15th Edition

The Blue Book

OCULAR DISORDERS PRESUMED TO BE INHERITED IN PUREBRED DOGS

GENETICS COMMITTEE OF THE AMERICAN COLLEGE OF VETERINARY OPHTHALMOLOGISTS

2023

Foreword

Ocular disorders, proven or presumed to be inherited in purebred dogs, have been a topic of intense dialogue by Diplomates of the American College of Veterinary Ophthalmologists (ACVO) for many years. Discussions commenced in the latter half of the 20th century during the early days of this College's inception, have continued into the 21st century, and will no doubt continue for years to come. Our knowledge of the existence, nature, progression, and inheritance of ocular disorders continues to expand as this field of veterinary science evolves. The Genetics Committee of the ACVO was originally formed in response to requests by registries, breed groups, and veterinarians, with the intent to provide a scientific advisory panel and guidelines regarding ocular disorders in purebred dogs. The Genetics Committee of today remains engaged in an ongoing effort to update information on ocular disorders for this purpose.

The content of this production has originated from several sources as the ACVO recently created a Companion Animal Eye Registry (CAER), which is a joint effort between the Orthopedic Foundation for Animals (OFA) and the ACVO. The addition of eye examination results to the OFA database makes the OFA the most complete source of canine health screening results in the world, allowing responsible breeders to make more informed breeding decisions in an effort to reduce the incidence of inherited disease.

The generation of statistical information is made possible by the efforts of dedicated breeders of purebred dogs who present their dogs to Diplomates of the ACVO for an OFA Companion Animal Eye Registry examination. The research copies of these examinations are then conscientiously submitted to OFA by the examining Veterinary Ophthalmologists. These data generate annual statistics. The statistics for each breed are then reviewed by the Genetics Committee for the most recent year and from the previous 5 years. Recommendations regarding the ocular disorders listed for each breed and the breeding advice are compiled following guidelines detailed elsewhere in this publication. A comprehensive review of the scientific literature since the last published edition was undertaken by all committee members. The scientific articles and breed disorders from the statistical and literature review have been added to the information on each breed in the production of this document. The collective educated clinical experience of the committee members is utilized to reach a consensus of opinion in areas where there remains a paucity of hard scientific proof regarding certain identified breed problems.

The current Genetics Committee has instituted an annual scientific literature search, in addition to the previously established yearly statistical data review. This information is compiled and submitted in an effort to maintain a bank of current information for future editions and versions of this document. The content of all editions past, present, and future will remain dynamic and ever changing as more precise technologies advance the study of the canine genome, as continued scientific research expands our knowledge, and as the database grows.

It is an honor and a privilege to serve the ACVO, our fellow Diplomates, reputable dog breeders, and our most trusted canine companions in this endeavor.

Genetics Committee 2024

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15th Edition
2023 Version Acknowledgements

The following groups and individuals deserve credit for the production of this edition of Ocular Disorders Presumed to be Inherited in Purebred Dogs ("The Blue Book"):

The ACVO Board of Regents

Genetics Committee Chairs Dr. Andras Komaromy 2006-2008, Dr. Katie Diehl (2009-2011), Dr. Jacqueline Pearce (2011-2012), Dr. Carrie Breaux (2011-2013), Dr. Kenneth Pierce (2014), Dr. Wendy Townsend (2015), Ellen Belknap (2016), Jessica Meekins (2017), Renee Carter (2018), Adam King (2019), Jane Ashley Huey (2020), Katelyn Fentiman (2021), Freya Mowat (2022), Sony Kuhn Asif (2023) and all previous Genetics Committee members

Eddie Dziuk, Chief Operating Officer, and Erika Werne, CAER Program Manager, for the OFA

Introduction

What is the purpose of this book?

The Orthopedic Foundation for Animals (OFA), Canine Eye Registration Foundation (CERF), other breed registry groups, breed clubs, and practicing veterinarians have requested that the American College of Veterinary Ophthalmologists (ACVO) provide a scientific advisory panel to furnish guidelines regarding ocular disorders of major concern to purebred dogs. The Genetics Committee of the ACVO was formed in response to these requests and is engaged in an ongoing effort to update information on ocular disorders proven or suspected to be hereditary in purebred dogs. The compendium of ocular disorders and breeding recommendations which follow are interim guidelines. They are reviewed regularly and revised whenever additional information becomes available.

How can this information be used?

National and international breed clubs are encouraged to submit their input regarding breeding decisions for ocular disorders found in their breeds. **Local breed clubs** can participate by encouraging and organizing ocular examination clinics and forwarding their requests and concerns to their national organization. **Practicing veterinarians** are encouraged to contribute by informing all owners of potential breeding animals of the value and availability of ocular examinations, prior to breeding. Information regarding ocular disorders found in litters or individuals can be forwarded to the Genetics Committee via any ACVO diplomate. **Individual breeders** wishing to uphold high ethical standards for the improvement of their breed are urged to contribute by annual examination of their breeding animals and by encouraging the same from other breeders. Further information can be obtained from the Orthopedic Foundation for Animals (OFA): 2300 E Nifong Boulevard, Columbia, MO, 65201-3806, 573-442-0418. Only through increased awareness of the problems and a sustained cooperative effort to disseminate accurate information, will we be able to control and/or eliminate hereditary eye diseases in purebred dogs.

How do we identify an inherited eye disease?

Although there are noteworthy exceptions, most of the ocular diseases of dogs which are presumed to be hereditary have not been adequately documented. Genetic studies require examination of large numbers of related animals in order to characterize the disorder (age of onset, characteristic appearance, rate of progression) and to define the mode of inheritance (recessive, dominant). In a clinical situation, related animals are frequently not available for examination once a disorder suspected to be inherited is identified in an individual dog. Maintaining a number of dogs for controlled breeding trials through several generations is a long and costly process. Both of these obstacles are compounded by the fact that many ocular conditions do not develop until later in life. Due to the potential for disease to arise from inherited genetic defects at any age, the Genetics Committee recommends annual eye exams.

Until the genetic basis of an ocular disorder is defined in a published report, we rely on what statistical information is available from registry organizations, informed opinions and consensus from ACVO diplomates, and must satisfy ourselves with terms like "presumed inherited" and "suspected to be inherited." Several companies provide information on genetic testing which greatly assists in providing more information and data to aid in defining the canine genetics of ocular diseases.

When do we suspect that a disorder is inherited in a given breed?

- When the frequency is greater than in other breeds
- When the frequency increases in a given breed as a whole
- When the frequency is greater in related dogs within a breed
- When it has a characteristic appearance and location
- When it has a characteristic age of onset and course of progression (predictable stages of development and time for each stage to develop)
- When it looks identical to an entity which has been proven to be inherited in another breed

Special thank you to the "Father of Veterinary Medical Genetics," Donald F. Patterson, DVM, DSc. Dr. Patterson, who died in 2013, was Emeritus Professor of Medicine and Medical Genetics, University of Pennsylvania School of Veterinary Medicine and Emeritus Professor of Human Genetics, University of Pennsylvania School of Medicine. These guidelines on the heritability of disorders in dogs are based on his lectures and publications.

Guidelines Used by the ACVO Genetics Committee in Making Breeding Recommendations

In this book, we chose the term "**BREEDING ADVICE**" and intentionally avoided the words "certifiable" and "registerable." The ACVO does not serve as a registry organization. Registry organizations operate independently of the ACVO and set their own standards for registration. However, the OFA does follow the guidelines set forth by the ACVO Genetics Committee in this publication. Any registry organization may use the information in this compendium and results of examinations performed by ACVO Diplomates in the registering of animals with regard to breeding suitability as they see fit.

It is important to recognize that the sensitivity of genetic disorder detection is greater when large numbers of dogs are examined. The extensive number of disorders listed in this book for some breeds may reflect the popularity of the breed and the numbers of animals evaluated. Conversely, the lack of disorders listed for other breeds often reflects only the paucity of examinations reported for each breed. For these reasons, the ACVO Genetics Committee strongly recommends annual evaluations of dogs of all breeds as the imperative first step in the control of hereditary ocular disorders. We would like to acknowledge the contribution of the Orthopedic Foundation for Animals (OFA) and Canine Eye Registration Foundation (CERF) for providing statistical summaries of ophthalmic examinations from their files.

For each breed, specific ocular disorders have been listed which are known or suspected to be inherited based on one or more of the following criteria:

1) There are published reports in the scientific literature regarding a condition in a particular breed with evidence of inheritance.

2) The incidence of affected animals (from OFA and CERF reports) is greater than or equal to 1% of the examined population with a minimum of five affected animals per five year period. Regardless of the population of dogs examined, if 50 or more affected individuals are identified in a five year period, the entity will be listed for that breed.

3) A specific request from a breed club that a condition be included for their breed may be considered at the ACVO annual meeting of the Genetics Committee if information is received by August 1. Such requests are reviewed critically and must include specific documentation as to the disorder in question and the numbers seen. Further information from the breed club may be requested. The request must receive agreement by a majority of the committee.

4) There is overwhelming opinion by a majority of the Genetics Committee members that clinical experience by ACVO Diplomates would indicate a particular condition should be listed for a breed, in spite of the absence of direct evidence of affected animals on OFA or CERF reports.

5) Results of genetic laboratory research and genetic testing.

The "Breeding Advice" given is determined by the significance of the condition to vision and/or very strong evidence of heritability:

Two categories of advice regarding breeding have been established:

> **NO**: Substantial evidence exists to support the heritability of this entity AND/OR the entity represents a potential compromise of vision or other ocular function.
>
> **BREEDER OPTION**: Entity is suspected to be inherited but does not represent potential compromise of vision or other ocular function.

When the breeding advice is "**NO,**" even a minor clinical form of the entity would make this animal unsuitable for breeding. When the advice is "**BREEDER OPTION,**" caution is advised. In time, it may be appropriate to modify this stand to "**NO**" based on accumulated evidence. If, in time, it becomes apparent that there is insufficient evidence that an entity is inherited, it may be deleted from the list.

There are currently eleven disorders for which there is an unequivocal recommendation <u>against</u> breeding in all breeds:

These are conditions which frequently result in blindness and for which there is definite evidence of heritability in one or more breeds. However, these disorders will not be listed on the individual breed page for a given breed, unless they also meet the criteria described above.

- **Keratoconjunctivitis sicca (KCS)** – Breeding is not recommended for any animal demonstrating keratitis consistent with KCS. The prudent approach is to assume KCS to be hereditary except in cases suspected to be non-genetic in origin. See *note.
- **Glaucoma** – See *note.
- **Persistent Pupillary Membranes**
  - **Iris to Lens**
  - **Iris to Cornea**
  - **Iris Sheets**
  - **Endothelial Opacity/No Strands**
- **Cataract** – Breeding is not recommended for any animal demonstrating partial or complete opacity of the lens or its capsule. See *note.
- **Lens luxation or subluxation** – See *note.
- **Persistent hyperplastic primary vitreous (PHPV)/persistent hyperplastic tunica vasculosa lentis (PHTVL)** – See *note.
- **Retinal detachment** – See *note.
- **Retinal atrophy – generalized (PRA)** - Breeding is not advised for any animal demonstrating bilaterally symmetric retinal degeneration (considered to be PRA unless proven otherwise).
- **Retinal dysplasia, geographic or detached forms** – See *note.
- **Optic nerve coloboma**
- **Optic nerve hypoplasia**

**Note: The prudent approach of these disorders is to assume they are hereditary except in cases specifically known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, or nutritional deficiencies.*

The following breeds are recommended to have a preliminary examination prior to initial pharmacological dilation to best facilitate identification of these disorders:

Dalmatian – iris hypoplasia/sphincter dysplasia
Australian Shepherd – iris coloboma
Miniature American Shepherd/Miniature Australian Shepherd – iris coloboma
Toy Australian Shepherd – iris coloboma
Mudi – iris hypoplasia/iris coloboma

What can be detected during an Eye Certification Examination?

A routine eye screening examination includes indirect ophthalmoscopy and slit lamp biomicroscopy following pharmacological dilation of the pupils. Gonioscopy, tonometry, Schirmer tear test, electroretinography, and ultrasonography are not routinely performed; thus, dogs with goniodysgenesis, glaucoma, keratoconjunctivitis sicca, or some early cases of progressive retinal atrophy might not be detected without further testing.

The diagnoses obtained during an ophthalmic eye certification examination refer only to the **phenotype** (clinical appearance) of an animal. Thus, it is possible for a clinically normal animal to be a carrier (abnormal **genotype**) of genetic abnormalities.

An individual ACVO Diplomate may disagree with the breeding advice contained in this compendium. It is appropriate for this examiner to contact the ACVO Genetics Committee to voice disagreement, initiate change, or suggest additions. The members of the Genetics Committee represent the ACVO but acknowledge that the information generated for a breed may not agree with the knowledge and clinical experience of every individual ACVO Diplomate.

What is the role of the responsible dog breeder?

The final beneficiary of the information in this book is the dog breeder. It is up to the conscientious breeder to use this information along with other criteria in selecting which animals to breed. To assist this determination, current certification is recommended. Animals currently free of heritable eye disease will be issued a certificate on receipt of the examination/application by OFA. To avoid confusion between a normal animal (no evidence of heritable eye disorders) and one that may have a minor fault coming under the advice of Breeder Option, the Breeder Option category will be printed on the certificate. This is intended to stimulate conversation as to the specific nature of the Breeder Option condition found in that particular animal, allowing breeders using a dog in a breeding program to make an informed decision.

There are many ocular conditions which are a direct result of selection for a facial conformation considered desirable by breeders.

These include:

- Entropion
- Ectropion
- Macroblepharon
- Exposure keratopathy syndrome

Facial conformation with excessively prominent eyes, heavy facial folds, or eyelids which are either inverted or everted predispose animals to corneal irritation, discomfort, and if left untreated, can lead to loss of vision. A responsible breeding program should recognize and select away from these exaggerated facial features.

THE ROLE OF GENETIC TESTING IN THE DETECTION OF OCULAR DISEASE

Genetic testing plays a very important role in the diagnosis of disease. However, it is important to be aware of the limitations of genetic testing and understand its role in the detection and control of genetically inherited diseases.

Genetically inherited diseases are caused by a deleterious sequence change (mutation) in the DNA that results in an abnormal protein (protein can be absent, have insufficient function, or have an abnormal function) that results in disease.

Genetic tests are developed by comparing the DNA sequence of a normal animal to that of an animal with disease. This allows the identification of a particular DNA sequence that can be causally associated with the disease. This is an extremely powerful tool that, in some cases, allows for identification of disease even before it is evident clinically.

However, a particular test is only capable of detecting the DNA sequence it was designed to detect. That is, the DNA test only tests for a specific change in the DNA that can cause disease. For example, a DNA test specific for the *PDE6B* gene mutation (responsible for the rcd1 form of PRA in the Irish Setter) will not detect any abnormalities in other breeds or mixed breeds that have other mutations in the same gene. Thus the specificity of a DNA test is also its limitation, and in the case of PRA in Irish Setters it is specific for the Irish Setter defect and not for any other defects.

In polygenic disorders, a genetic test cannot evaluate the integrity of all the proteins that make up a particular cellular process. Thus, it is possible for a DNA test that has been associated with a disease to be normal and yet the disease can still be present. The disease could be caused by an abnormality in one of the other genes that are involved with that particular cellular process. The defect in the other protein still results in an abnormal cellular process, which still results in disease. A perfect example of this is observed in oculo-skeletal dysplasia in Labrador Retrievers and Samoyed dogs. In both breeds the diseases are clinically identical, yet caused by mutations in different genes involved in fibril formation of a specific kind of collagen molecule.

Thus, obtaining a DNA test that is normal does not guarantee absence of disease. It only guarantees that the particular change the DNA test was designed to detect is not present, and that disease from that particular change will not occur. This is why genetic testing should be combined with ophthalmic examination for maximum efficacy. An ophthalmic exam evaluates the sum total or “result” of all the cellular processes required to maintain ocular health and result in vision, and is an essential part of the ocular wellness exam to ensure that other important clinically recognizable diseases are not present.

Breeder Option Codes

A – Eyelids

A1 Entropion
A2 Ectropion
A3 Distichiasis
A4 Ectopic Cilia
A6 Imperforate Lacrimal Punctum

B – Nicitans

B1 Cartilage Anomaly/Eversion
B2 Gland Prolapse

C – Cornea

C1 Corneal Dystrophy – Epithelial/Stromal
C2 Corneal Dystrophy – Endothelial
C4 Pigmentary Keratitis/Keratopathy

D – Uvea

D1a Uveal Cyst – Free Floating
D1b Uveal Cyst – Single
D1c Uveal Cyst – Multiple
D1d Uveal Cyst - Ruptured
D2 Iris Coloboma
D3 Persistent Pupillary Membranes – Iris to Iris
D4 Iris Hypoplasia

E – Lens

E1 Cataract – Suspect Not Inherited
E2 Posterior Y Tip Suture Opacities

F – Vitreous

F1 Persistent Hyaloid Artery
F2a Vitreous Degeneration – Syneresis
F2b Vitreous Degeneration – Anterior Chamber

G – Fundus

G1 Retinal Dysplasia – Folds
G5 Micropapilla
G6a CMR-Type Retinopathy
G6b Retinopathy

Breeds Not Listed for Insufficient Data

Attempts have been made to confirm information on the following list of breeds/rare breeds. This list is not an endorsement of the breed status and may change from time to time as additional information is available.

To date there are no published reports of inherited ocular conditions in these breeds and/or the numbers of individuals for which examinations are recorded are too low to identify the presence of significant ocular disorders. Examinations are encouraged to accumulate information and reduce the likelihood of undetected conditions becoming problematic.

Akbash
Alano
Alapaha Blue-Blood Bulldog
Alaskan Noble Companion Dog
American Alsatian
American Bandogge Mastiff
American English Coonhound
American Foxhound
American Husky
American Leopard Hound
Armenian Gampr
Australian Koolie
Azawakh
Bavarian Mountain Scent Hound
Bergamasco
Berger des Pyrenees
Blue Lacy
Blue Mountain Shepherd
Bluetick Coonhound
Boz Shepherd
Braque d'Auvergne
Braque du Bourbonnais
Braque Francais Pyrenees
Brazilian Terrier
Bull Terrier
Ca De Bou
Cao De Castro Laboreiro
Carolina Dog
Catalan Sheepdog
Caucasian Shepherd
Central Asian Shepherd
Cesky Terrier
Chart Polski
Chinese Foo Dog
Cirneco Dell'Etna
Danish Broholmer
Danish Swedish Farmhound
Dogo d'Argentino
Drentsch Partrijshond
Drever
ECT Landseer
English Coonhound
English Foxhound
English Jack Russell Terrier
English Shepherd
Epagneul Breton
Estrela Mountain Dog
Fila Brasileiro
French Pointer
German Spaniel
Grand Basset Griffon Vendeen
Greenland Dog
Hanoverian Hound
Harrier
Hovawart
Jindo
Kishu Ken
Korean Poongsan
Kromforhlander
Kyi-Leo
Large Munsterlander
Magyar Agar
Markiesje
Munsterlander
Native American Indian Dog
Native American Village Dog
New Zealand Huntaway
North American Shepherd
Norwegian Lundehund
Old English Bulldogge
Otterhound
Peruvian Inca Orchid
Picardy Spaniel
Plott
Polish Tatra Sheepdog
Porcelaine Hound
Portuguese Podengo
Portuguese Pointer
Pudelpointer
Pumi
Redbone Coonhound
Russian Tsvetnaya Bolonka
Scottish Deerhound
Seppala Siberian Sled Dog
Serbian Hound
Shorty Bull
Skye Terrier
Slovakian Wirehaired Pointer
Small Munsterlander
Spanish Greyhound
Spanish Mastiff
Stabyhoun
Tamaskan
Teddy Roosevelt Terrier
Treeing Walker
Wachtelhund
Welsh Sheepdog
White Shepherd
Windsprite
Working Kelpie
Yakutian Laika

Glossary of Terms

(For more detailed definitions, the reader is referred to medical and genetic scientific texts.)

Achromatopsia: see **Day blindness**

Canine multifocal retinopathy: characterized by numerous distinct (i.e. multifocal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). The condition includes numerous distinct (i.e. multi-focal), roughly circular patches of elevated retina with accumulation of material that produces gray-tan-pink colored lesions (multifocal bullous retinal detachments). These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs and might not progress or progress slowly, or may appear to heal with discrete areas of tapetal hyper-reflectivity or hyperpigmentation. Most dogs exhibit no noticeable problem with vision despite their abnormal appearing retinas.

Cataract: any opacity of the lens and/or its capsule, regardless of size or location within the lens. Cataracts are assumed to be hereditary unless associated with known trauma, ocular inflammation, specific metabolic diseases, or nutritional deficiencies.

Ceroid lipofuscinosis: an inherited disease of man and animals characterized by the accumulation of lipopigment in various tissues of the body including the eye. It results in progressive neurologic disease including blindness. (Also called Batten's disease.)

Choroidal hypoplasia: a congenital, inherited, non-progressive defect primarily affecting the choroid resulting in some or all of the following: decreased or lack of pigment in the retinal pigment epithelium or choroid, tapetal thinning, and reduced or abnormal choroidal blood vessels.

Chronic superficial keratitis (CSK): see **Pannus**

Collie eye anomaly: a congenital syndrome of ocular anomalies characterized by bilateral and often symmetrical defects including any combination of **choroidal hypoplasia**, **coloboma**, and **retinal detachment(s)**.

Coloboma: a congenital abnormality in ocular development usually characterized by focal absence of tissue, commonly (though not exclusively) located at the 6 o'clock position associated with failure of closure of the optic fissure.

Cone degeneration: the loss of photopic vision caused by selective degeneration of the cone photoreceptors. Also known as day blindness, hemeralopia, or achromatopsia.

Corneal degeneration: opacification of one or more of the corneal layers frequently resulting from deposition of lipid or mineral and occurring secondary to chronic inflammation.

Corneal dystrophy: non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers (**epithelium, stroma, endothelium**). The term dystrophy implies an inherited condition. It is usually bilateral although not necessarily symmetrical and the onset in one eye may precede the other.

> **Corneal dystrophy - endothelial:** breed-related loss or dysfunction of corneal endothelial cells resulting in bilateral, progressive corneal edema.

Corneal dystrophy - epithelial, stromal: breed-related, non-inflammatory, white to silver-colored opacification of the corneal epithelium and/or stroma frequently resulting from deposition of lipid.

Day blindness: see **Cone degeneration**

Dental-skeletal-retinal anomaly (DSRA): Dental-Skeletal-Retinal-Anomaly (DSRA) is a syndromic condition documented in the Cane Corso. This condition is associated with a MIA3 splice defect that has been identified in all affected dogs with an autosomal recessive inheritance pattern. Clinically affected dogs present with dwarfism, dental abnormalities including loss of enamel and tooth discoloration, as well as early onset retinal atrophy.

Dermoid: a congenital, non-cancerous growth occurring on the cornea, conjunctiva, or eyelid typified by the presence of skin-like structures.

Distichiasis: the presence of abnormally oriented eyelashes, frequently protruding from Meibomian gland ductal openings.

Dry eye: see **Keratoconjunctivitis sicca**

Dysplasia: abnormality of development.

Dystrophy: non-inflammatory, developmental, nutritional, or metabolic abnormality; dystrophy implies a possible hereditary basis and is usually bilateral.

Ectopic cilia: aberrant hairs emerging through the palpebral conjunctiva which often causes ocular discomfort and corneal disease.

Ectropion: a conformational defect resulting in eversion of the eyelid margin, which may cause ocular irritation due to exposure. It is likely that ectropion is influenced by several factors defining the skin and other structures, which make up the eyelids, orbital contents, and conformation of the skull.

Entropion: a conformational defect resulting in inversion of the eyelid margin which may cause ocular irritation. It is likely that entropion is influenced by several factors defining the skin and other structures, which make up the eyelids, orbital contents, and conformation of the skull.

Euryblepharon: an exceptionally long eyelid marginal length, which may lead to Ectropion or Entropion. Euryblepharon is synonymous with the term macropalpebral fissure.

Exposure/pigmentary keratitis: a condition characterized by variable degrees of superficial vascularization, fibrosis, and/or pigmentation of the cornea. May be associated with excessive exposure/irritation of the globe due to shallow orbits, lower eyelid medial entropion, lagophthalmos, and macropalpebral fissure.

Glaucoma: characterized by an elevation of intraocular pressure (IOP) which causes optic nerve and retinal degeneration and results in blindness. Diagnosis and classification of glaucoma requires tonometry and gonioscopy, which are not part of a routine eye certification examination.

Glaucoma, pigmentary: see O**cular melanosis**

Goniodysgenesis: congenital anomaly characterized by the persistence of a variably fenestrated sheet of uveal tissue spanning the iridocorneal angle, extending from the iris base to the peripheral cornea.

Diagnosis is by gonioscopy, which is not part of a routine eye certification examination.

Hemeralopia: see **Cone degeneration**

Imperforate lacrimal punctum: developmental anomaly resulting in an imperforate opening of the lacrimal puncta. An imperforate lower punctum may result in epiphora, an overflow of tears onto the face.
Iridocorneal angle: the junction between the iris and the cornea; the drainage angle. Aqueous humor leaves the anterior chamber via the trabecular meshwork within the iridocorneal angle into the venous circulation.

Iris coloboma: a congenital abnormality in iris development usually characterized by a full-thickness defect in iris tissue, commonly (though not exclusively) located at the 6 o'clock position associated with failure of closure of the optic fissure. A partial-thickness defect in iris tissue should be recorded as iris hypoplasia on the eye certification form.

Iris cyst: see **Uveal cyst**

Iris hypoplasia: a congenital abnormality in iris development usually characterized by a reduced quantity of tissue identified as a partial-thickness defect in iris tissue. Full-thickness iris hypoplasia is rare and should be recorded as an iris coloboma on the eye certification form.

Iris melanoma: see **Uveal melanoma**

Iris sphincter dysplasia: a congenital abnormality in iris development usually characterized by a full-thickness defect in iris tissue at the level of the iris sphincter, causing pupillary dilation. This abnormality has been noted in the Dalmatian breed.

Keratitis: inflammation of the cornea.

Keratitis, punctate: inflammation of the cornea accompanied by multifocal, coalescing areas of stromal corneal ulceration of variable depth.

Keratoconjunctivitis sicca (KCS): an abnormality of the tear film attributed to deficiency of the aqueous portion of the tears. Progressive KCS may result in ocular surface irritation and/or vision impairment via corneal opacification. Also called dry eye. The test for this condition is the Schirmer Tear Test, which is not part of a routine eye certification examination.

Lens subluxation/luxation: partial (subluxation) or complete displacement of the lens from the normal anatomic site. Lens luxation may result in elevated intraocular pressure (secondary glaucoma), causing vision impairment, pain, and/or retinal detachment.

Lenticonus: an anomaly of the lens in which the anterior or posterior surface protrudes in a conical form; usually congenital.

Macroblepharon: an exceptionally large palpebral fissure. Macroblepharon in conjunction with laxity of the lateral canthal structures may lead to lower lid ectropion and upper lid entropion. Either of these conditions may lead to severe ocular irritation.

Merle: an incompletely dominant phenotype in which heterozygous (M/m) dogs exhibit a coat color phenotype of various dilute color patches, while homozygous (M/M) dogs exhibit marked hypopigmentation and ocular defects, including microphthalmia, blindness and colobomas, and deafness. Deafness and

ocular defects are sometimes seen in heterozygous individuals.

Micropapilla: a congenital anomaly which results in a small optic disk diameter without vision loss. Contrast with optic nerve hypoplasia, which may have a similar ophthalmoscopic appearance with vision loss.

Microphakia: a congenital anomaly in which there is an abnormally small lens.
Microphthalmos: a congenital anomaly in which the globe is abnormally small. Commonly associated with multiple ocular malformations and when severe, may affect vision.

Nictitans cartilage anomaly/eversion: a congenital anomaly in the nictitating membrane in which the T-shaped cartilage is malformed and/or folded.

Nictitans gland prolapse: protrusion of the tear-producing gland of the nictitating membrane from its normal position posterior to the nictitating membrane, to a position superior to the free margin of this structure.

Nodular granulomatous episclerokeratitis (NGE): an inflammatory disorder of the sclera and episclera, with occasional corneal involvement, characterized by granulomatous infiltrates. Previously known as **Proliferative keratoconjunctivitis**. This condition is most commonly seen in the Collie.

Nyctalopia: loss of scotopic (night) vision. Causes include genetic defects in photoreceptors and in retinal pigment epithelium, either dystrophy or degeneration of affected cells.

Ocular melanosis: progressive bilateral and sometimes asymetrical increase in pigmentation with melanocytic accumulation the uveal tract and adjacent tissues. Ultimately progresses to glaucoma and loss of vision in most cases (melanocytic glaucoma). Not associated with systemic disease or metastases. Most often recognized in Cairn Terriers.

Optic nerve coloboma: a congenital abnormality of the optic nerve commonly associated with failure of closure of the optic fissure, resulting in a defect in the optic nerve in the anterior-posterior plane. May result in partial or total vision loss.

Optic nerve hypoplasia: a congenital anomaly, which results in a small optic disk diameter and vision loss. Contrast with micropapilla, which may have a similar ophthalmoscopic appearance but without loss of vision.

Pannus: a bilateral inflammatory disease of the cornea which usually starts as a grayish haze to the inferior or inferiotemporal cornea, followed by the formation of a vascularized subepithelial opacity that begins to spread toward the central cornea; pigmentation may follow the vascularization. If severe, vision impairment occurs. Plasma cell infiltration of the nictitans may occur in conjunction with CSK, or on its own. (Also called “CSK”.)

Persistent hyaloid artery (PHA): congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

Persistent hyperplastic primary vitreous (PHPV): congenital defect resulting from abnormalities in the regression of the hyaloid artery (the primary vitreous) and the interaction of the blood vessel with the posterior lens capsule/cortex during embryogenesis. This condition is often associated with congenital cataracts and frequently seen with PHTVL.

Persistent hyperplastic tunica vasculosa lentis (PHTVL): congenital defect resulting from failure of regression of the embryonic vascular network which surrounds the developing lens. Often associated with PHPV and a patent hyaloid artery.

Persistent pupillary membranes (PPM): persistent blood vessel remnants in the anterior chamber which fail to regress normally by 3 months of age. These strands arise from the iris collaret and may bridge from iris to iris, iris to lens, iris to cornea, or form sheets of tissue in the anterior chamber.

Persistent tunica vasculosa lentis (PTVL): clinically insignificant posterior epicapsular lenticular opacities resulting from incomplete regression of the embryonic vascular network which surrounds the developing lens.

Pigmentary glaucoma: see **Ocular melanosis**

Pigmentary uveitis: see **Uveitis, pigmentary**

Pigmentary keratopathy: a condition reported in Pugs in which the cornea becomes pigmented, often resulting in vision impairment. Development of pigmentary keratopathy is associated with congenital uveal pathology – iris hypoplasia and the presence of persistent pupillary membranes – but not with other factors such as Schirmer tear test values or medial canthal entropion.

Plasmoma: see **Pannus**. Also called Atypical Pannus. Bilateral thickening and depigmentation of the nictitans due to invasion of lymphocytes and plasma cells. It may or may not be associated with corneal involvement (Pannus).

Progressive rod-cone degeneration (PRCD) (see also **PRA**): Typically refers to recessively inherited generalized loss of rod photoreceptors followed by cone degeneration. Many different genetic mutations result in a similar phenotypic presentation.

Progressive retinal atrophy (PRA): an umbrella term used to describe a group of inherited dysplastic, dystrophic, or degenerative diseases of the retinal visual cells (photoreceptors, retinal pigment epithelium, or both).

Proliferative keratoconjunctivitis: see **Nodular granulomatous episclerokeratitis**

Retinal atrophy: a non-specific term used to describe a decrease in the number and deterioration of the cells of the retina, regardless of cause.

Retinal degeneration: see **Retinal atrophy**

Retinal detachment: a separation of the neurosensory retina from the retinal pigment epithelium.

Retinal dysplasia: abnormal development of the retina present at birth. This condition is non-progressive and recognized in 3 forms: **folds**, **geographic**, **detached**.

> **Retinal dysplasia – folds:** seen ophthalmoscopically as linear, triangular, curved or curvilinear foci of retinal folding. May be single or multiple. In puppies, retinal folds can be seen as a transient phenomenon, resolving as the eye retains maturity.
>
> **Retinal dysplasia – geographic:** an irregularly shaped area of retinal development containing both areas of thinning and areas of elevation. This form may be associated with visual impairment.

Retinal dysplasia – detached: severe retinal disorganization associated with separation of the neurosensory retina from the retinal pigmented epithelium. This form results in visual impairment.

Retinopathy: any non-inflammatory condition of the retina. These conditions can usually be detected by ophthalmoscopic examination, but an electroretinogram (ERG) may be required in some instances (e.g. canine multifocal retinopathy).

Rod-cone dysplasia: an inherited retinal disease characterized by abortive or abnormal development of rods and cones. Affected animals become blind early in life, usually within the first 6 months, with the exception of *rcd4* in the Gordon and Irish Setter dogs. See specific breed pages for rod-cone dysplasia type descriptions.

Rod dysplasia: abnormal development of the visual cells resulting in vision impairment in dim light by 6 months and total blindness at 3-5 years.

Uveal cyst: a pigmented, fluid-filled epithelial-lined structure arising from the posterior iris or ciliary body epithelium. Cysts may remain attached to the pupil margin, iris, or ciliary body, or may detach and be free-floating within the anterior chamber. They may rupture and adhere to the cornea or anterior lens capsule. Uveal cysts may occur in any breed. Uveal cysts are commonly benign, although they may be associated with other pathologic conditions in various breeds.

Uveal cyst, anterior chamber: a pigmented, fluid-filled, epithelial-lined structure arising from the posterior iris or ciliary body epithelium which has detached from its site of origin and is free-floating in the anterior chamber.

Uveal cyst, ciliary body: a pigmented, fluid-filled, epithelial-lined structure arising from the ciliary body epithelium and attached to the ciliary body.

Uveal cyst, iris: a pigmented, fluid-filled, epithelial-lined structure arising from the posterior iris epithelium and attached to the iris.

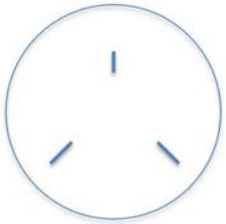
Uveal melanoma: a locally invasive melanocytic neoplasm arising within the uveal tract, may be benign (melanocytoma) or malignant (malignant melanoma). Uveal melanomas are reported in higher frequency in German Shepherd Dogs and Labrador Retrievers. Inherited iris melanoma has been reported in Labrador Retrievers.

Uveitis, pigmentary: a specific form of uveitis most commonly seen in middle-aged to older Golden Retrievers. Clinically manifests early as pigment deposition in a radial fashion on the anterior lens capsule with iridociliary cysts. Later stages are associated with posterior synechia, fibrinous anterior uveitis, cataract, and ultimately glaucoma. Not associated with systemic disease; may be asymmetric in presentation.

Uveodermatologic syndrome: an immune-mediated syndrome of anterior uveitis, chorioretinitis, dermal depigmentation (vitiligo), and hair depigmentation (poliosis). A similar syndrome in humans, called Vogt-Koyanagi-Harada syndrome (VKH), is an autoimmune disease directed against melanocytes. Secondary glaucoma and/or retinal detachment are frequent complications of this disease. Seen most commonly in the Akita, Samoyed, and Siberian Husky breeds.

Vitreous degeneration: Liquefaction of the vitreous gel which may predispose to retinal detachment resulting in blindness.

Y-suture tip opacity: These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



AFFENPINSCHER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
D.	Cataract	Not defined	1	NO	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

D. Cataract

Any opacity of the lens and/or its capsule, regardless of size or location within the lens. Cataracts are assumed to be hereditary unless associated with known trauma, ocular inflammation, specific metabolic diseases, or nutritional deficiencies.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
AFFENPINSCHER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 447 #	 %	2019-2023 146 #	 %
GLOBE				
.110 MICROPHTHALMOS	1	0.2%	0	0.0%
40.910 KERATOCONJUNCTIVITIS SICCA (KCS)	1	0.2%	0	0.0%
EYELIDS				
20.140 ECTOPIC CILIA	2	0.4%	1	0.7%
25.110 DISTICHIASIS	21	4.7%	6	4.1%
NICTITANS				
52.110 GLAND PROLAPSE	1	0.2%	0	0.0%
CORNEA				
70.220 EXPOSURE KERATOPATHY SYNDROME	0	0.0%	2	1.4%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	9	2.0%	4	2.7%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	37	8.3%	15	10.3%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	1	0.2%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	1	0.2%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	5	1.1%	2	1.4%
LENS				
100.200 CATARACT, UNSPECIFIED	3	0.7%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	8	1.8%	1	0.7%
100.301 PUNCTATE-ANTERIOR CORTEX	0	0.0%	2	1.4%
100.302 PUNCTATE-POSTERIOR CORTEX	1	0.2%	0	0.0%
100.303 PUNCTATE-EQUATORIAL CORTEX	1	0.2%	1	0.7%
100.307 PUNCTATE-CAPSULAR	1	0.2%	0	0.0%
100.311 INCIPIENT-ANTERIOR CORTEX	1	0.2%	2	1.4%
100.312 INCIPIENT-POSTERIOR CORTEX	3	0.7%	1	0.7%
100.314 INCIPIENT-ANTERIOR SUTURES	0	0.0%	1	0.7%
100.316 INCIPIENT-NUCLEUS	1	0.2%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	1	0.2%	3	2.1%
100.330 GENERALIZED/ COMPLETE	3	0.7%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***14***	***3.1%***	***7***	***4.8%***
VITREOUS				
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	0.7%	1	0.7%
110.320 VITREOUS DEGENERATION-SYNERESIS	2	0.4%	0	0.0%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	2	0.4%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	1	0.2%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	3	0.7%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	9	2.0%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	3	0.7%	2	1.4%
NORMAL				
.000 NORMAL GLOBE	369	82.6%	112	76.7%

AFGHAN HOUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1, 2	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
D.	Cataract	Not defined	1, 3	NO	
E.	Y-suture tip opacity	Not defined	1	Breeder option	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

D. Cataract

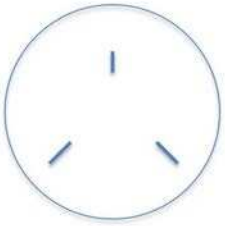
Any opacity of the lens and/or its capsule, regardless of size or location within the lens. Cataracts are assumed to be hereditary unless associated with known trauma, ocular inflammation, specific metabolic diseases, or nutritional deficiencies.

The characteristic cataract in the Afghan hound begins as equatorial lens vacuoles in dogs from 4 months to 2

years of age. The opacities then extend into the anterior and posterior cortices. Rapid progression can occur with visual impairment in young adults. Test breedings have been done which support a hereditary basis; however, the exact mode of inheritance is unknown.

E. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. Newer versions of the form (since 3/16/21) have boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Vainisi SJ, Goldberg MF. *Animal models of inherited disease. In: Genetic and Metabolic Eye Disease* Little Brown and Company, Boston, 1974.

3. Roberts SR, Helper LC. Cataracts in Afghan hounds. *J Am Vet Med Assoc*. 1972; 160: 427. PMID: 5014602

OCULAR DISORDERS REPORT
AFGHAN HOUND

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 2,426 #	 %	2019-2023 388 #	 %
GLOBE				
.110 MICROPHTHALMOS	1	0.0%	0	0.0%
10.000 GLAUCOMA	2	0.1%	0	0.0%
40.910 KERATOCONJUNCTIVITIS SICCA (KCS)	1	0.0%	0	0.0%
EYELIDS				
21.000 ENTROPION	2	0.1%	0	0.0%
25.110 DISTICHIASIS	28	1.2%	2	0.5%
32.110 IMPERFORATE LACRIMAL PUNCTUM	1	0.0%	0	0.0%
NICTITANS				
51.100 CARTILAGE ANOMALY/ EVERSION	1	0.0%	1	0.3%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	3	0.1%	0	0.0%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	264	10.9%	50	12.9%
70.730 DYSTROPHY-ENDOTHELIAL	3	0.1%	0	0.0%
UVEA				
93.120 UVEAL CYST-SINGLE	4	0.2%	1	0.3%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	68	2.8%	20	5.2%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	1	0.0%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	1	0.0%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	2	0.1%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	0	0.0%	1	0.3%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	1	0.0%	1	0.3%
93.810 UVEAL MELANOMA	1	0.0%	0	0.0%
95.120 UVEAL CYST-FREE FLOATING	0	0.0%	1	0.3%
FUNDUS				
97.120 COLOBOMA	2	0.1%	0	0.0%
120.170 RETINAL DYSPLASIA-FOLDS	6	0.2%	0	0.0%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	2	0.1%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	9	0.4%	0	0.0%
120.960 RETINOPATHY	3	0.1%	0	0.0%
130.110 MICROPAPILLA	0	0.0%	3	0.8%
LENS				
100.200 CATARACT, UNSPECIFIED	9	0.4%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	151	6.2%	21	5.4%
100.301 PUNCTATE-ANTERIOR CORTEX	12	0.5%	5	1.3%
100.302 PUNCTATE-POSTERIOR CORTEX	2	0.1%	1	0.3%
100.303 PUNCTATE-EQUATORIAL CORTEX	2	0.1%	0	0.0%
100.304 PUNCTATE-ANTERIOR SUTURES	1	0.0%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	45	1.9%	6	1.5%
100.306 PUNCTATE-NUCLEUS	6	0.2%	8	2.1%
100.307 PUNCTATE-CAPSULAR	9	0.4%	2	0.5%
100.311 INCIPIENT-ANTERIOR CORTEX	7	0.3%	2	0.5%
100.312 INCIPIENT-POSTERIOR CORTEX	4	0.2%	1	0.3%
100.313 INCIPIENT-EQUATORIAL CORTEX	2	0.1%	1	0.3%
100.314 INCIPIENT-ANTERIOR SUTURES	3	0.1%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	13	0.5%	1	0.3%
100.316 INCIPIENT-NUCLEUS	3	0.1%	2	0.5%
100.317 INCIPIENT-CAPSULAR	3	0.1%	1	0.3%
100.321 INCOMPLETE-ANTERIOR CORTEX	3	0.1%	0	0.0%
100.322 INCOMPLETE-POSTERIOR CORTEX	3	0.1%	0	0.0%
100.323 INCOMPLETE-EQUATORIAL CORTEX	2	0.1%	0	0.0%
100.324 INCOMPLETE-ANTERIOR SUTURES	1	0.0%	0	0.0%

OCULAR DISORDERS REPORT
AFGHAN HOUND

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 2,426 #	 %	Year Examined: 2019-2023 Total # Dogs: 388 #	 %
LENS Continued				
100.325 INCOMPLETE-POSTERIOR SUTURES	1	0.0%	0	0.0%
100.326 INCOMPLETE-NUCLEUS	4	0.2%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	34	1.4%	28	7.2%
100.330 GENERALIZED/ COMPLETE	2	0.1%	0	0.0%
100.375 SUBLUXATION/ LUXATION	1	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***137***	***5.6%***	***30***	***7.7%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	1	0.0%	2	0.5%
110.135 PHPV/ PTVL	1	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	7	0.3%	1	0.3%
110.320 VITREOUS DEGENERATION-SYNERESIS	7	0.3%	1	0.3%
OTHER				
900.000 OTHER, UNSPECIFIED	20	0.8%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	34	1.4%	1	0.3%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	27	1.1%	20	5.2%
NORMAL				
.000 NORMAL GLOBE	1,899	78.3%	258	66.5%

AIREDALE TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
	- endothelial opacity/no strands	Not defined	1	NO	
C.	Cataract	Not defined	1	NO	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

Any opacity of the lens and/or its capsule, regardless of size or location within the lens. Cataracts are assumed to be hereditary unless associated with known trauma, ocular inflammation, specific metabolic diseases, or nutritional deficiencies.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
AIREDALE TERRIER

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	877		121	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	3	0.3%	0	0.0%
10.000	GLAUCOMA	0	0.0%	1	0.8%
EYELIDS					
20.140	ECTOPIC CILIA	2	0.2%	0	0.0%
21.000	ENTROPION	4	0.5%	0	0.0%
25.110	DISTICHIASIS	61	7.0%	13	10.7%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	1	0.1%	0	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	9	1.0%	0	0.0%
70.730	DYSTROPHY-ENDOTHELIAL	3	0.3%	0	0.0%
UVEA					
93.120	UVEAL CYST-SINGLE	1	0.1%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	31	3.5%	3	2.5%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	8	0.9%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	22	2.5%	1	0.8%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	2	0.2%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	9	1.0%	2	1.7%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	6	0.7%	4	3.3%
97.150	COLOBOMA	1	0.1%	0	0.0%
FUNDUS					
97.120	COLOBOMA	1	0.1%	0	0.0%
120.170	RETINAL DYSPLASIA-FOLDS	22	2.5%	2	1.7%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	9	1.0%	0	0.0%
120.310	RETINAL ATROPHY-GENERALIZED	12	1.4%	0	0.0%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.1%	0	0.0%
130.110	MICROPAPILLA	0	0.0%	1	0.8%
130.120	OPTIC NERVE HYPOPLASIA	0	0.0%	1	0.8%
LENS					
100.200	CATARACT, UNSPECIFIED	7	0.8%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	56	6.4%	6	5.0%
100.301	PUNCTATE-ANTERIOR CORTEX	10	1.1%	6	5.0%
100.302	PUNCTATE-POSTERIOR CORTEX	6	0.7%	0	0.0%
100.303	PUNCTATE-EQUATORIAL CORTEX	2	0.2%	2	1.7%
100.304	PUNCTATE-ANTERIOR SUTURES	1	0.1%	0	0.0%
100.305	PUNCTATE-POSTERIOR SUTURES	8	0.9%	2	1.7%
100.306	PUNCTATE-NUCLEUS	4	0.5%	0	0.0%
100.307	PUNCTATE-CAPSULAR	4	0.5%	0	0.0%
100.311	INCIPIENT-ANTERIOR CORTEX	9	1.0%	0	0.0%
100.312	INCIPIENT-POSTERIOR CORTEX	9	1.0%	1	0.8%
100.313	INCIPIENT-EQUATORIAL CORTEX	7	0.8%	1	0.8%
100.315	INCIPIENT-POSTERIOR SUTURES	5	0.6%	1	0.8%
100.316	INCIPIENT-NUCLEUS	2	0.2%	0	0.0%
100.317	INCIPIENT-CAPSULAR	3	0.3%	0	0.0%
100.321	INCOMPLETE-ANTERIOR CORTEX	0	0.0%	2	1.7%
100.322	INCOMPLETE-POSTERIOR CORTEX	0	0.0%	2	1.7%
100.323	INCOMPLETE-EQUATORIAL CORTEX	0	0.0%	1	0.8%
100.328	Y-SUTURE TIP OPACITIES	1	0.1%	3	2.5%
100.330	GENERALIZED/ COMPLETE	4	0.5%	0	0.0%
100.375	SUBLUXATION/ LUXATION	0	0.0%	1	0.8%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***81***	***9.2%***	***18***	***14.9%***

OCULAR DISORDERS REPORT
AIREDALE TERRIER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 877 #	 %	Year Examined: 2019-2023 Total # Dogs: 121 #	 %
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	4	0.5%	1	0.8%
110.135 PHPV/ PTVL	1	0.1%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	7	0.8%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	8	0.9%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	35	4.0%	1	0.8%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	24	2.7%	6	5.0%
NORMAL				
.000 NORMAL GLOBE	635	72.4%	83	68.6%

AKBASH DOG

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the AKBASH DOG breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
AKBASH DOG

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 39 #	 %	2019-2023 0 #	 %
GLOBE				
.110 MICROPHTHALMOS	1	2.6%	0	
EYELIDS				
21.000 ENTROPION	3	7.7%	0	
22.000 ECTROPION	1	2.6%	0	
UVEA				
93.120 UVEAL CYST-SINGLE	2	5.1%	0	
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	2	5.1%	0	
100.303 PUNCTATE-EQUATORIAL CORTEX	1	2.6%	0	
100.316 INCIPIENT-NUCLEUS	1	2.6%	0	
100.330 GENERALIZED/ COMPLETE	1	2.6%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***3***	***7.7%***	***0***	
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	1	2.6%	0	
NORMAL				
.000 NORMAL GLOBE	32	82.1%	0	

AKITA

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Microphthalmia with multiple ocular defects	Not defined	2	NO	
B.	Entropion	Not defined	1, 3	Breeder option	
C.	Distichiasis	Not defined	1	Breeder option	
D.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
E.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
F.	Cataract	Not defined	1	NO	
G.	Y-suture tip opacity	Not defined	1	Breeder option	
H.	Retinal dysplasia				
	- folds	Not defined	1	Breeder option	
I.	Uveodermatologic syndrome	Not defined	4-13	NO	

Description and Comments

A. Microphthalmia with multiple ocular defects

Multiple ocular defects consisting of small eye (microphthalmia), opacity of the lens (cataract), conical shape of the posterior lens (posterior lenticonus), and folding of the retina into rosettes (retinal dysplasia) have been reported in related Akita pups. Cataracts affected primarily the nuclear and cortical lens. Retinal dysplasia affected the superior retina overlying the tapetal fundus. Affected dogs may have severe visual dysfunction. An autosomal recessive mode of inheritance is suspected but not proven.

B. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull. OFA data indicates that entropion in the Akita usually occurs by 2 years of age.

C. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make strong recommendations with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

D. Corneal Dystrophy

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

E. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

In the Akita, many of these strands bridge between the iris and lens, thus resulting in focal cataract and possible vision impairment.

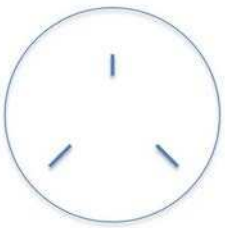
Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

F. Cataract

Any opacity of the lens and/or its capsule, regardless of size or location within the lens. Cataracts are assumed to be hereditary unless associated with known trauma, ocular inflammation, specific metabolic diseases, or nutritional deficiencies.

G. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. Newer versions of the form (since 3/16/21) have boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

H. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and the more severe forms of retinal dysplasia is undetermined.

I. Uveodermatologic syndrome

Uveodermatologic syndrome in the Akita bears many similarities to a condition in people called Vogt-Koyanagi-Harada (or VKH) syndrome. Thus, the condition in dogs is often referred to as VKH or VKH-like syndrome. It is an immune-mediated disease in which pigmented cells (melanocytes) in the eye and in the skin are destroyed by white blood cells (lymphocytes). The first clinical signs are usually inflammation of the intraocular structures (or uveitis) in both eyes. The uveitis is very difficult to control medically and ultimately results in blindness in most affected dogs. Whitening of the hair (poliosis) and skin (vitiligo) may also be noted in advanced cases. The genetics of this condition are unclear, but some genetic predisposition is indicated by the higher prevalence of this disorder in Akitas compared with other dog breeds. Affected dogs are generally young, ranging in age between 1 ½ to 4 years.

References

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OCULAR DISORDERS REPORT
AKITA

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 11,258 #	 %	2019-2023 795 #	 %
GLOBE				
.110 MICROPHTHALMOS	34	0.3%	8	1.0%
10.000 GLAUCOMA	2	0.0%	0	0.0%
EYELIDS				
21.000 ENTROPION	108	1.0%	13	1.6%
22.000 ECTROPION	15	0.1%	1	0.1%
25.110 DISTICHIASIS	74	0.7%	10	1.3%
32.110 IMPERFORATE LACRIMAL PUNCTUM	8	0.1%	2	0.3%
NICTITANS				
51.100 CARTILAGE ANOMALY/ EVERSION	7	0.1%	0	0.0%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	61	0.5%	6	0.8%
UVEA				
93.120 UVEAL CYST-SINGLE	1	0.0%	0	0.0%
93.150 IRIS COLOBOMA	1	0.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	278	2.5%	30	3.8%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	37	0.3%	2	0.3%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	27	0.2%	1	0.1%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	3	0.0%	1	0.1%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	14	0.1%	10	1.3%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	3	0.0%	1	0.1%
LENS				
100.200 CATARACT, UNSPECIFIED	28	0.2%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	257	2.3%	9	1.1%
100.301 PUNCTATE-ANTERIOR CORTEX	10	0.1%	1	0.1%
100.302 PUNCTATE-POSTERIOR CORTEX	9	0.1%	1	0.1%
100.303 PUNCTATE-EQUATORIAL CORTEX	4	0.0%	1	0.1%
100.304 PUNCTATE-ANTERIOR SUTURES	3	0.0%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	54	0.5%	8	1.0%
100.306 PUNCTATE-NUCLEUS	3	0.0%	0	0.0%
100.307 PUNCTATE-CAPSULAR	17	0.2%	6	0.8%
100.311 INCIPIENT-ANTERIOR CORTEX	12	0.1%	0	0.0%
100.312 INCIPIENT-POSTERIOR CORTEX	40	0.4%	0	0.0%
100.313 INCIPIENT-EQUATORIAL CORTEX	10	0.1%	0	0.0%
100.314 INCIPIENT-ANTERIOR SUTURES	2	0.0%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	18	0.2%	3	0.4%
100.316 INCIPIENT-NUCLEUS	7	0.1%	2	0.3%
100.317 INCIPIENT-CAPSULAR	11	0.1%	2	0.3%
100.321 INCOMPLETE-ANTERIOR CORTEX	0	0.0%	1	0.1%
100.322 INCOMPLETE-POSTERIOR CORTEX	2	0.0%	1	0.1%
100.324 INCOMPLETE-ANTERIOR SUTURES	1	0.0%	0	0.0%
100.326 INCOMPLETE-NUCLEUS	0	0.0%	1	0.1%
100.328 Y-SUTURE TIP OPACITIES	16	0.1%	14	1.8%
100.330 GENERALIZED/ COMPLETE	26	0.2%	2	0.3%
100.375 SUBLUXATION/ LUXATION	1	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***257***	***2.3%***	***29***	***3.6%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	20	0.2%	1	0.1%
110.135 PHPV/ PTVL	5	0.0%	1	0.1%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	8	0.1%	1	0.1%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	210	1.9%	11	1.4%

OCULAR DISORDERS REPORT
AKITA

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 11,258 #	 %	Year Examined: 2019-2023 Total # Dogs: 795 #	 %
FUNDUS Continued				
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	22	0.2%	4	0.5%
120.310 RETINAL ATROPHY-GENERALIZED	90	0.8%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	6	0.1%	0	0.0%
120.960 RETINOPATHY	1	0.0%	1	0.1%
120.970 RETINOPATHY - CMR/ CMR-LIKE	0	0.0%	1	0.1%
130.120 OPTIC NERVE HYPOPLASIA	8	0.1%	1	0.1%
OTHER				
900.000 OTHER, UNSPECIFIED	52	0.5%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	178	1.6%	2	0.3%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	109	1.0%	28	3.5%
NORMAL				
.000 NORMAL GLOBE	10,014	89.0%	647	81.4%

ALANO

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the ALANO breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
ALANO

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1 #	%	Year Examined: 2019-2023 Total # Dogs: 0 #	%
NORMAL				
.000 NORMAL GLOBE	1	100.0%	0	

ALAPAHO BLUE-BLOOD BULLDOG

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the ALAPAHO BLUE-BLOOD BULLDOG breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
ALAPAHA BLUE-BLOOD BULLDOG

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	1		1	
Diagnostic Name		**#**	**%**	**#**	**%**
UVEA					
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	1	100.0%	0	0.0%
NORMAL					
.000	NORMAL GLOBE	0	0.0%	1	100.0%

ALASKAN KLEE KAI

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Cataract	Not defined	1	NO	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Cataract

Any opacity of the lens and/or its capsule, regardless of size or location within the lens. Cataracts are assumed to be hereditary unless associated with known trauma, ocular inflammation, specific metabolic diseases, or nutritional deficiencies.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
ALASKAN KLEE KAI

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 771 #	 %	Year Examined: 2019-2023 Total # Dogs: 209 #	 %
EYELIDS				
25.110 DISTICHIASIS	56	7.3%	6	2.9%
32.110 IMPERFORATE LACRIMAL PUNCTUM	3	0.4%	1	0.5%
CORNEA				
70.220 EXPOSURE KERATOPATHY SYNDROME	1	0.1%	0	0.0%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	13	1.7%	1	0.5%
70.730 DYSTROPHY-ENDOTHELIAL	2	0.3%	0	0.0%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	11	1.4%	1	0.5%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	1	0.1%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	5	0.6%	0	0.0%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	19	2.5%	8	3.8%
100.301 PUNCTATE-ANTERIOR CORTEX	7	0.9%	4	1.9%
100.303 PUNCTATE-EQUATORIAL CORTEX	1	0.1%	0	0.0%
100.304 PUNCTATE-ANTERIOR SUTURES	1	0.1%	0	0.0%
100.306 PUNCTATE-NUCLEUS	2	0.3%	0	0.0%
100.307 PUNCTATE-CAPSULAR	3	0.4%	3	1.4%
100.311 INCIPIENT-ANTERIOR CORTEX	10	1.3%	3	1.4%
100.312 INCIPIENT-POSTERIOR CORTEX	1	0.1%	0	0.0%
100.316 INCIPIENT-NUCLEUS	1	0.1%	0	0.0%
100.317 INCIPIENT-CAPSULAR	0	0.0%	1	0.5%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***26***	***3.4%***	***11***	***5.3%***
VITREOUS				
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.1%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	8	1.0%	0	0.0%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	5	0.6%	1	0.5%
OTHER				
900.000 OTHER, UNSPECIFIED	6	0.8%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	4	0.5%	2	1.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	14	1.8%	4	1.9%
NORMAL				
.000 NORMAL GLOBE	661	85.7%	187	89.5%

ALASKAN MALAMUTE

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
D.	Cataract	Not defined	1	NO	
E.	Cone degeneration - day blindness	Autosomal recessive	2-8	NO	Mutation in the *CNGB3* gene

Descriptions and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

D. Cataract

Any opacity of the lens and/or its capsule, regardless of size or location within the lens. Cataracts are assumed to be hereditary unless associated with known trauma, ocular inflammation, specific metabolic diseases, or nutritional deficiencies.

E. Cone degeneration - day blindness or hemeralopia

Autosomal recessively inherited early degeneration of the cone photoreceptors. Affected puppies develop day-blindness, color blindness, and photophobia between 8 and 12 weeks of age. Affected dogs remain ophthalmoscopically normal their entire life. Electroretinography is required to definitively diagnose the disorder. In most cases, the condition results from a deletion in the *CNGB3* gene and a DNA test is available. A study in Alaskan malamutes from Australia showed some cases of day blindness in the breed occur from a different yet still unknown mutation.

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8. Seddon JM, Hampson ECGM, Smith RIE, et al. Genetic heterogeneity of day blindness in Alaskan Malamute. Anim Genet. 2006;37:407-410. PMID: 16879359 **reference derived from non-USA dog population**

OCULAR DISORDERS REPORT
ALASKAN MALAMUTE

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	9,418		920	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	2	0.0%	0	0.0%
10.000	GLAUCOMA	2	0.0%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	2	0.0%	0	0.0%
EYELIDS					
20.140	ECTOPIC CILIA	1	0.0%	0	0.0%
21.000	ENTROPION	5	0.1%	0	0.0%
22.000	ECTROPION	1	0.0%	0	0.0%
25.110	DISTICHIASIS	205	2.2%	17	1.8%
NICTITANS					
51.100	CARTILAGE ANOMALY/ EVERSION	1	0.0%	0	0.0%
52.110	GLAND PROLAPSE	1	0.0%	0	0.0%
CORNEA					
70.220	EXPOSURE KERATOPATHY SYNDROME	1	0.0%	0	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	79	0.8%	14	1.5%
UVEA					
93.120	UVEAL CYST-SINGLE	7	0.1%	3	0.3%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.0%	0	0.0%
93.150	IRIS COLOBOMA	3	0.0%	1	0.1%
93.170	UVEAL CYST-MULTIPLE	0	0.0%	2	0.2%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	614	6.5%	72	7.8%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	39	0.4%	5	0.5%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	12	0.1%	1	0.1%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	4	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	11	0.1%	13	1.4%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	4	0.0%	0	0.0%
93.810	UVEAL MELANOMA	2	0.0%	0	0.0%
FUNDUS					
97.110	CHOROIDAL HYPOPLASIA	3	0.0%	0	0.0%
97.120	COLOBOMA	1	0.0%	0	0.0%
120.170	RETINAL DYSPLASIA-FOLDS	60	0.6%	1	0.1%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	20	0.2%	1	0.1%
120.310	RETINAL ATROPHY-GENERALIZED	18	0.2%	0	0.0%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	10	0.1%	0	0.0%
120.920	RETINAL DETACHMENT	1	0.0%	0	0.0%
120.960	RETINOPATHY	1	0.0%	1	0.1%
130.110	MICROPAPILLA	3	0.0%	0	0.0%
130.120	OPTIC NERVE HYPOPLASIA	9	0.1%	0	0.0%
LENS					
100.200	CATARACT, UNSPECIFIED	125	1.3%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	381	4.0%	39	4.2%
100.301	PUNCTATE-ANTERIOR CORTEX	29	0.3%	14	1.5%
100.302	PUNCTATE-POSTERIOR CORTEX	149	1.6%	14	1.5%
100.303	PUNCTATE-EQUATORIAL CORTEX	25	0.3%	4	0.4%
100.304	PUNCTATE-ANTERIOR SUTURES	22	0.2%	2	0.2%
100.305	PUNCTATE-POSTERIOR SUTURES	76	0.8%	6	0.7%
100.306	PUNCTATE-NUCLEUS	21	0.2%	6	0.7%
100.307	PUNCTATE-CAPSULAR	47	0.5%	15	1.6%
100.311	INCIPIENT-ANTERIOR CORTEX	30	0.3%	5	0.5%
100.312	INCIPIENT-POSTERIOR CORTEX	384	4.1%	34	3.7%
100.313	INCIPIENT-EQUATORIAL CORTEX	44	0.5%	2	0.2%
100.314	INCIPIENT-ANTERIOR SUTURES	8	0.1%	1	0.1%

OCULAR DISORDERS REPORT
ALASKAN MALAMUTE

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 9,418 #	 %	Year Examined: 2019-2023 Total # Dogs: 920 #	 %
LENS Continued				
100.315 INCIPIENT-POSTERIOR SUTURES	82	0.9%	7	0.8%
100.316 INCIPIENT-NUCLEUS	23	0.2%	4	0.4%
100.317 INCIPIENT-CAPSULAR	51	0.5%	7	0.8%
100.321 INCOMPLETE-ANTERIOR CORTEX	3	0.0%	4	0.4%
100.322 INCOMPLETE-POSTERIOR CORTEX	27	0.3%	6	0.7%
100.323 INCOMPLETE-EQUATORIAL CORTEX	1	0.0%	0	0.0%
100.324 INCOMPLETE-ANTERIOR SUTURES	1	0.0%	0	0.0%
100.325 INCOMPLETE-POSTERIOR SUTURES	3	0.0%	0	0.0%
100.326 INCOMPLETE-NUCLEUS	3	0.0%	0	0.0%
100.327 INCOMPLETE-CAPSULAR	5	0.1%	2	0.2%
100.328 Y-SUTURE TIP OPACITIES	12	0.1%	3	0.3%
100.330 GENERALIZED/ COMPLETE	81	0.9%	1	0.1%
100.375 SUBLUXATION/ LUXATION	8	0.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1,240***	***13.2%***	***134***	***14.6%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	11	0.1%	4	0.4%
110.135 PHPV/ PTVL	6	0.1%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.0%	1	0.1%
110.320 VITREOUS DEGENERATION-SYNERESIS	12	0.1%	1	0.1%
OTHER				
900.000 OTHER, UNSPECIFIED	75	0.8%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	260	2.8%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	137	1.5%	34	3.7%
NORMAL				
.000 NORMAL GLOBE	7,371	78.3%	673	73.2%

ALASKAN NOBLE COMPANION DOG

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the ALASKAN NOBLE COMPANION DOG breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
ALASKAN NOBLE COMPANION DOG

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 83 #	 %	Year Examined: 2019-2023 Total # Dogs: 7 #	 %
UVEA				
93.170 UVEAL CYST-MULTIPLE	1	1.2%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	5	6.0%	0	0.0%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	1	1.2%	0	0.0%
100.312 INCIPIENT-POSTERIOR CORTEX	1	1.2%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1***	***1.2%***	***0***	***0.0%***
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	1	1.2%	0	0.0%
OTHER				
900.110 OTHER-SUSPECTED AS NOT-INHERITED	0	0.0%	1	14.3%
NORMAL				
.000 NORMAL GLOBE	78	94.0%	6	85.7%

AMERICAN ALSATIAN

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the AMERICAN ALSATIAN breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
AMERICAN ALSATIAN

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	1		2	
Diagnostic Name		#	%	#	%
NORMAL					
.000	NORMAL GLOBE	1	100.0%	2	100.0%

AMERICAN BANDOGGE MASTIFF

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the AMERICAN BANDOGGE MASTIFF breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
AMERICAN BANDOGGE MASTIFF

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	1		0	
Diagnostic Name		#	%	#	%
NORMAL					
.000	NORMAL GLOBE	1	100.0%	0	

AMERICAN BULLDOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Glaucoma	Not defined	2	NO	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Multifocal retinopathy - *IRD-BEST1* (*cmr1*)	Autosomal recessive	3	NO (Breeder option with normal DNA test for *cmr1*)	Mutation in the *BEST1* gene

Description and Comments

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure (IOP) which causes optic nerve and retinal degeneration and results in blindness. Diagnosis and classification of glaucoma requires tonometry and gonioscopy, which are not part of a routine eye certification examination.

American Bulldogs with glaucoma were reported to have uveal cysts (evident on ophthalmic exam, ultrasound biomicroscopy and/or histopathology), goniodysgenesis, and anterior segment inflammation. Consistent clinical findings among reported individuals included an absent menace response, diminished to absent light perception, mydriasis, and elevated intraocular pressures.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Multifocal retinopathy

Canine Multifocal Retinopathy type 1 (*cmr1*) is characterized by numerous distinct (i.e. multifocal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There may be a serous subretinal fluid, or accumulation of subretinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs between 11-20 weeks of age and there is minimal progression in lesion distribution after 1 year of age. The lesions may flatten, leaving areas of retinal thinning and RPE hypertrophy, hyperplasia, and pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE detachments. In the early stages of this disease, most dogs exhibit no noticeable problem with vision or electroretinographic abnormalities despite their abnormal appearing retinas. However, variable degrees of retinal degeneration occur with chronicity.

Canine Multifocal Retinopathy type 1 is caused by a mutation in the Bestrophin 1 gene (*BEST1*) and is described to be recessively inherited in a number of mastiff derived breeds. Documentation of *cmr1* in American bulldogs has

not yet been published in the scientific literature but noted based on data from Optigen via personal communication with Sue Pearce-Kelling. The reference cited here is included since it is the seminal paper describing the mutation. A DNA test is available.

The breeding advice for breeds diagnosed with "CMR/CMR-like retinopathy" will be changed from "No" to "Breeder option" if the owner of the dog provides the registering office with results of the DNA test for the affected dog showing that it is genetically normal, i.e., not a homozygous mutant, for the *BEST1* mutation.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Pumphrey SA, Pizzirani S, Pirie CG, et al. Glaucoma associated with uveal cysts and goniodysgenesis in American Bulldogs: a case series. *Vet Ophthalmol*. 2013 Sep; 16(5):377-85. PMID: 23110479

3. Guziewicz KE, Zangerl B, Lindauer SJ, et al. Bestrophin gene mutations cause canine multifocal retinopathy: a novel animal model for best disease. *Invest Ophthalmol Vis Sci.* 2007 May;48:1959-1967. PMID: 17460247

OCULAR DISORDERS REPORT
AMERICAN BULLDOG

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 145 #	 %	Year Examined: 2019-2023 Total # Dogs: 8 #	 %
EYELIDS				
20.160 MACROPALPEBRAL FISSURE	3	2.1%	0	0.0%
21.000 ENTROPION	9	6.2%	0	0.0%
22.000 ECTROPION	2	1.4%	0	0.0%
25.110 DISTICHIASIS	32	22.1%	0	0.0%
GLOBE				
40.910 KERATOCONJUNCTIVITIS SICCA (KCS)	4	2.8%	0	0.0%
CORNEA				
70.220 EXPOSURE KERATOPATHY SYNDROME	1	0.7%	0	0.0%
UVEA				
93.120 UVEAL CYST-SINGLE	1	0.7%	1	12.5%
93.170 UVEAL CYST-MULTIPLE	1	0.7%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	5	3.4%	1	12.5%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	1	0.7%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	1	0.7%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	0	0.0%	1	12.5%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	3	2.1%	0	0.0%
100.307 PUNCTATE-CAPSULAR	2	1.4%	0	0.0%
100.313 INCIPIENT-EQUATORIAL CORTEX	0	0.0%	1	12.5%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***2***	***1.4%***	***1***	***12.5%***
VITREOUS				
110.320 VITREOUS DEGENERATION-SYNERESIS	0	0.0%	1	12.5%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	3	2.1%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	16	11.0%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	1	0.7%	0	0.0%
NORMAL				
.000 NORMAL GLOBE	101	69.7%	6	75.0%

AMERICAN BULLY

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

Any opacity of the lens and/or its capsule, regardless of size or location within the lens. Cataracts are assumed to be hereditary unless associated with known trauma, ocular inflammation, specific metabolic diseases, or nutritional deficiencies.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
AMERICAN BULLY

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 52 #	 %	Year Examined: 2019-2023 Total # Dogs: 193 #	 %
EYELIDS				
25.110 DISTICHIASIS	3	5.8%	4	2.1%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	1	1.9%	1	0.5%
UVEA				
93.110 IRIS HYPOPLASIA	0	0.0%	1	0.5%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	4	7.7%	5	2.6%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	0	0.0%	3	1.6%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	3	5.8%	3	1.6%
100.301 PUNCTATE-ANTERIOR CORTEX	0	0.0%	2	1.0%
100.305 PUNCTATE-POSTERIOR SUTURES	3	5.8%	1	0.5%
100.306 PUNCTATE-NUCLEUS	1	1.9%	0	0.0%
100.307 PUNCTATE-CAPSULAR	0	0.0%	1	0.5%
100.322 INCOMPLETE-POSTERIOR CORTEX	0	0.0%	1	0.5%
100.328 Y-SUTURE TIP OPACITIES	1	1.9%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***4***	***7.7%***	***5***	***2.6%***
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	2	3.8%	2	1.0%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	0	0.0%	3	1.6%
120.310 RETINAL ATROPHY-GENERALIZED	1	1.9%	0	0.0%
OTHER				
900.110 OTHER-SUSPECTED AS NOT-INHERITED	5	9.6%	0	0.0%
NORMAL				
.000 NORMAL GLOBE	34	65.4%	170	88.1%

AMERICAN ENGLISH COONHOUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the AMERICAN ENGLISH COONHOUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
AMERICAN ENGLISH COONHOUND

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	3		3	
Diagnostic Name		#	%	#	%
NORMAL					
.000	NORMAL GLOBE	3	100.0%	3	100.0%

AMERICAN ESKIMO DOG

(all varieties)

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Cataract	Not defined	1,4	NO	
B.	Y-suture tip opacity	Not defined	1	Breeder option	
C.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- PRA-*prcd*	Autosomal recessive	2,3	NO	Mutation in the *prcd* gene

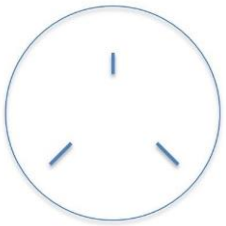
Description and Comments

A. Cataract

Any opacity of the lens and/or its capsule, regardless of size or location within the lens. Cataracts are assumed to be hereditary unless associated with known trauma, ocular inflammation, specific metabolic diseases, or nutritional deficiencies.

B. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. Newer versions of the form (since 3/16/21) have boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

D. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening

examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-*prcd*

Studies have shown that the principal form of PRA in the American Eskimo is *prcd* which is a late-onset autosomal recessive form of PRA. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected breeds to date, the disease is recognized clinically in dogs 3-6 years of age or older. However, in the American Eskimo Dog the phenotype can be highly variable in the age of onset. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Zangerl B, Goldstein O, Philp AR, et al. Identical mutation in a novel retinal gene causes progressive rod-cone degeneration in dogs and retinitis pigmentosa in humans. *Genomics*. 2006;88:551-563. PMID: 16938425

3. Moody JA, Famula TR, Sampson RC, Murphy KE. Identification of microsatellite markers linked to progressive retinal atrophy in American Eskimo Dogs. Am J Vet Res. 2005 Nov;66(11):1900-2. doi: 10.2460/ajvr.2005.66.1900. PMID: 16334947

4. Gelatt KN, Mackay EO. Prevalence of primary breed-related cataracts in the dog in North America. *Vet Ophthalmol*. 2005;8:101-111. PMID: 15762923

OCULAR DISORDERS REPORT
AMERICAN ESKIMO DOG

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 2,549 #	%	2019-2023 251 #	%
EYELIDS				
21.000 ENTROPION	4	0.2%	1	0.4%
25.110 DISTICHIASIS	19	0.7%	0	0.0%
32.110 IMPERFORATE LACRIMAL PUNCTUM	1	0.0%	1	0.4%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	10	0.4%	2	0.8%
70.730 DYSTROPHY-ENDOTHELIAL	4	0.2%	0	0.0%
UVEA				
93.120 UVEAL CYST-SINGLE	4	0.2%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	21	0.8%	2	0.8%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	1	0.0%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	5	0.2%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	4	0.2%	0	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	3	0.1%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	145	5.7%	13	5.2%
100.301 PUNCTATE-ANTERIOR CORTEX	34	1.3%	4	1.6%
100.302 PUNCTATE-POSTERIOR CORTEX	11	0.4%	2	0.8%
100.303 PUNCTATE-EQUATORIAL CORTEX	10	0.4%	2	0.8%
100.304 PUNCTATE-ANTERIOR SUTURES	3	0.1%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	10	0.4%	3	1.2%
100.306 PUNCTATE-NUCLEUS	5	0.2%	2	0.8%
100.307 PUNCTATE-CAPSULAR	4	0.2%	0	0.0%
100.311 INCIPIENT-ANTERIOR CORTEX	30	1.2%	4	1.6%
100.312 INCIPIENT-POSTERIOR CORTEX	24	0.9%	4	1.6%
100.313 INCIPIENT-EQUATORIAL CORTEX	15	0.6%	1	0.4%
100.314 INCIPIENT-ANTERIOR SUTURES	5	0.2%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	3	0.1%	0	0.0%
100.316 INCIPIENT-NUCLEUS	7	0.3%	0	0.0%
100.317 INCIPIENT-CAPSULAR	7	0.3%	3	1.2%
100.322 INCOMPLETE-POSTERIOR CORTEX	0	0.0%	1	0.4%
100.323 INCOMPLETE-EQUATORIAL CORTEX	1	0.0%	0	0.0%
100.326 INCOMPLETE-NUCLEUS	0	0.0%	3	1.2%
100.327 INCOMPLETE-CAPSULAR	2	0.1%	1	0.4%
100.328 Y-SUTURE TIP OPACITIES	6	0.2%	5	2.0%
100.330 GENERALIZED/ COMPLETE	10	0.4%	1	0.4%
100.340 RESORBING/ HYPERMATURE	1	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION	3	0.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***185***	***7.3%***	***31***	***12.4%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	7	0.3%	1	0.4%
110.135 PHPV/ PTVL	3	0.1%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	18	0.7%	0	0.0%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	8	0.3%	1	0.4%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	2	0.1%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	184	7.2%	1	0.4%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%
120.960 RETINOPATHY	1	0.0%	0	0.0%
130.110 MICROPAPILLA	2	0.1%	1	0.4%
130.120 OPTIC NERVE HYPOPLASIA	1	0.0%	0	0.0%

OCULAR DISORDERS REPORT
AMERICAN ESKIMO DOG

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 2,549 #	%	Year Examined: 2019-2023 Total # Dogs: 251 #	%
OTHER				
900.000 OTHER, UNSPECIFIED	8	0.3%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	86	3.4%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	30	1.2%	7	2.8%
NORMAL				
.000 NORMAL GLOBE	2,038	80.0%	210	83.7%

AMERICAN FOXHOUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the AMERICAN FOXHOUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
AMERICAN FOXHOUND

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 11 #	%	Year Examined: 2019-2023 Total # Dogs: 0 #	%
EYELIDS				
25.110 DISTICHIASIS	2	18.2%	0	
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	6	54.5%	0	
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	4	36.4%	0	
OTHER				
900.000 OTHER, UNSPECIFIED	1	9.1%	0	
NORMAL				
.000 NORMAL GLOBE	6	54.5%	0	

AMERICAN HAIRLESS TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Cataract	Not defined	1,	NO	
B.	Lens luxation	Autosomal recessive	2,3	NO	Mutation in the *ADAMTS17* gene

Description and Comments

A. Cataract

Any opacity of the lens and/or its capsule, regardless of size or location within the lens. Cataracts are assumed to be hereditary unless associated with known trauma, ocular inflammation, specific metabolic diseases, or nutritional deficiencies.

B. Lens Luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

A 2011 study by Gould et al. that evaluated genotypes of OFA tested dogs showed that the American hairless terrier had the lowest frequency of the ADAMTS17 mutation of all the terrier breeds evaluated and that no American hairless terriers were homozygous for the mutation.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Farias FH, Johnson GS, Taylor JF, et al. An ADAMTS17 splice donor site mutation in dogs with primary lens luxation. *Invest Ophthalmol Vis Sc*i. 2010 Sep;51:4716-4721. PMID: 20375329

3. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol.* 2011 Nov;14:378-384. PMID: 22050825

OCULAR DISORDERS REPORT
AMERICAN HAIRLESS TERRIER

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	73		109	
	Diagnostic Name	#	%	#	%
EYELIDS					
25.110	DISTICHIASIS	1	1.4%	0	0.0%
CORNEA					
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	0	0.0%	2	1.8%
UVEA					
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	2	2.7%	1	0.9%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	1	1.4%	4	3.7%
100.301	PUNCTATE-ANTERIOR CORTEX	1	1.4%	0	0.0%
100.305	PUNCTATE-POSTERIOR SUTURES	1	1.4%	0	0.0%
100.307	PUNCTATE-CAPSULAR	0	0.0%	1	0.9%
100.311	INCIPIENT-ANTERIOR CORTEX	0	0.0%	2	1.8%
100.312	INCIPIENT-POSTERIOR CORTEX	0	0.0%	1	0.9%
100.315	INCIPIENT-POSTERIOR SUTURES	0	0.0%	1	0.9%
100.321	INCOMPLETE-ANTERIOR CORTEX	0	0.0%	1	0.9%
100.322	INCOMPLETE-POSTERIOR CORTEX	0	0.0%	1	0.9%
100.323	INCOMPLETE-EQUATORIAL CORTEX	0	0.0%	1	0.9%
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	2	1.8%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***2***	***2.7%***	***8***	***7.3%***
FUNDUS					
120.170	RETINAL DYSPLASIA-FOLDS	1	1.4%	0	0.0%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	1.4%	0	0.0%
OTHER					
900.000	OTHER, UNSPECIFIED	1	1.4%	0	0.0%
900.110	OTHER-SUSPECTED AS NOT-INHERITED	1	1.4%	1	0.9%
NORMAL					
.000	NORMAL GLOBE	65	89.0%	99	90.8%

AMERICAN HUSKY

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the AMERICAN HUSKY breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
AMERICAN HUSKY

Year Examined:	1993-2018		2019-2023	
Total # Dogs:	1		0	
Diagnostic Name	**#**	**%**	**#**	**%**
NORMAL				
.000 NORMAL GLOBE	1	100.0%	0	

AMERICAN LEOPARD HOUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the AMERICAN LEOPARD HOUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
AMERICAN LEOPARD HOUND

Year Examined:	1993-2018		2019-2023	
Total # Dogs:	3		0	
Diagnostic Name	**#**	**%**	**#**	**%**
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	1	33.3%	0	
NORMAL				
.000 NORMAL GLOBE	2	66.7%	0	

AMERICAN PIT BULL TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- cone-rod dystrophy 2 (*crd2*)	Autosomal recessive	1	NO	Mutation in the NPHP5 (*IQCB1)* gene

Description and Comments

A. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- cone-rod dystrophy 2 (*crd2*)

A cone rod dystrophy characterized by initial loss of cones (day vision) followed by degeneration of the rods (night vision). Evidence of vision loss is evident at an early age with severe retinal degeneration and complete blindness by a year of age. The disease is a severe early onset retinal blindness more appropriately considered a form of Leber congenital amaurosis (LCA). The condition is inherited as an autosomal recessive trait and caused by a mutation in NPHP5 (*IQCB1).* A DNA test is available.

References

1. Goldstein O, Mezey JG, Schweitzer P, et al. IQCB1 and PDE6B mutations cause similar early onset retinal degenerations in two closely related terrier dog breeds. *Invest Ophthalmol*. 2013;54:7005-7019. PMID: 24045995

OCULAR DISORDERS REPORT
AMERICAN PIT BULL TERRIER

Diagnostic Name		Year Examined: 1993-2018 Total # Dogs: 223 #	 %	Year Examined: 2019-2023 Total # Dogs: 34 #	 %
EYELIDS					
25.110	DISTICHIASIS	7	3.1%	2	5.9%
32.110	IMPERFORATE LACRIMAL PUNCTUM	0	0.0%	1	2.9%
CORNEA					
70.220	EXPOSURE KERATOPATHY SYNDROME	0	0.0%	1	2.9%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	1	0.4%	0	0.0%
70.730	DYSTROPHY-ENDOTHELIAL	1	0.4%	0	0.0%
UVEA					
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	6	2.7%	1	2.9%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	2	0.9%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	2	0.9%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	1	0.4%	0	0.0%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	7	3.1%	1	2.9%
100.301	PUNCTATE-ANTERIOR CORTEX	2	0.9%	0	0.0%
100.302	PUNCTATE-POSTERIOR CORTEX	2	0.9%	0	0.0%
100.304	PUNCTATE-ANTERIOR SUTURES	1	0.4%	0	0.0%
100.305	PUNCTATE-POSTERIOR SUTURES	1	0.4%	0	0.0%
100.307	PUNCTATE-CAPSULAR	0	0.0%	1	2.9%
100.313	INCIPIENT-EQUATORIAL CORTEX	1	0.4%	0	0.0%
100.326	INCOMPLETE-NUCLEUS	1	0.4%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	1	2.9%
100.375	SUBLUXATION/ LUXATION	1	0.4%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***8***	***3.6%***	***1***	***2.9%***
FUNDUS					
120.170	RETINAL DYSPLASIA-FOLDS	2	0.9%	0	0.0%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	1	0.4%	0	0.0%
120.310	RETINAL ATROPHY-GENERALIZED	2	0.9%	0	0.0%
OTHER					
900.000	OTHER, UNSPECIFIED	1	0.4%	0	0.0%
900.100	OTHER-SUSPECTED AS INHERITED	11	4.9%	0	0.0%
900.110	OTHER-SUSPECTED AS NOT-INHERITED	2	0.9%	3	8.8%
NORMAL					
.000	NORMAL GLOBE	189	84.8%	26	76.5%

AMERICAN STAFFORDSHIRE TERRIER*

Please note that since 1972 the AKC considers the Staffordshire Bull Terrier a different breed from the American Staffordshire Terrier. Since the latter breed evolved from the former, it is possible that the same genetic diseases exist in both.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1, 2, 3	NO	
D.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- rod cone dysplasia 1b (*rcd1b)*	Autosomal recessive	4	NO	Mutation in the *PDE6B* gene
	- cone-rod dystrophy 2 (*crd2*)	Autosomal recessive	5	No	Mutation in the NPHP5 (*IQCB1)* gene
	- *CORD1*	Autosomal recessive	5	NO	Mutation in the *RPGRIP* gene
	- PRA-*prcd*	Autosomal recessive	5	NO	Mutation in the *prcd* gene
E.	Multifocal retinopathy – *IRD-BEST1 (cmr1)*	Autosomal recessive	5	NO (Breeder option with normal DNA test for cmr1)	Mutation in the *BEST1* gene
F.	Choroidal hypoplasia (Collie Eye Anomaly) - optic nerve coloboma - retinal detachment - retinal hemorrhage - staphyloma/coloboma	Autosomal recessive	5	NO	Mutation in the *NHEJ1* gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make strong recommendations with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

Any opacity of the lens and/or its capsule, regardless of size or location within the lens. Cataracts are assumed to be hereditary unless associated with known trauma, ocular inflammation, specific metabolic diseases, or nutritional deficiencies.

Presumed hereditary cataracts have been reported in the Staffordshire bull terrier and usually develop by one year of age. There is initial opacification of the suture lines progressing to nuclear and cortical cataract formation; complete cataracts and blindness develop by three years of age. A simple autosomal recessive mode of inheritance has been proposed; however, the genetics have not been defined and additional studies will be required. A similar scenario may be present in the American Staffordshire terrier given its breed lineage.

D. Retinal Atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

-rod-cone dysplasia 1b (*rcd1b*) [previously considered cone-rod dystrophy 1(*crd1*)]

The disease was previously considered a cone-rod dystrophy (crd1) based on incorrect phenotype ascertainment using ERG (Aguirre, personal communication, 2016). The term crd1 should no longer be used to refer to the disease in this breed. The disease is more appropriately classified as rod-cone dysplasia 1b (rcd1b). In affected dogs there is evidence of vision loss at an early age with severe retinal degeneration and complete blindness by early adulthood, and ophthalmoscopic evidence of advanced retinal degeneration by 1 year of age. The disease is caused by a mutation in the *PDE6B* gene, with clinical abnormalities similar to what is found in rcd1-affected Irish Setters, and rcd1a affected Sloughis and Spanish Water Dogs. A DNA test is available.

- **cone-rod dystrophy 2 (*crd2*)**

A cone rod dystrophy characterized by initial loss of cones (day vision) followed by degeneration of the rods (night vision). Evidence of vision loss is evident at an early age with severe retinal degeneration and complete blindness by a year of age. The disease is a severe early onset retinal blindness more appropriately considered a form of Leber congenital amaurosis (LCA). The condition is inherited as an autosomal recessive trait and caused by a mutation in NPHP5 (*IQCB1).* A DNA test is available.

- *CORD1*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram before it is apparent clinically.

This disease has been best described in Miniature Dachshunds in which it is a recessively inherited disorder caused by a 44 base pair insertion in the *RPGRIP1* gene. The insertion presumably truncates the protein and its major C-terminal RPGR binding domain. The resulting disease is called cone-rod dystrophy 1 (CORD1) as the salient clinical abnormalities are a cone ERG dysfunction which does not correlate with photopic vision defects. The onset of the

disease is variable and is influenced by a second modifier locus which also is located on canine chromosome 15. Dogs homozygous for both defects have retinal abnormalities on ophthalmoscopy before 1-2 years of age. Dogs homozygous only for the *RPGRIP* insertion may have a late onset (>6 years) retinal degeneration diagnosed by ophthalmoscopy. Although the *RPGRIP1* molecular defect can be identified by means of a DNA test, questions have been raised about its validity given the poor genotype-phenotype correlation. A DNA test is available.

In a previous study using an inbred research colony, a 44-nucleotide insertion (ins44) in exon 2 of RPGRIP1 was associated with retinal degeneration. Despite concordance of ins44 with retinal degeneration, evidence indicate that there was phenotype-genotype discordance within the miniature long-haired dachshunds that were not directly related to the experimental colony as not all dogs that were homozygous for ins44 were developing early onset retinal degeneration, but were developing retinal degeneration at a much later stage or not at all. In this investigation MAP9 deletion associated with early retinal degeneration onset was identified. Given the new genome assembly, the nominal title is CanFam3.1MAP9 corrected. Deletion was confirmed in early onset retinal degeneration cases and not late onset retinal degeneration cases, there is a variable age of onset and demonstrate the interaction of two independent loci that contribute to the phenotype. This study has shown that RPGRIP1 ins44/ins44 dogs with early onset retinal degeneration has several polymorphisms in MAP9, some of them potentially harmful, when compared with MAP9 in late onset retinal degeneration dogs. Detection of the presence or absence of MAP early onset retinal degeneration by qPCR can be used to specify early onset or late onset status for ins44 homozygotes. The story, however, is not as straightforward as suggested by the Forman et al. 2016 paper. Unpublished work by K. Miyadera and G. Aguirre in a research colony in which one of the founders originated from a MLHD at the Animal Health Trust finds that dogs that are homozygous for the RPGRIP1 ins 44 and the newly identified MAP9 deletion still do not show early-onset retinal degeneration. This suggests that there probably is a third genetic locus that interacts with MAP9 and RPGRIP1 in determining the age of disease onset and severity of the phenotype. Regardless, the identification of the MAP9 deletion is a major finding that will help unravel the complex genetics of this retinal disorder.

- PRA-*prcd*

This is a late-onset autosomal recessive form of PRA. The mutation is allelic to that present in Labrador Retrievers, Miniature Poodles, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

E. **Multifocal retinopathy**

Canine Multifocal Retinopathy type 1 (*cmr1*) is characterized by numerous distinct (i.e. multifocal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There may be a serous subretinal fluid, or accumulation of subretinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs between 11-20 weeks of age and there is minimal progression in lesion distribution after 1 year of age. The lesions may flatten, leaving areas of retinal thinning and RPE hypertrophy, hyperplasia, and pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE detachments. In the early stages of this disease, most dogs exhibit no noticeable problem with vision or electroretinographic abnormalities despite their abnormal appearing retinas. However, variable degrees of retinal degeneration occur with chronicity.

Canine Multifocal Retinopathy type 1 is caused by a mutation in the Bestrophin 1 gene (*BEST1*) and is described to be recessively inherited in a number of mastiff derived breeds. A DNA test is available.

The breeding advice for breeds diagnosed with "CMR/CMR-like retinopathy" will be changed from "No" to "Breeder

option" if the owner of the dog provides the registering office with results of the DNA test for the affected dog, showing that it is genetically normal, i.e., not a homozygous mutant, for the *BEST1* mutation.

F. Choroidal hypoplasia (Collie Eye Anomaly)
- staphyloma/coloboma
- retinal detachment
- retinal hemorrhage
- optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1.* The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Barnett KC. Hereditary cataract in the dog. *J Small Anim Pract*. 1978;19:109-120. PMID: 642468 **reference derived from non-USA dog population**

3. Barnett KC. The diagnosis and differential diagnosis of cataract in the dog. *J Small Anim Pract*. 1985;26:305-316. **reference derived from non-USA dog population**

4. Goldstein O, Mezey JG, Schweitzer P, et al. IQCB1 and PDE6B mutations cause similar early onset retinal degenerations in two closely related terrier dog breeds. *Invest Ophthalmol*. 2013;54:7005-7019. PMID: 24045995

5. Donner J, Freyer J, Davison S, et al. Genetic prevalence and clinical relevance of canine Mendelian disease variants in over one million dogs. *Plos Genet.* 2023;19(2)e.1010651. PMID36848397

OCULAR DISORDERS REPORT
AMERICAN STAFFORDSHIRE TERRIER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 795 #	 %	Year Examined: 2019-2023 Total # Dogs: 111 #	 %
EYELIDS				
21.000 ENTROPION	2	0.3%	0	0.0%
25.110 DISTICHIASIS	36	4.5%	3	2.7%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	1	0.1%	0	0.0%
70.220 EXPOSURE KERATOPATHY SYNDROME	2	0.3%	0	0.0%
70.730 DYSTROPHY-ENDOTHELIAL	1	0.1%	0	0.0%
UVEA				
93.110 IRIS HYPOPLASIA	0	0.0%	1	0.9%
93.120 UVEAL CYST-SINGLE	1	0.1%	0	0.0%
93.170 UVEAL CYST-MULTIPLE	1	0.1%	1	0.9%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	32	4.0%	3	2.7%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	2	0.3%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	1	0.1%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	1	0.1%	0	0.0%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	1	0.1%	0	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	1	0.1%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	32	4.0%	4	3.6%
100.301 PUNCTATE-ANTERIOR CORTEX	2	0.3%	0	0.0%
100.302 PUNCTATE-POSTERIOR CORTEX	2	0.3%	1	0.9%
100.303 PUNCTATE-EQUATORIAL CORTEX	2	0.3%	0	0.0%
100.304 PUNCTATE-ANTERIOR SUTURES	1	0.1%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	4	0.5%	1	0.9%
100.306 PUNCTATE-NUCLEUS	0	0.0%	3	2.7%
100.307 PUNCTATE-CAPSULAR	1	0.1%	0	0.0%
100.311 INCIPIENT-ANTERIOR CORTEX	4	0.5%	2	1.8%
100.312 INCIPIENT-POSTERIOR CORTEX	3	0.4%	0	0.0%
100.313 INCIPIENT-EQUATORIAL CORTEX	5	0.6%	0	0.0%
100.323 INCOMPLETE-EQUATORIAL CORTEX	1	0.1%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	2	0.3%	2	1.8%
100.330 GENERALIZED/ COMPLETE	1	0.1%	1	0.9%
100.375 SUBLUXATION/ LUXATION	2	0.3%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***27***	***3.4%***	***8***	***7.2%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	2	0.3%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.1%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	2	0.3%	1	0.9%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	8	1.0%	0	0.0%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	2	0.3%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	3	0.4%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	8	1.0%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	30	3.8%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	13	1.6%	3	2.7%
NORMAL				
.000 NORMAL GLOBE	674	84.8%	93	83.8%

AMERICAN WATER SPANIEL

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Cataract	Not defined	1	NO	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Cataract

Any opacity of the lens and/or its capsule, regardless of size or location within the lens. Cataracts are assumed to be hereditary unless associated with known trauma, ocular inflammation, specific metabolic diseases, or nutritional deficiencies.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
AMERICAN WATER SPANIEL

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	1,137		120	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	2	0.2%	0	0.0%
10.000	GLAUCOMA	3	0.3%	0	0.0%
EYELIDS					
20.160	MACROPALPEBRAL FISSURE	2	0.2%	0	0.0%
21.000	ENTROPION	8	0.7%	0	0.0%
22.000	ECTROPION	2	0.2%	0	0.0%
25.110	DISTICHIASIS	373	32.8%	51	42.5%
32.110	IMPERFORATE LACRIMAL PUNCTUM	0	0.0%	1	0.8%
CORNEA					
70.220	EXPOSURE KERATOPATHY SYNDROME	1	0.1%	0	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	6	0.5%	2	1.7%
UVEA					
93.120	UVEAL CYST-SINGLE	1	0.1%	0	0.0%
93.150	IRIS COLOBOMA	2	0.2%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	12	1.1%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	1	0.1%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	2	0.2%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	7	0.6%	4	3.3%
LENS					
100.200	CATARACT, UNSPECIFIED	5	0.4%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	41	3.6%	9	7.5%
100.301	PUNCTATE-ANTERIOR CORTEX	5	0.4%	1	0.8%
100.302	PUNCTATE-POSTERIOR CORTEX	7	0.6%	1	0.8%
100.303	PUNCTATE-EQUATORIAL CORTEX	2	0.2%	0	0.0%
100.305	PUNCTATE-POSTERIOR SUTURES	12	1.1%	3	2.5%
100.306	PUNCTATE-NUCLEUS	2	0.2%	1	0.8%
100.307	PUNCTATE-CAPSULAR	3	0.3%	6	5.0%
100.311	INCIPIENT-ANTERIOR CORTEX	7	0.6%	0	0.0%
100.312	INCIPIENT-POSTERIOR CORTEX	13	1.1%	5	4.2%
100.315	INCIPIENT-POSTERIOR SUTURES	7	0.6%	1	0.8%
100.316	INCIPIENT-NUCLEUS	1	0.1%	0	0.0%
100.317	INCIPIENT-CAPSULAR	2	0.2%	0	0.0%
100.321	INCOMPLETE-ANTERIOR CORTEX	0	0.0%	1	0.8%
100.322	INCOMPLETE-POSTERIOR CORTEX	1	0.1%	0	0.0%
100.326	INCOMPLETE-NUCLEUS	1	0.1%	0	0.0%
100.327	INCOMPLETE-CAPSULAR	0	0.0%	1	0.8%
100.328	Y-SUTURE TIP OPACITIES	7	0.6%	2	1.7%
100.330	GENERALIZED/ COMPLETE	1	0.1%	0	0.0%
100.375	SUBLUXATION/ LUXATION	0	0.0%	1	0.8%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***69***	***6.1%***	***20***	***16.7%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	2	0.2%	0	0.0%
110.135	PHPV/ PTVL	1	0.1%	0	0.0%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	0	0.0%	2	1.7%
110.320	VITREOUS DEGENERATION-SYNERESIS	1	0.1%	2	1.7%
FUNDUS					
120.170	RETINAL DYSPLASIA-FOLDS	8	0.7%	0	0.0%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	1	0.1%	0	0.0%
120.310	RETINAL ATROPHY-GENERALIZED	5	0.4%	0	0.0%
120.960	RETINOPATHY	1	0.1%	0	0.0%
130.110	MICROPAPILLA	2	0.2%	0	0.0%

OCULAR DISORDERS REPORT
AMERICAN WATER SPANIEL

Year Examined:	1993-2018		2019-2023	
Total # Dogs:	1,137		120	
Diagnostic Name	**#**	**%**	**#**	**%**
OTHER				
900.000 OTHER, UNSPECIFIED	5	0.4%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	18	1.6%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	6	0.5%	5	4.2%
NORMAL				
.000 NORMAL GLOBE	694	61.0%	53	44.2%

ANATOLIAN SHEPHERD

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Cataract	Not defined	1	NO	

Description and Comments

A. Cataract

Any opacity of the lens and/or its capsule, regardless of size or location within the lens. Cataracts are assumed to be hereditary unless associated with known trauma, ocular inflammation, specific metabolic diseases, or nutritional deficiencies.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
ANATOLIAN SHEPHERD

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 53 #	 %	Year Examined: 2019-2023 Total # Dogs: 30 #	 %
GLOBE				
.110 MICROPHTHALMOS	1	1.9%	0	0.0%
EYELIDS				
21.000 ENTROPION	0	0.0%	1	3.3%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	0	0.0%	2	6.7%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	1	1.9%	0	0.0%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	4	7.5%	2	6.7%
100.301 PUNCTATE-ANTERIOR CORTEX	0	0.0%	1	3.3%
100.302 PUNCTATE-POSTERIOR CORTEX	1	1.9%	1	3.3%
100.305 PUNCTATE-POSTERIOR SUTURES	2	3.8%	1	3.3%
100.312 INCIPIENT-POSTERIOR CORTEX	0	0.0%	1	3.3%
100.313 INCIPIENT-EQUATORIAL CORTEX	0	0.0%	1	3.3%
100.328 Y-SUTURE TIP OPACITIES	1	1.9%	1	3.3%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***3***	***5.7%***	***5***	***16.7%***
FUNDUS				
130.110 MICROPAPILLA	0	0.0%	1	3.3%
OTHER				
900.110 OTHER-SUSPECTED AS NOT-INHERITED	2	3.8%	1	3.3%
NORMAL				
.000 NORMAL GLOBE	45	84.9%	23	76.7%

ARMENIAN GAMPR

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the ARMENIAN GAMPR breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
ARMENIAN GAMPR

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 4 #	%	Year Examined: 2019-2023 Total # Dogs: 1 #	%
NORMAL				
.000 NORMAL GLOBE	4	100.0%	1	100.0%

AUSTRALIAN CATTLE DOG

(Queensland Heeler or Blue Heeler)

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Glaucoma	Not defined	2	NO	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1,7	NO	
D.	Y-suture tip opacity	Not defined	1	Breeder option	
E.	Lens luxation	Autosomal recessive	3-5	NO	Mutation in the *ADAMTS17* gene
F.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	-PRA-*prcd*	Autosomal recessive	6	NO	Mutation in the *prcd* gene
	- rod-cone dysplasia type 4 (*rcd4*)	Autosomal recessive	8	NO	Mutation in the *C2orf71* gene
G.	Retinopathy	Not defined	1	Breeder option	

Description and Comments

A. Glaucoma

Characterized by an elevation of intraocular pressure (IOP) which causes optic nerve and retinal degeneration and results in blindness. Diagnosis and classification of glaucoma requires tonometry and gonioscopy, which are not part of a routine eye certification examination.

B. Persistent pupillary membranes (PPMs)

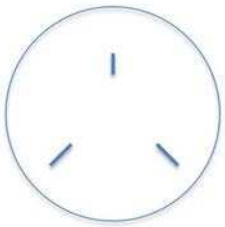
Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

Any opacity of the lens and/or its capsule, regardless of size or location within the lens. Cataracts are assumed to be hereditary unless associated with known trauma, ocular inflammation, specific metabolic diseases, or nutritional deficiencies.

D. Y-suture tip opacity

These are prominent (or "highlighted" or "more dense") distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a "peace sign" as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the "Lens" section of the CAER form. Newer versions of the form (since 3/16/21) have boxes that say, "posterior Y-suture tip opacities" which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures" AND ALSO MARK "suspect not inherited/significance unknown" (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: "E2" or "posterior suture tip opacities." This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

E. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site. Lens luxation may result in elevated intraocular pressure (secondary glaucoma), causing vision impairment, pain, and/or retinal detachment. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

F. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-*prcd*

Studies have shown that one form of PRA in the Australian Cattle Dog is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. However, in the Australian Cattle Dog the phenotype can be highly variable in the age of onset. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

- rod-cone dysplasia, type 4 (*rcd4*)

A form of PRA identified also in the Australian Cattle Dog breed. Clinical night blindness is observed on average as late as 10 years of age and progresses to total blindness. This form of PRA has been referred to as late-onset PRA (LOPRA). The disorder is caused by a mutation present in the *C2orf71* gene. A DNA test is available, though the labs that offer it may be limited. The test is accurate only for this mutation and is of no value in identifying other forms of PRA. Historical data from Optigen showed a high carrier frequency of this mutation, but only one homozygous mutant (personal communication with Sue Pierce Kelling).

Other forms of retinal degeneration that are not *prcd* are recognized in the breed. The currently available genetic test will not detect these other forms of PRA.

G. Retinopathy

Any non-inflammatory condition of the retina. These conditions can usually be detected by ophthalmoscopic examination, but an electroretinogram (ERG) may be required in some instances (e.g. canine multifocal retinopathy).

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Gelatt KN, MacKay EO. Prevalence of the breed-related glaucomas in pure-bred dogs in North America. *Vet Ophthalmol*. 2004;7:97-111. PMID: 14982589

3. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol*. 2011;14:378-384. PMID: 22050825

4. Farias FH, Johnson GS, Taylor JF, et al. An ADAMTS17 splice donor site mutation in dogs with primary lens luxation. *Invest Ophthalmol Vis Sci*. 2010;51:4716-4721. PMID: 20375329

5. Brakel KA, Taylor RP, Shaw GC et al. Primary lens luxation and zonular ligament dysplasia in non-terrier dog breeds. Abstract ACVO 2022. *Vet Ophthalmol. 2023; 26:e1-e-22.* PMID 36543745

6. Zangerl B, Goldstein O, Philp AR, et al. Identical mutation in a novel retinal gene causes progressive rod-cone degeneration in dogs and retinitis pigmentosa in humans. *Genomics*. 2006;88:551-563. PMID: 16938425

7. Gelatt KN, Mackay EO. Prevalence of primary breed-related cataracts in the dog in North America. *Vet Ophthalmol*. 2005;8:101-111. PMID: 15762923

8. Personal communication with Sue Pearce Kelling on September 12, 2023 based on OptiGen data

OCULAR DISORDERS REPORT
AUSTRALIAN CATTLE DOG

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	5,015		499	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	1	0.0%	1	0.2%
EYELIDS					
22.000	ECTROPION	1	0.0%	0	0.0%
25.110	DISTICHIASIS	16	0.3%	3	0.6%
32.110	IMPERFORATE LACRIMAL PUNCTUM	1	0.0%	1	0.2%
NICTITANS					
50.210	PLASMOMA/ ATYPICAL PANNUS	2	0.0%	0	0.0%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	2	0.0%	0	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	28	0.6%	3	0.6%
70.730	DYSTROPHY-ENDOTHELIAL	4	0.1%	0	0.0%
UVEA					
93.120	UVEAL CYST-SINGLE	13	0.3%	1	0.2%
93.170	UVEAL CYST-MULTIPLE	1	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	47	0.9%	7	1.4%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	2	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	3	0.1%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	6	0.1%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	2	0.0%	2	0.4%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	2	0.0%	0	0.0%
95.120	UVEAL CYST-FREE FLOATING	3	0.1%	2	0.4%
FUNDUS					
97.110	CHOROIDAL HYPOPLASIA	3	0.1%	0	0.0%
97.120	COLOBOMA	1	0.0%	0	0.0%
120.170	RETINAL DYSPLASIA-FOLDS	38	0.8%	2	0.4%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	14	0.3%	1	0.2%
120.310	RETINAL ATROPHY-GENERALIZED	256	5.1%	4	0.8%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	3	0.1%	0	0.0%
120.920	RETINAL DETACHMENT	0	0.0%	3	0.6%
120.960	RETINOPATHY	6	0.1%	2	0.4%
120.970	RETINOPATHY - CMR/ CMR-LIKE	0	0.0%	1	0.2%
130.120	OPTIC NERVE HYPOPLASIA	2	0.0%	0	0.0%
LENS					
100.200	CATARACT, UNSPECIFIED	35	0.7%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	306	6.1%	24	4.8%
100.301	PUNCTATE-ANTERIOR CORTEX	58	1.2%	9	1.8%
100.302	PUNCTATE-POSTERIOR CORTEX	44	0.9%	4	0.8%
100.303	PUNCTATE-EQUATORIAL CORTEX	21	0.4%	1	0.2%
100.304	PUNCTATE-ANTERIOR SUTURES	7	0.1%	0	0.0%
100.305	PUNCTATE-POSTERIOR SUTURES	36	0.7%	4	0.8%
100.306	PUNCTATE-NUCLEUS	5	0.1%	2	0.4%
100.307	PUNCTATE-CAPSULAR	6	0.1%	4	0.8%
100.311	INCIPIENT-ANTERIOR CORTEX	53	1.1%	10	2.0%
100.312	INCIPIENT-POSTERIOR CORTEX	73	1.5%	2	0.4%
100.313	INCIPIENT-EQUATORIAL CORTEX	56	1.1%	4	0.8%
100.314	INCIPIENT-ANTERIOR SUTURES	6	0.1%	1	0.2%
100.315	INCIPIENT-POSTERIOR SUTURES	19	0.4%	2	0.4%
100.316	INCIPIENT-NUCLEUS	8	0.2%	0	0.0%
100.317	INCIPIENT-CAPSULAR	7	0.1%	1	0.2%
100.321	INCOMPLETE-ANTERIOR CORTEX	2	0.0%	1	0.2%
100.322	INCOMPLETE-POSTERIOR CORTEX	2	0.0%	1	0.2%

OCULAR DISORDERS REPORT
AUSTRALIAN CATTLE DOG

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 5,015 #	 %	Year Examined: 2019-2023 Total # Dogs: 499 #	 %
LENS Continued				
100.323 INCOMPLETE-EQUATORIAL CORTEX	2	0.0%	0	0.0%
100.325 INCOMPLETE-POSTERIOR SUTURES	1	0.0%	0	0.0%
100.326 INCOMPLETE-NUCLEUS	3	0.1%	1	0.2%
100.327 INCOMPLETE-CAPSULAR	1	0.0%	1	0.2%
100.328 Y-SUTURE TIP OPACITIES	16	0.3%	18	3.6%
100.330 GENERALIZED/ COMPLETE	23	0.5%	1	0.2%
100.340 RESORBING/ HYPERMATURE	1	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION	4	0.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***469***	***9.4%***	***49***	***9.8%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	8	0.2%	0	0.0%
110.135 PHPV/ PTVL	1	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	14	0.3%	1	0.2%
OTHER				
900.000 OTHER, UNSPECIFIED	20	0.4%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	126	2.5%	1	0.2%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	67	1.3%	23	4.6%
NORMAL				
.000 NORMAL GLOBE	4,097	81.7%	411	82.4%

AUSTRALIAN KELPIE

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Cataract	Not defined	1	NO	
B.	Choroidal hypoplasia (Collie Eye Anomaly) - optic nerve coloboma - retinal detachment - retinal hemorrhage - staphyloma/ coloboma	Autosomal recessive	2	NO	Mutation in the *NHEJ1* gene

Description and Comments

A. Cataract

Any opacity of the lens and/or its capsule, regardless of size or location within the lens. Cataracts are assumed to be hereditary unless associated with known trauma, ocular inflammation, specific metabolic diseases, or nutritional deficiencies.

B. Choroidal hypoplasia (Collie Eye Anomaly)
- staphyloma/coloboma
- retinal detachment
- retinal hemorrhage
- optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1.* The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Kucharczyk, N., et al. (2019). "Collie Eye Anomaly in Australian Kelpie dogs in Poland." BMC Vet Res 15(1): 392. PMID: 31684941 **reference derived from non-USA dog population**

OCULAR DISORDERS REPORT
AUSTRALIAN KELPIE

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	239		13	
	Diagnostic Name	#	%	#	%
CORNEA					
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	1	0.4%	0	0.0%
UVEA					
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	1	0.4%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	1	0.4%	0	0.0%
93.810	UVEAL MELANOMA	3	1.3%	0	0.0%
FUNDUS					
97.110	CHOROIDAL HYPOPLASIA	1	0.4%	0	0.0%
120.170	RETINAL DYSPLASIA-FOLDS	5	2.1%	0	0.0%
120.310	RETINAL ATROPHY-GENERALIZED	11	4.6%	0	0.0%
LENS					
100.200	CATARACT, UNSPECIFIED	5	2.1%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	33	13.8%	0	0.0%
100.301	PUNCTATE-ANTERIOR CORTEX	9	3.8%	0	0.0%
100.302	PUNCTATE-POSTERIOR CORTEX	8	3.3%	0	0.0%
100.303	PUNCTATE-EQUATORIAL CORTEX	1	0.4%	0	0.0%
100.304	PUNCTATE-ANTERIOR SUTURES	1	0.4%	0	0.0%
100.306	PUNCTATE-NUCLEUS	4	1.7%	0	0.0%
100.311	INCIPIENT-ANTERIOR CORTEX	9	3.8%	0	0.0%
100.312	INCIPIENT-POSTERIOR CORTEX	7	2.9%	0	0.0%
100.313	INCIPIENT-EQUATORIAL CORTEX	2	0.8%	0	0.0%
100.315	INCIPIENT-POSTERIOR SUTURES	1	0.4%	0	0.0%
100.330	GENERALIZED/ COMPLETE	1	0.4%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***48***	***20.1%***	***0***	***0.0%***
VITREOUS					
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	2	0.8%	0	0.0%
110.320	VITREOUS DEGENERATION-SYNERESIS	1	0.4%	0	0.0%
OTHER					
900.000	OTHER, UNSPECIFIED	7	2.9%	0	0.0%
900.100	OTHER-SUSPECTED AS INHERITED	8	3.3%	0	0.0%
900.110	OTHER-SUSPECTED AS NOT-INHERITED	2	0.8%	0	0.0%
NORMAL					
.000	NORMAL GLOBE	178	74.5%	13	100.0%

AUSTRALIAN KOOLIE

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the AUSTRALIAN KOOLIE breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
AUSTRALIAN KOOLIE

Year Examined:	1993-2018		2019-2023	
Total # Dogs:	6		10	
Diagnostic Name	**#**	**%**	**#**	**%**
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	0	0.0%	2	20.0%
NORMAL				
.000 NORMAL GLOBE	6	100.0%	8	80.0%

AUSTRALIAN LABRADOODLE

(Labradoodle, Australian Cobber Dog)

*Due to the breed's ancestry, most of the references cited are for the Labrador Retriever or Standard Poodle. The examiner may also find the Labrador Retriever and Standard Poodle pages as a helpful resource for other conditions that may occur but are not yet reported in the Australian Labradoodle.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Imperforate lower nasolacrimal punctum	Not defined	1	Breeder option	
C.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
D.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
E.	Cataract	Not defined	1	NO	
F.	Y- suture tip opacity	Not defined	1	Breeder option	
G.	Persistent hyaloid artery remnant (PHA)	Not defined	1	Breeder option	
H.	Retinal atrophy				
	- generalized				
	- PRA-*prcd*	Autosomal recessive	2, 3	NO	Mutation of the *prcd* gene
I.	Achromatopsia Type 2 (day blindness/retinal degeneration) / CD-*CNGA3*	Autosomal recessive	17	NO	Mutation of the *CNG3A* gene in the Labrador Retriever
J.	Retinal dysplasia (without skeletal defects)				
	- folds	Presumed autosomal recessive	1	NO (Breeder option with Normal DNA test and folds only)	Mutation of the *COL9A3* gene
	- geographic, detached (without skeletal defects)	Presumed autosomal recessive	4-7	NO	

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
K.	Retinal dysplasia (with skeletal defects) / Dysplasia-*COL9A3* (*osd1*) - folds/geographic/ detached	Autosomal recessive with incomplete dominance for the eyes	8-15	NO	Mutation of the *COL9A3* gene
L.	Limbal melanoma	Not defined	16	NO	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Imperforate lower nasolacrimal punctum

Development anomaly resulting in an imperforate opening of the lacrimal puncta. An imperforate lower punctum may result in epiphora, an overflow of tears onto the face.

C. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

In Labrador Retrievers in Europe, one form of corneal dystrophy, known as macular dystrophy, has been shown to be caused by accumulations of glycosaminoglycans in the corneal stroma. This form of corneal dystrophy is caused by a mutation in the CHST6 gene, and therefore it is recommended that dogs with this disease not be bred. This has not yet been reported in Australian Labradoodles but could potentially occur due to the breed's history.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in

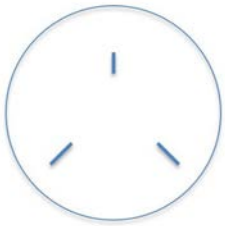
a localized region.

The most frequently reported cataracts in the Australian Labradoodle are bilateral or unilateral, focal, posterior polar (posterior cortical)/subcapsular cataracts, which usually present between 1-3 years of age. These are generally stationary or very slowly progressive and generally do not interfere with vision. It has been suggested that these cataracts are inherited as dominant with incomplete penetrance, but definitive breeding studies are still required to verify this hypothesis.

A second type of cataract is a progressive cortical cataract which may involve the entire lens. It is not clear whether this is a distinct entity, or an aberrant form of the posterior polar cataract.

F. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. Newer versions of the form (since 3/16/21) have boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

G. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

H. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-*prcd*

Unpublished data from Optigen Labs has shown that the principal form of PRA in the Australian Labradoodle is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Labrador Retrievers, Miniature Poodles, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

I. Achromatopsia Type 2 (ACHM – Type 2) Day blindness/retinal degeneration / CD-*CNGA3*

An autosomal recessive disorder of Standard Poodles and 'doodles' (where the mix-bred dogs are backcrossed to Standard Poodles that carry the genetic defect); the disease also has been referred to as day blindness/retinal degeneration. The salient clinical finding is profound visual difficulty in bright light (day blindness) with subjective normal night vision. In the early stages of the disease, fundus examination is normal with some dogs showing focal hyperreflectivity of the cone-rich fovea like region of the retina; the photopic ERG is not recordable. In some older dogs, there is progression resulting in poor/absent vision under both dim and bright light conditions, markedly abnormal or non-recordable ERG, and a fundus appearance indicative of late-stage retinal degeneration and indistinguishable from progressive retinal atrophy.

J. Retinal dysplasia (without skeletal defects)

- folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. In the Labrador Retriever, the presence of retinal folds may be seen in the heterozygous state of oculoskeletal dysplasia described below, thus the recommendation against breeding.

The breeding advice for Labrador Retrievers and Samoyeds diagnosed with "retinal dysplasia - folds" will be changed from "No" to "Breeder option" if the owner of the dog provides the registering office with results of the DNA test for the affected dog, showing that it is not a carrier of the *COL9A3* mutation.

- geographic

An irregularly shaped area of retinal development containing areas of retinal thickening, thinning, and disorganization. These lesions can take up to 1.5 years after birth to develop and be ophthalmoscopically visible. As a result, some dogs with this disease may have had normal prior eye examinations.

In the Golden Retriever, Labrador Retriever and German Shepherd dog, there is evidence that examination early in life is not reliable at identifying geographic "dysplasia". Therefore, it is recommended that these breeds are (re)examined at 1.5 to 2 years of age for this diagnosis

K. Retinal dysplasia - folds, geographic or detachment with skeletal defects (Dysplasia-*COL9A3*(osd1)

This condition is also known as oculo-skeletal dysplasia (OSD) or dwarfism with retinal dysplasia type 1 (DRD1) in the Labrador Retriever. A similar condition, DRD2, occurs in the Samoyed. The condition is autosomal recessive and homozygous affected dogs have shortened forelimbs ("downhill" conformation) with valgus deformity. They have severe ocular defects including cataract, retinal folds/multifocal retinal dysplasia, vitreal degeneration and retinal detachment. The ocular abnormalities result in blindness in most dogs. Heterozygous dogs can have either a normal ocular exam or have multiple retinal folds, vitreal membranes, or vitreal degeneration. It is important to note that generally the retinal folds present in heterozygous dogs tend to cluster around the major superior blood vessels of the central tapetal region. The condition is caused by a 1 base pair insertion of *COL9A3.* A DNA test is available.

L. Limbal melanoma

Most limbal melanomas are really epibulbar melanocytomas, but there is a possibility of an extension of an intraocular melanoma extending outward and presenting as a limbal melanoma. An epibulbar melanocytoma originates from the superficial pigment lining the limbus and the lesion may eventually extend into the eye. Metastasis has not been documented and the mass is characterized by large epithelioid cells. The lesion presents as a subconjunctival smooth mass most commonly in the dorsolateral limbal region and extends later into the cornea and posterior on the sclera. Breed predisposition has been noted in the German Shepherd, Labrador and Golden

Retriever.

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OCULAR DISORDERS REPORT
AUSTRALIAN LABRADOODLE

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	18,211		19,667	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	6	0.0%	3	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	0	0.0%	3	0.0%
EYELIDS					
21.000	ENTROPION	7	0.0%	8	0.0%
22.000	ECTROPION	2	0.0%	0	0.0%
25.110	DISTICHIASIS	365	2.0%	384	2.0%
32.110	IMPERFORATE LACRIMAL PUNCTUM	39	0.2%	50	0.3%
NICTITANS					
51.100	CARTILAGE ANOMALY/ EVERSION	6	0.0%	5	0.0%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	2	0.0%	0	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	411	2.3%	186	0.9%
UVEA					
93.110	IRIS HYPOPLASIA	5	0.0%	6	0.0%
93.120	UVEAL CYST-SINGLE	0	0.0%	2	0.0%
93.150	IRIS COLOBOMA	3	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	1,378	7.6%	1,380	7.0%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	45	0.2%	16	0.1%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	6	0.0%	5	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	495	2.7%	960	4.9%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	10	0.1%	2	0.0%
93.810	UVEAL MELANOMA	5	0.0%	1	0.0%
97.150	COLOBOMA	5	0.0%	0	0.0%
FUNDUS					
97.110	CHOROIDAL HYPOPLASIA	2	0.0%	1	0.0%
120.170	RETINAL DYSPLASIA-FOLDS	133	0.7%	112	0.6%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	8	0.0%	13	0.1%
120.920	RETINAL DETACHMENT	2	0.0%	0	0.0%
120.960	RETINOPATHY	14	0.1%	4	0.0%
120.970	RETINOPATHY - CMR/ CMR-LIKE	0	0.0%	3	0.0%
130.110	MICROPAPILLA	53	0.3%	29	0.1%
130.120	OPTIC NERVE HYPOPLASIA	12	0.1%	1	0.0%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	443	2.4%	497	2.5%
100.301	PUNCTATE-ANTERIOR CORTEX	144	0.8%	125	0.6%
100.302	PUNCTATE-POSTERIOR CORTEX	68	0.4%	51	0.3%
100.303	PUNCTATE-EQUATORIAL CORTEX	18	0.1%	19	0.1%
100.304	PUNCTATE-ANTERIOR SUTURES	21	0.1%	19	0.1%
100.305	PUNCTATE-POSTERIOR SUTURES	160	0.9%	76	0.4%
100.306	PUNCTATE-NUCLEUS	42	0.2%	30	0.2%
100.307	PUNCTATE-CAPSULAR	189	1.0%	169	0.9%
100.311	INCIPIENT-ANTERIOR CORTEX	42	0.2%	31	0.2%
100.312	INCIPIENT-POSTERIOR CORTEX	43	0.2%	36	0.2%
100.313	INCIPIENT-EQUATORIAL CORTEX	19	0.1%	21	0.1%
100.314	INCIPIENT-ANTERIOR SUTURES	7	0.0%	4	0.0%
100.315	INCIPIENT-POSTERIOR SUTURES	36	0.2%	29	0.1%
100.316	INCIPIENT-NUCLEUS	29	0.2%	30	0.2%
100.317	INCIPIENT-CAPSULAR	37	0.2%	73	0.4%
100.321	INCOMPLETE-ANTERIOR CORTEX	13	0.1%	4	0.0%
100.322	INCOMPLETE-POSTERIOR CORTEX	8	0.0%	6	0.0%
100.323	INCOMPLETE-EQUATORIAL CORTEX	4	0.0%	5	0.0%
100.325	INCOMPLETE-POSTERIOR SUTURES	3	0.0%	2	0.0%

OCULAR DISORDERS REPORT
AUSTRALIAN LABRADOODLE

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 18,211 #	 %	Year Examined: 2019-2023 Total # Dogs: 19,667 #	 %
LENS Continued				
100.326 INCOMPLETE-NUCLEUS	24	0.1%	4	0.0%
100.327 INCOMPLETE-CAPSULAR	2	0.0%	1	0.0%
100.328 Y-SUTURE TIP OPACITIES	122	0.7%	224	1.1%
100.330 GENERALIZED/ COMPLETE	23	0.1%	3	0.0%
100.340 RESORBING/ HYPERMATURE	0	0.0%	2	0.0%
100.375 SUBLUXATION/ LUXATION	5	0.0%	5	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***932***	***5.1%***	***740***	***3.8%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	64	0.4%	95	0.5%
110.135 PHPV/ PTVL	6	0.0%	13	0.1%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	4	0.0%	4	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	28	0.2%	18	0.1%
OTHER				
900.100 OTHER-SUSPECTED AS INHERITED	31	0.2%	16	0.1%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	612	3.4%	664	3.4%
NORMAL				
.000 NORMAL GLOBE	12,334	67.7%	15,453	78.6%

AUSTRALIAN SHEPHERD

It is recommended that this breed be examined prior to pharmacological dilation to best facilitate identification of iris coloboma.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Microphthalmia with multiple ocular defects	Presumed autosomal recessive with incomplete penetrance	2-6	NO	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
D.	Iris coloboma	Not defined	1	NO	
E.	Iris hypoplasia	Not defined	1	Breeder option	
F.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
G.	Cataract				
	- generalized	Not defined	1, 17	NO	
	- *HSF4*	Autosomal dominant (possibly incomplete penetrance)	7, 8	NO	Mutation in the *HSF4* gene
H.	Y-suture tip opacity	Not defined	1	Breeder option	
I.	Lens luxation	Not defined (potentially autosomal recessive)	9	NO	Potentially *ADAMTS17* gene
J.	Persistent hyaloid artery remnant	Not defined	1, 10	Breeder option	
K.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- PRA-*prcd*	Autosomal recessive	11	NO	Mutation in the *prcd* gene

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
L.	Multifocal retinopathy *IRD-BEST1 (cmr1)*	Autosomal recessive	12, 13	NO (Breeder option with normal DNA test for *cmr1*)	Mutation in the *BEST1* gene
M.	Retinal dysplasia				
	- folds	Not defined	1	Breeder option	
N.	Choroidal hypoplasia (Collie Eye Anomaly) - optic nerve coloboma - retinal detachment - retinal hemorrhage - staphyloma/coloboma	Autosomal recessive	10, 14-16	NO	Mutation in the *NHEJ1 gene*
O.	Coloboma/staphyloma without microphthalmia	Not defined	1	NO	
P.	Micropapilla	Not defined	1	Breeder option	

Description and Comments

A. Microphthalmia with multiple ocular defects

Microphthalmia is a congenital defect characterized by a small eye with associated defects of the cornea, iris (coloboma), anterior chamber, lens (cataract) and/or retina (dysplasia). In the Australian Shepherd, microphthalmia has long been suspected to be associated with merle coat coloration but a definitive genetic relationship has not been established. The eyes of affected homozygous merle (usually white) dogs have extreme forms of this entity and are usually blind at birth. Affected heterozygous merle-coated dogs demonstrate less severe manifestations.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Iris coloboma

A congenital abnormality in iris development usually characterized by a full-thickness defect in iris tissue, commonly (though not exclusively) located at the 6 o’clock position associated with failure of closure of the optic

fissure. A partial-thickness defect in iris tissue should be recorded as iris hypoplasia on the OFA form.

E. Iris hypoplasia

A congenital abnormality in iris development usually characterized by a reduced quantity of tissue identified as a partial-thickness defect in iris tissue. Full-thickness iris hypoplasia is rare and should be recorded as an iris coloboma on the OFA form.

F. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

G. Cataract

- generalized

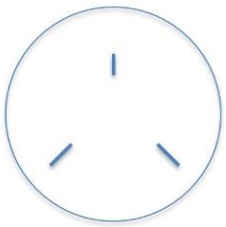
Any opacity of the lens and/or its capsule, regardless of size or location within the lens. Cataracts are assumed to be hereditary unless associated with known trauma, ocular inflammation, specific metabolic diseases, or nutritional deficiencies.

- HSF4

In the Australian Shepherd, a mutation in *HSF4* (heat shock transcription factor 4), the HSF4-2 mutation, has been shown to increase the likelihood of cataract formation. The mutation is inherited in a co-dominant manner. Dogs with one copy of the mutation develop bilateral posterior cataracts and homozygotes develop a nuclear cataract that typically progresses to a mature cataract. A DNA test is available for this mutation. Other genetic factors can contribute to cataract formation in this breed and will not be detected by this test.

H. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. Newer versions of the form (since 3/16/21) have boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

I. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site. Lens luxation may result in elevated intraocular pressure (secondary glaucoma), causing vision impairment, pain, and/or retinal detachment. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

J. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

K. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-*prcd*

Unpublished data from genetics laboratories has shown that the principal form of PRA in the Australian Shepherd is *prcd,* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically at 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

L. Multifocal retinopathy – *IRD-BEST1 (cmr1)*

Canine Multifocal Retinopathy type 1 (*cmr1*) is characterized by numerous distinct (i.e. multi-focal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There may be a serous subretinal fluid, or accumulation of subretinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs between 11-20 weeks of age and there is minimal progression in lesion distribution after 1 year of age. The lesions may flatten, leaving areas of retinal thinning and RPE hypertrophy, hyperplasia, and pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE detachments. In the early stages of this disease, most dogs exhibit no noticeable problem with vision or electroretinographic abnormalities despite their abnormal appearing retinas. However, variable degrees of retinal degeneration occur with chronicity.

Canine Multifocal Retinopathy type 1 is caused by a mutation in the Bestrophin 1 gene (*BEST1*) and is described to be recessively inherited in the Great Pyrenees, Dogue de Bordeaux, Bullmastiff, Mastiff, Australian Shepherd and other breeds.

The breeding advice for breeds diagnosed with "CMR/CMR-like retinopathy" will be changed from "No" to "Breeder option" if the owner of the dog provides the registering office with results of the DNA test for the affected dog, showing that it is genetically normal, i.e., not a homozygous mutant, for the *BEST1* mutation.

M. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

N. Choroidal hypoplasia (Collie Eye Anomaly)
- staphyloma/coloboma
- retinal detachment
- retinal hemorrhage
- optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1*. The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

O. Coloboma/staphyloma (without microphthalmia)

A coloboma is a congenital defect which may affect the iris, choroid or optic disc. Iris colobomas are seen as notches in the pupillary margin. Scleral ectasia is defined as a congenital thinning and secondary distention of the sclera; when lined by uveal tissue it is called a staphyloma. These may be anteriorly located, apparent as a bulge beneath the upper eyelid or posteriorly located, requiring visualization with an ophthalmoscope. These conditions may or may not be genetically related to the same anomalies seen associated with microphthalmia (entity "A" above).

P. Micropapilla

Micropapilla refers to a small optic disc which is not associated with vision impairment.

Optic nerve hypoplasia refers to a congenital defect of the optic nerve which causes blindness and abnormal pupil response in the affected eye. It may be difficult to differentiate between micropapilla and optic nerve hypoplasia on a routine (dilated) screening ophthalmoscopic exam.

References

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14. Rubin LF, Nelson EJ, Sharp CA. Collie eye anomaly in Australian shepherd dogs. *Prog in Vet Comp Ophthalmol*. 1991;1:105-108.

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16. Parker HG, Kukekova AV, Akey DT, et al. Breed relationships facilitate fine-mapping studies: a 7.8-kb deletion cosegregates with Collie eye anomaly across multiple dog breeds. *Genome research*. 2007;17:1562-1571. PMID: 17916641

17. Gelatt KN, Mackay EO. Prevalence of primary breed-related cataracts in the dog in North America. *Vet Ophthalmol*. 2005;8:101-111. PMID: 15762923

OCULAR DISORDERS REPORT
AUSTRALIAN SHEPHERD

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	111,295		21,436	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	100	0.1%	13	0.1%
10.000	GLAUCOMA	8	0.0%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	1	0.0%	0	0.0%
EYELIDS					
20.110	EYELID DERMOID	1	0.0%	0	0.0%
20.140	ECTOPIC CILIA	5	0.0%	1	0.0%
20.160	MACROPALPEBRAL FISSURE	4	0.0%	0	0.0%
21.000	ENTROPION	16	0.0%	1	0.0%
22.000	ECTROPION	6	0.0%	0	0.0%
25.110	DISTICHIASIS	1,765	1.6%	342	1.6%
32.110	IMPERFORATE LACRIMAL PUNCTUM	9	0.0%	8	0.0%
NICTITANS					
50.210	PLASMOMA/ ATYPICAL PANNUS	0	0.0%	1	0.0%
51.100	CARTILAGE ANOMALY/ EVERSION	4	0.0%	0	0.0%
52.110	GLAND PROLAPSE	3	0.0%	0	0.0%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	9	0.0%	0	0.0%
70.220	EXPOSURE KERATOPATHY SYNDROME	1	0.0%	1	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	572	0.5%	102	0.5%
70.730	DYSTROPHY-ENDOTHELIAL	15	0.0%	1	0.0%
UVEA					
93.110	IRIS HYPOPLASIA	300	0.3%	165	0.8%
93.120	UVEAL CYST-SINGLE	39	0.0%	5	0.0%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.0%	0	0.0%
93.150	IRIS COLOBOMA	1,578	1.4%	205	1.0%
93.170	UVEAL CYST-MULTIPLE	4	0.0%	0	0.0%
93.180	IRIS SPHINCTER DYSPLASIA	21	0.0%	16	0.1%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	5,634	5.1%	1,536	7.2%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	100	0.1%	22	0.1%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	47	0.0%	5	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	92	0.1%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	39	0.0%	28	0.1%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	23	0.0%	7	0.0%
93.810	UVEAL MELANOMA	8	0.0%	3	0.0%
95.120	UVEAL CYST-FREE FLOATING	1	0.0%	0	0.0%
97.150	COLOBOMA	25	0.0%	6	0.0%
FUNDUS					
97.110	CHOROIDAL HYPOPLASIA	173	0.2%	32	0.1%
97.120	COLOBOMA	96	0.1%	0	0.0%
120.170	RETINAL DYSPLASIA-FOLDS	1,078	1.0%	121	0.6%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	46	0.0%	6	0.0%
120.310	RETINAL ATROPHY-GENERALIZED	137	0.1%	3	0.0%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	61	0.1%	0	0.0%
120.920	RETINAL DETACHMENT	16	0.0%	6	0.0%
120.960	RETINOPATHY	12	0.0%	7	0.0%
120.970	RETINOPATHY - CMR/ CMR-LIKE	0	0.0%	1	0.0%
130.110	MICROPAPILLA	271	0.2%	93	0.4%
130.120	OPTIC NERVE HYPOPLASIA	129	0.1%	9	0.0%
LENS					
100.200	CATARACT, UNSPECIFIED	169	0.2%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	2,615	2.3%	384	1.8%

OCULAR DISORDERS REPORT
AUSTRALIAN SHEPHERD

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 111,295 #	 %	2019-2023 21,436 #	 %
LENS Continued				
100.301 PUNCTATE-ANTERIOR CORTEX	365	0.3%	93	0.4%
100.302 PUNCTATE-POSTERIOR CORTEX	388	0.3%	50	0.2%
100.303 PUNCTATE-EQUATORIAL CORTEX	127	0.1%	28	0.1%
100.304 PUNCTATE-ANTERIOR SUTURES	43	0.0%	19	0.1%
100.305 PUNCTATE-POSTERIOR SUTURES	384	0.3%	82	0.4%
100.306 PUNCTATE-NUCLEUS	276	0.2%	78	0.4%
100.307 PUNCTATE-CAPSULAR	167	0.2%	91	0.4%
100.311 INCIPIENT-ANTERIOR CORTEX	364	0.3%	49	0.2%
100.312 INCIPIENT-POSTERIOR CORTEX	794	0.7%	73	0.3%
100.313 INCIPIENT-EQUATORIAL CORTEX	215	0.2%	19	0.1%
100.314 INCIPIENT-ANTERIOR SUTURES	27	0.0%	1	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	174	0.2%	12	0.1%
100.316 INCIPIENT-NUCLEUS	236	0.2%	29	0.1%
100.317 INCIPIENT-CAPSULAR	133	0.1%	32	0.1%
100.321 INCOMPLETE-ANTERIOR CORTEX	18	0.0%	9	0.0%
100.322 INCOMPLETE-POSTERIOR CORTEX	33	0.0%	24	0.1%
100.323 INCOMPLETE-EQUATORIAL CORTEX	8	0.0%	3	0.0%
100.324 INCOMPLETE-ANTERIOR SUTURES	0	0.0%	1	0.0%
100.325 INCOMPLETE-POSTERIOR SUTURES	5	0.0%	2	0.0%
100.326 INCOMPLETE-NUCLEUS	8	0.0%	10	0.0%
100.327 INCOMPLETE-CAPSULAR	4	0.0%	2	0.0%
100.328 Y-SUTURE TIP OPACITIES	124	0.1%	145	0.7%
100.330 GENERALIZED/ COMPLETE	236	0.2%	6	0.0%
100.340 RESORBING/ HYPERMATURE	0	0.0%	1	0.0%
100.375 SUBLUXATION/ LUXATION	18	0.0%	2	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***4,174***	***3.8%***	***714***	***3.3%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	595	0.5%	183	0.9%
110.135 PHPV/ PTVL	120	0.1%	11	0.1%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	50	0.0%	18	0.1%
110.320 VITREOUS DEGENERATION-SYNERESIS	249	0.2%	41	0.2%
OTHER				
900.000 OTHER, UNSPECIFIED	545	0.5%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	1,282	1.2%	19	0.1%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	872	0.8%	393	1.8%
NORMAL				
.000 NORMAL GLOBE	96,729	86.9%	17,886	83.4%

AUSTRALIAN STUMPY TAIL CATTLE DOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- PRA-*prcd*	Autosomal recessive	1	NO	Mutation in the *prcd* gene

Description and Comments

A. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-*prcd*

Studies have shown that the principal form of PRA in the Australian Stumpy Tail Cattle Dog is *prcd*, which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the Australian Stumpy Tail Cattle Dog. The condition listed above is currently noted solely due to the availability of a genetic test for the disease.

1. Zangerl B, Goldstein O, Philp AR, et al. Identical mutation in a novel retinal gene causes progressive rod-cone degeneration in dogs and retinitis pigmentosa in humans. *Genomics*. 2006 Nov;88:551-563. PMID: 16938425

OCULAR DISORDERS REPORT
AUSTRALIAN STUMPY TAIL CATTLE DOG

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	44		10	
	Diagnostic Name	**#**	**%**	**#**	**%**
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	2	4.5%	0	0.0%
100.301	PUNCTATE-ANTERIOR CORTEX	1	2.3%	0	0.0%
100.305	PUNCTATE-POSTERIOR SUTURES	1	2.3%	0	0.0%
100.311	INCIPIENT-ANTERIOR CORTEX	1	2.3%	0	0.0%
100.312	INCIPIENT-POSTERIOR CORTEX	2	4.5%	0	0.0%
100.313	INCIPIENT-EQUATORIAL CORTEX	2	4.5%	0	0.0%
100.316	INCIPIENT-NUCLEUS	1	2.3%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***8***	***18.2%***	***0***	***0.0%***
FUNDUS					
120.170	RETINAL DYSPLASIA-FOLDS	1	2.3%	0	0.0%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	1	2.3%	0	0.0%
120.310	RETINAL ATROPHY-GENERALIZED	3	6.8%	0	0.0%
OTHER					
900.100	OTHER-SUSPECTED AS INHERITED	1	2.3%	0	0.0%
900.110	OTHER-SUSPECTED AS NOT-INHERITED	1	2.3%	0	0.0%
NORMAL					
.000	NORMAL GLOBE	38	86.4%	10	100.0%

AUSTRALIAN TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
B.	Cataract	Not defined	1,2	NO	

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

B. Cataract

Any opacity of the lens and/or its capsule, regardless of size or location within the lens. Cataracts are assumed to be hereditary unless associated with known trauma, ocular inflammation, specific metabolic diseases, or nutritional deficiencies.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Gelatt KN, Mackay EO. Prevalence of primary breed-related cataracts in the dog in North America. *Vet Ophthalmol*. 2005;8:101-111. PMID: 15762923

OCULAR DISORDERS REPORT
AUSTRALIAN TERRIER

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	965		201	
	Diagnostic Name	#	%	#	%
GLOBE					
10.000	GLAUCOMA	1	0.1%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	0	0.0%	1	0.5%
EYELIDS					
21.000	ENTROPION	2	0.2%	0	0.0%
25.110	DISTICHIASIS	3	0.3%	1	0.5%
CORNEA					
70.220	EXPOSURE KERATOPATHY SYNDROME	1	0.1%	0	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	4	0.4%	1	0.5%
UVEA					
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	50	5.2%	14	7.0%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	1	0.1%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	3	0.3%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	13	1.3%	11	5.5%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	1	0.1%	1	0.5%
LENS					
100.200	CATARACT, UNSPECIFIED	2	0.2%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	36	3.7%	4	2.0%
100.301	PUNCTATE-ANTERIOR CORTEX	9	0.9%	0	0.0%
100.302	PUNCTATE-POSTERIOR CORTEX	3	0.3%	0	0.0%
100.303	PUNCTATE-EQUATORIAL CORTEX	2	0.2%	1	0.5%
100.305	PUNCTATE-POSTERIOR SUTURES	4	0.4%	0	0.0%
100.306	PUNCTATE-NUCLEUS	2	0.2%	1	0.5%
100.307	PUNCTATE-CAPSULAR	1	0.1%	0	0.0%
100.311	INCIPIENT-ANTERIOR CORTEX	7	0.7%	2	1.0%
100.312	INCIPIENT-POSTERIOR CORTEX	6	0.6%	0	0.0%
100.313	INCIPIENT-EQUATORIAL CORTEX	5	0.5%	2	1.0%
100.314	INCIPIENT-ANTERIOR SUTURES	1	0.1%	0	0.0%
100.316	INCIPIENT-NUCLEUS	1	0.1%	1	0.5%
100.317	INCIPIENT-CAPSULAR	2	0.2%	0	0.0%
100.323	INCOMPLETE-EQUATORIAL CORTEX	1	0.1%	0	0.0%
100.326	INCOMPLETE-NUCLEUS	1	0.1%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	3	1.5%
100.330	GENERALIZED/ COMPLETE	8	0.8%	0	0.0%
100.375	SUBLUXATION/ LUXATION	1	0.1%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***55***	***5.7%***	***7***	***3.5%***
VITREOUS					
110.320	VITREOUS DEGENERATION-SYNERESIS	3	0.3%	0	0.0%
FUNDUS					
120.170	RETINAL DYSPLASIA-FOLDS	3	0.3%	0	0.0%
120.310	RETINAL ATROPHY-GENERALIZED	3	0.3%	0	0.0%
130.110	MICROPAPILLA	1	0.1%	0	0.0%
OTHER					
900.000	OTHER, UNSPECIFIED	4	0.4%	0	0.0%
900.100	OTHER-SUSPECTED AS INHERITED	9	0.9%	1	0.5%
900.110	OTHER-SUSPECTED AS NOT-INHERITED	6	0.6%	9	4.5%
NORMAL					
.000	NORMAL GLOBE	836	86.6%	159	79.1%

AZAWAKH

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the AZAWAKH breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
AZAWAKH

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 14 #	 %	Year Examined: 2019-2023 Total # Dogs: 16 #	 %
EYELIDS				
25.110 DISTICHIASIS	0	0.0%	1	6.3%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	1	7.1%	0	0.0%
100.301 PUNCTATE-ANTERIOR CORTEX	1	7.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1***	***7.1%***	***0***	***0.0%***
OTHER				
900.000 OTHER, UNSPECIFIED	1	7.1%	0	0.0%
NORMAL				
.000 NORMAL GLOBE	13	92.9%	15	93.8%

BARBET

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Cataract	Not defined	1	NO	
C.	Y-suture tip opacity	Not defined	1	Breeder option	
D.	Retinal atrophy				
	- generalized				
	- PRA-*prcd*	Autosomal recessive	2	NO	Mutation in the *prcd* gene

Description and Comments

A. Distichiasis

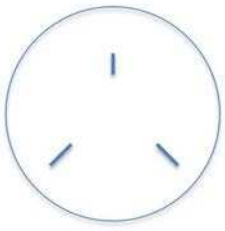
Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. Newer versions of the form (since 3/16/21)

have boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

D. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-*prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited. Unpublished data from genetics laboratories has shown that the principal form of PRA in the Barbet is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically at 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Personal communication with Sue Pearce-Kelling on 10/6/22 based on data from OptiGen

OCULAR DISORDERS REPORT
BARBET

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 259 #	 %	Year Examined: 2019-2023 Total # Dogs: 263 #	 %
EYELIDS				
25.110 DISTICHIASIS	11	4.2%	17	6.5%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	1	0.4%	1	0.4%
UVEA				
93.110 IRIS HYPOPLASIA	0	0.0%	1	0.4%
93.120 UVEAL CYST-SINGLE	1	0.4%	0	0.0%
93.170 UVEAL CYST-MULTIPLE	1	0.4%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	6	2.3%	6	2.3%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	9	3.5%	0	0.0%
FUNDUS				
97.110 CHOROIDAL HYPOPLASIA	1	0.4%	0	0.0%
120.170 RETINAL DYSPLASIA-FOLDS	1	0.4%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	2	0.8%	0	0.0%
120.920 RETINAL DETACHMENT	1	0.4%	0	0.0%
120.960 RETINOPATHY	3	1.2%	0	0.0%
130.110 MICROPAPILLA	2	0.8%	0	0.0%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	34	13.1%	12	4.6%
100.301 PUNCTATE-ANTERIOR CORTEX	7	2.7%	8	3.0%
100.302 PUNCTATE-POSTERIOR CORTEX	1	0.4%	0	0.0%
100.303 PUNCTATE-EQUATORIAL CORTEX	3	1.2%	1	0.4%
100.304 PUNCTATE-ANTERIOR SUTURES	1	0.4%	2	0.8%
100.305 PUNCTATE-POSTERIOR SUTURES	5	1.9%	0	0.0%
100.306 PUNCTATE-NUCLEUS	4	1.5%	1	0.4%
100.307 PUNCTATE-CAPSULAR	3	1.2%	1	0.4%
100.311 INCIPIENT-ANTERIOR CORTEX	4	1.5%	1	0.4%
100.312 INCIPIENT-POSTERIOR CORTEX	2	0.8%	1	0.4%
100.313 INCIPIENT-EQUATORIAL CORTEX	1	0.4%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	0	0.0%	1	0.4%
100.316 INCIPIENT-NUCLEUS	0	0.0%	1	0.4%
100.317 INCIPIENT-CAPSULAR	2	0.8%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	8	3.1%	7	2.7%
100.330 GENERALIZED/ COMPLETE	1	0.4%	1	0.4%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***34***	***13.1%***	***18***	***6.8%***
VITREOUS				
110.320 VITREOUS DEGENERATION-SYNERESIS	1	0.4%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	2	0.8%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	2	0.8%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	12	4.6%	5	1.9%
NORMAL				
.000 NORMAL GLOBE	196	75.7%	217	82.5%

BASENJI

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
	- endothelial	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1-5	Breeder option	
	- iris to cornea	Not defined	1, 2,4,5	NO	
	- iris to lens	Not defined	1,3,5	NO	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
	- endothelial opacity/no strands	Not defined	1-5	NO	
C.	Cataract	Not defined	1,3,4	NO	
D.	Y-suture tip opacity	Not defined	1	Breeder option	
E.	Retinal atrophy				
	- generalized	Not defined	6	NO	
	- *Bas_PRA1*	Autosomal recessive	7	NO	Mutation in the S-antigen (*SAG)*
F.	Optic nerve coloboma	Not defined	2,5	NO	

Description and Comments

A. Corneal dystrophy

- epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

- **endothelial**

breed-related loss or dysfunction of corneal endothelial cells resulting in bilateral, progressive corneal edema.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

In the Basenji, this is a particularly significant problem with many cases reported where the strands bridge between the iris and the cornea resulting in localized corneal opacities which may cause vision impairment. This has also been associated with optic nerve coloboma (see “F” below).

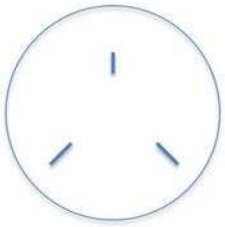
Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

Any opacity of the lens and/or its capsule, regardless of size or location within the lens. Cataracts are assumed to be hereditary unless associated with known trauma, ocular inflammation, specific metabolic diseases, or nutritional deficiencies.

D. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. Newer versions of the form (3/16/21) have boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

E. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. Except for X-linked PRA in the Siberian Husky, in all breeds studied to date, PRA is inherited as an autosomal recessive trait.

- *Bas_PRA1*

A specific mutation has been located in the S-antigen (*SAG)* gene that causes a late onset form of retinal degeneration in the Basenji. The condition is inherited in an autosomal recessive fashion. Initial thinning of the retina evidenced by irregular hypo and hyper-reflectivity of the tapetal fundus is typically noted at 5 years of age with retinal vascular attenuation noted by 6-7 years of age. Clinically the disease closely resembles *prcd*-PRA. The retinal degeneration progresses gradually and ultimately results in complete vision loss. This mutation is responsible for the majority, but not all cases of PRA within the Basenji breed.

F. Optic nerve coloboma

A congenital cavity in the optic nerve which, if large, may cause blindness or vision impairment. In the Basenji, this condition has been associated with persistent pupillary membranes (see above).

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Barnett KC and Knight CG. Persistent pupillary membrane and associated defects in the Basenji. *Vet Rec*. 1969 Aug 30;85:242-248. PMID: 4980462 **reference derived from non-USA dog population**

3. Roberts SR and Bistner SI. Persistent pupillary membrane in Basenji dogs. *J Am Vet Med Assoc*. 1968 Sep 1;153:533-542. PMID: 5691151

4. Mason TA. Persistent pupillary membrane in the Basenji. *Aust Vet J*. 1976 Aug;52:343-344. PMID: 985254 **reference derived from non-USA dog population**

5. Bistner SI, Rubin LF and Roberts SR. A review of persistent pupillary membranes in the Basenji dog.*J Am Anim Hosp Assoc*. 1971;7:143.

6. Priester W. Canine progressive retinal atrophy: Occurrence by age, breed, and sex. *American Journal of Veterinary Research*. 1974;35:571-574.

7. Goldstein O, Jordan JA, Aguirre GD, et al. A non-stop S-antigen gene mutation is associated with late onset hereditary retinal degeneration in dogs. *Mol Vis*. 2013;19:1871-1884. PMID: 24019744

OCULAR DISORDERS REPORT
BASENJI

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 11,442 #	 %	Year Examined: 2019-2023 Total # Dogs: 1,741 #	 %
GLOBE				
.110 MICROPHTHALMOS	9	0.1%	0	0.0%
EYELIDS				
20.160 MACROPALPEBRAL FISSURE	1	0.0%	0	0.0%
21.000 ENTROPION	6	0.1%	3	0.2%
22.000 ECTROPION	1	0.0%	0	0.0%
25.110 DISTICHIASIS	70	0.6%	14	0.8%
NICTITANS				
51.100 CARTILAGE ANOMALY/ EVERSION	0	0.0%	1	0.1%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	2	0.0%	0	0.0%
70.220 EXPOSURE KERATOPATHY SYNDROME	2	0.0%	0	0.0%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	340	3.0%	38	2.2%
70.730 DYSTROPHY-ENDOTHELIAL	253	2.2%	11	0.6%
UVEA				
90.250 PIGMENTARY UVEITIS	1	0.0%	0	0.0%
93.110 IRIS HYPOPLASIA	1	0.0%	1	0.1%
93.120 UVEAL CYST-SINGLE	2	0.0%	1	0.1%
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	18	0.2%	0	0.0%
93.150 IRIS COLOBOMA	9	0.1%	0	0.0%
93.170 UVEAL CYST-MULTIPLE	0	0.0%	10	0.6%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	5,930	51.8%	1,057	60.7%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	469	4.1%	83	4.8%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	1,173	10.3%	181	10.4%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	43	0.4%	7	0.4%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	25	0.2%	42	2.4%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	242	2.1%	213	12.2%
93.810 UVEAL MELANOMA	1	0.0%	0	0.0%
97.150 COLOBOMA	1	0.0%	0	0.0%
FUNDUS				
97.110 CHOROIDAL HYPOPLASIA	1	0.0%	0	0.0%
97.120 COLOBOMA	13	0.1%	0	0.0%
120.170 RETINAL DYSPLASIA-FOLDS	22	0.2%	3	0.2%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	20	0.2%	1	0.1%
120.310 RETINAL ATROPHY-GENERALIZED	381	3.3%	2	0.1%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	7	0.1%	0	0.0%
120.960 RETINOPATHY	13	0.1%	0	0.0%
130.110 MICROPAPILLA	1	0.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	3	0.0%	2	0.1%
LENS				
100.200 CATARACT, UNSPECIFIED	47	0.4%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	499	4.4%	47	2.7%
100.301 PUNCTATE-ANTERIOR CORTEX	53	0.5%	12	0.7%
100.302 PUNCTATE-POSTERIOR CORTEX	30	0.3%	3	0.2%
100.303 PUNCTATE-EQUATORIAL CORTEX	12	0.1%	0	0.0%
100.304 PUNCTATE-ANTERIOR SUTURES	5	0.0%	1	0.1%
100.305 PUNCTATE-POSTERIOR SUTURES	101	0.9%	21	1.2%
100.306 PUNCTATE-NUCLEUS	28	0.2%	7	0.4%
100.307 PUNCTATE-CAPSULAR	89	0.8%	14	0.8%
100.311 INCIPIENT-ANTERIOR CORTEX	34	0.3%	1	0.1%
100.312 INCIPIENT-POSTERIOR CORTEX	29	0.3%	12	0.7%
100.313 INCIPIENT-EQUATORIAL CORTEX	21	0.2%	1	0.1%

OCULAR DISORDERS REPORT
BASENJI

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 11,442 #	 %	Year Examined: 2019-2023 Total # Dogs: 1,741 #	 %
LENS Continued				
100.314 INCIPIENT-ANTERIOR SUTURES	3	0.0%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	36	0.3%	5	0.3%
100.316 INCIPIENT-NUCLEUS	22	0.2%	7	0.4%
100.317 INCIPIENT-CAPSULAR	27	0.2%	3	0.2%
100.322 INCOMPLETE-POSTERIOR CORTEX	0	0.0%	1	0.1%
100.325 INCOMPLETE-POSTERIOR SUTURES	1	0.0%	1	0.1%
100.328 Y-SUTURE TIP OPACITIES	25	0.2%	57	3.3%
100.330 GENERALIZED/ COMPLETE	22	0.2%	0	0.0%
100.375 SUBLUXATION/ LUXATION	9	0.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***560***	***4.9%***	***89***	***5.1%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	10	0.1%	9	0.5%
110.135 PHPV/ PTVL	9	0.1%	2	0.1%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	6	0.1%	3	0.2%
110.320 VITREOUS DEGENERATION-SYNERESIS	25	0.2%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	78	0.7%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	227	2.0%	7	0.4%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	290	2.5%	42	2.4%
NORMAL				
.000 NORMAL GLOBE	4,356	38.1%	395	22.7%

BASSET FAUVE DE BRETAGNE

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Glaucoma				
	- POAG	Autosomal recessive	2	NO	Mutation in the *ADAMTS17* gene
B.	Persistent pupillary membranes				
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	

Description and Comments

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure which, when sustained even for a brief period of time, causes intraocular damage resulting in blindness. The elevated intraocular pressure occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine breed eye screening exam.

POAG in the Basset Fauve de Bretagne is caused by a 19 base pair deletion in exon 2 of *ADAMTS17.* This deletion alters the reading frame and is suspected to cause a truncated protein. The trait shows an autosomal recessive mode of inheritance. A DNA test is available.

B. Persistent pupillary membranes (PPM)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Oliver JA, Forman OP, Pettitt L, et al. Two independent mutations in ADAMTS17 are associated with primary open angle glaucoma in the Basset Hound and Basset Fauve de Bretagne breeds of dog. *PloS one*. 2015;10:e0140436. PMID: 26474315

OCULAR DISORDERS REPORT
BASSET FAUVE DE BRETAGNE

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	77		122	
	Diagnostic Name	**#**	**%**	**#**	**%**
GLOBE					
10.000	GLAUCOMA	2	2.6%	0	0.0%
EYELIDS					
25.110	DISTICHIASIS	1	1.3%	0	0.0%
CORNEA					
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	0	0.0%	1	0.8%
UVEA					
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	2	2.6%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	19	24.7%	8	6.6%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	7	9.1%	3	2.5%
100.302	PUNCTATE-POSTERIOR CORTEX	1	1.3%	0	0.0%
100.305	PUNCTATE-POSTERIOR SUTURES	2	2.6%	1	0.8%
100.306	PUNCTATE-NUCLEUS	1	1.3%	0	0.0%
100.313	INCIPIENT-EQUATORIAL CORTEX	1	1.3%	0	0.0%
100.315	INCIPIENT-POSTERIOR SUTURES	1	1.3%	0	0.0%
100.317	INCIPIENT-CAPSULAR	0	0.0%	2	1.6%
100.322	INCOMPLETE-POSTERIOR CORTEX	2	2.6%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	1	1.3%	1	0.8%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***8***	***10.4%***	***3***	***2.5%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	1	1.3%	1	0.8%
OTHER					
900.110	OTHER-SUSPECTED AS NOT-INHERITED	4	5.2%	3	2.5%
NORMAL					
.000	NORMAL GLOBE	46	59.7%	108	88.5%

BASSET HOUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Keratoconjunctivitis sicca	Not defined	2	NO	
B.	Glaucoma				
	- PCAG	Not defined	3-10	NO	
	- POAG	Autosomal recessive	11	NO	Mutation in the *ADAMTS17* gene
C.	Distichiasis	Not defined	1	Breeder option	
D.	Entropion	Not defined	1	Breeder option	
E.	Ectropion	Not defined	1, 12	Breeder option	
F.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- iris to cornea	Not defined	1	NO	
G.	Cataract	Not defined	1	NO	

Description and Comments

A. Keratoconjunctivitis sicca (KCS)

An abnormality of the tear film, most commonly a deficiency of the aqueous portion, although the mucin and/or lipid layers may be affected; results in ocular irritation and/or vision impairment.

B. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure which, when sustained even for a brief period of time, causes intraocular damage resulting in blindness. The elevated intraocular pressure occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine breed eye screening exam.

In the basset hound, both closed angle (PACG) and open angle (POAG) forms of glaucoma are present. Some basset hounds have an abnormality of the iridocorneal angle termed pectinate ligament dysplasia (also known as goniodysgenesis). This abnormality is not visible during routine ophthalmologic examination using an indirect ophthalmoscope or a slit-lamp microscope. There appears to be an association between pectinate ligament dysplasia and glaucoma, but the mechanism by which the angle defect results in glaucoma has not been determined. It is suspected that mild to severe anterior uveitis impairs outflow of aqueous through the small

perforations that are present in the sheet of tissue in the iridocorneal angle; this results in a secondary and often irreversible rise in intraocular pressure that causes blindness.

The inheritance of PACG and pectinate ligament dysplasia in the basset hound are not known. Until the inheritance is determined, control should be directed to removing dogs from breeding that have glaucoma and have pectinate ligament dysplasia, as well as those dogs that produce progeny affected with glaucoma. Three genetic loci, *COL1A2, RAB22A,* and *NEB,* have been implicated as possible contributors to the development of PACG in the Basset Hound. One is an autosomal recessive missense mutation of a nebulin (NEB) residue on chromosome 19. Because 33% of unaffected animals were homozygous for the risk allele, it was hypothesized that modifying factors may be present. A genetic test is not yet available for PACG.

POAG in the Basset Hound is caused by a 19 base pair deletion in exon 2 of *ADAMTS17.* This deletion alters the reading frame and is suspected to cause a truncated protein. The trait shows an autosomal recessive mode of inheritance. A DNA test is available.

C. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

D. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

E. Ectropion

A conformational defect resulting in eversion of the eyelids, which may cause ocular irritation. It is likely that ectropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

In the Basset Hound, ectropion is associated with an exceptionally large palpebral fissure (macroblepharon) and laxity of the canthal structures. Central lower lid ectropion is often associated with entropion of the adjacent lid segment. This causes severe ocular irritation.

It is acknowledged that factors other than genetics may play a role or be the cause of entropion and/or ectropion. However, when non-genetic factors can be ruled out, selection should be directed to a more normal head conformation that minimizes or eliminates the likelihood of the defects.

F. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

G. Cataract

Any opacity of the lens and/or its capsule, regardless of size or location within the lens. Cataracts are assumed to be hereditary unless associated with known trauma, ocular inflammation, specific metabolic diseases, or nutritional deficiencies.

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OCULAR DISORDERS REPORT
BASSET HOUND

	Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1,907 #	%	2019-2023 158 #	%
GLOBE					
.110	MICROPHTHALMOS	1	0.1%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	6	0.3%	1	0.6%
EYELIDS					
20.140	ECTOPIC CILIA	1	0.1%	0	0.0%
20.160	MACROPALPEBRAL FISSURE	17	0.9%	0	0.0%
21.000	ENTROPION	26	1.4%	4	2.5%
22.000	ECTROPION	137	7.2%	18	11.4%
25.110	DISTICHIASIS	26	1.4%	1	0.6%
32.110	IMPERFORATE LACRIMAL PUNCTUM	0	0.0%	1	0.6%
NICTITANS					
51.100	CARTILAGE ANOMALY/ EVERSION	21	1.1%	2	1.3%
52.110	GLAND PROLAPSE	10	0.5%	5	3.2%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	3	0.2%	0	0.0%
70.220	EXPOSURE KERATOPATHY SYNDROME	3	0.2%	0	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	4	0.2%	1	0.6%
70.730	DYSTROPHY-ENDOTHELIAL	5	0.3%	0	0.0%
UVEA					
93.120	UVEAL CYST-SINGLE	4	0.2%	0	0.0%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.1%	0	0.0%
93.170	UVEAL CYST-MULTIPLE	1	0.1%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	55	2.9%	3	1.9%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	11	0.6%	2	1.3%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	28	1.5%	2	1.3%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	1	0.1%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	1	0.1%	1	0.6%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	4	0.2%	1	0.6%
LENS					
100.200	CATARACT, UNSPECIFIED	6	0.3%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	57	3.0%	10	6.3%
100.301	PUNCTATE-ANTERIOR CORTEX	19	1.0%	2	1.3%
100.302	PUNCTATE-POSTERIOR CORTEX	10	0.5%	0	0.0%
100.303	PUNCTATE-EQUATORIAL CORTEX	6	0.3%	0	0.0%
100.304	PUNCTATE-ANTERIOR SUTURES	3	0.2%	1	0.6%
100.305	PUNCTATE-POSTERIOR SUTURES	9	0.5%	2	1.3%
100.306	PUNCTATE-NUCLEUS	5	0.3%	1	0.6%
100.307	PUNCTATE-CAPSULAR	10	0.5%	2	1.3%
100.311	INCIPIENT-ANTERIOR CORTEX	7	0.4%	1	0.6%
100.312	INCIPIENT-POSTERIOR CORTEX	14	0.7%	0	0.0%
100.313	INCIPIENT-EQUATORIAL CORTEX	2	0.1%	1	0.6%
100.314	INCIPIENT-ANTERIOR SUTURES	1	0.1%	0	0.0%
100.315	INCIPIENT-POSTERIOR SUTURES	3	0.2%	0	0.0%
100.316	INCIPIENT-NUCLEUS	4	0.2%	1	0.6%
100.317	INCIPIENT-CAPSULAR	7	0.4%	0	0.0%
100.322	INCOMPLETE-POSTERIOR CORTEX	0	0.0%	1	0.6%
100.326	INCOMPLETE-NUCLEUS	2	0.1%	0	0.0%
100.327	INCOMPLETE-CAPSULAR	1	0.1%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	1	0.1%	0	0.0%
100.330	GENERALIZED/ COMPLETE	5	0.3%	0	0.0%
100.375	SUBLUXATION/ LUXATION	2	0.1%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***114***	***6.0%***	***12***	***7.6%***

OCULAR DISORDERS REPORT
BASSET HOUND

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1,907 #	 %	Year Examined: 2019-2023 Total # Dogs: 158 #	 %
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	7	0.4%	0	0.0%
110.135 PHPV/ PTVL	1	0.1%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	2	0.1%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	3	0.2%	0	0.0%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	11	0.6%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	2	0.1%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	2	0.1%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	2	0.1%	1	0.6%
OTHER				
900.000 OTHER, UNSPECIFIED	19	1.0%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	49	2.6%	3	1.9%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	105	5.5%	5	3.2%
NORMAL				
.000 NORMAL GLOBE	1,454	76.2%	109	69.0%

BAVARIAN MOUNTAIN SCENT HOUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the BAVARIAN MOUNTAIN SCENT HOUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
BAVARIAN MOUNTAIN SCENT HOUND

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 23 #	 %	Year Examined: 2019-2023 Total # Dogs: 51 #	 %
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	1	4.3%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	0	0.0%	3	5.9%
NORMAL				
.000 NORMAL GLOBE	22	95.7%	48	94.1%

BEAGLE

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Microphthalmia with multiple ocular defects	See below	1, 2	NO	
B.	Glaucoma				
	- POAG	Presumed autosomal recessive	3-15	NO	Mutation in the *ADAMTS10* gene
	- PACG	Not defined	16	NO	
C.	Distichiasis	Not defined	1	Breeder option	
D.	Imperforate lacrimal punctum	Not defined	1	Breeder option	
E.	Corneal dystrophy				
	- epithelial/stromal	Not defined	17-21	Breeder option	
F.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
G.	Cataract	Not defined	1,22,23	NO	
H.	Lens luxation	Not defined, presumed autosomal recessive	24	NO	Potentially *ADAMTS17* mutation but not yet documented in Beagle
I.	Tapetal degeneration	Presumed autosomal recessive	25-28	Breeder option	
J.	Retinal dysplasia				
	- folds	Not defined	1, 29	Breeder option	
K.	Congenital stationary night blindness	Autosomal recessive	30-33	NO	Mutation in the *LRIT3* gene

Description and Comments

A. Microphthalmia with multiple congenital ocular defects

A developmental anomaly in which the eyeball is abnormally small. This is often associated with other ocular malformations, including defects of the cornea, anterior chamber, lens, and/or retina.

In the Beagle, the condition may be present unilaterally or bilaterally and is characterized by a small globe and associated ocular defects which are variable. Several forms of the condition, all apparently different, are recognized:

1) In one study, complete lens opacities were noted by 5-6 months of age; the severity of the cataract correlated closely with the extent of microphthalmia. Severely microphthalmic eyes also had multiple retinal folds. The disorder appeared to be inherited; the exact mode was not fully defined, although an X-linked disorder could not be ruled out.

2) A different form of microphthalmia is recognized in association with microphakia and persistent pupillary membrane (PPM). Based on a limited pedigree of one cross, a dominant inheritance was proposed; heterozygotes have PPM and microphakia/cataract and homozygous affected show microphthalmia and multiple congenital ocular anomalies.

3) A third form of microphthalmia is recognized in the breed. This condition is usually unilateral and the fellow eye is normal. The mode of inheritance has not been defined, but autosomal recessive inheritance is suspected.

B. Glaucoma

Glaucoma is an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine breed eye screening exam.

Primary open angle glaucoma is present in the breed, and extensive breeding studies have demonstrated its inheritance as autosomal recessive. By one year of age, the intraocular pressure (IOP) is elevated, but the filtration angle is open (early glaucoma). Animals with moderate glaucoma show sustained elevations of IOP, focal disinsertions of the lens zonules and focal closures of the iridocorneal angle. Later the globe enlarges, the lens luxates and the eyes become blind and show the effects of chronic glaucoma. The causative mutation in *ADAMTS10* causes an arginine for glycine substitution at position 661. A DNA test is available.

Primary angle closure glaucoma has also been reported in the Beagle.

C. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

D. Imperforate lacrimal punctum

A developmental anomaly resulting in failure of opening of the lacrimal duct located at the medial lid margins. The lower punctum is more frequently affected. This defect usually results in epiphora, an overflow of tears onto the face.

E. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

In the Beagle, corneal dystrophy has been described as an oval opacity located at the junction at the middle and inferior thirds of the cornea. The opacities are caused by accumulation of cholesterol and other lipids within the cornea. Progression was noted with possible vision impairment.

F. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

G. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

Several different types of cataract (anterior capsular, posterior cortical, other) have been reported in the Beagle, but the mode of inheritance of the defects is unknown. When one considers that this breed, particularly the laboratory-bred Beagle, has been the subject of extensive ophthalmological examination, the relatively low incidence of cataracts is surprising.

H. Lens Luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site. Lens luxation may result in elevated intraocular pressure (secondary glaucoma), causing vision impairment, pain, and/or retinal detachment. A mutation in *ADAMTS17* has been associated with primary lens luxation in many canine breeds. A DNA test is available. In addition, lens luxation is often also seen clinically in beagles with POAG due to the *ADAMTS10* mutation (see B. for additional information).

I. Tapetal degeneration

The tapetum lucidum is a modified choroidal structure present in the eyes of many animals that have good night vision. In Beagles there is a recessively inherited defect of the tapetal layer. Absence of this layer is determined by ophthalmoscopy which shows that the fundus has a uniform reddish coloration. The degeneration of the tapetum occurs as a result of abnormal postnatal development of this structure. The degeneration of the tapetum does not affect vision and does not result in functional or structural damage to the retina. As such, the condition probably represents an insignificant inherited variation of no functional significance.

J. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

K. Congenital stationary night blindness (CSNB)

A non-progressive retinal disease characterized by night blindness; day vision is normal. This condition was initially described in a research colony in Japan, and in 2018 was documented in a Beagle obtained from a commercial breeding facility in the USA (Oh et al). Genomic analysis has concluded that this disease is rare in the wider Beagle population. The condition is inherited in an autosomal recessive manner. Affected dogs had normal retinas on clinical examination, but no detectable rod photoreceptor responses with an electroretinogram (ERG). A DNA test is available.

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OCULAR DISORDERS REPORT
BEAGLE

Diagnostic Name	1993-2018 #	1993-2018 %	2019-2023 #	2019-2023 %
Year Examined:	**1993-2018**		**2019-2023**	
Total # Dogs:	**1,835**		**652**	
GLOBE				
.110 MICROPHTHALMOS	4	0.2%	1	0.2%
40.910 KERATOCONJUNCTIVITIS SICCA (KCS)	3	0.2%	3	0.5%
EYELIDS				
21.000 ENTROPION	6	0.3%	1	0.2%
22.000 ECTROPION	1	0.1%	0	0.0%
25.110 DISTICHIASIS	339	18.5%	97	14.9%
32.110 IMPERFORATE LACRIMAL PUNCTUM	9	0.5%	8	1.2%
NICTITANS				
51.100 CARTILAGE ANOMALY/ EVERSION	1	0.1%	0	0.0%
52.110 GLAND PROLAPSE	11	0.6%	0	0.0%
CORNEA				
70.220 EXPOSURE KERATOPATHY SYNDROME	1	0.1%	0	0.0%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	7	0.4%	1	0.2%
70.730 DYSTROPHY-ENDOTHELIAL	2	0.1%	1	0.2%
UVEA				
93.120 UVEAL CYST-SINGLE	2	0.1%	2	0.3%
93.150 IRIS COLOBOMA	0	0.0%	1	0.2%
93.170 UVEAL CYST-MULTIPLE	1	0.1%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	20	1.1%	7	1.1%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	3	0.2%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	1	0.1%	0	0.0%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	1	0.1%	1	0.2%
95.120 UVEAL CYST-FREE FLOATING	1	0.1%	2	0.3%
LENS				
100.200 CATARACT, UNSPECIFIED	9	0.5%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	53	2.9%	15	2.3%
100.301 PUNCTATE-ANTERIOR CORTEX	13	0.7%	2	0.3%
100.302 PUNCTATE-POSTERIOR CORTEX	6	0.3%	1	0.2%
100.303 PUNCTATE-EQUATORIAL CORTEX	2	0.1%	4	0.6%
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100.307 PUNCTATE-CAPSULAR	3	0.2%	2	0.3%
100.311 INCIPIENT-ANTERIOR CORTEX	4	0.2%	6	0.9%
100.312 INCIPIENT-POSTERIOR CORTEX	14	0.8%	3	0.5%
100.313 INCIPIENT-EQUATORIAL CORTEX	8	0.4%	3	0.5%
100.315 INCIPIENT-POSTERIOR SUTURES	1	0.1%	0	0.0%
100.316 INCIPIENT-NUCLEUS	5	0.3%	2	0.3%
100.317 INCIPIENT-CAPSULAR	2	0.1%	1	0.2%
100.322 INCOMPLETE-POSTERIOR CORTEX	1	0.1%	0	0.0%
100.323 INCOMPLETE-EQUATORIAL CORTEX	1	0.1%	0	0.0%
100.325 INCOMPLETE-POSTERIOR SUTURES	1	0.1%	0	0.0%
100.327 INCOMPLETE-CAPSULAR	1	0.1%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	1	0.1%	2	0.3%
100.330 GENERALIZED/ COMPLETE	20	1.1%	1	0.2%
100.375 SUBLUXATION/ LUXATION	1	0.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***102***	***5.6%***	***26***	***4.0%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	1	0.1%	0	0.0%
110.135 PHPV/ PTVL	1	0.1%	1	0.2%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	2	0.1%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	6	0.3%	0	0.0%

OCULAR DISORDERS REPORT
BEAGLE

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1,835 #	 %	Year Examined: 2019-2023 Total # Dogs: 652 #	 %
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	34	1.9%	5	0.8%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	6	0.3%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	8	0.4%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	2	0.1%	0	0.0%
130.110 MICROPAPILLA	1	0.1%	1	0.2%
130.120 OPTIC NERVE HYPOPLASIA	4	0.2%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	18	1.0%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	44	2.4%	1	0.2%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	29	1.6%	27	4.1%
NORMAL				
.000 NORMAL GLOBE	1,340	73.0%	490	75.2%

BEARDED COLLIE

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
D.	Cataract	Not defined	1,2	NO	
E.	Y-suture tip opacity	Not defined	1	Breeder option	
F.	Retinal dysplasia				
	- folds	Not defined	1	Breeder option	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

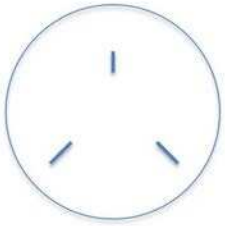
D. Cataract

Any opacity of the lens and/or its capsule, regardless of size or location within the lens. Cataracts

are assumed to be hereditary unless associated with known trauma, ocular inflammation, specific metabolic diseases, or nutritional deficiencies.

E. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. Newer versions of the form (3/16/21) have boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

F. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached), which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Gelatt KN, Mackay EO. Prevalence of primary breed-related cataracts in the dog in North America. *Vet Ophthalmol*. 2005;8:101-111. PMID: 15762923

OCULAR DISORDERS REPORT
BEARDED COLLIE

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	4,100		360	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	2	0.0%	0	0.0%
EYELIDS					
25.110	DISTICHIASIS	30	0.7%	5	1.4%
CORNEA					
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	52	1.3%	5	1.4%
70.730	DYSTROPHY-ENDOTHELIAL	1	0.0%	0	0.0%
UVEA					
93.120	UVEAL CYST-SINGLE	6	0.1%	1	0.3%
93.150	IRIS COLOBOMA	1	0.0%	0	0.0%
93.170	UVEAL CYST-MULTIPLE	1	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	169	4.1%	15	4.2%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	9	0.2%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	2	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	1	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	2	0.0%	2	0.6%
93.810	UVEAL MELANOMA	0	0.0%	1	0.3%
95.120	UVEAL CYST-FREE FLOATING	3	0.1%	0	0.0%
FUNDUS					
97.110	CHOROIDAL HYPOPLASIA	22	0.5%	4	1.1%
97.120	COLOBOMA	4	0.1%	0	0.0%
120.170	RETINAL DYSPLASIA-FOLDS	52	1.3%	6	1.7%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	3	0.1%	2	0.6%
120.310	RETINAL ATROPHY-GENERALIZED	8	0.2%	0	0.0%
120.960	RETINOPATHY	2	0.0%	0	0.0%
LENS					
100.200	CATARACT, UNSPECIFIED	12	0.3%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	418	10.2%	40	11.1%
100.301	PUNCTATE-ANTERIOR CORTEX	62	1.5%	14	3.9%
100.302	PUNCTATE-POSTERIOR CORTEX	18	0.4%	3	0.8%
100.303	PUNCTATE-EQUATORIAL CORTEX	37	0.9%	5	1.4%
100.304	PUNCTATE-ANTERIOR SUTURES	6	0.1%	2	0.6%
100.305	PUNCTATE-POSTERIOR SUTURES	46	1.1%	4	1.1%
100.306	PUNCTATE-NUCLEUS	10	0.2%	8	2.2%
100.307	PUNCTATE-CAPSULAR	24	0.6%	9	2.5%
100.311	INCIPIENT-ANTERIOR CORTEX	41	1.0%	3	0.8%
100.312	INCIPIENT-POSTERIOR CORTEX	37	0.9%	2	0.6%
100.313	INCIPIENT-EQUATORIAL CORTEX	29	0.7%	5	1.4%
100.314	INCIPIENT-ANTERIOR SUTURES	3	0.1%	1	0.3%
100.315	INCIPIENT-POSTERIOR SUTURES	14	0.3%	1	0.3%
100.316	INCIPIENT-NUCLEUS	16	0.4%	4	1.1%
100.317	INCIPIENT-CAPSULAR	12	0.3%	1	0.3%
100.321	INCOMPLETE-ANTERIOR CORTEX	3	0.1%	0	0.0%
100.322	INCOMPLETE-POSTERIOR CORTEX	1	0.0%	0	0.0%
100.327	INCOMPLETE-CAPSULAR	2	0.0%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	24	0.6%	13	3.6%
100.330	GENERALIZED/ COMPLETE	5	0.1%	0	0.0%
100.375	SUBLUXATION/ LUXATION	7	0.2%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***378***	***9.2%***	***62***	***17.2%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	6	0.1%	1	0.3%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.0%	0	0.0%
110.320	VITREOUS DEGENERATION-SYNERESIS	7	0.2%	0	0.0%

OCULAR DISORDERS REPORT
BEARDED COLLIE

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 4,100 #	 %	Year Examined: 2019-2023 Total # Dogs: 360 #	 %
OTHER				
900.000 OTHER, UNSPECIFIED	37	0.9%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	73	1.8%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	53	1.3%	11	3.1%
NORMAL				
.000 NORMAL GLOBE	3,257	79.4%	261	72.5%

BEAUCERON

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
C.	Cataracts	Not defined	1	NO	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded. Breeding discretion is advised.

B. Persistent pupillary membranes (PPM)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
BEAUCERON

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	338		674	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	1	0.3%	0	0.0%
EYELIDS					
25.110	DISTICHIASIS	3	0.9%	8	1.2%
NICTITANS					
51.100	CARTILAGE ANOMALY/ EVERSION	0	0.0%	1	0.1%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	1	0.3%	0	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	1	0.3%	2	0.3%
UVEA					
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	9	2.7%	38	5.6%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	1	0.3%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	0	0.0%	1	0.1%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	24	7.1%	53	7.9%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	0	0.0%	1	0.1%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	12	3.6%	19	2.8%
100.301	PUNCTATE-ANTERIOR CORTEX	1	0.3%	6	0.9%
100.302	PUNCTATE-POSTERIOR CORTEX	1	0.3%	2	0.3%
100.305	PUNCTATE-POSTERIOR SUTURES	3	0.9%	0	0.0%
100.306	PUNCTATE-NUCLEUS	6	1.8%	1	0.1%
100.307	PUNCTATE-CAPSULAR	3	0.9%	12	1.8%
100.311	INCIPIENT-ANTERIOR CORTEX	2	0.6%	1	0.1%
100.312	INCIPIENT-POSTERIOR CORTEX	0	0.0%	2	0.3%
100.313	INCIPIENT-EQUATORIAL CORTEX	0	0.0%	1	0.1%
100.315	INCIPIENT-POSTERIOR SUTURES	2	0.6%	1	0.1%
100.316	INCIPIENT-NUCLEUS	2	0.6%	1	0.1%
100.317	INCIPIENT-CAPSULAR	1	0.3%	0	0.0%
100.322	INCOMPLETE-POSTERIOR CORTEX	1	0.3%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	3	0.9%	0	0.0%
100.375	SUBLUXATION/ LUXATION	2	0.6%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***22***	***6.5%***	***27***	***4.0%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	0	0.0%	2	0.3%
110.135	PHPV/ PTVL	0	0.0%	3	0.4%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	0	0.0%	1	0.1%
110.320	VITREOUS DEGENERATION-SYNERESIS	6	1.8%	3	0.4%
FUNDUS					
120.170	RETINAL DYSPLASIA-FOLDS	1	0.3%	5	0.7%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	1	0.3%	2	0.3%
120.310	RETINAL ATROPHY-GENERALIZED	0	0.0%	1	0.1%
OTHER					
900.000	OTHER, UNSPECIFIED	3	0.9%	0	0.0%
900.110	OTHER-SUSPECTED AS NOT-INHERITED	10	3.0%	23	3.4%
NORMAL					
.000	NORMAL GLOBE	269	79.6%	523	77.6%

BEDLINGTON TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded. Breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
BEDLINGTON TERRIER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1,764 #	%	2019-2023 305 #	%
GLOBE				
.110 MICROPHTHALMOS	5	0.3%	0	0.0%
EYELIDS				
20.140 ECTOPIC CILIA	2	0.1%	0	0.0%
21.000 ENTROPION	2	0.1%	0	0.0%
25.110 DISTICHIASIS	136	7.7%	13	4.3%
32.110 IMPERFORATE LACRIMAL PUNCTUM	15	0.9%	0	0.0%
NICTITANS				
52.110 GLAND PROLAPSE	1	0.1%	0	0.0%
CORNEA				
70.220 EXPOSURE KERATOPATHY SYNDROME	1	0.1%	0	0.0%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	7	0.4%	1	0.3%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	153	8.7%	37	12.1%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	2	0.1%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	5	0.3%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	3	0.2%	0	0.0%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	1	0.1%	0	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	13	0.7%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	131	7.4%	7	2.3%
100.301 PUNCTATE-ANTERIOR CORTEX	17	1.0%	5	1.6%
100.302 PUNCTATE-POSTERIOR CORTEX	5	0.3%	0	0.0%
100.303 PUNCTATE-EQUATORIAL CORTEX	16	0.9%	1	0.3%
100.304 PUNCTATE-ANTERIOR SUTURES	3	0.2%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	39	2.2%	5	1.6%
100.306 PUNCTATE-NUCLEUS	3	0.2%	1	0.3%
100.307 PUNCTATE-CAPSULAR	8	0.5%	1	0.3%
100.311 INCIPIENT-ANTERIOR CORTEX	39	2.2%	3	1.0%
100.312 INCIPIENT-POSTERIOR CORTEX	18	1.0%	0	0.0%
100.313 INCIPIENT-EQUATORIAL CORTEX	32	1.8%	0	0.0%
100.314 INCIPIENT-ANTERIOR SUTURES	4	0.2%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	9	0.5%	3	1.0%
100.316 INCIPIENT-NUCLEUS	4	0.2%	0	0.0%
100.317 INCIPIENT-CAPSULAR	1	0.1%	0	0.0%
100.321 INCOMPLETE-ANTERIOR CORTEX	1	0.1%	0	0.0%
100.322 INCOMPLETE-POSTERIOR CORTEX	1	0.1%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	6	0.3%	4	1.3%
100.330 GENERALIZED/ COMPLETE	16	0.9%	0	0.0%
100.375 SUBLUXATION/ LUXATION	1	0.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***229***	***13.0%***	***19***	***6.2%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	0	0.0%	3	1.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	2	0.1%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	6	0.3%	0	0.0%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	10	0.6%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	3	0.2%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.1%	0	0.0%
120.960 RETINOPATHY	1	0.1%	0	0.0%
130.110 MICROPAPILLA	0	0.0%	2	0.7%
130.120 OPTIC NERVE HYPOPLASIA	1	0.1%	0	0.0%

OCULAR DISORDERS REPORT
BEDLINGTON TERRIER

Year Examined:	1993-2018		2019-2023	
Total # Dogs:	1,764		305	
Diagnostic Name	**#**	**%**	**#**	**%**
OTHER				
900.000 OTHER, UNSPECIFIED	13	0.7%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	34	1.9%	3	1.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	25	1.4%	7	2.3%
NORMAL				
.000 NORMAL GLOBE	1,292	73.2%	228	74.8%

BELGIAN LAEKENOIS

There are 4 varieties of Belgian Shepherd- the Groenendael, Laekenois, Malinois and Tervuren. In Europe these varieties may be interbred and are not considered genetically distinct, thus it is likely that the same genetic diseases exist in all four. In the United States the Groenendael (known as the Belgian Sheepdog), Malinois, Tervuren and Laekenois are recognized as separate breeds.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Cataracts	Not defined	1	NO	

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
BELGIAN LAEKENOIS

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 188 #	 %	Year Examined: 2019-2023 Total # Dogs: 89 #	 %
EYELIDS				
25.110 DISTICHIASIS	5	2.7%	0	0.0%
NICTITANS				
52.110 GLAND PROLAPSE	2	1.1%	0	0.0%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	1	0.5%	0	0.0%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	2	1.1%	1	1.1%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	1	0.5%	1	1.1%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	17	9.0%	6	6.7%
100.301 PUNCTATE-ANTERIOR CORTEX	2	1.1%	4	4.5%
100.302 PUNCTATE-POSTERIOR CORTEX	0	0.0%	1	1.1%
100.303 PUNCTATE-EQUATORIAL CORTEX	1	0.5%	0	0.0%
100.304 PUNCTATE-ANTERIOR SUTURES	1	0.5%	0	0.0%
100.306 PUNCTATE-NUCLEUS	0	0.0%	1	1.1%
100.307 PUNCTATE-CAPSULAR	1	0.5%	1	1.1%
100.311 INCIPIENT-ANTERIOR CORTEX	1	0.5%	1	1.1%
100.312 INCIPIENT-POSTERIOR CORTEX	0	0.0%	3	3.4%
100.314 INCIPIENT-ANTERIOR SUTURES	1	0.5%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	0	0.0%	1	1.1%
100.322 INCOMPLETE-POSTERIOR CORTEX	0	0.0%	2	2.2%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***7***	***3.7%***	***14***	***15.7%***
VITREOUS				
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.5%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	4	2.1%	0	0.0%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	6	3.2%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	1	0.5%	4	4.5%
120.960 RETINOPATHY	0	0.0%	2	2.2%
OTHER				
900.000 OTHER, UNSPECIFIED	4	2.1%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	4	2.1%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	2	1.1%	3	3.4%
NORMAL				
.000 NORMAL GLOBE	155	82.4%	69	77.5%

BELGIAN MALINOIS

There are 4 varieties of Belgian Shepherd- the Groenendael, Laekenois, Malinois and Tervuren. In Europe these varieties may be interbred and are not considered genetically distinct, thus it is likely that the same genetic diseases exist in all four. In the United States the Groenendael (known as the Belgian Sheepdog), Malinois, Tervuren and Laekenois are recognized as separate breeds.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
B	Y-suture tip opacity	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	

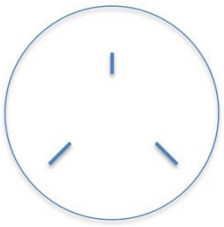
Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. Newer versions of the form (3/16/21) have boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be

associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

In the Belgian Malinois, cataract most often occurs as a non-progressive, triangular opacity in the posterior cortex.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
BELGIAN MALINOIS

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 3,127 #	%	2019-2023 1,106 #	%
GLOBE				
.110 MICROPHTHALMOS	2	0.1%	0	0.0%
EYELIDS				
21.000 ENTROPION	1	0.0%	0	0.0%
22.000 ECTROPION	1	0.0%	0	0.0%
25.110 DISTICHIASIS	3	0.1%	2	0.2%
NICTITANS				
50.210 PLASMOMA/ ATYPICAL PANNUS	1	0.0%	3	0.3%
51.100 CARTILAGE ANOMALY/ EVERSION	2	0.1%	1	0.1%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	11	0.4%	4	0.4%
70.220 EXPOSURE KERATOPATHY SYNDROME	1	0.0%	3	0.3%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	18	0.6%	8	0.7%
70.730 DYSTROPHY-ENDOTHELIAL	2	0.1%	0	0.0%
UVEA				
93.120 UVEAL CYST-SINGLE	9	0.3%	0	0.0%
93.170 UVEAL CYST-MULTIPLE	1	0.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	41	1.3%	21	1.9%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	0	0.0%	1	0.1%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	1	0.0%	2	0.2%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	1	0.0%	1	0.1%
FUNDUS				
97.120 COLOBOMA	1	0.0%	0	0.0%
120.170 RETINAL DYSPLASIA-FOLDS	26	0.8%	2	0.2%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	7	0.2%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	14	0.4%	1	0.1%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	4	0.1%	0	0.0%
120.920 RETINAL DETACHMENT	4	0.1%	0	0.0%
120.960 RETINOPATHY	2	0.1%	2	0.2%
LENS				
100.200 CATARACT, UNSPECIFIED	3	0.1%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	145	4.6%	56	5.1%
100.301 PUNCTATE-ANTERIOR CORTEX	36	1.2%	20	1.8%
100.302 PUNCTATE-POSTERIOR CORTEX	14	0.4%	6	0.5%
100.303 PUNCTATE-EQUATORIAL CORTEX	5	0.2%	1	0.1%
100.304 PUNCTATE-ANTERIOR SUTURES	9	0.3%	6	0.5%
100.305 PUNCTATE-POSTERIOR SUTURES	26	0.8%	4	0.4%
100.306 PUNCTATE-NUCLEUS	10	0.3%	11	1.0%
100.307 PUNCTATE-CAPSULAR	7	0.2%	8	0.7%
100.311 INCIPIENT-ANTERIOR CORTEX	15	0.5%	8	0.7%
100.312 INCIPIENT-POSTERIOR CORTEX	26	0.8%	6	0.5%
100.313 INCIPIENT-EQUATORIAL CORTEX	7	0.2%	2	0.2%
100.314 INCIPIENT-ANTERIOR SUTURES	8	0.3%	1	0.1%
100.315 INCIPIENT-POSTERIOR SUTURES	10	0.3%	1	0.1%
100.316 INCIPIENT-NUCLEUS	20	0.6%	9	0.8%
100.317 INCIPIENT-CAPSULAR	3	0.1%	2	0.2%
100.321 INCOMPLETE-ANTERIOR CORTEX	0	0.0%	5	0.5%
100.322 INCOMPLETE-POSTERIOR CORTEX	0	0.0%	2	0.2%
100.324 INCOMPLETE-ANTERIOR SUTURES	1	0.0%	0	0.0%
100.326 INCOMPLETE-NUCLEUS	1	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	10	0.3%	14	1.3%
100.330 GENERALIZED/ COMPLETE	6	0.2%	0	0.0%
100.375 SUBLUXATION/ LUXATION	1	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***207***	***6.6%***	***92***	***8.3%***

OCULAR DISORDERS REPORT
BELGIAN MALINOIS

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 3,127 #	 %	Year Examined: 2019-2023 Total # Dogs: 1,106 #	 %
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	2	0.1%	7	0.6%
110.135 PHPV/ PTVL	2	0.1%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	2	0.1%	1	0.1%
110.320 VITREOUS DEGENERATION-SYNERESIS	21	0.7%	7	0.6%
OTHER				
900.000 OTHER, UNSPECIFIED	21	0.7%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	78	2.5%	3	0.3%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	53	1.7%	52	4.7%
NORMAL				
.000 NORMAL GLOBE	2,741	87.7%	922	83.4%

BELGIAN SHEEPDOG

(BELGIAN SHEPHERD-GROENENDAEL)

There are 4 varieties of Belgian Shepherd- the Groenendael, Laekenois, Malinois and Tervuren. In Europe these varieties may be interbred and are not considered genetically distinct, thus it is likely that the same genetic diseases exist in all four. In the United States the Groenendael (known as the Belgian Sheepdog), Malinois, Tervuren and Laekenois are recognized as separate breeds.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Chronic superficial keratitis/pannus	Not defined	1	NO	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	
D.	Achiasmic optic nerves with nystagmus	Autosomal recessive	2	NO	

Description and Comments

A. Chronic superficial keratitis/pannus

A bilateral inflammatory disease of the cornea which usually starts as a grayish haze to the ventral or ventrolateral cornea, followed by the formation of a vascularized subepithelial growth that begins to spread toward the central cornea; pigmentation follows the vascularization. If severe, vision impairment occurs. Pannus may be associated with plasma cell infiltration of the nictitans.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.
In the Belgian Sheepdog, cataract most often occurs as a non-progressive, triangular opacity in the posterior cortex.

D. Achiasmatic optic nerves with nystagmus

Achiasmatic optic nerves with nystagmus have been described in a small family of black Belgian Sheepdogs. Congenital nystagmus is the clinical sign most commonly noted. All retinal ganglion cell axons extend directly into the ipsilateral optic disc with no chiasmal decussation. No optic nerve hypoplasia/micropapilla was noted in the

animals studied and reported.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Hogan D and Williams RW. Analysis of the retinas and optic nerves of achiasmatic Belgian sheepdogs. *The Journal of comparative neurology.* 1995 Feb 13;352:367-380. PMID: 7706558

OCULAR DISORDERS REPORT
BELGIAN SHEEPDOG

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 6,278 #	%	2019-2023 882 #	%
GLOBE				
10.000 GLAUCOMA	1	0.0%	0	0.0%
EYELIDS				
22.000 ECTROPION	1	0.0%	0	0.0%
25.110 DISTICHIASIS	13	0.2%	1	0.1%
NICTITANS				
50.210 PLASMOMA/ ATYPICAL PANNUS	8	0.1%	1	0.1%
51.100 CARTILAGE ANOMALY/ EVERSION	3	0.0%	1	0.1%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	63	1.0%	9	1.0%
70.220 EXPOSURE KERATOPATHY SYNDROME	4	0.1%	7	0.8%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	34	0.5%	5	0.6%
70.730 DYSTROPHY-ENDOTHELIAL	1	0.0%	0	0.0%
UVEA				
93.120 UVEAL CYST-SINGLE	3	0.0%	1	0.1%
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.0%	0	0.0%
93.170 UVEAL CYST-MULTIPLE	1	0.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	471	7.5%	70	7.9%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	3	0.0%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	6	0.1%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	5	0.1%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	15	0.2%	7	0.8%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	3	0.0%	1	0.1%
93.810 UVEAL MELANOMA	0	0.0%	1	0.1%
95.120 UVEAL CYST-FREE FLOATING	0	0.0%	1	0.1%
97.150 COLOBOMA	1	0.0%	0	0.0%
FUNDUS				
97.120 COLOBOMA	2	0.0%	0	0.0%
120.170 RETINAL DYSPLASIA-FOLDS	38	0.6%	3	0.3%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	7	0.1%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	4	0.1%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	2	0.0%	0	0.0%
120.960 RETINOPATHY	0	0.0%	1	0.1%
130.110 MICROPAPILLA	30	0.5%	7	0.8%
130.120 OPTIC NERVE HYPOPLASIA	14	0.2%	0	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	13	0.2%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	221	3.5%	35	4.0%
100.301 PUNCTATE-ANTERIOR CORTEX	42	0.7%	11	1.2%
100.302 PUNCTATE-POSTERIOR CORTEX	49	0.8%	12	1.4%
100.303 PUNCTATE-EQUATORIAL CORTEX	5	0.1%	1	0.1%
100.304 PUNCTATE-ANTERIOR SUTURES	5	0.1%	2	0.2%
100.305 PUNCTATE-POSTERIOR SUTURES	23	0.4%	1	0.1%
100.306 PUNCTATE-NUCLEUS	9	0.1%	2	0.2%
100.307 PUNCTATE-CAPSULAR	18	0.3%	12	1.4%
100.311 INCIPIENT-ANTERIOR CORTEX	28	0.4%	6	0.7%
100.312 INCIPIENT-POSTERIOR CORTEX	64	1.0%	12	1.4%
100.313 INCIPIENT-EQUATORIAL CORTEX	15	0.2%	1	0.1%
100.314 INCIPIENT-ANTERIOR SUTURES	4	0.1%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	15	0.2%	3	0.3%
100.316 INCIPIENT-NUCLEUS	11	0.2%	0	0.0%
100.317 INCIPIENT-CAPSULAR	7	0.1%	5	0.6%

OCULAR DISORDERS REPORT
BELGIAN SHEEPDOG

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 6,278 #	 %	Year Examined: 2019-2023 Total # Dogs: 882 #	 %
LENS Continued				
100.321 INCOMPLETE-ANTERIOR CORTEX	1	0.0%	1	0.1%
100.322 INCOMPLETE-POSTERIOR CORTEX	2	0.0%	1	0.1%
100.325 INCOMPLETE-POSTERIOR SUTURES	1	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	9	0.1%	7	0.8%
100.330 GENERALIZED/ COMPLETE	7	0.1%	0	0.0%
100.375 SUBLUXATION/ LUXATION	1	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***319***	***5.1%***	***70***	***7.9%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	3	0.0%	7	0.8%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	4	0.1%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	54	0.9%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	113	1.8%	1	0.1%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	75	1.2%	51	5.8%
NORMAL				
.000 NORMAL GLOBE	5,308	84.5%	670	76.0%

BELGIAN TERVUREN

There are 4 varieties of Belgian Shepherd- the Groenendael, Laekenois, Malinois and Tervuren. In Europe these varieties may be interbred and are not considered genetically distinct, thus it is likely that the same genetic diseases exist in all four. In the United States the Groenendael (known as the Belgian Sheepdog), Malinois, Tervuren and Laekenois are recognized as separate breeds.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Chronic superficial keratitis/pannus	Not defined	1, 2	NO	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
C.	Cataract	Not defined	1	NO	
D.	Micropapilla	Not defined	1	Breeder option	

Description and Comments

A. Chronic superficial keratitis/pannus

A bilateral inflammatory disease of the cornea which usually starts as a grayish haze to the ventral or ventrolateral cornea, followed by the formation of a vascularized subepithelial growth that begins to spread toward the central cornea; pigmentation follows the vascularization. If severe, vision impairment occurs. Pannus may be associated with plasma cell infiltration of the nictitans which may also occur independent of corneal disease.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

In the Belgian Tervuren, cataract most often occurs as a non-progressive, triangular opacity in the posterior cortex.

D. Micropapilla

Micropapilla refers to a small optic disc which is not associated with vision impairment. Optic nerve hypoplasia refers to a congenital defect of the optic nerve which causes blindness and abnormal pupil response in the affected eye. It may be difficult to differentiate between micropapilla and optic nerve hypoplasia on a routine (dilated) screening ophthalmoscopic exam.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Chavkin MJ, Roberts SM, Salman MD, et al. Risk factors for development of chronic superficial keratitis in dogs. *J Am Vet Med Assoc*. 1994 May 15;204:1630-1634. PMID: 8050943

OCULAR DISORDERS REPORT
BELGIAN TERVUREN

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	13,785		1,776	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	4	0.0%	0	0.0%
10.000	GLAUCOMA	1	0.0%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	2	0.0%	2	0.1%
EYELIDS					
21.000	ENTROPION	3	0.0%	0	0.0%
25.110	DISTICHIASIS	121	0.9%	5	0.3%
NICTITANS					
50.210	PLASMOMA/ ATYPICAL PANNUS	8	0.1%	7	0.4%
51.100	CARTILAGE ANOMALY/ EVERSION	21	0.2%	3	0.2%
52.110	GLAND PROLAPSE	1	0.0%	0	0.0%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	104	0.8%	20	1.1%
70.220	EXPOSURE KERATOPATHY SYNDROME	9	0.1%	2	0.1%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	76	0.6%	7	0.4%
70.730	DYSTROPHY-ENDOTHELIAL	7	0.1%	0	0.0%
UVEA					
93.120	UVEAL CYST-SINGLE	15	0.1%	0	0.0%
93.150	IRIS COLOBOMA	2	0.0%	0	0.0%
93.170	UVEAL CYST-MULTIPLE	1	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	1,090	7.9%	205	11.5%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	14	0.1%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	5	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	14	0.1%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	53	0.4%	27	1.5%
93.810	UVEAL MELANOMA	2	0.0%	2	0.1%
95.120	UVEAL CYST-FREE FLOATING	2	0.0%	0	0.0%
FUNDUS					
97.110	CHOROIDAL HYPOPLASIA	1	0.0%	0	0.0%
97.120	COLOBOMA	2	0.0%	0	0.0%
120.170	RETINAL DYSPLASIA-FOLDS	44	0.3%	1	0.1%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	13	0.1%	1	0.1%
120.310	RETINAL ATROPHY-GENERALIZED	23	0.2%	3	0.2%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%
120.920	RETINAL DETACHMENT	1	0.0%	0	0.0%
120.960	RETINOPATHY	6	0.0%	0	0.0%
130.110	MICROPAPILLA	136	1.0%	14	0.8%
130.120	OPTIC NERVE HYPOPLASIA	95	0.7%	3	0.2%
LENS					
100.200	CATARACT, UNSPECIFIED	66	0.5%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	754	5.5%	124	7.0%
100.301	PUNCTATE-ANTERIOR CORTEX	167	1.2%	57	3.2%
100.302	PUNCTATE-POSTERIOR CORTEX	108	0.8%	33	1.9%
100.303	PUNCTATE-EQUATORIAL CORTEX	24	0.2%	8	0.5%
100.304	PUNCTATE-ANTERIOR SUTURES	11	0.1%	12	0.7%
100.305	PUNCTATE-POSTERIOR SUTURES	52	0.4%	6	0.3%
100.306	PUNCTATE-NUCLEUS	16	0.1%	10	0.6%
100.307	PUNCTATE-CAPSULAR	61	0.4%	24	1.4%
100.311	INCIPIENT-ANTERIOR CORTEX	72	0.5%	12	0.7%
100.312	INCIPIENT-POSTERIOR CORTEX	152	1.1%	31	1.7%
100.313	INCIPIENT-EQUATORIAL CORTEX	25	0.2%	7	0.4%
100.314	INCIPIENT-ANTERIOR SUTURES	7	0.1%	0	0.0%
100.315	INCIPIENT-POSTERIOR SUTURES	30	0.2%	6	0.3%

OCULAR DISORDERS REPORT
BELGIAN TERVUREN

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 13,785 #	 %	Year Examined: 2019-2023 Total # Dogs: 1,776 #	 %
LENS Continued				
100.316 INCIPIENT-NUCLEUS	5	0.0%	1	0.1%
100.317 INCIPIENT-CAPSULAR	20	0.1%	10	0.6%
100.321 INCOMPLETE-ANTERIOR CORTEX	1	0.0%	2	0.1%
100.322 INCOMPLETE-POSTERIOR CORTEX	2	0.0%	5	0.3%
100.326 INCOMPLETE-NUCLEUS	0	0.0%	1	0.1%
100.328 Y-SUTURE TIP OPACITIES	18	0.1%	11	0.6%
100.330 GENERALIZED/ COMPLETE	12	0.1%	3	0.2%
100.340 RESORBING/ HYPERMATURE	1	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION	1	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***832***	***6.0%***	***228***	***12.8%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	13	0.1%	9	0.5%
110.135 PHPV/ PTVL	3	0.0%	1	0.1%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	0.0%	1	0.1%
110.320 VITREOUS DEGENERATION-SYNERESIS	40	0.3%	2	0.1%
OTHER				
900.000 OTHER, UNSPECIFIED	107	0.8%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	252	1.8%	1	0.1%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	230	1.7%	93	5.2%
NORMAL				
.000 NORMAL GLOBE	11,285	81.9%	1,256	70.7%

BERGAMASCO

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the BERGAMASCO breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
BERGAMASCO

Year Examined:	1993-2018		2019-2023	
Total # Dogs:	8		10	
Diagnostic Name	**#**	**%**	**#**	**%**
EYELIDS				
25.110 DISTICHIASIS	0	0.0%	1	10.0%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	1	12.5%	0	0.0%
NORMAL				
.000 NORMAL GLOBE	7	87.5%	9	90.0%

BERGER DE PYRENEES

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the BERGER DE PYRENEES breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
BERGER DES PYRENEES

Year Examined:	1993-2018		2019-2023	
Total # Dogs:	3		10	
Diagnostic Name	**#**	**%**	**#**	**%**
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	0	0.0%	2	20.0%
OTHER				
900.110 OTHER-SUSPECTED AS NOT-INHERITED	1	33.3%	0	0.0%
NORMAL				
.000 NORMAL GLOBE	2	66.7%	8	80.0%

BERGER PICARD

(PICARDY SHEPHERD, PICARDIE)

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Nictitans cartilage anomaly/eversion	Not defined	1	Breeder option	
C.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
D.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
E.	Cataract	Not defined	1	NO	
F.	Y-suture tip opacity	Not defined	1	Breeder option	
G.	Retinal atrophy				
	- generalized	Not defined	1,2	NO	
H.	Retinal dysplasia				
	- folds	Not defined	1	Breeder option	
I.	Retinopathy	Not defined	1	Breeder option	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Nictitans cartilage anomaly/eversion

A scroll-like curling of the cartilage of the third eyelid, usually everting the margin. This condition may occur in one or both eyes and may cause mild ocular irritation.

C. Corneal dystrophy- epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and

bilateral.

D. Persistent pupillary membranes (PPMs)

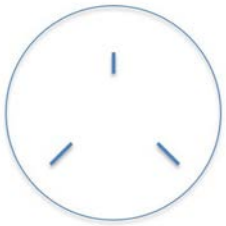
Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

F. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. Newer versions of the form (3/16/21) have boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

G. Retinal atrophy - generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality is also known as progressive retinal atrophy or PRA, and may be detected by electroretinogram (not part of a routine eye screening examination) before there are detectable funduscopic changes seen by ophthalmoscopy. There are multiple genetic types of PRA.

H. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

I. Retinopathy

A lesion similar to canine multifocal retinopathy has been noted in the Berger Picard. The lesions initially appear as

multifocal sub-retinal fluid elevations that over time may become hyper-reflective lesions.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Ortiz F, Kick GR, Donnelly K, et al, Progressive retinal atrophy in Berger Picard dogs. Abstract from the annual American College of Veterinary Ophthalmologists conference, 2022.

OCULAR DISORDERS REPORT
BERGER PICARD

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	1,287		660	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	1	0.1%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	2	0.2%	0	0.0%
EYELIDS					
25.110	DISTICHIASIS	96	7.5%	40	6.1%
NICTITANS					
51.100	CARTILAGE ANOMALY/ EVERSION	27	2.1%	8	1.2%
52.110	GLAND PROLAPSE	1	0.1%	2	0.3%
CORNEA					
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	24	1.9%	13	2.0%
UVEA					
90.250	PIGMENTARY UVEITIS	1	0.1%	0	0.0%
93.120	UVEAL CYST-SINGLE	3	0.2%	1	0.2%
93.150	IRIS COLOBOMA	1	0.1%	0	0.0%
93.170	UVEAL CYST-MULTIPLE	2	0.2%	1	0.2%
93.180	IRIS SPHINCTER DYSPLASIA	1	0.1%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	265	20.6%	39	5.9%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	1	0.1%	1	0.2%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	1	0.1%	0	0.0%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	1	0.1%	0	0.0%
93.810	UVEAL MELANOMA	1	0.1%	0	0.0%
95.120	UVEAL CYST-FREE FLOATING	1	0.1%	0	0.0%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	145	11.3%	61	9.2%
100.301	PUNCTATE-ANTERIOR CORTEX	9	0.7%	14	2.1%
100.302	PUNCTATE-POSTERIOR CORTEX	6	0.5%	4	0.6%
100.303	PUNCTATE-EQUATORIAL CORTEX	3	0.2%	1	0.2%
100.304	PUNCTATE-ANTERIOR SUTURES	2	0.2%	1	0.2%
100.305	PUNCTATE-POSTERIOR SUTURES	95	7.4%	39	5.9%
100.306	PUNCTATE-NUCLEUS	7	0.5%	6	0.9%
100.307	PUNCTATE-CAPSULAR	16	1.2%	9	1.4%
100.311	INCIPIENT-ANTERIOR CORTEX	5	0.4%	7	1.1%
100.312	INCIPIENT-POSTERIOR CORTEX	11	0.9%	10	1.5%
100.313	INCIPIENT-EQUATORIAL CORTEX	3	0.2%	3	0.5%
100.314	INCIPIENT-ANTERIOR SUTURES	1	0.1%	0	0.0%
100.315	INCIPIENT-POSTERIOR SUTURES	26	2.0%	11	1.7%
100.316	INCIPIENT-NUCLEUS	2	0.2%	0	0.0%
100.317	INCIPIENT-CAPSULAR	2	0.2%	6	0.9%
100.321	INCOMPLETE-ANTERIOR CORTEX	2	0.2%	1	0.2%
100.322	INCOMPLETE-POSTERIOR CORTEX	5	0.4%	3	0.5%
100.325	INCOMPLETE-POSTERIOR SUTURES	1	0.1%	2	0.3%
100.326	INCOMPLETE-NUCLEUS	1	0.1%	0	0.0%
100.327	INCOMPLETE-CAPSULAR	1	0.1%	1	0.2%
100.328	Y-SUTURE TIP OPACITIES	86	6.7%	68	10.3%
100.330	GENERALIZED/ COMPLETE	1	0.1%	1	0.2%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***199***	***15.5%***	***119***	***18.0%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	9	0.7%	1	0.2%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	0	0.0%	1	0.2%
110.320	VITREOUS DEGENERATION-SYNERESIS	1	0.1%	1	0.2%
FUNDUS					
120.170	RETINAL DYSPLASIA-FOLDS	224	17.4%	43	6.5%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	10	0.8%	5	0.8%

OCULAR DISORDERS REPORT
BERGER PICARD

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1,287 #	 %	Year Examined: 2019-2023 Total # Dogs: 660 #	 %
FUNDUS Continued				
120.310 RETINAL ATROPHY-GENERALIZED	25	1.9%	12	1.8%
120.960 RETINOPATHY	57	4.4%	16	2.4%
120.970 RETINOPATHY - CMR/ CMR-LIKE	0	0.0%	18	2.7%
130.110 MICROPAPILLA	1	0.1%	2	0.3%
130.120 OPTIC NERVE HYPOPLASIA	0	0.0%	1	0.2%
OTHER				
900.000 OTHER, UNSPECIFIED	25	1.9%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	22	1.7%	2	0.3%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	55	4.3%	45	6.8%
NORMAL				
.000 NORMAL GLOBE	595	46.2%	360	54.5%

BERNESE MOUNTAIN DOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Entropion	Not defined	1	Breeder option
B.	Distichiasis	Not defined	1	Breeder option
C.	Persistent pupillary membranes			
	- iris to iris	Not defined	1	Breeder option
	- lens pigment foci/no strands	Not defined	1	Passes with no notation
D.	Cataract	Not defined	1	NO
E.	Retinal atrophy			
	- generalized	Not defined	2	NO

Description and Comments

A. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and

affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Retinal atrophy - generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. Except for X-linked PRA in the Siberian Husky, in all breeds studied to date, PRA is inherited as an autosomal recessive trait.

In the Bernese Mountain Dog, one French report found the early onset retinopathy to be functionally and electroretinographically similar to the retinal dystrophy seen in the Briard.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Chaudieu G and Molon-Noblot S. Early retinopathy in the Bernese Mountain Dog in France: preliminary observations. *Vet Ophthalmol*. 2004 May-Jun;7:175-184. PMID: 15091325 **non-USA dog population**

OCULAR DISORDERS REPORT
BERNESE MOUNTAIN DOG

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	18,107		3,412	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	7	0.0%	0	0.0%
EYELIDS					
20.160	MACROPALPEBRAL FISSURE	25	0.1%	0	0.0%
21.000	ENTROPION	267	1.5%	42	1.2%
22.000	ECTROPION	116	0.6%	12	0.4%
25.110	DISTICHIASIS	174	1.0%	32	0.9%
32.110	IMPERFORATE LACRIMAL PUNCTUM	1	0.0%	0	0.0%
NICTITANS					
50.210	PLASMOMA/ ATYPICAL PANNUS	0	0.0%	2	0.1%
51.100	CARTILAGE ANOMALY/ EVERSION	43	0.2%	7	0.2%
52.110	GLAND PROLAPSE	1	0.0%	2	0.1%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	3	0.0%	0	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	68	0.4%	17	0.5%
70.730	DYSTROPHY-ENDOTHELIAL	4	0.0%	0	0.0%
UVEA					
93.110	IRIS HYPOPLASIA	1	0.0%	0	0.0%
93.120	UVEAL CYST-SINGLE	51	0.3%	6	0.2%
93.150	IRIS COLOBOMA	8	0.0%	0	0.0%
93.170	UVEAL CYST-MULTIPLE	4	0.0%	3	0.1%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	691	3.8%	176	5.2%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	18	0.1%	2	0.1%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	11	0.1%	1	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	5	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	31	0.2%	36	1.1%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	11	0.1%	4	0.1%
95.120	UVEAL CYST-FREE FLOATING	2	0.0%	2	0.1%
FUNDUS					
97.110	CHOROIDAL HYPOPLASIA	1	0.0%	0	0.0%
120.170	RETINAL DYSPLASIA-FOLDS	43	0.2%	6	0.2%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	9	0.0%	0	0.0%
120.310	RETINAL ATROPHY-GENERALIZED	51	0.3%	0	0.0%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	3	0.0%	0	0.0%
120.920	RETINAL DETACHMENT	1	0.0%	1	0.0%
120.960	RETINOPATHY	8	0.0%	6	0.2%
130.110	MICROPAPILLA	26	0.1%	4	0.1%
130.120	OPTIC NERVE HYPOPLASIA	33	0.2%	5	0.1%
LENS					
100.200	CATARACT, UNSPECIFIED	6	0.0%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	1,064	5.9%	170	5.0%
100.301	PUNCTATE-ANTERIOR CORTEX	193	1.1%	61	1.8%
100.302	PUNCTATE-POSTERIOR CORTEX	114	0.6%	21	0.6%
100.303	PUNCTATE-EQUATORIAL CORTEX	62	0.3%	15	0.4%
100.304	PUNCTATE-ANTERIOR SUTURES	25	0.1%	7	0.2%
100.305	PUNCTATE-POSTERIOR SUTURES	47	0.3%	9	0.3%
100.306	PUNCTATE-NUCLEUS	56	0.3%	23	0.7%
100.307	PUNCTATE-CAPSULAR	63	0.3%	50	1.5%
100.311	INCIPIENT-ANTERIOR CORTEX	65	0.4%	13	0.4%
100.312	INCIPIENT-POSTERIOR CORTEX	185	1.0%	25	0.7%
100.313	INCIPIENT-EQUATORIAL CORTEX	113	0.6%	17	0.5%
100.314	INCIPIENT-ANTERIOR SUTURES	11	0.1%	1	0.0%

OCULAR DISORDERS REPORT
BERNESE MOUNTAIN DOG

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 18,107 #	 %	Year Examined: 2019-2023 Total # Dogs: 3,412 #	 %
LENS Continued				
100.315 INCIPIENT-POSTERIOR SUTURES	30	0.2%	5	0.1%
100.316 INCIPIENT-NUCLEUS	38	0.2%	23	0.7%
100.317 INCIPIENT-CAPSULAR	62	0.3%	16	0.5%
100.321 INCOMPLETE-ANTERIOR CORTEX	2	0.0%	2	0.1%
100.322 INCOMPLETE-POSTERIOR CORTEX	4	0.0%	4	0.1%
100.323 INCOMPLETE-EQUATORIAL CORTEX	4	0.0%	0	0.0%
100.325 INCOMPLETE-POSTERIOR SUTURES	0	0.0%	1	0.0%
100.326 INCOMPLETE-NUCLEUS	7	0.0%	7	0.2%
100.327 INCOMPLETE-CAPSULAR	4	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	10	0.1%	18	0.5%
100.330 GENERALIZED/ COMPLETE	29	0.2%	0	0.0%
100.340 RESORBING/ HYPERMATURE	2	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION	9	0.0%	2	0.1%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1,122***	***6.2%***	***300***	***8.8%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	30	0.2%	13	0.4%
110.135 PHPV/ PTVL	10	0.1%	5	0.1%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	7	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	23	0.1%	1	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	193	1.1%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	459	2.5%	1	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	246	1.4%	90	2.6%
NORMAL				
.000 NORMAL GLOBE	15,382	85.0%	2,753	80.7%

BICHON FRISE

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Entropion	Not defined	1	Breeder option	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
D.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
E.	Cataract	Not defined	1-3	NO	
F.	Y-suture tip opacity	Not defined	1	Breeder option	
G.	Vitreous degeneration	Not defined	1	Breeder option	
	- syneresis				

Description and Comments

A. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Corneal dystrophy- epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

In the Bichon Frise, many of these strands bridge between the iris and cornea where they may be associated with corneal opacities and vision impairment.

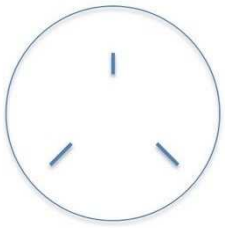
E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

The range in age of animals affected with cataracts in one study was 1-2 years to 9-10 years old, with the peak age of 3 years old. The cataracts involved all regions of the lens, but in age groups of 2-4 years old, the predominant regions affected were the posterior cortex, and the anterior and posterior cortices combined. The earliest abnormalities usually consisted of small punctate opacities in the paracentral posterior cortex, independent of the posterior lens sutures.

F. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. Newer versions of the form (3/16/21) have boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

G. Vitreous degeneration - syneresis

Liquefaction of the vitreous gel which may predispose to retinal detachment.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Gelatt KN, Wallace MR, Andrew SE, et al. Cataracts in the Bichon Frise. *Vet Ophthalmol*. 2003 Mar;6:3-9. PMID: 12641835

3. Schmidt GM and Vainisi SJ. Retrospective study of prophylactic random transscleral retinopexy in the Bichon Frise with cataract. *Vet Ophthalmol*. 2004 Sep-Oct;7:307-310. PMID: 15310289

OCULAR DISORDERS REPORT
BICHON FRISE

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 10,790 #	 %	Year Examined: 2019-2023 Total # Dogs: 1,795 #	 %
GLOBE				
.110 MICROPHTHALMOS	2	0.0%	0	0.0%
40.910 KERATOCONJUNCTIVITIS SICCA (KCS)	2	0.0%	1	0.1%
EYELIDS				
20.140 ECTOPIC CILIA	2	0.0%	0	0.0%
21.000 ENTROPION	8	0.1%	19	1.1%
22.000 ECTROPION	1	0.0%	0	0.0%
25.110 DISTICHIASIS	395	3.7%	83	4.6%
32.110 IMPERFORATE LACRIMAL PUNCTUM	1	0.0%	2	0.1%
NICTITANS				
51.100 CARTILAGE ANOMALY/ EVERSION	1	0.0%	0	0.0%
52.110 GLAND PROLAPSE	1	0.0%	3	0.2%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	2	0.0%	0	0.0%
70.220 EXPOSURE KERATOPATHY SYNDROME	3	0.0%	2	0.1%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	379	3.5%	58	3.2%
70.730 DYSTROPHY-ENDOTHELIAL	7	0.1%	0	0.0%
UVEA				
93.110 IRIS HYPOPLASIA	2	0.0%	0	0.0%
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	2	0.0%	0	0.0%
93.150 IRIS COLOBOMA	4	0.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	264	2.4%	59	3.3%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	13	0.1%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	31	0.3%	2	0.1%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	8	0.1%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	5	0.0%	7	0.4%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	10	0.1%	2	0.1%
FUNDUS				
97.120 COLOBOMA	1	0.0%	0	0.0%
120.170 RETINAL DYSPLASIA-FOLDS	70	0.6%	8	0.4%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	4	0.0%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	59	0.5%	2	0.1%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%
120.960 RETINOPATHY	4	0.0%	2	0.1%
130.110 MICROPAPILLA	2	0.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	1	0.0%	0	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	23	0.2%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	581	5.4%	64	3.6%
100.301 PUNCTATE-ANTERIOR CORTEX	152	1.4%	33	1.8%
100.302 PUNCTATE-POSTERIOR CORTEX	98	0.9%	14	0.8%
100.303 PUNCTATE-EQUATORIAL CORTEX	19	0.2%	5	0.3%
100.304 PUNCTATE-ANTERIOR SUTURES	11	0.1%	3	0.2%
100.305 PUNCTATE-POSTERIOR SUTURES	57	0.5%	10	0.6%
100.306 PUNCTATE-NUCLEUS	22	0.2%	7	0.4%
100.307 PUNCTATE-CAPSULAR	29	0.3%	18	1.0%
100.311 INCIPIENT-ANTERIOR CORTEX	95	0.9%	7	0.4%
100.312 INCIPIENT-POSTERIOR CORTEX	229	2.1%	21	1.2%
100.313 INCIPIENT-EQUATORIAL CORTEX	36	0.3%	7	0.4%
100.314 INCIPIENT-ANTERIOR SUTURES	2	0.0%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	49	0.5%	3	0.2%
100.316 INCIPIENT-NUCLEUS	11	0.1%	2	0.1%

OCULAR DISORDERS REPORT
BICHON FRISE

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 10,790 #	 %	Year Examined: 2019-2023 Total # Dogs: 1,795 #	 %
LENS Continued				
100.317 INCIPIENT-CAPSULAR	15	0.1%	6	0.3%
100.321 INCOMPLETE-ANTERIOR CORTEX	3	0.0%	2	0.1%
100.322 INCOMPLETE-POSTERIOR CORTEX	5	0.0%	4	0.2%
100.327 INCOMPLETE-CAPSULAR	0	0.0%	1	0.1%
100.328 Y-SUTURE TIP OPACITIES	16	0.1%	37	2.1%
100.330 GENERALIZED/ COMPLETE	149	1.4%	2	0.1%
100.375 SUBLUXATION/ LUXATION	4	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1,005***	***9.3%***	***145***	***8.1%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	28	0.3%	12	0.7%
110.135 PHPV/ PTVL	3	0.0%	1	0.1%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	12	0.1%	9	0.5%
110.320 VITREOUS DEGENERATION-SYNERESIS	115	1.1%	18	1.0%
OTHER				
900.000 OTHER, UNSPECIFIED	39	0.4%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	145	1.3%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	93	0.9%	88	4.9%
NORMAL				
.000 NORMAL GLOBE	8,805	81.6%	1,344	74.9%

Biewer Terrier

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
BIEWER TERRIER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 73 #	 %	2019-2023 454 #	 %
GLOBE				
.110 MICROPHTHALMOS	0	0.0%	1	0.2%
40.910 KERATOCONJUNCTIVITIS SICCA (KCS)	0	0.0%	2	0.4%
EYELIDS				
25.110 DISTICHIASIS	1	1.4%	14	3.1%
32.110 IMPERFORATE LACRIMAL PUNCTUM	0	0.0%	3	0.7%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	0	0.0%	5	1.1%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	9	12.3%	44	9.7%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	0	0.0%	2	0.4%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	2	2.7%	5	1.1%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	1	1.4%	0	0.0%
FUNDUS				
97.110 CHOROIDAL HYPOPLASIA	1	1.4%	0	0.0%
120.170 RETINAL DYSPLASIA-FOLDS	0	0.0%	4	0.9%
120.960 RETINOPATHY	0	0.0%	1	0.2%
130.110 MICROPAPILLA	0	0.0%	1	0.2%
130.120 OPTIC NERVE HYPOPLASIA	0	0.0%	1	0.2%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	4	5.5%	5	1.1%
100.302 PUNCTATE-POSTERIOR CORTEX	1	1.4%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	4	5.5%	1	0.2%
100.307 PUNCTATE-CAPSULAR	0	0.0%	4	0.9%
100.312 INCIPIENT-POSTERIOR CORTEX	0	0.0%	1	0.2%
100.315 INCIPIENT-POSTERIOR SUTURES	0	0.0%	2	0.4%
100.317 INCIPIENT-CAPSULAR	0	0.0%	1	0.2%
100.330 GENERALIZED/ COMPLETE	1	1.4%	0	0.0%
100.340 RESORBING/ HYPERMATURE	1	1.4%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***7***	***9.6%***	***9***	***2.0%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	1	1.4%	2	0.4%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	0	0.0%	1	0.2%
110.320 VITREOUS DEGENERATION-SYNERESIS	0	0.0%	3	0.7%
OTHER				
900.000 OTHER, UNSPECIFIED	1	1.4%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	0	0.0%	10	2.2%
NORMAL				
.000 NORMAL GLOBE	59	80.8%	364	80.2%

BLACK AND TAN COONHOUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Cataract	Not defined	1	NO	
B.	Retinal dysplasia				
	- folds	Not defined	1	Breeder option	

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

B. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
BLACK AND TAN COONHOUND

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	655		150	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	1	0.2%	0	0.0%
EYELIDS					
21.000	ENTROPION	3	0.5%	1	0.7%
22.000	ECTROPION	7	1.1%	2	1.3%
25.110	DISTICHIASIS	6	0.9%	1	0.7%
NICTITANS					
51.100	CARTILAGE ANOMALY/ EVERSION	2	0.3%	0	0.0%
52.110	GLAND PROLAPSE	1	0.2%	0	0.0%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	2	0.3%	0	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	0	0.0%	1	0.7%
UVEA					
93.170	UVEAL CYST-MULTIPLE	1	0.2%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	5	0.8%	1	0.7%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	3	0.5%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	0	0.0%	3	2.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	8	1.2%	3	2.0%
FUNDUS					
97.110	CHOROIDAL HYPOPLASIA	1	0.2%	0	0.0%
120.170	RETINAL DYSPLASIA-FOLDS	57	8.7%	17	11.3%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	1	0.2%	0	0.0%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	47	7.2%	8	5.3%
100.301	PUNCTATE-ANTERIOR CORTEX	7	1.1%	0	0.0%
100.302	PUNCTATE-POSTERIOR CORTEX	1	0.2%	0	0.0%
100.303	PUNCTATE-EQUATORIAL CORTEX	2	0.3%	0	0.0%
100.304	PUNCTATE-ANTERIOR SUTURES	3	0.5%	1	0.7%
100.305	PUNCTATE-POSTERIOR SUTURES	2	0.3%	0	0.0%
100.306	PUNCTATE-NUCLEUS	7	1.1%	5	3.3%
100.307	PUNCTATE-CAPSULAR	5	0.8%	1	0.7%
100.311	INCIPIENT-ANTERIOR CORTEX	1	0.2%	0	0.0%
100.312	INCIPIENT-POSTERIOR CORTEX	6	0.9%	2	1.3%
100.314	INCIPIENT-ANTERIOR SUTURES	2	0.3%	0	0.0%
100.316	INCIPIENT-NUCLEUS	4	0.6%	1	0.7%
100.317	INCIPIENT-CAPSULAR	1	0.2%	1	0.7%
100.323	INCOMPLETE-EQUATORIAL CORTEX	1	0.2%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	1	0.2%	1	0.7%
100.330	GENERALIZED/ COMPLETE	3	0.5%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***45***	***6.9%***	***11***	***7.3%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	1	0.2%	1	0.7%
110.135	PHPV/ PTVL	1	0.2%	1	0.7%
110.320	VITREOUS DEGENERATION-SYNERESIS	1	0.2%	0	0.0%
OTHER					
900.000	OTHER, UNSPECIFIED	2	0.3%	0	0.0%
900.100	OTHER-SUSPECTED AS INHERITED	11	1.7%	0	0.0%
900.110	OTHER-SUSPECTED AS NOT-INHERITED	8	1.2%	6	4.0%
NORMAL					
.000	NORMAL GLOBE	495	75.6%	111	74.0%

BLACK RUSSIAN TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	
D.	POANV (polyneuropathy, ocular abnormalities neuronal vacuolation) - Microphthalmia - Cataracts - PPM (iris to iris)	Autosomal recessive	2	NO	Mutation in the *RAB3GAP1: c.743delC* gene

Description and Comments

A. Corneal dystrophy- epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. POANV- Polyneuropathy with ocular abnormalities and neuronal vacuolation

An autosomal recessive condition resulting in juvenile polyneuropathy that presents as laryngeal paralysis and weakness. Patients have concurrent ophthalmic abnormalities including microphthalmia, incomplete cataracts (primarily nuclear) and iris-to-iris PPMs. Neuronal vacuolation was identified on histopathology. Affected dogs were found to be homozygous for the RAB3GAP1: c.743delC mutation. Dogs with this variant are not reported to survive past 6 months.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Mhlanga-Mutangadura T, Johnson GJ, Schnabel RD, et al. A mutation in the Warburg syndrome gene, RAB3GAP1, causes a similar syndrome with polyneuropathy and neuronal vacuolation in Black Russian Terrier dogs. Neurobiology of Disease. 2016;86:75-85. PMID: 26607784

OCULAR DISORDERS REPORT
BLACK RUSSIAN TERRIER

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	742		354	
	Diagnostic Name	**#**	**%**	**#**	**%**
EYELIDS					
21.000	ENTROPION	8	1.1%	4	1.1%
22.000	ECTROPION	4	0.5%	1	0.3%
25.110	DISTICHIASIS	8	1.1%	5	1.4%
NICTITANS					
51.100	CARTILAGE ANOMALY/ EVERSION	1	0.1%	0	0.0%
52.110	GLAND PROLAPSE	1	0.1%	0	0.0%
CORNEA					
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	2	0.3%	5	1.4%
UVEA					
93.110	IRIS HYPOPLASIA	1	0.1%	0	0.0%
93.120	UVEAL CYST-SINGLE	4	0.5%	0	0.0%
93.150	IRIS COLOBOMA	1	0.1%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	15	2.0%	9	2.5%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	2	0.3%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	0	0.0%	1	0.3%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	3	0.4%	3	0.8%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	1	0.1%	1	0.3%
93.810	UVEAL MELANOMA	1	0.1%	0	0.0%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	42	5.7%	19	5.4%
100.301	PUNCTATE-ANTERIOR CORTEX	17	2.3%	15	4.2%
100.302	PUNCTATE-POSTERIOR CORTEX	7	0.9%	2	0.6%
100.303	PUNCTATE-EQUATORIAL CORTEX	1	0.1%	0	0.0%
100.304	PUNCTATE-ANTERIOR SUTURES	2	0.3%	1	0.3%
100.305	PUNCTATE-POSTERIOR SUTURES	3	0.4%	3	0.8%
100.306	PUNCTATE-NUCLEUS	1	0.1%	0	0.0%
100.307	PUNCTATE-CAPSULAR	5	0.7%	4	1.1%
100.311	INCIPIENT-ANTERIOR CORTEX	9	1.2%	5	1.4%
100.312	INCIPIENT-POSTERIOR CORTEX	13	1.8%	4	1.1%
100.315	INCIPIENT-POSTERIOR SUTURES	1	0.1%	1	0.3%
100.316	INCIPIENT-NUCLEUS	1	0.1%	0	0.0%
100.317	INCIPIENT-CAPSULAR	1	0.1%	2	0.6%
100.322	INCOMPLETE-POSTERIOR CORTEX	0	0.0%	1	0.3%
100.323	INCOMPLETE-EQUATORIAL CORTEX	6	0.8%	0	0.0%
100.326	INCOMPLETE-NUCLEUS	0	0.0%	2	0.6%
100.328	Y-SUTURE TIP OPACITIES	1	0.1%	1	0.3%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***67***	***9.0%***	***40***	***11.3%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	1	0.1%	2	0.6%
110.320	VITREOUS DEGENERATION-SYNERESIS	2	0.3%	3	0.8%
FUNDUS					
120.170	RETINAL DYSPLASIA-FOLDS	3	0.4%	1	0.3%
120.920	RETINAL DETACHMENT	0	0.0%	1	0.3%
130.110	MICROPAPILLA	1	0.1%	2	0.6%
130.120	OPTIC NERVE HYPOPLASIA	0	0.0%	2	0.6%
OTHER					
900.000	OTHER, UNSPECIFIED	12	1.6%	0	0.0%
900.100	OTHER-SUSPECTED AS INHERITED	8	1.1%	0	0.0%
900.110	OTHER-SUSPECTED AS NOT-INHERITED	11	1.5%	5	1.4%
NORMAL					
.000	NORMAL GLOBE	628	84.6%	281	79.4%

BLOODHOUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Ectropion	Not defined	1	Breeder option	
B.	Entropion	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- iris to cornea	Not defined	1	NO	
D.	Cataract	Not defined	1	NO	
E.	Retinal dysplasia				
	- folds	Not defined	1	Breeder option	

Description and Comment

A. Ectropion

A conformational defect resulting in eversion of the eyelid(s), which may cause ocular irritation due to exposure. It is likely that ectropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary

membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
BLOODHOUND

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 613 #	 %	Year Examined: 2019-2023 Total # Dogs: 82 #	 %
GLOBE				
.110 MICROPHTHALMOS	1	0.2%	1	1.2%
40.910 KERATOCONJUNCTIVITIS SICCA (KCS)	3	0.5%	1	1.2%
EYELIDS				
20.160 MACROPALPEBRAL FISSURE	75	12.2%	0	0.0%
21.000 ENTROPION	132	21.5%	8	9.8%
22.000 ECTROPION	157	25.6%	8	9.8%
25.110 DISTICHIASIS	11	1.8%	0	0.0%
NICTITANS				
51.100 CARTILAGE ANOMALY/ EVERSION	1	0.2%	0	0.0%
52.110 GLAND PROLAPSE	6	1.0%	0	0.0%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	5	0.8%	0	0.0%
70.220 EXPOSURE KERATOPATHY SYNDROME	3	0.5%	0	0.0%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	0	0.0%	1	1.2%
70.730 DYSTROPHY-ENDOTHELIAL	2	0.3%	1	1.2%
UVEA				
93.120 UVEAL CYST-SINGLE	0	0.0%	1	1.2%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	18	2.9%	6	7.3%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	5	0.8%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	38	6.2%	2	2.4%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	3	0.5%	0	0.0%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	1	0.2%	0	0.0%
95.120 UVEAL CYST-FREE FLOATING	1	0.2%	0	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	1	0.2%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	16	2.6%	3	3.7%
100.301 PUNCTATE-ANTERIOR CORTEX	10	1.6%	2	2.4%
100.302 PUNCTATE-POSTERIOR CORTEX	1	0.2%	0	0.0%
100.306 PUNCTATE-NUCLEUS	3	0.5%	0	0.0%
100.307 PUNCTATE-CAPSULAR	3	0.5%	2	2.4%
100.311 INCIPIENT-ANTERIOR CORTEX	16	2.6%	2	2.4%
100.312 INCIPIENT-POSTERIOR CORTEX	6	1.0%	1	1.2%
100.314 INCIPIENT-ANTERIOR SUTURES	3	0.5%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	1	0.2%	0	0.0%
100.316 INCIPIENT-NUCLEUS	4	0.7%	0	0.0%
100.317 INCIPIENT-CAPSULAR	6	1.0%	1	1.2%
100.321 INCOMPLETE-ANTERIOR CORTEX	1	0.2%	2	2.4%
100.322 INCOMPLETE-POSTERIOR CORTEX	2	0.3%	1	1.2%
100.326 INCOMPLETE-NUCLEUS	0	0.0%	1	1.2%
100.330 GENERALIZED/ COMPLETE	1	0.2%	0	0.0%
100.340 RESORBING/ HYPERMATURE	1	0.2%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***59***	***9.6%***	***12***	***14.6%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	1	0.2%	1	1.2%
110.135 PHPV/ PTVL	1	0.2%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	1	0.2%	0	0.0%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	34	5.5%	5	6.1%
120.310 RETINAL ATROPHY-GENERALIZED	1	0.2%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.2%	0	0.0%

OCULAR DISORDERS REPORT
BLOODHOUND

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	613		82	
	Diagnostic Name	**#**	**%**	**#**	**%**
OTHER					
900.000	OTHER, UNSPECIFIED	5	0.8%	0	0.0%
900.100	OTHER-SUSPECTED AS INHERITED	12	2.0%	1	1.2%
900.110	OTHER-SUSPECTED AS NOT-INHERITED	12	2.0%	6	7.3%
NORMAL					
.000	NORMAL GLOBE	282	46.0%	43	52.4%

BLUE LACY

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the BLUE LACY breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
BLUE LACY

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 6 #	 %	2019-2023 0 #	 %
NORMAL				
.000 NORMAL GLOBE	6	100.0%	0	

BLUE MOUNTAIN SHEPHERD

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the BLUE MOUNTAIN SHEPHERD breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
BLUE MOUNTAIN SHEPHERD

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	1		0	
Diagnostic Name		#	%	#	%
NORMAL					
.000	NORMAL GLOBE	1	100.0%	0	

BLUETICK COONHOUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the BLUETICK COONHOUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
BLUETICK COONHOUND

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 46 #	 %	Year Examined: 2019-2023 Total # Dogs: 35 #	 %
EYELIDS				
22.000 ECTROPION	1	2.2%	0	0.0%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	1	2.2%	1	2.9%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	2	4.3%	0	0.0%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	1	2.2%	1	2.9%
100.313 INCIPIENT-EQUATORIAL CORTEX	0	0.0%	1	2.9%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***0***	***0.0%***	***1***	***2.9%***
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	2	4.3%	1	2.9%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	1	2.2%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	3	6.5%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	1	2.2%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	2	4.3%	1	2.9%
NORMAL				
.000 NORMAL GLOBE	37	80.4%	32	91.4%

BOERBOEL

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Cataract	Not defined	1	NO	
B.	Retinal dysplasia				
	- folds	Not defined	1	Breeder option	
C.	Multifocal retinopathy - IRD-*BEST1* (*cmr1)*	Autosomal recessive	2,3	NO (Breeder option with normal DNA test for *cmr1*)	Mutation in the *BEST1* gene

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

B. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

C. Multifocal retinopoathy – IRD-*BEST1* (*cmr1*)

Canine Multifocal Retinopathy type 1 (*cmr1*) is characterized by numerous distinct (i.e. multi-focal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There may be a serous sub-retinal fluid or accumulation of sub-retinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs between 11-20 weeks of age and there is minimal progression after 1 year of age. The lesions may flatten, leaving areas of retinal thinning and RPE hypertrophy, hyperplasia, and pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE detachments. Many dogs exhibit no noticeable problem with vision or electroretinographic abnormalities despite their abnormal appearing retinas, although variable degrees of retinal degeneration can eventually occur with chronicity.

The breeding advice for breeds diagnosed with "multifocal retinopathy" will be changed from "No" to "Breeder option" if the owner of the dog provides the registering office with results of the DNA test for the affected dog, showing that it is genetically normal, i.e., not a homozygous mutant, for the BEST1 mutation.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Gornik KR, Pirie CG, Duker JS, Boudrieau RJ. Canine multifocal retinopathy caused by a BEST1 mutation in a Boerboel. *Vet Ophthalmol* 2014;17:368-372. PMID 23998685D

3. Personal communication with Sue Pearce-Kelling (formerly Optigen) on September 20th, 2023

OCULAR DISORDERS REPORT
BOERBOEL

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	58		81	
	Diagnostic Name	#	%	#	%
EYELIDS					
20.160	MACROPALPEBRAL FISSURE	1	1.7%	0	0.0%
21.000	ENTROPION	1	1.7%	4	4.9%
22.000	ECTROPION	1	1.7%	0	0.0%
25.110	DISTICHIASIS	3	5.2%	2	2.5%
CORNEA					
70.220	EXPOSURE KERATOPATHY SYNDROME	1	1.7%	0	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	1	1.7%	0	0.0%
70.730	DYSTROPHY-ENDOTHELIAL	1	1.7%	0	0.0%
UVEA					
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	1	1.7%	1	1.2%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	1	1.7%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	2	3.4%	1	1.2%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	0	0.0%	2	2.5%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	2	3.4%	0	0.0%
FUNDUS					
97.110	CHOROIDAL HYPOPLASIA	0	0.0%	1	1.2%
120.170	RETINAL DYSPLASIA-FOLDS	4	6.9%	4	4.9%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	1	1.7%	0	0.0%
120.310	RETINAL ATROPHY-GENERALIZED	0	0.0%	1	1.2%
120.920	RETINAL DETACHMENT	0	0.0%	1	1.2%
120.960	RETINOPATHY	0	0.0%	1	1.2%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	3	5.2%	2	2.5%
100.301	PUNCTATE-ANTERIOR CORTEX	0	0.0%	1	1.2%
100.302	PUNCTATE-POSTERIOR CORTEX	1	1.7%	0	0.0%
100.305	PUNCTATE-POSTERIOR SUTURES	2	3.4%	1	1.2%
100.306	PUNCTATE-NUCLEUS	1	1.7%	0	0.0%
100.312	INCIPIENT-POSTERIOR CORTEX	1	1.7%	0	0.0%
100.315	INCIPIENT-POSTERIOR SUTURES	1	1.7%	0	0.0%
100.316	INCIPIENT-NUCLEUS	0	0.0%	1	1.2%
100.321	INCOMPLETE-ANTERIOR CORTEX	0	0.0%	1	1.2%
100.328	Y-SUTURE TIP OPACITIES	1	1.7%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***6***	***10.3%***	***4***	***4.9%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	1	1.7%	1	1.2%
110.320	VITREOUS DEGENERATION-SYNERESIS	0	0.0%	1	1.2%
OTHER					
900.110	OTHER-SUSPECTED AS NOT-INHERITED	1	1.7%	11	13.6%
NORMAL					
.000	NORMAL GLOBE	41	70.7%	54	66.7%

BOLOGNESE

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
BOLOGNESE

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	799		66	
	Diagnostic Name	#	%	#	%
EYELIDS					
21.000	ENTROPION	3	0.4%	0	0.0%
25.110	DISTICHIASIS	109	13.6%	5	7.6%
32.110	IMPERFORATE LACRIMAL PUNCTUM	2	0.3%	0	0.0%
GLOBE					
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	2	0.3%	0	0.0%
NICTITANS					
52.110	GLAND PROLAPSE	2	0.3%	1	1.5%
CORNEA					
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	15	1.9%	1	1.5%
UVEA					
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	119	14.9%	13	19.7%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	6	0.8%	0	0.0%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	4	0.5%	0	0.0%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	20	2.5%	0	0.0%
100.305	PUNCTATE-POSTERIOR SUTURES	1	0.1%	0	0.0%
100.306	PUNCTATE-NUCLEUS	1	0.1%	0	0.0%
100.307	PUNCTATE-CAPSULAR	1	0.1%	0	0.0%
100.311	INCIPIENT-ANTERIOR CORTEX	2	0.3%	0	0.0%
100.312	INCIPIENT-POSTERIOR CORTEX	2	0.3%	0	0.0%
100.313	INCIPIENT-EQUATORIAL CORTEX	3	0.4%	0	0.0%
100.314	INCIPIENT-ANTERIOR SUTURES	1	0.1%	0	0.0%
100.315	INCIPIENT-POSTERIOR SUTURES	7	0.9%	0	0.0%
100.317	INCIPIENT-CAPSULAR	1	0.1%	1	1.5%
100.330	GENERALIZED/ COMPLETE	4	0.5%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***23***	***2.9%***	***1***	***1.5%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	1	0.1%	0	0.0%
110.135	PHPV/ PTVL	1	0.1%	0	0.0%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	5	0.6%	0	0.0%
110.320	VITREOUS DEGENERATION-SYNERESIS	9	1.1%	1	1.5%
FUNDUS					
120.170	RETINAL DYSPLASIA-FOLDS	6	0.8%	0	0.0%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	1	0.1%	0	0.0%
120.310	RETINAL ATROPHY-GENERALIZED	1	0.1%	0	0.0%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.1%	0	0.0%
130.110	MICROPAPILLA	1	0.1%	0	0.0%
OTHER					
900.000	OTHER, UNSPECIFIED	19	2.4%	0	0.0%
900.100	OTHER-SUSPECTED AS INHERITED	20	2.5%	0	0.0%
900.110	OTHER-SUSPECTED AS NOT-INHERITED	8	1.0%	1	1.5%
NORMAL					
.000	NORMAL GLOBE	578	72.3%	45	68.2%

BORDER COLLIE

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Glaucoma	Not defined	2-4	NO	
B.	Corneal dystrophy		1		
	- epithelial/stromal	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
D.	Cataract	Not defined	1	NO	
E.	Y-suture tip opacity	Not defined	1	Breeder option	
F.	Lens luxation	Not defined	5	NO	
G.	Retinal atrophy				
	- generalized	Suggested X-linked	6	NO	
H.	Choroidal hypoplasia (Collie Eye Anomaly) - optic Nerve coloboma - retinal detachment - retinal hemorrhage - staphyloma/coloboma	Autosomal recessive	1, 7-10	NO	Mutation in the *NHEJ1* gene. See note*

Description and Comments

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated intraocular pressure occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of the IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests are part of a routine screening exam for certification.

Glaucoma in the Border Collie is recognized in the UK. It is associated with a closed angle (goniodysgenesis) and 2 independent studies (Oliver et al, 2020 and Pugh et al, 2019)have associated a variant in Olfactomedin Like 3 (*OLFML*3) with goniodysgenesis and glaucoma in this breed. Affected dogs were described to have varying degrees of pectinate ligament dysplasia (defined as “abnormally broad pectinate ligament fibers or solid sheets of tissue with or without flow holes”) ranging from 20% of the circumference of the angle to >90% of the circumference (Oliver et al, 2017).

B. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Persistent pupillary membranes (PPMs)

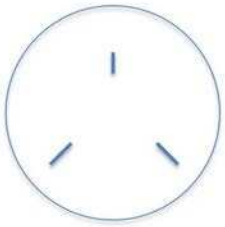
Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

F. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness.

E. Retinal atrophy - generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

H. Choroidal hypoplasia (Collie Eye Anomaly)
- Staphyloma/coloboma
- Retinal detachment
- Retinal hemorrhage
- Optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1.* The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. Genotype-phenotype discordance has been described in European dogs. For colobomas to develop, an additional mutation in a second gene must be present; that gene is still unknown.

***Historical Note:**

Central progressive retinal atrophy was previously a condition listed for this breed. However as the condition is no longer identified in the breed, the condition has been removed. Central progressive retinal atrophy was a progressive retinal degeneration in which photoreceptor death occurred secondary to disease of the underlying pigment epithelium. Progression was slow and some animals never lost vision. CPRA occurred in England but was uncommon elsewhere.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Oliver JA, Ekiri AB, Mellersh CS. Pectinate ligament dysplasia in the Border Collie, Hungarian Vizsla and Golden Retriever. *Vet Rec* 2017;180:279. PMID 27999154**reference derived from non-USA dog population*

3. Oliver JAC, Wright H, Massidda PA, Burmeister LM, Mellersh CS. A variant in OLFML3 is associated with pectinate ligament abnormality and primary closed-angle glaucoma in Border Collies from the United Kingdom. *Vet Ophthalmol* 2020;23:25-36. PMID 31141290 **reference primarily derived from non-USA dog population**

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5. Foster SJ, Curtis R, Barnett KC. Primary lens luxation in the Border Collie. J Small Anim Pract. 1986;27:1 **reference derived from non-USA dog population**

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7. Bedford PG. Collie eye anomaly in the Border Collie. *Vet Rec*. 1982;111:34-35. PMID 6812274 **reference derived from non-USA dog population**

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9. Lowe JK, Kukekova AV, Kirkness EF, et al. Linkage mapping of the primary disease locus for collie eye anomaly. *Genomics*. 2003;82:86-95.

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OCULAR DISORDERS REPORT
BORDER COLLIE

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	27,494		3,075	
	Diagnostic Name	**#**	**%**	**#**	**%**
GLOBE					
.110	MICROPHTHALMOS	13	0.0%	1	0.0%
10.000	GLAUCOMA	1	0.0%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	0	0.0%	1	0.0%
EYELIDS					
21.000	ENTROPION	2	0.0%	0	0.0%
25.110	DISTICHIASIS	132	0.5%	16	0.5%
NICTITANS					
50.210	PLASMOMA/ ATYPICAL PANNUS	0	0.0%	1	0.0%
51.100	CARTILAGE ANOMALY/ EVERSION	7	0.0%	0	0.0%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	22	0.1%	4	0.1%
70.220	EXPOSURE KERATOPATHY SYNDROME	1	0.0%	1	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	236	0.9%	39	1.3%
70.730	DYSTROPHY-ENDOTHELIAL	5	0.0%	0	0.0%
UVEA					
90.250	PIGMENTARY UVEITIS	1	0.0%	1	0.0%
93.110	IRIS HYPOPLASIA	2	0.0%	2	0.1%
93.120	UVEAL CYST-SINGLE	9	0.0%	1	0.0%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	2	0.0%	0	0.0%
93.150	IRIS COLOBOMA	8	0.0%	0	0.0%
93.170	UVEAL CYST-MULTIPLE	1	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	1,726	6.3%	206	6.7%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	36	0.1%	4	0.1%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	35	0.1%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	15	0.1%	1	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	13	0.0%	17	0.6%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	4	0.0%	3	0.1%
93.810	UVEAL MELANOMA	1	0.0%	2	0.1%
95.120	UVEAL CYST-FREE FLOATING	2	0.0%	0	0.0%
97.150	COLOBOMA	3	0.0%	0	0.0%
FUNDUS					
97.110	CHOROIDAL HYPOPLASIA	464	1.7%	12	0.4%
97.120	COLOBOMA	48	0.2%	0	0.0%
120.170	RETINAL DYSPLASIA-FOLDS	210	0.8%	8	0.3%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	16	0.1%	2	0.1%
120.310	RETINAL ATROPHY-GENERALIZED	238	0.9%	9	0.3%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	18	0.1%	0	0.0%
120.920	RETINAL DETACHMENT	1	0.0%	0	0.0%
120.960	RETINOPATHY	22	0.1%	1	0.0%
130.110	MICROPAPILLA	23	0.1%	2	0.1%
130.120	OPTIC NERVE HYPOPLASIA	19	0.1%	0	0.0%
LENS					
100.200	CATARACT, UNSPECIFIED	57	0.2%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	1,305	4.7%	180	5.9%
100.301	PUNCTATE-ANTERIOR CORTEX	172	0.6%	45	1.5%
100.302	PUNCTATE-POSTERIOR CORTEX	88	0.3%	10	0.3%
100.303	PUNCTATE-EQUATORIAL CORTEX	64	0.2%	17	0.6%
100.304	PUNCTATE-ANTERIOR SUTURES	9	0.0%	7	0.2%
100.305	PUNCTATE-POSTERIOR SUTURES	236	0.9%	46	1.5%
100.306	PUNCTATE-NUCLEUS	52	0.2%	19	0.6%
100.307	PUNCTATE-CAPSULAR	70	0.3%	26	0.8%

OCULAR DISORDERS REPORT
BORDER COLLIE

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 27,494 #	 %	Year Examined: 2019-2023 Total # Dogs: 3,075 #	 %
LENS Continued				
100.311 INCIPIENT-ANTERIOR CORTEX	152	0.6%	17	0.6%
100.312 INCIPIENT-POSTERIOR CORTEX	115	0.4%	9	0.3%
100.313 INCIPIENT-EQUATORIAL CORTEX	138	0.5%	23	0.7%
100.314 INCIPIENT-ANTERIOR SUTURES	14	0.1%	1	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	68	0.2%	29	0.9%
100.316 INCIPIENT-NUCLEUS	38	0.1%	13	0.4%
100.317 INCIPIENT-CAPSULAR	35	0.1%	11	0.4%
100.321 INCOMPLETE-ANTERIOR CORTEX	12	0.0%	4	0.1%
100.322 INCOMPLETE-POSTERIOR CORTEX	7	0.0%	5	0.2%
100.323 INCOMPLETE-EQUATORIAL CORTEX	5	0.0%	1	0.0%
100.325 INCOMPLETE-POSTERIOR SUTURES	1	0.0%	1	0.0%
100.326 INCOMPLETE-NUCLEUS	4	0.0%	1	0.0%
100.327 INCOMPLETE-CAPSULAR	2	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	100	0.4%	147	4.8%
100.330 GENERALIZED/ COMPLETE	30	0.1%	0	0.0%
100.340 RESORBING/ HYPERMATURE	1	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION	14	0.1%	1	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1,370***	***5.0%***	***285***	***9.3%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	68	0.2%	12	0.4%
110.135 PHPV/ PTVL	20	0.1%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	18	0.1%	6	0.2%
110.320 VITREOUS DEGENERATION-SYNERESIS	165	0.6%	26	0.8%
OTHER				
900.000 OTHER, UNSPECIFIED	214	0.8%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	607	2.2%	4	0.1%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	314	1.1%	177	5.8%
NORMAL				
.000 NORMAL GLOBE	22,775	82.8%	2,246	73.0%

BORDER TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	
D.	Y-suture tip opacity	Not defined	1	Breeder option	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

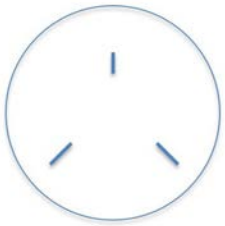
Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. Newer versions of the form (3/16/21) have boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
BORDER TERRIER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 6,925 #	%	2019-2023 1,643 #	%
EYELIDS				
21.000 ENTROPION	3	0.0%	0	0.0%
25.110 DISTICHIASIS	50	0.7%	21	1.3%
32.110 IMPERFORATE LACRIMAL PUNCTUM	1	0.0%	2	0.1%
NICTITANS				
52.110 GLAND PROLAPSE	1	0.0%	0	0.0%
CORNEA				
70.220 EXPOSURE KERATOPATHY SYNDROME	0	0.0%	1	0.1%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	14	0.2%	2	0.1%
UVEA				
93.120 UVEAL CYST-SINGLE	1	0.0%	0	0.0%
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	198	2.9%	73	4.4%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	1	0.0%	1	0.1%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	3	0.0%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	2	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	2	0.0%	6	0.4%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	1	0.0%	0	0.0%
FUNDUS				
97.110 CHOROIDAL HYPOPLASIA	1	0.0%	0	0.0%
97.120 COLOBOMA	1	0.0%	0	0.0%
120.170 RETINAL DYSPLASIA-FOLDS	15	0.2%	4	0.2%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	8	0.1%	1	0.1%
120.310 RETINAL ATROPHY-GENERALIZED	13	0.2%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%
120.960 RETINOPATHY	0	0.0%	5	0.3%
130.110 MICROPAPILLA	0	0.0%	3	0.2%
130.120 OPTIC NERVE HYPOPLASIA	1	0.0%	1	0.1%
LENS				
100.200 CATARACT, UNSPECIFIED	9	0.1%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	462	6.7%	121	7.4%
100.301 PUNCTATE-ANTERIOR CORTEX	88	1.3%	48	2.9%
100.302 PUNCTATE-POSTERIOR CORTEX	37	0.5%	15	0.9%
100.303 PUNCTATE-EQUATORIAL CORTEX	37	0.5%	9	0.5%
100.304 PUNCTATE-ANTERIOR SUTURES	8	0.1%	3	0.2%
100.305 PUNCTATE-POSTERIOR SUTURES	115	1.7%	28	1.7%
100.306 PUNCTATE-NUCLEUS	10	0.1%	8	0.5%
100.307 PUNCTATE-CAPSULAR	32	0.5%	28	1.7%
100.311 INCIPIENT-ANTERIOR CORTEX	79	1.1%	29	1.8%
100.312 INCIPIENT-POSTERIOR CORTEX	63	0.9%	11	0.7%
100.313 INCIPIENT-EQUATORIAL CORTEX	90	1.3%	13	0.8%
100.314 INCIPIENT-ANTERIOR SUTURES	4	0.1%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	21	0.3%	4	0.2%
100.316 INCIPIENT-NUCLEUS	15	0.2%	3	0.2%
100.317 INCIPIENT-CAPSULAR	11	0.2%	5	0.3%
100.321 INCOMPLETE-ANTERIOR CORTEX	8	0.1%	5	0.3%
100.322 INCOMPLETE-POSTERIOR CORTEX	10	0.1%	2	0.1%
100.323 INCOMPLETE-EQUATORIAL CORTEX	4	0.1%	3	0.2%
100.326 INCOMPLETE-NUCLEUS	1	0.0%	1	0.1%
100.327 INCOMPLETE-CAPSULAR	1	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	85	1.2%	115	7.0%
100.330 GENERALIZED/ COMPLETE	22	0.3%	0	0.0%

OCULAR DISORDERS REPORT
BORDER TERRIER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 6,925 #	 %	Year Examined: 2019-2023 Total # Dogs: 1,643 #	 %
LENS Continued				
100.340 RESORBING/ HYPERMATURE	3	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION	1	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***668***	***9.6%***	***215***	***13.1%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	9	0.1%	4	0.2%
110.135 PHPV/ PTVL	0	0.0%	1	0.1%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	17	0.2%	4	0.2%
110.320 VITREOUS DEGENERATION-SYNERESIS	63	0.9%	7	0.4%
OTHER				
900.000 OTHER, UNSPECIFIED	56	0.8%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	130	1.9%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	112	1.6%	45	2.7%
NORMAL				
.000 NORMAL GLOBE	5,988	86.5%	1,246	75.8%

BORZOI

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
B.	Cataract	Not defined	1	NO	
C.	Retinopathy	Not defined	1, 2	Breeder option	

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Retinopathy

Patchy focal unilateral or bilateral hyper reflective tapetal lesions most frequently peripheral but occasionally central around a pigmented spot, usually non progressive. Not usually present prior to 3 months of age but usually present by 18 months of age.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Storey ES, Grahn BH and Alcorn J. Multifocal chorioretinal lesions in Borzoi dogs. *Vet Ophthalmol*. 2005 Sep-Oct;8:337-347. PMID: 16178845

OCULAR DISORDERS REPORT
BORZOI

Diagnostic Name	1993-2018 #	1993-2018 %	2019-2023 #	2019-2023 %
	Year Examined:	**1993-2018**	**2019-2023**	
	Total # Dogs:	**3,868**	**1,054**	
GLOBE				
.110 MICROPHTHALMOS	7	0.2%	1	0.1%
EYELIDS				
20.160 MACROPALPEBRAL FISSURE	1	0.0%	0	0.0%
25.110 DISTICHIASIS	10	0.3%	1	0.1%
NICTITANS				
50.210 PLASMOMA/ ATYPICAL PANNUS	1	0.0%	2	0.2%
51.100 CARTILAGE ANOMALY/ EVERSION	2	0.1%	3	0.3%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	17	0.4%	9	0.9%
70.220 EXPOSURE KERATOPATHY SYNDROME	1	0.0%	1	0.1%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	16	0.4%	0	0.0%
70.730 DYSTROPHY-ENDOTHELIAL	1	0.0%	0	0.0%
UVEA				
93.120 UVEAL CYST-SINGLE	7	0.2%	1	0.1%
93.170 UVEAL CYST-MULTIPLE	2	0.1%	1	0.1%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	79	2.0%	20	1.9%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	6	0.2%	1	0.1%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	11	0.3%	2	0.2%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	1	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	3	0.1%	2	0.2%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	2	0.1%	0	0.0%
93.810 UVEAL MELANOMA	3	0.1%	3	0.3%
95.120 UVEAL CYST-FREE FLOATING	1	0.0%	1	0.1%
LENS				
100.200 CATARACT, UNSPECIFIED	2	0.1%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	118	3.1%	29	2.8%
100.301 PUNCTATE-ANTERIOR CORTEX	13	0.3%	4	0.4%
100.302 PUNCTATE-POSTERIOR CORTEX	14	0.4%	1	0.1%
100.303 PUNCTATE-EQUATORIAL CORTEX	2	0.1%	1	0.1%
100.304 PUNCTATE-ANTERIOR SUTURES	2	0.1%	1	0.1%
100.305 PUNCTATE-POSTERIOR SUTURES	18	0.5%	0	0.0%
100.306 PUNCTATE-NUCLEUS	2	0.1%	3	0.3%
100.307 PUNCTATE-CAPSULAR	10	0.3%	20	1.9%
100.311 INCIPIENT-ANTERIOR CORTEX	13	0.3%	3	0.3%
100.312 INCIPIENT-POSTERIOR CORTEX	19	0.5%	0	0.0%
100.313 INCIPIENT-EQUATORIAL CORTEX	7	0.2%	0	0.0%
100.314 INCIPIENT-ANTERIOR SUTURES	2	0.1%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	1	0.0%	0	0.0%
100.316 INCIPIENT-NUCLEUS	3	0.1%	1	0.1%
100.317 INCIPIENT-CAPSULAR	11	0.3%	1	0.1%
100.321 INCOMPLETE-ANTERIOR CORTEX	0	0.0%	1	0.1%
100.322 INCOMPLETE-POSTERIOR CORTEX	0	0.0%	2	0.2%
100.324 INCOMPLETE-ANTERIOR SUTURES	1	0.0%	0	0.0%
100.327 INCOMPLETE-CAPSULAR	1	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	9	0.2%	6	0.6%
100.330 GENERALIZED/ COMPLETE	8	0.2%	1	0.1%
100.340 RESORBING/ HYPERMATURE	1	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION	4	0.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***130***	***3.4%***	***39***	***3.7%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	14	0.4%	1	0.1%

OCULAR DISORDERS REPORT
BORZOI

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 3,868 #	 %	Year Examined: 2019-2023 Total # Dogs: 1,054 #	 %
VITREOUS Continued				
110.135 PHPV/ PTVL	11	0.3%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	4	0.1%	3	0.3%
110.320 VITREOUS DEGENERATION-SYNERESIS	9	0.2%	3	0.3%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	10	0.3%	0	0.0%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	9	0.2%	4	0.4%
120.310 RETINAL ATROPHY-GENERALIZED	27	0.7%	5	0.5%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	5	0.1%	0	0.0%
120.920 RETINAL DETACHMENT	2	0.1%	0	0.0%
120.960 RETINOPATHY	32	0.8%	25	2.4%
120.970 RETINOPATHY - CMR/ CMR-LIKE	0	0.0%	3	0.3%
130.110 MICROPAPILLA	14	0.4%	4	0.4%
130.120 OPTIC NERVE HYPOPLASIA	16	0.4%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	44	1.1%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	110	2.8%	3	0.3%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	107	2.8%	76	7.2%
NORMAL				
.000 NORMAL GLOBE	3,336	86.2%	862	81.8%

BOSTON TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Glaucoma	Not defined	2,3	NO	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Imperforate lacrimal punctum	Not defined	1	Breeder option	
D.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
	- endothelial	Not defined	4,5	NO	
E.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
F.	Cataract				
	- generalized	Not defined	1, 6, 7	NO	
	- *HSF4*	Autosomal recessive	5,8	NO	Mutation in the *HSF4* gene (*HSF4-1*)
G.	Vitreous degeneration				
	- syneresis	Not defined	1	Breeder option	
H.	Multifocal retinopathy *IRD-BEST1* (*cmr1)*	Autosomal recessive	9	NO (Breeder option with Normal DNA test for *cmr1*)	Mutation in the *BEST1* gene

Description and Comments

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated intraocular pressure occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of the IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests are part of a routine screening exam for certification.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds.

Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Imperforate lacrimal punctum

A developmental anomaly resulting in failure of opening of the lacrimal duct located at the medial lid margins. The lower punctum is more frequently affected. This defect usually results in epiphora, an overflow of tears onto the face.

D. Corneal dystrophy

- epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

- endothelial

Corneal endothelial dystrophy is an abnormal loss of the inner lining of the cornea that causes progressive fluid retention (edema). With time the edema results in keratitis and decreased vision. This usually does not occur until the animal is older. Reduced density of the endothelial cells has been documented compared with age-matched control dogs, with progressive loss of cells documented over an approximate 1-year period.

In the Boston Terrier, this is a primary degenerative endothelial disease leading to progressive and permanent corneal edema. It is not known if this disease is an inherited disorder. There is no sex predilection. The condition is observed in older dogs, 6 to 13 years of age with a mean of 9.5 years. The corneal edema starts asymptomatically in the dorsal temporal corneal quadrant of one eye and slowly progresses medially, eventually involving the entire cornea. Typically, it becomes bilateral. In the later stages, discomfort, intracorneal bullae with subsequent ulceration and keratoconus may develop.

E. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally during the first three months of life. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

F. Cataract

- generalized

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

- HSF4

The Boston Terrier has at least two distinct forms of inherited cataract. One type has an onset before 6 months of age with rapid progression to complete opacity prior to 2 years old. The early onset cataract is inherited as an autosomal recessive mutation in the *HSF4* gene (*HSF4-1*). A DNA test is available. A second type of cataract occurs after 4-5 years of age with variable progression. The genetic mutation responsible for this cataract is not yet known.

G. Vitreous degeneration - syneresis

Liquefaction of the vitreous gel which may predispose to retinal detachment.

H. Multifocal retinopathy - IRD-*BEST1* (*cmr1)*

Canine Multifocal Retinopathy type 1 (*cmr1*) is characterized by numerous distinct (i.e. multi-focal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There may be a serous sub-retinal fluid or accumulation of sub-retinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs between 11-20 weeks of age and there is minimal progression after 1 year of age. The lesions may flatten, leaving areas of retinal thinning and RPE hypertrophy, hyperplasia, and pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE detachments. Many dogs exhibit no noticeable problem with vision or electroretinographic abnormalities despite their abnormal appearing retinas, although variable degrees of retinal degeneration can eventually occur with chronicity.

The breeding advice for breeds diagnosed with "multifocal retinopathy" will be changed from "No" to "Breeder option" if the owner of the dog provides the registering office with results of the DNA test for the affected dog, showing that it is genetically normal, i.e., not a homozygous mutant, for the *BEST1* mutation.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Slater MR, Erb HN. Effects of risk factors and prophylactic treatment on primary glaucoma in the dog. *J Am Vet Med Assoc*. 1986;188:1028-1030. PMID 3710885

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OCULAR DISORDERS REPORT
BOSTON TERRIER

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	15,741		4,169	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	4	0.0%	2	0.0%
10.000	GLAUCOMA	1	0.0%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	14	0.1%	0	0.0%
EYELIDS					
20.140	ECTOPIC CILIA	5	0.0%	0	0.0%
20.160	MACROPALPEBRAL FISSURE	12	0.1%	0	0.0%
21.000	ENTROPION	44	0.3%	15	0.4%
22.000	ECTROPION	2	0.0%	0	0.0%
25.110	DISTICHIASIS	540	3.4%	119	2.9%
32.110	IMPERFORATE LACRIMAL PUNCTUM	67	0.4%	82	2.0%
NICTITANS					
50.210	PLASMOMA/ ATYPICAL PANNUS	2	0.0%	2	0.0%
51.100	CARTILAGE ANOMALY/ EVERSION	1	0.0%	1	0.0%
52.110	GLAND PROLAPSE	12	0.1%	2	0.0%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	1	0.0%	0	0.0%
70.220	EXPOSURE KERATOPATHY SYNDROME	21	0.1%	8	0.2%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	361	2.3%	96	2.3%
70.730	DYSTROPHY-ENDOTHELIAL	27	0.2%	6	0.1%
UVEA					
93.110	IRIS HYPOPLASIA	7	0.0%	1	0.0%
93.120	UVEAL CYST-SINGLE	25	0.2%	2	0.0%
93.150	IRIS COLOBOMA	8	0.1%	0	0.0%
93.170	UVEAL CYST-MULTIPLE	8	0.1%	1	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	605	3.8%	155	3.7%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	14	0.1%	2	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	7	0.0%	3	0.1%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	8	0.1%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	1	0.0%	1	0.0%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	0	0.0%	2	0.0%
93.810	UVEAL MELANOMA	1	0.0%	0	0.0%
95.120	UVEAL CYST-FREE FLOATING	7	0.0%	4	0.1%
FUNDUS					
97.110	CHOROIDAL HYPOPLASIA	3	0.0%	2	0.0%
120.170	RETINAL DYSPLASIA-FOLDS	37	0.2%	5	0.1%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	15	0.1%	2	0.0%
120.310	RETINAL ATROPHY-GENERALIZED	11	0.1%	2	0.0%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%
120.920	RETINAL DETACHMENT	2	0.0%	1	0.0%
120.960	RETINOPATHY	4	0.0%	3	0.1%
130.110	MICROPAPILLA	1	0.0%	0	0.0%
130.120	OPTIC NERVE HYPOPLASIA	2	0.0%	1	0.0%
LENS					
100.200	CATARACT, UNSPECIFIED	81	0.5%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	365	2.3%	68	1.6%
100.301	PUNCTATE-ANTERIOR CORTEX	223	1.4%	50	1.2%
100.302	PUNCTATE-POSTERIOR CORTEX	60	0.4%	10	0.2%
100.303	PUNCTATE-EQUATORIAL CORTEX	97	0.6%	18	0.4%
100.304	PUNCTATE-ANTERIOR SUTURES	50	0.3%	14	0.3%
100.305	PUNCTATE-POSTERIOR SUTURES	36	0.2%	4	0.1%
100.306	PUNCTATE-NUCLEUS	18	0.1%	1	0.0%

OCULAR DISORDERS REPORT
BOSTON TERRIER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 15,741 #	 %	Year Examined: 2019-2023 Total # Dogs: 4,169 #	 %
LENS Continued				
100.307 PUNCTATE-CAPSULAR	50	0.3%	18	0.4%
100.311 INCIPIENT-ANTERIOR CORTEX	716	4.5%	140	3.4%
100.312 INCIPIENT-POSTERIOR CORTEX	172	1.1%	30	0.7%
100.313 INCIPIENT-EQUATORIAL CORTEX	322	2.0%	48	1.2%
100.314 INCIPIENT-ANTERIOR SUTURES	93	0.6%	8	0.2%
100.315 INCIPIENT-POSTERIOR SUTURES	38	0.2%	3	0.1%
100.316 INCIPIENT-NUCLEUS	23	0.1%	3	0.1%
100.317 INCIPIENT-CAPSULAR	20	0.1%	5	0.1%
100.321 INCOMPLETE-ANTERIOR CORTEX	63	0.4%	47	1.1%
100.322 INCOMPLETE-POSTERIOR CORTEX	24	0.2%	18	0.4%
100.323 INCOMPLETE-EQUATORIAL CORTEX	24	0.2%	11	0.3%
100.324 INCOMPLETE-ANTERIOR SUTURES	3	0.0%	0	0.0%
100.325 INCOMPLETE-POSTERIOR SUTURES	1	0.0%	0	0.0%
100.326 INCOMPLETE-NUCLEUS	3	0.0%	0	0.0%
100.327 INCOMPLETE-CAPSULAR	0	0.0%	1	0.0%
100.328 Y-SUTURE TIP OPACITIES	16	0.1%	11	0.3%
100.330 GENERALIZED/ COMPLETE	101	0.6%	3	0.1%
100.340 RESORBING/ HYPERMATURE	1	0.0%	1	0.0%
100.375 SUBLUXATION/ LUXATION	17	0.1%	1	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***2,219***	***14.1%***	***433***	***10.4%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	56	0.4%	29	0.7%
110.135 PHPV/ PTVL	11	0.1%	2	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	46	0.3%	9	0.2%
110.320 VITREOUS DEGENERATION-SYNERESIS	159	1.0%	24	0.6%
OTHER				
900.000 OTHER, UNSPECIFIED	165	1.0%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	382	2.4%	7	0.2%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	301	1.9%	204	4.9%
NORMAL				
.000 NORMAL GLOBE	12,563	79.8%	3,252	78.0%

BOUVIER DES FLANDRES

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Glaucoma	Not defined	2-3	NO	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
C.	Cataract	Not defined	1	NO	
D.	Y-suture tip opacity	Not defined	1	Breeder option	
E.	Persistent hyperplastic primary vitreous / Persistent hyperplastic tunica vasculosa lentis (PHPV/PHTVL)	Not defined	4	NO	

Description and Comments

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated intraocular pressure occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of the IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests are part of a routine screening exam for certification.

In this breed, primary glaucoma is associated with narrowed iridocorneal angles and various degrees of congenital angle malformations varying from mild to severe. Dysplastic pectinate ligaments and subsequent narrowed angles are similar to those described in the Basset Hound and American and English Cocker Spaniels. The occurrence of glaucoma is related to the most severe abnormalities of the pectinate ligaments. The relationship between glaucoma development and the anomaly of the pectinate ligament is not clear.

A recent study evaluated risk factors for development of glaucoma in the Bouvier des Flandres. A narrow angle with dysplastic pectinate ligaments on gonioscopy and/or presence of a narrow or closed ciliary cleft on high resolution ultrasound were associated with development of primary glaucoma in the breed.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

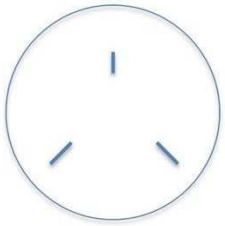
Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Y-suture tip opacity

These are prominent (or "highlighted" or "more dense") distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a "peace sign" as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the "Lens" section of the CAER form. Newer versions of the form (3/16/21) have boxes that say, "posterior Y-suture tip opacities" which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures" AND ALSO MARK "suspect not inherited/significance unknown" (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: "E2" or "posterior suture tip opacities." This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

E. Persistent hyperplastic primary vitreous (PHPV)/Persistent hyperplastic tunica vasculosa lentis (PHTVL)

Persistent hyperplastic primary vitreous is a congenital defect resulting from abnormalities in the development and regression of the hyaloid artery (the primary vitreous) and the interaction of this blood vessel with the posterior lens capsule/cortex during embryogenesis. This condition is often associated with persistent hyperplastic tunica vasculosa lentis which results from failure of regression of the embryologic vascular network which surrounds the developing lens.

In the Bouvier des Flandres, the condition is associated with retinal dysplasia and detachment, optic nerve hypoplasia, lenticonus, cataract and congenital blindness.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. van der Linde-Sipman JS. Dysplasia of the pectinate ligament and primary glaucoma in the Bouvier des Flandres dog. *Vet Pathol*. 1987;24:201-206. PMID: 3603960

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OCULAR DISORDERS REPORT
BOUVIER DES FLANDRES

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 5,577 #	%	2019-2023 734 #	%
GLOBE				
10.000 GLAUCOMA	2	0.0%	0	0.0%
EYELIDS				
20.160 MACROPALPEBRAL FISSURE	1	0.0%	0	0.0%
21.000 ENTROPION	30	0.5%	4	0.5%
22.000 ECTROPION	6	0.1%	0	0.0%
25.110 DISTICHIASIS	46	0.8%	4	0.5%
32.110 IMPERFORATE LACRIMAL PUNCTUM	0	0.0%	1	0.1%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	1	0.0%	0	0.0%
70.220 EXPOSURE KERATOPATHY SYNDROME	2	0.0%	0	0.0%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	33	0.6%	5	0.7%
70.730 DYSTROPHY-ENDOTHELIAL	4	0.1%	0	0.0%
UVEA				
93.120 UVEAL CYST-SINGLE	15	0.3%	5	0.7%
93.170 UVEAL CYST-MULTIPLE	2	0.0%	1	0.1%
93.180 IRIS SPHINCTER DYSPLASIA	1	0.0%	1	0.1%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	467	8.4%	72	9.8%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	11	0.2%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	7	0.1%	2	0.3%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	8	0.1%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	26	0.5%	16	2.2%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	2	0.0%	1	0.1%
93.810 UVEAL MELANOMA	1	0.0%	0	0.0%
95.120 UVEAL CYST-FREE FLOATING	1	0.0%	1	0.1%
LENS				
100.200 CATARACT, UNSPECIFIED	5	0.1%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	488	8.8%	72	9.8%
100.301 PUNCTATE-ANTERIOR CORTEX	80	1.4%	20	2.7%
100.302 PUNCTATE-POSTERIOR CORTEX	48	0.9%	6	0.8%
100.303 PUNCTATE-EQUATORIAL CORTEX	7	0.1%	3	0.4%
100.304 PUNCTATE-ANTERIOR SUTURES	15	0.3%	3	0.4%
100.305 PUNCTATE-POSTERIOR SUTURES	74	1.3%	13	1.8%
100.306 PUNCTATE-NUCLEUS	24	0.4%	9	1.2%
100.307 PUNCTATE-CAPSULAR	41	0.7%	15	2.0%
100.311 INCIPIENT-ANTERIOR CORTEX	23	0.4%	4	0.5%
100.312 INCIPIENT-POSTERIOR CORTEX	110	2.0%	11	1.5%
100.313 INCIPIENT-EQUATORIAL CORTEX	25	0.4%	5	0.7%
100.314 INCIPIENT-ANTERIOR SUTURES	1	0.0%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	29	0.5%	2	0.3%
100.316 INCIPIENT-NUCLEUS	39	0.7%	8	1.1%
100.317 INCIPIENT-CAPSULAR	18	0.3%	5	0.7%
100.321 INCOMPLETE-ANTERIOR CORTEX	4	0.1%	4	0.5%
100.322 INCOMPLETE-POSTERIOR CORTEX	5	0.1%	2	0.3%
100.323 INCOMPLETE-EQUATORIAL CORTEX	0	0.0%	1	0.1%
100.326 INCOMPLETE-NUCLEUS	2	0.0%	2	0.3%
100.328 Y-SUTURE TIP OPACITIES	49	0.9%	64	8.7%
100.330 GENERALIZED/ COMPLETE	31	0.6%	0	0.0%
100.375 SUBLUXATION/ LUXATION	2	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***581***	***10.4%***	***113***	***15.4%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	12	0.2%	3	0.4%

OCULAR DISORDERS REPORT
BOUVIER DES FLANDRES

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 5,577 #	 %	Year Examined: 2019-2023 Total # Dogs: 734 #	 %
VITREOUS Continued				
110.135 PHPV/ PTVL	6	0.1%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	2	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	12	0.2%	0	0.0%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	36	0.6%	0	0.0%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	3	0.1%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	14	0.3%	1	0.1%
120.960 RETINOPATHY	1	0.0%	0	0.0%
130.110 MICROPAPILLA	3	0.1%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	1	0.0%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	64	1.1%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	138	2.5%	1	0.1%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	170	3.0%	36	4.9%
NORMAL				
.000 NORMAL GLOBE	4,277	76.7%	475	64.7%

BOXER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1, 2	Breeder option	
B.	Ectropion	Not defined	1	Breeder option	
C.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
D.	Spontaneous chronic corneal epithelial defect (SCCED)	Not defined	3-6	Breeder option see note**	Mutation in the *NOG* gene
E.	Cataract	Not defined	1	NO	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

In the Boxer, because there is significant clinical disease associated with the abnormal hairs, breeding affected animals should be discouraged.

B. Ectropion

A conformational defect resulting in eversion of the eyelid(s), which may cause ocular irritation due to exposure. It is likely that ectropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

C. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Spontaneous chronic corneal epithelial defect (SCCED)

A general group of corneal ulcerative conditions (e.g. erosions, indolent or persistent ulcers, epithelial bonding defects) is recognized as a common problem in older Boxers (as well as other older animals). It has been commonly referred to as Boxer corneal ulceration. Animals that are affected are usually 7-8 years of age or older. The ulceration can be a very difficult lesion to heal, and it is often recurrent. The chronic form stimulates eventual

scarring, with vascularization, fibrosis and pigmentation of the lesion site. The lesion can cause vision impairment. A genetic mutation in the NOG gene has been identified as related to this condition in Boxers. **Although this current recommendation is breeder option, if further studied and heritability defined, this recommendation could be modified**

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Jondeau C, Gounon M, Bourguet A, Chahory S. Epidemiology and clinical significance of canine distichiasis: A retrospective study of 291 cases. *Vet Ophthalmol* 2023;26:339-346. PMID 37028946

3. Roberts SR. Superficial indolent ulcer in the cornea of Boxer dogs. *J Small Anim Pract.* 1965;6:111.

4. Gelatt KN and Samuelson DA. Recurrent corneal erosions and epithelial dystrophy in the Boxer dog. *J Am Anim Hosp Assoc*. 1982;18:453.

5. Kirschner SE, Niyo Y and Betts DM. Idiopathic persistent corneal erosions: clinical and pathological findings in 18 dogs. *J Am Anim Hosp Assoc*. 1989;25:84.

6. Meurs KM, Montgomery K, Friedenberg SG, Williams B, Gilger BC. A defect in the NOG gene increases susceptibility to spontaneous superficial chronic corneal epithelial defects (SCCED) in boxer dogs. BMC Vet Res. 2021 Jul 26;17(1):254. doi: 10.1186/s12917-021-02955-1. PMID: 34311726; PMCID: PMC8314488.

OCULAR DISORDERS REPORT
BOXER

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	1,848		218	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	5	0.3%	0	0.0%
EYELIDS					
20.140	ECTOPIC CILIA	3	0.2%	0	0.0%
20.160	MACROPALPEBRAL FISSURE	9	0.5%	0	0.0%
21.000	ENTROPION	7	0.4%	0	0.0%
22.000	ECTROPION	70	3.8%	2	0.9%
25.110	DISTICHIASIS	224	12.1%	13	6.0%
32.110	IMPERFORATE LACRIMAL PUNCTUM	1	0.1%	1	0.5%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	1	0.1%	0	0.0%
70.220	EXPOSURE KERATOPATHY SYNDROME	1	0.1%	0	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	152	8.2%	18	8.3%
70.730	DYSTROPHY-ENDOTHELIAL	3	0.2%	0	0.0%
UVEA					
93.120	UVEAL CYST-SINGLE	2	0.1%	0	0.0%
93.150	IRIS COLOBOMA	1	0.1%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	4	0.2%	0	0.0%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	3	0.2%	1	0.5%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	12	0.6%	2	0.9%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	1	0.1%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	5	0.3%	2	0.9%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	5	0.3%	1	0.5%
LENS					
100.200	CATARACT, UNSPECIFIED	4	0.2%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	49	2.7%	7	3.2%
100.301	PUNCTATE-ANTERIOR CORTEX	3	0.2%	1	0.5%
100.302	PUNCTATE-POSTERIOR CORTEX	1	0.1%	0	0.0%
100.303	PUNCTATE-EQUATORIAL CORTEX	4	0.2%	0	0.0%
100.304	PUNCTATE-ANTERIOR SUTURES	3	0.2%	1	0.5%
100.305	PUNCTATE-POSTERIOR SUTURES	4	0.2%	0	0.0%
100.306	PUNCTATE-NUCLEUS	2	0.1%	1	0.5%
100.307	PUNCTATE-CAPSULAR	4	0.2%	2	0.9%
100.311	INCIPIENT-ANTERIOR CORTEX	20	1.1%	3	1.4%
100.312	INCIPIENT-POSTERIOR CORTEX	2	0.1%	2	0.9%
100.313	INCIPIENT-EQUATORIAL CORTEX	7	0.4%	1	0.5%
100.314	INCIPIENT-ANTERIOR SUTURES	2	0.1%	0	0.0%
100.315	INCIPIENT-POSTERIOR SUTURES	2	0.1%	1	0.5%
100.316	INCIPIENT-NUCLEUS	4	0.2%	1	0.5%
100.317	INCIPIENT-CAPSULAR	2	0.1%	2	0.9%
100.321	INCOMPLETE-ANTERIOR CORTEX	2	0.1%	0	0.0%
100.326	INCOMPLETE-NUCLEUS	1	0.1%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	3	0.2%	0	0.0%
100.330	GENERALIZED/ COMPLETE	7	0.4%	0	0.0%
100.375	SUBLUXATION/ LUXATION	2	0.1%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***74***	***4.0%***	***15***	***6.9%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	3	0.2%	0	0.0%
110.135	PHPV/ PTVL	1	0.1%	0	0.0%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	0	0.0%	1	0.5%
110.320	VITREOUS DEGENERATION-SYNERESIS	12	0.6%	2	0.9%
FUNDUS					
120.170	RETINAL DYSPLASIA-FOLDS	5	0.3%	0	0.0%

OCULAR DISORDERS REPORT
BOXER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1,848 #	 %	Year Examined: 2019-2023 Total # Dogs: 218 #	 %
FUNDUS Continued				
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	2	0.1%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	3	0.2%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.1%	0	0.0%
130.110 MICROPAPILLA	1	0.1%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	1	0.1%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	13	0.7%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	44	2.4%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	27	1.5%	17	7.8%
NORMAL				
.000 NORMAL GLOBE	1,340	72.5%	159	72.9%

BOYKIN SPANIEL

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
D.	Cataract	Not defined	1	NO	
E	Y-suture tip opacity	Not defined	1	Breeder option	
F.	Persistent hyaloid artery remnant (PHA)	Not defined	1	Breeder option	
G.	Retinal dysplasia				
	- folds	Not defined	1	Breeder option	
H.	Choroidal hypoplasia (Collie Eye Anomaly) - staphyloma/coloboma - retinal detachment - retinal hemorrhage - optic nerve coloboma	Autosomal recessive	1-3	NO	Mutation in the *NHEJ1 gene*

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of

age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

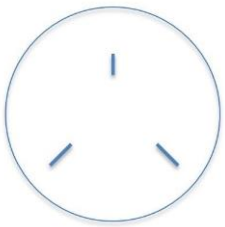
Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. Newer versions of the form (3/16/21) have boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

F. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

G. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

H. Choroidal hypoplasia (Collie Eye Anomaly)
- **Staphyloma/coloboma**
- **Retinal detachment**
- **Retinal hemorrhage**
- **Optic nerve coloboma**

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1.* The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

References

1. ACVO Genetics Committee, 1999 and/or Data from OFA All-Breeds Report, 1991-1998.

2. Parker HG, Kukekova AV, Akey DT, et al. Breed relationships facilitate fine-mapping studies: a 7.8-kb deletion cosegregates with Collie eye anomaly across multiple dog breeds. *Genome Res*. 2007 Nov;17:1562-1571. PMID: 17916641 PMCID: PMC2045139

3. Donner J, Freyer J, Davison S, et al. Genetic prevalence and clinical relevance of canine Mendelian disease variants in over one million dogs. *PLoS Genet* 2023;19:e1010651. PMID 36848397

OCULAR DISORDERS REPORT
BOYKIN SPANIEL

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	4,486		1,679	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	1	0.0%	1	0.1%
EYELIDS					
20.160	MACROPALPEBRAL FISSURE	2	0.0%	0	0.0%
21.000	ENTROPION	1	0.0%	1	0.1%
25.110	DISTICHIASIS	600	13.4%	245	14.6%
32.110	IMPERFORATE LACRIMAL PUNCTUM	2	0.0%	2	0.1%
NICTITANS					
51.100	CARTILAGE ANOMALY/ EVERSION	2	0.0%	0	0.0%
52.110	GLAND PROLAPSE	1	0.0%	1	0.1%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	1	0.0%	0	0.0%
70.220	EXPOSURE KERATOPATHY SYNDROME	4	0.1%	0	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	59	1.3%	24	1.4%
70.730	DYSTROPHY-ENDOTHELIAL	1	0.0%	0	0.0%
UVEA					
93.110	IRIS HYPOPLASIA	4	0.1%	2	0.1%
93.120	UVEAL CYST-SINGLE	1	0.0%	2	0.1%
93.150	IRIS COLOBOMA	1	0.0%	0	0.0%
93.180	IRIS SPHINCTER DYSPLASIA	0	0.0%	1	0.1%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	119	2.7%	35	2.1%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	2	0.0%	1	0.1%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	5	0.1%	1	0.1%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	2	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	29	0.6%	30	1.8%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	0	0.0%	2	0.1%
97.150	COLOBOMA	2	0.0%	0	0.0%
FUNDUS					
97.110	CHOROIDAL HYPOPLASIA	54	1.2%	4	0.2%
97.120	COLOBOMA	1	0.0%	0	0.0%
120.170	RETINAL DYSPLASIA-FOLDS	77	1.7%	17	1.0%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	9	0.2%	4	0.2%
120.310	RETINAL ATROPHY-GENERALIZED	31	0.7%	3	0.2%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	2	0.0%	0	0.0%
120.920	RETINAL DETACHMENT	1	0.0%	2	0.1%
120.960	RETINOPATHY	15	0.3%	4	0.2%
130.110	MICROPAPILLA	1	0.0%	0	0.0%
130.120	OPTIC NERVE HYPOPLASIA	4	0.1%	0	0.0%
LENS					
100.200	CATARACT, UNSPECIFIED	7	0.2%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	291	6.5%	141	8.4%
100.301	PUNCTATE-ANTERIOR CORTEX	70	1.6%	56	3.3%
100.302	PUNCTATE-POSTERIOR CORTEX	58	1.3%	16	1.0%
100.303	PUNCTATE-EQUATORIAL CORTEX	9	0.2%	6	0.4%
100.304	PUNCTATE-ANTERIOR SUTURES	12	0.3%	2	0.1%
100.305	PUNCTATE-POSTERIOR SUTURES	36	0.8%	13	0.8%
100.306	PUNCTATE-NUCLEUS	42	0.9%	30	1.8%
100.307	PUNCTATE-CAPSULAR	58	1.3%	48	2.9%
100.311	INCIPIENT-ANTERIOR CORTEX	23	0.5%	11	0.7%
100.312	INCIPIENT-POSTERIOR CORTEX	68	1.5%	30	1.8%
100.313	INCIPIENT-EQUATORIAL CORTEX	8	0.2%	9	0.5%
100.314	INCIPIENT-ANTERIOR SUTURES	1	0.0%	0	0.0%

OCULAR DISORDERS REPORT
BOYKIN SPANIEL

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 4,486 #	 %	Year Examined: 2019-2023 Total # Dogs: 1,679 #	 %
LENS Continued				
100.315 INCIPIENT-POSTERIOR SUTURES	8	0.2%	7	0.4%
100.316 INCIPIENT-NUCLEUS	14	0.3%	9	0.5%
100.317 INCIPIENT-CAPSULAR	20	0.4%	22	1.3%
100.321 INCOMPLETE-ANTERIOR CORTEX	2	0.0%	1	0.1%
100.322 INCOMPLETE-POSTERIOR CORTEX	1	0.0%	3	0.2%
100.323 INCOMPLETE-EQUATORIAL CORTEX	3	0.1%	1	0.1%
100.325 INCOMPLETE-POSTERIOR SUTURES	1	0.0%	1	0.1%
100.326 INCOMPLETE-NUCLEUS	1	0.0%	0	0.0%
100.327 INCOMPLETE-CAPSULAR	1	0.0%	1	0.1%
100.328 Y-SUTURE TIP OPACITIES	20	0.4%	23	1.4%
100.330 GENERALIZED/ COMPLETE	11	0.2%	1	0.1%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***454***	***10.1%***	***267***	***15.9%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	50	1.1%	30	1.8%
110.135 PHPV/ PTVL	6	0.1%	3	0.2%
110.320 VITREOUS DEGENERATION-SYNERESIS	9	0.2%	4	0.2%
OTHER				
900.000 OTHER, UNSPECIFIED	73	1.6%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	87	1.9%	3	0.2%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	111	2.5%	96	5.7%
NORMAL				
.000 NORMAL GLOBE	3,251	72.5%	1,051	62.6%

BOZ SHEPHERD

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the BOZ SHEPHERD breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
BOZ SHEPHERD

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	1		0	
Diagnostic Name		#	%	#	%
NORMAL					
.000 NORMAL GLOBE		1	100.0%	0	

BRACCO ITALIANO

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Cataract	Not defined	1	NO	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
BRACCO ITALIANO

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 163 #	 %	Year Examined: 2019-2023 Total # Dogs: 114 #	 %
EYELIDS				
20.160 MACROPALPEBRAL FISSURE	1	0.6%	0	0.0%
21.000 ENTROPION	8	4.9%	9	7.9%
25.110 DISTICHIASIS	17	10.4%	10	8.8%
NICTITANS				
51.100 CARTILAGE ANOMALY/ EVERSION	2	1.2%	1	0.9%
52.110 GLAND PROLAPSE	1	0.6%	0	0.0%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	2	1.2%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	1	0.6%	1	0.9%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	12	7.4%	3	2.6%
100.301 PUNCTATE-ANTERIOR CORTEX	3	1.8%	1	0.9%
100.302 PUNCTATE-POSTERIOR CORTEX	5	3.1%	1	0.9%
100.304 PUNCTATE-ANTERIOR SUTURES	1	0.6%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	2	1.2%	0	0.0%
100.307 PUNCTATE-CAPSULAR	1	0.6%	1	0.9%
100.311 INCIPIENT-ANTERIOR CORTEX	3	1.8%	1	0.9%
100.312 INCIPIENT-POSTERIOR CORTEX	9	5.5%	3	2.6%
100.313 INCIPIENT-EQUATORIAL CORTEX	4	2.5%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	0	0.0%	1	0.9%
100.316 INCIPIENT-NUCLEUS	3	1.8%	1	0.9%
100.317 INCIPIENT-CAPSULAR	2	1.2%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	2	1.2%	3	2.6%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***33***	***20.2%***	***9***	***7.9%***
VITREOUS				
110.135 PHPV/ PTVL	2	1.2%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	2	1.2%	0	0.0%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	8	4.9%	2	1.8%
120.960 RETINOPATHY	2	1.2%	1	0.9%
OTHER				
900.000 OTHER, UNSPECIFIED	2	1.2%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	3	1.8%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	4	2.5%	3	2.6%
NORMAL				
.000 NORMAL GLOBE	100	61.3%	84	73.7%

BRAQUE D’AUVERGNE

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the BRAQUE D’AUVERGNE breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
BRAQUE D'AUVERGNE

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	40		11	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	1	2.5%	0	0.0%
EYELIDS					
25.110	DISTICHIASIS	0	0.0%	1	9.1%
UVEA					
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	5	12.5%	1	9.1%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	1	2.5%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	1	2.5%	0	0.0%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	7	17.5%	0	0.0%
100.301	PUNCTATE-ANTERIOR CORTEX	3	7.5%	0	0.0%
100.302	PUNCTATE-POSTERIOR CORTEX	1	2.5%	0	0.0%
100.303	PUNCTATE-EQUATORIAL CORTEX	2	5.0%	0	0.0%
100.306	PUNCTATE-NUCLEUS	2	5.0%	0	0.0%
100.312	INCIPIENT-POSTERIOR CORTEX	1	2.5%	0	0.0%
100.317	INCIPIENT-CAPSULAR	2	5.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***11***	***27.5%***	***0***	***0.0%***
FUNDUS					
120.170	RETINAL DYSPLASIA-FOLDS	1	2.5%	0	0.0%
OTHER					
900.100	OTHER-SUSPECTED AS INHERITED	1	2.5%	0	0.0%
900.110	OTHER-SUSPECTED AS NOT-INHERITED	3	7.5%	4	36.4%
NORMAL					
.000	NORMAL GLOBE	23	57.5%	6	54.5%

BRAQUE DU BOURBONNAIS

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the BRAQUE DU BOURBONNAIS breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
BRAQUE DU BOURBONNAIS

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	6		9	
	Diagnostic Name	#	%	#	%
UVEA					
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	0	0.0%	1	11.1%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	0	0.0%	2	22.2%
100.301	PUNCTATE-ANTERIOR CORTEX	0	0.0%	1	11.1%
100.306	PUNCTATE-NUCLEUS	0	0.0%	1	11.1%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***0***	***0.0%***	***2***	***22.2%***
OTHER					
900.110	OTHER-SUSPECTED AS NOT-INHERITED	0	0.0%	1	11.1%
NORMAL					
.000	NORMAL GLOBE	6	100.0%	5	55.6%

BRAQUE FRANCAIS

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Cataract	Not defined	1	NO	

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
BRAQUE FRANCAIS

Diagnostic Name		Year Examined: 1993-2018 Total # Dogs: 65 #	 %	Year Examined: 2019-2023 Total # Dogs: 63 #	 %
EYELIDS					
25.110	DISTICHIASIS	2	3.1%	3	4.8%
UVEA					
93.120	UVEAL CYST-SINGLE	0	0.0%	1	1.6%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	1	1.5%	1	1.6%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	2	3.1%	2	3.2%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	6	9.2%	2	3.2%
100.301	PUNCTATE-ANTERIOR CORTEX	1	1.5%	2	3.2%
100.302	PUNCTATE-POSTERIOR CORTEX	0	0.0%	1	1.6%
100.306	PUNCTATE-NUCLEUS	0	0.0%	1	1.6%
100.307	PUNCTATE-CAPSULAR	2	3.1%	1	1.6%
100.311	INCIPIENT-ANTERIOR CORTEX	0	0.0%	2	3.2%
100.312	INCIPIENT-POSTERIOR CORTEX	1	1.5%	1	1.6%
100.315	INCIPIENT-POSTERIOR SUTURES	0	0.0%	1	1.6%
100.317	INCIPIENT-CAPSULAR	2	3.1%	1	1.6%
100.321	INCOMPLETE-ANTERIOR CORTEX	0	0.0%	1	1.6%
100.322	INCOMPLETE-POSTERIOR CORTEX	1	1.5%	2	3.2%
100.323	INCOMPLETE-EQUATORIAL CORTEX	0	0.0%	1	1.6%
100.326	INCOMPLETE-NUCLEUS	0	0.0%	2	3.2%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***7***	***10.8%***	***16***	***25.4%***
VITREOUS					
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	0	0.0%	1	1.6%
FUNDUS					
120.170	RETINAL DYSPLASIA-FOLDS	0	0.0%	1	1.6%
OTHER					
900.100	OTHER-SUSPECTED AS INHERITED	0	0.0%	2	3.2%
900.110	OTHER-SUSPECTED AS NOT-INHERITED	7	10.8%	3	4.8%
NORMAL					
.000	NORMAL GLOBE	49	75.4%	41	65.1%

BRAQUE FRANCAIS PYRENEES

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the BRAQUE FRANCAIS PYRENEES breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
BRAQUE FRANCAIS PYRENEES

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	6		22	
	Diagnostic Name	**#**	**%**	**#**	**%**
UVEA					
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	0	0.0%	2	9.1%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	0	0.0%	1	4.5%
100.301	PUNCTATE-ANTERIOR CORTEX	0	0.0%	1	4.5%
100.316	INCIPIENT-NUCLEUS	1	16.7%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***1***	***16.7%***	***1***	***4.5%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	0	0.0%	1	4.5%
OTHER					
900.110	OTHER-SUSPECTED AS NOT-INHERITED	0	0.0%	1	4.5%
NORMAL					
.000	NORMAL GLOBE	4	66.7%	18	81.8%

BRAZILIAN TERRIER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the BRAZILIAN TERRIER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
BRAZILIAN TERRIER

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions for this breed.

BRIARD

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
C.	Cataract	Not defined	1	NO	
D.	Retinal dystrophy formerly Congenital stationary night blindness (*CSNB*)	Autosomal recessive	2	NO	Mutation in the *RPE65* gene

Description and Comments

A. Corneal dystrophy- epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Retinal dystrophy formerly Congenital stationary night blindness (*CSNB*)

A non-progressive retinal function defect characterized primarily by night blindness; day vision is normal to severely compromised. The condition is an autosomal recessive trait caused by a mutation in the *RPE65* gene. The condition is detected by 5-6 weeks of age, after the postnatal maturation of the retina is completed. Nystagmus is present in

some dogs, particularly in those having night blindness and severely compromised day vision, and some dogs undergo early area centralis degeneration. Ophthalmoscopic examination shows no abnormalities. Abnormalities in serum lipids (mild hypercholesterolemia) and elevated arachidonic acid have been noted in some animals. The ERG results are specific and diagnostic for the disorder. ERG testing is essential to distinguish this disorder from more central visual pathway defects which may appear clinically similar.

The gene mutation *RPE65* has been identified. This is the same mutation as causes Leber's congenital amaurosis, also sometimes called juvenile retinitis pigmentosa (RP), in humans. A DNA test is available.

Historical Note:

Central progressive retinal atrophy was previously a condition listed for this breed. However as the condition is no longer identified in the breed, the condition has been removed. Central progressive retinal atrophy was a progressive retinal degeneration in which photoreceptor death occurred secondary to disease of the underlying pigment epithelium. Progression was slow and some animals never lost vision. CPRA occurred in England, but was uncommon elsewhere.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Veske A, Nilsson SE, Narfström K, Gal A. Retinal dystrophy of Swedish briard/briard-beagle dogs is due to a 4-bp deletion in RPE65. Genomics. 1999 Apr 1;57(1):57-61. doi: 10.1006/geno.1999.5754. PMID: 10191083.

OCULAR DISORDERS REPORT
BRIARD

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 2,373 #	%	Year Examined: 2019-2023 Total # Dogs: 166 #	%
GLOBE				
10.000 GLAUCOMA	1	0.0%	0	0.0%
EYELIDS				
20.140 ECTOPIC CILIA	1	0.0%	0	0.0%
21.000 ENTROPION	1	0.0%	0	0.0%
25.110 DISTICHIASIS	9	0.4%	6	3.6%
32.110 IMPERFORATE LACRIMAL PUNCTUM	2	0.1%	0	0.0%
NICTITANS				
51.100 CARTILAGE ANOMALY/ EVERSION	2	0.1%	2	1.2%
52.110 GLAND PROLAPSE	2	0.1%	0	0.0%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	1	0.0%	0	0.0%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	34	1.4%	5	3.0%
UVEA				
93.120 UVEAL CYST-SINGLE	10	0.4%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	29	1.2%	4	2.4%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	3	0.1%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	2	0.1%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	2	0.1%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	11	0.5%	5	3.0%
FUNDUS				
97.120 COLOBOMA	1	0.0%	0	0.0%
120.170 RETINAL DYSPLASIA-FOLDS	7	0.3%	0	0.0%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	1	0.0%	1	0.6%
120.310 RETINAL ATROPHY-GENERALIZED	1	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	2	0.1%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	1	0.0%	0	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	9	0.4%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	76	3.2%	7	4.2%
100.301 PUNCTATE-ANTERIOR CORTEX	8	0.3%	1	0.6%
100.302 PUNCTATE-POSTERIOR CORTEX	3	0.1%	1	0.6%
100.303 PUNCTATE-EQUATORIAL CORTEX	2	0.1%	0	0.0%
100.304 PUNCTATE-ANTERIOR SUTURES	1	0.0%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	5	0.2%	2	1.2%
100.306 PUNCTATE-NUCLEUS	6	0.3%	1	0.6%
100.307 PUNCTATE-CAPSULAR	7	0.3%	6	3.6%
100.311 INCIPIENT-ANTERIOR CORTEX	6	0.3%	1	0.6%
100.312 INCIPIENT-POSTERIOR CORTEX	9	0.4%	2	1.2%
100.313 INCIPIENT-EQUATORIAL CORTEX	2	0.1%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	1	0.0%	0	0.0%
100.316 INCIPIENT-NUCLEUS	7	0.3%	2	1.2%
100.317 INCIPIENT-CAPSULAR	4	0.2%	1	0.6%
100.323 INCOMPLETE-EQUATORIAL CORTEX	1	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	3	0.1%	1	0.6%
100.330 GENERALIZED/ COMPLETE	3	0.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***74***	***3.1%***	***17***	***10.2%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	1	0.0%	2	1.2%
110.135 PHPV/ PTVL	3	0.1%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	2	0.1%	2	1.2%

OCULAR DISORDERS REPORT
BRIARD

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 2,373 #	 %	Year Examined: 2019-2023 Total # Dogs: 166 #	 %
OTHER				
900.000 OTHER, UNSPECIFIED	37	1.6%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	58	2.4%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	36	1.5%	11	6.6%
NORMAL				
.000 NORMAL GLOBE	2,162	91.1%	127	76.5%

BRITTANY

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membrane				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
C.	Cataract	Not defined	1	NO	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membrane (PPM)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

The exact frequency and significance of cataracts in the Brittany is not known, although it is probably low.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
BRITTANY

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 2,757 #	%	Year Examined: 2019-2023 Total # Dogs: 861 #	%
EYELIDS				
21.000 ENTROPION	0	0.0%	1	0.1%
25.110 DISTICHIASIS	64	2.3%	8	0.9%
32.110 IMPERFORATE LACRIMAL PUNCTUM	0	0.0%	1	0.1%
GLOBE				
40.910 KERATOCONJUNCTIVITIS SICCA (KCS)	1	0.0%	0	0.0%
NICTITANS				
52.110 GLAND PROLAPSE	2	0.1%	0	0.0%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	6	0.2%	2	0.2%
70.730 DYSTROPHY-ENDOTHELIAL	3	0.1%	0	0.0%
UVEA				
93.120 UVEAL CYST-SINGLE	1	0.0%	0	0.0%
93.170 UVEAL CYST-MULTIPLE	0	0.0%	1	0.1%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	45	1.6%	7	0.8%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	3	0.1%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	23	0.8%	24	2.8%
LENS				
100.200 CATARACT, UNSPECIFIED	10	0.4%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	125	4.5%	43	5.0%
100.301 PUNCTATE-ANTERIOR CORTEX	27	1.0%	21	2.4%
100.302 PUNCTATE-POSTERIOR CORTEX	35	1.3%	13	1.5%
100.303 PUNCTATE-EQUATORIAL CORTEX	6	0.2%	2	0.2%
100.304 PUNCTATE-ANTERIOR SUTURES	2	0.1%	1	0.1%
100.305 PUNCTATE-POSTERIOR SUTURES	13	0.5%	1	0.1%
100.306 PUNCTATE-NUCLEUS	9	0.3%	8	0.9%
100.307 PUNCTATE-CAPSULAR	20	0.7%	17	2.0%
100.311 INCIPIENT-ANTERIOR CORTEX	16	0.6%	4	0.5%
100.312 INCIPIENT-POSTERIOR CORTEX	48	1.7%	10	1.2%
100.313 INCIPIENT-EQUATORIAL CORTEX	13	0.5%	1	0.1%
100.314 INCIPIENT-ANTERIOR SUTURES	2	0.1%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	9	0.3%	3	0.3%
100.316 INCIPIENT-NUCLEUS	9	0.3%	2	0.2%
100.317 INCIPIENT-CAPSULAR	7	0.3%	4	0.5%
100.321 INCOMPLETE-ANTERIOR CORTEX	1	0.0%	0	0.0%
100.322 INCOMPLETE-POSTERIOR CORTEX	1	0.0%	0	0.0%
100.323 INCOMPLETE-EQUATORIAL CORTEX	1	0.0%	0	0.0%
100.327 INCOMPLETE-CAPSULAR	4	0.1%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	3	0.1%	5	0.6%
100.330 GENERALIZED/ COMPLETE	4	0.1%	0	0.0%
100.340 RESORBING/ HYPERMATURE	1	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION	4	0.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***238***	***8.6%***	***87***	***10.1%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	7	0.3%	5	0.6%
110.135 PHPV/ PTVL	1	0.0%	1	0.1%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.0%	4	0.5%
110.320 VITREOUS DEGENERATION-SYNERESIS	17	0.6%	3	0.3%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	8	0.3%	4	0.5%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	8	0.3%	1	0.1%
120.310 RETINAL ATROPHY-GENERALIZED	21	0.8%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%
120.920 RETINAL DETACHMENT	1	0.0%	0	0.0%

OCULAR DISORDERS REPORT
BRITTANY

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 2,757 #	 %	Year Examined: 2019-2023 Total # Dogs: 861 #	 %
FUNDUS Continued				
120.960 RETINOPATHY	2	0.1%	1	0.1%
130.110 MICROPAPILLA	1	0.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	1	0.0%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	17	0.6%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	62	2.2%	1	0.1%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	43	1.6%	49	5.7%
NORMAL				
.000 NORMAL GLOBE	2,344	85.0%	689	80.0%

BRUSSELS GRIFFON

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Exposure keratopathy syndrome	Not defined	1	Breeder option	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
D.	Cataract	Not defined	1	NO	
E.	Vitreous degeneration				
	- anterior chamber	Not defined	1, 2	Breeder option	
	- syneresis	Not defined	1, 2	Breeder option	
F.	Retinal dysplasia				
	- folds	Not defined	1	Breeder option	
	- geographic	Not defined	1	NO	

Description and Comments

A. Exposure keratopathy syndrome

A condition characterized by variable degrees of superficial vascularization, fibrosis and/or pigmentation of the cornea. May be associated with excessive exposure/irritation of the globe due to shallow orbits, lower eyelid medial entropion, lagophthalmos and macropalpebral fissure.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior

chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Vitreous degeneration

Liquefaction of the vitreous gel which may predispose to retinal detachment.

F. Retinal dysplasia

- folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

- geographic

An irregularly shaped area of retinal development containing areas of retinal thickening and disorganization. These lesions can take up to 1.5 years after birth to develop and be ophthalmoscopically visible. As a result, some dogs with this disease may have had normal prior eye examinations.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Krishnan, H., et al. (2020). Vitreous degeneration and associated ocular abnormalities in the dog. Vet Ophthalmol 23(2): 219-224. PMID: 31464365.

OCULAR DISORDERS REPORT
BRUSSELS GRIFFON

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1,572 #	%	2019-2023 380 #	%
EYELIDS				
20.140 ECTOPIC CILIA	8	0.5%	2	0.5%
21.000 ENTROPION	6	0.4%	0	0.0%
25.110 DISTICHIASIS	35	2.2%	12	3.2%
GLOBE				
40.910 KERATOCONJUNCTIVITIS SICCA (KCS)	3	0.2%	0	0.0%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	1	0.1%	0	0.0%
70.220 EXPOSURE KERATOPATHY SYNDROME	26	1.7%	4	1.1%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	10	0.6%	9	2.4%
UVEA				
93.110 IRIS HYPOPLASIA	2	0.1%	0	0.0%
93.120 UVEAL CYST-SINGLE	2	0.1%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	140	8.9%	47	12.4%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	1	0.1%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	2	0.1%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	1	0.1%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	15	1.0%	12	3.2%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	4	0.3%	1	0.3%
97.150 COLOBOMA	1	0.1%	1	0.3%
FUNDUS				
97.110 CHOROIDAL HYPOPLASIA	2	0.1%	0	0.0%
97.120 COLOBOMA	2	0.1%	0	0.0%
120.170 RETINAL DYSPLASIA-FOLDS	31	2.0%	4	1.1%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	15	1.0%	3	0.8%
120.310 RETINAL ATROPHY-GENERALIZED	23	1.5%	2	0.5%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	2	0.1%	0	0.0%
120.960 RETINOPATHY	1	0.1%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	3	0.2%	0	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	8	0.5%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	59	3.8%	8	2.1%
100.301 PUNCTATE-ANTERIOR CORTEX	35	2.2%	2	0.5%
100.302 PUNCTATE-POSTERIOR CORTEX	12	0.8%	1	0.3%
100.303 PUNCTATE-EQUATORIAL CORTEX	6	0.4%	2	0.5%
100.304 PUNCTATE-ANTERIOR SUTURES	3	0.2%	1	0.3%
100.305 PUNCTATE-POSTERIOR SUTURES	1	0.1%	0	0.0%
100.306 PUNCTATE-NUCLEUS	1	0.1%	1	0.3%
100.307 PUNCTATE-CAPSULAR	4	0.3%	1	0.3%
100.311 INCIPIENT-ANTERIOR CORTEX	85	5.4%	12	3.2%
100.312 INCIPIENT-POSTERIOR CORTEX	36	2.3%	5	1.3%
100.313 INCIPIENT-EQUATORIAL CORTEX	45	2.9%	8	2.1%
100.314 INCIPIENT-ANTERIOR SUTURES	7	0.4%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	5	0.3%	0	0.0%
100.316 INCIPIENT-NUCLEUS	5	0.3%	2	0.5%
100.317 INCIPIENT-CAPSULAR	2	0.1%	3	0.8%
100.321 INCOMPLETE-ANTERIOR CORTEX	3	0.2%	4	1.1%
100.322 INCOMPLETE-POSTERIOR CORTEX	1	0.1%	1	0.3%
100.323 INCOMPLETE-EQUATORIAL CORTEX	0	0.0%	1	0.3%
100.327 INCOMPLETE-CAPSULAR	0	0.0%	1	0.3%
100.330 GENERALIZED/ COMPLETE	29	1.8%	1	0.3%
100.375 SUBLUXATION/ LUXATION	8	0.5%	0	0.0%

OCULAR DISORDERS REPORT
BRUSSELS GRIFFON

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1,572 #	 %	Year Examined: 2019-2023 Total # Dogs: 380 #	 %
LENS Continued				
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***288***	***18.3%***	***46***	***12.1%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	10	0.6%	1	0.3%
110.135 PHPV/ PTVL	2	0.1%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	92	5.9%	13	3.4%
110.320 VITREOUS DEGENERATION-SYNERESIS	262	16.7%	26	6.8%
OTHER				
900.000 OTHER, UNSPECIFIED	26	1.7%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	29	1.8%	1	0.3%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	32	2.0%	19	5.0%
NORMAL				
.000 NORMAL GLOBE	958	60.9%	250	65.8%

BULL TERRIER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the BULL TERRIER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
BULL TERRIER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 254 #	%	Year Examined: 2019-2023 Total # Dogs: 20 #	%
GLOBE				
.110 MICROPHTHALMOS	3	1.2%	0	0.0%
EYELIDS				
21.000 ENTROPION	2	0.8%	0	0.0%
22.000 ECTROPION	1	0.4%	0	0.0%
25.110 DISTICHIASIS	5	2.0%	0	0.0%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	1	0.4%	0	0.0%
70.730 DYSTROPHY-ENDOTHELIAL	5	2.0%	0	0.0%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	8	3.1%	0	0.0%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	4	1.6%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	12	4.7%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	1	0.4%	0	0.0%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	1	0.4%	0	0.0%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	6	2.4%	0	0.0%
100.301 PUNCTATE-ANTERIOR CORTEX	3	1.2%	0	0.0%
100.302 PUNCTATE-POSTERIOR CORTEX	2	0.8%	0	0.0%
100.303 PUNCTATE-EQUATORIAL CORTEX	2	0.8%	0	0.0%
100.304 PUNCTATE-ANTERIOR SUTURES	1	0.4%	0	0.0%
100.306 PUNCTATE-NUCLEUS	1	0.4%	0	0.0%
100.307 PUNCTATE-CAPSULAR	1	0.4%	0	0.0%
100.311 INCIPIENT-ANTERIOR CORTEX	1	0.4%	1	5.0%
100.312 INCIPIENT-POSTERIOR CORTEX	1	0.4%	0	0.0%
100.313 INCIPIENT-EQUATORIAL CORTEX	4	1.6%	0	0.0%
100.314 INCIPIENT-ANTERIOR SUTURES	1	0.4%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	1	0.4%	0	0.0%
100.330 GENERALIZED/ COMPLETE	3	1.2%	0	0.0%
100.375 SUBLUXATION/ LUXATION	7	2.8%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***21***	***8.3%***	***1***	***5.0%***
VITREOUS				
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.4%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	4	1.6%	1	5.0%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	1	0.4%	0	0.0%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	1	0.4%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	1	0.4%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	2	0.8%	0	0.0%
130.110 MICROPAPILLA	3	1.2%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	3	1.2%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	5	2.0%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	8	3.1%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	3	1.2%	1	5.0%
NORMAL				
.000 NORMAL GLOBE	199	78.3%	17	85.0%

BULLDOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Keratoconjunctivitis sicca	Not defined	6,8	NO	
B.	Entropion	Not defined	1	Breeder option	
C.	Ectropion	Not defined	1	Breeder option	
D.	Distichiasis	Not defined	1, 2	Breeder option	
E.	Prolapsed gland of third eyelid	Not defined	3-5	Breeder option	
F.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
G.	Keratitis	Not defined	1	Passes with no notation	
H.	Cataract	Not defined	1	NO	
I.	Retinal dysplasia				
	- folds	Not defined	1	Breeder option	
J.	Multifocal retinopathy - IRD-*BEST1* (*cmr1*)	Autosomal recessive	7	NO (Breeder option with normal DNA test for *cmr1*)	Mutation in the *BEST1* gene

Description and Comments

A. Keratoconjunctivitis sicca

An abnormality of the tear film, most commonly a deficiency of the aqueous portion, although the mucin and/or lipid layers may be affected; results in ocular irritation and/or vision impairment.

B. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

C. Ectropion

A conformational defect resulting in eversion of the eyelids which may cause ocular irritation due to exposure. It is likely that ectropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

In the Bulldog, ectropion is associated with an exceptionally large palpebral fissure and laxity of the canthal structures. Central lower lid ectropion is often associated with entropion of the adjacent lid. This causes severe ocular irritation.

D. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

In the Bulldog, these abnormal eyelashes may be associated with significant clinical disease and breeding of affected animals should be discouraged.

E. Prolapse of the gland of the third eyelid

Protrusion of the tear gland associated with the third eyelid. The mode of inheritance of this disorder is unknown. The exposed gland may become irritated and severe chronic inflammation or keratoconjunctivitis sicca/dry eye syndrome may ensue. Commonly referred to as "cherry eye."

Bulldogs were overrepresented in a study of prolapsed gland of the third eyelid. In the study, 100% of the prolapsed glands in Bulldogs occurred before 1 year of age. Bulldogs were also more likely to develop bilateral prolapsed glands that occurred either simultaneously with the first prolapse or with a short time interval between prolapses.

F. Corneal dystrophy- epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

G. Keratitis

A specific designation does not exist on the CAER form for this condition. We ask examiners to mark other – unlisted conditions suspected as inherited. Then in the comments box please write “keratitis”.

A condition characterized by variable degrees of superficial vascularization, fibrosis and/or pigmentation of the cornea. Often associated with entropion or a combination of entropion and ectropion.

H. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

I. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

J. Multifocal retinopathy - IRD-*BEST1* (*cmr1)*

Canine Multifocal Retinopathy type 1 (*cmr1*) is characterized by numerous distinct (i.e. multifocal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There may be a serous subretinal fluid, or accumulation of subretinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog. The disease generally develops in young dogs between 11-20 weeks of age and there is minimal progression after 1 year of age. The lesions may flatten, leaving areas of retinal thinning and RPE hypertrophy, hyperplasia, and pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE detachments. Most dogs exhibit no noticeable problem with vision or electroretinographic abnormalities despite their abnormal appearing retinas. However, variable degrees of retinal degeneration occur with chronicity.

Canine Multifocal Retinopathy type 1 is caused by a mutation in the Bestrophin 1 gene (*BEST1*) and is described to be recessively inherited in the Great Pyrenees, Dogue de Bordeaux, Bullmastiff, Mastiff and a number of other mastiff-derived breeds. A DNA test is available.

The breeding advice for breeds diagnosed with "CMR/CMR-like retinopathy" will be changed from "No" to "Breeder option" if the owner of the dog provides the registering office with results of the DNA test for the affected dog showing that it is genetically normal, i.e., not a homozygous mutant, for the *BEST1* mutation.

References

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2. Jondeau C, Gounon M, Bourguet A, Chahory S. Epidemiology and clinical significance of canine distichiasis: A retrospective study of 291 cases. *Vet Ophthalmol* 2023;26:339-346. PMID 37028946

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4. Morgan RV, Duddy JM, McClurg K. Prolapse of the gland of the third eyelid in the dog: A retrospective study of 89 cases. (1980-1990). *J Am Anim Hosp Assoc*. 1993;29:56.

5. Mazzucchelli S, Vaillant MD, Weverberg F, et al. Retrospective study of 155 cases of prolapse of the nictitating membrane gland in dogs. *Vet Rec*. 2012;170:443. PMID 22472538

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7. Guziewicz KE, Slavik J, Lindauer SP et al. Molecular consequences of BEST1 gene mutations in canine multifocal retinopathy predict functional implications for human bestrophinopathies. IOVS 52(7) 2011; 4497-505. PMID 21498618

8. O'Neil DG, Brodbelt DC, Keddy A, et al. Keratoconjunctivitis sicca in dogs under primary veterinary care in the UK: an epidemiological study. *JSAP*. 2021; 62: 636-645. PMID: 34134171. **Reference derived from a non-USA dog population.**

OCULAR DISORDERS REPORT
BULLDOG

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	1,471		419	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	1	0.1%	1	0.2%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	10	0.7%	6	1.4%
EYELIDS					
20.140	ECTOPIC CILIA	12	0.8%	2	0.5%
20.160	MACROPALPEBRAL FISSURE	16	1.1%	0	0.0%
21.000	ENTROPION	214	14.5%	65	15.5%
22.000	ECTROPION	73	5.0%	9	2.1%
25.110	DISTICHIASIS	340	23.1%	100	23.9%
32.110	IMPERFORATE LACRIMAL PUNCTUM	6	0.4%	3	0.7%
NICTITANS					
52.110	GLAND PROLAPSE	23	1.6%	2	0.5%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	12	0.8%	1	0.2%
70.220	EXPOSURE KERATOPATHY SYNDROME	31	2.1%	3	0.7%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	11	0.7%	6	1.4%
UVEA					
93.120	UVEAL CYST-SINGLE	8	0.5%	4	1.0%
93.170	UVEAL CYST-MULTIPLE	1	0.1%	1	0.2%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	13	0.9%	3	0.7%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	1	0.1%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	2	0.1%	0	0.0%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	1	0.1%	2	0.5%
95.120	UVEAL CYST-FREE FLOATING	3	0.2%	0	0.0%
LENS					
100.200	CATARACT, UNSPECIFIED	1	0.1%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	35	2.4%	11	2.6%
100.301	PUNCTATE-ANTERIOR CORTEX	7	0.5%	6	1.4%
100.302	PUNCTATE-POSTERIOR CORTEX	2	0.1%	1	0.2%
100.303	PUNCTATE-EQUATORIAL CORTEX	2	0.1%	2	0.5%
100.305	PUNCTATE-POSTERIOR SUTURES	7	0.5%	1	0.2%
100.306	PUNCTATE-NUCLEUS	1	0.1%	0	0.0%
100.307	PUNCTATE-CAPSULAR	2	0.1%	3	0.7%
100.311	INCIPIENT-ANTERIOR CORTEX	5	0.3%	5	1.2%
100.312	INCIPIENT-POSTERIOR CORTEX	2	0.1%	1	0.2%
100.313	INCIPIENT-EQUATORIAL CORTEX	4	0.3%	3	0.7%
100.314	INCIPIENT-ANTERIOR SUTURES	1	0.1%	1	0.2%
100.316	INCIPIENT-NUCLEUS	4	0.3%	0	0.0%
100.317	INCIPIENT-CAPSULAR	2	0.1%	1	0.2%
100.321	INCOMPLETE-ANTERIOR CORTEX	0	0.0%	1	0.2%
100.328	Y-SUTURE TIP OPACITIES	6	0.4%	5	1.2%
100.330	GENERALIZED/ COMPLETE	5	0.3%	0	0.0%
100.375	SUBLUXATION/ LUXATION	3	0.2%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***45***	***3.1%***	***25***	***6.0%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	1	0.1%	0	0.0%
110.320	VITREOUS DEGENERATION-SYNERESIS	2	0.1%	0	0.0%
FUNDUS					
120.170	RETINAL DYSPLASIA-FOLDS	86	5.8%	29	6.9%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	4	0.3%	0	0.0%
120.960	RETINOPATHY	1	0.1%	0	0.0%
130.110	MICROPAPILLA	0	0.0%	1	0.2%
130.120	OPTIC NERVE HYPOPLASIA	0	0.0%	1	0.2%

OCULAR DISORDERS REPORT
BULLDOG

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1,471 #	 %	Year Examined: 2019-2023 Total # Dogs: 419 #	 %
OTHER				
900.000 OTHER, UNSPECIFIED	7	0.5%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	40	2.7%	1	0.2%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	64	4.4%	29	6.9%
NORMAL				
.000 NORMAL GLOBE	829	56.4%	208	49.6%

BULLMASTIFF

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Entropion	Not defined	1	Breeder option	
B.	Ectropion	Not defined	1	Breeder option	
C.	Distichiasis	Not defined	1	Breeder option	
D.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
E.	Cataract	Not defined	1	NO	
F.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- PRA-*RHO*	Autosomal dominant	2	NO	Mutation in the *RHO* gene
G.	Retinal dysplasia				
	- folds	Not defined	1	Breeder option	
H.	Multifocal retinopathy - IRD-*BEST1* (*cmr1*)	Autosomal recessive	3	NO (Breeder option with normal DNA test for *cmr1*)	Mutation in the *BEST1* gene

Description and Comments

A. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

In the Bullmastiff, the palpebral fissures may become vertical and/or shaped like a "pagoda." Entropion in the Bullmastiff is severe and may require multiple surgical corrections.

B. Ectropion

A conformational defect resulting in eversion (rolling-out) of the eyelids, which may cause ocular irritation due to exposure. It is likely that ectropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

C. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

F. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-*RHO*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. PRA in the Bullmastiff is inherited as an autosomal dominant trait. A DNA test is available.

G. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

H. Multifocal retinopathy – IRD-*BEST1 (cmr1)*

Canine Multifocal Retinopathy type 1 (*cmr1*) is characterized by numerous distinct (i.e. multifocal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There may be a serous sub-retinal fluid, or accumulation of sub-retinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs between 11-20 weeks of age and there is minimal progression after 1 year of age. The lesions may flatten, leaving areas of retinal thinning and RPE hypertrophy, hyperplasia, and

pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE detachments. Most dogs exhibit no noticeable problem with vision or electroretinographic abnormalities despite their abnormal appearing retinas. However, variable degrees of retinal degeneration occur with chronicity.

Canine Multifocal Retinopathy type 1 is caused by a mutation in the Bestrophin 1 gene (*BEST1*) and is described to be recessively inherited in the Great Pyrenees, Dogue de Bordeaux, Bullmastiff, Mastiff and a number of other mastiff-derived breeds. A DNA test is available.

The breeding advice for breeds diagnosed with "CMR/CMR-like retinopathy" will be changed from "No" to "Breeder option" if the owner of the dog provides the registering office with results of the DNA test for the affected dog showing that it is genetically normal, i.e., not a homozygous mutant, for the *BEST1* mutation.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Kijas JW, Cideciyan AV, Aleman TS, et al. Naturally occurring rhodopsin mutation in the dog causes retinal dysfunction and degeneration mimicking human dominant retinitis pigmentosa. *Proc Natl Acad Sci U S A*. 2002 Apr 30;99:6328-6333. PMID: 11972042

3. Guziewicz KE, Zangerl B, Lindauer SJ, et al. Bestrophin gene mutations cause canine multifocal retinopathy: a novel animal model for best disease. *Invest Ophthalmol Vis Sci.* 2007 May;48:1959-1967. PMID: 17460247

OCULAR DISORDERS REPORT
BULLMASTIFF

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 2,040 #	 %	Year Examined: 2019-2023 Total # Dogs: 683 #	 %
GLOBE				
.110 MICROPHTHALMOS	5	0.2%	0	0.0%
40.910 KERATOCONJUNCTIVITIS SICCA (KCS)	0	0.0%	1	0.1%
EYELIDS				
20.160 MACROPALPEBRAL FISSURE	16	0.8%	0	0.0%
21.000 ENTROPION	114	5.6%	57	8.3%
22.000 ECTROPION	32	1.6%	6	0.9%
25.110 DISTICHIASIS	55	2.7%	13	1.9%
NICTITANS				
51.100 CARTILAGE ANOMALY/ EVERSION	3	0.1%	0	0.0%
52.110 GLAND PROLAPSE	1	0.0%	0	0.0%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	2	0.1%	0	0.0%
70.220 EXPOSURE KERATOPATHY SYNDROME	5	0.2%	6	0.9%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	3	0.1%	2	0.3%
70.730 DYSTROPHY-ENDOTHELIAL	1	0.0%	0	0.0%
UVEA				
93.120 UVEAL CYST-SINGLE	9	0.4%	6	0.9%
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.0%	0	0.0%
93.150 IRIS COLOBOMA	4	0.2%	0	0.0%
93.170 UVEAL CYST-MULTIPLE	0	0.0%	7	1.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	87	4.3%	20	2.9%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	10	0.5%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	27	1.3%	3	0.4%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	1	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	7	0.3%	1	0.1%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	7	0.3%	2	0.3%
95.120 UVEAL CYST-FREE FLOATING	1	0.0%	0	0.0%
97.150 COLOBOMA	1	0.0%	0	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	1	0.0%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	63	3.1%	12	1.8%
100.301 PUNCTATE-ANTERIOR CORTEX	12	0.6%	6	0.9%
100.302 PUNCTATE-POSTERIOR CORTEX	6	0.3%	3	0.4%
100.303 PUNCTATE-EQUATORIAL CORTEX	4	0.2%	1	0.1%
100.305 PUNCTATE-POSTERIOR SUTURES	5	0.2%	1	0.1%
100.306 PUNCTATE-NUCLEUS	2	0.1%	1	0.1%
100.307 PUNCTATE-CAPSULAR	3	0.1%	4	0.6%
100.311 INCIPIENT-ANTERIOR CORTEX	12	0.6%	7	1.0%
100.312 INCIPIENT-POSTERIOR CORTEX	15	0.7%	4	0.6%
100.313 INCIPIENT-EQUATORIAL CORTEX	12	0.6%	5	0.7%
100.315 INCIPIENT-POSTERIOR SUTURES	3	0.1%	0	0.0%
100.316 INCIPIENT-NUCLEUS	6	0.3%	2	0.3%
100.317 INCIPIENT-CAPSULAR	1	0.0%	1	0.1%
100.321 INCOMPLETE-ANTERIOR CORTEX	1	0.0%	0	0.0%
100.322 INCOMPLETE-POSTERIOR CORTEX	4	0.2%	1	0.1%
100.323 INCOMPLETE-EQUATORIAL CORTEX	1	0.0%	0	0.0%
100.326 INCOMPLETE-NUCLEUS	1	0.0%	0	0.0%
100.327 INCOMPLETE-CAPSULAR	0	0.0%	1	0.1%
100.328 Y-SUTURE TIP OPACITIES	3	0.1%	3	0.4%
100.330 GENERALIZED/ COMPLETE	8	0.4%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***97***	***4.8%***	***37***	***5.4%***

OCULAR DISORDERS REPORT
BULLMASTIFF

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 2,040 #	 %	Year Examined: 2019-2023 Total # Dogs: 683 #	 %
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	1	0.0%	3	0.4%
110.135 PHPV/ PTVL	1	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	2	0.1%	0	0.0%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	101	5.0%	26	3.8%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	3	0.1%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	3	0.1%	0	0.0%
120.960 RETINOPATHY	7	0.3%	1	0.1%
120.970 RETINOPATHY - CMR/ CMR-LIKE	0	0.0%	2	0.3%
130.110 MICROPAPILLA	8	0.4%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	7	0.3%	1	0.1%
OTHER				
900.000 OTHER, UNSPECIFIED	25	1.2%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	42	2.1%	5	0.7%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	34	1.7%	23	3.4%
NORMAL				
.000 NORMAL GLOBE	1,540	75.5%	507	74.2%

CA DE BOU

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the CA DE BOU breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
CA DE BOU

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions for this breed.

CAIRN TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Ocular melanosis with and without glaucoma	Presumed autosomal dominant	2	NO	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
C.	Cataract	Not defined	1	NO	
D.	Vitreous degeneration				
	- syneresis	Not defined	1	Breeder option	
E.	Persistent hyaloid artery remnant (PHA)	Not defined	1	Breeder option	

Description and Comments

A. Ocular melanosis with and without glaucoma
(Previously ocular melanosis with secondary glaucoma, previously pigmentary glaucoma)

A proliferation of melanocytes within the uveal tract associated with an elevation in intraocular pressure. Obstruction of the aqueous outflow pathways occurs resulting in glaucoma. This condition has been identified most commonly in the Cairn Terrier. The condition is familial but the exact mode of inheritance is unknown (pedigree anaylsis has ruled out a sex-linked disorder). In the Cairn Terrier, the disease is very slowly progressive and blindness ultimately results. Some dogs develop episodes of anterior uveitis associated with the shedding of large amounts of pigment from the iris surface. There is a long pre-glaucomatous phase of the disease in which diagnosis of the condition is possible. Age of onset varies from 2-14 years.

B. Persistent pupillary membranes (PPM)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Vitreous degeneration

A liquefaction of the vitreous gel which may predispose to retinal detachment.

E. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Petersen-Jones SM, Forcier J, Mentzer AL. Ocular melanosis in the Cairn Terrier: clinical description and investigation of mode of inheritance. *Vet Ophthalmol*. 2007;10 Suppl 1:63-69. PMID: 17973836

OCULAR DISORDERS REPORT
CAIRN TERRIER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 4,448 #	%	2019-2023 592 #	%
GLOBE				
.110 MICROPHTHALMOS	2	0.0%	0	0.0%
10.000 GLAUCOMA	3	0.1%	0	0.0%
40.910 KERATOCONJUNCTIVITIS SICCA (KCS)	8	0.2%	0	0.0%
EYELIDS				
25.110 DISTICHIASIS	18	0.4%	4	0.7%
32.110 IMPERFORATE LACRIMAL PUNCTUM	1	0.0%	3	0.5%
NICTITANS				
51.100 CARTILAGE ANOMALY/ EVERSION	1	0.0%	0	0.0%
52.110 GLAND PROLAPSE	1	0.0%	1	0.2%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	1	0.0%	0	0.0%
70.220 EXPOSURE KERATOPATHY SYNDROME	7	0.2%	0	0.0%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	28	0.6%	1	0.2%
70.730 DYSTROPHY-ENDOTHELIAL	3	0.1%	0	0.0%
UVEA				
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.0%	0	0.0%
93.150 IRIS COLOBOMA	2	0.0%	0	0.0%
93.170 UVEAL CYST-MULTIPLE	1	0.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	415	9.3%	96	16.2%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	15	0.3%	1	0.2%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	5	0.1%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	2	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	48	1.1%	19	3.2%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	13	0.3%	3	0.5%
93.810 UVEAL MELANOMA	2	0.0%	0	0.0%
93.930 OCULAR MELANOCYTOSIS	9	0.2%	0	0.0%
FUNDUS				
97.110 CHOROIDAL HYPOPLASIA	2	0.0%	0	0.0%
97.120 COLOBOMA	1	0.0%	0	0.0%
120.170 RETINAL DYSPLASIA-FOLDS	21	0.5%	4	0.7%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	9	0.2%	1	0.2%
120.310 RETINAL ATROPHY-GENERALIZED	23	0.5%	0	0.0%
120.960 RETINOPATHY	1	0.0%	0	0.0%
130.110 MICROPAPILLA	3	0.1%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	8	0.2%	0	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	11	0.2%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	275	6.2%	36	6.1%
100.301 PUNCTATE-ANTERIOR CORTEX	77	1.7%	25	4.2%
100.302 PUNCTATE-POSTERIOR CORTEX	48	1.1%	5	0.8%
100.303 PUNCTATE-EQUATORIAL CORTEX	40	0.9%	5	0.8%
100.304 PUNCTATE-ANTERIOR SUTURES	2	0.0%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	13	0.3%	2	0.3%
100.306 PUNCTATE-NUCLEUS	5	0.1%	2	0.3%
100.307 PUNCTATE-CAPSULAR	26	0.6%	9	1.5%
100.311 INCIPIENT-ANTERIOR CORTEX	42	0.9%	19	3.2%
100.312 INCIPIENT-POSTERIOR CORTEX	68	1.5%	18	3.0%
100.313 INCIPIENT-EQUATORIAL CORTEX	34	0.8%	4	0.7%
100.315 INCIPIENT-POSTERIOR SUTURES	10	0.2%	0	0.0%
100.316 INCIPIENT-NUCLEUS	5	0.1%	0	0.0%
100.317 INCIPIENT-CAPSULAR	7	0.2%	0	0.0%

OCULAR DISORDERS REPORT
CAIRN TERRIER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 4,448 #	 %	2019-2023 592 #	 %
LENS Continued				
100.321 INCOMPLETE-ANTERIOR CORTEX	13	0.3%	1	0.2%
100.322 INCOMPLETE-POSTERIOR CORTEX	15	0.3%	3	0.5%
100.323 INCOMPLETE-EQUATORIAL CORTEX	3	0.1%	1	0.2%
100.324 INCOMPLETE-ANTERIOR SUTURES	0	0.0%	1	0.2%
100.325 INCOMPLETE-POSTERIOR SUTURES	1	0.0%	0	0.0%
100.326 INCOMPLETE-NUCLEUS	3	0.1%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	2	0.0%	0	0.0%
100.330 GENERALIZED/ COMPLETE	39	0.9%	1	0.2%
100.340 RESORBING/ HYPERMATURE	4	0.1%	0	0.0%
100.375 SUBLUXATION/ LUXATION	2	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***466***	***10.5%***	***96***	***16.2%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	53	1.2%	6	1.0%
110.135 PHPV/ PTVL	6	0.1%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	4	0.1%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	54	1.2%	5	0.8%
OTHER				
900.000 OTHER, UNSPECIFIED	76	1.7%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	129	2.9%	4	0.7%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	140	3.1%	25	4.2%
NORMAL				
.000 NORMAL GLOBE	3,354	75.4%	385	65.0%

CANAAN DOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Cataract	Not defined	1	NO	

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
CANAAN DOG

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 566 #	%	2019-2023 68 #	%
EYELIDS				
25.110 DISTICHIASIS	16	2.8%	0	0.0%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	4	0.7%	0	0.0%
UVEA				
93.120 UVEAL CYST-SINGLE	1	0.2%	0	0.0%
93.170 UVEAL CYST-MULTIPLE	1	0.2%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	22	3.9%	2	2.9%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	1	0.2%	0	0.0%
FUNDUS				
97.110 CHOROIDAL HYPOPLASIA	2	0.4%	0	0.0%
120.170 RETINAL DYSPLASIA-FOLDS	2	0.4%	1	1.5%
120.310 RETINAL ATROPHY-GENERALIZED	9	1.6%	0	0.0%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	20	3.5%	6	8.8%
100.301 PUNCTATE-ANTERIOR CORTEX	2	0.4%	1	1.5%
100.302 PUNCTATE-POSTERIOR CORTEX	2	0.4%	0	0.0%
100.303 PUNCTATE-EQUATORIAL CORTEX	1	0.2%	0	0.0%
100.304 PUNCTATE-ANTERIOR SUTURES	1	0.2%	0	0.0%
100.306 PUNCTATE-NUCLEUS	4	0.7%	1	1.5%
100.307 PUNCTATE-CAPSULAR	1	0.2%	1	1.5%
100.311 INCIPIENT-ANTERIOR CORTEX	3	0.5%	0	0.0%
100.312 INCIPIENT-POSTERIOR CORTEX	7	1.2%	3	4.4%
100.314 INCIPIENT-ANTERIOR SUTURES	1	0.2%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	1	0.2%	0	0.0%
100.316 INCIPIENT-NUCLEUS	12	2.1%	0	0.0%
100.322 INCOMPLETE-POSTERIOR CORTEX	1	0.2%	0	0.0%
100.323 INCOMPLETE-EQUATORIAL CORTEX	1	0.2%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	1	0.2%	1	1.5%
100.330 GENERALIZED/ COMPLETE	13	2.3%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***50***	***8.8%***	***6***	***8.8%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	1	0.2%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	6	1.1%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	18	3.2%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	6	1.1%	3	4.4%
NORMAL				
.000 NORMAL GLOBE	463	81.8%	57	83.8%

CANADIAN ESKIMO DOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
CANADIAN ESKIMO DOG

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 45 #	 %	Year Examined: 2019-2023 Total # Dogs: 24 #	 %
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	1	2.2%	0	0.0%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	9	20.0%	8	33.3%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	0	0.0%	1	4.2%
100.302 PUNCTATE-POSTERIOR CORTEX	1	2.2%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	0	0.0%	1	4.2%
100.307 PUNCTATE-CAPSULAR	1	2.2%	1	4.2%
100.311 INCIPIENT-ANTERIOR CORTEX	0	0.0%	1	4.2%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***2***	***4.4%***	***3***	***12.5%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	1	2.2%	0	0.0%
FUNDUS				
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	1	2.2%	0	0.0%
120.920 RETINAL DETACHMENT	0	0.0%	1	4.2%
OTHER				
900.110 OTHER-SUSPECTED AS NOT-INHERITED	2	4.4%	2	8.3%
NORMAL				
.000 NORMAL GLOBE	34	75.6%	12	50.0%

CANE CORSO

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Cataract	Not defined	1	NO	
C.	Dental-skeletal-retinal anomaly (DSRA)	Autosomal recessive	2	NO	Mutation in *MIA3*
D.	Multifocal retinopathy - IRD-*BEST1* (cmr1*)*	Autosomal recessive	3	NO (Breeder option with normal DNA test for *cmr1*)	Mutation in *BEST1*

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Dental-skeletal-retinal anomaly (DSRA)

Dental-Skeletal-Retinal-Anomaly (DSRA) is a syndromic condition documented in the Cane Corso. This condition is associated with a MIA3 splice defect that has been identified in all affected dogs with an autosomal recessive inheritance pattern. Clinically affected dogs present with dwarfism, dental abnormalities including loss of enamel and tooth discoloration, as well as early onset retinal atrophy.

D. Multifocal Retinopathy - IRD-*BEST1* - (*cmr1*)

Canine Multifocal Retinopathy type 1 (*cmr1*) is characterized by numerous distinct (i.e. multifocal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There may be a serous subretinal fluid, or accumulation of subretinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog. The disease generally develops in young dogs between 11-20 weeks of age and there is minimal progression after 1 year of age. The lesions may flatten, leaving areas of retinal thinning and RPE hypertrophy, hyperplasia, and pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE

detachments. Early in the disease, most dogs exhibit no noticeable problem with vision or electroretinographic abnormalities despite their abnormal appearing retinas. However, variable degrees of retinal degeneration occur with chronicity.

Canine Multifocal Retinopathy type 1 is caused by a mutation in the Bestrophin 1 gene (*BEST1*) and is described to be recessively inherited in the Great Pyrenees, Dogue de Bordeaux, Bullmastiff, Mastiff and a number of other mastiff-derived breeds. A DNA test is available.

The breeding advice for breeds diagnosed with "CMR/CMR-like retinopathy" will be changed from "No" to "Breeder option" if the owner of the dog provides the registering office with results of the DNA test for the affected dog showing that it is genetically normal, i.e., not a homozygous mutant, for the *BEST1* mutation.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breed Report.

2. Christen M, Booij-Vrieling H, Oksa-Minalto J, et al. *MIA3* Splice Defect in Cane Corso Dogs with Dental-Skeletal-Retinal Anomaly (DSRA). *Genes* (Basel). 2021;12(10):1497. PMID: 34680893

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OCULAR DISORDERS REPORT
CANE CORSO

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 221 #	 %	Year Examined: 2019-2023 Total # Dogs: 168 #	 %
EYELIDS				
21.000 ENTROPION	5	2.3%	5	3.0%
22.000 ECTROPION	13	5.9%	2	1.2%
25.110 DISTICHIASIS	9	4.1%	10	6.0%
NICTITANS				
51.100 CARTILAGE ANOMALY/ EVERSION	1	0.5%	0	0.0%
52.110 GLAND PROLAPSE	3	1.4%	1	0.6%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	1	0.5%	3	1.8%
UVEA				
93.110 IRIS HYPOPLASIA	1	0.5%	0	0.0%
93.120 UVEAL CYST-SINGLE	2	0.9%	0	0.0%
93.170 UVEAL CYST-MULTIPLE	1	0.5%	1	0.6%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	3	1.4%	1	0.6%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	0	0.0%	1	0.6%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	2	0.9%	2	1.2%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	8	3.6%	5	3.0%
100.301 PUNCTATE-ANTERIOR CORTEX	3	1.4%	1	0.6%
100.302 PUNCTATE-POSTERIOR CORTEX	3	1.4%	1	0.6%
100.305 PUNCTATE-POSTERIOR SUTURES	2	0.9%	1	0.6%
100.306 PUNCTATE-NUCLEUS	1	0.5%	2	1.2%
100.307 PUNCTATE-CAPSULAR	2	0.9%	2	1.2%
100.311 INCIPIENT-ANTERIOR CORTEX	1	0.5%	0	0.0%
100.317 INCIPIENT-CAPSULAR	1	0.5%	1	0.6%
100.328 Y-SUTURE TIP OPACITIES	1	0.5%	1	0.6%
100.330 GENERALIZED/ COMPLETE	1	0.5%	0	0.0%
100.375 SUBLUXATION/ LUXATION	1	0.5%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***14***	***6.3%***	***8***	***4.8%***
VITREOUS				
110.135 PHPV/ PTVL	1	0.5%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	0	0.0%	1	0.6%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	1	0.5%	2	1.2%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	0	0.0%	1	0.6%
120.310 RETINAL ATROPHY-GENERALIZED	0	0.0%	1	0.6%
120.960 RETINOPATHY	1	0.5%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	1	0.5%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	1	0.5%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	2	0.9%	7	4.2%
NORMAL				
.000 NORMAL GLOBE	178	80.5%	130	77.4%

CAO DE CASTRO LABOREIRO

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the CAO DE CASTRO LABOREIRO breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
CAO DE CASTRO LABOREIRO

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	1		0	
Diagnostic Name		#	%	#	%
NORMAL					
.000	NORMAL GLOBE	1	100.0%	0	

CARDIGAN WELSH CORGI

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	
D.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- PRA-*PDE6A* (*rcd3*)	Autosomal recessive	2-4	NO	Mutation in the *PDE6A* gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin that may cause ocular irritation. Distichiasis may occur any time in the life of the dog. It is difficult to make a strong recommendation about breeding dogs with this entity. The hereditary basis is not known although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

Lens opacity which may affect one or both eyes and may involve the lens partially or completely. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membranes, persistent hyaloid, or nutritional deficiencies.

D. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-*PDE6A* (*rcd3*)

PRA in the Cardigan Welsh Corgi is an autosomal recessive trait caused by a one base pair deletion in the gene encoding the alpha subunit of cyclic GMP phosphodiesterase (*rcd3*). PRA begins early in life with clinical signs of night blindness and a lack of rod ERG responses is seen at 6-8 weeks of age. Dogs are completely blind by 2-3 years of age when ophthalmoscopic signs are first visible. The mutation is found in the *PDE6A* gene. A DNA test is available.

Historical Note:

Central progressive retinal atrophy (CPRA) was previously a condition listed for this breed. However as the condition is no longer identified in the breed, the condition has been removed. CPRA was a progressive retinal degeneration in which photoreceptor death occurred secondary to disease of the underlying pigment epithelium. Progression was slow and some animals never lost vision. CPRA occurred in England, but was uncommon elsewhere.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Petersen-Jones SM, Entz DD, Sargan DR. cGMP phosphodiesterase-alpha mutation causes progressive retinal atrophy in the Cardigan Welsh Corgi dog. *Invest Ophthalmol Vis Sci*. 1999;40:1637-1644. PMID: 10393029

3. Petersen-Jones SM, Entz DD. An improved DNA-based test for detection of the codon 616 mutation in the alpha cyclic GMP phosphodiesterase gene that causes progressive retinal atrophy in the Cardigan Welsh Corgi. *Vet Ophthalmol*. 2002;5:103-106. PMID: 12071867

4. Keep JM. Clinical aspects of progressive retinal atrophy in the Cardigan Welsh Corgi. *Aust Vet J*.1972;48:197-199. PMID: 5082485. **reference derived from non-USA dog population**

OCULAR DISORDERS REPORT
CARDIGAN WELSH CORGI

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	4,058		629	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	2	0.0%	0	0.0%
EYELIDS					
25.110	DISTICHIASIS	151	3.7%	18	2.9%
32.110	IMPERFORATE LACRIMAL PUNCTUM	1	0.0%	0	0.0%
CORNEA					
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	17	0.4%	2	0.3%
70.730	DYSTROPHY-ENDOTHELIAL	2	0.0%	1	0.2%
UVEA					
93.120	UVEAL CYST-SINGLE	0	0.0%	1	0.2%
93.150	IRIS COLOBOMA	1	0.0%	0	0.0%
93.180	IRIS SPHINCTER DYSPLASIA	1	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	117	2.9%	8	1.3%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	4	0.1%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	9	0.2%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	1	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	0	0.0%	1	0.2%
93.810	UVEAL MELANOMA	1	0.0%	0	0.0%
FUNDUS					
97.110	CHOROIDAL HYPOPLASIA	3	0.1%	1	0.2%
97.120	COLOBOMA	2	0.0%	0	0.0%
120.170	RETINAL DYSPLASIA-FOLDS	25	0.6%	2	0.3%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	6	0.1%	1	0.2%
120.310	RETINAL ATROPHY-GENERALIZED	9	0.2%	0	0.0%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	2	0.0%	0	0.0%
120.960	RETINOPATHY	1	0.0%	0	0.0%
130.120	OPTIC NERVE HYPOPLASIA	3	0.1%	0	0.0%
LENS					
100.200	CATARACT, UNSPECIFIED	15	0.4%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	134	3.3%	20	3.2%
100.301	PUNCTATE-ANTERIOR CORTEX	16	0.4%	7	1.1%
100.302	PUNCTATE-POSTERIOR CORTEX	14	0.3%	0	0.0%
100.303	PUNCTATE-EQUATORIAL CORTEX	17	0.4%	5	0.8%
100.304	PUNCTATE-ANTERIOR SUTURES	2	0.0%	0	0.0%
100.305	PUNCTATE-POSTERIOR SUTURES	4	0.1%	3	0.5%
100.306	PUNCTATE-NUCLEUS	8	0.2%	4	0.6%
100.307	PUNCTATE-CAPSULAR	20	0.5%	1	0.2%
100.311	INCIPIENT-ANTERIOR CORTEX	35	0.9%	4	0.6%
100.312	INCIPIENT-POSTERIOR CORTEX	20	0.5%	6	1.0%
100.313	INCIPIENT-EQUATORIAL CORTEX	17	0.4%	2	0.3%
100.314	INCIPIENT-ANTERIOR SUTURES	4	0.1%	0	0.0%
100.315	INCIPIENT-POSTERIOR SUTURES	3	0.1%	2	0.3%
100.316	INCIPIENT-NUCLEUS	8	0.2%	1	0.2%
100.317	INCIPIENT-CAPSULAR	3	0.1%	2	0.3%
100.321	INCOMPLETE-ANTERIOR CORTEX	1	0.0%	1	0.2%
100.322	INCOMPLETE-POSTERIOR CORTEX	1	0.0%	0	0.0%
100.326	INCOMPLETE-NUCLEUS	0	0.0%	1	0.2%
100.327	INCOMPLETE-CAPSULAR	1	0.0%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	3	0.1%	3	0.5%
100.330	GENERALIZED/ COMPLETE	8	0.2%	0	0.0%
100.340	RESORBING/ HYPERMATURE	1	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***198***	***4.9%***	***39***	***6.2%***

OCULAR DISORDERS REPORT
CARDIGAN WELSH CORGI

Year Examined:	1993-2018		2019-2023	
Total # Dogs:	4,058		629	
Diagnostic Name	**#**	**%**	**#**	**%**
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	5	0.1%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	5	0.1%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	5	0.1%	1	0.2%
OTHER				
900.000 OTHER, UNSPECIFIED	16	0.4%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	39	1.0%	2	0.3%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	27	0.7%	19	3.0%
NORMAL				
.000 NORMAL GLOBE	3,549	87.5%	541	86.0%

CAROLINA DOG

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the CAROLINA DOG breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
CAROLINA DOG

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 2 #	%	2019-2023 14 #	%
EYELIDS				
25.110 DISTICHIASIS	0	0.0%	1	7.1%
NORMAL				
.000 NORMAL GLOBE	2	100.0%	13	92.9%

CATALAN SHEEPDOG

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the CATALAN SHEEPDOG breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
CATALAN SHEEPDOG

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1 #	%	2019-2023 0 #	%
UVEA				
93.150 IRIS COLOBOMA	1	100.0%	0	

CAUCASIAN SHEPHERD

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the CAUCASIAN SHEPHERD breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
CAUCASIAN SHEPHERD

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	16		4	
	Diagnostic Name	#	%	#	%
EYELIDS					
21.000	ENTROPION	1	6.3%	0	0.0%
22.000	ECTROPION	1	6.3%	0	0.0%
UVEA					
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	2	12.5%	0	0.0%
LENS					
100.311	INCIPIENT-ANTERIOR CORTEX	1	6.3%	0	0.0%
100.312	INCIPIENT-POSTERIOR CORTEX	1	6.3%	0	0.0%
100.313	INCIPIENT-EQUATORIAL CORTEX	1	6.3%	0	0.0%
100.321	INCOMPLETE-ANTERIOR CORTEX	1	6.3%	0	0.0%
100.323	INCOMPLETE-EQUATORIAL CORTEX	1	6.3%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***5***	***31.3%***	***0***	***0.0%***
OTHER					
900.110	OTHER-SUSPECTED AS NOT-INHERITED	0	0.0%	1	25.0%
NORMAL					
.000	NORMAL GLOBE	11	68.8%	3	75.0%

CAVALIER KING CHARLES SPANIEL

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Microphthalmia with multiple ocular defects	Not defined	2	NO	
B.	Keratoconjunctivitis sicca	Not defined	3, 9	NO	
C.	Congenital KCS and ichthyosiform dermatosis	Autosomal recessive	4, 5	NO	
D.	Entropion	Not defined	1	Breeder option	
E.	Distichiasis	Not defined	1, 8	Breeder option	
F.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1, 6	Breeder option	
G.	Exposure/pigmentary keratitis	Not defined	1	Breeder option	
H.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
I.	Cataract	Not defined	1, 2, 7	NO	
J.	Y-suture tip opacity	Not defined	1	Breeder option	
K.	Vitreous degeneration				
	- syneresis	Not defined	1	Breeder option	
L.	Retinal dysplasia				
	- folds	Not defined	1	Breeder option	
	- geographic	Not defined	1	NO	

Description and Comments

A. Microphthalmia

Microphthalmia is a congenital defect characterized by a small eye often associated with other ocular malformations, including defects of the cornea, anterior chamber, lens and/or retina.

B. Keratoconjunctivitis sicca (KCS)

An abnormality of the tear film, most commonly a deficiency of the aqueous portion, although the mucin and/or lipid layers may be affected; results in ocular irritation and/or vision impairment.

C. Congenital KCS and ichthyosiform dermatosis

A syndrome in which dogs are born with severe to absolute keratoconjunctivitis sicca (KCS) which is poorly responsive to lacrimostimulant treatment. Concurrent congenital dermatopathy affecting haircoat, skin and footpads is severe and requires intensive life-long care. Clinical signs are so devastating that affected dogs are often euthanized.

D. Entropion

A conformational defect resulting in "in-rolling" of one or both of the eyelids, which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

E. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

F. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral. In the Cavalier King Charles Spaniel, lesions are circular or semicircular central crystalline deposits in the anterior corneal stroma that appear between 2 and 5 years of age. It may be associated with exophthalmos and lagophthalmos common in these dogs.

G. Exposure/pigmentary keratitis

A condition characterized by variable degrees of superficial vascularization, fibrosis and/or pigmentation of the cornea. May be associated with excessive exposure/irritation of the globe due to shallow orbits, lower eyelid medial entropion, lagophthalmos and macropalpebral fissure.

H. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

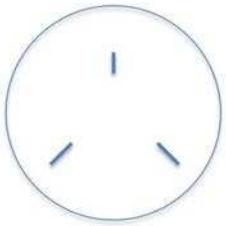
I. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

In the Cavalier King Charles Spaniel, onset is at an early age (less than 6 months), affecting the cortex and nucleus with rapid progression to complete cataract, resulting in blindness.

J. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex and occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. Newer versions of the form (3/16/21) have boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

K. Vitreous degeneration - syneresis

Liquefaction of the vitreous gel which may predispose to retinal detachment.

L. Retinal dysplasia

- folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

- geographic

An irregularly shaped area of retinal development containing areas of retinal thickening and disorganization. These lesions can take up to 1.5 years after birth to develop and be ophthalmoscopically visible. As a result, some dogs with this disease may have had normal prior eye examinations.

References

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3. Sanchez RF, Innocent G, Mould J, et al. Canine keratoconjunctivitis sicca: disease trends in a review of 229 cases. *J Small Anim Pract*. 2007;48:211-217. PMID: 17381766

4. Hartley C, Donaldson D, Smith KC, et al. Congenital keratoconjunctivitis sicca and ichthyosiform dermatosis in 25 Cavalier King Charles spaniel dogs – part I: clinical signs, histopathology, and inheritance. *Vet Ophthalmol*. 2012;15:315-326. PMID: 22212237

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8. Jondeau C, Gounon M, Bourguet A, et al. Epidemiology and clinical significance of canine distichiasis: A retrospective study of 291 cases. *Vet. Ophthalmol*. 2023;26:339-346. PMID: 37028946

9. O'Neil DG, Brodbelt DC, Keddy A, et al. Keratoconjunctivitis sicca in dogs under primary veterinary care in the UK: an epidemiological study. *JSAP*. 2021; 62: 636-645. PMID: 34134171. **Reference derived from a non-USA dog population.**

OCULAR DISORDERS REPORT
CAVALIER KING CHARLES SPANIEL

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 59,686 #	 %	Year Examined: 2019-2023 Total # Dogs: 17,092 #	 %
GLOBE				
.110 MICROPHTHALMOS	91	0.2%	10	0.1%
10.000 GLAUCOMA	3	0.0%	0	0.0%
40.910 KERATOCONJUNCTIVITIS SICCA (KCS)	112	0.2%	32	0.2%
EYELIDS				
20.140 ECTOPIC CILIA	4	0.0%	0	0.0%
20.160 MACROPALPEBRAL FISSURE	126	0.2%	0	0.0%
21.000 ENTROPION	229	0.4%	78	0.5%
22.000 ECTROPION	11	0.0%	0	0.0%
25.110 DISTICHIASIS	5,400	9.0%	1,574	9.2%
32.110 IMPERFORATE LACRIMAL PUNCTUM	60	0.1%	47	0.3%
NICTITANS				
50.210 PLASMOMA/ ATYPICAL PANNUS	1	0.0%	1	0.0%
51.100 CARTILAGE ANOMALY/ EVERSION	7	0.0%	3	0.0%
52.110 GLAND PROLAPSE	20	0.0%	5	0.0%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	18	0.0%	1	0.0%
70.220 EXPOSURE KERATOPATHY SYNDROME	320	0.5%	144	0.8%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	5,219	8.7%	1,345	7.9%
70.730 DYSTROPHY-ENDOTHELIAL	60	0.1%	8	0.0%
UVEA				
90.250 PIGMENTARY UVEITIS	0	0.0%	1	0.0%
93.110 IRIS HYPOPLASIA	4	0.0%	6	0.0%
93.120 UVEAL CYST-SINGLE	21	0.0%	7	0.0%
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	7	0.0%	0	0.0%
93.150 IRIS COLOBOMA	4	0.0%	1	0.0%
93.170 UVEAL CYST-MULTIPLE	5	0.0%	2	0.0%
93.180 IRIS SPHINCTER DYSPLASIA	3	0.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	662	1.1%	212	1.2%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	38	0.1%	5	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	35	0.1%	3	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	44	0.1%	1	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	53	0.1%	53	0.3%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	11	0.0%	3	0.0%
95.120 UVEAL CYST-FREE FLOATING	1	0.0%	3	0.0%
97.150 COLOBOMA	8	0.0%	5	0.0%
FUNDUS				
97.110 CHOROIDAL HYPOPLASIA	9	0.0%	3	0.0%
97.120 COLOBOMA	4	0.0%	0	0.0%
120.170 RETINAL DYSPLASIA-FOLDS	3,998	6.7%	549	3.2%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	1,647	2.8%	266	1.6%
120.310 RETINAL ATROPHY-GENERALIZED	163	0.3%	14	0.1%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	20	0.0%	0	0.0%
120.920 RETINAL DETACHMENT	4	0.0%	6	0.0%
120.960 RETINOPATHY	41	0.1%	22	0.1%
120.970 RETINOPATHY - CMR/ CMR-LIKE	0	0.0%	2	0.0%
130.110 MICROPAPILLA	28	0.0%	9	0.1%
130.120 OPTIC NERVE HYPOPLASIA	16	0.0%	4	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	57	0.1%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	2,155	3.6%	481	2.8%
100.301 PUNCTATE-ANTERIOR CORTEX	546	0.9%	216	1.3%

OCULAR DISORDERS REPORT
CAVALIER KING CHARLES SPANIEL

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 59,686 #	%	2019-2023 17,092 #	%
LENS Continued				
100.302 PUNCTATE-POSTERIOR CORTEX	187	0.3%	45	0.3%
100.303 PUNCTATE-EQUATORIAL CORTEX	176	0.3%	41	0.2%
100.304 PUNCTATE-ANTERIOR SUTURES	75	0.1%	24	0.1%
100.305 PUNCTATE-POSTERIOR SUTURES	263	0.4%	65	0.4%
100.306 PUNCTATE-NUCLEUS	203	0.3%	79	0.5%
100.307 PUNCTATE-CAPSULAR	118	0.2%	47	0.3%
100.311 INCIPIENT-ANTERIOR CORTEX	460	0.8%	114	0.7%
100.312 INCIPIENT-POSTERIOR CORTEX	332	0.6%	72	0.4%
100.313 INCIPIENT-EQUATORIAL CORTEX	189	0.3%	46	0.3%
100.314 INCIPIENT-ANTERIOR SUTURES	33	0.1%	9	0.1%
100.315 INCIPIENT-POSTERIOR SUTURES	96	0.2%	33	0.2%
100.316 INCIPIENT-NUCLEUS	271	0.5%	73	0.4%
100.317 INCIPIENT-CAPSULAR	81	0.1%	37	0.2%
100.321 INCOMPLETE-ANTERIOR CORTEX	44	0.1%	26	0.2%
100.322 INCOMPLETE-POSTERIOR CORTEX	64	0.1%	34	0.2%
100.323 INCOMPLETE-EQUATORIAL CORTEX	13	0.0%	7	0.0%
100.325 INCOMPLETE-POSTERIOR SUTURES	7	0.0%	0	0.0%
100.326 INCOMPLETE-NUCLEUS	34	0.1%	19	0.1%
100.327 INCOMPLETE-CAPSULAR	16	0.0%	3	0.0%
100.328 Y-SUTURE TIP OPACITIES	107	0.2%	197	1.2%
100.330 GENERALIZED/ COMPLETE	228	0.4%	17	0.1%
100.340 RESORBING/ HYPERMATURE	11	0.0%	4	0.0%
100.375 SUBLUXATION/ LUXATION	16	0.0%	2	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***3,504***	***5.9%***	***1,011***	***5.9%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	102	0.2%	35	0.2%
110.135 PHPV/ PTVL	33	0.1%	3	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	41	0.1%	9	0.1%
110.320 VITREOUS DEGENERATION-SYNERESIS	246	0.4%	48	0.3%
OTHER				
900.000 OTHER, UNSPECIFIED	596	1.0%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	1,166	2.0%	28	0.2%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	1,044	1.7%	753	4.4%
NORMAL				
.000 NORMAL GLOBE	42,836	71.8%	11,883	69.5%

CENTRAL ASIAN SHEPHERD

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the CENTRAL ASIAN SHEPHERD breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
CENTRAL ASIAN SHEPHERD

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	8		12	
	Diagnostic Name	#	%	#	%
NICTITANS					
51.100	CARTILAGE ANOMALY/ EVERSION	0	0.0%	1	8.3%
CORNEA					
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	0	0.0%	1	8.3%
UVEA					
93.120	UVEAL CYST-SINGLE	0	0.0%	1	8.3%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	2	25.0%	1	8.3%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	2	25.0%	1	8.3%
100.305	PUNCTATE-POSTERIOR SUTURES	1	12.5%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	1	12.5%	1	8.3%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***1***	***12.5%***	***0***	***0.0%***
OTHER					
900.110	OTHER-SUSPECTED AS NOT-INHERITED	0	0.0%	1	8.3%
NORMAL					
.000	NORMAL GLOBE	4	50.0%	7	58.3%

CESKY TERRIER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the CESKY TERRIER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
CESKY TERRIER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 129 #	 %	Year Examined: 2019-2023 Total # Dogs: 27 #	 %
EYELIDS				
25.110 DISTICHIASIS	19	14.7%	0	0.0%
32.110 IMPERFORATE LACRIMAL PUNCTUM	1	0.8%	0	0.0%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	8	6.2%	0	0.0%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	4	3.1%	2	7.4%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	0	0.0%	2	7.4%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	1	0.8%	1	3.7%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	0	0.0%	1	3.7%
97.150 COLOBOMA	1	0.8%	0	0.0%
FUNDUS				
97.110 CHOROIDAL HYPOPLASIA	1	0.8%	0	0.0%
120.170 RETINAL DYSPLASIA-FOLDS	8	6.2%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.8%	0	0.0%
120.920 RETINAL DETACHMENT	0	0.0%	1	3.7%
130.110 MICROPAPILLA	1	0.8%	0	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	1	0.8%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	1	0.8%	0	0.0%
100.301 PUNCTATE-ANTERIOR CORTEX	1	0.8%	0	0.0%
100.307 PUNCTATE-CAPSULAR	2	1.6%	0	0.0%
100.311 INCIPIENT-ANTERIOR CORTEX	1	0.8%	0	0.0%
100.312 INCIPIENT-POSTERIOR CORTEX	1	0.8%	1	3.7%
100.321 INCOMPLETE-ANTERIOR CORTEX	0	0.0%	1	3.7%
100.326 INCOMPLETE-NUCLEUS	0	0.0%	1	3.7%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***6***	***4.7%***	***3***	***11.1%***
OTHER				
900.000 OTHER, UNSPECIFIED	1	0.8%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	4	3.1%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	1	0.8%	0	0.0%
NORMAL				
.000 NORMAL GLOBE	90	69.8%	20	74.1%

CHART POLSKI

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the CHART POLSKI breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
CHART POLSKI

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 11 #	 %	Year Examined: 2019-2023 Total # Dogs: 4 #	 %
EYELIDS				
25.110 DISTICHIASIS	1	9.1%	0	0.0%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	1	9.1%	0	0.0%
FUNDUS				
97.110 CHOROIDAL HYPOPLASIA	2	18.2%	0	0.0%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	1	9.1%	0	0.0%
VITREOUS				
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	9.1%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	3	27.3%	0	0.0%
NORMAL				
.000 NORMAL GLOBE	4	36.4%	4	100.0%

CHESAPEAKE BAY RETRIEVER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
C.	Cataract	Not defined	1, 2	NO	
D.	Vitreous degeneration				
	- anterior chamber	Not defined	1	Breeder option	
E.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- PRA-*prcd*	Autosomal recessive	3	NO	Mutation in the *PRCD* gene
	- PRA-unknown	Not defined	4	NO	

Description and Comments

A. Distichiasis

Eyelashes abnormally located in the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

Hereditary cataracts have been described in the Chesapeake Bay Retriever and affect the young adult dog. They appear as posterior cortical, axial, triangular opacities and the Y suture tips can be affected in both the anterior and posterior cortices. Extension of the cataract into the posterior cortex and progression to impair vision can occur. An autosomal dominant inheritance with incomplete penetrance has been proposed; however, the genetics have not been completely defined and additional studies will be required.

D. Vitreous degeneration - anterior chamber

A liquefaction of the vitreous gel which may predispose to retinal detachment.

E. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-*prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Chesapeake Bay Retriever is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available. It is important to note than in all breeds in which a molecular diagnostic test for the disease is available, it is possible to have dogs diagnosed clinically as affected, yet the DNA test results are normal. This suggests that other genetic causes of PRA exist or that the diagnosed affected dog has an acquired disease that mimics the inherited disorder.

- PRA-*unknown*

A second, less common form of PRA is also present in the Chesapeake Bay Retriever with ophthalmoscopic abnormalities characteristic of mid-stage disease found in dogs between 8-12 months of age. The lesions are progressive and end-stage lesions are evident by 2-3 years of age. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Gelatt KN. Cataracts in Chesapeake Bay Retrievers. *J Am Vet Med Assoc*. 1979;175:1176-1178. PMID: 511742

3. Zangerl B, Goldstein O, Philp AR, et al. Identical mutation in a novel retinal gene causes progressive rod-cone degeneration in dogs and retinitis pigmentosa in humans. *Genomics*. 2006;88:551-563. PMID: 16938425

4. Personal communication with Gus Aguirre, advisor to Genetics Committee, September 2023.

OCULAR DISORDERS REPORT
CHESAPEAKE BAY RETRIEVER

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	13,948		1,622	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	7	0.1%	1	0.1%
10.000	GLAUCOMA	4	0.0%	0	0.0%
EYELIDS					
20.140	ECTOPIC CILIA	2	0.0%	0	0.0%
20.160	MACROPALPEBRAL FISSURE	3	0.0%	0	0.0%
21.000	ENTROPION	56	0.4%	3	0.2%
22.000	ECTROPION	7	0.1%	1	0.1%
25.110	DISTICHIASIS	1,031	7.4%	153	9.4%
32.110	IMPERFORATE LACRIMAL PUNCTUM	1	0.0%	0	0.0%
NICTITANS					
51.100	CARTILAGE ANOMALY/ EVERSION	3	0.0%	0	0.0%
52.110	GLAND PROLAPSE	2	0.0%	0	0.0%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	1	0.0%	0	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	86	0.6%	11	0.7%
70.730	DYSTROPHY-ENDOTHELIAL	1	0.0%	1	0.1%
UVEA					
93.110	IRIS HYPOPLASIA	0	0.0%	1	0.1%
93.120	UVEAL CYST-SINGLE	25	0.2%	8	0.5%
93.150	IRIS COLOBOMA	1	0.0%	0	0.0%
93.170	UVEAL CYST-MULTIPLE	4	0.0%	4	0.2%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	253	1.8%	53	3.3%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	11	0.1%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	3	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	14	0.1%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	68	0.5%	63	3.9%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	4	0.0%	0	0.0%
93.810	UVEAL MELANOMA	1	0.0%	1	0.1%
95.120	UVEAL CYST-FREE FLOATING	3	0.0%	0	0.0%
FUNDUS					
97.110	CHOROIDAL HYPOPLASIA	3	0.0%	0	0.0%
120.170	RETINAL DYSPLASIA-FOLDS	86	0.6%	2	0.1%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	53	0.4%	3	0.2%
120.310	RETINAL ATROPHY-GENERALIZED	95	0.7%	1	0.1%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%
120.960	RETINOPATHY	10	0.1%	2	0.1%
120.970	RETINOPATHY - CMR/ CMR-LIKE	0	0.0%	3	0.2%
130.110	MICROPAPILLA	1	0.0%	1	0.1%
130.120	OPTIC NERVE HYPOPLASIA	2	0.0%	1	0.1%
LENS					
100.200	CATARACT, UNSPECIFIED	74	0.5%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	603	4.3%	89	5.5%
100.301	PUNCTATE-ANTERIOR CORTEX	83	0.6%	29	1.8%
100.302	PUNCTATE-POSTERIOR CORTEX	138	1.0%	19	1.2%
100.303	PUNCTATE-EQUATORIAL CORTEX	53	0.4%	7	0.4%
100.304	PUNCTATE-ANTERIOR SUTURES	18	0.1%	3	0.2%
100.305	PUNCTATE-POSTERIOR SUTURES	58	0.4%	7	0.4%
100.306	PUNCTATE-NUCLEUS	18	0.1%	13	0.8%
100.307	PUNCTATE-CAPSULAR	66	0.5%	26	1.6%
100.311	INCIPIENT-ANTERIOR CORTEX	72	0.5%	13	0.8%
100.312	INCIPIENT-POSTERIOR CORTEX	243	1.7%	31	1.9%

OCULAR DISORDERS REPORT
CHESAPEAKE BAY RETRIEVER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 13,948 #	 %	Year Examined: 2019-2023 Total # Dogs: 1,622 #	 %
LENS Continued				
100.313 INCIPIENT-EQUATORIAL CORTEX	63	0.5%	10	0.6%
100.314 INCIPIENT-ANTERIOR SUTURES	8	0.1%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	54	0.4%	0	0.0%
100.316 INCIPIENT-NUCLEUS	24	0.2%	3	0.2%
100.317 INCIPIENT-CAPSULAR	27	0.2%	7	0.4%
100.321 INCOMPLETE-ANTERIOR CORTEX	3	0.0%	0	0.0%
100.322 INCOMPLETE-POSTERIOR CORTEX	5	0.0%	5	0.3%
100.323 INCOMPLETE-EQUATORIAL CORTEX	2	0.0%	2	0.1%
100.325 INCOMPLETE-POSTERIOR SUTURES	4	0.0%	1	0.1%
100.326 INCOMPLETE-NUCLEUS	1	0.0%	1	0.1%
100.328 Y-SUTURE TIP OPACITIES	16	0.1%	8	0.5%
100.330 GENERALIZED/ COMPLETE	43	0.3%	1	0.1%
100.375 SUBLUXATION/ LUXATION	8	0.1%	1	0.1%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1,057***	***7.6%***	***178***	***11.0%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	21	0.2%	4	0.2%
110.135 PHPV/ PTVL	10	0.1%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	58	0.4%	16	1.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	50	0.4%	5	0.3%
OTHER				
900.000 OTHER, UNSPECIFIED	127	0.9%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	338	2.4%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	221	1.6%	103	6.4%
NORMAL				
.000 NORMAL GLOBE	11,290	80.9%	1,135	70.0%

CHIHUAHUA

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Corneal dystrophy				
	- endothelial	Not defined	2	NO	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
D.	Cataract	Not defined	1	NO	
E.	Lens luxation	Not defined, presumed autosomal recessive	5	NO	Potential mutation in *ADAMTS17* – not yet confirmed in the Chihuahua
F.	Vitreous degeneration				
	- anterior chamber	Not defined	1	Breeder option	
	- syneresis	Not defined	1	Breeder option	
G.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- PRA-*prcd*	Autosomal recessive	3, 4	NO	Mutation in the *prcd* gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Corneal dystrophy - endothelial

An abnormal loss of the inner lining of the cornea that causes progressive fluid retention (edema). With time the edema results in keratitis and decreased vision. This usually does not occur until the animal is older.

In the Chihuahua, this is a primary degenerative endothelial disease leading to progressive and permanent corneal edema. It is suspected to be a heritable disorder. There is no sex predilection. The condition is observed in older dogs, 6 to 13 years of age with a mean of 9.5 years. The corneal edema starts asymptomatically in the dorsal temporal corneal quadrant of one eye and slowly progresses medially, eventually involving the entire cornea. Typically, it becomes bilateral. In the later stages, discomfort, intracorneal bullae with subsequent ulceration and keratoconus may develop. Histologically, the primary endothelial disease appears slightly different from the clinically similar disorder of the Boston Terrier.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma) causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation in many breeds. A DNA test is available.

F. Vitreous degeneration

A liquefaction of the vitreous gel which may predispose to retinal detachment.

G. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-*prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as Progressive Retinal Atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Chihuahua is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Martin CL and Dice PF. Corneal endothelial dystrophy in the dog. *J Am Anim Hosp Assoc.* 1982;18:327.

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4. Downs LM, Hitti R, Pregnolato S, et al. Genetic screening for PRA-associated mutations in multiple dog breeds shows that PRA is heterogeneous within and between breeds. *Vet Ophthalmol*. 2014;17:126-130. PMID: 24255994

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OCULAR DISORDERS REPORT
CHIHUAHUA

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	2,092		1,824	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	1	0.0%	1	0.1%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	3	0.1%	5	0.3%
EYELIDS					
20.140	ECTOPIC CILIA	1	0.0%	0	0.0%
21.000	ENTROPION	4	0.2%	4	0.2%
25.110	DISTICHIASIS	99	4.7%	60	3.3%
32.110	IMPERFORATE LACRIMAL PUNCTUM	5	0.2%	4	0.2%
NICTITANS					
52.110	GLAND PROLAPSE	5	0.2%	5	0.3%
CORNEA					
70.220	EXPOSURE KERATOPATHY SYNDROME	5	0.2%	4	0.2%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	6	0.3%	4	0.2%
70.730	DYSTROPHY-ENDOTHELIAL	8	0.4%	1	0.1%
UVEA					
93.110	IRIS HYPOPLASIA	0	0.0%	1	0.1%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	146	7.0%	77	4.2%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	4	0.2%	3	0.2%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	2	0.1%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	9	0.4%	5	0.3%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	2	0.1%	0	0.0%
97.150	COLOBOMA	1	0.0%	0	0.0%
FUNDUS					
97.110	CHOROIDAL HYPOPLASIA	1	0.0%	0	0.0%
120.170	RETINAL DYSPLASIA-FOLDS	8	0.4%	7	0.4%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	3	0.1%	1	0.1%
120.310	RETINAL ATROPHY-GENERALIZED	12	0.6%	0	0.0%
120.960	RETINOPATHY	1	0.0%	1	0.1%
130.110	MICROPAPILLA	1	0.0%	1	0.1%
130.120	OPTIC NERVE HYPOPLASIA	0	0.0%	1	0.1%
LENS					
100.200	CATARACT, UNSPECIFIED	3	0.1%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	57	2.7%	33	1.8%
100.301	PUNCTATE-ANTERIOR CORTEX	23	1.1%	14	0.8%
100.302	PUNCTATE-POSTERIOR CORTEX	0	0.0%	3	0.2%
100.303	PUNCTATE-EQUATORIAL CORTEX	3	0.1%	2	0.1%
100.304	PUNCTATE-ANTERIOR SUTURES	2	0.1%	1	0.1%
100.305	PUNCTATE-POSTERIOR SUTURES	4	0.2%	1	0.1%
100.306	PUNCTATE-NUCLEUS	3	0.1%	4	0.2%
100.307	PUNCTATE-CAPSULAR	3	0.1%	6	0.3%
100.311	INCIPIENT-ANTERIOR CORTEX	35	1.7%	12	0.7%
100.312	INCIPIENT-POSTERIOR CORTEX	21	1.0%	8	0.4%
100.313	INCIPIENT-EQUATORIAL CORTEX	9	0.4%	5	0.3%
100.314	INCIPIENT-ANTERIOR SUTURES	2	0.1%	0	0.0%
100.315	INCIPIENT-POSTERIOR SUTURES	2	0.1%	0	0.0%
100.316	INCIPIENT-NUCLEUS	8	0.4%	4	0.2%
100.317	INCIPIENT-CAPSULAR	3	0.1%	4	0.2%
100.321	INCOMPLETE-ANTERIOR CORTEX	5	0.2%	3	0.2%
100.322	INCOMPLETE-POSTERIOR CORTEX	0	0.0%	3	0.2%
100.325	INCOMPLETE-POSTERIOR SUTURES	1	0.0%	1	0.1%
100.326	INCOMPLETE-NUCLEUS	4	0.2%	1	0.1%
100.328	Y-SUTURE TIP OPACITIES	2	0.1%	4	0.2%
100.330	GENERALIZED/ COMPLETE	12	0.6%	2	0.1%

OCULAR DISORDERS REPORT
CHIHUAHUA

Year Examined:	1993-2018		2019-2023	
Total # Dogs:	2,092		1,824	
Diagnostic Name	**#**	**%**	**#**	**%**
LENS Continued				
100.375 SUBLUXATION/ LUXATION	2	0.1%	1	0.1%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***143***	***6.8%***	***74***	***4.1%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	2	0.1%	4	0.2%
110.135 PHPV/ PTVL	2	0.1%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	21	1.0%	20	1.1%
110.320 VITREOUS DEGENERATION-SYNERESIS	60	2.9%	16	0.9%
OTHER				
900.000 OTHER, UNSPECIFIED	21	1.0%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	24	1.1%	2	0.1%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	51	2.4%	58	3.2%
NORMAL				
.000 NORMAL GLOBE	1,670	79.8%	1,534	84.1%

CHINESE CRESTED

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
B.	Cataract	Not defined	1	NO	
C.	Lens luxation	Autosomal recessive	2	NO	Mutation in the *ADAMTS17 gene*
D.	Vitreous degeneration				
	- anterior chamber	Not defined	1	Breeder option	
	- syneresis	Not defined	1	Breeder option	
E.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- PRA-*prcd*	Autosomal recessive	3	NO	Mutation in the *prcd* gene
	- rod-cone dysplasia type 3 (*rcd3*)	Autosomal recessive	3	NO	Mutation in the *PDE6A* gene

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Lens luxation

Partial (subluxation) or complete displacement of the lens from its normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may

result in elevated intraocular pressure (glaucoma) causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

D. Vitreous degeneration

Liquefaction of the vitreous gel which may predispose to retinal detachment.

E. Retinal atrophy

- *generalized*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-*prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as Progressive Retinal Atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Chinese Crested is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness fol lowed by day blindness. A DNA test is available.

In the Chinese Crested, a second, but very infrequent type of PRA has been identified that is caused by the mutation in the *PDE6A* gene that causes PRA in Cardigan Welsh Corgis. However, most cases of PRA that test normal for the *prcd* gene defect likely results from a gene defect that is still to be identified.

- rod-cone dysplasia type 3 (*rcd3*)

PRA in the Chinese Crested is an autosomal recessive trait caused by a one base pair deletion in the gene encoding the alpha subunit of cyclic GMP phosphodiesterase (rcd3). PRA begins early in life with clinical signs of night blindness and a lack of rod ERG responses seen at 6-8 weeks of age. Dogs are completely blind by 2-3 years of age when ophthalmoscopic signs are first visible. The mutation is found in the *PDE6A* gene. A DNA test is available.

References

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2. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol*. 2011;14:378-384. PMID: 22050825

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OCULAR DISORDERS REPORT
CHINESE CRESTED

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	6,853		550	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	4	0.1%	1	0.2%
10.000	GLAUCOMA	2	0.0%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	18	0.3%	3	0.5%
EYELIDS					
20.140	ECTOPIC CILIA	3	0.0%	0	0.0%
21.000	ENTROPION	4	0.1%	0	0.0%
25.110	DISTICHIASIS	42	0.6%	5	0.9%
32.110	IMPERFORATE LACRIMAL PUNCTUM	5	0.1%	2	0.4%
NICTITANS					
52.110	GLAND PROLAPSE	3	0.0%	0	0.0%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	5	0.1%	0	0.0%
70.220	EXPOSURE KERATOPATHY SYNDROME	8	0.1%	0	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	37	0.5%	3	0.5%
70.730	DYSTROPHY-ENDOTHELIAL	3	0.0%	0	0.0%
UVEA					
93.110	IRIS HYPOPLASIA	5	0.1%	0	0.0%
93.120	UVEAL CYST-SINGLE	3	0.0%	1	0.2%
93.150	IRIS COLOBOMA	2	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	181	2.6%	11	2.0%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	11	0.2%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	10	0.1%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	5	0.1%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	3	0.0%	1	0.2%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	3	0.0%	0	0.0%
95.120	UVEAL CYST-FREE FLOATING	1	0.0%	0	0.0%
FUNDUS					
97.110	CHOROIDAL HYPOPLASIA	3	0.0%	0	0.0%
97.120	COLOBOMA	2	0.0%	0	0.0%
120.170	RETINAL DYSPLASIA-FOLDS	32	0.5%	0	0.0%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	6	0.1%	0	0.0%
120.310	RETINAL ATROPHY-GENERALIZED	98	1.4%	1	0.2%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	8	0.1%	0	0.0%
120.960	RETINOPATHY	2	0.0%	0	0.0%
130.110	MICROPAPILLA	4	0.1%	0	0.0%
130.120	OPTIC NERVE HYPOPLASIA	13	0.2%	0	0.0%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	165	2.4%	19	3.5%
100.301	PUNCTATE-ANTERIOR CORTEX	47	0.7%	9	1.6%
100.302	PUNCTATE-POSTERIOR CORTEX	22	0.3%	2	0.4%
100.303	PUNCTATE-EQUATORIAL CORTEX	16	0.2%	2	0.4%
100.304	PUNCTATE-ANTERIOR SUTURES	5	0.1%	1	0.2%
100.305	PUNCTATE-POSTERIOR SUTURES	10	0.1%	0	0.0%
100.306	PUNCTATE-NUCLEUS	14	0.2%	4	0.7%
100.307	PUNCTATE-CAPSULAR	10	0.1%	3	0.5%
100.311	INCIPIENT-ANTERIOR CORTEX	44	0.6%	4	0.7%
100.312	INCIPIENT-POSTERIOR CORTEX	31	0.5%	3	0.5%
100.313	INCIPIENT-EQUATORIAL CORTEX	31	0.5%	1	0.2%
100.314	INCIPIENT-ANTERIOR SUTURES	2	0.0%	0	0.0%
100.315	INCIPIENT-POSTERIOR SUTURES	6	0.1%	0	0.0%
100.316	INCIPIENT-NUCLEUS	6	0.1%	0	0.0%

OCULAR DISORDERS REPORT
CHINESE CRESTED

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 6,853 #	 %	Year Examined: 2019-2023 Total # Dogs: 550 #	 %
LENS Continued				
100.317 INCIPIENT-CAPSULAR	2	0.0%	2	0.4%
100.321 INCOMPLETE-ANTERIOR CORTEX	3	0.0%	2	0.4%
100.322 INCOMPLETE-POSTERIOR CORTEX	5	0.1%	2	0.4%
100.323 INCOMPLETE-EQUATORIAL CORTEX	1	0.0%	1	0.2%
100.326 INCOMPLETE-NUCLEUS	1	0.0%	0	0.0%
100.327 INCOMPLETE-CAPSULAR	1	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	4	0.1%	2	0.4%
100.330 GENERALIZED/ COMPLETE	27	0.4%	3	0.5%
100.340 RESORBING/ HYPERMATURE	1	0.0%	1	0.2%
100.375 SUBLUXATION/ LUXATION	29	0.4%	2	0.4%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***285***	***4.2%***	***40***	***7.3%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	7	0.1%	4	0.7%
110.135 PHPV/ PTVL	2	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	254	3.7%	18	3.3%
110.320 VITREOUS DEGENERATION-SYNERESIS	544	7.9%	34	6.2%
OTHER				
900.000 OTHER, UNSPECIFIED	68	1.0%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	152	2.2%	2	0.4%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	58	0.8%	27	4.9%
NORMAL				
.000 NORMAL GLOBE	5,791	84.5%	439	79.8%

CHINESE FOO DOG

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the CHINESE FOO DOG breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
CHINESE FOO DOG

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions for this breed.

CHINESE SHAR-PEI

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Glaucoma – POAG	Autosomal recessive	2, 3	NO	Mutation in the *ADAMTS17* gene
B.	Entropion	Not defined	1, 4-7	NO	
C.	Secondary keratitis - chronic	Not defined	1	Passes with no notation	
D.	Lens luxation	Autosomal recessive	2, 8,9	NO	Mutation in the *ADAMTS17* gene

Description and Comments

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of the intraocular pressure (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine breed eye screening exam.

A 6 base pair deletion in exon 22 of *ADAMTS17* has been found in some affected Chinese Shar-Pei. Results supported phenotype is an autosomal recessive trait. A genetic test is available.

B. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

The condition is a particularly severe problem in the Chinese Shar-Pei and is compounded by breeder selection for facial conformation with heavy skin folds which encourages formation of entropion.

C. Secondary keratitis - chronic

A specific designation does not exist on the CAER form for this condition. We ask examiners to mark other – unlisted conditions suspected as inherited. Then in the comments box please write secondary keratitis – chronic.

A condition characterized by variable degrees of superficial vascularization, fibrosis and/or pigmentation of the cornea. Often associated with entropion or a combination of entropion and ectropion.

D. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma) causing vision impairment or blindness.

A 6 base pair deletion in exon 22 of *ADAMTS17* has been found in some affected Chinese Shar-Pei. Results supported phenotype is an autosomal recessive trait. A genetic test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Oliver, JAC, Rustidge S, Pettit L, et al. Evaluation of ADAMTS17 in Chinese Shar-Pei with primary open-angle glaucoma, primary lens luxation, or both. *Am J Vet Res.* 2018 Jan;79(1): 98-106. PMID: 29287154

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OCULAR DISORDERS REPORT
CHINESE SHAR-PEI

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	649		106	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	2	0.3%	1	0.9%
10.000	GLAUCOMA	0	0.0%	2	1.9%
EYELIDS					
21.000	ENTROPION	318	49.0%	42	39.6%
22.000	ECTROPION	12	1.8%	1	0.9%
25.110	DISTICHIASIS	3	0.5%	0	0.0%
NICTITANS					
51.100	CARTILAGE ANOMALY/ EVERSION	2	0.3%	0	0.0%
52.110	GLAND PROLAPSE	3	0.5%	0	0.0%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	29	4.5%	0	0.0%
70.220	EXPOSURE KERATOPATHY SYNDROME	13	2.0%	9	8.5%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	4	0.6%	0	0.0%
70.730	DYSTROPHY-ENDOTHELIAL	7	1.1%	0	0.0%
UVEA					
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	16	2.5%	2	1.9%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	5	0.8%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	8	1.2%	1	0.9%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	4	0.6%	2	1.9%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	1	0.2%	0	0.0%
93.810	UVEAL MELANOMA	1	0.2%	0	0.0%
LENS					
100.200	CATARACT, UNSPECIFIED	4	0.6%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	15	2.3%	1	0.9%
100.301	PUNCTATE-ANTERIOR CORTEX	2	0.3%	1	0.9%
100.302	PUNCTATE-POSTERIOR CORTEX	1	0.2%	1	0.9%
100.305	PUNCTATE-POSTERIOR SUTURES	2	0.3%	0	0.0%
100.306	PUNCTATE-NUCLEUS	3	0.5%	0	0.0%
100.307	PUNCTATE-CAPSULAR	1	0.2%	0	0.0%
100.311	INCIPIENT-ANTERIOR CORTEX	2	0.3%	0	0.0%
100.312	INCIPIENT-POSTERIOR CORTEX	6	0.9%	0	0.0%
100.313	INCIPIENT-EQUATORIAL CORTEX	1	0.2%	0	0.0%
100.314	INCIPIENT-ANTERIOR SUTURES	1	0.2%	0	0.0%
100.315	INCIPIENT-POSTERIOR SUTURES	2	0.3%	0	0.0%
100.316	INCIPIENT-NUCLEUS	1	0.2%	0	0.0%
100.330	GENERALIZED/ COMPLETE	2	0.3%	0	0.0%
100.375	SUBLUXATION/ LUXATION	9	1.4%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***28***	***4.3%***	***2***	***1.9%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	1	0.2%	1	0.9%
110.135	PHPV/ PTVL	0	0.0%	1	0.9%
110.320	VITREOUS DEGENERATION-SYNERESIS	1	0.2%	0	0.0%
FUNDUS					
120.170	RETINAL DYSPLASIA-FOLDS	4	0.6%	1	0.9%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	1	0.2%	0	0.0%
120.310	RETINAL ATROPHY-GENERALIZED	2	0.3%	0	0.0%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.2%	0	0.0%
130.120	OPTIC NERVE HYPOPLASIA	1	0.2%	0	0.0%
OTHER					
900.000	OTHER, UNSPECIFIED	9	1.4%	0	0.0%
900.100	OTHER-SUSPECTED AS INHERITED	17	2.6%	1	0.9%

OCULAR DISORDERS REPORT
CHINESE SHAR-PEI

Year Examined:	1993-2018		2019-2023	
Total # Dogs:	649		106	
Diagnostic Name	**#**	**%**	**#**	**%**
OTHER Continued				
900.110 OTHER-SUSPECTED AS NOT-INHERITED	26	4.0%	7	6.6%
NORMAL				
.000 NORMAL GLOBE	308	47.5%	52	49.1%

CHINOOK

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Persistent pupillary membranes	Not defined	1	Breeder option	
	- iris to iris	Not defined	1	Breeder option	
B.	Cataract	Not defined	1	NO	
C.	Retinal dysplasia				
	- folds	Not defined	1	Breeder option	

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
CHINOOK

Diagnostic Name	1993-2018 #	1993-2018 %	2019-2023 #	2019-2023 %
Year Examined:	**1993-2018**		**2019-2023**	
Total # Dogs:	**1,584**		**247**	
EYELIDS				
20.140 ECTOPIC CILIA	1	0.1%	0	0.0%
25.110 DISTICHIASIS	5	0.3%	0	0.0%
GLOBE				
40.910 KERATOCONJUNCTIVITIS SICCA (KCS)	1	0.1%	0	0.0%
NICTITANS				
51.100 CARTILAGE ANOMALY/ EVERSION	4	0.3%	2	0.8%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	2	0.1%	1	0.4%
70.730 DYSTROPHY-ENDOTHELIAL	1	0.1%	0	0.0%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	94	5.9%	2	0.8%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	2	0.1%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	2	0.1%	1	0.4%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	1	0.1%	0	0.0%
93.810 UVEAL MELANOMA	1	0.1%	0	0.0%
FUNDUS				
97.110 CHOROIDAL HYPOPLASIA	1	0.1%	1	0.4%
120.170 RETINAL DYSPLASIA-FOLDS	65	4.1%	2	0.8%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	1	0.1%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	1	0.1%	0	0.0%
120.920 RETINAL DETACHMENT	1	0.1%	0	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	2	0.1%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	86	5.4%	11	4.5%
100.301 PUNCTATE-ANTERIOR CORTEX	9	0.6%	4	1.6%
100.302 PUNCTATE-POSTERIOR CORTEX	3	0.2%	0	0.0%
100.303 PUNCTATE-EQUATORIAL CORTEX	3	0.2%	0	0.0%
100.304 PUNCTATE-ANTERIOR SUTURES	1	0.1%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	6	0.4%	2	0.8%
100.306 PUNCTATE-NUCLEUS	11	0.7%	2	0.8%
100.307 PUNCTATE-CAPSULAR	5	0.3%	5	2.0%
100.311 INCIPIENT-ANTERIOR CORTEX	10	0.6%	1	0.4%
100.312 INCIPIENT-POSTERIOR CORTEX	17	1.1%	1	0.4%
100.313 INCIPIENT-EQUATORIAL CORTEX	8	0.5%	0	0.0%
100.314 INCIPIENT-ANTERIOR SUTURES	1	0.1%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	9	0.6%	0	0.0%
100.316 INCIPIENT-NUCLEUS	8	0.5%	1	0.4%
100.317 INCIPIENT-CAPSULAR	5	0.3%	0	0.0%
100.321 INCOMPLETE-ANTERIOR CORTEX	2	0.1%	0	0.0%
100.322 INCOMPLETE-POSTERIOR CORTEX	3	0.2%	1	0.4%
100.326 INCOMPLETE-NUCLEUS	0	0.0%	1	0.4%
100.327 INCOMPLETE-CAPSULAR	0	0.0%	1	0.4%
100.328 Y-SUTURE TIP OPACITIES	5	0.3%	3	1.2%
100.330 GENERALIZED/ COMPLETE	10	0.6%	0	0.0%
100.375 SUBLUXATION/ LUXATION	1	0.1%	1	0.4%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***113***	***7.1%***	***19***	***7.7%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	2	0.1%	2	0.8%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.1%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	18	1.1%	2	0.8%

OCULAR DISORDERS REPORT
CHINOOK

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1,584 #	 %	Year Examined: 2019-2023 Total # Dogs: 247 #	 %
OTHER				
900.000 OTHER, UNSPECIFIED	19	1.2%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	41	2.6%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	18	1.1%	10	4.0%
NORMAL				
.000 NORMAL GLOBE	1,326	83.7%	207	83.8%

CHOW CHOW

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Glaucoma	Autosomal recessive	2, 3	NO	
B.	Entropion	Not defined	1	NO	
C.	Ectropion	Not defined	1	Breeder option	
D.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- iris to cornea	Not defined	1	NO	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
	- endothelial opacity/no strands	Not defined	1	NO	
E.	Cataract	Not defined	1, 4	NO	

DESCRIPTION AND COMMENTS

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated intraocular pressure occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of the IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests are part of a routine screening exam for certification.

Age of onset in the Chow Chow appears to be anywhere between 3-6 years of age and has been observed as a bilateral condition. Gonioscopy has shown extremely narrow iridocorneal angles and in many regions no evidence of trabecular meshwork.

B. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

Entropion in the Chow Chow has been observed for decades and is definitely related to the amount of skin covering the head and face. Because of the conformation admired by both fanciers and the judges, it is doubtful that we will see a significant change in the incidence of entropion as folds are, in many cases, desired by these individuals. Entropion requires surgical correction in the Chow Chow to return comfort and decrease chances for vision loss.

C. Ectropion

A conformational defect resulting in eversion of the eyelids, which may cause ocular irritation. It is likely that ectropion

is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Major PPM's have been observed in the Chow Chow. Many ophthalmologists have observed puppies so severely affected that they are temporarily or permanently blind. The blindness is due to adherence of the membranes to the cornea and/or lens.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

In the Chow Chow, the only reported cataract is congenital. The clinical appearance is variable, ranging from small nuclear or capsular opacities to generalized opacity. The central lens (nucleus) is most consistently affected with variable involvement of the peripheral lens (cortex). Concurrent ocular anomalies may include entropion, microphthalmia, persistent pupillary membranes, and retinal folds, although any direct relationship of these latter conditions to the cataract is unclear.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Gelatt KN, MacKay EO. Prevalence of the breed-related glaucomas in pure-bred dogs in North America. *Vet Ophthalmol*. 2004;7:97-111. PMID: 14982589

3. Corcaran KA, Koch SA. Primary glaucoma in the Chow chows. *Prog Vet Comp Ophthal*. 1994;4:193-197.

4. Collins BK, Collier LL, Johnson GS, et al. Familial cataracts and concurrent ocular anomalies in chow chows. *J Am Vet Med Assoc*. 1992;200:1485-1491. PMID:1612983

OCULAR DISORDERS REPORT
CHOW CHOW

Diagnostic Name		Year Examined: 1993-2018 Total # Dogs: 1,466 #	 %	Year Examined: 2019-2023 Total # Dogs: 279 #	 %
GLOBE					
.110	MICROPHTHALMOS	4	0.3%	1	0.4%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	2	0.1%	0	0.0%
EYELIDS					
20.160	MACROPALPEBRAL FISSURE	3	0.2%	0	0.0%
21.000	ENTROPION	386	26.3%	50	17.9%
22.000	ECTROPION	25	1.7%	5	1.8%
25.110	DISTICHIASIS	9	0.6%	1	0.4%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	9	0.6%	0	0.0%
70.220	EXPOSURE KERATOPATHY SYNDROME	26	1.8%	5	1.8%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	9	0.6%	0	0.0%
70.730	DYSTROPHY-ENDOTHELIAL	17	1.2%	1	0.4%
UVEA					
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	5	0.3%	0	0.0%
93.170	UVEAL CYST-MULTIPLE	0	0.0%	1	0.4%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	510	34.8%	75	26.9%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	18	1.2%	1	0.4%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	62	4.2%	6	2.2%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	8	0.5%	1	0.4%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	17	1.2%	14	5.0%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	7	0.5%	9	3.2%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	32	2.2%	3	1.1%
100.301	PUNCTATE-ANTERIOR CORTEX	2	0.1%	0	0.0%
100.302	PUNCTATE-POSTERIOR CORTEX	5	0.3%	0	0.0%
100.303	PUNCTATE-EQUATORIAL CORTEX	2	0.1%	0	0.0%
100.305	PUNCTATE-POSTERIOR SUTURES	3	0.2%	1	0.4%
100.306	PUNCTATE-NUCLEUS	2	0.1%	0	0.0%
100.307	PUNCTATE-CAPSULAR	2	0.1%	1	0.4%
100.311	INCIPIENT-ANTERIOR CORTEX	5	0.3%	1	0.4%
100.312	INCIPIENT-POSTERIOR CORTEX	9	0.6%	1	0.4%
100.315	INCIPIENT-POSTERIOR SUTURES	1	0.1%	1	0.4%
100.316	INCIPIENT-NUCLEUS	4	0.3%	2	0.7%
100.322	INCOMPLETE-POSTERIOR CORTEX	0	0.0%	2	0.7%
100.325	INCOMPLETE-POSTERIOR SUTURES	1	0.1%	0	0.0%
100.326	INCOMPLETE-NUCLEUS	1	0.1%	2	0.7%
100.328	Y-SUTURE TIP OPACITIES	2	0.1%	2	0.7%
100.330	GENERALIZED/ COMPLETE	1	0.1%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***38***	***2.6%***	***11***	***3.9%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	5	0.3%	0	0.0%
110.320	VITREOUS DEGENERATION-SYNERESIS	3	0.2%	0	0.0%
FUNDUS					
120.170	RETINAL DYSPLASIA-FOLDS	2	0.1%	0	0.0%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	1	0.1%	0	0.0%
120.310	RETINAL ATROPHY-GENERALIZED	8	0.5%	0	0.0%
130.120	OPTIC NERVE HYPOPLASIA	1	0.1%	0	0.0%
OTHER					
900.000	OTHER, UNSPECIFIED	17	1.2%	0	0.0%
900.100	OTHER-SUSPECTED AS INHERITED	22	1.5%	0	0.0%
900.110	OTHER-SUSPECTED AS NOT-INHERITED	26	1.8%	8	2.9%

OCULAR DISORDERS REPORT
CHOW CHOW

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1,466 #	 %	Year Examined: 2019-2023 Total # Dogs: 279 #	 %
NORMAL				
.000 NORMAL GLOBE	657	44.8%	135	48.4%

CIRNECO DELL'ETNA

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the CIRNECO DELL'ETNA breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
CIRNECO DELL ETNA

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 50 #	 %	Year Examined: 2019-2023 Total # Dogs: 67 #	 %
EYELIDS				
25.110 DISTICHIASIS	2	4.0%	3	4.5%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	1	2.0%	1	1.5%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	1	2.0%	2	3.0%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	2	4.0%	3	4.5%
100.301 PUNCTATE-ANTERIOR CORTEX	1	2.0%	1	1.5%
100.307 PUNCTATE-CAPSULAR	1	2.0%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	1	2.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***3***	***6.0%***	***1***	***1.5%***
FUNDUS				
130.120 OPTIC NERVE HYPOPLASIA	0	0.0%	1	1.5%
OTHER				
900.110 OTHER-SUSPECTED AS NOT-INHERITED	2	4.0%	0	0.0%
NORMAL				
.000 NORMAL GLOBE	43	86.0%	57	85.1%

CLUMBER SPANIEL

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Keratoconjunctivitis sicca	Not defined	1	NO	
B.	Entropion	Not defined	1, 2	Breeder option	
C.	Ectropion	Not defined	1	Breeder option	
D.	Distichiasis	Not defined	1	Breeder option	
E.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
F.	Cataract	Not defined	1	NO	
G.	Retinal dysplasia				
	- folds	Not defined	1	Breeder option	

Description and Comments

A. Keratoconjunctivitis sicca (KCS)

An abnormality of the tear film, most commonly a deficiency of the aqueous portion, although the mucin and/or lipid layers may be affected; results in ocular irritation and/or vision impairment.

B. Entropion

A conformational defect resulting in "in-rolling" of one or both of the eyelids, which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

C. Ectropion

A conformational defect resulting in eversion of the eyelids, which may cause ocular irritation. It is likely that ectropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

D. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity.

The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

E. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

F. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

G. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Hodgman SFJ. Abnormalities and defects in pedigree dogs: I. An investigation into the existence of abnormalities in pedigree dogs in British Isles. *J Small Anim Pract*. 1963;4:447-456. **reference derived from non-USA dog population**

OCULAR DISORDERS REPORT
CLUMBER SPANIEL

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	2,852		348	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	6	0.2%	1	0.3%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	20	0.7%	5	1.4%
EYELIDS					
20.140	ECTOPIC CILIA	1	0.0%	0	0.0%
20.160	MACROPALPEBRAL FISSURE	167	5.9%	0	0.0%
21.000	ENTROPION	615	21.6%	76	21.8%
22.000	ECTROPION	454	15.9%	51	14.7%
25.110	DISTICHIASIS	211	7.4%	45	12.9%
32.110	IMPERFORATE LACRIMAL PUNCTUM	5	0.2%	0	0.0%
NICTITANS					
52.110	GLAND PROLAPSE	1	0.0%	0	0.0%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	13	0.5%	0	0.0%
70.220	EXPOSURE KERATOPATHY SYNDROME	12	0.4%	0	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	5	0.2%	0	0.0%
70.730	DYSTROPHY-ENDOTHELIAL	0	0.0%	1	0.3%
UVEA					
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	69	2.4%	1	0.3%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	2	0.1%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	6	0.2%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	1	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	0	0.0%	1	0.3%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	2	0.1%	0	0.0%
FUNDUS					
97.110	CHOROIDAL HYPOPLASIA	2	0.1%	0	0.0%
97.120	COLOBOMA	3	0.1%	0	0.0%
120.170	RETINAL DYSPLASIA-FOLDS	183	6.4%	8	2.3%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	10	0.4%	1	0.3%
120.310	RETINAL ATROPHY-GENERALIZED	15	0.5%	0	0.0%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%
120.960	RETINOPATHY	1	0.0%	0	0.0%
130.110	MICROPAPILLA	0	0.0%	1	0.3%
LENS					
100.200	CATARACT, UNSPECIFIED	15	0.5%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	96	3.4%	17	4.9%
100.301	PUNCTATE-ANTERIOR CORTEX	23	0.8%	13	3.7%
100.302	PUNCTATE-POSTERIOR CORTEX	29	1.0%	2	0.6%
100.303	PUNCTATE-EQUATORIAL CORTEX	8	0.3%	0	0.0%
100.304	PUNCTATE-ANTERIOR SUTURES	1	0.0%	0	0.0%
100.305	PUNCTATE-POSTERIOR SUTURES	19	0.7%	0	0.0%
100.306	PUNCTATE-NUCLEUS	8	0.3%	1	0.3%
100.307	PUNCTATE-CAPSULAR	2	0.1%	3	0.9%
100.311	INCIPIENT-ANTERIOR CORTEX	15	0.5%	4	1.1%
100.312	INCIPIENT-POSTERIOR CORTEX	43	1.5%	9	2.6%
100.313	INCIPIENT-EQUATORIAL CORTEX	7	0.2%	0	0.0%
100.314	INCIPIENT-ANTERIOR SUTURES	2	0.1%	0	0.0%
100.315	INCIPIENT-POSTERIOR SUTURES	16	0.6%	1	0.3%
100.316	INCIPIENT-NUCLEUS	9	0.3%	1	0.3%
100.317	INCIPIENT-CAPSULAR	5	0.2%	1	0.3%
100.322	INCOMPLETE-POSTERIOR CORTEX	2	0.1%	1	0.3%
100.323	INCOMPLETE-EQUATORIAL CORTEX	1	0.0%	0	0.0%

OCULAR DISORDERS REPORT
CLUMBER SPANIEL

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 2,852 #	 %	Year Examined: 2019-2023 Total # Dogs: 348 #	 %
LENS Continued				
100.325 INCOMPLETE-POSTERIOR SUTURES	0	0.0%	2	0.6%
100.326 INCOMPLETE-NUCLEUS	1	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	5	0.2%	2	0.6%
100.330 GENERALIZED/ COMPLETE	5	0.2%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***211***	***7.4%***	***38***	***10.9%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	6	0.2%	1	0.3%
110.135 PHPV/ PTVL	3	0.1%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	25	0.9%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	64	2.2%	3	0.9%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	34	1.2%	6	1.7%
NORMAL				
.000 NORMAL GLOBE	1,505	52.8%	173	49.7%

COCKER SPANIEL

(*American)

*The official breed name is Cocker Spaniel. The designation "American" has been used to avoid confusion and emphasize the distinction from the English Cocker Spaniel breed.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Keratoconjunctivitis sicca	Not defined	1, 2	NO	
B.	Glaucoma	Not defined	3, 4	NO	
C.	Ectropion	Not defined	1	Breeder option	
D.	Distichiasis	Not defined	1, 2, 5, 15	Breeder option	
E.	Imperforate lacrimal punctum	Not defined	1	Breeder option	
F.	Prolapsed gland-nictitans	Not defined	6	Breeder option	
G.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
H.	Secondary keratitis - chronic	Not defined	1	Passes with no notation	
I.	Cataract	Not defined	1, 2, 7-10	NO	
J.	Retinal atrophy, generalized	Not defined	1	NO	
	-PRA-*prcd*	Autosomal recessive	11-13	NO	Mutation in the *prcd* gene
K.	Retinal dysplasia				
	- folds	Not defined	1, 14	Breeder option	

Description and Comments

A. Keratoconjunctivitis sicca

An abnormality of the tear film, most commonly a deficiency of the aqueous portion, although the mucin and/or lipid layers may be affected; results in ocular irritation and/or vision impairment.

B. Glaucoma

An elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification

of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine breed eye screening exam.

C. Ectropion

A conformational defect resulting in eversion of the eyelids, which may cause ocular irritation due to exposure. It is likely that ectropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

D. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

E. Imperforate lacrimal punctum

A developmental anomaly resulting in failure of opening of the lacrimal duct adjacent to the eye. The lower punctum is more frequently affected. This defect usually results in epiphora, an overflow of tears onto the face.

F. Prolapsed gland of the third eyelid

Protrusion of the tear gland associated with the third eyelid. The mode of inheritance of this disorder is unknown. The exposed gland may become irritated. Commonly referred to as "cherry eye."

G. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

H. Secondary keratitis - chronic

A specific designation does not exist on the CAER form for this condition. We ask examiners to mark other – unlisted conditions suspected as inherited. Then in the comments box please write “keratitis”.

A condition characterized by variable degrees of superficial vascularization, fibrosis and/or pigmentation of the cornea. Often associated with entropion or a combination of entropion and ectropion.

I. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

In this breed, the onset of cataract may occur at an early age (less than 2 years) with rapid progression to maturity and associated with significant lens-induced inflammation.

J. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-*prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Cocker Spaniel is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

K. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

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OCULAR DISORDERS REPORT
COCKER SPANIEL

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 61,317 #	%	2019-2023 5,799 #	%
GLOBE				
.110 MICROPHTHALMOS	36	0.1%	6	0.1%
10.000 GLAUCOMA	37	0.1%	7	0.1%
40.910 KERATOCONJUNCTIVITIS SICCA (KCS)	412	0.7%	69	1.2%
EYELIDS				
20.110 EYELID DERMOID	2	0.0%	0	0.0%
20.140 ECTOPIC CILIA	56	0.1%	1	0.0%
20.160 MACROPALPEBRAL FISSURE	179	0.3%	0	0.0%
21.000 ENTROPION	161	0.3%	13	0.2%
22.000 ECTROPION	1,006	1.6%	21	0.4%
25.110 DISTICHIASIS	30,768	50.2%	2,975	51.3%
32.110 IMPERFORATE LACRIMAL PUNCTUM	612	1.0%	268	4.6%
NICTITANS				
50.210 PLASMOMA/ ATYPICAL PANNUS	1	0.0%	2	0.0%
51.100 CARTILAGE ANOMALY/ EVERSION	8	0.0%	2	0.0%
52.110 GLAND PROLAPSE	231	0.4%	30	0.5%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	498	0.8%	0	0.0%
70.220 EXPOSURE KERATOPATHY SYNDROME	571	0.9%	104	1.8%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	1,682	2.7%	124	2.1%
70.730 DYSTROPHY-ENDOTHELIAL	43	0.1%	0	0.0%
UVEA				
90.250 PIGMENTARY UVEITIS	1	0.0%	0	0.0%
93.110 IRIS HYPOPLASIA	3	0.0%	1	0.0%
93.120 UVEAL CYST-SINGLE	22	0.0%	1	0.0%
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	2	0.0%	0	0.0%
93.150 IRIS COLOBOMA	9	0.0%	1	0.0%
93.170 UVEAL CYST-MULTIPLE	0	0.0%	1	0.0%
93.180 IRIS SPHINCTER DYSPLASIA	1	0.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	181	0.3%	22	0.4%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	32	0.1%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	35	0.1%	1	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	28	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	59	0.1%	29	0.5%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	7	0.0%	0	0.0%
93.810 UVEAL MELANOMA	1	0.0%	0	0.0%
95.120 UVEAL CYST-FREE FLOATING	1	0.0%	1	0.0%
97.150 COLOBOMA	6	0.0%	0	0.0%
FUNDUS				
97.110 CHOROIDAL HYPOPLASIA	33	0.1%	0	0.0%
97.120 COLOBOMA	14	0.0%	0	0.0%
120.170 RETINAL DYSPLASIA-FOLDS	7,028	11.5%	208	3.6%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	172	0.3%	6	0.1%
120.310 RETINAL ATROPHY-GENERALIZED	468	0.8%	7	0.1%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	14	0.0%	0	0.0%
120.960 RETINOPATHY	39	0.1%	13	0.2%
120.970 RETINOPATHY - CMR/ CMR-LIKE	0	0.0%	1	0.0%
130.110 MICROPAPILLA	4	0.0%	1	0.0%
130.120 OPTIC NERVE HYPOPLASIA	10	0.0%	0	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	1,023	1.7%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	3,670	6.0%	358	6.2%

OCULAR DISORDERS REPORT
COCKER SPANIEL

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 61,317 #	 %	Year Examined: 2019-2023 Total # Dogs: 5,799 #	 %
LENS Continued				
100.301 PUNCTATE-ANTERIOR CORTEX	1,320	2.2%	234	4.0%
100.302 PUNCTATE-POSTERIOR CORTEX	627	1.0%	65	1.1%
100.303 PUNCTATE-EQUATORIAL CORTEX	191	0.3%	32	0.6%
100.304 PUNCTATE-ANTERIOR SUTURES	192	0.3%	36	0.6%
100.305 PUNCTATE-POSTERIOR SUTURES	295	0.5%	56	1.0%
100.306 PUNCTATE-NUCLEUS	108	0.2%	20	0.3%
100.307 PUNCTATE-CAPSULAR	146	0.2%	43	0.7%
100.311 INCIPIENT-ANTERIOR CORTEX	1,164	1.9%	96	1.7%
100.312 INCIPIENT-POSTERIOR CORTEX	1,309	2.1%	98	1.7%
100.313 INCIPIENT-EQUATORIAL CORTEX	354	0.6%	49	0.8%
100.314 INCIPIENT-ANTERIOR SUTURES	117	0.2%	3	0.1%
100.315 INCIPIENT-POSTERIOR SUTURES	200	0.3%	16	0.3%
100.316 INCIPIENT-NUCLEUS	216	0.4%	19	0.3%
100.317 INCIPIENT-CAPSULAR	107	0.2%	17	0.3%
100.321 INCOMPLETE-ANTERIOR CORTEX	95	0.2%	34	0.6%
100.322 INCOMPLETE-POSTERIOR CORTEX	92	0.2%	54	0.9%
100.323 INCOMPLETE-EQUATORIAL CORTEX	19	0.0%	9	0.2%
100.324 INCOMPLETE-ANTERIOR SUTURES	3	0.0%	0	0.0%
100.325 INCOMPLETE-POSTERIOR SUTURES	5	0.0%	1	0.0%
100.326 INCOMPLETE-NUCLEUS	26	0.0%	13	0.2%
100.327 INCOMPLETE-CAPSULAR	3	0.0%	2	0.0%
100.328 Y-SUTURE TIP OPACITIES	62	0.1%	73	1.3%
100.330 GENERALIZED/ COMPLETE	1,056	1.7%	30	0.5%
100.340 RESORBING/ HYPERMATURE	31	0.1%	16	0.3%
100.375 SUBLUXATION/ LUXATION	87	0.1%	7	0.1%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***8,699***	***14.2%***	***943***	***16.3%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	47	0.1%	13	0.2%
110.135 PHPV/ PTVL	9	0.0%	1	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	25	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	148	0.2%	13	0.2%
OTHER				
900.000 OTHER, UNSPECIFIED	451	0.7%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	1,069	1.7%	37	0.6%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	1,094	1.8%	270	4.7%
NORMAL				
.000 NORMAL GLOBE	24,991	40.8%	2,062	35.6%

COLLIE

(Rough and Smooth varieties)

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Microphthalmia	Not defined	1, 2	NO	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
D.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- iris to lens	Not defined	1	NO	
E.	Cataract	Not defined	1	NO	
F.	Persistent hyaloid artery remnant	Not defined	1	Breeder option	
G.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- Rod-cone dysplasia type 2- (*rcd2*)	Autosomal recessive	3-6	NO	Mutation in the *RD3* gene
H.	Retinal dysplasia				
	- folds	Not defined	1	Breeder option	
I.	Choroidal hypoplasia (Collie Eye Anomaly) - staphyloma/coloboma - retinal detachment - retinal hemorrhage - optic nerve coloboma	Autosomal recessive	1, 7-31	NO	Mutation in the *NHEJ1* gene
J.	Optic Nerve Hypoplasia	Not defined	1	NO	

Description and Comments

A. Microphthalmia

Microphthalmia is a congenital defect characterized by a small eye often associated with defects of the cornea, iris

(coloboma), anterior chamber, lens (cataract) and/or retina. An association has been made between partial albinism, multiple ocular defects (especially microphthalmia) and deafness in a number of canine breeds including the Collie. From these reports it appears that a predominantly white hair coat is associated with a higher incidence of ocular defects.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. In the Collie, because there is significant clinical disease associated with the abnormal hairs, breeding of affected animals should be discouraged.

C. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

In the Collie, this is a particularly serious problem noted frequently on routine screening examination. The majority of persistent pupillary membranes identified on routine screening examinations include iris sheets, and bridging from the iris to cornea and the iris to lens. These may result in vision impairment.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

F. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

G. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. PRA is inherited as an autosomal recessive trait in most breeds. In the Collie, the rod/cone degeneration occurs very rarely and in those cases has not been caused by any of the known genetic mutations.

- Rod-cone dysplasia type 2- (*rcd2*)

An inherited retinal disease characterized by abortive or abnormal development of rods and cones. The disease can be detected histologically by 6 weeks. Clinical night blindness is observed as early as 6 weeks with total blindness by 1 year of age. It may be diagnosed as early as 24 days with an ERG. Histologically the disease can be detected by 6 weeks. This form of retinal dysplasia is clinically similar to, but genetically distinct from that seen in the Irish Setter. This condition is caused by an insertion in *RD3.* A DNA test is available.

H. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

I. Choroidal hypoplasia (Collie Eye Anomaly)
- staphyloma/coloboma
- retinal detachment
- retinal hemorrhage
- optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1.* The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

J. Optic nerve hypoplasia

A congenital anomaly which results in a small optic disk diameter and vision loss. Contrast with micropapilla, which may have a similar ophthalmoscopic appearance but without loss of vision.

Historical Note:

Central progressive retinal atrophy (CPRA) was previously a condition listed for this breed. However as the condition is no longer identified in the breed, the condition has been removed. CPRA was a progressive retinal degeneration in which photoreceptor death occurred secondary to disease of the underlying pigment epithelium. Progression was slow and some animals never lost vision. CPRA occurred in England, but was uncommon elsewhere.

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OCULAR DISORDERS REPORT
COLLIE

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 61,196 #	 %	2019-2023 7,279 #	 %
GLOBE				
.110 MICROPHTHALMOS	1,042	1.7%	224	3.1%
10.000 GLAUCOMA	7	0.0%	0	0.0%
40.910 KERATOCONJUNCTIVITIS SICCA (KCS)	5	0.0%	0	0.0%
EYELIDS				
20.110 EYELID DERMOID	1	0.0%	0	0.0%
20.140 ECTOPIC CILIA	5	0.0%	0	0.0%
20.160 MACROPALPEBRAL FISSURE	1	0.0%	0	0.0%
21.000 ENTROPION	58	0.1%	3	0.0%
22.000 ECTROPION	8	0.0%	0	0.0%
25.110 DISTICHIASIS	1,123	1.8%	152	2.1%
32.110 IMPERFORATE LACRIMAL PUNCTUM	9	0.0%	1	0.0%
NICTITANS				
51.100 CARTILAGE ANOMALY/ EVERSION	13	0.0%	1	0.0%
52.110 GLAND PROLAPSE	2	0.0%	0	0.0%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	3	0.0%	0	0.0%
70.220 EXPOSURE KERATOPATHY SYNDROME	8	0.0%	0	0.0%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	420	0.7%	9	0.1%
70.730 DYSTROPHY-ENDOTHELIAL	12	0.0%	0	0.0%
UVEA				
90.250 PIGMENTARY UVEITIS	1	0.0%	0	0.0%
93.110 IRIS HYPOPLASIA	6	0.0%	2	0.0%
93.120 UVEAL CYST-SINGLE	22	0.0%	8	0.1%
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.0%	0	0.0%
93.150 IRIS COLOBOMA	24	0.0%	0	0.0%
93.170 UVEAL CYST-MULTIPLE	5	0.0%	7	0.1%
93.180 IRIS SPHINCTER DYSPLASIA	3	0.0%	1	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	10,457	17.1%	1,721	23.6%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	539	0.9%	85	1.2%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	132	0.2%	12	0.2%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	67	0.1%	7	0.1%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	48	0.1%	18	0.2%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	12	0.0%	2	0.0%
93.810 UVEAL MELANOMA	4	0.0%	1	0.0%
95.120 UVEAL CYST-FREE FLOATING	1	0.0%	2	0.0%
97.150 COLOBOMA	364	0.6%	168	2.3%
FUNDUS				
97.110 CHOROIDAL HYPOPLASIA	42,119	68.8%	5,647	77.6%
97.120 COLOBOMA	2,298	3.8%	0	0.0%
120.170 RETINAL DYSPLASIA-FOLDS	4,222	6.9%	531	7.3%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	61	0.1%	3	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	815	1.3%	1	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	823	1.3%	0	0.0%
120.920 RETINAL DETACHMENT	143	0.2%	72	1.0%
120.960 RETINOPATHY	1	0.0%	2	0.0%
120.970 RETINOPATHY - CMR/ CMR-LIKE	0	0.0%	1	0.0%
130.110 MICROPAPILLA	168	0.3%	51	0.7%
130.120 OPTIC NERVE HYPOPLASIA	255	0.4%	26	0.4%
LENS				
100.200 CATARACT, UNSPECIFIED	114	0.2%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	607	1.0%	88	1.2%

OCULAR DISORDERS REPORT
COLLIE

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 61,196 #	 %	Year Examined: 2019-2023 Total # Dogs: 7,279 #	 %
LENS Continued				
100.301 PUNCTATE-ANTERIOR CORTEX	112	0.2%	15	0.2%
100.302 PUNCTATE-POSTERIOR CORTEX	27	0.0%	4	0.1%
100.303 PUNCTATE-EQUATORIAL CORTEX	6	0.0%	1	0.0%
100.304 PUNCTATE-ANTERIOR SUTURES	34	0.1%	1	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	27	0.0%	4	0.1%
100.306 PUNCTATE-NUCLEUS	237	0.4%	47	0.6%
100.307 PUNCTATE-CAPSULAR	50	0.1%	14	0.2%
100.311 INCIPIENT-ANTERIOR CORTEX	107	0.2%	13	0.2%
100.312 INCIPIENT-POSTERIOR CORTEX	114	0.2%	12	0.2%
100.313 INCIPIENT-EQUATORIAL CORTEX	41	0.1%	3	0.0%
100.314 INCIPIENT-ANTERIOR SUTURES	40	0.1%	3	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	28	0.0%	3	0.0%
100.316 INCIPIENT-NUCLEUS	164	0.3%	52	0.7%
100.317 INCIPIENT-CAPSULAR	34	0.1%	9	0.1%
100.321 INCOMPLETE-ANTERIOR CORTEX	4	0.0%	2	0.0%
100.322 INCOMPLETE-POSTERIOR CORTEX	3	0.0%	3	0.0%
100.325 INCOMPLETE-POSTERIOR SUTURES	0	0.0%	1	0.0%
100.326 INCOMPLETE-NUCLEUS	9	0.0%	2	0.0%
100.327 INCOMPLETE-CAPSULAR	1	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	6	0.0%	1	0.0%
100.330 GENERALIZED/ COMPLETE	49	0.1%	1	0.0%
100.340 RESORBING/ HYPERMATURE	0	0.0%	1	0.0%
100.375 SUBLUXATION/ LUXATION	9	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1,201***	***2.0%***	***191***	***2.6%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	401	0.7%	62	0.9%
110.135 PHPV/ PTVL	51	0.1%	4	0.1%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	2	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	46	0.1%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	132	0.2%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	297	0.5%	17	0.2%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	640	1.0%	27	0.4%
NORMAL				
.000 NORMAL GLOBE	15,162	24.8%	1,100	15.1%

COTON DE TULEAR

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Imperforate lacrimal punctum	Not defined	1	Breeder option	
B.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
D.	Cataract	Not defined	1	NO	
E.	Y-suture tip opacity	Not defined	1	Breeder option	
F.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- PRD-*prcd*	Not defined	2	NO	Mutation in the *prcd* gene
G.	Multifocal retinopathy - IRD-*BEST1* (*cmr2*)	Autosomal recessive	3, 4	NO (Breeder option with normal DNA test for *cmr2*)	Mutation in the *BEST1* gene

Description and Comments

A. Imperforate Lacrimal Punctum

A developmental anomaly resulting in failure of opening of the lacrimal duct located at the medial lid margins. The lower punctum is more frequently affected. This defect usually results in epiphora, an overflow of tears onto the face.

B. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior

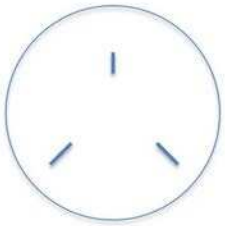
chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. Newer versions of the form (3/16/21) have boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

F. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. PRA is inherited as an autosomal recessive trait in most breeds.

- PRA-*prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as Progressive Retinal Atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Coton de Tulear is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells

following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

G. Multifocal retinopathy – IRD-*BEST1 (cmr2)*

Canine Multifocal Retinopathy type 2 (*cmr2*) is characterized by numerous distinct (i.e. multi-focal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There is typically a serous sub-retinal fluid in the Coton de Tulear, although there may be accumulation of sub-retinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs between 15 weeks to 1 year of age. The lesions typically remain static in size and color beyond 1 year of age. The bullae appear to gradually lose the serous sub-retinal fluid after 4-5 years of age. Discrete areas of tapetal hyper-reflectivity might also be seen. Early in the disease, most dogs exhibit no noticeable problem with vision despite their abnormal appearing retinas, however variable degrees of retinal degeneration occur with chronicity. Electroretinograms reveal significant differences in photopic flickers in affected dogs.

Canine Multifocal Retinopathy type 2 is caused by a mutation in the Bestrophin 1 gene (*BEST1*) and is described to be recessively inherited in the Coton du Tulear. A DNA test is available.

The breeding advice for breeds diagnosed with "CMR/CMR-like retinopathy" will be changed from "No" to "Breeder option" if the owner of the dog provides the registering office with results of the DNA test for the affected dog showing that it is genetically normal, i.e., not a homozygous mutant, for the *BEST1* mutation.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Donner J, Kaukonen M, Anderson H, Möller F, Kyöstilä K, Sankari S, Hytönen M, Giger U, Lohi H. Genetic Panel Screening of Nearly 100 Mutations Reveals New Insights into the Breed Distribution of Risk Variants for Canine Hereditary Disorders. PLoS One. 2016 Aug 15;11(8):e0161005. doi: 10.1371/journal.pone.0161005. PMID: 27525650

3. Guziewicz KE, Zangerl B, Lindauer SJ, et al. Bestrophin gene mutations cause canine multifocal retinopathy: a novel animal model for best disease. *Invest Ophthalmol Vis Sci*. 2007;48:1959-1967. PMID: 17460247

4. Grahn BH, Sandmeyer LL, Breaux C. Retinopathy of Coton de Tulear dogs: clinical manifestations, electroretinographic, ultrasonographic, fluorescein and indocyanine green angiographic, and optical coherence tomographic findings. *Vet Ophthalmol*. 2008;11:242-249. PMID: 18638350

OCULAR DISORDERS REPORT
COTON DE TULEAR

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	5,548		601	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	1	0.0%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	2	0.0%	0	0.0%
EYELIDS					
20.140	ECTOPIC CILIA	1	0.0%	0	0.0%
21.000	ENTROPION	4	0.1%	2	0.3%
25.110	DISTICHIASIS	47	0.8%	5	0.8%
32.110	IMPERFORATE LACRIMAL PUNCTUM	5	0.1%	9	1.5%
NICTITANS					
52.110	GLAND PROLAPSE	20	0.4%	4	0.7%
CORNEA					
70.220	EXPOSURE KERATOPATHY SYNDROME	1	0.0%	0	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	60	1.1%	2	0.3%
70.730	DYSTROPHY-ENDOTHELIAL	1	0.0%	0	0.0%
UVEA					
93.110	IRIS HYPOPLASIA	2	0.0%	0	0.0%
93.120	UVEAL CYST-SINGLE	4	0.1%	0	0.0%
93.150	IRIS COLOBOMA	2	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	470	8.5%	73	12.1%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	9	0.2%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	6	0.1%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	1	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	2	0.0%	2	0.3%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	8	0.1%	0	0.0%
97.150	COLOBOMA	1	0.0%	0	0.0%
FUNDUS					
97.110	CHOROIDAL HYPOPLASIA	1	0.0%	1	0.2%
120.170	RETINAL DYSPLASIA-FOLDS	21	0.4%	0	0.0%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	11	0.2%	0	0.0%
120.310	RETINAL ATROPHY-GENERALIZED	34	0.6%	3	0.5%
120.370	MULTIFOCAL RETINOPATHY	2	0.0%	0	0.0%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%
120.960	RETINOPATHY	1	0.0%	3	0.5%
130.110	MICROPAPILLA	3	0.1%	0	0.0%
130.120	OPTIC NERVE HYPOPLASIA	2	0.0%	0	0.0%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	200	3.6%	27	4.5%
100.301	PUNCTATE-ANTERIOR CORTEX	18	0.3%	1	0.2%
100.302	PUNCTATE-POSTERIOR CORTEX	10	0.2%	1	0.2%
100.303	PUNCTATE-EQUATORIAL CORTEX	7	0.1%	4	0.7%
100.304	PUNCTATE-ANTERIOR SUTURES	3	0.1%	0	0.0%
100.305	PUNCTATE-POSTERIOR SUTURES	27	0.5%	2	0.3%
100.306	PUNCTATE-NUCLEUS	5	0.1%	1	0.2%
100.307	PUNCTATE-CAPSULAR	23	0.4%	7	1.2%
100.311	INCIPIENT-ANTERIOR CORTEX	15	0.3%	5	0.8%
100.312	INCIPIENT-POSTERIOR CORTEX	18	0.3%	2	0.3%
100.313	INCIPIENT-EQUATORIAL CORTEX	10	0.2%	2	0.3%
100.314	INCIPIENT-ANTERIOR SUTURES	3	0.1%	0	0.0%
100.315	INCIPIENT-POSTERIOR SUTURES	7	0.1%	0	0.0%
100.316	INCIPIENT-NUCLEUS	6	0.1%	4	0.7%
100.317	INCIPIENT-CAPSULAR	8	0.1%	3	0.5%
100.321	INCOMPLETE-ANTERIOR CORTEX	2	0.0%	0	0.0%

OCULAR DISORDERS REPORT
COTON DE TULEAR

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 5,548 #	 %	Year Examined: 2019-2023 Total # Dogs: 601 #	 %
LENS Continued				
100.322 INCOMPLETE-POSTERIOR CORTEX	0	0.0%	1	0.2%
100.328 Y-SUTURE TIP OPACITIES	22	0.4%	15	2.5%
100.330 GENERALIZED/ COMPLETE	7	0.1%	1	0.2%
100.340 RESORBING/ HYPERMATURE	1	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION	1	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***170***	***3.1%***	***34***	***5.7%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	8	0.1%	1	0.2%
110.135 PHPV/ PTVL	1	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	6	0.1%	1	0.2%
110.320 VITREOUS DEGENERATION-SYNERESIS	50	0.9%	4	0.7%
OTHER				
900.000 OTHER, UNSPECIFIED	44	0.8%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	152	2.7%	3	0.5%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	76	1.4%	21	3.5%
NORMAL				
.000 NORMAL GLOBE	4,703	84.8%	450	74.9%

CURLY-COATED RETRIEVER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
C.	Cataract	Not defined	1, 2	NO	
D.	Y-suture tip opacity	Not defined	1	Breeder option	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membrane (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

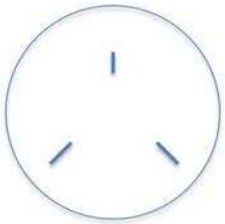
A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region. In the Curly-Coated Retriever the following cataracts have been reported:

1. Anterior cortical subcapsular cataract: Anterior subcapsular striate cortical cataracts usually occur bilaterally, slowly progress and usually occur between 5-8 years of age.

2. Posterior subcapsular cataract: Posterior polar subcapsular opacities occur at 2-4 years of age and progress slowly.

D. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. Newer versions of the form (3/16/21) have boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Barnett KC. Comparative aspects of canine hereditary eye disease. *Adv Vet Sci Comp Med.* 1976;20:39-67. PMID: 827198

OCULAR DISORDERS REPORT
CURLY-COATED RETRIEVER

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	2,021		223	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	1	0.0%	0	0.0%
EYELIDS					
20.140	ECTOPIC CILIA	4	0.2%	0	0.0%
21.000	ENTROPION	11	0.5%	0	0.0%
22.000	ECTROPION	3	0.1%	0	0.0%
25.110	DISTICHIASIS	155	7.7%	18	8.1%
32.110	IMPERFORATE LACRIMAL PUNCTUM	0	0.0%	1	0.4%
NICTITANS					
51.100	CARTILAGE ANOMALY/ EVERSION	3	0.1%	1	0.4%
52.110	GLAND PROLAPSE	1	0.0%	0	0.0%
CORNEA					
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	14	0.7%	0	0.0%
70.730	DYSTROPHY-ENDOTHELIAL	1	0.0%	0	0.0%
UVEA					
90.250	PIGMENTARY UVEITIS	1	0.0%	0	0.0%
93.120	UVEAL CYST-SINGLE	1	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	79	3.9%	8	3.6%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	4	0.2%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	5	0.2%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	2	0.1%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	19	0.9%	10	4.5%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	1	0.0%	0	0.0%
FUNDUS					
97.110	CHOROIDAL HYPOPLASIA	13	0.6%	0	0.0%
120.170	RETINAL DYSPLASIA-FOLDS	21	1.0%	1	0.4%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	3	0.1%	1	0.4%
120.310	RETINAL ATROPHY-GENERALIZED	12	0.6%	0	0.0%
120.960	RETINOPATHY	1	0.0%	1	0.4%
120.970	RETINOPATHY - CMR/ CMR-LIKE	0	0.0%	1	0.4%
130.110	MICROPAPILLA	1	0.0%	0	0.0%
130.120	OPTIC NERVE HYPOPLASIA	3	0.1%	0	0.0%
LENS					
100.200	CATARACT, UNSPECIFIED	19	0.9%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	127	6.3%	22	9.9%
100.301	PUNCTATE-ANTERIOR CORTEX	18	0.9%	3	1.3%
100.302	PUNCTATE-POSTERIOR CORTEX	17	0.8%	6	2.7%
100.303	PUNCTATE-EQUATORIAL CORTEX	4	0.2%	4	1.8%
100.304	PUNCTATE-ANTERIOR SUTURES	2	0.1%	1	0.4%
100.305	PUNCTATE-POSTERIOR SUTURES	31	1.5%	9	4.0%
100.306	PUNCTATE-NUCLEUS	3	0.1%	4	1.8%
100.307	PUNCTATE-CAPSULAR	15	0.7%	2	0.9%
100.311	INCIPIENT-ANTERIOR CORTEX	12	0.6%	1	0.4%
100.312	INCIPIENT-POSTERIOR CORTEX	13	0.6%	2	0.9%
100.313	INCIPIENT-EQUATORIAL CORTEX	11	0.5%	2	0.9%
100.314	INCIPIENT-ANTERIOR SUTURES	1	0.0%	1	0.4%
100.315	INCIPIENT-POSTERIOR SUTURES	8	0.4%	0	0.0%
100.316	INCIPIENT-NUCLEUS	3	0.1%	1	0.4%
100.317	INCIPIENT-CAPSULAR	3	0.1%	0	0.0%
100.323	INCOMPLETE-EQUATORIAL CORTEX	0	0.0%	1	0.4%
100.328	Y-SUTURE TIP OPACITIES	20	1.0%	22	9.9%
100.375	SUBLUXATION/ LUXATION	3	0.1%	0	0.0%

OCULAR DISORDERS REPORT
CURLY-COATED RETRIEVER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 2,021 #	 %	Year Examined: 2019-2023 Total # Dogs: 223 #	 %
LENS Continued				
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***160***	***7.9%***	***37***	***16.6%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	3	0.1%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	0.1%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	17	0.8%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	16	0.8%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	35	1.7%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	31	1.5%	15	6.7%
NORMAL				
.000 NORMAL GLOBE	1,597	79.0%	136	61.0%

CZECHOSLOVAKIAN VLCAK

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Cataract	Not defined	1	NO	

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
CZECHOSLOVAKIAN VLCAK

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 35 #	 %	Year Examined: 2019-2023 Total # Dogs: 78 #	 %
EYELIDS				
32.110 IMPERFORATE LACRIMAL PUNCTUM	2	5.7%	0	0.0%
UVEA				
93.120 UVEAL CYST-SINGLE	2	5.7%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	0	0.0%	2	2.6%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	0	0.0%	1	1.3%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	3	8.6%	4	5.1%
100.301 PUNCTATE-ANTERIOR CORTEX	0	0.0%	2	2.6%
100.306 PUNCTATE-NUCLEUS	1	2.9%	2	2.6%
100.311 INCIPIENT-ANTERIOR CORTEX	0	0.0%	2	2.6%
100.316 INCIPIENT-NUCLEUS	2	5.7%	0	0.0%
100.326 INCOMPLETE-NUCLEUS	0	0.0%	1	1.3%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***3***	***8.6%***	***7***	***9.0%***
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	1	2.9%	0	0.0%
130.110 MICROPAPILLA	1	2.9%	2	2.6%
OTHER				
900.000 OTHER, UNSPECIFIED	1	2.9%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	2	5.7%	4	5.1%
NORMAL				
.000 NORMAL GLOBE	36	102.9%	65	83.3%

DACHSHUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Microphthalmia and multiple ocular defects	Not defined	2,3	NO	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Corneal dystrophy				
	- endothelial	Not defined	4, 5	NO	
D.	Superficial punctate keratitis	Not defined	6	Breeder option	
E.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
F.	Cataract	Not defined	1	NO	
G.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- PRA-*RPGRIP1* (*CORD1*)	Autosomal recessive	7-18	NO	Mutation in the *RPGRIP1* gene* in the Miniature Long- and Shorthaired Dachshunds
	- PRA-*NPHP4* (cone-rod dystrophy)	Autosomal recessive	19	NO	Mutation in the *NPHP4* gene in the Standard Wire Haired Dachshund
	- PRA-*NECAP1*	Autosomal recessive	18	NO	Mutation in the *NECAP1* gene in the Miniature Long- and Shorthaired Dachshunds
H.	Retinal degeneration / retinopathy - associated with ceroid lipofuscinosis-2	Autosomal recessive	20-21	NO	Mutation in the *TPP1* gene in the Miniature Longhaired Dachshund
I.	Retinal dysplasia				
	- folds	Not defined	1	Breeder option	

Description and Comments

A. Microphthalmia and multiple ocular anomalies

Microphthalmia is a congenital defect characterized by a small eye often with associated defects of the cornea, anterior chamber, lens and/or retina. An association has been made between partial albinism, multiple ocular defects (especially microphthalmia) and deafness in a number of canine breeds including the Dachshund. From these reports it appears that a predominantly white hair coat is associated with a higher incidence of ocular defects.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Corneal dystrophy - endothelial

An abnormal loss of the inner lining of the cornea that causes progressive fluid retention (edema). With time the edema results in keratitis and decreased vision.

D. Superficial punctate keratitis

Superficial punctate keratitis is characterized by multiple sites of discrete corneal inflammation and/or ulceration and which is suspected to be immune-mediated in etiology. Lesions are typically oval to circular, well-defined and may be associated with an arborizing vascular response.

E. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

F. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

G. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-*RPGRIP1* (CORD1)

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram before it is apparent clinically.

In Miniature Dachshunds there is a recessively inherited disorder caused by a 44 base pair insertion in the *RPGRIP1* gene. The insertion presumably truncates the protein and its major C-terminal RPGR binding domain. The resulting

disease is called cone-rod dystrophy 1 (CORD1) as the salient clinical abnormalities are a cone ERG dysfunction which does not correlate with photopic vision defects until advanced stages of disease. The onset of the disease is variable and is influenced by 2 modifier loci- MAP9 and L3, each of which are associated with severity and earlier onset of disease. Dogs homozygous for the *RPGRIP1* variant and affected by both MAP9 and L3 modifiers showed the most severe phenotype and had rapid disease progression. The MAP9 modifier was found to result in accelerated rod and cone disease, while the L3 modifier resulted in accelerated cone disease only. Dogs homozygous for the *RGPRIP1* insertion affected by one or both modifiers have retinal abnormalities on ophthalmoscopy before 1-2 years of age. Sixty-seven percent dogs homozygous for the *RGPRIP1* insertion with both modifiers reached end-stage retinal degeneration as early as 3 years of age. Dogs homozygous only for the *RPGRIP* insertion may have a late onset (>6 years) retinal degeneration diagnosed by ophthalmoscopy. The *RPGRIP1* molecular defect can be identified by means of a DNA test, though questions have been raised about its validity given the poor genotype-phenotype correlation. It is now clear that genetic modifiers in addition to the *RPGRIP1* insertion explain the variable age of onset and severity of this disease. A DNA test is available. The *RPGRIP1* mutation has been identified in several other breeds, however the significance of homozygous individuals and the known modifiers in breeds other than the Dachshund is unknown.

- PRA-*NPHP4*

This is an early onset cone-rod dystrophy with disease onset documented between 10 months to 3 years of age, with complete retinal atrophy noted by 6 years of age in affected animals. On ERG, cone dysfunction can be noted as early as 5 weeks of age.

-**PRA-*NECAP1***

Recent evidence (Donner et al, PMID: 36848397) suggests that individuals of the Miniature Long- and Shorthaired Dachshund breeds have been identified as homozygous affected for the *NECAP1* mutation causing progressive retinal atrophy. Significance for the breed is unknown at this time. See glossary for more information on this condition.

*note these forms of retinal degeneration are clinically indistinguishable from other forms of PRA, and can only be differentiated by genetic test or functional studies.

H. Retinal degeneration / retinopathy associated with ceroid lipofuscinosis-2

Ceroid lipofuscinosis-2 is a fatal, autosomal recessive, inherited lysosomal storage disease of Miniature Longhaired Dachshunds that is characterized by progressive neurodegeneration and retinal degeneration. The disease results from a defect in the *TPP1* (tripeptidyl peptidase-1) gene. Progressive multifocal, serous retinal detachments also occur in 65% of miniature long-haired dachshunds that are homozygous for the mutant TPP1 gene when they are 5-12 months old. Inheritance of the retinopathy is linked to this gene.

I. Retinal dysplasia – folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and the more severe forms of retinal dysplasia is undetermined.

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OCULAR DISORDERS REPORT
DACHSHUND

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 6,928 #	%	2019-2023 2,358 #	%
GLOBE				
.110 MICROPHTHALMOS	24	0.3%	0	0.0%
10.000 GLAUCOMA	2	0.0%	0	0.0%
40.910 KERATOCONJUNCTIVITIS SICCA (KCS)	5	0.1%	1	0.0%
EYELIDS				
21.000 ENTROPION	7	0.1%	2	0.1%
25.110 DISTICHIASIS	433	6.3%	228	9.7%
32.110 IMPERFORATE LACRIMAL PUNCTUM	2	0.0%	3	0.1%
NICTITANS				
50.210 PLASMOMA/ ATYPICAL PANNUS	1	0.0%	0	0.0%
51.100 CARTILAGE ANOMALY/ EVERSION	2	0.0%	0	0.0%
52.110 GLAND PROLAPSE	9	0.1%	3	0.1%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	3	0.0%	0	0.0%
70.220 EXPOSURE KERATOPATHY SYNDROME	0	0.0%	1	0.0%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	35	0.5%	2	0.1%
70.730 DYSTROPHY-ENDOTHELIAL	9	0.1%	0	0.0%
UVEA				
93.110 IRIS HYPOPLASIA	12	0.2%	6	0.3%
93.120 UVEAL CYST-SINGLE	4	0.1%	0	0.0%
93.150 IRIS COLOBOMA	25	0.4%	2	0.1%
93.180 IRIS SPHINCTER DYSPLASIA	1	0.0%	1	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	303	4.4%	105	4.5%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	30	0.4%	4	0.2%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	31	0.4%	10	0.4%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	4	0.1%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	121	1.7%	154	6.5%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	14	0.2%	11	0.5%
95.120 UVEAL CYST-FREE FLOATING	0	0.0%	1	0.0%
97.150 COLOBOMA	2	0.0%	2	0.1%
FUNDUS				
97.110 CHOROIDAL HYPOPLASIA	7	0.1%	0	0.0%
97.120 COLOBOMA	14	0.2%	0	0.0%
120.170 RETINAL DYSPLASIA-FOLDS	59	0.9%	24	1.0%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	7	0.1%	2	0.1%
120.310 RETINAL ATROPHY-GENERALIZED	127	1.8%	4	0.2%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	5	0.1%	0	0.0%
120.920 RETINAL DETACHMENT	2	0.0%	1	0.0%
120.960 RETINOPATHY	2	0.0%	0	0.0%
130.110 MICROPAPILLA	22	0.3%	4	0.2%
130.120 OPTIC NERVE HYPOPLASIA	40	0.6%	3	0.1%
LENS				
100.200 CATARACT, UNSPECIFIED	43	0.6%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	283	4.1%	40	1.7%
100.301 PUNCTATE-ANTERIOR CORTEX	45	0.6%	18	0.8%
100.302 PUNCTATE-POSTERIOR CORTEX	19	0.3%	5	0.2%
100.303 PUNCTATE-EQUATORIAL CORTEX	14	0.2%	2	0.1%
100.304 PUNCTATE-ANTERIOR SUTURES	9	0.1%	3	0.1%
100.305 PUNCTATE-POSTERIOR SUTURES	18	0.3%	4	0.2%
100.306 PUNCTATE-NUCLEUS	18	0.3%	6	0.3%
100.307 PUNCTATE-CAPSULAR	25	0.4%	14	0.6%
100.311 INCIPIENT-ANTERIOR CORTEX	52	0.8%	11	0.5%

OCULAR DISORDERS REPORT
DACHSHUND

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 6,928 #	 %	Year Examined: 2019-2023 Total # Dogs: 2,358 #	 %
LENS Continued				
100.312 INCIPIENT-POSTERIOR CORTEX	23	0.3%	3	0.1%
100.313 INCIPIENT-EQUATORIAL CORTEX	18	0.3%	3	0.1%
100.314 INCIPIENT-ANTERIOR SUTURES	2	0.0%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	19	0.3%	0	0.0%
100.316 INCIPIENT-NUCLEUS	11	0.2%	5	0.2%
100.317 INCIPIENT-CAPSULAR	10	0.1%	4	0.2%
100.321 INCOMPLETE-ANTERIOR CORTEX	4	0.1%	3	0.1%
100.322 INCOMPLETE-POSTERIOR CORTEX	1	0.0%	0	0.0%
100.324 INCOMPLETE-ANTERIOR SUTURES	1	0.0%	0	0.0%
100.326 INCOMPLETE-NUCLEUS	0	0.0%	1	0.0%
100.328 Y-SUTURE TIP OPACITIES	5	0.1%	10	0.4%
100.330 GENERALIZED/ COMPLETE	41	0.6%	0	0.0%
100.340 RESORBING/ HYPERMATURE	3	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION	9	0.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***376***	***5.4%***	***82***	***3.5%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	39	0.6%	16	0.7%
110.135 PHPV/ PTVL	15	0.2%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	2	0.0%	3	0.1%
110.320 VITREOUS DEGENERATION-SYNERESIS	39	0.6%	5	0.2%
OTHER				
900.000 OTHER, UNSPECIFIED	89	1.3%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	201	2.9%	6	0.3%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	135	1.9%	97	4.1%
NORMAL				
.000 NORMAL GLOBE	5,348	77.2%	1,722	73.0%

DALMATIAN

It is recommended that this breed be examined prior to pharmacological dilation to best facilitate identification of iris hypoplasia/sphincter dysplasia**

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Glaucoma	Not defined	3	NO	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
D.	Iris hypoplasia**	Not defined	1	Breeder option	
E.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
F.	Cataract	Not defined	1, 2	NO	

Description and Comments

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure which, when sustained, causes intraocular damage resulting in blindness. The elevated intraocular pressure occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of the intraocular pressure (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine breed eye screening exam.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Iris Hypoplasia**

A congenital abnormality in iris development usually characterized by a reduced quantity of tissue identified as

partial-thickness defect in iris tissue. Full-thickness iris hypoplasia is rare and should be recorded as an iris coloboma on the OFA form.

****Historical Note:** Iris sphincter dysplasia is a congenital abnormality in iris development usually characterized by a full-thickness defect in iris tissue at the level of the iris sphincter, causing pupillary dilation. This abnormality was historically listed on this breed's page, however, it is no longer reported consistently in this breed, so it was removed from the breed page. As this condition may result in discomfort, examiners should still be aware that this has historically affected this breed and perform a pre-dilation exam to screen for this condition.

E. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

F. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Hodgman SFJ. Abnormalities and defects in pedigree dogs: I. An investigation into the existence of abnormalities in pedigree dogs in British Isles. *J Small Anim Pract*. 1963;4:447-456.

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OCULAR DISORDERS REPORT
DALMATIAN

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 3,382 #	%	2019-2023 1,309 #	%
GLOBE				
.110 MICROPHTHALMOS	1	0.0%	0	0.0%
EYELIDS				
20.140 ECTOPIC CILIA	1	0.0%	0	0.0%
21.000 ENTROPION	5	0.1%	0	0.0%
22.000 ECTROPION	1	0.0%	0	0.0%
25.110 DISTICHIASIS	160	4.7%	50	3.8%
32.110 IMPERFORATE LACRIMAL PUNCTUM	2	0.1%	4	0.3%
NICTITANS				
52.110 GLAND PROLAPSE	1	0.0%	0	0.0%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	1	0.0%	0	0.0%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	88	2.6%	31	2.4%
70.730 DYSTROPHY-ENDOTHELIAL	2	0.1%	0	0.0%
UVEA				
93.110 IRIS HYPOPLASIA	55	1.6%	23	1.8%
93.120 UVEAL CYST-SINGLE	3	0.1%	0	0.0%
93.150 IRIS COLOBOMA	16	0.5%	0	0.0%
93.180 IRIS SPHINCTER DYSPLASIA	22	0.7%	5	0.4%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	28	0.8%	15	1.1%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	3	0.1%	1	0.1%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	6	0.2%	1	0.1%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	1	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	3	0.1%	1	0.1%
95.120 UVEAL CYST-FREE FLOATING	0	0.0%	1	0.1%
97.150 COLOBOMA	1	0.0%	0	0.0%
FUNDUS				
97.110 CHOROIDAL HYPOPLASIA	1	0.0%	0	0.0%
120.170 RETINAL DYSPLASIA-FOLDS	16	0.5%	10	0.8%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	0	0.0%	5	0.4%
120.310 RETINAL ATROPHY-GENERALIZED	7	0.2%	3	0.2%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%
120.960 RETINOPATHY	3	0.1%	4	0.3%
130.110 MICROPAPILLA	2	0.1%	0	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	1	0.0%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	67	2.0%	27	2.1%
100.301 PUNCTATE-ANTERIOR CORTEX	22	0.7%	9	0.7%
100.302 PUNCTATE-POSTERIOR CORTEX	9	0.3%	2	0.2%
100.303 PUNCTATE-EQUATORIAL CORTEX	12	0.4%	3	0.2%
100.305 PUNCTATE-POSTERIOR SUTURES	3	0.1%	1	0.1%
100.306 PUNCTATE-NUCLEUS	6	0.2%	4	0.3%
100.307 PUNCTATE-CAPSULAR	4	0.1%	3	0.2%
100.311 INCIPIENT-ANTERIOR CORTEX	27	0.8%	7	0.5%
100.312 INCIPIENT-POSTERIOR CORTEX	14	0.4%	1	0.1%
100.313 INCIPIENT-EQUATORIAL CORTEX	14	0.4%	2	0.2%
100.314 INCIPIENT-ANTERIOR SUTURES	3	0.1%	1	0.1%
100.315 INCIPIENT-POSTERIOR SUTURES	1	0.0%	0	0.0%
100.316 INCIPIENT-NUCLEUS	6	0.2%	1	0.1%
100.317 INCIPIENT-CAPSULAR	3	0.1%	4	0.3%
100.321 INCOMPLETE-ANTERIOR CORTEX	5	0.1%	0	0.0%
100.322 INCOMPLETE-POSTERIOR CORTEX	4	0.1%	0	0.0%
100.323 INCOMPLETE-EQUATORIAL CORTEX	1	0.0%	1	0.1%

OCULAR DISORDERS REPORT
DALMATIAN

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 3,382 #	 %	Year Examined: 2019-2023 Total # Dogs: 1,309 #	 %
LENS Continued				
100.327 INCOMPLETE-CAPSULAR	1	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	1	0.0%	1	0.1%
100.330 GENERALIZED/ COMPLETE	6	0.2%	0	0.0%
100.340 RESORBING/ HYPERMATURE	1	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION	4	0.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***143***	***4.2%***	***39***	***3.0%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	3	0.1%	3	0.2%
110.135 PHPV/ PTVL	2	0.1%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	9	0.3%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	22	0.7%	9	0.7%
OTHER				
900.000 OTHER, UNSPECIFIED	43	1.3%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	90	2.7%	5	0.4%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	137	4.1%	39	3.0%
NORMAL				
.000 NORMAL GLOBE	2,788	82.4%	1,102	84.2%

DANDIE DINMONT TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Glaucoma	Not defined	2, 3	NO	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	

Description and Comments

A. Glaucoma

Glaucoma is an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine breed eye screening exam.

In the Dandie Dinmont Terrier a 9.5 Mb susceptibility locus has been identified on canine chromosome 8. The definitive mutation has not been determined. A genetic test is not yet available.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from /OFA All-Breeds Report.

2. Ahonen SJ, Pietila E, Mellersh CS, et al. Genome-wide association study identifies a novel canine glaucoma locus. *PloS one*. 2013;8:e70903. PMID: 23951034

3. Oliver JA, Ekiri A, Mellersch CS. Prevalence of pectinate ligament dysplasia and associations with age, sex and intraocular pressure in the Basset hound, Flat-coated retriever, and Dandie Dinmont Terrier. *Canine Genet and Epidemiol*. 2016; 3:1 PMID: 26973793

OCULAR DISORDERS REPORT
DANDIE DINMONT TERRIER

Diagnostic Name		Year Examined: 1993-2018 Total # Dogs: 281 #	 %	Year Examined: 2019-2023 Total # Dogs: 128 #	 %
GLOBE					
.110	MICROPHTHALMOS	1	0.4%	0	0.0%
10.000	GLAUCOMA	1	0.4%	0	0.0%
EYELIDS					
25.110	DISTICHIASIS	21	7.5%	3	2.3%
CORNEA					
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	6	2.1%	3	2.3%
UVEA					
93.120	UVEAL CYST-SINGLE	1	0.4%	0	0.0%
93.170	UVEAL CYST-MULTIPLE	1	0.4%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	28	10.0%	7	5.5%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	1	0.4%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	6	2.1%	1	0.8%
LENS					
100.200	CATARACT, UNSPECIFIED	4	1.4%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	30	10.7%	6	4.7%
100.301	PUNCTATE-ANTERIOR CORTEX	5	1.8%	1	0.8%
100.302	PUNCTATE-POSTERIOR CORTEX	3	1.1%	0	0.0%
100.303	PUNCTATE-EQUATORIAL CORTEX	1	0.4%	0	0.0%
100.305	PUNCTATE-POSTERIOR SUTURES	2	0.7%	0	0.0%
100.307	PUNCTATE-CAPSULAR	5	1.8%	4	3.1%
100.311	INCIPIENT-ANTERIOR CORTEX	5	1.8%	1	0.8%
100.312	INCIPIENT-POSTERIOR CORTEX	1	0.4%	0	0.0%
100.313	INCIPIENT-EQUATORIAL CORTEX	1	0.4%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	1	0.8%
100.330	GENERALIZED/ COMPLETE	5	1.8%	0	0.0%
100.375	SUBLUXATION/ LUXATION	1	0.4%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***32***	***11.4%***	***6***	***4.7%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	3	1.1%	0	0.0%
OTHER					
900.000	OTHER, UNSPECIFIED	6	2.1%	0	0.0%
900.100	OTHER-SUSPECTED AS INHERITED	7	2.5%	0	0.0%
900.110	OTHER-SUSPECTED AS NOT-INHERITED	7	2.5%	2	1.6%
NORMAL					
.000	NORMAL GLOBE	191	68.0%	105	82.0%

DANISH BROHOLMER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the DANISH BROHOLMER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
DANISH BROHOLMER

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	2		0	
Diagnostic Name		#	%	#	%
NORMAL					
.000	NORMAL GLOBE	2	100.0%	0	

DANISH SWEDISH FARMDOG

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the DANISH SWEDISH FARMDOG breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
DANISH SWEDISH FARMDOG

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 40 #	 %	Year Examined: 2019-2023 Total # Dogs: 63 #	 %
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	4	10.0%	2	3.2%
LENS				
100.316 INCIPIENT-NUCLEUS	1	2.5%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	1	1.6%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1***	***2.5%***	***0***	***0.0%***
FUNDUS				
130.110 MICROPAPILLA	0	0.0%	1	1.6%
OTHER				
900.100 OTHER-SUSPECTED AS INHERITED	1	2.5%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	1	2.5%	1	1.6%
NORMAL				
.000 NORMAL GLOBE	34	85.0%	58	92.1%

DOBERMAN PINSCHER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Microphthalmia with multiple ocular defects	Not defined	2-5	NO	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1-5	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
D.	Cataract	Not defined	1	NO	
E.	Persistent hyperplastic primary vitreous/ Persistent hyperplastic tunica vasculosa lentis (PHPV/PHTVL)	Presumed dominant/ incomplete penetrance	1, 6-14	NO	
F.	Retinal dysplasia				
	- folds	Not defined	1	Breeder option	
G.	Ligneous conjunctivitis	Not defined	15	NO	

Description and Comments

A. Microphthalmia with multiple ocular defects

Microphthalmia is a congenital defect characterized by a small eye often associated with defects of the cornea, iris (coloboma), anterior chamber, lens (cataract) and/or retina (retinal dysplasia). Note that this syndrome is distinct from "E," PHPV/PHTVL, which may also be associated with microphthalmia.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time. It is difficult to make a strong recommendation with regards to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded and breeding discretion is advised.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness

may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

Lens opacity which may affect one or both eyes and may involve the lens partially or completely. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membranes, persistent hyaloid, or nutritional deficiencies.

Cataracts have been infrequently observed in the Doberman Pinscher and there is no specific location attributed to cataracts within the Doberman lens. Most cataracts are bilateral, usually observed within the first two years of life, and may cause significant vision loss.

E. Persistent hyperplastic primary vitreous (PHPV)/Persistent hyperplastic tunica vasculosa lentis (PHTVL)

Persistent hyperplastic primary vitreous is a congenital defect resulting from abnormalities in the development and regression of the hyaloid artery (the primary vitreous) and the interaction of this blood vessel with the posterior lens capsule/cortex during embryogenesis. This condition is often associated with persistent hyperplastic tunica vasculosa lentis which results from failure of regression of the embryologic vascular network which surrounds the developing lens.

The condition in the Doberman includes a spectrum of malformations ranging from spots of pigment on the posterior surface of the lens to posterior lenticonus, cataract and a dense fibrous plaque on the posterior surface of the lens. In the more severe forms, partial or complete vision impairment occurs. PHPV has been extensively studied in the Doberman in Europe. This disorder has been observed occasionally in the Doberman in the United States.

F. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

G. Ligneous conjunctivitis

A rare type of conjunctivitis characterized by the formation of thick membranes covering conjunctiva of the nictitans and eyelids of affected dogs. This condition has been diagnosed in four unrelated Doberman Pinschers, three of which had life-threatening systemic disease.

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14. Boeve MH and Stades FC. Persistent hyperplastic tunica vasculosa lentis and primary vitreous (PHTVL/PHPV) in the dog: A comparative review. prog *Vet Comp Ophthalmol.* 1992;2:163.

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OCULAR DISORDERS REPORT
DOBERMAN PINSCHER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 6,071 #	%	Year Examined: 2019-2023 Total # Dogs: 1,360 #	%
GLOBE				
.110 MICROPHTHALMOS	7	0.1%	0	0.0%
10.000 GLAUCOMA	0	0.0%	1	0.1%
40.910 KERATOCONJUNCTIVITIS SICCA (KCS)	2	0.0%	0	0.0%
EYELIDS				
20.140 ECTOPIC CILIA	1	0.0%	0	0.0%
21.000 ENTROPION	7	0.1%	0	0.0%
22.000 ECTROPION	1	0.0%	0	0.0%
25.110 DISTICHIASIS	101	1.7%	23	1.7%
NICTITANS				
51.100 CARTILAGE ANOMALY/ EVERSION	8	0.1%	4	0.3%
52.110 GLAND PROLAPSE	7	0.1%	0	0.0%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	10	0.2%	3	0.2%
70.730 DYSTROPHY-ENDOTHELIAL	4	0.1%	0	0.0%
UVEA				
93.110 IRIS HYPOPLASIA	1	0.0%	1	0.1%
93.120 UVEAL CYST-SINGLE	12	0.2%	3	0.2%
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	2	0.0%	0	0.0%
93.150 IRIS COLOBOMA	1	0.0%	0	0.0%
93.170 UVEAL CYST-MULTIPLE	1	0.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	131	2.2%	23	1.7%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	35	0.6%	2	0.1%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	10	0.2%	1	0.1%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	4	0.1%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	168	2.8%	222	16.3%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	6	0.1%	1	0.1%
93.810 UVEAL MELANOMA	4	0.1%	0	0.0%
97.150 COLOBOMA	1	0.0%	0	0.0%
FUNDUS				
97.110 CHOROIDAL HYPOPLASIA	2	0.0%	0	0.0%
97.120 COLOBOMA	1	0.0%	0	0.0%
120.170 RETINAL DYSPLASIA-FOLDS	99	1.6%	7	0.5%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	12	0.2%	2	0.1%
120.310 RETINAL ATROPHY-GENERALIZED	12	0.2%	4	0.3%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	2	0.0%	0	0.0%
120.920 RETINAL DETACHMENT	0	0.0%	2	0.1%
120.960 RETINOPATHY	1	0.0%	0	0.0%
120.970 RETINOPATHY - CMR/ CMR-LIKE	0	0.0%	1	0.1%
130.110 MICROPAPILLA	0	0.0%	1	0.1%
130.120 OPTIC NERVE HYPOPLASIA	3	0.0%	0	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	32	0.5%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	327	5.4%	77	5.7%
100.301 PUNCTATE-ANTERIOR CORTEX	25	0.4%	9	0.7%
100.302 PUNCTATE-POSTERIOR CORTEX	6	0.1%	7	0.5%
100.303 PUNCTATE-EQUATORIAL CORTEX	5	0.1%	1	0.1%
100.304 PUNCTATE-ANTERIOR SUTURES	4	0.1%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	22	0.4%	5	0.4%
100.306 PUNCTATE-NUCLEUS	21	0.3%	11	0.8%
100.307 PUNCTATE-CAPSULAR	46	0.8%	46	3.4%
100.311 INCIPIENT-ANTERIOR CORTEX	14	0.2%	3	0.2%

OCULAR DISORDERS REPORT
DOBERMAN PINSCHER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 6,071 #	 %	Year Examined: 2019-2023 Total # Dogs: 1,360 #	 %
LENS Continued				
100.312 INCIPIENT-POSTERIOR CORTEX	19	0.3%	6	0.4%
100.313 INCIPIENT-EQUATORIAL CORTEX	10	0.2%	1	0.1%
100.315 INCIPIENT-POSTERIOR SUTURES	10	0.2%	2	0.1%
100.316 INCIPIENT-NUCLEUS	24	0.4%	10	0.7%
100.317 INCIPIENT-CAPSULAR	14	0.2%	7	0.5%
100.321 INCOMPLETE-ANTERIOR CORTEX	2	0.0%	0	0.0%
100.322 INCOMPLETE-POSTERIOR CORTEX	2	0.0%	1	0.1%
100.323 INCOMPLETE-EQUATORIAL CORTEX	0	0.0%	1	0.1%
100.326 INCOMPLETE-NUCLEUS	1	0.0%	2	0.1%
100.328 Y-SUTURE TIP OPACITIES	6	0.1%	13	1.0%
100.330 GENERALIZED/ COMPLETE	16	0.3%	0	0.0%
100.375 SUBLUXATION/ LUXATION	4	0.1%	1	0.1%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***273***	***4.5%***	***112***	***8.2%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	22	0.4%	12	0.9%
110.135 PHPV/ PTVL	51	0.8%	10	0.7%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	10	0.2%	3	0.2%
OTHER				
900.000 OTHER, UNSPECIFIED	57	0.9%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	170	2.8%	6	0.4%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	139	2.3%	90	6.6%
NORMAL				
.000 NORMAL GLOBE	5,012	82.6%	909	66.8%

DOGO ARGENTINO

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the DOGO ARGENTINO breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
DOGO ARGENTINO

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 141 #	 %	Year Examined: 2019-2023 Total # Dogs: 69 #	 %
EYELIDS				
21.000 ENTROPION	0	0.0%	2	2.9%
25.110 DISTICHIASIS	1	0.7%	2	2.9%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	3	2.1%	1	1.4%
70.730 DYSTROPHY-ENDOTHELIAL	1	0.7%	0	0.0%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	14	9.9%	1	1.4%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	1	0.7%	0	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	1	0.7%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	1	0.7%	1	1.4%
100.302 PUNCTATE-POSTERIOR CORTEX	1	0.7%	0	0.0%
100.306 PUNCTATE-NUCLEUS	0	0.0%	2	2.9%
100.312 INCIPIENT-POSTERIOR CORTEX	3	2.1%	1	1.4%
100.315 INCIPIENT-POSTERIOR SUTURES	0	0.0%	1	1.4%
100.316 INCIPIENT-NUCLEUS	2	1.4%	0	0.0%
100.330 GENERALIZED/ COMPLETE	1	0.7%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***8***	***5.7%***	***4***	***5.8%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	1	0.7%	0	0.0%
OTHER				
900.100 OTHER-SUSPECTED AS INHERITED	1	0.7%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	1	0.7%	6	8.7%
NORMAL				
.000 NORMAL GLOBE	118	83.7%	56	81.2%

DOGUE DE BORDEAUX

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Entropion	Not defined	1	Breeder option	
B.	Ectropion	Not defined	1	Breeder option	
C.	Distichiasis	Not defined	1	Breeder option	
D.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
E.	Cataract	Not defined	1	NO	
F.	Multifocal retinopathy -IRD-*BEST1* (*cmr1)*	Autosomal recessive	2	NO (Breeder option with normal DNA test for *cmr1*)	Mutation in the *BEST1* gene

Description and Comments

A. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull. Entropion in the Mastiff is severe and may require multiple surgical corrections.

B. Ectropion

A conformational defect resulting in eversion of the eyelids, which may cause ocular irritation due to exposure. It is likely that ectropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

C. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

D. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

F. Multifocal retinopathy - IRD-*BEST1* (*cmr1)*

Canine Multifocal Retinopathy type 1 (*cmr1*) is characterized by numerous distinct (i.e. multifocal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There may be a serous sub-retinal fluid, or accumulation of sub-retinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs between 11-20 weeks of age and there is minimal progression after 1 year of age. The lesions may flatten, leaving areas of retinal thinning and RPE hypertrophy, hyperplasia, and pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE detachments. Early in the disease, most dogs exhibit no noticeable problem with vision or electroretinographic abnormalities despite their abnormal appearing retinas. However, variable degrees of retinal degeneration occur with chronicity.

Canine Multifocal Retinopathy type 1 is caused by a mutation in the Bestrophin 1 gene (*BEST1*) and is described to be recessively inherited in the Great Pyrenees, Dogue de Bordeaux, Bullmastiff, Mastiff and a number of other mastiff-derived breeds. A DNA test is available.

The breeding advice for breeds diagnosed with "CMR/CMR-like retinopathy" will be changed from "No" to "Breeder option" if the owner of the dog provides the registering office with results of the DNA test for the affected dog showing that it is genetically normal, i.e., not a homozygous mutant, for the *BEST1* mutation.

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OCULAR DISORDERS REPORT
DOGUE DE BORDEAUX

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 347 #	 %	Year Examined: 2019-2023 Total # Dogs: 109 #	 %
EYELIDS				
20.160 MACROPALPEBRAL FISSURE	9	2.6%	0	0.0%
21.000 ENTROPION	22	6.3%	26	23.9%
22.000 ECTROPION	40	11.5%	12	11.0%
25.110 DISTICHIASIS	35	10.1%	8	7.3%
NICTITANS				
52.110 GLAND PROLAPSE	1	0.3%	0	0.0%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	9	2.6%	3	2.8%
70.730 DYSTROPHY-ENDOTHELIAL	1	0.3%	0	0.0%
UVEA				
93.120 UVEAL CYST-SINGLE	2	0.6%	2	1.8%
93.170 UVEAL CYST-MULTIPLE	1	0.3%	1	0.9%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	16	4.6%	2	1.8%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	1	0.3%	1	0.9%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	4	1.2%	2	1.8%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	5	1.4%	0	0.0%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	1	0.3%	1	0.9%
95.120 UVEAL CYST-FREE FLOATING	2	0.6%	0	0.0%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	9	2.6%	3	2.8%
100.301 PUNCTATE-ANTERIOR CORTEX	2	0.6%	1	0.9%
100.302 PUNCTATE-POSTERIOR CORTEX	0	0.0%	1	0.9%
100.306 PUNCTATE-NUCLEUS	4	1.2%	2	1.8%
100.311 INCIPIENT-ANTERIOR CORTEX	1	0.3%	0	0.0%
100.313 INCIPIENT-EQUATORIAL CORTEX	0	0.0%	2	1.8%
100.316 INCIPIENT-NUCLEUS	2	0.6%	0	0.0%
100.317 INCIPIENT-CAPSULAR	1	0.3%	0	0.0%
100.321 INCOMPLETE-ANTERIOR CORTEX	0	0.0%	1	0.9%
100.327 INCOMPLETE-CAPSULAR	0	0.0%	1	0.9%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***10***	***2.9%***	***8***	***7.3%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	1	0.3%	0	0.0%
110.135 PHPV/ PTVL	0	0.0%	1	0.9%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	6	1.7%	1	0.9%
120.960 RETINOPATHY	1	0.3%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	6	1.7%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	10	2.9%	2	1.8%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	8	2.3%	2	1.8%
NORMAL				
.000 NORMAL GLOBE	230	66.3%	59	54.1%

DRENTSCH PARTRIJSHOND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the DRENTSCH PARTRIJSHOND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
DRENTSCHE PATRIJSHOND

Diagnostic Name		Year Examined: 1993-2018 Total # Dogs: 20 #	 %	Year Examined: 2019-2023 Total # Dogs: 38 #	 %
UVEA					
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	1	5.0%	2	5.3%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	1	5.0%	2	5.3%
100.301	PUNCTATE-ANTERIOR CORTEX	1	5.0%	1	2.6%
100.302	PUNCTATE-POSTERIOR CORTEX	1	5.0%	0	0.0%
100.306	PUNCTATE-NUCLEUS	1	5.0%	1	2.6%
100.307	PUNCTATE-CAPSULAR	0	0.0%	1	2.6%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***3***	***15.0%***	***3***	***7.9%***
FUNDUS					
120.170	RETINAL DYSPLASIA-FOLDS	0	0.0%	1	2.6%
OTHER					
900.110	OTHER-SUSPECTED AS NOT-INHERITED	2	10.0%	3	7.9%
NORMAL					
.000	NORMAL GLOBE	16	80.0%	31	81.6%

DREVER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the DREVER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
DREVER

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions for this breed.

DUTCH SHEPHERD

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
B.	Cataract	Not defined	1	NO	

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
DUTCH SHEPHERD

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 90 #	 %	Year Examined: 2019-2023 Total # Dogs: 157 #	 %
EYELIDS				
25.110 DISTICHIASIS	3	3.3%	0	0.0%
NICTITANS				
50.210 PLASMOMA/ ATYPICAL PANNUS	0	0.0%	1	0.6%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	0	0.0%	2	1.3%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	2	2.2%	2	1.3%
UVEA				
93.120 UVEAL CYST-SINGLE	0	0.0%	1	0.6%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	0	0.0%	7	4.5%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	2	2.2%	3	1.9%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	12	13.3%	8	5.1%
100.301 PUNCTATE-ANTERIOR CORTEX	2	2.2%	1	0.6%
100.302 PUNCTATE-POSTERIOR CORTEX	0	0.0%	5	3.2%
100.303 PUNCTATE-EQUATORIAL CORTEX	2	2.2%	0	0.0%
100.304 PUNCTATE-ANTERIOR SUTURES	1	1.1%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	0	0.0%	2	1.3%
100.306 PUNCTATE-NUCLEUS	5	5.6%	2	1.3%
100.307 PUNCTATE-CAPSULAR	4	4.4%	2	1.3%
100.311 INCIPIENT-ANTERIOR CORTEX	2	2.2%	1	0.6%
100.312 INCIPIENT-POSTERIOR CORTEX	1	1.1%	3	1.9%
100.313 INCIPIENT-EQUATORIAL CORTEX	2	2.2%	0	0.0%
100.321 INCOMPLETE-ANTERIOR CORTEX	0	0.0%	2	1.3%
100.322 INCOMPLETE-POSTERIOR CORTEX	0	0.0%	2	1.3%
100.323 INCOMPLETE-EQUATORIAL CORTEX	0	0.0%	1	0.6%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	4	2.5%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***19***	***21.1%***	***21***	***13.4%***
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	0	0.0%	3	1.9%
120.310 RETINAL ATROPHY-GENERALIZED	1	1.1%	0	0.0%
120.960 RETINOPATHY	0	0.0%	1	0.6%
OTHER				
900.000 OTHER, UNSPECIFIED	3	3.3%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	1	1.1%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	5	5.6%	10	6.4%
NORMAL				
.000 NORMAL GLOBE	71	78.9%	115	73.2%

ECT LANDSEER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the ECT LANDSEER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
ECT LANDSEER

Year Examined:	1993-2018		2019-2023	
Total # Dogs:	2		0	
Diagnostic Name	**#**	**%**	**#**	**%**
NORMAL				
.000 NORMAL GLOBE	2	100.0%	0	

ENGLISH COCKER SPANIEL

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Keratoconjunctivitis sicca	Not defined	2, 16	NO	
B.	Glaucoma	Not defined	3, 4	NO	
C.	Distichiasis	Not defined	1, 5, 14	Breeder option	
D.	Persistent pupillary membranes				
	- iris to iris	Not defined	1, 6	Breeder option	
	- iris to cornea	Not defined	1, 6	NO	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
E.	Cataract	Not defined	1, 6-9	NO	
F.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- PRA-*prcd*	Autosomal recessive	10-13	NO	Mutation in *prcd* gene
G.	Retinal dysplasia				
	- folds	Presumed autosomal recessive	1	Breeder option	
H.	Retinal detachment -X-linked retinal dysplasia (*NDP*)	X-linked recessive	15	NO	Mutation in *NDP* gene

Description and Comments

A. Keratoconjunctivitis sicca (KCS)

An abnormality of the tear film, most commonly a deficiency of the aqueous portion, although the mucin and/or lipid layers may be affected; results in ocular irritation and/or vision impairment.

B. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated intraocular pressure occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of the IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine screening exam for certification.

Glaucoma in the English Cocker Spaniel is recognized in England. The frequency and significance of this disease in the breed in the United States is not known, but is probably low.

C. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

In the English Cocker Spaniel, this is a particularly serious problem as the majority of PPMs identified on routine screening examination bridge from the iris to the cornea and are associated with corneal opacities which may result in vision impairment. Lens pigment foci/no strands is considered an insignificant finding and therefore is not noted on the certificate.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

Congenital cataracts have been reported in Red Cocker Spaniels, presumably English Cocker Spaniels, in Denmark. The cataracts affected the anterior capsule; in some cases the cortex and/or nucleus were opaque. Associated findings in some dogs were persistent pupillary membrane (PPM) and/or microphthalmia. It is likely that these cataracts are part of a syndrome characterized by multiple congenital ocular anomalies. The condition is familial, but a specific mode of inheritance has not been defined.

F. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-*prcd*

Studies have shown that the principal form of PRA in the English Cocker Spaniel is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, and American Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. However, in the English Cocker Spaniel, the phenotype can be very variable in the age of onset. This photoreceptor degeneration is characterized by slow death of visual cells following their

normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

Other forms of retinal degeneration that are not *prcd* are recognized in the breed. The currently available genetic test will not detect these other forms of PRA.

Historical Note:

Central progressive retinal atrophy/retinal pigment epithelial dystrophy (CPRA/RPED) was previously a condition listed for this breed. However as the condition is no longer identified in the breed, the condition has been removed. Central progressive retinal atrophy was a progressive retinal degeneration in which photoreceptor death occurred secondary to disease of the underlying pigment epithelium. Progression was slow and some animals never lost vision. CPRA occurred in England, but was uncommon elsewhere. In the English Cocker Spaniel, retinal lesions of CPRA have been related to an underlying abnormal metabolism of Vitamin E resulting in a systemic deficiency

G. Retinal dysplasia – folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

H. Retinal detachment -X-linked retinal dysplasia (*NDP*)

Congenital blindness from complete retinal detachment has been documented in English Cocker Spaniels in the United Kingdom. Pedigree analysis is consistent with an X-linked recessive mode of inheritance. Whole genome sequencing of an affected individual led to the identification of a variant in norrin cystine knot growth factor (*NDP*) that is predicted to result in 15 aberrant amino acids and a premature stop. Variants in this gene are also associated with X-linked retinal detachment in people. A DNA test is available.

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OCULAR DISORDERS REPORT
ENGLISH COCKER SPANIEL

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	11,607		1,418	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	14	0.1%	1	0.1%
10.000	GLAUCOMA	1	0.0%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	12	0.1%	1	0.1%
EYELIDS					
20.110	EYELID DERMOID	1	0.0%	0	0.0%
20.140	ECTOPIC CILIA	6	0.1%	0	0.0%
20.160	MACROPALPEBRAL FISSURE	3	0.0%	0	0.0%
21.000	ENTROPION	50	0.4%	6	0.4%
22.000	ECTROPION	98	0.8%	0	0.0%
25.110	DISTICHIASIS	2,062	17.8%	230	16.2%
32.110	IMPERFORATE LACRIMAL PUNCTUM	25	0.2%	20	1.4%
NICTITANS					
52.110	GLAND PROLAPSE	6	0.1%	0	0.0%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	10	0.1%	1	0.1%
70.220	EXPOSURE KERATOPATHY SYNDROME	11	0.1%	1	0.1%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	102	0.9%	12	0.8%
70.730	DYSTROPHY-ENDOTHELIAL	37	0.3%	0	0.0%
UVEA					
90.250	PIGMENTARY UVEITIS	1	0.0%	0	0.0%
93.120	UVEAL CYST-SINGLE	5	0.0%	0	0.0%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	6	0.1%	0	0.0%
93.150	IRIS COLOBOMA	2	0.0%	0	0.0%
93.170	UVEAL CYST-MULTIPLE	0	0.0%	1	0.1%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	152	1.3%	30	2.1%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	43	0.4%	4	0.3%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	188	1.6%	6	0.4%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	10	0.1%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	63	0.5%	48	3.4%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	22	0.2%	10	0.7%
FUNDUS					
97.110	CHOROIDAL HYPOPLASIA	0	0.0%	1	0.1%
120.170	RETINAL DYSPLASIA-FOLDS	171	1.5%	24	1.7%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	16	0.1%	2	0.1%
120.310	RETINAL ATROPHY-GENERALIZED	424	3.7%	3	0.2%
120.960	RETINOPATHY	3	0.0%	0	0.0%
130.110	MICROPAPILLA	2	0.0%	0	0.0%
130.120	OPTIC NERVE HYPOPLASIA	2	0.0%	1	0.1%
LENS					
100.200	CATARACT, UNSPECIFIED	172	1.5%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	715	6.2%	73	5.1%
100.301	PUNCTATE-ANTERIOR CORTEX	131	1.1%	34	2.4%
100.302	PUNCTATE-POSTERIOR CORTEX	59	0.5%	9	0.6%
100.303	PUNCTATE-EQUATORIAL CORTEX	25	0.2%	8	0.6%
100.304	PUNCTATE-ANTERIOR SUTURES	15	0.1%	4	0.3%
100.305	PUNCTATE-POSTERIOR SUTURES	41	0.4%	4	0.3%
100.306	PUNCTATE-NUCLEUS	29	0.2%	14	1.0%
100.307	PUNCTATE-CAPSULAR	22	0.2%	19	1.3%
100.311	INCIPIENT-ANTERIOR CORTEX	134	1.2%	7	0.5%
100.312	INCIPIENT-POSTERIOR CORTEX	136	1.2%	2	0.1%
100.313	INCIPIENT-EQUATORIAL CORTEX	89	0.8%	5	0.4%

OCULAR DISORDERS REPORT
ENGLISH COCKER SPANIEL

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 11,607 #	%	2019-2023 1,418 #	%
LENS Continued				
100.314 INCIPIENT-ANTERIOR SUTURES	8	0.1%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	27	0.2%	1	0.1%
100.316 INCIPIENT-NUCLEUS	64	0.6%	3	0.2%
100.317 INCIPIENT-CAPSULAR	20	0.2%	2	0.1%
100.321 INCOMPLETE-ANTERIOR CORTEX	6	0.1%	2	0.1%
100.322 INCOMPLETE-POSTERIOR CORTEX	5	0.0%	2	0.1%
100.323 INCOMPLETE-EQUATORIAL CORTEX	6	0.1%	1	0.1%
100.326 INCOMPLETE-NUCLEUS	3	0.0%	0	0.0%
100.327 INCOMPLETE-CAPSULAR	1	0.0%	1	0.1%
100.328 Y-SUTURE TIP OPACITIES	6	0.1%	15	1.1%
100.330 GENERALIZED/ COMPLETE	102	0.9%	2	0.1%
100.340 RESORBING/ HYPERMATURE	0	0.0%	2	0.1%
100.375 SUBLUXATION/ LUXATION	9	0.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1,095***	***9.4%***	***122***	***8.6%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	11	0.1%	6	0.4%
110.135 PHPV/ PTVL	4	0.0%	1	0.1%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	2	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	25	0.2%	2	0.1%
OTHER				
900.000 OTHER, UNSPECIFIED	47	0.4%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	242	2.1%	12	0.8%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	200	1.7%	70	4.9%
NORMAL				
.000 NORMAL GLOBE	7,839	67.5%	959	67.6%

ENGLISH COONHOUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the ENGLISH COONHOUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
ENGLISH COONHOUND

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions for this breed.

ENGLISH FOXHOUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the ENGLISH FOXHOUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
ENGLISH FOXHOUND

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	3		0	
Diagnostic Name		#	%	#	%
OTHER					
900.110	OTHER-SUSPECTED AS NOT-INHERITED	1	33.3%	0	
NORMAL					
.000	NORMAL GLOBE	2	66.7%	0	

ENGLISH JACK RUSSELL TERRIER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the ENGLISH JACK RUSSELL TERRIER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
ENGLISH JACK RUSSELL TERRIER

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	2		1	
Diagnostic Name		#	%	#	%
NORMAL					
.000	NORMAL GLOBE	2	100.0%	1	100.0%

ENGLISH SETTER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	
D.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- rod-cone dysplasia recessive type 1 (*rcd4*)	Autosomal recessive	2, 3	NO	Mutation in the *C2orf71* gene
E.	Retinal dysplasia				
	- folds	Not defined	1	Breeder option	
F.	Ceroid lipofuscinosis	Autosomal recessive	4-9	NO	Mutation in the *CLN8* gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of the dog. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in

a localized region.

D. Retinal atrophy
- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- Rod-cone dysplasia, type 4 (*rcd4*)

A form of PRA identified in the Gordon and Irish Setter breeds. Clinical night blindness is observed on average as late as 10 years of age and progresses to total blindness. This form of PRA has been referred to as late-onset PRA (LOPRA). The disorder is caused by a mutation present in the *C2orf71* gene. A DNA test is available that will unequivocally identify genetically normal, affected and carrier dogs. The test is accurate only for this mutation and will not identify other forms of PRA.

E. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

F. Ceroid lipofuscinosis

An inherited disease of humans and animals characterized by the accumulation of lipopigment in various tissues of the body including the eye. It results in progressive neurologic disease including blindness. (Also called Batten's Disease.) A DNA test is available.

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OCULAR DISORDERS REPORT
ENGLISH SETTER

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	1,790		66	
	Diagnostic Name	#	%	#	%
EYELIDS					
21.000	ENTROPION	11	0.6%	0	0.0%
22.000	ECTROPION	3	0.2%	0	0.0%
25.110	DISTICHIASIS	71	4.0%	1	1.5%
NICTITANS					
52.110	GLAND PROLAPSE	2	0.1%	0	0.0%
CORNEA					
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	14	0.8%	0	0.0%
70.730	DYSTROPHY-ENDOTHELIAL	3	0.2%	0	0.0%
UVEA					
93.120	UVEAL CYST-SINGLE	1	0.1%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	68	3.8%	0	0.0%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	5	0.3%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	7	0.4%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	1	0.1%	2	3.0%
93.810	UVEAL MELANOMA	1	0.1%	0	0.0%
LENS					
100.200	CATARACT, UNSPECIFIED	5	0.3%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	66	3.7%	6	9.1%
100.301	PUNCTATE-ANTERIOR CORTEX	7	0.4%	2	3.0%
100.302	PUNCTATE-POSTERIOR CORTEX	11	0.6%	2	3.0%
100.303	PUNCTATE-EQUATORIAL CORTEX	1	0.1%	1	1.5%
100.305	PUNCTATE-POSTERIOR SUTURES	5	0.3%	0	0.0%
100.306	PUNCTATE-NUCLEUS	2	0.1%	0	0.0%
100.307	PUNCTATE-CAPSULAR	2	0.1%	1	1.5%
100.311	INCIPIENT-ANTERIOR CORTEX	5	0.3%	0	0.0%
100.312	INCIPIENT-POSTERIOR CORTEX	8	0.4%	1	1.5%
100.313	INCIPIENT-EQUATORIAL CORTEX	3	0.2%	1	1.5%
100.315	INCIPIENT-POSTERIOR SUTURES	2	0.1%	0	0.0%
100.316	INCIPIENT-NUCLEUS	2	0.1%	0	0.0%
100.317	INCIPIENT-CAPSULAR	2	0.1%	0	0.0%
100.321	INCOMPLETE-ANTERIOR CORTEX	1	0.1%	0	0.0%
100.322	INCOMPLETE-POSTERIOR CORTEX	2	0.1%	0	0.0%
100.326	INCOMPLETE-NUCLEUS	0	0.0%	1	1.5%
100.328	Y-SUTURE TIP OPACITIES	4	0.2%	1	1.5%
100.330	GENERALIZED/ COMPLETE	4	0.2%	1	1.5%
100.375	SUBLUXATION/ LUXATION	1	0.1%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***62***	***3.5%***	***10***	***15.2%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	7	0.4%	0	0.0%
110.135	PHPV/ PTVL	1	0.1%	0	0.0%
110.320	VITREOUS DEGENERATION-SYNERESIS	4	0.2%	1	1.5%
FUNDUS					
120.170	RETINAL DYSPLASIA-FOLDS	37	2.1%	1	1.5%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	15	0.8%	0	0.0%
120.310	RETINAL ATROPHY-GENERALIZED	22	1.2%	0	0.0%
130.110	MICROPAPILLA	1	0.1%	0	0.0%
130.120	OPTIC NERVE HYPOPLASIA	1	0.1%	0	0.0%
OTHER					
900.000	OTHER, UNSPECIFIED	6	0.3%	0	0.0%
900.100	OTHER-SUSPECTED AS INHERITED	53	3.0%	0	0.0%
900.110	OTHER-SUSPECTED AS NOT-INHERITED	5	0.3%	4	6.1%

OCULAR DISORDERS REPORT
ENGLISH SETTER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1,790 #	%	Year Examined: 2019-2023 Total # Dogs: 66 #	%
NORMAL				
.000 NORMAL GLOBE	1,502	83.9%	48	72.7%

ENGLISH SHEPHERD

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the ENGLISH SHEPHERD breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
ENGLISH SHEPHERD

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 142 #	 %	Year Examined: 2019-2023 Total # Dogs: 27 #	 %
GLOBE				
.110 MICROPHTHALMOS	2	1.4%	0	0.0%
EYELIDS				
21.000 ENTROPION	5	3.5%	0	0.0%
25.110 DISTICHIASIS	1	0.7%	2	7.4%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	1	0.7%	0	0.0%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	1	0.7%	0	0.0%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	6	4.2%	1	3.7%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	1	0.7%	0	0.0%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	3	2.1%	3	11.1%
100.301 PUNCTATE-ANTERIOR CORTEX	2	1.4%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	1	0.7%	0	0.0%
100.306 PUNCTATE-NUCLEUS	1	0.7%	0	0.0%
100.307 PUNCTATE-CAPSULAR	1	0.7%	2	7.4%
100.313 INCIPIENT-EQUATORIAL CORTEX	0	0.0%	1	3.7%
100.315 INCIPIENT-POSTERIOR SUTURES	1	0.7%	0	0.0%
100.317 INCIPIENT-CAPSULAR	1	0.7%	0	0.0%
100.321 INCOMPLETE-ANTERIOR CORTEX	2	1.4%	0	0.0%
100.322 INCOMPLETE-POSTERIOR CORTEX	3	2.1%	0	0.0%
100.330 GENERALIZED/ COMPLETE	4	2.8%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***16***	***11.3%***	***3***	***11.1%***
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	2	1.4%	0	0.0%
OTHER				
900.100 OTHER-SUSPECTED AS INHERITED	4	2.8%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	10	7.0%	2	7.4%
NORMAL				
.000 NORMAL GLOBE	110	77.5%	21	77.8%

ENGLISH SPRINGER SPANIEL

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Entropion	Not defined	1	Breeder option	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
D.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
E.	Cataract	Not defined	1	NO	
F.	Persistent hyaloid artery remnant	Not defined	1	NO	
G.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- PRA-*cord1*	Autosomal recessive	1, 3	NO	
H.	Retinal dysplasia				
	- folds	Presumed autosomal recessive	1, 4-6. 9	NO	
	- geographic	Not defined	4-6	NO	
I.	Refractive error	Not defined	7, 8	Breeder option	

Description and Comments

A. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull. In the English Springer Spaniel this usually involves the lower lateral lid margin.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted

E. Cataract

Lens opacity which may affect one or both eyes and may involve the lens partially or completely. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membranes, persistent hyaloid, or nutritional deficiencies.

Cataract in the English Springer Spaniel is reported to be a familial trait usually involving the posterior subcapsular region of the lens that progresses slowly.

F. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

G. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA *cord-1*

Cord-1 PRA in the English Springer Spaniel has an onset of clinical signs at 2 to 9 years of age leading to blindness in most affected dogs. *Cord1* PRA in the English Springer Spaniel has been described as beginning with increased granularity of the fundus or tiny hyporeflective brown or grey patches in the far peripheral tapetum. Over time, these abnormalities become more diffuse with mottling over much of the tapetum. Vessel attenuation accompanies the more diffuse changes. In advanced cases, there is generalized tapetal hyperreflectivity and vessel attenuation. Pedigree analysis has shown cord-1 in the English Springer Spaniel to be an autosomal recessive trait. A mutation in the *RPGRIP1* gene in cone-rod dystrophy (*cord1*) was found through genetic testing to be associated with one form of PRA in English Springer Spaniels, but not all clinically affected dogs have the

RPGRIP1 mutation, implying that other mutations have yet to be identified. A DNA test is available. The test is accurate only for this mutation and will not identify other forms of PRA. Not all dogs homozygous for the *RPGRIP1* genotype demonstrate the phenotype clinically.

H. Retinal dysplasia

- folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

The relationship between folds and geographic/detached lesions has been a topic of dispute for many years. It is the consensus of the English Springer Spaniel Field Trial Association Heritable Defects Committee (the parent breed club in the United States) that none of the forms of retinal dysplasia are desirable in a breeding animal.

Clinically the retinal dysplasia observed in this breed is unique and distinct from the classical “folds” or “geographic” forms of dysplasia.

- geographic

An irregularly shaped area of retinal development containing areas of retinal thickening and disorganization. These lesions can take up to 1.5 years after birth to develop and be ophthalmoscopically visible. As a result, some dogs with this disease may have had normal prior eye examinations.

Clinically the retinal dysplasia observed in this breed is unique and distinct from the classical “folds” or “geographic” forms of dysplasia.

I. Refractive Myopia

A condition of the eye where the light that comes in does not directly focus on the retina but in front of it. In common terminology, "near-sighted." This condition has been shown to have a genetic component in English Springer Spaniels, although the exact mode of inheritance has not been determined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Lheriteau E, Petit L, Weber M, et al. Successful gene therapy in the RPGRIP1-deficient dog: a large model of cone-rod dystrophy. *Mol Ther*. 2014;22:265-277. PMID: 24091916

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9. Historical breed club request.

OCULAR DISORDERS REPORT
ENGLISH SPRINGER SPANIEL

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	51,412		6,240	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	28	0.1%	2	0.0%
10.000	GLAUCOMA	7	0.0%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	12	0.0%	0	0.0%
EYELIDS					
20.110	EYELID DERMOID	2	0.0%	0	0.0%
20.160	MACROPALPEBRAL FISSURE	3	0.0%	0	0.0%
21.000	ENTROPION	303	0.6%	55	0.9%
22.000	ECTROPION	59	0.1%	5	0.1%
25.110	DISTICHIASIS	406	0.8%	50	0.8%
32.110	IMPERFORATE LACRIMAL PUNCTUM	11	0.0%	2	0.0%
NICTITANS					
51.100	CARTILAGE ANOMALY/ EVERSION	1	0.0%	0	0.0%
52.110	GLAND PROLAPSE	8	0.0%	0	0.0%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	7	0.0%	0	0.0%
70.220	EXPOSURE KERATOPATHY SYNDROME	4	0.0%	2	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	636	1.2%	103	1.7%
70.730	DYSTROPHY-ENDOTHELIAL	13	0.0%	1	0.0%
UVEA					
90.250	PIGMENTARY UVEITIS	0	0.0%	2	0.0%
93.110	IRIS HYPOPLASIA	13	0.0%	5	0.1%
93.120	UVEAL CYST-SINGLE	16	0.0%	2	0.0%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	4	0.0%	0	0.0%
93.150	IRIS COLOBOMA	31	0.1%	0	0.0%
93.170	UVEAL CYST-MULTIPLE	3	0.0%	2	0.0%
93.180	IRIS SPHINCTER DYSPLASIA	1	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	3,916	7.6%	530	8.5%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	125	0.2%	4	0.1%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	90	0.2%	7	0.1%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	48	0.1%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	101	0.2%	61	1.0%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	16	0.0%	2	0.0%
93.810	UVEAL MELANOMA	2	0.0%	0	0.0%
95.120	UVEAL CYST-FREE FLOATING	2	0.0%	0	0.0%
97.150	COLOBOMA	1	0.0%	0	0.0%
FUNDUS					
97.110	CHOROIDAL HYPOPLASIA	4	0.0%	0	0.0%
97.120	COLOBOMA	5	0.0%	0	0.0%
120.170	RETINAL DYSPLASIA-FOLDS	1,989	3.9%	118	1.9%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	748	1.5%	48	0.8%
120.310	RETINAL ATROPHY-GENERALIZED	497	1.0%	23	0.4%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	57	0.1%	0	0.0%
120.920	RETINAL DETACHMENT	2	0.0%	6	0.1%
120.960	RETINOPATHY	23	0.0%	7	0.1%
120.970	RETINOPATHY - CMR/ CMR-LIKE	0	0.0%	2	0.0%
130.110	MICROPAPILLA	13	0.0%	6	0.1%
130.120	OPTIC NERVE HYPOPLASIA	9	0.0%	1	0.0%
LENS					
100.200	CATARACT, UNSPECIFIED	97	0.2%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	1,287	2.5%	205	3.3%
100.301	PUNCTATE-ANTERIOR CORTEX	278	0.5%	83	1.3%

OCULAR DISORDERS REPORT
ENGLISH SPRINGER SPANIEL

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 51,412 #	 %	Year Examined: 2019-2023 Total # Dogs: 6,240 #	 %
LENS Continued				
100.302 PUNCTATE-POSTERIOR CORTEX	125	0.2%	18	0.3%
100.303 PUNCTATE-EQUATORIAL CORTEX	66	0.1%	13	0.2%
100.304 PUNCTATE-ANTERIOR SUTURES	27	0.1%	7	0.1%
100.305 PUNCTATE-POSTERIOR SUTURES	107	0.2%	15	0.2%
100.306 PUNCTATE-NUCLEUS	74	0.1%	25	0.4%
100.307 PUNCTATE-CAPSULAR	84	0.2%	47	0.8%
100.311 INCIPIENT-ANTERIOR CORTEX	230	0.4%	31	0.5%
100.312 INCIPIENT-POSTERIOR CORTEX	220	0.4%	26	0.4%
100.313 INCIPIENT-EQUATORIAL CORTEX	112	0.2%	17	0.3%
100.314 INCIPIENT-ANTERIOR SUTURES	25	0.0%	5	0.1%
100.315 INCIPIENT-POSTERIOR SUTURES	42	0.1%	9	0.1%
100.316 INCIPIENT-NUCLEUS	75	0.1%	14	0.2%
100.317 INCIPIENT-CAPSULAR	39	0.1%	20	0.3%
100.321 INCOMPLETE-ANTERIOR CORTEX	11	0.0%	3	0.0%
100.322 INCOMPLETE-POSTERIOR CORTEX	10	0.0%	5	0.1%
100.323 INCOMPLETE-EQUATORIAL CORTEX	5	0.0%	2	0.0%
100.324 INCOMPLETE-ANTERIOR SUTURES	0	0.0%	1	0.0%
100.326 INCOMPLETE-NUCLEUS	6	0.0%	1	0.0%
100.327 INCOMPLETE-CAPSULAR	7	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	26	0.1%	19	0.3%
100.330 GENERALIZED/ COMPLETE	92	0.2%	2	0.0%
100.340 RESORBING/ HYPERMATURE	0	0.0%	3	0.0%
100.375 SUBLUXATION/ LUXATION	29	0.1%	1	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1,732***	***3.4%***	***347***	***5.6%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	267	0.5%	99	1.6%
110.135 PHPV/ PTVL	42	0.1%	1	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	8	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	225	0.4%	15	0.2%
OTHER				
900.000 OTHER, UNSPECIFIED	336	0.7%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	730	1.4%	9	0.1%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	553	1.1%	170	2.7%
NORMAL				
.000 NORMAL GLOBE	42,098	81.9%	4,884	78.3%

ENGLISH TOY SPANIEL

(King Charles, Prince Charles, Ruby, Blenheim)

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Entropion	Not defined	1	Breeder option	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Pigmentary keratitis	Not defined	1	Breeder option	
D.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
E.	Persistent pupillary membrane				
	- iris to iris	Not defined	1	Breeder option	
F.	Cataract	Not defined	1	NO	
G.	Persistent hyperplastic primary vitreous /Persistent hyperplastic tunica vasculosa lentis (PHPV/PHTVL)	Not defined	1	NO	
H.	Persistent hyaloid artery remnant (PHA)	Not defined	1	Breeder option	
I.	Retinal dysplasia				
	- folds	Not defined	1	Breeder option	

Description and Comments

A. Entropion

A conformational defect resulting in "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures, which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin, which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding

discretion is advised.

C. Exposure/pigmentary keratitis

A condition characterized by variable degrees of superficial vascularization, fibrosis, and/or pigmentation of the cornea. May be associated with excessive exposure/irritation of the globe due to shallow orbits, lower eyelid medial entropion, lagophthalmos, and macropalpebral fissure.

D. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

E. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

F. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

Onset of cataract in the English Toy Spaniel is at an early age (less than 6 months), affecting the cortex and nucleus with rapid progression to complete cataract, resulting in blindness.

G. Persistent hyperplastic primary vitreous (PHPV)/Persistent hyperplastic tunica vasculosa lentis (PHTVL)

Persistent hyperplastic primary vitreous is a congenital defect resulting from abnormalities in the development and regression of the hyaloid artery (the primary vitreous) and the interaction of this blood vessel with the posterior lens capsule/cortex during embryogenesis. This condition is often associated with persistent hyperplastic tunica vasculosa lentis which results from failure of regression of the embryologic vascular network which surrounds the developing lens.

H. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

I. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
ENGLISH TOY SPANIEL

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	1,288		442	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	5	0.4%	3	0.7%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	2	0.2%	0	0.0%
EYELIDS					
20.140	ECTOPIC CILIA	1	0.1%	0	0.0%
20.160	MACROPALPEBRAL FISSURE	10	0.8%	0	0.0%
21.000	ENTROPION	59	4.6%	8	1.8%
22.000	ECTROPION	3	0.2%	0	0.0%
25.110	DISTICHIASIS	138	10.7%	39	8.8%
NICTITANS					
51.100	CARTILAGE ANOMALY/ EVERSION	0	0.0%	1	0.2%
52.110	GLAND PROLAPSE	2	0.2%	0	0.0%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	1	0.1%	0	0.0%
70.220	EXPOSURE KERATOPATHY SYNDROME	22	1.7%	4	0.9%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	176	13.7%	74	16.7%
70.730	DYSTROPHY-ENDOTHELIAL	5	0.4%	2	0.5%
UVEA					
93.120	UVEAL CYST-SINGLE	1	0.1%	0	0.0%
93.170	UVEAL CYST-MULTIPLE	1	0.1%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	14	1.1%	15	3.4%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	2	0.2%	2	0.5%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	1	0.1%	1	0.2%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	6	0.5%	3	0.7%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	1	0.1%	0	0.0%
97.150	COLOBOMA	0	0.0%	1	0.2%
LENS					
100.200	CATARACT, UNSPECIFIED	10	0.8%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	72	5.6%	10	2.3%
100.301	PUNCTATE-ANTERIOR CORTEX	27	2.1%	5	1.1%
100.302	PUNCTATE-POSTERIOR CORTEX	21	1.6%	1	0.2%
100.303	PUNCTATE-EQUATORIAL CORTEX	7	0.5%	2	0.5%
100.305	PUNCTATE-POSTERIOR SUTURES	6	0.5%	0	0.0%
100.306	PUNCTATE-NUCLEUS	9	0.7%	1	0.2%
100.307	PUNCTATE-CAPSULAR	29	2.3%	3	0.7%
100.311	INCIPIENT-ANTERIOR CORTEX	31	2.4%	9	2.0%
100.312	INCIPIENT-POSTERIOR CORTEX	25	1.9%	8	1.8%
100.313	INCIPIENT-EQUATORIAL CORTEX	5	0.4%	4	0.9%
100.315	INCIPIENT-POSTERIOR SUTURES	1	0.1%	0	0.0%
100.316	INCIPIENT-NUCLEUS	14	1.1%	4	0.9%
100.317	INCIPIENT-CAPSULAR	16	1.2%	2	0.5%
100.321	INCOMPLETE-ANTERIOR CORTEX	6	0.5%	2	0.5%
100.322	INCOMPLETE-POSTERIOR CORTEX	8	0.6%	1	0.2%
100.323	INCOMPLETE-EQUATORIAL CORTEX	3	0.2%	1	0.2%
100.326	INCOMPLETE-NUCLEUS	6	0.5%	1	0.2%
100.327	INCOMPLETE-CAPSULAR	2	0.2%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	3	0.2%	1	0.2%
100.330	GENERALIZED/ COMPLETE	21	1.6%	1	0.2%
100.340	RESORBING/ HYPERMATURE	3	0.2%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***250***	***19.4%***	***45***	***10.2%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	110	8.5%	58	13.1%
110.135	PHPV/ PTVL	15	1.2%	5	1.1%

OCULAR DISORDERS REPORT
ENGLISH TOY SPANIEL

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1,288 #	 %	Year Examined: 2019-2023 Total # Dogs: 442 #	 %
VITREOUS Continued				
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	0	0.0%	1	0.2%
110.320 VITREOUS DEGENERATION-SYNERESIS	21	1.6%	1	0.2%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	64	5.0%	29	6.6%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	8	0.6%	4	0.9%
120.310 RETINAL ATROPHY-GENERALIZED	7	0.5%	0	0.0%
120.920 RETINAL DETACHMENT	1	0.1%	0	0.0%
120.960 RETINOPATHY	0	0.0%	1	0.2%
130.110 MICROPAPILLA	1	0.1%	1	0.2%
OTHER				
900.000 OTHER, UNSPECIFIED	55	4.3%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	38	3.0%	3	0.7%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	66	5.1%	15	3.4%
NORMAL				
.000 NORMAL GLOBE	642	49.8%	206	46.6%

ENTLEBUCHER MOUNTAIN DOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Glaucoma	Not defined	2	NO	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
C.	Cataract	Presumed autosomal recessive	1-3	NO	
D.	Vitreal degeneration				
	- syneresis	Not defined	1	Breeder option	
E.	Retinal atrophy				
	- generalized	Not defined	1,3	NO	
	- PRA-*prcd*	Autosomal recessive	2, 4	NO	Mutation in the *prcd* gene
F.	Retinal dysplasia				
	- folds	Not defined	1	Breeder option	

Description and Comments

A. Glaucoma

Glaucoma is an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests are part of a routine breed eye screening exam.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore is not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

Cataracts in the Entlebucher Mountain Dog generally become evident in young to middle-aged dogs (5.5 +/- 2.6 years). The opacities typically begin in the posterior subcapsular/capsular polar region along the suture lines as early as 1-2 years of age. Most dogs are affected with bilaterally symmetrical cataracts, which may or may not progress. Pedigree analysis suggests an autosomal recessive mode of inheritance.

D. Vitreous degeneration - syneresis

Liquefaction of the vitreous gel which may predispose to retinal detachment resulting in blindness.

E. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-*prcd*

Studies have shown that the principal form of PRA in the Entlebucher Mountain Dog is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

F. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Spiess BM. [Inherited eye diseases in the Entlebucher Mountain Dog]. *Schweizer Archiv fur Tierheilkunde*. 1994;136:105-110. Vererbte Augenkrankheiten beim Entlebucher Sennenhund. PMID: 8171308 **reference derived from non-USA derived dog population**

3. Heitmann M, Hamann H, Brahm R, et al. Analysis of prevalence of presumed inherited eye diseases in Entlebucher Mountain Dogs. *Vet Ophthalmol*. 2005;8:145-151. PMID: 15910366

4. Zangerl B, Goldstein O, Philp AR, et al. Identical mutation in a novel retinal gene causes progressive rod-cone degeneration in dogs and retinitis pigmentosa in humans. *Genomics*. 2006;88:551-563. PMID:

16938425

OCULAR DISORDERS REPORT
ENTLEBUCHER MOUNTAIN DOG

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1,185 #	 %	2019-2023 267 #	 %
EYELIDS				
20.140 ECTOPIC CILIA	1	0.1%	0	0.0%
21.000 ENTROPION	1	0.1%	0	0.0%
25.110 DISTICHIASIS	11	0.9%	3	1.1%
NICTITANS				
52.110 GLAND PROLAPSE	3	0.3%	0	0.0%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	5	0.4%	1	0.4%
UVEA				
93.120 UVEAL CYST-SINGLE	2	0.2%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	56	4.7%	5	1.9%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	4	0.3%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	2	0.2%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	1	0.1%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	14	1.2%	8	3.0%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	75	6.3%	32	12.0%
100.301 PUNCTATE-ANTERIOR CORTEX	11	0.9%	10	3.7%
100.302 PUNCTATE-POSTERIOR CORTEX	41	3.5%	10	3.7%
100.303 PUNCTATE-EQUATORIAL CORTEX	8	0.7%	1	0.4%
100.304 PUNCTATE-ANTERIOR SUTURES	3	0.3%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	4	0.3%	1	0.4%
100.306 PUNCTATE-NUCLEUS	6	0.5%	5	1.9%
100.307 PUNCTATE-CAPSULAR	18	1.5%	17	6.4%
100.311 INCIPIENT-ANTERIOR CORTEX	14	1.2%	1	0.4%
100.312 INCIPIENT-POSTERIOR CORTEX	82	6.9%	16	6.0%
100.313 INCIPIENT-EQUATORIAL CORTEX	9	0.8%	7	2.6%
100.315 INCIPIENT-POSTERIOR SUTURES	5	0.4%	0	0.0%
100.316 INCIPIENT-NUCLEUS	4	0.3%	1	0.4%
100.317 INCIPIENT-CAPSULAR	11	0.9%	1	0.4%
100.322 INCOMPLETE-POSTERIOR CORTEX	4	0.3%	2	0.7%
100.330 GENERALIZED/ COMPLETE	9	0.8%	0	0.0%
100.375 SUBLUXATION/ LUXATION	1	0.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***229***	***19.3%***	***72***	***27.0%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	1	0.1%	3	1.1%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.1%	3	1.1%
110.320 VITREOUS DEGENERATION-SYNERESIS	8	0.7%	8	3.0%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	30	2.5%	2	0.7%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	7	0.6%	2	0.7%
120.310 RETINAL ATROPHY-GENERALIZED	30	2.5%	1	0.4%
120.960 RETINOPATHY	2	0.2%	1	0.4%
130.110 MICROPAPILLA	2	0.2%	1	0.4%
130.120 OPTIC NERVE HYPOPLASIA	1	0.1%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	20	1.7%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	41	3.5%	1	0.4%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	42	3.5%	10	3.7%
NORMAL				
.000 NORMAL GLOBE	866	73.1%	175	65.5%

EPAGNEUL BRETON

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the EPAGNEUL BRETON breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
EPAGNEUL BRETON

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 22 #	 %	Year Examined: 2019-2023 Total # Dogs: 25 #	 %
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	2	9.1%	1	4.0%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	0	0.0%	1	4.0%
100.311 INCIPIENT-ANTERIOR CORTEX	1	4.5%	1	4.0%
100.312 INCIPIENT-POSTERIOR CORTEX	0	0.0%	1	4.0%
100.313 INCIPIENT-EQUATORIAL CORTEX	1	4.5%	1	4.0%
100.323 INCOMPLETE-EQUATORIAL CORTEX	0	0.0%	1	4.0%
100.328 Y-SUTURE TIP OPACITIES	1	4.5%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***2***	***9.1%***	***4***	***16.0%***
OTHER				
900.110 OTHER-SUSPECTED AS NOT-INHERITED	2	9.1%	0	0.0%
NORMAL				
.000 NORMAL GLOBE	17	77.3%	21	84.0%

ESTRELA MOUNTAIN DOG

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the ESTRELA MOUNTAIN DOG breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
ESTRELA MOUNTAIN DOG

Year Examined:	1993-2018		2019-2023	
Total # Dogs:	3		5	
Diagnostic Name	**#**	**%**	**#**	**%**
NORMAL				
.000 NORMAL GLOBE	3	100.0%	5	100.0%

EURASIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Glaucoma	Not defined	2,3	NO	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Cataracts	Not defined	1	NO	

Description and Comments

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure which, when sustained even for a brief period of time, causes intraocular damage resulting in blindness. The elevated intraocular pressure occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine breed eye screening examination.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Cataracts

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Boillot T, Rosolen SG, Dulaurent T, Goulle F, Thomas P, Isard PF, Azoulay T, Lafarge-Beurlet S, Woods M, Lavillegrand S, Ivkovic I, Neveux N, Sahel JA, Picaud S, Froger N. Determination of morphological, biometric and biochemical susceptibilities in healthy Eurasier dogs with suspected inherited glaucoma. PLoS One. 2014 Nov 7;9(11):e111873. doi: 10.1371/journal.pone.0111873. PMID: 25380252

3. Strom AR, Hassig M, Iburg TM, et al. Epidemiology of canine glaucoma presented to University of Zurich from 1995 to 2009. Part 1: Congenital and primary glaucoma (4 and 123 cases). *Vet*

Ophthalmol. 2011;14:121-126. Epub 2011/03/04. PMID: 21366828

OCULAR DISORDERS REPORT
EURASIER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 147 #	 %	Year Examined: 2019-2023 Total # Dogs: 115 #	 %
EYELIDS				
25.110 DISTICHIASIS	45	30.6%	30	26.1%
32.110 IMPERFORATE LACRIMAL PUNCTUM	0	0.0%	1	0.9%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	4	2.7%	2	1.7%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	4	2.7%	1	0.9%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	2	1.4%	1	0.9%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	0	0.0%	1	0.9%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	8	5.4%	4	3.5%
100.301 PUNCTATE-ANTERIOR CORTEX	1	0.7%	1	0.9%
100.302 PUNCTATE-POSTERIOR CORTEX	3	2.0%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	6	4.1%	0	0.0%
100.306 PUNCTATE-NUCLEUS	0	0.0%	2	1.7%
100.307 PUNCTATE-CAPSULAR	1	0.7%	1	0.9%
100.312 INCIPIENT-POSTERIOR CORTEX	3	2.0%	1	0.9%
100.315 INCIPIENT-POSTERIOR SUTURES	1	0.7%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	2	1.4%	1	0.9%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***15***	***10.2%***	***5***	***4.3%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	1	0.7%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	1	0.7%	0	0.0%
FUNDUS				
130.110 MICROPAPILLA	1	0.7%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	5	3.4%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	5	3.4%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	4	2.7%	5	4.3%
NORMAL				
.000 NORMAL GLOBE	87	59.2%	69	60.0%

FIELD SPANIEL

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
D.	Cataract	Not defined	1	NO	
E.	Retinal dysplasia				
	- folds	Not defined	1	Breeder option	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin, which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary

membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
FIELD SPANIEL

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	2,885		756	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	1	0.0%	1	0.1%
EYELIDS					
20.160	MACROPALPEBRAL FISSURE	6	0.2%	0	0.0%
21.000	ENTROPION	10	0.3%	2	0.3%
22.000	ECTROPION	11	0.4%	1	0.1%
25.110	DISTICHIASIS	176	6.1%	36	4.8%
32.110	IMPERFORATE LACRIMAL PUNCTUM	14	0.5%	6	0.8%
NICTITANS					
52.110	GLAND PROLAPSE	1	0.0%	0	0.0%
CORNEA					
70.220	EXPOSURE KERATOPATHY SYNDROME	1	0.0%	0	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	34	1.2%	4	0.5%
70.730	DYSTROPHY-ENDOTHELIAL	1	0.0%	0	0.0%
UVEA					
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	197	6.8%	18	2.4%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	6	0.2%	2	0.3%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	8	0.3%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	35	1.2%	23	3.0%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	6	0.2%	1	0.1%
FUNDUS					
97.120	COLOBOMA	1	0.0%	0	0.0%
120.170	RETINAL DYSPLASIA-FOLDS	283	9.8%	38	5.0%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	12	0.4%	1	0.1%
120.310	RETINAL ATROPHY-GENERALIZED	5	0.2%	0	0.0%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%
120.960	RETINOPATHY	1	0.0%	0	0.0%
130.110	MICROPAPILLA	3	0.1%	0	0.0%
130.120	OPTIC NERVE HYPOPLASIA	1	0.0%	1	0.1%
LENS					
100.200	CATARACT, UNSPECIFIED	3	0.1%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	140	4.9%	29	3.8%
100.301	PUNCTATE-ANTERIOR CORTEX	28	1.0%	10	1.3%
100.302	PUNCTATE-POSTERIOR CORTEX	5	0.2%	2	0.3%
100.303	PUNCTATE-EQUATORIAL CORTEX	1	0.0%	0	0.0%
100.304	PUNCTATE-ANTERIOR SUTURES	5	0.2%	3	0.4%
100.305	PUNCTATE-POSTERIOR SUTURES	8	0.3%	1	0.1%
100.306	PUNCTATE-NUCLEUS	4	0.1%	3	0.4%
100.307	PUNCTATE-CAPSULAR	16	0.6%	6	0.8%
100.311	INCIPIENT-ANTERIOR CORTEX	20	0.7%	8	1.1%
100.312	INCIPIENT-POSTERIOR CORTEX	8	0.3%	0	0.0%
100.313	INCIPIENT-EQUATORIAL CORTEX	2	0.1%	3	0.4%
100.314	INCIPIENT-ANTERIOR SUTURES	3	0.1%	2	0.3%
100.315	INCIPIENT-POSTERIOR SUTURES	5	0.2%	0	0.0%
100.316	INCIPIENT-NUCLEUS	8	0.3%	1	0.1%
100.317	INCIPIENT-CAPSULAR	6	0.2%	1	0.1%
100.321	INCOMPLETE-ANTERIOR CORTEX	1	0.0%	0	0.0%
100.322	INCOMPLETE-POSTERIOR CORTEX	1	0.0%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	9	0.3%	7	0.9%
100.330	GENERALIZED/ COMPLETE	3	0.1%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***127***	***4.4%***	***40***	***5.3%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	4	0.1%	1	0.1%

OCULAR DISORDERS REPORT
FIELD SPANIEL

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 2,885 #	 %	Year Examined: 2019-2023 Total # Dogs: 756 #	 %
VITREOUS Continued				
110.135 PHPV/ PTVL	4	0.1%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	0.1%	1	0.1%
110.320 VITREOUS DEGENERATION-SYNERESIS	2	0.1%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	47	1.6%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	61	2.1%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	82	2.8%	23	3.0%
NORMAL				
.000 NORMAL GLOBE	2,070	71.8%	588	77.8%

FILA BRASILEIRO

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the FILA BRASILEIRO breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
FILA BRASILEIRO

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 4 #	%	2019-2023 0 #	%
OTHER				
900.000 OTHER, UNSPECIFIED	1	25.0%	0	
NORMAL				
.000 NORMAL GLOBE	4	100.0%	0	

FINNISH LAPPHUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
B.	Cataract	Not defined	1	NO	
C.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- PRA-*prcd*	Autosomal recessive	2	NO	Mutation in the *prcd* gene

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. PRA is inherited as an autosomal recessive trait in most breeds.

-PRA-*prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the form of PRA in the Finnish Lapphund is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Zangerl B, Goldstein O, Philp AR, et al. Identical mutation in a novel retinal gene causes progressive rod-cone degeneration in dogs and retinitis pigmentosa in humans. *Genomics*. 2006 Nov;88:551-563.PMID: 6938425

OCULAR DISORDERS REPORT
FINNISH LAPPHUND

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 614 #	 %	Year Examined: 2019-2023 Total # Dogs: 317 #	 %
EYELIDS				
25.110 DISTICHIASIS	1	0.2%	1	0.3%
32.110 IMPERFORATE LACRIMAL PUNCTUM	0	0.0%	1	0.3%
CORNEA				
70.220 EXPOSURE KERATOPATHY SYNDROME	1	0.2%	1	0.3%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	62	10.1%	25	7.9%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	1	0.2%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	6	1.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	4	0.7%	11	3.5%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	41	6.7%	16	5.0%
100.301 PUNCTATE-ANTERIOR CORTEX	7	1.1%	2	0.6%
100.302 PUNCTATE-POSTERIOR CORTEX	10	1.6%	4	1.3%
100.303 PUNCTATE-EQUATORIAL CORTEX	1	0.2%	3	0.9%
100.304 PUNCTATE-ANTERIOR SUTURES	0	0.0%	1	0.3%
100.305 PUNCTATE-POSTERIOR SUTURES	5	0.8%	2	0.6%
100.306 PUNCTATE-NUCLEUS	3	0.5%	1	0.3%
100.307 PUNCTATE-CAPSULAR	5	0.8%	7	2.2%
100.311 INCIPIENT-ANTERIOR CORTEX	1	0.2%	1	0.3%
100.312 INCIPIENT-POSTERIOR CORTEX	1	0.2%	5	1.6%
100.313 INCIPIENT-EQUATORIAL CORTEX	2	0.3%	1	0.3%
100.315 INCIPIENT-POSTERIOR SUTURES	0	0.0%	1	0.3%
100.316 INCIPIENT-NUCLEUS	0	0.0%	4	1.3%
100.317 INCIPIENT-CAPSULAR	2	0.3%	4	1.3%
100.322 INCOMPLETE-POSTERIOR CORTEX	0	0.0%	1	0.3%
100.328 Y-SUTURE TIP OPACITIES	1	0.2%	5	1.6%
100.330 GENERALIZED/ COMPLETE	1	0.2%	1	0.3%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***38***	***6.2%***	***38***	***12.0%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	1	0.2%	1	0.3%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	10	1.6%	2	0.6%
120.310 RETINAL ATROPHY-GENERALIZED	1	0.2%	0	0.0%
120.960 RETINOPATHY	1	0.2%	0	0.0%
130.110 MICROPAPILLA	0	0.0%	2	0.6%
OTHER				
900.000 OTHER, UNSPECIFIED	10	1.6%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	14	2.3%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	10	1.6%	10	3.2%
NORMAL				
.000 NORMAL GLOBE	499	81.3%	234	73.8%

FINNISH SPITZ

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Persistent pupillary membranes				
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
FINNISH SPITZ

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 254 #	 %	Year Examined: 2019-2023 Total # Dogs: 26 #	 %
EYELIDS				
20.140 ECTOPIC CILIA	1	0.4%	0	0.0%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	2	0.8%	0	0.0%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	2	0.8%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	5	2.0%	7	26.9%
LENS				
100.200 CATARACT, UNSPECIFIED	1	0.4%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	33	13.0%	3	11.5%
100.301 PUNCTATE-ANTERIOR CORTEX	2	0.8%	0	0.0%
100.302 PUNCTATE-POSTERIOR CORTEX	1	0.4%	0	0.0%
100.304 PUNCTATE-ANTERIOR SUTURES	1	0.4%	0	0.0%
100.307 PUNCTATE-CAPSULAR	2	0.8%	0	0.0%
100.311 INCIPIENT-ANTERIOR CORTEX	1	0.4%	3	11.5%
100.312 INCIPIENT-POSTERIOR CORTEX	1	0.4%	0	0.0%
100.323 INCOMPLETE-EQUATORIAL CORTEX	0	0.0%	1	3.8%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***9***	***3.5%***	***4***	***15.4%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	4	1.6%	1	3.8%
110.320 VITREOUS DEGENERATION-SYNERESIS	3	1.2%	2	7.7%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	2	0.8%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	6	2.4%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	3	1.2%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	8	3.1%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	2	0.8%	2	7.7%
NORMAL				
.000 NORMAL GLOBE	199	78.3%	14	53.8%

FLAT-COATED RETRIEVER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Glaucoma	Not defined	2-4	NO	
B.	Pectinate ligament dysplasia	Not defined	2-4	Passes with no notation	
C.	Distichiasis	Not defined	1	Breeder option	
D.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
E.	Cataract	Not defined	1	NO	
F.	Y-suture tip opacity	Not defined	1	Breeder option	

Description and Comments

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of the intraocular pressure (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests are part of a routine breed eye screening exam.

B. Pectinate ligament dysplasia

Flat-Coated Retrievers have been shown to have a higher prevalence of pectinate ligament abnormalities compared with other breeds. There is a significant association between pectinate ligament abnormalities and glaucoma in this breed. The heritability of pectinate ligament abnormalities in Flat-Coated Retrievers is estimated at 0.7. Since glaucoma and pectinate ligament abnormalities are closely associated in this breed, glaucoma may also be heritable. In a recent report, pectinate ligament abnormalities were prevalent and significantly associated with age in a population of Flat-Coated Retrievers in the UK. Due to the incidence of PLD in the breed and the increased progression observed with age, it may be prudent to perform repeated gonioscopy examinations over time.

C. Distichiasis

Eyelashes abnormally located on the eyelid margin, which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

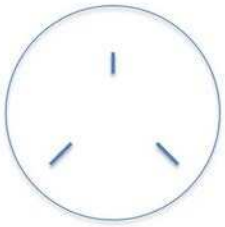
Lens pigment foci/no strands is considered an insignificant finding and therefore is not noted on the certificate.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region. The exact frequency and significance of cataracts in the breed is not known.

F. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. Newer versions of the form (3/16/21) have boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Read RA, Wood JL, Lakhani KH, Read RA. Pectinate ligament dysplasia (PLD) and glaucoma in Flat-Coated Retrievers. I. Objectives, technique and results of a PLD survey. *Vet Ophthalmol*. 1998;1:85-90. PMID: 11397215

3. Read RA, Wood JL, Lakhani KH, Read RA. Pectinate ligament dysplasia (PLD) and glaucoma in Flat-Coated Retrievers. II. Assessment of prevalence and heritability. *Vet Ophthalmol.* 1998;1:91-99. PMID: 11397216

4. Oliver JA, Ekiri A, Mellersh CS. Prevalence of pectinate ligament dysplasia and associations with age, sex and intraocular pressure in the Basset Hound, Flat-Coated Retriever and Dandie Dinmont Terrier. Can Genet Epidemiol 2016 March 12;3:1doi: 10.1186/s40575-016-0033-1. PMID: 26973793

OCULAR DISORDERS REPORT
FLAT-COATED RETRIEVER

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	9,929		1,787	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	3	0.0%	1	0.1%
10.000	GLAUCOMA	2	0.0%	0	0.0%
EYELIDS					
20.140	ECTOPIC CILIA	10	0.1%	1	0.1%
20.160	MACROPALPEBRAL FISSURE	2	0.0%	0	0.0%
21.000	ENTROPION	20	0.2%	5	0.3%
22.000	ECTROPION	35	0.4%	1	0.1%
25.110	DISTICHIASIS	1,252	12.6%	248	13.9%
NICTITANS					
50.210	PLASMOMA/ ATYPICAL PANNUS	1	0.0%	0	0.0%
51.100	CARTILAGE ANOMALY/ EVERSION	0	0.0%	1	0.1%
52.110	GLAND PROLAPSE	4	0.0%	0	0.0%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	0	0.0%	1	0.1%
70.220	EXPOSURE KERATOPATHY SYNDROME	2	0.0%	1	0.1%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	58	0.6%	14	0.8%
70.730	DYSTROPHY-ENDOTHELIAL	3	0.0%	1	0.1%
UVEA					
93.110	IRIS HYPOPLASIA	2	0.0%	0	0.0%
93.120	UVEAL CYST-SINGLE	29	0.3%	2	0.1%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.0%	0	0.0%
93.170	UVEAL CYST-MULTIPLE	3	0.0%	2	0.1%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	263	2.6%	65	3.6%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	14	0.1%	1	0.1%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	3	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	101	1.0%	77	4.3%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	5	0.1%	0	0.0%
93.810	UVEAL MELANOMA	4	0.0%	0	0.0%
95.120	UVEAL CYST-FREE FLOATING	0	0.0%	2	0.1%
FUNDUS					
97.110	CHOROIDAL HYPOPLASIA	1	0.0%	0	0.0%
97.120	COLOBOMA	1	0.0%	0	0.0%
120.170	RETINAL DYSPLASIA-FOLDS	23	0.2%	8	0.4%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	13	0.1%	3	0.2%
120.310	RETINAL ATROPHY-GENERALIZED	55	0.6%	2	0.1%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%
120.920	RETINAL DETACHMENT	3	0.0%	1	0.1%
120.960	RETINOPATHY	24	0.2%	12	0.7%
130.110	MICROPAPILLA	8	0.1%	4	0.2%
130.120	OPTIC NERVE HYPOPLASIA	3	0.0%	0	0.0%
LENS					
100.200	CATARACT, UNSPECIFIED	16	0.2%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	1,169	11.8%	293	16.4%
100.301	PUNCTATE-ANTERIOR CORTEX	349	3.5%	183	10.2%
100.302	PUNCTATE-POSTERIOR CORTEX	35	0.4%	9	0.5%
100.303	PUNCTATE-EQUATORIAL CORTEX	16	0.2%	6	0.3%
100.304	PUNCTATE-ANTERIOR SUTURES	47	0.5%	23	1.3%
100.305	PUNCTATE-POSTERIOR SUTURES	83	0.8%	39	2.2%
100.306	PUNCTATE-NUCLEUS	33	0.3%	29	1.6%
100.307	PUNCTATE-CAPSULAR	62	0.6%	30	1.7%
100.311	INCIPIENT-ANTERIOR CORTEX	55	0.6%	16	0.9%
100.312	INCIPIENT-POSTERIOR CORTEX	25	0.3%	8	0.4%

OCULAR DISORDERS REPORT
FLAT-COATED RETRIEVER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 9,929 #	 %	Year Examined: 2019-2023 Total # Dogs: 1,787 #	 %
LENS Continued				
100.313 INCIPIENT-EQUATORIAL CORTEX	24	0.2%	8	0.4%
100.314 INCIPIENT-ANTERIOR SUTURES	8	0.1%	3	0.2%
100.315 INCIPIENT-POSTERIOR SUTURES	14	0.1%	5	0.3%
100.316 INCIPIENT-NUCLEUS	11	0.1%	9	0.5%
100.317 INCIPIENT-CAPSULAR	9	0.1%	7	0.4%
100.321 INCOMPLETE-ANTERIOR CORTEX	2	0.0%	0	0.0%
100.323 INCOMPLETE-EQUATORIAL CORTEX	1	0.0%	0	0.0%
100.325 INCOMPLETE-POSTERIOR SUTURES	1	0.0%	0	0.0%
100.326 INCOMPLETE-NUCLEUS	1	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	70	0.7%	75	4.2%
100.330 GENERALIZED/ COMPLETE	8	0.1%	0	0.0%
100.340 RESORBING/ HYPERMATURE	1	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION	3	0.0%	1	0.1%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***801***	***8.1%***	***375***	***21.0%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	17	0.2%	10	0.6%
110.135 PHPV/ PTVL	5	0.1%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	2	0.0%	1	0.1%
110.320 VITREOUS DEGENERATION-SYNERESIS	2	0.0%	3	0.2%
OTHER				
900.000 OTHER, UNSPECIFIED	160	1.6%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	274	2.8%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	250	2.5%	137	7.7%
NORMAL				
.000 NORMAL GLOBE	7,304	73.6%	1,041	58.3%

FRENCH BULLDOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Entropion	Not defined	1	Breeder option	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Imperforate lacrimal punctum	Not defined	1	Breeder option	
D.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
E.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- iris to cornea	Not defined	1	NO	
	- endothelial opacity/no strands	Not defined	1	NO	
F.	Cataract				
	- generalized	Not defined	1	NO	
	- *HSF4*	Autosomal recessive	1, 2, 3	NO	Mutation in the *HSF4* gene
G.	Retinal dysplasia				
	- folds	Not defined	1	Breeder option	
H.	Multifocal retinopathy *BEST1 (cmr1)*	Autosomal recessive	4	NO (Breeder option with normal DNA test for *cmr1)*	Mutation in the *BEST1* gene
I.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- *RPGRIP1 (cord1)*	Autosomal recessive	4	NO	Mutation in the *RPGRIP1* gene

Description and Comments

A. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It

is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of the dog. It is difficult to make a strong recommendation with regards to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded and breeding discretion is advised.

C. Imperforate lacrimal punctum

A developmental anomaly resulting in failure of opening of the lacrimal duct located at the medial lid margins. The lower punctum is more frequently affected. This defect usually results in epiphora, an overflow of tears onto the face.

D. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

E. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

F. Cataract

- generalized

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

- *HSF4*

In the French Bulldog, the condition is inherited as an autosomal recessive mutation in the *HSF4* gene (*HSF4-1*). A DNA test is available.

G. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

H. Multifocal Retinopathy – cmr1

Recent evidence (4) suggests that individuals of this breed have been identified as homozygous affected for the *BEST1* mutation causing canine multifocal retinopathy. Significance for this breed is unknown at this time. See glossary for more information on multifocal retinopathy.

I. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

***- RPGRIP1*-(*CORD1*)**

Recent evidence (4) suggests that individuals of this breed have been identified as homozygous affected for the *RPGRIP1* mutation causing canine multifocal retinopathy. Significance for this breed is unknown at this time. See glossary for more information on retinal atrophy.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Mellersh CS, Pettitt L, Forman OP, et al. Identification of mutations in HSF4 in dogs of three different breeds with hereditary cataracts. *Vet Ophthalmol*. 2006;9:369-378. PMID:16939467

3. Mellersh CS. The genetics of eye disorders in the dog. Canine Genet Epidemiol. 2014 Apr 16;1:3. PMID: 26401320.

4. Donner J, Freyer J, Davison S, et al. (2023) Genetic prevalence and clinical relevance of canine Mendelian disease variants in over one million dogs. PLoS Genet 19(2). PMID: 36848397.

OCULAR DISORDERS REPORT
FRENCH BULLDOG

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	5,214		3,308	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	2	0.0%	1	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	4	0.1%	1	0.0%
EYELIDS					
20.140	ECTOPIC CILIA	1	0.0%	6	0.2%
20.160	MACROPALPEBRAL FISSURE	3	0.1%	0	0.0%
21.000	ENTROPION	51	1.0%	46	1.4%
22.000	ECTROPION	8	0.2%	0	0.0%
25.110	DISTICHIASIS	337	6.5%	175	5.3%
32.110	IMPERFORATE LACRIMAL PUNCTUM	58	1.1%	52	1.6%
NICTITANS					
50.210	PLASMOMA/ ATYPICAL PANNUS	2	0.0%	0	0.0%
52.110	GLAND PROLAPSE	8	0.2%	4	0.1%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	4	0.1%	1	0.0%
70.220	EXPOSURE KERATOPATHY SYNDROME	29	0.6%	18	0.5%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	40	0.8%	39	1.2%
70.730	DYSTROPHY-ENDOTHELIAL	7	0.1%	0	0.0%
UVEA					
93.110	IRIS HYPOPLASIA	0	0.0%	6	0.2%
93.120	UVEAL CYST-SINGLE	9	0.2%	3	0.1%
93.150	IRIS COLOBOMA	1	0.0%	3	0.1%
93.170	UVEAL CYST-MULTIPLE	0	0.0%	1	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	135	2.6%	85	2.6%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	7	0.1%	1	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	70	1.3%	21	0.6%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	3	0.1%	1	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	11	0.2%	6	0.2%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	62	1.2%	39	1.2%
93.810	UVEAL MELANOMA	2	0.0%	0	0.0%
95.120	UVEAL CYST-FREE FLOATING	1	0.0%	1	0.0%
97.150	COLOBOMA	1	0.0%	1	0.0%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	116	2.2%	52	1.6%
100.301	PUNCTATE-ANTERIOR CORTEX	28	0.5%	18	0.5%
100.302	PUNCTATE-POSTERIOR CORTEX	14	0.3%	2	0.1%
100.303	PUNCTATE-EQUATORIAL CORTEX	17	0.3%	5	0.2%
100.304	PUNCTATE-ANTERIOR SUTURES	3	0.1%	2	0.1%
100.305	PUNCTATE-POSTERIOR SUTURES	8	0.2%	0	0.0%
100.306	PUNCTATE-NUCLEUS	15	0.3%	7	0.2%
100.307	PUNCTATE-CAPSULAR	9	0.2%	21	0.6%
100.311	INCIPIENT-ANTERIOR CORTEX	53	1.0%	22	0.7%
100.312	INCIPIENT-POSTERIOR CORTEX	16	0.3%	6	0.2%
100.313	INCIPIENT-EQUATORIAL CORTEX	23	0.4%	11	0.3%
100.314	INCIPIENT-ANTERIOR SUTURES	3	0.1%	0	0.0%
100.315	INCIPIENT-POSTERIOR SUTURES	4	0.1%	0	0.0%
100.316	INCIPIENT-NUCLEUS	16	0.3%	4	0.1%
100.317	INCIPIENT-CAPSULAR	11	0.2%	6	0.2%
100.321	INCOMPLETE-ANTERIOR CORTEX	3	0.1%	8	0.2%
100.322	INCOMPLETE-POSTERIOR CORTEX	2	0.0%	2	0.1%
100.323	INCOMPLETE-EQUATORIAL CORTEX	1	0.0%	1	0.0%
100.326	INCOMPLETE-NUCLEUS	5	0.1%	5	0.2%

OCULAR DISORDERS REPORT
FRENCH BULLDOG

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 5,214 #	 %	Year Examined: 2019-2023 Total # Dogs: 3,308 #	 %
LENS Continued				
100.328 Y-SUTURE TIP OPACITIES	2	0.0%	6	0.2%
100.330 GENERALIZED/ COMPLETE	19	0.4%	2	0.1%
100.340 RESORBING/ HYPERMATURE	0	0.0%	1	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***250***	***4.8%***	***123***	***3.7%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	29	0.6%	18	0.5%
110.135 PHPV/ PTVL	1	0.0%	2	0.1%
110.320 VITREOUS DEGENERATION-SYNERESIS	13	0.2%	6	0.2%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	116	2.2%	38	1.1%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	15	0.3%	11	0.3%
120.310 RETINAL ATROPHY-GENERALIZED	1	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%
120.920 RETINAL DETACHMENT	1	0.0%	1	0.0%
120.960 RETINOPATHY	2	0.0%	1	0.0%
130.110 MICROPAPILLA	1	0.0%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	65	1.2%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	95	1.8%	15	0.5%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	110	2.1%	140	4.2%
NORMAL				
.000 NORMAL GLOBE	4,183	80.2%	2,620	79.2%

FRENCH POINTER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the FRENCH POINTER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
FRENCH POINTER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 2 #	 %	Year Examined: 2019-2023 Total # Dogs: 2 #	 %
LENS				
100.328 Y-SUTURE TIP OPACITIES	1	50.0%	0	0.0%
NORMAL				
.000 NORMAL GLOBE	1	50.0%	2	100.0%

FRENCH SPANIEL

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Cataract	Not defined	1	NO	

Description and Comments

A. Cataracts

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
FRENCH SPANIEL

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 3 #	 %	Year Examined: 2019-2023 Total # Dogs: 28 #	 %
GLOBE				
.110 MICROPHTHALMOS	1	33.3%	0	0.0%
EYELIDS				
25.110 DISTICHIASIS	0	0.0%	2	7.1%
UVEA				
93.110 IRIS HYPOPLASIA	0	0.0%	1	3.6%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	0	0.0%	2	7.1%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	1	33.3%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	0	0.0%	1	3.6%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	0	0.0%	2	7.1%
100.301 PUNCTATE-ANTERIOR CORTEX	1	33.3%	0	0.0%
100.302 PUNCTATE-POSTERIOR CORTEX	1	33.3%	0	0.0%
100.303 PUNCTATE-EQUATORIAL CORTEX	1	33.3%	0	0.0%
100.306 PUNCTATE-NUCLEUS	1	33.3%	0	0.0%
100.307 PUNCTATE-CAPSULAR	1	33.3%	1	3.6%
100.312 INCIPIENT-POSTERIOR CORTEX	0	0.0%	1	3.6%
100.313 INCIPIENT-EQUATORIAL CORTEX	0	0.0%	2	7.1%
100.317 INCIPIENT-CAPSULAR	0	0.0%	1	3.6%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***5***	***166.7%***	***5***	***17.9%***
VITREOUS				
110.320 VITREOUS DEGENERATION-SYNERESIS	1	33.3%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	3	100.0%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	0	0.0%	1	3.6%
NORMAL				
.000 NORMAL GLOBE	0	0.0%	20	71.4%

GERMAN LONGHAIRED POINTER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Cataract	Not defined	1	NO	

Description and Comments

A. Cataracts

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
GERMAN LONGHAIRED POINTER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 30 #	 %	Year Examined: 2019-2023 Total # Dogs: 26 #	 %
EYELIDS				
21.000 ENTROPION	1	3.3%	0	0.0%
UVEA				
93.120 UVEAL CYST-SINGLE	1	3.3%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	2	6.7%	1	3.8%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	2	6.7%	1	3.8%
LENS				
100.302 PUNCTATE-POSTERIOR CORTEX	1	3.3%	1	3.8%
100.305 PUNCTATE-POSTERIOR SUTURES	1	3.3%	1	3.8%
100.311 INCIPIENT-ANTERIOR CORTEX	1	3.3%	3	11.5%
100.312 INCIPIENT-POSTERIOR CORTEX	1	3.3%	5	19.2%
100.316 INCIPIENT-NUCLEUS	0	0.0%	1	3.8%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***4***	***13.3%***	***11***	***42.3%***
VITREOUS				
110.320 VITREOUS DEGENERATION-SYNERESIS	1	3.3%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	1	3.3%	0	0.0%
NORMAL				
.000 NORMAL GLOBE	22	73.3%	18	69.2%

GERMAN PINSCHER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
C.	Cataract	Not defined	1	NO	
D.	Persistent hyperplastic tunica vasculosa lentis (PHTVL)	Not defined	2, 3	NO	
E.	Micropapilla	Not defined	1	Breeder option	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of the dog. It is difficult to make a strong recommendation with regards to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded and breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

There may be more than one type of inherited cataract in German Pinschers. One form is reported in Finland with a later age of onset in which a pedigree analysis suggested autosomal recessive or incomplete dominant inheritance (4). Another form is reported in Germany with an earlier age of onset in which a pedigree analysis suggested autosomal recessive inheritance (5). Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Persistent hyperplastic tunica vasculosa lentis (PHTVL)

Persistent tunica vasculosa lentis results from the failure of regression of the embryologic vascular network which surrounds the developing lens. This disorder has been observed in German Pinschers in Finland and Germany. A pedigree analysis suggested recessive or incomplete dominant inheritance (3).

E. Micropapilla

Micropapilla refers to a small optic disc which is not associated with vision impairment. Optic nerve hypoplasia refers to a congenital defect of the optic nerve which causes blindness and abnormal pupil response in the affected eye. It may be difficult to differentiate between micropapilla and optic nerve hypoplasia on a routine (dilated) screening ophthalmoscopic exam.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

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OCULAR DISORDERS REPORT
GERMAN PINSCHER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1,414 #	%	2019-2023 335 #	%
EYELIDS				
25.110 DISTICHIASIS	9	0.6%	5	1.5%
NICTITANS				
52.110 GLAND PROLAPSE	1	0.1%	0	0.0%
CORNEA				
70.220 EXPOSURE KERATOPATHY SYNDROME	0	0.0%	2	0.6%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	20	1.4%	2	0.6%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	10	0.7%	0	0.0%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	5	0.4%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	21	1.5%	9	2.7%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	99	7.0%	21	6.3%
100.301 PUNCTATE-ANTERIOR CORTEX	34	2.4%	12	3.6%
100.302 PUNCTATE-POSTERIOR CORTEX	34	2.4%	5	1.5%
100.303 PUNCTATE-EQUATORIAL CORTEX	2	0.1%	0	0.0%
100.304 PUNCTATE-ANTERIOR SUTURES	10	0.7%	2	0.6%
100.305 PUNCTATE-POSTERIOR SUTURES	12	0.8%	1	0.3%
100.306 PUNCTATE-NUCLEUS	5	0.4%	0	0.0%
100.307 PUNCTATE-CAPSULAR	12	0.8%	6	1.8%
100.311 INCIPIENT-ANTERIOR CORTEX	31	2.2%	4	1.2%
100.312 INCIPIENT-POSTERIOR CORTEX	46	3.3%	3	0.9%
100.313 INCIPIENT-EQUATORIAL CORTEX	10	0.7%	4	1.2%
100.314 INCIPIENT-ANTERIOR SUTURES	7	0.5%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	9	0.6%	0	0.0%
100.316 INCIPIENT-NUCLEUS	8	0.6%	2	0.6%
100.317 INCIPIENT-CAPSULAR	10	0.7%	4	1.2%
100.321 INCOMPLETE-ANTERIOR CORTEX	1	0.1%	3	0.9%
100.322 INCOMPLETE-POSTERIOR CORTEX	4	0.3%	2	0.6%
100.325 INCOMPLETE-POSTERIOR SUTURES	1	0.1%	1	0.3%
100.326 INCOMPLETE-NUCLEUS	1	0.1%	0	0.0%
100.327 INCOMPLETE-CAPSULAR	0	0.0%	2	0.6%
100.328 Y-SUTURE TIP OPACITIES	6	0.4%	2	0.6%
100.330 GENERALIZED/ COMPLETE	9	0.6%	2	0.6%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***246***	***17.4%***	***53***	***15.8%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	2	0.1%	1	0.3%
110.135 PHPV/ PTVL	4	0.3%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	16	1.1%	0	0.0%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	2	0.1%	1	0.3%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	1	0.1%	0	0.0%
120.960 RETINOPATHY	2	0.1%	0	0.0%
120.970 RETINOPATHY - CMR/ CMR-LIKE	0	0.0%	1	0.3%
130.110 MICROPAPILLA	13	0.9%	2	0.6%
130.120 OPTIC NERVE HYPOPLASIA	7	0.5%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	26	1.8%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	32	2.3%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	38	2.7%	25	7.5%
NORMAL				
.000 NORMAL GLOBE	1,119	79.1%	254	75.8%

GERMAN SHEPHERD DOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Plasmoma/atypical pannus	Not defined	1	NO	
C.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1, 2	Breeder option	
D.	Chronic superficial keratitis/pannus	Not defined	1, 3-9	NO	
E.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
F.	Cataract	Not defined	1	NO	
	- cortical	Presumed autosomal recessive	10	NO	
G.	Y-suture tip opacities	Not defined	1	Breeder option	
H.	Cone degeneration - achromatopsia	Autosomal recessive	11	NO	Mutation in the *CNGA3* gene
I.	Retinal dysplasia				
	- folds	Not defined	1, 12	Breeder option	
	- geographic	Not defined	12,14	NO	
J.	Micropapilla	Not defined	1	Breeder option	
K.	Limbal melanoma	Not defined	13	NO	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Plasmoma/atypical pannus

Bilateral lymphocytic/plasmocytic infiltration of the nictitating membranes which may occur independent of corneal Pannus.

C. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Chronic superficial keratitis/pannus

A bilateral inflammatory disease of the cornea which usually starts as a grayish haze to the ventral or ventrolateral cornea, followed by the formation of a vascularized subepithelial growth that begins to spread toward the central cornea; pigmentation may follow the vascularization. If severe, vision impairment occurs. Plasma cell infiltration of the nictitans may occur in conjunction with CSK, or on its own. (Also called “CSK”)

The German Shepherd Dog has a higher incidence of pannus than any other breed. The MHC class II risk haplotype has been shown. Although there are likely several other genes and environmental factors that contribute to CSK, a recent paper suggested that MHC class II is a major genetic risk factor. Dogs with the risk haplotype were 2.7 times more likely to develop CSK. Homozygosity of the risk haplotype increased the risk of CSK to over eightfold.

E. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

F. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

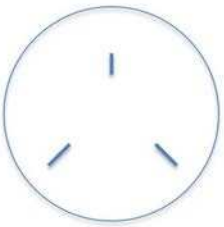
- cortical

Reported by Barnett in Great Britain, opacities are first apparent at 8-12 weeks of age, in the posterior cortex and progress to involve the Y-sutures and nucleus. The equatorial subcapsular cortex is unaffected. No progression is noted after 1-2 years of age. Test breeding suggests an autosomal recessive mode of inheritance.

G. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above)

suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. Newer versions of the form (3/16/21) have boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

H. Cone degeneration - achromatopsia

Autosomal recessively inherited early degeneration of the cone photoreceptors. Afflicted puppies develop day-blindness and color blindness. Afflicted dogs remain ophthalmoscopically normal their entire life. Electroretinography is required to definitively diagnose the disorder. A single, 5-month-old German Shepherd puppy with vision loss during daylight hours was identified with a mutation in the *CNGA3* gene.

I. Retinal dysplasia

- folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

- geographic

In the Golden Retriever, Labrador Retriever and German Shepherd dog, there is evidence that examination early in life is not reliable at identifying geographic “dysplasia”. Therefore, it is recommended that these breeds are (re)examined at 1.5 to 2 years of age for this diagnosis. See glossary for more information about geographic retinal dysplasia.

J. Micropapilla

Micropapilla refers to a congenital anomaly which results in a small optic disk diameter without vision loss. Contrast with optic nerve hypoplasia, which may have a similar ophthalmoscopic appearance with vision loss.

K. Limbal melanoma

Most limbal melanomas are really epibulbar melanocytomas, but there is a possibility of an extension of an intraocular melanoma extending outward and presenting as a limbal melanoma. An epibulbar melanocytoma originates from the superficial pigment lining the limbus and the lesion may eventually

extend into the eye. Metastasis has not been documented and the mass is characterized by large epithelioid cells The lesion presents as a subconjunctival smooth mass most commonly in the dorsolateral limbal region and extends later into the cornea and posterior on the sclera. Breed predisposition have been noted in the German Shepherd, Labrador and Golden Retriever.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Crispin SM, Barnett KC. Dystrophy, degeneration and infiltration of the canine cornea. *J Small Anim Pract*. 1983;24:63-83.

3. Campbell LH, Okuda HK, Lipton DE, et al. Chronic superficial keratitis in dogs: detection of cellular hypersensitivity. *Am J Vet Res*. 1975;36:669-671. PMID: 1169896

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5. Uberreiter O. A particular form of keratitis [chronic superficial keratitis] in dogs. *Wien Tierarztl Mschr*. 1961;48:65.

6. Drahenmann A. Auto-immune phenomenon in chronic superficial keratitis (Uberreiter) in Shepherd dogs. In: *The Cornea in Health and Disease* (ed. Roper, T.). The Royal Society of Medicine, Academic Press, Grune & Stratton; London, 1981;261.

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8. Eichenbaum JD, Lavach JD, Gould DH, et al. Immunohistochemical staining patterns of canine eyes affected with chronic superficial keratitis. *Am J Vet Res*. 1986;47:1952-1955. PMID: 3767102

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14. Holle DM, Stankovics ME, Sarna CS, Aguirre GD. The geographic form of retinal dysplasia in dogs is not always a congenital abnormality. Vet Ophthalmol. 1999;2(1):61-66. PMID: 11397243.

OCULAR DISORDERS REPORT
GERMAN SHEPHERD DOG

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 5,341 #	%	Year Examined: 2019-2023 Total # Dogs: 1,048 #	%
GLOBE				
.110 MICROPHTHALMOS	9	0.2%	0	0.0%
10.000 GLAUCOMA	3	0.1%	0	0.0%
40.910 KERATOCONJUNCTIVITIS SICCA (KCS)	3	0.1%	0	0.0%
EYELIDS				
20.140 ECTOPIC CILIA	1	0.0%	0	0.0%
20.160 MACROPALPEBRAL FISSURE	1	0.0%	0	0.0%
21.000 ENTROPION	4	0.1%	2	0.2%
22.000 ECTROPION	4	0.1%	0	0.0%
25.110 DISTICHIASIS	57	1.1%	5	0.5%
32.110 IMPERFORATE LACRIMAL PUNCTUM	1	0.0%	0	0.0%
NICTITANS				
50.210 PLASMOMA/ ATYPICAL PANNUS	20	0.4%	10	1.0%
51.100 CARTILAGE ANOMALY/ EVERSION	4	0.1%	1	0.1%
52.110 GLAND PROLAPSE	1	0.0%	0	0.0%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	122	2.3%	15	1.4%
70.220 EXPOSURE KERATOPATHY SYNDROME	2	0.0%	0	0.0%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	243	4.5%	58	5.5%
70.730 DYSTROPHY-ENDOTHELIAL	2	0.0%	0	0.0%
UVEA				
93.120 UVEAL CYST-SINGLE	23	0.4%	2	0.2%
93.170 UVEAL CYST-MULTIPLE	2	0.0%	4	0.4%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	74	1.4%	25	2.4%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	16	0.3%	2	0.2%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	11	0.2%	2	0.2%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	3	0.1%	1	0.1%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	17	0.3%	16	1.5%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	3	0.1%	0	0.0%
93.810 UVEAL MELANOMA	3	0.1%	0	0.0%
95.120 UVEAL CYST-FREE FLOATING	1	0.0%	0	0.0%
FUNDUS				
97.110 CHOROIDAL HYPOPLASIA	1	0.0%	0	0.0%
120.170 RETINAL DYSPLASIA-FOLDS	97	1.8%	14	1.3%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	19	0.4%	2	0.2%
120.310 RETINAL ATROPHY-GENERALIZED	21	0.4%	1	0.1%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	4	0.1%	0	0.0%
120.920 RETINAL DETACHMENT	2	0.0%	0	0.0%
120.960 RETINOPATHY	2	0.0%	0	0.0%
120.970 RETINOPATHY - CMR/ CMR-LIKE	0	0.0%	2	0.2%
130.110 MICROPAPILLA	34	0.6%	10	1.0%
130.120 OPTIC NERVE HYPOPLASIA	36	0.7%	6	0.6%
LENS				
100.200 CATARACT, UNSPECIFIED	28	0.5%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	295	5.5%	91	8.7%
100.301 PUNCTATE-ANTERIOR CORTEX	50	0.9%	18	1.7%
100.302 PUNCTATE-POSTERIOR CORTEX	17	0.3%	2	0.2%
100.303 PUNCTATE-EQUATORIAL CORTEX	19	0.4%	2	0.2%
100.304 PUNCTATE-ANTERIOR SUTURES	3	0.1%	2	0.2%
100.305 PUNCTATE-POSTERIOR SUTURES	35	0.7%	14	1.3%
100.306 PUNCTATE-NUCLEUS	62	1.2%	42	4.0%
100.307 PUNCTATE-CAPSULAR	22	0.4%	10	1.0%

OCULAR DISORDERS REPORT
GERMAN SHEPHERD DOG

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 5,341 #	 %	Year Examined: 2019-2023 Total # Dogs: 1,048 #	 %
LENS Continued				
100.311 INCIPIENT-ANTERIOR CORTEX	40	0.7%	5	0.5%
100.312 INCIPIENT-POSTERIOR CORTEX	36	0.7%	6	0.6%
100.313 INCIPIENT-EQUATORIAL CORTEX	25	0.5%	1	0.1%
100.314 INCIPIENT-ANTERIOR SUTURES	5	0.1%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	8	0.1%	3	0.3%
100.316 INCIPIENT-NUCLEUS	81	1.5%	26	2.5%
100.317 INCIPIENT-CAPSULAR	10	0.2%	7	0.7%
100.321 INCOMPLETE-ANTERIOR CORTEX	1	0.0%	2	0.2%
100.322 INCOMPLETE-POSTERIOR CORTEX	2	0.0%	1	0.1%
100.323 INCOMPLETE-EQUATORIAL CORTEX	1	0.0%	1	0.1%
100.325 INCOMPLETE-POSTERIOR SUTURES	0	0.0%	1	0.1%
100.326 INCOMPLETE-NUCLEUS	2	0.0%	2	0.2%
100.327 INCOMPLETE-CAPSULAR	2	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	19	0.4%	19	1.8%
100.330 GENERALIZED/ COMPLETE	25	0.5%	1	0.1%
100.340 RESORBING/ HYPERMATURE	0	0.0%	1	0.1%
100.375 SUBLUXATION/ LUXATION	8	0.1%	1	0.1%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***474***	***8.9%***	***147***	***14.0%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	9	0.2%	1	0.1%
110.135 PHPV/ PTVL	3	0.1%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	5	0.1%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	11	0.2%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	58	1.1%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	146	2.7%	5	0.5%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	120	2.2%	53	5.1%
NORMAL				
.000 NORMAL GLOBE	4,042	75.7%	746	71.2%

GERMAN SHORTHAIRED POINTER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
C.	Cataract	Not defined	1	NO	
D.	Retinal dysplasia				
	- folds	Not defined	1	Breeder option	
E.	Cone degeneration - (achromatopsia)	Autosomal recessive	2, 3	NO	Mutation in the *CNGB3* gene
F.	Persistent hyaloid artery remnant	Not defined	1	Breeder option	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

E. Cone degeneration - hemeralopia/achromatopsia

Autosomal recessively inherited early degeneration of the cone photoreceptors. Afflicted puppies develop day-blindness, color blindness, and photophobia between 8 and 12 weeks of age. Afflicted dogs remain ophthalmoscopically normal their entire life. Electroretinography is required to definitively diagnose the disorder. A missense mutation in the same gene (CNGB3) that has been identified in CD-affected Alaskan Malamute-derived dogs has been detected in German Shorthaired Pointers affected with a clinically identical allelic disorder. A DNA test is available.

F. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Sidjanin DJ, Lowe JK, McElwee JL, et al. Canine CNGB3 mutations establish cone degeneration as orthologous to the human achromatopsia locus ACHM3. Human Molecular Genetics. 2002;11:1823-1833. PMID: 12140184

3. Yeh CY, Goldstein O, Kukekova AV, Holley D, Knollinger AM, Huson HJ, Pearce-Kelling SE, Acland GM, Komáromy AM. Genomic deletion of CNGB3 is identical by descent in multiple canine breeds and causes achromatopsia. BMC Genet. 2013 Apr 20;14:27. doi: 10.1186/1471-2156-14-27. PMID: 23601474

OCULAR DISORDERS REPORT
GERMAN SHORTHAIRED POINTER

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	7,383		2,296	
	Diagnostic Name	#	%	#	%
GLOBE					
10.000	GLAUCOMA	1	0.0%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	1	0.0%	0	0.0%
EYELIDS					
20.160	MACROPALPEBRAL FISSURE	1	0.0%	0	0.0%
21.000	ENTROPION	11	0.1%	9	0.4%
22.000	ECTROPION	5	0.1%	0	0.0%
25.110	DISTICHIASIS	301	4.1%	107	4.7%
NICTITANS					
51.100	CARTILAGE ANOMALY/ EVERSION	3	0.0%	3	0.1%
52.110	GLAND PROLAPSE	2	0.0%	0	0.0%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	1	0.0%	0	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	20	0.3%	3	0.1%
70.730	DYSTROPHY-ENDOTHELIAL	1	0.0%	0	0.0%
UVEA					
93.110	IRIS HYPOPLASIA	2	0.0%	1	0.0%
93.120	UVEAL CYST-SINGLE	7	0.1%	3	0.1%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.0%	0	0.0%
93.150	IRIS COLOBOMA	2	0.0%	1	0.0%
93.170	UVEAL CYST-MULTIPLE	1	0.0%	1	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	504	6.8%	155	6.8%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	19	0.3%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	8	0.1%	3	0.1%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	2	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	37	0.5%	19	0.8%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	4	0.1%	0	0.0%
93.810	UVEAL MELANOMA	1	0.0%	0	0.0%
95.120	UVEAL CYST-FREE FLOATING	1	0.0%	0	0.0%
97.150	COLOBOMA	1	0.0%	0	0.0%
FUNDUS					
97.110	CHOROIDAL HYPOPLASIA	1	0.0%	0	0.0%
120.170	RETINAL DYSPLASIA-FOLDS	140	1.9%	26	1.1%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	27	0.4%	1	0.0%
120.310	RETINAL ATROPHY-GENERALIZED	9	0.1%	3	0.1%
120.920	RETINAL DETACHMENT	3	0.0%	0	0.0%
120.960	RETINOPATHY	8	0.1%	3	0.1%
120.970	RETINOPATHY - CMR/ CMR-LIKE	0	0.0%	1	0.0%
130.110	MICROPAPILLA	3	0.0%	1	0.0%
130.120	OPTIC NERVE HYPOPLASIA	5	0.1%	0	0.0%
LENS					
100.200	CATARACT, UNSPECIFIED	9	0.1%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	364	4.9%	94	4.1%
100.301	PUNCTATE-ANTERIOR CORTEX	60	0.8%	23	1.0%
100.302	PUNCTATE-POSTERIOR CORTEX	61	0.8%	15	0.7%
100.303	PUNCTATE-EQUATORIAL CORTEX	17	0.2%	7	0.3%
100.304	PUNCTATE-ANTERIOR SUTURES	6	0.1%	6	0.3%
100.305	PUNCTATE-POSTERIOR SUTURES	32	0.4%	6	0.3%
100.306	PUNCTATE-NUCLEUS	44	0.6%	37	1.6%
100.307	PUNCTATE-CAPSULAR	30	0.4%	22	1.0%
100.311	INCIPIENT-ANTERIOR CORTEX	20	0.3%	8	0.3%
100.312	INCIPIENT-POSTERIOR CORTEX	101	1.4%	22	1.0%

OCULAR DISORDERS REPORT
GERMAN SHORTHAIRED POINTER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 7,383 #	 %	Year Examined: 2019-2023 Total # Dogs: 2,296 #	 %
LENS Continued				
100.313 INCIPIENT-EQUATORIAL CORTEX	21	0.3%	5	0.2%
100.314 INCIPIENT-ANTERIOR SUTURES	2	0.0%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	19	0.3%	4	0.2%
100.316 INCIPIENT-NUCLEUS	25	0.3%	15	0.7%
100.317 INCIPIENT-CAPSULAR	17	0.2%	11	0.5%
100.321 INCOMPLETE-ANTERIOR CORTEX	3	0.0%	3	0.1%
100.322 INCOMPLETE-POSTERIOR CORTEX	8	0.1%	4	0.2%
100.323 INCOMPLETE-EQUATORIAL CORTEX	1	0.0%	0	0.0%
100.325 INCOMPLETE-POSTERIOR SUTURES	1	0.0%	0	0.0%
100.326 INCOMPLETE-NUCLEUS	1	0.0%	5	0.2%
100.327 INCOMPLETE-CAPSULAR	0	0.0%	1	0.0%
100.328 Y-SUTURE TIP OPACITIES	13	0.2%	14	0.6%
100.330 GENERALIZED/ COMPLETE	15	0.2%	1	0.0%
100.340 RESORBING/ HYPERMATURE	1	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION	2	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***494***	***6.7%***	***195***	***8.5%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	24	0.3%	19	0.8%
110.135 PHPV/ PTVL	16	0.2%	1	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	24	0.3%	11	0.5%
OTHER				
900.000 OTHER, UNSPECIFIED	99	1.3%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	137	1.9%	1	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	124	1.7%	90	3.9%
NORMAL				
.000 NORMAL GLOBE	5,905	80.0%	1,751	76.3%

GERMAN SPANIEL

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the GERMAN SPANIEL breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
GERMAN SPANIEL

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1 #	%	2019-2023 0 #	%
NORMAL				
.000 NORMAL GLOBE	1	100.0%	0	

GERMAN SPITZ

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Persistent hyaloid artery remnant (PHA)	Not defined	1	Breeder option	
B.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- PRA-*GUCY2D*	Autosomal Recessive	2,3	NO	Mutation in the *GUCY2D* gene

Description and Comments

A. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

B. Retinal Atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. PRA is inherited as an autosomal recessive trait in most breeds.

- PRA-*GUCY2D*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically.

In the German Spitz, a form of progressive retinal atrophy has been identified in a population of dogs in Brazil ranging in age from 1.5 to 36 months. Initial fundus changes were pale papilla and retinal vascular attenuation. Some affected dogs can develop multifocal bullous retinal detachments before clinically apparent retinal degeneration. Vision impairment in both scoptic and photopic conditions were observed. Affected animals had unrecordable rod-mediated ERGs and attenuated to unrecordable cone-mediated responses. A mutation in *GUCY2D* was identified in affected animals.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Bortolini, M, Winkler, PA, Moreno, JCD, et al. Preliminary characterization of a novel form of progressive retinal atrophy in the German Spitz dog associated with a frameshift mutation in *GUCY2D*. *Vet*

Ophthalmol. 2023; 00: 1-16. PMID: 36872573

3. Marinho LFLP, Occelli LM, Bortolini M, Sun K, Winkler PA, Montiani-Ferreira F, Petersen-Jones SM. Development of retinal bullae in dogs with progressive retinal atrophy. Vet Ophthalmol. 2022 Mar;25(2):109-117. doi: 10.1111/vop.12932. Epub 2021 Oct 28. PMID: 34708922; PMCID: PMC10074838.

OCULAR DISORDERS REPORT
GERMAN SPITZ

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 10 #	 %	2019-2023 52 #	 %
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	1	10.0%	1	1.9%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	0	0.0%	1	1.9%
LENS				
100.307 PUNCTATE-CAPSULAR	0	0.0%	1	1.9%
100.311 INCIPIENT-ANTERIOR CORTEX	0	0.0%	1	1.9%
100.321 INCOMPLETE-ANTERIOR CORTEX	0	0.0%	1	1.9%
100.330 GENERALIZED/ COMPLETE	0	0.0%	1	1.9%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***0***	***0.0%***	***4***	***7.7%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	0	0.0%	10	19.2%
110.135 PHPV/ PTVL	0	0.0%	1	1.9%
FUNDUS				
120.960 RETINOPATHY	1	10.0%	0	0.0%
OTHER				
900.110 OTHER-SUSPECTED AS NOT-INHERITED	0	0.0%	1	1.9%
NORMAL				
.000 NORMAL GLOBE	9	90.0%	37	71.2%

GERMAN WIREHAIRED POINTER

(Drathaar, Deutsch Drathaar)

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Persistant pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
B.	Cataract	Not defined	1	NO	

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
GERMAN WIREHAIRED POINTER

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	912		376	
	Diagnostic Name	#	%	#	%
EYELIDS					
20.160	MACROPALPEBRAL FISSURE	1	0.1%	0	0.0%
25.110	DISTICHIASIS	13	1.4%	5	1.3%
CORNEA					
70.730	DYSTROPHY-ENDOTHELIAL	0	0.0%	1	0.3%
UVEA					
93.110	IRIS HYPOPLASIA	1	0.1%	1	0.3%
93.120	UVEAL CYST-SINGLE	0	0.0%	1	0.3%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	21	2.3%	16	4.3%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	0	0.0%	2	0.5%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	1	0.1%	0	0.0%
93.810	UVEAL MELANOMA	0	0.0%	1	0.3%
LENS					
100.200	CATARACT, UNSPECIFIED	5	0.5%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	27	3.0%	15	4.0%
100.301	PUNCTATE-ANTERIOR CORTEX	2	0.2%	6	1.6%
100.302	PUNCTATE-POSTERIOR CORTEX	7	0.8%	1	0.3%
100.303	PUNCTATE-EQUATORIAL CORTEX	1	0.1%	0	0.0%
100.305	PUNCTATE-POSTERIOR SUTURES	3	0.3%	2	0.5%
100.306	PUNCTATE-NUCLEUS	5	0.5%	4	1.1%
100.307	PUNCTATE-CAPSULAR	8	0.9%	1	0.3%
100.311	INCIPIENT-ANTERIOR CORTEX	3	0.3%	3	0.8%
100.312	INCIPIENT-POSTERIOR CORTEX	12	1.3%	6	1.6%
100.313	INCIPIENT-EQUATORIAL CORTEX	0	0.0%	1	0.3%
100.315	INCIPIENT-POSTERIOR SUTURES	1	0.1%	0	0.0%
100.316	INCIPIENT-NUCLEUS	2	0.2%	0	0.0%
100.317	INCIPIENT-CAPSULAR	3	0.3%	2	0.5%
100.327	INCOMPLETE-CAPSULAR	1	0.1%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	2	0.2%	0	0.0%
100.330	GENERALIZED/ COMPLETE	2	0.2%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***55***	***6.0%***	***26***	***6.9%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	2	0.2%	2	0.5%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.1%	0	0.0%
110.320	VITREOUS DEGENERATION-SYNERESIS	3	0.3%	0	0.0%
FUNDUS					
120.170	RETINAL DYSPLASIA-FOLDS	3	0.3%	0	0.0%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	2	0.2%	0	0.0%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.1%	0	0.0%
OTHER					
900.000	OTHER, UNSPECIFIED	9	1.0%	0	0.0%
900.100	OTHER-SUSPECTED AS INHERITED	8	0.9%	0	0.0%
900.110	OTHER-SUSPECTED AS NOT-INHERITED	20	2.2%	13	3.5%
NORMAL					
.000	NORMAL GLOBE	795	87.2%	322	85.6%

GIANT SCHNAUZER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
B.	Cataract	Not defined	1	NO	
C.	Persistent hyaloid artery remnant (PHA)	Not defined	1	Breeder option	
D.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- PRA-*prcd*	Autosomal recessive	3	NO	Mutation in the PRA-*prcd* gene
	- PRA-*NECAP1*	Autosomal recessive	2	NO	Mutation in the PRA-*NECAP1* gene
E.	Retinal dysplasia				
	- folds	Not defined	1	Breeder option	

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

D. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-*prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A genetic test is available.

- PRA-*NECAP1*

In addition, another mutation in the *NECAP1* gene has been identified in Giant Schnauzers with PRA. Proposed mode of inheritance is autosomal recessive, and affected animals presented with clinical signs of PRA at 4-5 years of age.

E. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Hitti, R. J., et al. Whole Genome Sequencing of Giant Schnauzer Dogs with Progressive Retinal Atrophy Establishes NECAP1 as a Novel Candidate Gene for Retinal Degeneration. Genes (Basel) 2019 10(5). PMID: 31117272

3. Donner J, Freyer J, Davison S, et al. Genetic prevalence and clinical relevance of canine Mendelian disease variants in over one million dogs. PLoS Genet. 2023 Feb 27;19(2). PMID: 36848397

OCULAR DISORDERS REPORT
GIANT SCHNAUZER

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	1,358		507	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	1	0.1%	0	0.0%
EYELIDS					
21.000	ENTROPION	0	0.0%	2	0.4%
25.110	DISTICHIASIS	6	0.4%	2	0.4%
32.110	IMPERFORATE LACRIMAL PUNCTUM	1	0.1%	1	0.2%
NICTITANS					
51.100	CARTILAGE ANOMALY/ EVERSION	12	0.9%	1	0.2%
52.110	GLAND PROLAPSE	2	0.1%	0	0.0%
CORNEA					
70.220	EXPOSURE KERATOPATHY SYNDROME	0	0.0%	1	0.2%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	1	0.1%	3	0.6%
70.730	DYSTROPHY-ENDOTHELIAL	1	0.1%	0	0.0%
UVEA					
93.120	UVEAL CYST-SINGLE	2	0.1%	1	0.2%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	61	4.5%	15	3.0%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	4	0.3%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	6	0.4%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	0	0.0%	1	0.2%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	12	0.9%	26	5.1%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	1	0.1%	0	0.0%
95.120	UVEAL CYST-FREE FLOATING	1	0.1%	0	0.0%
LENS					
100.200	CATARACT, UNSPECIFIED	5	0.4%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	67	4.9%	27	5.3%
100.301	PUNCTATE-ANTERIOR CORTEX	12	0.9%	10	2.0%
100.302	PUNCTATE-POSTERIOR CORTEX	9	0.7%	2	0.4%
100.303	PUNCTATE-EQUATORIAL CORTEX	1	0.1%	0	0.0%
100.304	PUNCTATE-ANTERIOR SUTURES	1	0.1%	1	0.2%
100.305	PUNCTATE-POSTERIOR SUTURES	7	0.5%	3	0.6%
100.306	PUNCTATE-NUCLEUS	3	0.2%	0	0.0%
100.307	PUNCTATE-CAPSULAR	20	1.5%	16	3.2%
100.311	INCIPIENT-ANTERIOR CORTEX	3	0.2%	4	0.8%
100.312	INCIPIENT-POSTERIOR CORTEX	27	2.0%	4	0.8%
100.313	INCIPIENT-EQUATORIAL CORTEX	9	0.7%	1	0.2%
100.315	INCIPIENT-POSTERIOR SUTURES	5	0.4%	0	0.0%
100.316	INCIPIENT-NUCLEUS	3	0.2%	1	0.2%
100.317	INCIPIENT-CAPSULAR	5	0.4%	4	0.8%
100.322	INCOMPLETE-POSTERIOR CORTEX	0	0.0%	1	0.2%
100.328	Y-SUTURE TIP OPACITIES	6	0.4%	5	1.0%
100.330	GENERALIZED/ COMPLETE	2	0.1%	0	0.0%
100.375	SUBLUXATION/ LUXATION	2	0.1%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***112***	***8.2%***	***47***	***9.3%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	8	0.6%	9	1.8%
110.135	PHPV/ PTVL	5	0.4%	1	0.2%
110.320	VITREOUS DEGENERATION-SYNERESIS	2	0.1%	2	0.4%
FUNDUS					
120.170	RETINAL DYSPLASIA-FOLDS	29	2.1%	3	0.6%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	3	0.2%	1	0.2%
120.310	RETINAL ATROPHY-GENERALIZED	8	0.6%	3	0.6%
120.960	RETINOPATHY	2	0.1%	0	0.0%

OCULAR DISORDERS REPORT
GIANT SCHNAUZER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1,358 #	 %	Year Examined: 2019-2023 Total # Dogs: 507 #	 %
FUNDUS Continued				
130.110 MICROPAPILLA	1	0.1%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	26	1.9%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	19	1.4%	1	0.2%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	20	1.5%	32	6.3%
NORMAL				
.000 NORMAL GLOBE	1,131	83.3%	401	79.1%

GLEN OF IMAAL TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Cataract	Not defined	1	NO	
C.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- PRA-*ADAM9* (*crd3*)	Autosomal recessive	2, 3	NO	Mutation in the *ADAM9* gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-*ADAM9* (*crd3*)

A form of late-onset PRA identified in Glen of Imaal Terriers. Ophthalmoscopic lesions are typically diagnosed by 5 years of age, however lesions may be present as early as 3 years of age in affected dogs. Two distinct phenotypes are observed in affected Glen of Imaal Terriers. The most common phenotype is subtle but generalized tapetal hyperreflectivity and retinal vascular attenuation that progresses over 1 - 2 years after initial examination. The less common phenotype is a focal mid-temporal (area centralis) area of distinct tapetal hyperreflectivity without

generalized retinal disease. This lesion may remain unchanged for over a year but will progress to generalized retinal atrophy by 2 - 4 years after initial examination. ERG dysfunction can be observed as early as 15 weeks of age. The disorder is caused by a mutation present in the *ADAM9* gene. A DNA test is available that will unequivocally identify normal, affected, and carrier dogs. The test is accurate only for this mutation and will not identify other forms of PRA.

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OCULAR DISORDERS REPORT
GLEN OF IMAAL TERRIER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 729 #	 %	Year Examined: 2019-2023 Total # Dogs: 187 #	 %
GLOBE				
.110 MICROPHTHALMOS	1	0.1%	0	0.0%
EYELIDS				
21.000 ENTROPION	2	0.3%	1	0.5%
25.110 DISTICHIASIS	26	3.6%	8	4.3%
32.110 IMPERFORATE LACRIMAL PUNCTUM	1	0.1%	0	0.0%
CORNEA				
70.220 EXPOSURE KERATOPATHY SYNDROME	1	0.1%	0	0.0%
UVEA				
93.120 UVEAL CYST-SINGLE	2	0.3%	0	0.0%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	1	0.1%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	1	0.1%	1	0.5%
97.150 COLOBOMA	1	0.1%	0	0.0%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	61	8.4%	4	2.1%
100.301 PUNCTATE-ANTERIOR CORTEX	11	1.5%	1	0.5%
100.302 PUNCTATE-POSTERIOR CORTEX	3	0.4%	0	0.0%
100.303 PUNCTATE-EQUATORIAL CORTEX	6	0.8%	2	1.1%
100.304 PUNCTATE-ANTERIOR SUTURES	1	0.1%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	3	0.4%	0	0.0%
100.306 PUNCTATE-NUCLEUS	3	0.4%	0	0.0%
100.307 PUNCTATE-CAPSULAR	4	0.5%	1	0.5%
100.311 INCIPIENT-ANTERIOR CORTEX	8	1.1%	0	0.0%
100.312 INCIPIENT-POSTERIOR CORTEX	1	0.1%	0	0.0%
100.313 INCIPIENT-EQUATORIAL CORTEX	6	0.8%	0	0.0%
100.314 INCIPIENT-ANTERIOR SUTURES	1	0.1%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	2	0.3%	0	0.0%
100.316 INCIPIENT-NUCLEUS	1	0.1%	0	0.0%
100.321 INCOMPLETE-ANTERIOR CORTEX	1	0.1%	0	0.0%
100.322 INCOMPLETE-POSTERIOR CORTEX	1	0.1%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	1	0.1%	0	0.0%
100.330 GENERALIZED/ COMPLETE	1	0.1%	0	0.0%
100.375 SUBLUXATION/ LUXATION	3	0.4%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***53***	***7.3%***	***4***	***2.1%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	2	0.3%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	2	0.3%	0	0.0%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	7	1.0%	2	1.1%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	4	0.5%	2	1.1%
120.310 RETINAL ATROPHY-GENERALIZED	24	3.3%	0	0.0%
120.960 RETINOPATHY	1	0.1%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	1	0.1%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	12	1.6%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	14	1.9%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	32	4.4%	5	2.7%
NORMAL				
.000 NORMAL GLOBE	585	80.2%	166	88.8%

GOLDEN RETRIEVER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Multiple congenital abnormalities	Autosomal recessive	2	NO	Mutation in the *SIX6* gene
B.	Entropion	Not defined	1	Breeder option	
C.	Distichiasis	Not defined	1	Breeder option	
D.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
E.	Uveal cysts	Not defined	1, 3-5	Breeder option	
	- single	Not defined	1, 3-5	Breeder option	
	- multiple	Not defined	1, 3-5	Breeder option	
	- free-floating	Not defined	1, 3-5	Breeder option	
F.	Pigmentary uveitis	Not defined	1, 3-6	NO	
G.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
H.	Cataract	Not defined	1, 7-11	NO	
I.	Y-suture tip opacity	Not defined	1	Breeder option	
J.	Persistent hyaloid artery remnant (PHA)	Not defined	1	Breeder option	
K.	Vitreous degeneration				
	- syneresis	Not defined	1	Breeder option	
L.	Retinal Atrophy				
	- generalized	Not defined	1	NO	
	- PRA-*prcd*	Autosomal recessive	11,12	NO	Mutation in the PRA-*prcd* gene

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
	- *PRA 1*	Autosomal recessive	13	NO	Mutation in the *SLC4A3* gene
	- *PRA 2*	Autosomal recessive	14,15	NO	Mutation in the *TTC8* gene
M.	Retinal dysplasia				
	- folds	Not defined	1, 16	Breeder option	
	- geographic	Not defined	1, 16,17	NO	
N.	Limbal melanoma	Not defined	18	NO	

Description and Comments

A. Multiple congenital abnormalities

A publication describes multiple abnormalities in 7 related Golden Retrievers. The condition can be unilateral or bilateral. Abnormalities described range from dense, sheet-like persistent pupillary membrane often associated with vision abnormalities, blindness with congenital cataract, posterior lenticonus, retinal dysplasia with detachment and optic nerve hypoplasia.

B. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull. Selection should be directed against entropion and toward a head conformation that reduces or eliminates the likelihood of the defect.

C. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

D. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

E. Uveal cysts

Fluid filled sacs arising from the posterior surface of the iris, to which they may remain attached or break free and float into the anterior chamber. Usually occur in mature dogs.

This disorder may be observed in any breed but retriever breeds tend to be predisposed. There is usually no effect on vision unless the cysts are heavily clustered and impinge on the pupillary area. Less frequently, the cysts may rupture and adhere to the cornea or anterior lens capsule. Multiple cysts may occlude the iridocorneal angle and cause glaucoma.

F. Pigmentary uveitis

A unique uveitis observed in the Golden Retriever that is not associated with other ocular or systemic disorders. Adhesions develop between iris and lens and the peripheral iris and cornea. Pigment dispersion (exfoliation) occurs across the anterior lens capsule from the pigmented cells of the posterior iris. Other complications include secondary cataract and obstructive glaucoma. Onset is usually between 5-10 years of age.

G. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

H. Cataract

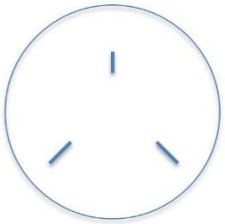
A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

The most common cataract reported in the Golden Retriever is a posterior polar (posterior cortical) cataract. These are generally bilateral, although an occasional unilateral affliction may be observed. These focal opacities will occasionally remain stationary. These cataracts are usually observed between 9 months and 3 years of age. A more generalized cataract is also observed in this breed and is not always associated with the previously mentioned polar cataract. There are also cataract changes involving the Y sutures which may or may not progress.

The existence of cataracts in the Golden Retriever, often with limited clinical significance, presents problems with breeder recognition as the majority of these dogs do not evidence visual impairment. It is strongly recommended that all Golden Retrievers that are used in breeding programs be examined annually as cataract changes have been observed in multiple locations of the lens and variable age of onset.

I. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and



are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.

These should be marked under the “Lens” section of the CAER form. Newer versions of the form (3/16/21) have boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

J. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

K. Vitreous degeneration- syneresis

A liquefaction of the vitreous gel which may predispose to retinal detachment.

L. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-*prcd*

Studies have shown that one form of PRA in the Golden Retriever is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

- *PRA1 & PRA2*

In addition, two other known mutations that cause PRA are present in the breed. Golden Retriever PRA 1 (GR PRA1) is an autosomal recessive trait and is the predominant form in European lines of Golden Retrievers. Golden Retriever PRA 2 (GR PRA2) has also been identified within the breed. Therefore three different DNA tests are available. However these tests will only detect these three mutations. Syndromic effects in Golden Retrievers seems to be mild.

M. Retinal dysplasia

- folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

- geographic

An irregularly shaped area of retinal development containing areas of retinal thickening and disorganization. These lesions can take up to 2 years after birth to develop and be ophthalmoscopically visible. As a result, some dogs with this disease may have had normal prior eye examinations.

In the Golden Retriever, Labrador Retriever and German Shepherd dog, there is evidence that examination early in life is not reliable at identifying geographic “dysplasia”. Therefore, it is recommended that these breeds are (re)examined at 1.5 to 2 years of age for this diagnosis.

N. Limbal melanoma

Most limbal melanomas are really epibulbar melanocytomas, but there is a possibility of an extension of an intraocular melanoma extending outward and presenting as a limbal melanoma. An epibulbar melanocytoma originates from the superficial pigment lining the limbus and the lesion may eventually extend into the eye. Metastasis has not been documented and the mass is characterized by large epithelioid cells. The lesion presents as a subconjunctival smooth mass most commonly in the dorsolateral limbal region and extends later into the cornea and posterior on the sclera. Breed predispositions have been noted in the German Shepherd Dog, and Labrador and Golden Retrievers.

Historical Note:

Central progressive retinal atrophy was previously a condition listed for this breed. However as the condition is no longer identified in the breed, the condition has been removed. Central progressive retinal atrophy was a progressive retinal degeneration in which photoreceptor death occurred secondary to disease of the underlying pigment epithelium. Progression was slow and some animals never lost vision. CPRA occurred in England, but was uncommon elsewhere.

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OCULAR DISORDERS REPORT
GOLDEN RETRIEVER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 183,719 #	%	Year Examined: 2019-2023 Total # Dogs: 48,620 #	%
GLOBE				
.110 MICROPHTHALMOS	57	0.0%	6	0.0%
10.000 GLAUCOMA	33	0.0%	0	0.0%
40.910 KERATOCONJUNCTIVITIS SICCA (KCS)	5	0.0%	4	0.0%
EYELIDS				
20.110 EYELID DERMOID	3	0.0%	0	0.0%
20.140 ECTOPIC CILIA	58	0.0%	4	0.0%
20.160 MACROPALPEBRAL FISSURE	22	0.0%	0	0.0%
21.000 ENTROPION	412	0.2%	98	0.2%
22.000 ECTROPION	107	0.1%	18	0.0%
25.110 DISTICHIASIS	19,296	10.5%	4,144	8.5%
32.110 IMPERFORATE LACRIMAL PUNCTUM	61	0.0%	45	0.1%
NICTITANS				
50.210 PLASMOMA/ ATYPICAL PANNUS	2	0.0%	0	0.0%
51.100 CARTILAGE ANOMALY/ EVERSION	20	0.0%	6	0.0%
52.110 GLAND PROLAPSE	42	0.0%	1	0.0%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	11	0.0%	1	0.0%
70.220 EXPOSURE KERATOPATHY SYNDROME	25	0.0%	11	0.0%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	779	0.4%	266	0.5%
70.730 DYSTROPHY-ENDOTHELIAL	42	0.0%	6	0.0%
UVEA				
90.250 PIGMENTARY UVEITIS	1,316	0.7%	520	1.1%
93.110 IRIS HYPOPLASIA	6	0.0%	5	0.0%
93.120 UVEAL CYST-SINGLE	7,663	4.2%	2,045	4.2%
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	17	0.0%	0	0.0%
93.150 IRIS COLOBOMA	21	0.0%	2	0.0%
93.170 UVEAL CYST-MULTIPLE	1,451	0.8%	1,344	2.8%
93.180 IRIS SPHINCTER DYSPLASIA	2	0.0%	1	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	4,182	2.3%	1,291	2.7%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	127	0.1%	15	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	88	0.0%	13	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	112	0.1%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	773	0.4%	822	1.7%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	56	0.0%	19	0.0%
93.810 UVEAL MELANOMA	34	0.0%	21	0.0%
95.120 UVEAL CYST-FREE FLOATING	927	0.5%	358	0.7%
97.150 COLOBOMA	2	0.0%	1	0.0%
FUNDUS				
97.110 CHOROIDAL HYPOPLASIA	9	0.0%	0	0.0%
97.120 COLOBOMA	8	0.0%	0	0.0%
120.170 RETINAL DYSPLASIA-FOLDS	2,272	1.2%	433	0.9%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	926	0.5%	213	0.4%
120.310 RETINAL ATROPHY-GENERALIZED	181	0.1%	6	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	28	0.0%	0	0.0%
120.920 RETINAL DETACHMENT	5	0.0%	2	0.0%
120.960 RETINOPATHY	63	0.0%	29	0.1%
120.970 RETINOPATHY - CMR/ CMR-LIKE	0	0.0%	6	0.0%
130.110 MICROPAPILLA	16	0.0%	11	0.0%
130.120 OPTIC NERVE HYPOPLASIA	41	0.0%	4	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	952	0.5%	0	0.0%

OCULAR DISORDERS REPORT
GOLDEN RETRIEVER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 183,719 #	%	2019-2023 48,620 #	%
LENS Continued				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	11,368	6.2%	3,705	7.6%
100.301 PUNCTATE-ANTERIOR CORTEX	2,014	1.1%	1,151	2.4%
100.302 PUNCTATE-POSTERIOR CORTEX	3,015	1.6%	717	1.5%
100.303 PUNCTATE-EQUATORIAL CORTEX	1,210	0.7%	718	1.5%
100.304 PUNCTATE-ANTERIOR SUTURES	230	0.1%	110	0.2%
100.305 PUNCTATE-POSTERIOR SUTURES	1,157	0.6%	222	0.5%
100.306 PUNCTATE-NUCLEUS	668	0.4%	440	0.9%
100.307 PUNCTATE-CAPSULAR	938	0.5%	513	1.1%
100.311 INCIPIENT-ANTERIOR CORTEX	1,319	0.7%	538	1.1%
100.312 INCIPIENT-POSTERIOR CORTEX	3,736	2.0%	936	1.9%
100.313 INCIPIENT-EQUATORIAL CORTEX	1,476	0.8%	735	1.5%
100.314 INCIPIENT-ANTERIOR SUTURES	90	0.0%	25	0.1%
100.315 INCIPIENT-POSTERIOR SUTURES	840	0.5%	146	0.3%
100.316 INCIPIENT-NUCLEUS	568	0.3%	320	0.7%
100.317 INCIPIENT-CAPSULAR	452	0.2%	246	0.5%
100.321 INCOMPLETE-ANTERIOR CORTEX	84	0.0%	75	0.2%
100.322 INCOMPLETE-POSTERIOR CORTEX	158	0.1%	110	0.2%
100.323 INCOMPLETE-EQUATORIAL CORTEX	48	0.0%	45	0.1%
100.324 INCOMPLETE-ANTERIOR SUTURES	2	0.0%	4	0.0%
100.325 INCOMPLETE-POSTERIOR SUTURES	20	0.0%	18	0.0%
100.326 INCOMPLETE-NUCLEUS	48	0.0%	41	0.1%
100.327 INCOMPLETE-CAPSULAR	30	0.0%	23	0.0%
100.328 Y-SUTURE TIP OPACITIES	290	0.2%	320	0.7%
100.330 GENERALIZED/ COMPLETE	375	0.2%	27	0.1%
100.340 RESORBING/ HYPERMATURE	12	0.0%	8	0.0%
100.375 SUBLUXATION/ LUXATION	33	0.0%	1	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***19,442***	***10.6%***	***7,168***	***14.7%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	197	0.1%	113	0.2%
110.135 PHPV/ PTVL	43	0.0%	14	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	21	0.0%	13	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	309	0.2%	80	0.2%
OTHER				
900.000 OTHER, UNSPECIFIED	1,783	1.0%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	3,071	1.7%	103	0.2%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	3,281	1.8%	2,077	4.3%
NORMAL				
.000 NORMAL GLOBE	135,788	73.9%	32,491	66.8%

GORDON SETTER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Ectropion	Not defined	1	Breeder option	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
D.	Cataract	Not defined	1	NO	
E.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- rod-cone dysplasia type 4 (*rcd4)*	Autosomal recessive	2	NO	Mutation in the *C2orf71* gene
F.	Cone dysfunction – achromatopsia	Not defined	3	NO	
G	Retinal dysplasia				
	- folds	Not defined	1	Breeder option	

Description and Comments

A. Ectropion

A conformational defect resulting in eversion of the eyelids which may cause ocular irritation. It is likely that ectropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior

chamber. The last three forms pose the greatest threat to vision and when severe,vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Retinal Atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- rod-cone dysplasia, type 4 (*rcd4*)

A form of PRA identified in the Gordon and Irish Setter breeds. Clinical night blindness is observed on average as late as 10 years of age and progresses to total blindness. This form of PRA has been referred to as late-onset PRA (LOPRA). The disorder is caused by a mutation present in the *C2orf71* gene. A DNA test is now available that will unequivocally identify genetically normal, affected and carrier dogs. The test is accurate only for this mutation and will not identify other forms of PRA.

F. Cone dysfunction - achromatopsia

Suspected inherited retinal disease characterized by dysfunction of the cone receptors and loss of vision in bright light. Age of onset is variable. Ophthalmoscopic examination is normal. The ERG abnormalities are more suggestive of a cone-rod dystrophy. The mode of inheritance and genetic mutation are not yet known.

G. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Downs LM, Bell JS, Freeman J, et al. Late-onset progressive retinal atrophy in the Gordon and Irish Setter breeds is associated with a frameshift mutation in C2orf71. *Anim Genet*. 2012;44:169-177.PMID: 22686255

3. Good KL, Komaromy AM, Kass PH, et al. Novel retinopathy in related Gordon Setters: a clinical, behavioral, electrophysiological, and genetic investigation. *Vet Ophthalmol*. 2015:1-11. PMID: 26417729

OCULAR DISORDERS REPORT
GORDON SETTER

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	2,401		313	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	2	0.1%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	3	0.1%	0	0.0%
EYELIDS					
20.140	ECTOPIC CILIA	1	0.0%	0	0.0%
20.160	MACROPALPEBRAL FISSURE	9	0.4%	0	0.0%
21.000	ENTROPION	17	0.7%	0	0.0%
22.000	ECTROPION	55	2.3%	2	0.6%
25.110	DISTICHIASIS	44	1.8%	6	1.9%
32.110	IMPERFORATE LACRIMAL PUNCTUM	0	0.0%	1	0.3%
NICTITANS					
51.100	CARTILAGE ANOMALY/ EVERSION	1	0.0%	1	0.3%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	3	0.1%	0	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	8	0.3%	0	0.0%
UVEA					
93.120	UVEAL CYST-SINGLE	20	0.8%	0	0.0%
93.170	UVEAL CYST-MULTIPLE	1	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	117	4.9%	50	16.0%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	7	0.3%	1	0.3%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	4	0.2%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	2	0.1%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	20	0.8%	17	5.4%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	4	0.2%	2	0.6%
LENS					
100.200	CATARACT, UNSPECIFIED	9	0.4%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	90	3.7%	9	2.9%
100.301	PUNCTATE-ANTERIOR CORTEX	13	0.5%	3	1.0%
100.302	PUNCTATE-POSTERIOR CORTEX	12	0.5%	0	0.0%
100.303	PUNCTATE-EQUATORIAL CORTEX	3	0.1%	0	0.0%
100.305	PUNCTATE-POSTERIOR SUTURES	4	0.2%	1	0.3%
100.306	PUNCTATE-NUCLEUS	11	0.5%	1	0.3%
100.307	PUNCTATE-CAPSULAR	10	0.4%	3	1.0%
100.311	INCIPIENT-ANTERIOR CORTEX	7	0.3%	1	0.3%
100.312	INCIPIENT-POSTERIOR CORTEX	15	0.6%	3	1.0%
100.313	INCIPIENT-EQUATORIAL CORTEX	9	0.4%	0	0.0%
100.315	INCIPIENT-POSTERIOR SUTURES	2	0.1%	0	0.0%
100.316	INCIPIENT-NUCLEUS	7	0.3%	0	0.0%
100.317	INCIPIENT-CAPSULAR	7	0.3%	3	1.0%
100.321	INCOMPLETE-ANTERIOR CORTEX	1	0.0%	0	0.0%
100.322	INCOMPLETE-POSTERIOR CORTEX	1	0.0%	0	0.0%
100.327	INCOMPLETE-CAPSULAR	1	0.0%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	2	0.1%	1	0.3%
100.330	GENERALIZED/ COMPLETE	10	0.4%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***122***	***5.1%***	***15***	***4.8%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	15	0.6%	1	0.3%
110.135	PHPV/ PTVL	7	0.3%	0	0.0%
110.320	VITREOUS DEGENERATION-SYNERESIS	5	0.2%	0	0.0%
FUNDUS					
120.170	RETINAL DYSPLASIA-FOLDS	37	1.5%	3	1.0%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	4	0.2%	0	0.0%

OCULAR DISORDERS REPORT
GORDON SETTER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 2,401 #	 %	Year Examined: 2019-2023 Total # Dogs: 313 #	 %
FUNDUS Continued				
120.310 RETINAL ATROPHY-GENERALIZED	18	0.7%	1	0.3%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	2	0.1%	0	0.0%
130.110 MICROPAPILLA	8	0.3%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	8	0.3%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	40	1.7%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	59	2.5%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	40	1.7%	10	3.2%
NORMAL				
.000 NORMAL GLOBE	1,950	81.2%	224	71.6%

GRAND BASSET GRIFFON VENDEEN

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the GRAND BASSET GRIFFON VENDEEN breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
GRAND BASSET GRIFFON VENDEEN

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 135 #	 %	Year Examined: 2019-2023 Total # Dogs: 66 #	 %
EYELIDS				
25.110 DISTICHIASIS	1	0.7%	0	0.0%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	6	4.4%	3	4.5%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	7	5.2%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	1	0.7%	0	0.0%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	7	5.2%	2	3.0%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	7	5.2%	1	1.5%
100.301 PUNCTATE-ANTERIOR CORTEX	1	0.7%	0	0.0%
100.302 PUNCTATE-POSTERIOR CORTEX	1	0.7%	0	0.0%
100.303 PUNCTATE-EQUATORIAL CORTEX	0	0.0%	1	1.5%
100.306 PUNCTATE-NUCLEUS	0	0.0%	1	1.5%
100.307 PUNCTATE-CAPSULAR	1	0.7%	0	0.0%
100.311 INCIPIENT-ANTERIOR CORTEX	2	1.5%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	1	0.7%	0	0.0%
100.316 INCIPIENT-NUCLEUS	2	1.5%	0	0.0%
100.317 INCIPIENT-CAPSULAR	2	1.5%	0	0.0%
100.321 INCOMPLETE-ANTERIOR CORTEX	1	0.7%	0	0.0%
100.327 INCOMPLETE-CAPSULAR	1	0.7%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	1	0.7%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***12***	***8.9%***	***2***	***3.0%***
VITREOUS				
110.135 PHPV/ PTVL	1	0.7%	0	0.0%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	1	0.7%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	1	0.7%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	2	1.5%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	1	0.7%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	1	0.7%	1	1.5%
NORMAL				
.000 NORMAL GLOBE	103	76.3%	58	87.9%

GREAT DANE

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Microphthalmia with multiple ocular defects associated with partial albinism	Presumed autosomal dominant	2	NO	
B.	Glaucoma	Not defined	3	NO	
C.	Entropion	Not defined	1	Breeder option	
D.	Ectropion	Not defined	1	Breeder option	
E.	Distichiasis	Not defined	1	Breeder option	
F.	Nictitans cartilage anomaly/eversion	Not defined	1	Breeder option	
G.	Prolapsed gland-nictitans	Not defined	4	Breeder option	
H.	Uveal cysts	Not defined	1, 5	Breeder option	
	- single	Not defined	1	Breeder option	
	- multiple	Not defined	1, 5	Breeder option	
I.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
J.	Cataract	Not defined	1	NO	

Description and Comments

A. Microphthalmia with multiple ocular defects associated with partial albinism

Multiple ocular defects are seen associated with partial albinism (white or light coat color) and deafness in Great Danes. The abnormalities are thought to stem from a common developmental defect. Ocular defects are anterior segment dysgenesis, equatorial staphylomas, microphthalmia, cortical cataracts, lens luxation, spherophakia, iris coloboma, and blue irides. An autosomal dominant mode of inheritance is suspected. The hearing loss is attributable to cochlea-saccular degeneration.

B. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated intraocular pressure occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of the IOP (tonometry) and

examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine screening exam for certification.

C. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull. Entropion and ectropion often occur together in this breed, associated with an abnormally large palpebral fissure.

D. Ectropion

A conformational defect resulting in eversion of the eyelids which may cause ocular irritation. It is likely that ectropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

E. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

F. Nictitans cartilage anomaly/eversion

A scroll-like curling of the cartilage of the third eyelid, usually everting the margin. This condition may occur in one or both eyes and may cause mild ocular irritation.

G. Prolapsed gland- nictitans

Protrusion of the tear gland associated with the third eyelid. The mode of inheritance of this disorder is unknown. The exposed gland may become irritated. Commonly referred to as "cherry eye."

Great Danes were overrepresented in a study of prolapsed gland of the third eyelid. In the study, 83% of the prolapsed glands in Great Danes occurred before 1 year of age. Great Danes were also more likely to develop bilateral prolapsed glands that occurred either simultaneously with the first prolapse or with a short time interval between prolapses.

H. Uveal cysts

Fluid filled sacs arising from the posterior surface of the iris, to which they may remain attached or break free and float into the anterior chamber. Usually occur in mature dogs. In the Great Dane, pigmented cysts may also arise from pigmented epithelial cells of the ciliary body. Ciliary body cysts may predispose to glaucoma in the Great Dane.

I. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

J. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Gwin RM, Wyman M, Lim DJ, et al. Multiple ocular defects associated with partial albinism and deafness in the dog. *J Am Anim Hosp Assoc*. 1981;17:401-408.

3. Wood JL, Lakhani KH, Mason IK, et al. Relationship of the degree of goniodysgenesis and other ocular measurements to glaucoma in Great Danes. *Am J Vet Res*. 2001;62:1493-1499. PMID: 11560283

4. Mazzucchelli S, Vaillant MD, Weverberg F, et al. Retrospective study of 155 cases of prolapse of the nictitating membrane gland in dogs. *Vet Rec*. 2012;170:443. PMID: 22472538. **reference derived from non-USA dog population**

5. Spiess BM, Bolliger JO, Guscetti F, et al. Multiple ciliary body cysts and secondary glaucoma in the Great Dane: a report of nine cases. *Vet Ophthalmol*. 1998;1:41-45. PMID: 11397208 **reference derived from non-USA dog population**

OCULAR DISORDERS REPORT
GREAT DANE

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 8,392 #	 %	Year Examined: 2019-2023 Total # Dogs: 2,743 #	 %
GLOBE				
.110 MICROPHTHALMOS	25	0.3%	3	0.1%
10.000 GLAUCOMA	2	0.0%	0	0.0%
40.910 KERATOCONJUNCTIVITIS SICCA (KCS)	2	0.0%	0	0.0%
EYELIDS				
20.160 MACROPALPEBRAL FISSURE	124	1.5%	0	0.0%
21.000 ENTROPION	243	2.9%	131	4.8%
22.000 ECTROPION	330	3.9%	106	3.9%
25.110 DISTICHIASIS	454	5.4%	124	4.5%
32.110 IMPERFORATE LACRIMAL PUNCTUM	7	0.1%	2	0.1%
NICTITANS				
51.100 CARTILAGE ANOMALY/ EVERSION	190	2.3%	87	3.2%
52.110 GLAND PROLAPSE	21	0.3%	11	0.4%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	2	0.0%	0	0.0%
70.220 EXPOSURE KERATOPATHY SYNDROME	5	0.1%	4	0.1%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	34	0.4%	3	0.1%
UVEA				
90.250 PIGMENTARY UVEITIS	2	0.0%	1	0.0%
93.110 IRIS HYPOPLASIA	8	0.1%	7	0.3%
93.120 UVEAL CYST-SINGLE	92	1.1%	27	1.0%
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	2	0.0%	0	0.0%
93.150 IRIS COLOBOMA	19	0.2%	5	0.2%
93.170 UVEAL CYST-MULTIPLE	23	0.3%	31	1.1%
93.180 IRIS SPHINCTER DYSPLASIA	1	0.0%	1	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	88	1.0%	21	0.8%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	16	0.2%	4	0.1%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	9	0.1%	4	0.1%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	4	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	32	0.4%	26	0.9%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	3	0.0%	2	0.1%
93.810 UVEAL MELANOMA	4	0.0%	2	0.1%
95.120 UVEAL CYST-FREE FLOATING	10	0.1%	1	0.0%
FUNDUS				
97.110 CHOROIDAL HYPOPLASIA	1	0.0%	3	0.1%
97.120 COLOBOMA	2	0.0%	0	0.0%
120.170 RETINAL DYSPLASIA-FOLDS	27	0.3%	3	0.1%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	3	0.0%	1	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	7	0.1%	1	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%
120.920 RETINAL DETACHMENT	1	0.0%	0	0.0%
120.960 RETINOPATHY	2	0.0%	2	0.1%
130.110 MICROPAPILLA	1	0.0%	3	0.1%
130.120 OPTIC NERVE HYPOPLASIA	4	0.0%	0	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	15	0.2%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	292	3.5%	87	3.2%
100.301 PUNCTATE-ANTERIOR CORTEX	49	0.6%	32	1.2%
100.302 PUNCTATE-POSTERIOR CORTEX	95	1.1%	33	1.2%
100.303 PUNCTATE-EQUATORIAL CORTEX	29	0.3%	8	0.3%
100.304 PUNCTATE-ANTERIOR SUTURES	6	0.1%	1	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	30	0.4%	3	0.1%

OCULAR DISORDERS REPORT
GREAT DANE

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 8,392 #	%	2019-2023 2,743 #	%
LENS Continued				
100.306 PUNCTATE-NUCLEUS	23	0.3%	11	0.4%
100.307 PUNCTATE-CAPSULAR	58	0.7%	29	1.1%
100.311 INCIPIENT-ANTERIOR CORTEX	89	1.1%	29	1.1%
100.312 INCIPIENT-POSTERIOR CORTEX	179	2.1%	39	1.4%
100.313 INCIPIENT-EQUATORIAL CORTEX	52	0.6%	19	0.7%
100.314 INCIPIENT-ANTERIOR SUTURES	6	0.1%	1	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	24	0.3%	7	0.3%
100.316 INCIPIENT-NUCLEUS	36	0.4%	12	0.4%
100.317 INCIPIENT-CAPSULAR	34	0.4%	11	0.4%
100.321 INCOMPLETE-ANTERIOR CORTEX	9	0.1%	6	0.2%
100.322 INCOMPLETE-POSTERIOR CORTEX	13	0.2%	11	0.4%
100.323 INCOMPLETE-EQUATORIAL CORTEX	2	0.0%	1	0.0%
100.325 INCOMPLETE-POSTERIOR SUTURES	0	0.0%	1	0.0%
100.326 INCOMPLETE-NUCLEUS	3	0.0%	3	0.1%
100.327 INCOMPLETE-CAPSULAR	3	0.0%	1	0.0%
100.328 Y-SUTURE TIP OPACITIES	7	0.1%	2	0.1%
100.330 GENERALIZED/ COMPLETE	54	0.6%	2	0.1%
100.340 RESORBING/ HYPERMATURE	0	0.0%	1	0.0%
100.375 SUBLUXATION/ LUXATION	14	0.2%	1	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***809***	***9.6%***	***261***	***9.5%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	19	0.2%	9	0.3%
110.135 PHPV/ PTVL	16	0.2%	5	0.2%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	18	0.2%	6	0.2%
110.320 VITREOUS DEGENERATION-SYNERESIS	31	0.4%	11	0.4%
OTHER				
900.000 OTHER, UNSPECIFIED	60	0.7%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	148	1.8%	23	0.8%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	152	1.8%	110	4.0%
NORMAL				
.000 NORMAL GLOBE	6,474	77.1%	1,989	72.5%

GREAT PYRENEES

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
B.	Cataract	Not defined	1	NO	
C.	Multifocal retinopathy - IRD-*BEST1* (*cmr1)*	Autosomal recessive	2-4	NO (Breeder option with normal DNA test for *cmr1*)	Mutation in the *BEST1* gene

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Multifocal retinopathy

Canine Multifocal Retinopathy type 1 (*cmr1*) is characterized by numerous distinct (i.e. multifocal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There may be a serous sub-retinal fluid, or accumulation of sub-retinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs between 11-20 weeks of age and there is minimal progression after 1 year of age. The lesions may flatten, leaving areas of retinal thinning and RPE hypertrophy, hyperplasia, and pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE detachments. Most dogs exhibit no noticeable problem with vision or electroretinographic abnormalities despite their abnormal appearing retinas. However, variable degrees of retinal degeneration occur with chronicity.

Canine Multifocal Retinopathy type 1 is caused by a mutation in the Bestrophin 1 gene (*BEST1*) and is described to be recessively inherited in the Great Pyrenees, Dogue de Bordeaux, Bullmastiff, Mastiff and a number of other mastiff-derived breeds. A DNA test is available.

The breeding advice for breeds diagnosed with "CMR/CMR-like retinopathy" will be changed from "No" to "Breeder

option" if the owner of the dog provides the registering office with results of the DNA test for the affected dog showing that it is genetically normal, i.e., not a homozygous mutant, for the *BEST1* mutation.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Guziewicz KE, Zangerl B, Lindauer SJ, et al. Bestrophin gene mutations cause canine multifocal retinopathy: a novel animal model for best disease. *Invest Ophthalmol Vis Sci*. 2007;48:1959-1967. PMID: 17460247

3. Grahn BH, Philibert H, Cullen CL, et al. Multifocal retinopathy of Great Pyrenees dogs. *Vet Ophthalmol*. 1998;1:211-221. PMID: 11397233

4. Grahn BH, Cullen CL. Retinopathy of Great Pyrenees dogs: fluorescein angiography, light microscopy and transmitting and scanning electron microscopy. *Vet Ophthalmol*. 2001;4:191-199. PMID: 11722783

OCULAR DISORDERS REPORT
GREAT PYRENEES

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1,334 #	%	2019-2023 122 #	%
GLOBE				
.110 MICROPHTHALMOS	2	0.1%	0	0.0%
EYELIDS				
20.160 MACROPALPEBRAL FISSURE	3	0.2%	0	0.0%
21.000 ENTROPION	15	1.1%	0	0.0%
22.000 ECTROPION	3	0.2%	0	0.0%
25.110 DISTICHIASIS	16	1.2%	2	1.6%
32.110 IMPERFORATE LACRIMAL PUNCTUM	1	0.1%	0	0.0%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	1	0.1%	0	0.0%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	17	1.3%	0	0.0%
70.730 DYSTROPHY-ENDOTHELIAL	3	0.2%	0	0.0%
UVEA				
93.110 IRIS HYPOPLASIA	1	0.1%	0	0.0%
93.120 UVEAL CYST-SINGLE	7	0.5%	1	0.8%
93.150 IRIS COLOBOMA	1	0.1%	0	0.0%
93.170 UVEAL CYST-MULTIPLE	2	0.1%	1	0.8%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	336	25.2%	31	25.4%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	13	1.0%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	7	0.5%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	1	0.1%	0	0.0%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	2	0.1%	0	0.0%
93.810 UVEAL MELANOMA	1	0.1%	0	0.0%
95.120 UVEAL CYST-FREE FLOATING	0	0.0%	1	0.8%
FUNDUS				
97.110 CHOROIDAL HYPOPLASIA	2	0.1%	0	0.0%
97.120 COLOBOMA	1	0.1%	0	0.0%
120.170 RETINAL DYSPLASIA-FOLDS	9	0.7%	0	0.0%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	16	1.2%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	5	0.4%	1	0.8%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	4	0.3%	0	0.0%
120.960 RETINOPATHY	9	0.7%	3	2.5%
120.970 RETINOPATHY - CMR/ CMR-LIKE	0	0.0%	4	3.3%
130.110 MICROPAPILLA	6	0.4%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	5	0.4%	0	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	3	0.2%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	56	4.2%	5	4.1%
100.301 PUNCTATE-ANTERIOR CORTEX	14	1.0%	0	0.0%
100.302 PUNCTATE-POSTERIOR CORTEX	15	1.1%	0	0.0%
100.303 PUNCTATE-EQUATORIAL CORTEX	7	0.5%	0	0.0%
100.304 PUNCTATE-ANTERIOR SUTURES	3	0.2%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	3	0.2%	0	0.0%
100.306 PUNCTATE-NUCLEUS	4	0.3%	0	0.0%
100.307 PUNCTATE-CAPSULAR	1	0.1%	2	1.6%
100.311 INCIPIENT-ANTERIOR CORTEX	26	1.9%	3	2.5%
100.312 INCIPIENT-POSTERIOR CORTEX	22	1.6%	2	1.6%
100.313 INCIPIENT-EQUATORIAL CORTEX	25	1.9%	3	2.5%
100.315 INCIPIENT-POSTERIOR SUTURES	6	0.4%	0	0.0%
100.316 INCIPIENT-NUCLEUS	1	0.1%	0	0.0%
100.317 INCIPIENT-CAPSULAR	5	0.4%	1	0.8%
100.321 INCOMPLETE-ANTERIOR CORTEX	1	0.1%	0	0.0%
100.322 INCOMPLETE-POSTERIOR CORTEX	1	0.1%	0	0.0%

OCULAR DISORDERS REPORT
GREAT PYRENEES

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1,334 #	 %	Year Examined: 2019-2023 Total # Dogs: 122 #	 %
LENS Continued				
100.323 INCOMPLETE-EQUATORIAL CORTEX	1	0.1%	0	0.0%
100.325 INCOMPLETE-POSTERIOR SUTURES	1	0.1%	0	0.0%
100.330 GENERALIZED/ COMPLETE	5	0.4%	0	0.0%
100.375 SUBLUXATION/ LUXATION	1	0.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***144***	***10.8%***	***11***	***9.0%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	0	0.0%	1	0.8%
110.135 PHPV/ PTVL	1	0.1%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	0	0.0%	1	0.8%
OTHER				
900.000 OTHER, UNSPECIFIED	7	0.5%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	35	2.6%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	18	1.3%	3	2.5%
NORMAL				
.000 NORMAL GLOBE	872	65.4%	73	59.8%

GREATER SWISS MOUNTAIN DOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
GREATER SWISS MOUNTAIN DOG

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	3,458		665	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	1	0.0%	0	0.0%
EYELIDS					
20.140	ECTOPIC CILIA	1	0.0%	0	0.0%
20.160	MACROPALPEBRAL FISSURE	1	0.0%	0	0.0%
21.000	ENTROPION	21	0.6%	6	0.9%
22.000	ECTROPION	3	0.1%	0	0.0%
25.110	DISTICHIASIS	1,115	32.2%	150	22.6%
NICTITANS					
51.100	CARTILAGE ANOMALY/ EVERSION	5	0.1%	0	0.0%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	2	0.1%	0	0.0%
70.220	EXPOSURE KERATOPATHY SYNDROME	1	0.0%	0	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	14	0.4%	1	0.2%
70.730	DYSTROPHY-ENDOTHELIAL	1	0.0%	0	0.0%
UVEA					
93.120	UVEAL CYST-SINGLE	5	0.1%	0	0.0%
93.150	IRIS COLOBOMA	1	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	119	3.4%	15	2.3%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	6	0.2%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	6	0.2%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	5	0.1%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	2	0.1%	0	0.0%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	1	0.0%	0	0.0%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	298	8.6%	27	4.1%
100.301	PUNCTATE-ANTERIOR CORTEX	88	2.5%	17	2.6%
100.302	PUNCTATE-POSTERIOR CORTEX	64	1.9%	15	2.3%
100.303	PUNCTATE-EQUATORIAL CORTEX	38	1.1%	8	1.2%
100.304	PUNCTATE-ANTERIOR SUTURES	8	0.2%	0	0.0%
100.305	PUNCTATE-POSTERIOR SUTURES	14	0.4%	6	0.9%
100.306	PUNCTATE-NUCLEUS	8	0.2%	4	0.6%
100.307	PUNCTATE-CAPSULAR	21	0.6%	8	1.2%
100.311	INCIPIENT-ANTERIOR CORTEX	66	1.9%	15	2.3%
100.312	INCIPIENT-POSTERIOR CORTEX	98	2.8%	23	3.5%
100.313	INCIPIENT-EQUATORIAL CORTEX	82	2.4%	17	2.6%
100.314	INCIPIENT-ANTERIOR SUTURES	2	0.1%	1	0.2%
100.315	INCIPIENT-POSTERIOR SUTURES	13	0.4%	3	0.5%
100.316	INCIPIENT-NUCLEUS	9	0.3%	1	0.2%
100.317	INCIPIENT-CAPSULAR	11	0.3%	2	0.3%
100.321	INCOMPLETE-ANTERIOR CORTEX	3	0.1%	3	0.5%
100.322	INCOMPLETE-POSTERIOR CORTEX	2	0.1%	8	1.2%
100.323	INCOMPLETE-EQUATORIAL CORTEX	3	0.1%	3	0.5%
100.326	INCOMPLETE-NUCLEUS	1	0.0%	0	0.0%
100.327	INCOMPLETE-CAPSULAR	1	0.0%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	4	0.1%	3	0.5%
100.330	GENERALIZED/ COMPLETE	7	0.2%	0	0.0%
100.375	SUBLUXATION/ LUXATION	3	0.1%	1	0.2%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***539***	***15.6%***	***134***	***20.2%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	15	0.4%	3	0.5%
110.135	PHPV/ PTVL	4	0.1%	0	0.0%

OCULAR DISORDERS REPORT
GREATER SWISS MOUNTAIN DOG

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 3,458 #	 %	Year Examined: 2019-2023 Total # Dogs: 665 #	 %
VITREOUS Continued				
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	2	0.1%	1	0.2%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	19	0.5%	2	0.3%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	7	0.2%	2	0.3%
120.310 RETINAL ATROPHY-GENERALIZED	4	0.1%	1	0.2%
130.110 MICROPAPILLA	7	0.2%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	5	0.1%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	29	0.8%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	71	2.1%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	38	1.1%	19	2.9%
NORMAL				
.000 NORMAL GLOBE	2,005	58.0%	400	60.2%

GREENLAND DOG

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the GREENLAND DOG breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
GREENLAND DOG

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1 #	 %	Year Examined: 2019-2023 Total # Dogs: 1 #	 %
UVEA				
90.250 PIGMENTARY UVEITIS	1	100.0%	0	0.0%
NORMAL				
.000 NORMAL GLOBE	0	0.0%	1	100.0%

GREYHOUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Chronic superficial keratitis/pannus	Not defined	2	NO	
B.	Cataract	Not defined	1	NO	

Description and Comments

A. Chronic superficial keratitis/Pannus

A bilateral disease of the cornea which usually starts as a grayish haze to the ventral or ventrolateral cornea, followed by the formation of a vascularized subepithelial growth that begins to spread toward the central cornea; pigmentation follows the vascularization. If severe, vision impairment occurs. Pannus may be associated with plasma cell infiltration of the nictitans.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Peiffer RL, Jr., Gelatt KN, Gwin RM. Chronic superficial keratitis. *Vet Med Small Anim Clin*. 1977;72:35-37. PMID: 584092

OCULAR DISORDERS REPORT
GREYHOUND

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	720		194	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	1	0.1%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	1	0.1%	0	0.0%
EYELIDS					
25.110	DISTICHIASIS	2	0.3%	0	0.0%
NICTITANS					
50.210	PLASMOMA/ ATYPICAL PANNUS	2	0.3%	0	0.0%
51.100	CARTILAGE ANOMALY/ EVERSION	2	0.3%	1	0.5%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	21	2.9%	1	0.5%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	6	0.8%	0	0.0%
70.730	DYSTROPHY-ENDOTHELIAL	1	0.1%	0	0.0%
UVEA					
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	2	0.3%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	2	0.3%	0	0.0%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	1	0.1%	0	0.0%
LENS					
100.200	CATARACT, UNSPECIFIED	2	0.3%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	27	3.8%	19	9.8%
100.301	PUNCTATE-ANTERIOR CORTEX	7	1.0%	5	2.6%
100.302	PUNCTATE-POSTERIOR CORTEX	5	0.7%	0	0.0%
100.303	PUNCTATE-EQUATORIAL CORTEX	2	0.3%	1	0.5%
100.304	PUNCTATE-ANTERIOR SUTURES	2	0.3%	0	0.0%
100.306	PUNCTATE-NUCLEUS	3	0.4%	4	2.1%
100.307	PUNCTATE-CAPSULAR	2	0.3%	5	2.6%
100.311	INCIPIENT-ANTERIOR CORTEX	6	0.8%	4	2.1%
100.312	INCIPIENT-POSTERIOR CORTEX	10	1.4%	3	1.5%
100.313	INCIPIENT-EQUATORIAL CORTEX	7	1.0%	2	1.0%
100.314	INCIPIENT-ANTERIOR SUTURES	1	0.1%	0	0.0%
100.316	INCIPIENT-NUCLEUS	2	0.3%	0	0.0%
100.317	INCIPIENT-CAPSULAR	2	0.3%	1	0.5%
100.322	INCOMPLETE-POSTERIOR CORTEX	1	0.1%	0	0.0%
100.330	GENERALIZED/ COMPLETE	1	0.1%	0	0.0%
100.375	SUBLUXATION/ LUXATION	2	0.3%	1	0.5%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***53***	***7.4%***	***25***	***12.9%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	2	0.3%	0	0.0%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	0.4%	1	0.5%
110.320	VITREOUS DEGENERATION-SYNERESIS	13	1.8%	2	1.0%
FUNDUS					
120.170	RETINAL DYSPLASIA-FOLDS	5	0.7%	2	1.0%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	1	0.1%	1	0.5%
120.310	RETINAL ATROPHY-GENERALIZED	6	0.8%	1	0.5%
120.920	RETINAL DETACHMENT	1	0.1%	0	0.0%
130.110	MICROPAPILLA	2	0.3%	0	0.0%
130.120	OPTIC NERVE HYPOPLASIA	2	0.3%	0	0.0%
OTHER					
900.000	OTHER, UNSPECIFIED	8	1.1%	0	0.0%
900.100	OTHER-SUSPECTED AS INHERITED	14	1.9%	0	0.0%
900.110	OTHER-SUSPECTED AS NOT-INHERITED	33	4.6%	12	6.2%
NORMAL					
.000	NORMAL GLOBE	580	80.6%	159	82.0%

HANOVERIAN HOUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the HANOVERIAN HOUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
HANOVERIAN HOUND

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	1		25	
Diagnostic Name		#	%	#	%
NORMAL					
.000	NORMAL GLOBE	1	100.0%	25	100.0%

HARRIER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the HARRIER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
HARRIER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 420 #	 %	Year Examined: 2019-2023 Total # Dogs: 38 #	 %
EYELIDS				
21.000 ENTROPION	1	0.2%	0	0.0%
25.110 DISTICHIASIS	2	0.5%	0	0.0%
GLOBE				
40.910 KERATOCONJUNCTIVITIS SICCA (KCS)	1	0.2%	0	0.0%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	1	0.2%	0	0.0%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	1	0.2%	0	0.0%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	12	2.9%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	1	0.2%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	1	0.2%	0	0.0%
FUNDUS				
97.120 COLOBOMA	1	0.2%	0	0.0%
120.170 RETINAL DYSPLASIA-FOLDS	0	0.0%	1	2.6%
120.310 RETINAL ATROPHY-GENERALIZED	3	0.7%	0	0.0%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	8	1.9%	1	2.6%
100.302 PUNCTATE-POSTERIOR CORTEX	2	0.5%	1	2.6%
100.306 PUNCTATE-NUCLEUS	1	0.2%	0	0.0%
100.311 INCIPIENT-ANTERIOR CORTEX	4	1.0%	0	0.0%
100.312 INCIPIENT-POSTERIOR CORTEX	3	0.7%	0	0.0%
100.317 INCIPIENT-CAPSULAR	1	0.2%	0	0.0%
100.322 INCOMPLETE-POSTERIOR CORTEX	1	0.2%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***12***	***2.9%***	***1***	***2.6%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	1	0.2%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	2	0.5%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	11	2.6%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	5	1.2%	2	5.3%
NORMAL				
.000 NORMAL GLOBE	386	91.9%	34	89.5%

HAVANA SILK DOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin, which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
HAVANA SILK DOG

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 674 #	 %	Year Examined: 2019-2023 Total # Dogs: 86 #	 %
EYELIDS				
25.110 DISTICHIASIS	33	4.9%	3	3.5%
NICTITANS				
52.110 GLAND PROLAPSE	2	0.3%	0	0.0%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	10	1.5%	0	0.0%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	33	4.9%	3	3.5%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	1	0.1%	0	0.0%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	1	0.1%	0	0.0%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	11	1.6%	0	0.0%
100.301 PUNCTATE-ANTERIOR CORTEX	2	0.3%	0	0.0%
100.304 PUNCTATE-ANTERIOR SUTURES	1	0.1%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	3	0.4%	1	1.2%
100.311 INCIPIENT-ANTERIOR CORTEX	2	0.3%	0	0.0%
100.312 INCIPIENT-POSTERIOR CORTEX	3	0.4%	0	0.0%
100.313 INCIPIENT-EQUATORIAL CORTEX	1	0.1%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	1	0.1%	0	0.0%
100.316 INCIPIENT-NUCLEUS	4	0.6%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	4	0.6%	4	4.7%
100.330 GENERALIZED/ COMPLETE	2	0.3%	0	0.0%
100.375 SUBLUXATION/ LUXATION	1	0.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***19***	***2.8%***	***1***	***1.2%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	2	0.3%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	0.4%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	3	0.4%	0	0.0%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	1	0.1%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	7	1.0%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	1	0.1%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	6	0.9%	1	1.2%
NORMAL				
.000 NORMAL GLOBE	591	87.7%	77	89.5%

HAVANESE

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1, 3	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1, 2	NO	
D.	Y-suture tip opacity	Not defined	1	Breeder option	
E.	Vitreous degeneration				
	- syneresis	Not defined	1	Breeder option	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin, which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

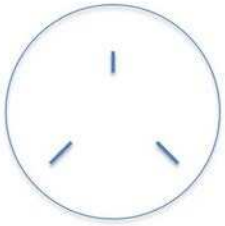
C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region. The exact frequency and significance of cataracts in the breed is not known.

D. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but

occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. Newer versions of the form (3/16/21) have boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

E. Vitreous degeneration - syneresis

A liquefaction of the vitreous gel which may predispose to retinal detachment.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Starr AN, Famula TR, Markward NJ, et al. Hereditary evaluation of multiple developmental abnormalities in the Havanese dog breed. *J Hered.* 2007;98:510-517. PMID: 17621585

3. Bellamy KKL, Lingaas F, Madsen P. Heritability of distichiasis in Havanese dogs in Norway. *Canine Med Genet.* 2021; 8(1):11. PMID: 34784963. **reference derived from non-USA dog population**

OCULAR DISORDERS REPORT
HAVANESE

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 31,467 #	%	2019-2023 5,421 #	%
GLOBE				
.110 MICROPHTHALMOS	6	0.0%	1	0.0%
40.910 KERATOCONJUNCTIVITIS SICCA (KCS)	10	0.0%	1	0.0%
EYELIDS				
20.140 ECTOPIC CILIA	11	0.0%	2	0.0%
21.000 ENTROPION	18	0.1%	4	0.1%
22.000 ECTROPION	4	0.0%	0	0.0%
25.110 DISTICHIASIS	1,566	5.0%	264	4.9%
32.110 IMPERFORATE LACRIMAL PUNCTUM	11	0.0%	4	0.1%
NICTITANS				
51.100 CARTILAGE ANOMALY/ EVERSION	3	0.0%	0	0.0%
52.110 GLAND PROLAPSE	149	0.5%	34	0.6%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	2	0.0%	0	0.0%
70.220 EXPOSURE KERATOPATHY SYNDROME	7	0.0%	0	0.0%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	127	0.4%	32	0.6%
70.730 DYSTROPHY-ENDOTHELIAL	5	0.0%	0	0.0%
UVEA				
90.250 PIGMENTARY UVEITIS	1	0.0%	1	0.0%
93.110 IRIS HYPOPLASIA	1	0.0%	1	0.0%
93.120 UVEAL CYST-SINGLE	5	0.0%	0	0.0%
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	3	0.0%	0	0.0%
93.150 IRIS COLOBOMA	3	0.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	1,918	6.1%	267	4.9%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	32	0.1%	1	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	14	0.0%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	18	0.1%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	42	0.1%	39	0.7%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	5	0.0%	2	0.0%
93.810 UVEAL MELANOMA	3	0.0%	1	0.0%
FUNDUS				
97.110 CHOROIDAL HYPOPLASIA	2	0.0%	0	0.0%
97.120 COLOBOMA	4	0.0%	0	0.0%
120.170 RETINAL DYSPLASIA-FOLDS	143	0.5%	16	0.3%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	25	0.1%	5	0.1%
120.310 RETINAL ATROPHY-GENERALIZED	108	0.3%	4	0.1%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	12	0.0%	0	0.0%
120.920 RETINAL DETACHMENT	3	0.0%	1	0.0%
120.960 RETINOPATHY	22	0.1%	6	0.1%
120.970 RETINOPATHY - CMR/ CMR-LIKE	0	0.0%	1	0.0%
130.110 MICROPAPILLA	1	0.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	3	0.0%	1	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	22	0.1%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	1,858	5.9%	281	5.2%
100.301 PUNCTATE-ANTERIOR CORTEX	272	0.9%	91	1.7%
100.302 PUNCTATE-POSTERIOR CORTEX	169	0.5%	46	0.8%
100.303 PUNCTATE-EQUATORIAL CORTEX	59	0.2%	14	0.3%
100.304 PUNCTATE-ANTERIOR SUTURES	57	0.2%	11	0.2%
100.305 PUNCTATE-POSTERIOR SUTURES	502	1.6%	102	1.9%
100.306 PUNCTATE-NUCLEUS	30	0.1%	16	0.3%
100.307 PUNCTATE-CAPSULAR	121	0.4%	46	0.8%

OCULAR DISORDERS REPORT
HAVANESE

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 31,467 #	 %	Year Examined: 2019-2023 Total # Dogs: 5,421 #	 %
LENS Continued				
100.311 INCIPIENT-ANTERIOR CORTEX	143	0.5%	28	0.5%
100.312 INCIPIENT-POSTERIOR CORTEX	250	0.8%	41	0.8%
100.313 INCIPIENT-EQUATORIAL CORTEX	64	0.2%	8	0.1%
100.314 INCIPIENT-ANTERIOR SUTURES	18	0.1%	4	0.1%
100.315 INCIPIENT-POSTERIOR SUTURES	107	0.3%	15	0.3%
100.316 INCIPIENT-NUCLEUS	22	0.1%	5	0.1%
100.317 INCIPIENT-CAPSULAR	58	0.2%	22	0.4%
100.321 INCOMPLETE-ANTERIOR CORTEX	7	0.0%	5	0.1%
100.322 INCOMPLETE-POSTERIOR CORTEX	18	0.1%	11	0.2%
100.323 INCOMPLETE-EQUATORIAL CORTEX	1	0.0%	1	0.0%
100.325 INCOMPLETE-POSTERIOR SUTURES	6	0.0%	2	0.0%
100.326 INCOMPLETE-NUCLEUS	3	0.0%	0	0.0%
100.327 INCOMPLETE-CAPSULAR	1	0.0%	2	0.0%
100.328 Y-SUTURE TIP OPACITIES	301	1.0%	305	5.6%
100.330 GENERALIZED/ COMPLETE	126	0.4%	6	0.1%
100.340 RESORBING/ HYPERMATURE	3	0.0%	2	0.0%
100.375 SUBLUXATION/ LUXATION	13	0.0%	3	0.1%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***2,059***	***6.5%***	***478***	***8.8%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	30	0.1%	7	0.1%
110.135 PHPV/ PTVL	3	0.0%	2	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	60	0.2%	22	0.4%
110.320 VITREOUS DEGENERATION-SYNERESIS	508	1.6%	59	1.1%
OTHER				
900.000 OTHER, UNSPECIFIED	257	0.8%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	565	1.8%	8	0.1%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	333	1.1%	162	3.0%
NORMAL				
.000 NORMAL GLOBE	25,760	81.9%	4,058	74.9%

HOKKAIDO KEN

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
B.	Choroidal hypoplasia (Collie Eye Anomaly) - staphyloma/coloboma - retinal detachment - retinal hemorrhage - optic nerve coloboma	Autosomal recessive	1, 2	NO	Mutation in the *NHEJ1* gene
C.	Cataract	Not defined	1	NO	

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Choroidal hypoplasia (Collie Eye Anomaly)
- staphyloma/coloboma
- retinal detachment
- retinal hemorrhage
- optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1.* The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

C. Cataract

Any opacity of the lens and/or its capsule, regardless of size or location within the lens. Cataracts are assumed to be hereditary unless associated with known trauma, ocular inflammation, specific metabolic diseases, or nutritional deficiencies

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Mizukami K, Chang H, Ota M, et al. Collie eye anomaly in Hokkaido dogs: case study. *Vet Ophthalmol.* 2012;15:128-32. PMID: 22051190 **reference derived from non-USA dog population**

OCULAR DISORDERS REPORT
HOKKAIDO KEN

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	14		33	
	Diagnostic Name	#	%	#	%
EYELIDS					
25.110	DISTICHIASIS	0	0.0%	2	6.1%
CORNEA					
70.220	EXPOSURE KERATOPATHY SYNDROME	0	0.0%	1	3.0%
UVEA					
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	4	28.6%	6	18.2%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	1	7.1%	1	3.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	0	0.0%	1	3.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	0	0.0%	2	6.1%
FUNDUS					
97.110	CHOROIDAL HYPOPLASIA	7	50.0%	3	9.1%
120.170	RETINAL DYSPLASIA-FOLDS	2	14.3%	0	0.0%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	1	7.1%	3	9.1%
100.301	PUNCTATE-ANTERIOR CORTEX	1	7.1%	1	3.0%
100.306	PUNCTATE-NUCLEUS	0	0.0%	2	6.1%
100.307	PUNCTATE-CAPSULAR	0	0.0%	4	12.1%
100.311	INCIPIENT-ANTERIOR CORTEX	5	35.7%	3	9.1%
100.312	INCIPIENT-POSTERIOR CORTEX	0	0.0%	1	3.0%
100.316	INCIPIENT-NUCLEUS	0	0.0%	1	3.0%
100.321	INCOMPLETE-ANTERIOR CORTEX	0	0.0%	4	12.1%
100.326	INCOMPLETE-NUCLEUS	0	0.0%	1	3.0%
100.327	INCOMPLETE-CAPSULAR	0	0.0%	1	3.0%
100.330	GENERALIZED/ COMPLETE	0	0.0%	2	6.1%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***6***	***42.9%***	***20***	***60.6%***
OTHER					
900.100	OTHER-SUSPECTED AS INHERITED	1	7.1%	0	0.0%
NORMAL					
.000	NORMAL GLOBE	2	14.3%	14	42.4%

HOVAWART

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the HOVAWART breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
HOVAWART

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 46 #	 %	Year Examined: 2019-2023 Total # Dogs: 24 #	 %
EYELIDS				
25.110 DISTICHIASIS	2	4.3%	1	4.2%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	0	0.0%	1	4.2%
UVEA				
93.120 UVEAL CYST-SINGLE	0	0.0%	2	8.3%
93.170 UVEAL CYST-MULTIPLE	1	2.2%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	2	4.3%	3	12.5%
95.120 UVEAL CYST-FREE FLOATING	0	0.0%	1	4.2%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	2	4.3%	1	4.2%
100.301 PUNCTATE-ANTERIOR CORTEX	2	4.3%	0	0.0%
100.302 PUNCTATE-POSTERIOR CORTEX	1	2.2%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	0	0.0%	1	4.2%
100.306 PUNCTATE-NUCLEUS	1	2.2%	0	0.0%
100.307 PUNCTATE-CAPSULAR	0	0.0%	1	4.2%
100.322 INCOMPLETE-POSTERIOR CORTEX	0	0.0%	1	4.2%
100.325 INCOMPLETE-POSTERIOR SUTURES	0	0.0%	1	4.2%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	1	4.2%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***4***	***8.7%***	***4***	***16.7%***
VITREOUS				
110.320 VITREOUS DEGENERATION-SYNERESIS	1	2.2%	0	0.0%
FUNDUS				
130.110 MICROPAPILLA	0	0.0%	1	4.2%
OTHER				
900.100 OTHER-SUSPECTED AS INHERITED	0	0.0%	1	4.2%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	1	2.2%	1	4.2%
NORMAL				
.000 NORMAL GLOBE	37	80.4%	16	66.7%

IBIZAN HOUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
B.	Cataract	Not defined	1	NO	
C.	Y-suture tip opacities	Not defined	1	Breeder option	

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

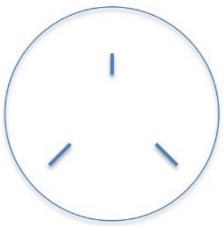
Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Y-suture tip opacities

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. Newer versions of the form (3/16/21) have boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the

form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures" AND ALSO MARK "suspect not inherited/significance unknown" (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: "E2" or "posterior suture tip opacities." This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
IBIZAN HOUND

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	1,606		537	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	4	0.2%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	1	0.1%	0	0.0%
EYELIDS					
25.110	DISTICHIASIS	4	0.2%	0	0.0%
NICTITANS					
51.100	CARTILAGE ANOMALY/ EVERSION	1	0.1%	1	0.2%
52.110	GLAND PROLAPSE	1	0.1%	0	0.0%
CORNEA					
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	10	0.6%	1	0.2%
UVEA					
93.120	UVEAL CYST-SINGLE	3	0.2%	1	0.2%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.1%	0	0.0%
93.150	IRIS COLOBOMA	1	0.1%	0	0.0%
93.170	UVEAL CYST-MULTIPLE	0	0.0%	1	0.2%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	189	11.8%	49	9.1%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	1	0.1%	1	0.2%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	15	0.9%	14	2.6%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	5	0.3%	0	0.0%
95.120	UVEAL CYST-FREE FLOATING	1	0.1%	0	0.0%
97.150	COLOBOMA	1	0.1%	0	0.0%
FUNDUS					
97.110	CHOROIDAL HYPOPLASIA	1	0.1%	0	0.0%
120.170	RETINAL DYSPLASIA-FOLDS	11	0.7%	0	0.0%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	2	0.1%	0	0.0%
120.310	RETINAL ATROPHY-GENERALIZED	4	0.2%	0	0.0%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.1%	0	0.0%
120.960	RETINOPATHY	1	0.1%	0	0.0%
LENS					
100.200	CATARACT, UNSPECIFIED	4	0.2%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	91	5.7%	31	5.8%
100.301	PUNCTATE-ANTERIOR CORTEX	11	0.7%	10	1.9%
100.302	PUNCTATE-POSTERIOR CORTEX	4	0.2%	2	0.4%
100.303	PUNCTATE-EQUATORIAL CORTEX	1	0.1%	0	0.0%
100.304	PUNCTATE-ANTERIOR SUTURES	4	0.2%	0	0.0%
100.305	PUNCTATE-POSTERIOR SUTURES	8	0.5%	0	0.0%
100.306	PUNCTATE-NUCLEUS	14	0.9%	11	2.0%
100.307	PUNCTATE-CAPSULAR	7	0.4%	4	0.7%
100.311	INCIPIENT-ANTERIOR CORTEX	8	0.5%	1	0.2%
100.312	INCIPIENT-POSTERIOR CORTEX	12	0.7%	1	0.2%
100.313	INCIPIENT-EQUATORIAL CORTEX	6	0.4%	2	0.4%
100.314	INCIPIENT-ANTERIOR SUTURES	2	0.1%	0	0.0%
100.315	INCIPIENT-POSTERIOR SUTURES	0	0.0%	1	0.2%
100.316	INCIPIENT-NUCLEUS	32	2.0%	7	1.3%
100.317	INCIPIENT-CAPSULAR	3	0.2%	1	0.2%
100.322	INCOMPLETE-POSTERIOR CORTEX	1	0.1%	0	0.0%
100.326	INCOMPLETE-NUCLEUS	0	0.0%	1	0.2%
100.327	INCOMPLETE-CAPSULAR	1	0.1%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	2	0.1%	7	1.3%
100.330	GENERALIZED/ COMPLETE	2	0.1%	0	0.0%
100.375	SUBLUXATION/ LUXATION	3	0.2%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***120***	***7.5%***	***41***	***7.6%***

OCULAR DISORDERS REPORT
IBIZAN HOUND

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1,606 #	 %	Year Examined: 2019-2023 Total # Dogs: 537 #	 %
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	4	0.2%	2	0.4%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	6	0.4%	1	0.2%
110.320 VITREOUS DEGENERATION-SYNERESIS	11	0.7%	1	0.2%
OTHER				
900.000 OTHER, UNSPECIFIED	24	1.5%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	20	1.2%	1	0.2%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	22	1.4%	19	3.5%
NORMAL				
.000 NORMAL GLOBE	1,268	79.0%	424	79.0%

ICELANDIC SHEEPDOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
B.	Cataract	Not defined	1	NO	

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
ICELANDIC SHEEPDOG

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	2,467		865	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	0	0.0%	2	0.2%
EYELIDS					
21.000	ENTROPION	5	0.2%	0	0.0%
25.110	DISTICHIASIS	22	0.9%	3	0.3%
32.110	IMPERFORATE LACRIMAL PUNCTUM	0	0.0%	3	0.3%
NICTITANS					
50.210	PLASMOMA/ ATYPICAL PANNUS	1	0.0%	0	0.0%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	1	0.0%	1	0.1%
70.220	EXPOSURE KERATOPATHY SYNDROME	1	0.0%	0	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	9	0.4%	0	0.0%
UVEA					
93.110	IRIS HYPOPLASIA	2	0.1%	0	0.0%
93.170	UVEAL CYST-MULTIPLE	0	0.0%	1	0.1%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	118	4.8%	27	3.1%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	1	0.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	3	0.1%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	2	0.1%	2	0.2%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	63	2.6%	40	4.6%
100.301	PUNCTATE-ANTERIOR CORTEX	17	0.7%	7	0.8%
100.302	PUNCTATE-POSTERIOR CORTEX	9	0.4%	5	0.6%
100.303	PUNCTATE-EQUATORIAL CORTEX	3	0.1%	3	0.3%
100.304	PUNCTATE-ANTERIOR SUTURES	2	0.1%	1	0.1%
100.305	PUNCTATE-POSTERIOR SUTURES	16	0.6%	3	0.3%
100.306	PUNCTATE-NUCLEUS	4	0.2%	4	0.5%
100.307	PUNCTATE-CAPSULAR	8	0.3%	16	1.8%
100.311	INCIPIENT-ANTERIOR CORTEX	4	0.2%	0	0.0%
100.312	INCIPIENT-POSTERIOR CORTEX	14	0.6%	3	0.3%
100.313	INCIPIENT-EQUATORIAL CORTEX	4	0.2%	3	0.3%
100.315	INCIPIENT-POSTERIOR SUTURES	9	0.4%	1	0.1%
100.316	INCIPIENT-NUCLEUS	0	0.0%	6	0.7%
100.317	INCIPIENT-CAPSULAR	3	0.1%	5	0.6%
100.321	INCOMPLETE-ANTERIOR CORTEX	4	0.2%	1	0.1%
100.322	INCOMPLETE-POSTERIOR CORTEX	4	0.2%	2	0.2%
100.323	INCOMPLETE-EQUATORIAL CORTEX	0	0.0%	1	0.1%
100.327	INCOMPLETE-CAPSULAR	0	0.0%	1	0.1%
100.328	Y-SUTURE TIP OPACITIES	6	0.2%	10	1.2%
100.330	GENERALIZED/ COMPLETE	1	0.0%	2	0.2%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***102***	***4.1%***	***64***	***7.4%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	3	0.1%	1	0.1%
110.320	VITREOUS DEGENERATION-SYNERESIS	4	0.2%	1	0.1%
FUNDUS					
120.170	RETINAL DYSPLASIA-FOLDS	9	0.4%	0	0.0%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	1	0.0%	0	0.0%
120.310	RETINAL ATROPHY-GENERALIZED	1	0.0%	3	0.3%
120.960	RETINOPATHY	2	0.1%	2	0.2%
130.110	MICROPAPILLA	0	0.0%	1	0.1%
OTHER					
900.000	OTHER, UNSPECIFIED	25	1.0%	0	0.0%
900.100	OTHER-SUSPECTED AS INHERITED	32	1.3%	0	0.0%

OCULAR DISORDERS REPORT
ICELANDIC SHEEPDOG

Year Examined:	1993-2018		2019-2023	
Total # Dogs:	2,467		865	
Diagnostic Name	**#**	**%**	**#**	**%**
OTHER Continued				
900.110 OTHER-SUSPECTED AS NOT-INHERITED	54	2.2%	41	4.7%
NORMAL				
.000 NORMAL GLOBE	2,222	90.1%	737	85.2%

IRISH RED AND WHITE SETTER

	Disorder	Inheritance	Reference	Breeding Advice	Genetic Mutations Described
A.	Cataract	Not defined	1	NO	
B.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- PRA-*PDE6B (RCD1)*	Autosomal recessive	2-21	NO	Mutation of the *PDE6B* gene
	- PRA-*C2orf71 (rcd4)*	Autosomal recessive	22	NO	Mutation of the *C2orf71* gene

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

B. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-*PDE6B*-rod-cone dysplasia, type 1 (*rcd1*)

A form of PRA identified in Irish Setters and Irish Red and White Setters. Clinical night blindness is observed as early as 6 weeks of age progressing to total blindness by one year. It may be diagnosed as early as 24 days with an ERG. Histologically the disease can be detected by 6 weeks. The disorder is caused by a mutation present in exon 21/codon 807 of the *PDE6B* gene. A DNA test is now available that will unequivocally identify genetically normal, affected and carrier dogs. The test is accurate only for this mutation and will not identify other forms of PRA.

- PRA-C2orf71-rod-cone dysplasia, type 4 (*rcd4*)

A form of PRA identified in the Gordon and Irish Setter breeds. Clinical night blindness is observed on average as late as 10 years of age and progresses to total blindness. This form of PRA has been referred to as late-onset PRA (LOPRA). The disorder is caused by a mutation present in the *C2orf71* gene. A DNA test is now available that will unequivocally identify genetically normal, affected and carrier dogs. The test is accurate only for this mutation and will not identify other forms of PRA.

References

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OCULAR DISORDERS REPORT
IRISH RED & WHITE SETTER

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	593		200	
	Diagnostic Name	#	%	#	%
EYELIDS					
21.000	ENTROPION	1	0.2%	0	0.0%
25.110	DISTICHIASIS	24	4.0%	2	1.0%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	2	0.3%	0	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	1	0.2%	1	0.5%
70.730	DYSTROPHY-ENDOTHELIAL	1	0.2%	0	0.0%
UVEA					
93.120	UVEAL CYST-SINGLE	2	0.3%	1	0.5%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	8	1.3%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	2	0.3%	2	1.0%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	1	0.2%	0	0.0%
95.120	UVEAL CYST-FREE FLOATING	1	0.2%	0	0.0%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	24	4.0%	14	7.0%
100.301	PUNCTATE-ANTERIOR CORTEX	6	1.0%	7	3.5%
100.302	PUNCTATE-POSTERIOR CORTEX	8	1.3%	2	1.0%
100.304	PUNCTATE-ANTERIOR SUTURES	1	0.2%	1	0.5%
100.305	PUNCTATE-POSTERIOR SUTURES	2	0.3%	0	0.0%
100.306	PUNCTATE-NUCLEUS	1	0.2%	2	1.0%
100.307	PUNCTATE-CAPSULAR	3	0.5%	5	2.5%
100.311	INCIPIENT-ANTERIOR CORTEX	6	1.0%	1	0.5%
100.312	INCIPIENT-POSTERIOR CORTEX	8	1.3%	3	1.5%
100.313	INCIPIENT-EQUATORIAL CORTEX	2	0.3%	0	0.0%
100.315	INCIPIENT-POSTERIOR SUTURES	1	0.2%	0	0.0%
100.316	INCIPIENT-NUCLEUS	3	0.5%	1	0.5%
100.317	INCIPIENT-CAPSULAR	2	0.3%	1	0.5%
100.321	INCOMPLETE-ANTERIOR CORTEX	1	0.2%	1	0.5%
100.322	INCOMPLETE-POSTERIOR CORTEX	1	0.2%	1	0.5%
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	2	1.0%
100.340	RESORBING/ HYPERMATURE	1	0.2%	0	0.0%
100.375	SUBLUXATION/ LUXATION	1	0.2%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***46***	***7.8%***	***25***	***12.5%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	0	0.0%	1	0.5%
110.135	PHPV/ PTVL	1	0.2%	0	0.0%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.2%	0	0.0%
110.320	VITREOUS DEGENERATION-SYNERESIS	4	0.7%	2	1.0%
FUNDUS					
120.170	RETINAL DYSPLASIA-FOLDS	4	0.7%	1	0.5%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	2	0.3%	1	0.5%
120.310	RETINAL ATROPHY-GENERALIZED	3	0.5%	1	0.5%
120.960	RETINOPATHY	1	0.2%	0	0.0%
OTHER					
900.000	OTHER, UNSPECIFIED	5	0.8%	0	0.0%
900.100	OTHER-SUSPECTED AS INHERITED	7	1.2%	1	0.5%
900.110	OTHER-SUSPECTED AS NOT-INHERITED	21	3.5%	21	10.5%
NORMAL					
.000	NORMAL GLOBE	497	83.8%	153	76.5%

IRISH SETTER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Entropion	Not defined	1	Breeder option	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
D.	Cataract	Not defined	1	NO	
E.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- PRA-*PDE6B (rcd1)*	Autosomal recessive	1, 2-21	NO	Mutation of the *PDE6B* gene
	- PRA-*C2orf71 (rcd4)*	Autosomal recessive	23	NO	Mutation of the *C2orf71* gene
F.	Amblyopia with quadriplegia	Autosomal recessive	24, 25	NO	

Description and Comments

A. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull. In the Irish Setter, the entropion usually involves the lower eyelids.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness

may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. Except for X-linked PRA in the Siberian Husky, in all breeds studied to date, PRA is inherited as an autosomal recessive trait.

In the Irish Setter, a later form of progressive retinal atrophy has been observed by several ophthalmologists at 4-5 years of age. Cases seen in this category appear to advance more rapidly than those with rod-cone dysplasia.

- PRA-*PDE6B*-rod-cone dysplasia, type 1 (*rcd1*)

A form of PRA identified in Irish Setters. Clinical night blindness is observed as early as 6 weeks of age progressing to total blindness by one year. It may be diagnosed as early as 24 days with an ERG. Histologically the disease can be detected by 6 weeks. The disorder is caused by a mutation present in exon 21/codon 807 of the *PDE6B* gene. A DNA test is available that will unequivocally identify genetically normal, affected and carrier dogs. The test is accurate only for this mutation and will not identify other forms of PRA.

- PRA-C2orf71-rod-cone dysplasia, type 4 (*rcd4*)

A form of PRA identified in the Gordon and Irish Setter breeds. Clinical night blindness is observed on average as late as 10 years of age and progresses to total blindness. This form of PRA has been referred to as late-onset PRA (LOPRA). The disorder is caused by a mutation present in the *C2orf71* gene. A DNA test is available that will unequivocally identify genetically normal, affected and carrier dogs. The test is accurate only for this mutation and will not identify other forms of PRA.

F. Amblyopia with quadriplegia

A congenital quadriplegia and amblyopia. The main symptoms include inability to stand or walk, amblyopia, tremor, nystagmus and possible seizures. Pathologic lesions are confined to the cerebellum. The condition was shown to be due to a fully penetrant autosomal recessive gene that is post-natally lethal in the homozygote.

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OCULAR DISORDERS REPORT
IRISH SETTER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 2,221 #	%	2019-2023 382 #	%
GLOBE				
.110 MICROPHTHALMOS	2	0.1%	0	0.0%
10.000 GLAUCOMA	1	0.0%	0	0.0%
40.910 KERATOCONJUNCTIVITIS SICCA (KCS)	1	0.0%	1	0.3%
EYELIDS				
20.140 ECTOPIC CILIA	1	0.0%	0	0.0%
20.160 MACROPALPEBRAL FISSURE	2	0.1%	0	0.0%
21.000 ENTROPION	54	2.4%	5	1.3%
22.000 ECTROPION	9	0.4%	0	0.0%
25.110 DISTICHIASIS	126	5.7%	23	6.0%
32.110 IMPERFORATE LACRIMAL PUNCTUM	2	0.1%	0	0.0%
NICTITANS				
52.110 GLAND PROLAPSE	3	0.1%	0	0.0%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	1	0.0%	0	0.0%
70.220 EXPOSURE KERATOPATHY SYNDROME	1	0.0%	0	0.0%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	6	0.3%	1	0.3%
70.730 DYSTROPHY-ENDOTHELIAL	1	0.0%	0	0.0%
UVEA				
93.120 UVEAL CYST-SINGLE	3	0.1%	1	0.3%
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	2	0.1%	0	0.0%
93.170 UVEAL CYST-MULTIPLE	1	0.0%	1	0.3%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	96	4.3%	22	5.8%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	7	0.3%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	6	0.3%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	30	1.4%	24	6.3%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	4	0.2%	1	0.3%
93.810 UVEAL MELANOMA	1	0.0%	0	0.0%
95.120 UVEAL CYST-FREE FLOATING	1	0.0%	0	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	31	1.4%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	109	4.9%	14	3.7%
100.301 PUNCTATE-ANTERIOR CORTEX	15	0.7%	6	1.6%
100.302 PUNCTATE-POSTERIOR CORTEX	18	0.8%	0	0.0%
100.303 PUNCTATE-EQUATORIAL CORTEX	4	0.2%	0	0.0%
100.304 PUNCTATE-ANTERIOR SUTURES	1	0.0%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	3	0.1%	0	0.0%
100.306 PUNCTATE-NUCLEUS	4	0.2%	3	0.8%
100.307 PUNCTATE-CAPSULAR	16	0.7%	4	1.0%
100.311 INCIPIENT-ANTERIOR CORTEX	22	1.0%	4	1.0%
100.312 INCIPIENT-POSTERIOR CORTEX	21	0.9%	2	0.5%
100.313 INCIPIENT-EQUATORIAL CORTEX	5	0.2%	1	0.3%
100.314 INCIPIENT-ANTERIOR SUTURES	4	0.2%	1	0.3%
100.315 INCIPIENT-POSTERIOR SUTURES	4	0.2%	0	0.0%
100.316 INCIPIENT-NUCLEUS	9	0.4%	0	0.0%
100.317 INCIPIENT-CAPSULAR	7	0.3%	0	0.0%
100.321 INCOMPLETE-ANTERIOR CORTEX	1	0.0%	1	0.3%
100.322 INCOMPLETE-POSTERIOR CORTEX	1	0.0%	1	0.3%
100.325 INCOMPLETE-POSTERIOR SUTURES	1	0.0%	1	0.3%
100.328 Y-SUTURE TIP OPACITIES	1	0.0%	0	0.0%
100.330 GENERALIZED/ COMPLETE	18	0.8%	0	0.0%
100.340 RESORBING/ HYPERMATURE	1	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION	1	0.0%	0	0.0%

OCULAR DISORDERS REPORT
IRISH SETTER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 2,221 #	 %	Year Examined: 2019-2023 Total # Dogs: 382 #	 %
LENS Continued				
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***186***	***8.4%***	***24***	***6.3%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	24	1.1%	14	3.7%
110.135 PHPV/ PTVL	10	0.5%	2	0.5%
110.320 VITREOUS DEGENERATION-SYNERESIS	4	0.2%	0	0.0%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	11	0.5%	6	1.6%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	1	0.0%	2	0.5%
120.310 RETINAL ATROPHY-GENERALIZED	18	0.8%	2	0.5%
120.960 RETINOPATHY	1	0.0%	1	0.3%
130.120 OPTIC NERVE HYPOPLASIA	4	0.2%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	19	0.9%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	38	1.7%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	46	2.1%	22	5.8%
NORMAL				
.000 NORMAL GLOBE	1,690	76.1%	265	69.4%

IRISH TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Cataract	Not defined	1	NO	

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
IRISH TERRIER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 104 #	 %	Year Examined: 2019-2023 Total # Dogs: 47 #	 %
EYELIDS				
25.110 DISTICHIASIS	1	1.0%	1	2.1%
NICTITANS				
50.210 PLASMOMA/ ATYPICAL PANNUS	0	0.0%	1	2.1%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	1	1.0%	1	2.1%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	1	1.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	0	0.0%	2	4.3%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	9	8.7%	8	17.0%
100.301 PUNCTATE-ANTERIOR CORTEX	1	1.0%	1	2.1%
100.306 PUNCTATE-NUCLEUS	3	2.9%	4	8.5%
100.307 PUNCTATE-CAPSULAR	1	1.0%	2	4.3%
100.311 INCIPIENT-ANTERIOR CORTEX	4	3.8%	0	0.0%
100.312 INCIPIENT-POSTERIOR CORTEX	1	1.0%	0	0.0%
100.316 INCIPIENT-NUCLEUS	2	1.9%	1	2.1%
100.317 INCIPIENT-CAPSULAR	3	2.9%	0	0.0%
100.330 GENERALIZED/ COMPLETE	1	1.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***16***	***15.4%***	***8***	***17.0%***
OTHER				
900.000 OTHER, UNSPECIFIED	3	2.9%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	1	1.0%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	1	1.0%	2	4.3%
NORMAL				
.000 NORMAL GLOBE	85	81.7%	33	70.2%

IRISH WATER SPANIEL

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	
D.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Corneal dystrophy – epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report

OCULAR DISORDERS REPORT
IRISH WATER SPANIEL

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1,227 #	 %	Year Examined: 2019-2023 Total # Dogs: 196 #	 %
EYELIDS				
20.140 ECTOPIC CILIA	1	0.1%	0	0.0%
21.000 ENTROPION	10	0.8%	0	0.0%
22.000 ECTROPION	3	0.2%	0	0.0%
25.110 DISTICHIASIS	315	25.7%	43	21.9%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	5	0.4%	4	2.0%
UVEA				
93.120 UVEAL CYST-SINGLE	2	0.2%	1	0.5%
93.150 IRIS COLOBOMA	1	0.1%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	55	4.5%	15	7.7%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	2	0.2%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	3	0.2%	0	0.0%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	1	0.1%	0	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	3	0.2%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	113	9.2%	16	8.2%
100.301 PUNCTATE-ANTERIOR CORTEX	36	2.9%	7	3.6%
100.302 PUNCTATE-POSTERIOR CORTEX	12	1.0%	7	3.6%
100.303 PUNCTATE-EQUATORIAL CORTEX	9	0.7%	1	0.5%
100.304 PUNCTATE-ANTERIOR SUTURES	2	0.2%	1	0.5%
100.305 PUNCTATE-POSTERIOR SUTURES	3	0.2%	1	0.5%
100.306 PUNCTATE-NUCLEUS	4	0.3%	1	0.5%
100.307 PUNCTATE-CAPSULAR	4	0.3%	1	0.5%
100.311 INCIPIENT-ANTERIOR CORTEX	15	1.2%	2	1.0%
100.312 INCIPIENT-POSTERIOR CORTEX	23	1.9%	7	3.6%
100.313 INCIPIENT-EQUATORIAL CORTEX	10	0.8%	1	0.5%
100.314 INCIPIENT-ANTERIOR SUTURES	2	0.2%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	2	0.2%	1	0.5%
100.316 INCIPIENT-NUCLEUS	6	0.5%	1	0.5%
100.317 INCIPIENT-CAPSULAR	5	0.4%	1	0.5%
100.321 INCOMPLETE-ANTERIOR CORTEX	1	0.1%	0	0.0%
100.322 INCOMPLETE-POSTERIOR CORTEX	0	0.0%	1	0.5%
100.326 INCOMPLETE-NUCLEUS	1	0.1%	1	0.5%
100.328 Y-SUTURE TIP OPACITIES	1	0.1%	1	0.5%
100.330 GENERALIZED/ COMPLETE	1	0.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***139***	***11.3%***	***34***	***17.3%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	2	0.2%	3	1.5%
110.320 VITREOUS DEGENERATION-SYNERESIS	2	0.2%	0	0.0%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	5	0.4%	1	0.5%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	1	0.1%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	5	0.4%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.1%	0	0.0%
120.920 RETINAL DETACHMENT	0	0.0%	2	1.0%
120.960 RETINOPATHY	3	0.2%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	20	1.6%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	15	1.2%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	17	1.4%	6	3.1%
NORMAL				
.000 NORMAL GLOBE	818	66.7%	116	59.2%

IRISH WOLFHOUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Nictitans cartilage anomaly/eversion	Not defined	1	Breeder option	
C.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
D.	Uveal cysts				
	- single	Not defined	1	Breeder option	
	- multiple	Not defined	1	Breeder option	
E.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
F.	Cataract	Not defined	1	NO	
G.	Retinal dysplasia				
	- folds	Not defined	1	Breeder option	
H.	Optic nerve hypoplasia	Not defined	1	NO	
I.	Micropapilla	Not defined	1	Breeder option	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Nictitans cartilage anomaly/eversion

A scroll-like curling of the cartilage of the third eyelid, usually everting the margin. This condition may occur in one or both eyes and may cause mild ocular irritation.

C. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Uveal cysts

Fluid filled sacs arising from the posterior surface of the iris, to which they may remain attached or break free and float into the anterior chamber. Usually occur in mature dogs.

E. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally in the neonatal period. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

F. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

G. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

H. Optic nerve hypoplasia

A congenital defect of the optic nerve which causes blindness and abnormal pupil response in the affected eye. May be unable to differentiate from micropapilla on a routine (dilated) screening ophthalmoscopic exam.

I. Micropapilla

A congenital anomaly which results in a small optic disk diameter without vision loss. Contrast with optic nerve hypoplasia, which may have a similar ophthalmoscopic appearance with vision loss.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
IRISH WOLFHOUND

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 2,138 #	%	2019-2023 527 #	%
GLOBE				
.110 MICROPHTHALMOS	1	0.0%	0	0.0%
EYELIDS				
20.140 ECTOPIC CILIA	1	0.0%	0	0.0%
21.000 ENTROPION	6	0.3%	1	0.2%
25.110 DISTICHIASIS	105	4.9%	31	5.9%
32.110 IMPERFORATE LACRIMAL PUNCTUM	0	0.0%	1	0.2%
NICTITANS				
50.210 PLASMOMA/ ATYPICAL PANNUS	1	0.0%	0	0.0%
51.100 CARTILAGE ANOMALY/ EVERSION	21	1.0%	11	2.1%
CORNEA				
70.220 EXPOSURE KERATOPATHY SYNDROME	1	0.0%	0	0.0%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	39	1.8%	3	0.6%
70.730 DYSTROPHY-ENDOTHELIAL	2	0.1%	0	0.0%
UVEA				
93.120 UVEAL CYST-SINGLE	95	4.4%	25	4.7%
93.170 UVEAL CYST-MULTIPLE	20	0.9%	32	6.1%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	23	1.1%	9	1.7%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	7	0.3%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	11	0.5%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	5	0.2%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	0	0.0%	1	0.2%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	2	0.1%	0	0.0%
93.810 UVEAL MELANOMA	1	0.0%	0	0.0%
95.120 UVEAL CYST-FREE FLOATING	5	0.2%	1	0.2%
LENS				
100.200 CATARACT, UNSPECIFIED	12	0.6%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	97	4.5%	35	6.6%
100.301 PUNCTATE-ANTERIOR CORTEX	17	0.8%	0	0.0%
100.302 PUNCTATE-POSTERIOR CORTEX	29	1.4%	5	0.9%
100.303 PUNCTATE-EQUATORIAL CORTEX	6	0.3%	2	0.4%
100.304 PUNCTATE-ANTERIOR SUTURES	1	0.0%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	11	0.5%	3	0.6%
100.306 PUNCTATE-NUCLEUS	9	0.4%	10	1.9%
100.307 PUNCTATE-CAPSULAR	13	0.6%	7	1.3%
100.311 INCIPIENT-ANTERIOR CORTEX	16	0.7%	8	1.5%
100.312 INCIPIENT-POSTERIOR CORTEX	39	1.8%	15	2.8%
100.313 INCIPIENT-EQUATORIAL CORTEX	10	0.5%	6	1.1%
100.314 INCIPIENT-ANTERIOR SUTURES	1	0.0%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	15	0.7%	1	0.2%
100.316 INCIPIENT-NUCLEUS	13	0.6%	4	0.8%
100.317 INCIPIENT-CAPSULAR	8	0.4%	8	1.5%
100.321 INCOMPLETE-ANTERIOR CORTEX	1	0.0%	0	0.0%
100.322 INCOMPLETE-POSTERIOR CORTEX	3	0.1%	0	0.0%
100.323 INCOMPLETE-EQUATORIAL CORTEX	1	0.0%	0	0.0%
100.325 INCOMPLETE-POSTERIOR SUTURES	1	0.0%	0	0.0%
100.326 INCOMPLETE-NUCLEUS	1	0.0%	0	0.0%
100.327 INCOMPLETE-CAPSULAR	0	0.0%	1	0.2%
100.328 Y-SUTURE TIP OPACITIES	2	0.1%	0	0.0%
100.330 GENERALIZED/ COMPLETE	5	0.2%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***212***	***9.9%***	***70***	***13.3%***

OCULAR DISORDERS REPORT
IRISH WOLFHOUND

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 2,138 #	 %	Year Examined: 2019-2023 Total # Dogs: 527 #	 %
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	7	0.3%	0	0.0%
110.135 PHPV/ PTVL	0	0.0%	1	0.2%
110.320 VITREOUS DEGENERATION-SYNERESIS	7	0.3%	2	0.4%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	28	1.3%	6	1.1%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	11	0.5%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	2	0.1%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%
120.960 RETINOPATHY	1	0.0%	1	0.2%
120.970 RETINOPATHY - CMR/ CMR-LIKE	0	0.0%	1	0.2%
130.110 MICROPAPILLA	15	0.7%	6	1.1%
130.120 OPTIC NERVE HYPOPLASIA	30	1.4%	3	0.6%
OTHER				
900.000 OTHER, UNSPECIFIED	22	1.0%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	59	2.8%	1	0.2%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	54	2.5%	24	4.6%
NORMAL				
.000 NORMAL GLOBE	1,617	75.6%	350	66.4%

ITALIAN GREYHOUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Cataract	Not defined	1	NO	
B.	Vitreous degeneration				
	- syneresis	Not defined	1, 2	Breeder option	
	- anterior chamber	Not defined	1, 2	Breeder option	
C.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- *IG-PRA1***	Autosomal recessive	3	NO	

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

In the Italian Greyhound, posterior subcapsular and cortical cataracts at two to three years of age appear to be the more common location of occurrence, with progression noted in an undetermined percentage of dogs.

B. Vitreous degeneration - syneresis

A liquefaction of the vitreous gel which may predispose to retinal detachment, but in this breed, it was shown not to be associated (Krishnan et al reference)

C. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- IG-PRA1

Italian Greyhound PRA (*IG-PRA1*) is considered a "late onset" PRA with clinical signs detected between 3-5 years of age. Dogs initially lose night vision followed by decreased vision in bright light conditions. Clinically increases in

tapetal reflectivity and retinal vessel attenuation are noted. The risk allele is known, but the genetic mutation has not been determined. The disease has been presumed to be inherited as an autosomal recessive trait. However some affected dogs had only one copy of the risk allele suggesting an autosomal dominant with incomplete penetrance mode of inheritance.

At least one other form of PRA appears to be present in the breed and will not be detected with this test. **A DNA test is available for the risk allele, but is multilocus and no mutation is described.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Krishnan, H., et al. (2020). Vitreous degeneration and associated ocular abnormalities in the dog. Vet Ophthalmol 23(2): 219-224. PMID: 31464365

3. Goldstein O, Pearce-Kelling, SE, Aguirre GD, Acland GM. Adult onset autosomal recessive hereditary retinal degeneration in Italian Greyhound dogs. *IOVS*, April 2011, Vol 52, 4351. ARVO abstract. (Only reference available for this condition)

OCULAR DISORDERS REPORT
ITALIAN GREYHOUND

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	8,030		500	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	1	0.0%	1	0.2%
EYELIDS					
21.000	ENTROPION	0	0.0%	1	0.2%
25.110	DISTICHIASIS	23	0.3%	0	0.0%
32.110	IMPERFORATE LACRIMAL PUNCTUM	8	0.1%	1	0.2%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	7	0.1%	0	0.0%
70.220	EXPOSURE KERATOPATHY SYNDROME	2	0.0%	0	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	21	0.3%	1	0.2%
UVEA					
93.110	IRIS HYPOPLASIA	1	0.0%	0	0.0%
93.120	UVEAL CYST-SINGLE	3	0.0%	0	0.0%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	3	0.0%	0	0.0%
93.150	IRIS COLOBOMA	6	0.1%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	52	0.6%	3	0.6%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	6	0.1%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	5	0.1%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	5	0.1%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	7	0.1%	2	0.4%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	5	0.1%	0	0.0%
FUNDUS					
97.110	CHOROIDAL HYPOPLASIA	22	0.3%	0	0.0%
120.170	RETINAL DYSPLASIA-FOLDS	26	0.3%	1	0.2%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	4	0.0%	0	0.0%
120.310	RETINAL ATROPHY-GENERALIZED	250	3.1%	7	1.4%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	8	0.1%	0	0.0%
120.920	RETINAL DETACHMENT	3	0.0%	0	0.0%
120.960	RETINOPATHY	8	0.1%	1	0.2%
130.110	MICROPAPILLA	21	0.3%	4	0.8%
130.120	OPTIC NERVE HYPOPLASIA	36	0.4%	1	0.2%
LENS					
100.200	CATARACT, UNSPECIFIED	17	0.2%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	354	4.4%	26	5.2%
100.301	PUNCTATE-ANTERIOR CORTEX	124	1.5%	17	3.4%
100.302	PUNCTATE-POSTERIOR CORTEX	97	1.2%	4	0.8%
100.303	PUNCTATE-EQUATORIAL CORTEX	36	0.4%	3	0.6%
100.304	PUNCTATE-ANTERIOR SUTURES	6	0.1%	0	0.0%
100.305	PUNCTATE-POSTERIOR SUTURES	20	0.2%	0	0.0%
100.306	PUNCTATE-NUCLEUS	10	0.1%	1	0.2%
100.307	PUNCTATE-CAPSULAR	19	0.2%	4	0.8%
100.311	INCIPIENT-ANTERIOR CORTEX	183	2.3%	9	1.8%
100.312	INCIPIENT-POSTERIOR CORTEX	186	2.3%	7	1.4%
100.313	INCIPIENT-EQUATORIAL CORTEX	109	1.4%	4	0.8%
100.314	INCIPIENT-ANTERIOR SUTURES	9	0.1%	0	0.0%
100.315	INCIPIENT-POSTERIOR SUTURES	18	0.2%	0	0.0%
100.316	INCIPIENT-NUCLEUS	16	0.2%	1	0.2%
100.317	INCIPIENT-CAPSULAR	19	0.2%	2	0.4%
100.321	INCOMPLETE-ANTERIOR CORTEX	13	0.2%	2	0.4%
100.322	INCOMPLETE-POSTERIOR CORTEX	14	0.2%	4	0.8%
100.323	INCOMPLETE-EQUATORIAL CORTEX	5	0.1%	3	0.6%
100.324	INCOMPLETE-ANTERIOR SUTURES	1	0.0%	0	0.0%

OCULAR DISORDERS REPORT
ITALIAN GREYHOUND

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 8,030 #	 %	2019-2023 500 #	 %
LENS Continued				
100.326 INCOMPLETE-NUCLEUS	1	0.0%	0	0.0%
100.327 INCOMPLETE-CAPSULAR	0	0.0%	1	0.2%
100.328 Y-SUTURE TIP OPACITIES	2	0.0%	0	0.0%
100.330 GENERALIZED/ COMPLETE	49	0.6%	2	0.4%
100.375 SUBLUXATION/ LUXATION	36	0.4%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***952***	***11.9%***	***64***	***12.8%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	22	0.3%	3	0.6%
110.135 PHPV/ PTVL	3	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1,094	13.6%	94	18.8%
110.320 VITREOUS DEGENERATION-SYNERESIS	1,733	21.6%	63	12.6%
OTHER				
900.000 OTHER, UNSPECIFIED	63	0.8%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	143	1.8%	1	0.2%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	116	1.4%	14	2.8%
NORMAL				
.000 NORMAL GLOBE	5,235	65.2%	333	66.6%

JACK RUSSELL TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	
D.	Lens luxation	Autosomal recessive	2-7	NO	Mutation of the *ADAMTS17* gene
E.	Vitreous degeneration				
	- syneresis	Not defined	1, 2	Breeder option	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Lens luxation

Partial (subluxation) or complete displacement of the lens from its normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated

intraocular pressure (glaucoma) causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

E. Vitreous degeneration - syneresis

Liquefaction of the vitreous gel which may predispose to retinal detachment.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Lawson DD. Luxation of the crystalline lens in the dog. J Small Anim Pract. 1969;10:461-463. PMID: 5387868

3. Curtis R, Barnett KC. Primary lens luxation in the dog. J Small Anim Pract. 1980;21:657-668. PMID: 6969820

4. Curtis R, Barnett KC, Lewis SJ. Clinical and pathological observations concerning the aetiology of primary lens luxation in the dog. Vet Rec. 1983;112:238-246. PMID: 6601878

5. Oberbauer AM, Hollingsworth SR, Belanger JM, et al. Inheritance of cataracts and primary lens luxation in Jack Russell Terriers. Am J Vet Res. 2008;69:222-227. PMID: 18241019

6. Farias FH, Johnson GS, Taylor JF, et al. An ADAMTS17 splice donor site mutation in dogs with primary lens luxation. Invest Ophthalmol Vis Sci. 2010;51:4716-4721. PMID: 20375329

7. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. Vet Ophthalmol. 2011;14:378-384. PMID: 22050825

OCULAR DISORDERS REPORT
JACK RUSSELL TERRIER

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	16,393		1,247	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	5	0.0%	0	0.0%
10.000	GLAUCOMA	3	0.0%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	2	0.0%	1	0.1%
EYELIDS					
20.140	ECTOPIC CILIA	2	0.0%	0	0.0%
20.160	MACROPALPEBRAL FISSURE	1	0.0%	0	0.0%
21.000	ENTROPION	3	0.0%	0	0.0%
25.110	DISTICHIASIS	371	2.3%	18	1.4%
NICTITANS					
51.100	CARTILAGE ANOMALY/ EVERSION	0	0.0%	1	0.1%
52.110	GLAND PROLAPSE	1	0.0%	1	0.1%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	1	0.0%	0	0.0%
70.220	EXPOSURE KERATOPATHY SYNDROME	9	0.1%	0	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	64	0.4%	5	0.4%
70.730	DYSTROPHY-ENDOTHELIAL	11	0.1%	0	0.0%
UVEA					
93.120	UVEAL CYST-SINGLE	5	0.0%	0	0.0%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.0%	0	0.0%
93.150	IRIS COLOBOMA	4	0.0%	0	0.0%
93.170	UVEAL CYST-MULTIPLE	1	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	742	4.5%	50	4.0%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	40	0.2%	1	0.1%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	18	0.1%	1	0.1%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	10	0.1%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	13	0.1%	13	1.0%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	6	0.0%	0	0.0%
95.120	UVEAL CYST-FREE FLOATING	1	0.0%	0	0.0%
FUNDUS					
97.120	COLOBOMA	2	0.0%	0	0.0%
120.170	RETINAL DYSPLASIA-FOLDS	59	0.4%	3	0.2%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	20	0.1%	0	0.0%
120.310	RETINAL ATROPHY-GENERALIZED	85	0.5%	2	0.2%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	8	0.0%	0	0.0%
120.960	RETINOPATHY	3	0.0%	0	0.0%
130.110	MICROPAPILLA	7	0.0%	0	0.0%
130.120	OPTIC NERVE HYPOPLASIA	13	0.1%	0	0.0%
LENS					
100.200	CATARACT, UNSPECIFIED	4	0.0%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	558	3.4%	59	4.7%
100.301	PUNCTATE-ANTERIOR CORTEX	102	0.6%	21	1.7%
100.302	PUNCTATE-POSTERIOR CORTEX	90	0.5%	14	1.1%
100.303	PUNCTATE-EQUATORIAL CORTEX	26	0.2%	6	0.5%
100.304	PUNCTATE-ANTERIOR SUTURES	16	0.1%	0	0.0%
100.305	PUNCTATE-POSTERIOR SUTURES	64	0.4%	10	0.8%
100.306	PUNCTATE-NUCLEUS	31	0.2%	11	0.9%
100.307	PUNCTATE-CAPSULAR	24	0.1%	8	0.6%
100.311	INCIPIENT-ANTERIOR CORTEX	198	1.2%	10	0.8%
100.312	INCIPIENT-POSTERIOR CORTEX	390	2.4%	30	2.4%
100.313	INCIPIENT-EQUATORIAL CORTEX	70	0.4%	7	0.6%
100.314	INCIPIENT-ANTERIOR SUTURES	8	0.0%	0	0.0%

OCULAR DISORDERS REPORT
JACK RUSSELL TERRIER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 16,393 #	 %	Year Examined: 2019-2023 Total # Dogs: 1,247 #	 %
LENS Continued				
100.315 INCIPIENT-POSTERIOR SUTURES	146	0.9%	7	0.6%
100.316 INCIPIENT-NUCLEUS	33	0.2%	0	0.0%
100.317 INCIPIENT-CAPSULAR	28	0.2%	6	0.5%
100.321 INCOMPLETE-ANTERIOR CORTEX	4	0.0%	1	0.1%
100.322 INCOMPLETE-POSTERIOR CORTEX	11	0.1%	7	0.6%
100.323 INCOMPLETE-EQUATORIAL CORTEX	1	0.0%	1	0.1%
100.325 INCOMPLETE-POSTERIOR SUTURES	1	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	9	0.1%	11	0.9%
100.330 GENERALIZED/ COMPLETE	97	0.6%	1	0.1%
100.375 SUBLUXATION/ LUXATION	82	0.5%	1	0.1%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1,344***	***8.2%***	***140***	***11.2%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	20	0.1%	2	0.2%
110.135 PHPV/ PTVL	4	0.0%	1	0.1%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	25	0.2%	3	0.2%
110.320 VITREOUS DEGENERATION-SYNERESIS	218	1.3%	8	0.6%
OTHER				
900.000 OTHER, UNSPECIFIED	113	0.7%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	647	3.9%	3	0.2%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	156	1.0%	64	5.1%
NORMAL				
.000 NORMAL GLOBE	13,539	82.6%	999	80.1%

JAGDTERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Lens luxation	Autosomal recessive	1	NO	Mutation of the *ADAMTS17* gene

Description and Comments

A. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the Jagdterrier. The condition listed above is currently noted solely due to the availability of a genetic test for the disease.

1. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. Vet Ophthalmol. 2011; 14: 378-384. PMID: 22050825

OCULAR DISORDERS REPORT
JAGDTERRIER

Year Examined:	1993-2018		2019-2023	
Total # Dogs:	2		2	
Diagnostic Name	**#**	**%**	**#**	**%**
OTHER				
900.110 OTHER-SUSPECTED AS NOT-INHERITED	0	0.0%	2	100.0%
NORMAL				
.000 NORMAL GLOBE	2	100.0%	0	0.0%

JAMTHUND

(Swedish Elkhound)

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Retinal atrophy			
	- generalized	Not defined	1	NO

Description and Comments

A. Retinal atrophy

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

References

1. Hertil E, Bergström T, Kell U, Karlstam L, Ekman S, Ekesten B. Retinal degeneration in nine Swedish Jämthund dogs. Vet Ophthalmol. 2010 Mar;13(2):110-6. doi: 10.1111/j.1463-5224.2010.00761.x. PMID: 20447030.

OCULAR DISORDERS REPORT
JAMTHUND

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 0 #	%	Year Examined: 2019-2023 Total # Dogs: 1 #	%
NORMAL				
.000 NORMAL GLOBE	0		1	100.0%

JAPANESE AKITA

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A	Distichiasis	Not defined	1	Breeder option	
B.	Uveodermatologic syndrome	Not defined	2-8	NO	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
D.	Corneal dystrophy				
	– epithelial/stromal	Not defined	1	Breeder option	
E	Cataract	Not defined	1	NO	
F	Y-suture tip opacities	Not defined	1	Breeder option	
G.	Persistent hyaloid artery remnant (PHA)	Not defined	1	Breeder option	
H.	Retinal dysplasia				
	- folds	Not defined	1	Breeder option	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Uveodermatologic syndrome

American Akitas and Japanese Akitas are both recognized but are closely related genetically. Because the term “Akita” is commonly used interchangeably to refer to either type, heritable diseases described may affect one or both of these types of Akita.

Uveodermatologic syndrome in the Akita bears many similarities to a condition in people called Vogt-Koyanagi-Harada (or VKH) syndrome. Thus, the condition in dogs is often referred to as VKH or VKH-like syndrome. It is an immune-mediated disease in which pigmented cells (melanocytes) in the eye and in the skin are destroyed by white blood cells (lymphocytes). The

first clinical signs are usually inflammation of the intraocular structures (or uveitis) in both eyes. The uveitis is very difficult to control medically and ultimately results in blindness in most affected dogs. Whitening of the hair (poliosis) and skin (vitiligo) may also be noted in advanced cases. The genetics of this condition are unclear, but some genetic predisposition is indicated by the higher prevalence of this disorder in Akitas compared with other dog breeds. Affected dogs are generally young, ranging in age between 1 ½ to 4 years.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or from sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

D. Corneal Dystrophy - epithelial/stromal

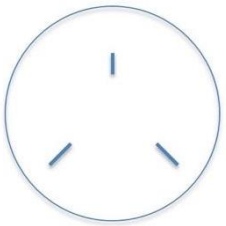
A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

F. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. The newest version of the form (3/16/21) has boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

H. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

H. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Startup FG. Hereditary eye problems in the Japanese Akita. *Vet Rec*. 1986;118:251. PMID: 3705415

3. Asakura S, Takahasi K, Onishi T. Vogt-Koyanagi-Harada syndrome (uveitis diffusa acuta) in the dog. *Japanese J Vet Med*. 1977;673:445-455.

4 Cottrell BD, Barnett KC. Harada disease in the Japanese Akita. *J Small Anim Pract*. 1987;28:517-521. **reference derived from non-USA dog population**

5. Bellhorn RW, Murphy CL, Thirkill CE. Antiretinal immunoglobulins in canine ocular diseases. *Semin Vet Med Surg*. 1988;3:28-32. PMID: 3363244

6. Morgan RV. Vogt-Koyanagi-Harada syndrome in humans and dogs. *Comp Cont Educ Pract Vet*. 1989;11:1211-1217.

7. Angles JM, Famula TR, Pedersen NC. Uveodermatologic (VKH-like) syndrome in American Akita dogs is associated with an increased frequency of DQA1*00201. Tissue Antigens. 2005 Dec;66(6):656-65. doi: 10.1111/j.1399-0039.2005.00508.x. PMID: 16305682.

8. Yamaki K, Takiyama N, Itho N, Mizuki N, Seiya M, Sinsuke W, Hayakawa K, Kotani T. Experimentally induced Vogt-Koyanagi-Harada disease in two Akita dogs. Exp Eye Res. 2005 Feb;80(2):273-80. doi: 10.1016/j.exer.2004.09.010. PMID: 15670805. **reference derived from non-USA dog population**

OCULAR DISORDERS REPORT
JAPANESE AKITA

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 124 #	 %	Year Examined: 2019-2023 Total # Dogs: 245 #	 %
EYELIDS				
25.110 DISTICHIASIS	1	0.8%	5	2.0%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	1	0.8%	6	2.4%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	8	6.5%	26	10.6%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	1	0.8%	0	0.0%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	6	4.8%	18	7.3%
100.301 PUNCTATE-ANTERIOR CORTEX	1	0.8%	1	0.4%
100.302 PUNCTATE-POSTERIOR CORTEX	2	1.6%	4	1.6%
100.303 PUNCTATE-EQUATORIAL CORTEX	0	0.0%	1	0.4%
100.304 PUNCTATE-ANTERIOR SUTURES	0	0.0%	2	0.8%
100.305 PUNCTATE-POSTERIOR SUTURES	5	4.0%	3	1.2%
100.306 PUNCTATE-NUCLEUS	0	0.0%	3	1.2%
100.307 PUNCTATE-CAPSULAR	1	0.8%	5	2.0%
100.315 INCIPIENT-POSTERIOR SUTURES	0	0.0%	2	0.8%
100.317 INCIPIENT-CAPSULAR	0	0.0%	6	2.4%
100.326 INCOMPLETE-NUCLEUS	0	0.0%	1	0.4%
100.328 Y-SUTURE TIP OPACITIES	4	3.2%	13	5.3%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***9***	***7.3%***	***28***	***11.4%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	0	0.0%	9	3.7%
110.320 VITREOUS DEGENERATION-SYNERESIS	1	0.8%	1	0.4%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	2	1.6%	4	1.6%
120.920 RETINAL DETACHMENT	1	0.8%	0	0.0%
120.960 RETINOPATHY	0	0.0%	2	0.8%
OTHER				
900.100 OTHER-SUSPECTED AS INHERITED	3	2.4%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	8	6.5%	18	7.3%
NORMAL				
.000 NORMAL GLOBE	94	75.8%	167	68.2%

JAPANESE CHIN

(JAPANESE SPANIEL)

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Entropion	Not defined	1	Breeder option	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Exposure keratopathy syndrome	Not defined	1	Breeder option	
D.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
E.	Cataract	Not defined	1	NO	
F.	Vitreous degeneration				
	- syneresis	Not defined	1	Breeder option	
G.	Persistent hyaloid artery remnant	Not defined	1	Breeder option	

Description and Comments

A. Entropion

A conformational defect resulting in an "in-rolling" of one or more of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Exposure keratopathy syndrome

A condition characterized by variable degrees of superficial vascularization, fibrosis and/or pigmentation of the cornea. May be associated with excessive exposure/irritation of the globe due to shallow orbits, lower eyelid medial entropion, lagophthalmos and macropalpebral fissure.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or from sheets of tissue in the anterior

chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

F. Vitreous degeneration - syneresis

A liquefaction of the vitreous gel which may predispose to retinal detachment.

G. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
JAPANESE CHIN

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	1,331		224	
	Diagnostic Name	#	%	#	%
EYELIDS					
20.160	MACROPALPEBRAL FISSURE	13	1.0%	0	0.0%
21.000	ENTROPION	102	7.7%	17	7.6%
22.000	ECTROPION	1	0.1%	0	0.0%
25.110	DISTICHIASIS	57	4.3%	13	5.8%
32.110	IMPERFORATE LACRIMAL PUNCTUM	1	0.1%	0	0.0%
GLOBE					
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	1	0.1%	4	1.8%
NICTITANS					
52.110	GLAND PROLAPSE	2	0.2%	0	0.0%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	11	0.8%	0	0.0%
70.220	EXPOSURE KERATOPATHY SYNDROME	47	3.5%	12	5.4%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	3	0.2%	0	0.0%
70.730	DYSTROPHY-ENDOTHELIAL	4	0.3%	0	0.0%
UVEA					
93.150	IRIS COLOBOMA	1	0.1%	1	0.4%
93.170	UVEAL CYST-MULTIPLE	1	0.1%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	140	10.5%	11	4.9%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	6	0.5%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	7	0.5%	1	0.4%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	6	0.5%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	1	0.1%	0	0.0%
FUNDUS					
97.120	COLOBOMA	1	0.1%	0	0.0%
120.170	RETINAL DYSPLASIA-FOLDS	2	0.2%	2	0.9%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	2	0.2%	1	0.4%
120.310	RETINAL ATROPHY-GENERALIZED	16	1.2%	0	0.0%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.1%	0	0.0%
120.920	RETINAL DETACHMENT	1	0.1%	0	0.0%
120.960	RETINOPATHY	0	0.0%	1	0.4%
130.110	MICROPAPILLA	1	0.1%	0	0.0%
130.120	OPTIC NERVE HYPOPLASIA	0	0.0%	1	0.4%
LENS					
100.200	CATARACT, UNSPECIFIED	1	0.1%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	64	4.8%	9	4.0%
100.301	PUNCTATE-ANTERIOR CORTEX	27	2.0%	5	2.2%
100.302	PUNCTATE-POSTERIOR CORTEX	11	0.8%	2	0.9%
100.303	PUNCTATE-EQUATORIAL CORTEX	9	0.7%	2	0.9%
100.304	PUNCTATE-ANTERIOR SUTURES	6	0.5%	2	0.9%
100.305	PUNCTATE-POSTERIOR SUTURES	7	0.5%	1	0.4%
100.306	PUNCTATE-NUCLEUS	2	0.2%	0	0.0%
100.307	PUNCTATE-CAPSULAR	4	0.3%	1	0.4%
100.311	INCIPIENT-ANTERIOR CORTEX	48	3.6%	11	4.9%
100.312	INCIPIENT-POSTERIOR CORTEX	32	2.4%	3	1.3%
100.313	INCIPIENT-EQUATORIAL CORTEX	26	2.0%	4	1.8%
100.314	INCIPIENT-ANTERIOR SUTURES	2	0.2%	0	0.0%
100.315	INCIPIENT-POSTERIOR SUTURES	10	0.8%	0	0.0%
100.316	INCIPIENT-NUCLEUS	7	0.5%	0	0.0%
100.317	INCIPIENT-CAPSULAR	13	1.0%	2	0.9%
100.321	INCOMPLETE-ANTERIOR CORTEX	6	0.5%	3	1.3%
100.322	INCOMPLETE-POSTERIOR CORTEX	0	0.0%	2	0.9%
100.328	Y-SUTURE TIP OPACITIES	2	0.2%	1	0.4%

OCULAR DISORDERS REPORT
JAPANESE CHIN

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1,331 #	 %	Year Examined: 2019-2023 Total # Dogs: 224 #	 %
LENS Continued				
100.330 GENERALIZED/ COMPLETE	8	0.6%	0	0.0%
100.340 RESORBING/ HYPERMATURE	0	0.0%	1	0.4%
100.375 SUBLUXATION/ LUXATION	6	0.5%	2	0.9%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***219***	***16.5%***	***39***	***17.4%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	16	1.2%	4	1.8%
110.135 PHPV/ PTVL	13	1.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	11	0.8%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	57	4.3%	7	3.1%
OTHER				
900.000 OTHER, UNSPECIFIED	28	2.1%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	46	3.5%	2	0.9%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	51	3.8%	25	11.2%
NORMAL				
.000 NORMAL GLOBE	836	62.8%	120	53.6%

JINDO

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the JINDO breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
JINDO

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 10 #	 %	Year Examined: 2019-2023 Total # Dogs: 15 #	 %
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	0	0.0%	1	6.7%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	0	0.0%	1	6.7%
100.301 PUNCTATE-ANTERIOR CORTEX	1	10.0%	0	0.0%
100.306 PUNCTATE-NUCLEUS	0	0.0%	1	6.7%
100.313 INCIPIENT-EQUATORIAL CORTEX	1	10.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	1	6.7%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***2***	***20.0%***	***1***	***6.7%***
NORMAL				
.000 NORMAL GLOBE	9	90.0%	13	86.7%

KAI KEN

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE
A.	Persistent pupillary membranes			
	- lens pigment foci/no strands	Not defined	1	Passes with no notation

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
KAI KEN

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 14 #	 %	Year Examined: 2019-2023 Total # Dogs: 34 #	 %
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	0	0.0%	1	2.9%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	1	7.1%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	5	35.7%	13	38.2%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	0	0.0%	3	8.8%
100.302 PUNCTATE-POSTERIOR CORTEX	0	0.0%	1	2.9%
100.303 PUNCTATE-EQUATORIAL CORTEX	0	0.0%	1	2.9%
100.304 PUNCTATE-ANTERIOR SUTURES	0	0.0%	1	2.9%
100.307 PUNCTATE-CAPSULAR	0	0.0%	1	2.9%
100.312 INCIPIENT-POSTERIOR CORTEX	0	0.0%	1	2.9%
100.313 INCIPIENT-EQUATORIAL CORTEX	0	0.0%	1	2.9%
100.317 INCIPIENT-CAPSULAR	0	0.0%	1	2.9%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***0***	***0.0%***	***7***	***20.6%***
FUNDUS				
120.960 RETINOPATHY	1	7.1%	0	0.0%
NORMAL				
.000 NORMAL GLOBE	8	57.1%	18	52.9%

KARELIAN BEAR DOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Cataract	Not defined	1	NO	
B.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- PRA-*prcd*	Autosomal recessive	2	NO	Mutation of the *prcd* gene

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

B. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-*prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited. A genetic test is available to detect the progressive rod cone degeneration form of PRA caused by a mutation in the *prcd* gene.

A second form of PRA is also present in the Karelian Bear Dog for which the causative mutation is not yet known.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Ahonen S, Lohi H, editors. Progressive retinal atrophy in the Karelian Bear Dog: A large animal model for retinitis pigmentosa. ARVO Abstract 2014 Annual Meeting; 2014; Orlando, FL. Program number: 3270.

OCULAR DISORDERS REPORT
KARELIAN BEAR DOG

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 110 #	 %	Year Examined: 2019-2023 Total # Dogs: 22 #	 %
EYELIDS				
25.110 DISTICHIASIS	2	1.8%	0	0.0%
CORNEA				
70.220 EXPOSURE KERATOPATHY SYNDROME	0	0.0%	1	4.5%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	4	3.6%	1	4.5%
70.730 DYSTROPHY-ENDOTHELIAL	1	0.9%	0	0.0%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	10	9.1%	2	9.1%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	3	2.7%	0	0.0%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	2	1.8%	1	4.5%
100.302 PUNCTATE-POSTERIOR CORTEX	0	0.0%	1	4.5%
100.307 PUNCTATE-CAPSULAR	2	1.8%	0	0.0%
100.311 INCIPIENT-ANTERIOR CORTEX	3	2.7%	0	0.0%
100.312 INCIPIENT-POSTERIOR CORTEX	4	3.6%	1	4.5%
100.314 INCIPIENT-ANTERIOR SUTURES	1	0.9%	0	0.0%
100.316 INCIPIENT-NUCLEUS	1	0.9%	0	0.0%
100.317 INCIPIENT-CAPSULAR	2	1.8%	0	0.0%
100.322 INCOMPLETE-POSTERIOR CORTEX	0	0.0%	2	9.1%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***13***	***11.8%***	***4***	***18.2%***
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	4	3.6%	1	4.5%
120.310 RETINAL ATROPHY-GENERALIZED	1	0.9%	0	0.0%
120.960 RETINOPATHY	1	0.9%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	1	0.9%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	1	0.9%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	1	0.9%	2	9.1%
NORMAL				
.000 NORMAL GLOBE	83	75.5%	13	59.1%

KEESHOND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCIRBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Cataract	Not defined	1	NO	
C.	Y-suture tip opacity	Not defined	1	Breeder option	

Description and Comments

A. Distichiasis

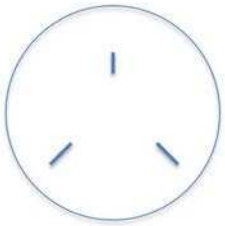
Eyelashes abnormally located in the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. Newer versions of the form (since 3/16/21) have boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true

sutural cataracts - which would either be breeder option or failing.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
KEESHOND

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 3,564 #	%	2019-2023 638 #	%
GLOBE				
.110 MICROPHTHALMOS	1	0.0%	0	0.0%
EYELIDS				
21.000 ENTROPION	9	0.3%	2	0.3%
25.110 DISTICHIASIS	205	5.8%	24	3.8%
32.110 IMPERFORATE LACRIMAL PUNCTUM	1	0.0%	0	0.0%
CORNEA				
70.220 EXPOSURE KERATOPATHY SYNDROME	1	0.0%	0	0.0%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	12	0.3%	0	0.0%
70.730 DYSTROPHY-ENDOTHELIAL	2	0.1%	0	0.0%
UVEA				
93.120 UVEAL CYST-SINGLE	2	0.1%	0	0.0%
93.150 IRIS COLOBOMA	1	0.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	30	0.8%	5	0.8%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	2	0.1%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	2	0.1%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	2	0.1%	3	0.5%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	1	0.0%	0	0.0%
FUNDUS				
97.120 COLOBOMA	1	0.0%	0	0.0%
120.170 RETINAL DYSPLASIA-FOLDS	6	0.2%	1	0.2%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	2	0.1%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	10	0.3%	2	0.3%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	2	0.1%	0	0.0%
120.960 RETINOPATHY	5	0.1%	0	0.0%
130.110 MICROPAPILLA	9	0.3%	1	0.2%
130.120 OPTIC NERVE HYPOPLASIA	13	0.4%	0	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	18	0.5%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	325	9.1%	45	7.1%
100.301 PUNCTATE-ANTERIOR CORTEX	18	0.5%	5	0.8%
100.302 PUNCTATE-POSTERIOR CORTEX	22	0.6%	2	0.3%
100.303 PUNCTATE-EQUATORIAL CORTEX	12	0.3%	1	0.2%
100.304 PUNCTATE-ANTERIOR SUTURES	3	0.1%	1	0.2%
100.305 PUNCTATE-POSTERIOR SUTURES	150	4.2%	24	3.8%
100.306 PUNCTATE-NUCLEUS	10	0.3%	9	1.4%
100.307 PUNCTATE-CAPSULAR	23	0.6%	5	0.8%
100.311 INCIPIENT-ANTERIOR CORTEX	8	0.2%	1	0.2%
100.312 INCIPIENT-POSTERIOR CORTEX	39	1.1%	2	0.3%
100.313 INCIPIENT-EQUATORIAL CORTEX	10	0.3%	1	0.2%
100.314 INCIPIENT-ANTERIOR SUTURES	2	0.1%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	27	0.8%	8	1.3%
100.316 INCIPIENT-NUCLEUS	15	0.4%	3	0.5%
100.317 INCIPIENT-CAPSULAR	11	0.3%	3	0.5%
100.321 INCOMPLETE-ANTERIOR CORTEX	0	0.0%	1	0.2%
100.322 INCOMPLETE-POSTERIOR CORTEX	1	0.0%	1	0.2%
100.325 INCOMPLETE-POSTERIOR SUTURES	1	0.0%	1	0.2%
100.326 INCOMPLETE-NUCLEUS	1	0.0%	0	0.0%
100.327 INCOMPLETE-CAPSULAR	1	0.0%	1	0.2%
100.328 Y-SUTURE TIP OPACITIES	96	2.7%	110	17.2%
100.330 GENERALIZED/ COMPLETE	8	0.2%	0	0.0%
100.340 RESORBING/ HYPERMATURE	1	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION	1	0.0%	0	0.0%

OCULAR DISORDERS REPORT
KEESHOND

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 3,564 #	 %	Year Examined: 2019-2023 Total # Dogs: 638 #	 %
LENS Continued				
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***381***	***10.7%***	***69***	***10.8%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	1	0.0%	2	0.3%
110.320 VITREOUS DEGENERATION-SYNERESIS	11	0.3%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	21	0.6%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	46	1.3%	2	0.3%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	41	1.2%	28	4.4%
NORMAL				
.000 NORMAL GLOBE	2,831	79.4%	445	69.7%

KERRY BLUE TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Cataract	Not defined	1	NO	

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
KERRY BLUE TERRIER

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	775		128	
	Diagnostic Name	#	%	#	%
EYELIDS					
25.110	DISTICHIASIS	12	1.5%	4	3.1%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	1	0.1%	0	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	4	0.5%	2	1.6%
UVEA					
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	11	1.4%	4	3.1%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	2	0.3%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	1	0.1%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	2	0.3%	0	0.0%
LENS					
100.200	CATARACT, UNSPECIFIED	6	0.8%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	30	3.9%	2	1.6%
100.301	PUNCTATE-ANTERIOR CORTEX	16	2.1%	1	0.8%
100.302	PUNCTATE-POSTERIOR CORTEX	3	0.4%	0	0.0%
100.303	PUNCTATE-EQUATORIAL CORTEX	0	0.0%	1	0.8%
100.306	PUNCTATE-NUCLEUS	3	0.4%	0	0.0%
100.307	PUNCTATE-CAPSULAR	1	0.1%	2	1.6%
100.311	INCIPIENT-ANTERIOR CORTEX	1	0.1%	0	0.0%
100.312	INCIPIENT-POSTERIOR CORTEX	4	0.5%	0	0.0%
100.313	INCIPIENT-EQUATORIAL CORTEX	3	0.4%	1	0.8%
100.322	INCOMPLETE-POSTERIOR CORTEX	1	0.1%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	1	0.8%
100.330	GENERALIZED/ COMPLETE	6	0.8%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***44***	***5.7%***	***5***	***3.9%***
VITREOUS					
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	0.4%	0	0.0%
110.320	VITREOUS DEGENERATION-SYNERESIS	7	0.9%	1	0.8%
FUNDUS					
120.310	RETINAL ATROPHY-GENERALIZED	2	0.3%	1	0.8%
OTHER					
900.000	OTHER, UNSPECIFIED	1	0.1%	0	0.0%
900.100	OTHER-SUSPECTED AS INHERITED	21	2.7%	0	0.0%
900.110	OTHER-SUSPECTED AS NOT-INHERITED	4	0.5%	5	3.9%
NORMAL					
.000	NORMAL GLOBE	684	88.3%	109	85.2%

KISHU-KEN

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the KISHU-KEN breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
KISHU KEN

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 2 #	 %	Year Examined: 2019-2023 Total # Dogs: 19 #	 %
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	0	0.0%	7	36.8%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	0	0.0%	1	5.3%
100.307 PUNCTATE-CAPSULAR	0	0.0%	1	5.3%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	2	10.5%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***0***	***0.0%***	***1***	***5.3%***
NORMAL				
.000 NORMAL GLOBE	2	100.0%	9	47.4%

KOMONDOR

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Cataract	Not defined	1	NO	

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

Appears to be relatively young age for onset in the Komondor (<4yr) and mainly anterior cortical.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
KOMONDOR

Diagnostic Name	1993-2018 # (Total # Dogs: 377)	1993-2018 %	2019-2023 # (Total # Dogs: 39)	2019-2023 %
EYELIDS				
21.000 ENTROPION	1	0.3%	0	0.0%
22.000 ECTROPION	1	0.3%	0	0.0%
25.110 DISTICHIASIS	1	0.3%	0	0.0%
NICTITANS				
51.100 CARTILAGE ANOMALY/ EVERSION	1	0.3%	0	0.0%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	1	0.3%	0	0.0%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	5	1.3%	0	0.0%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	2	0.5%	0	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	14	3.7%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	29	7.7%	1	2.6%
100.301 PUNCTATE-ANTERIOR CORTEX	1	0.3%	0	0.0%
100.303 PUNCTATE-EQUATORIAL CORTEX	2	0.5%	0	0.0%
100.304 PUNCTATE-ANTERIOR SUTURES	1	0.3%	0	0.0%
100.306 PUNCTATE-NUCLEUS	5	1.3%	1	2.6%
100.307 PUNCTATE-CAPSULAR	4	1.1%	0	0.0%
100.312 INCIPIENT-POSTERIOR CORTEX	4	1.1%	1	2.6%
100.313 INCIPIENT-EQUATORIAL CORTEX	5	1.3%	0	0.0%
100.314 INCIPIENT-ANTERIOR SUTURES	1	0.3%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	4	1.1%	0	0.0%
100.316 INCIPIENT-NUCLEUS	5	1.3%	0	0.0%
100.326 INCOMPLETE-NUCLEUS	1	0.3%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	1	0.3%	1	2.6%
100.330 GENERALIZED/ COMPLETE	1	0.3%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***48***	***12.7%***	***2***	***5.1%***
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	1	0.3%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	7	1.9%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	6	1.6%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	1	0.3%	0	0.0%
NORMAL				
.000 NORMAL GLOBE	310	82.2%	36	92.3%

KOREAN POONGSAN

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the KOREAN POONGSAN breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
KOREAN POONGSAN

Year Examined:	1993-2018		2019-2023	
Total # Dogs:	1		0	
Diagnostic Name	**#**	**%**	**#**	**%**
NORMAL				
.000 NORMAL GLOBE	1	100.0%	0	

KROMFORHLANDER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the KROMFORHLANDER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
KROMFOHRLANDER

Year Examined:	1993-2018		2019-2023	
Total # Dogs:	9		7	
Diagnostic Name	**#**	**%**	**#**	**%**
NORMAL				
.000 NORMAL GLOBE	9	100.0%	7	100.0%

KUVASZ

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- PRA-*prcd*	Autosomal recessive	1	NO	Mutation of the *prcd* gene

Description and Comments

A. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-*prcd*

Studies have shown that the form of PRA in the Kuvasz is *prcd*, which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

1. Zangerl B, Goldstein O, Philp AR, et al. Identical mutation in a novel retinal gene causes progressive rod-cone degeneration in dogs and retinitis pigmentosa in humans. *Genomics*. 2006;88:551-563. PMID: 16938425

OCULAR DISORDERS REPORT
KUVASZ

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 551 #	 %	Year Examined: 2019-2023 Total # Dogs: 7 #	 %
GLOBE				
.110 MICROPHTHALMOS	2	0.4%	0	0.0%
EYELIDS				
20.140 ECTOPIC CILIA	1	0.2%	0	0.0%
20.160 MACROPALPEBRAL FISSURE	1	0.2%	0	0.0%
22.000 ECTROPION	2	0.4%	0	0.0%
25.110 DISTICHIASIS	21	3.8%	0	0.0%
NICTITANS				
51.100 CARTILAGE ANOMALY/ EVERSION	1	0.2%	0	0.0%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	6	1.1%	0	0.0%
70.730 DYSTROPHY-ENDOTHELIAL	1	0.2%	0	0.0%
UVEA				
93.150 IRIS COLOBOMA	2	0.4%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	23	4.2%	0	0.0%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	3	0.5%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	3	0.5%	0	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	2	0.4%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	15	2.7%	1	14.3%
100.301 PUNCTATE-ANTERIOR CORTEX	1	0.2%	0	0.0%
100.302 PUNCTATE-POSTERIOR CORTEX	1	0.2%	0	0.0%
100.303 PUNCTATE-EQUATORIAL CORTEX	1	0.2%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	1	0.2%	0	0.0%
100.306 PUNCTATE-NUCLEUS	0	0.0%	1	14.3%
100.312 INCIPIENT-POSTERIOR CORTEX	1	0.2%	0	0.0%
100.313 INCIPIENT-EQUATORIAL CORTEX	1	0.2%	0	0.0%
100.316 INCIPIENT-NUCLEUS	3	0.5%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	1	14.3%
100.330 GENERALIZED/ COMPLETE	5	0.9%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***16***	***2.9%***	***1***	***14.3%***
VITREOUS				
110.320 VITREOUS DEGENERATION-SYNERESIS	1	0.2%	0	0.0%
FUNDUS				
120.310 RETINAL ATROPHY-GENERALIZED	4	0.7%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	1	0.2%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	12	2.2%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	4	0.7%	0	0.0%
NORMAL				
.000 NORMAL GLOBE	462	83.8%	5	71.4%

KYI-LEO

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the KYI-LEO breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
KYI-LEO

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 2 #	%	2019-2023 1 #	%
FUNDUS				
120.310 RETINAL ATROPHY-GENERALIZED	1	50.0%	0	0.0%
NORMAL				
.000 NORMAL GLOBE	1	50.0%	1	100.0%

LABRADOR RETRIEVER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Entropion	Not defined	1-3	Breeder option	
B.	Ectropion	Not defined	1	Breeder option	
C.	Distichiasis	Not defined	1	Breeder option	
D.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
	- macular	Autosomal recessive	4-5	NO	Mutation of the *CHST6* gene
E.	Uveal cysts				
	- single	Not defined	1	Breeder option	
F.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
G.	Cataract				
	- generalized	Not defined	1	NO	
	- posterior polar (posterior cortical /subcapsular)	Presumed dominant with incomplete penetrance	1-3, 6-8	NO	
	- progressive cortical	Autosomal recessive	9	NO	
H.	Y-suture tip opacity	Not defined	1	Breeder option	
I.	Persistent hyaloid artery remnant (PHA)	Not defined	1	Breeder option	
J.	Vitreous degeneration				
	- syneresis	Not defined	1	Breeder option	
K.	Retinal atrophy				
	- generalized	Not defined	1	NO	

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
	- PRA-*prcd*	Autosomal recessive	10-14	NO	Mutation of the *prcd* gene
L.	Inherited retinal disorder (IRD)-*ABCA4* (Stargardt's Disease)	Autosomal recessive	15, 33	NO	Mutation in the *ABCA4* gene
M.	Achromatopsia Type 2 (day blindness/ retinal degeneration) / CD-*CNGA3*	Autosomal recessive	16, 17	NO	Mutation of the *CNGA3* gene
N.	Retinal dysplasia (without skeletal defects)				
	- folds	Presumed autosomal recessive	1, 18-27	NO (Breeder option with Normal DNA test and folds only)	Mutation in the *COL9A3* gene
	- geographic, detached (without skeletal defects)	Presumed autosomal recessive	27, 31	NO	
O.	Retinal dysplasia (with skeletal defects) / Dysplasia-*COL9A3* (osd1)				
	- folds/geographic/ detached	Autosomal recessive with incomplete dominance for the eyes	18-26, 28-29	NO	Mutation in the *COL9A3* gene
P.	Limbal melanoma	Not defined	30	NO	

Description and Comments

A. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull. Selection should be directed against entropion and toward a head conformation that reduces or eliminates the likelihood of the defect.

B. Ectropion

A conformational defect resulting in eversion of the eyelid(s), which may cause ocular irritation due to exposure. It is likely that ectropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

C. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

D. Corneal dystrophy

- epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

- **macular**

In Labrador Retrievers in Europe, macular corneal dystrophy (MCD) has been shown to be caused by accumulations of glycosaminoglycans in the corneal stroma. This form of corneal dystrophy is caused by a mutation in the *CHST6* gene.

E. Uveal cysts

Fluid filled sacs arising from the posterior surface of the iris, to which they may remain attached or break free and float into the anterior chamber. Usually occur in mature dogs.

This disorder may be observed in any breed, but retriever breeds tend to be predisposed. There is usually no effect on vision unless the cysts are heavily clustered and impinge on the pupillary area. Less frequently, the cysts may rupture and adhere to the cornea or anterior lens capsule. Multiple cysts may occlude the iridocorneal angle and cause glaucoma.

F. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

In the Labrador Retriever, this is a potentially serious problem as many of the PPMs identified on routine screening examinations bridge from the iris to the cornea and/or from iris sheets bridging the pupils. These forms may cause vision impairment.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

G. Cataract

- generalized

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

- posterior polar (posterior cortical/subcapsular)

The most frequently reported cataracts in the Labrador Retriever are bilateral or unilateral, focal, posterior polar (posterior cortical)/subcapsular cataracts which usually present between 1-3 years of age. These are generally

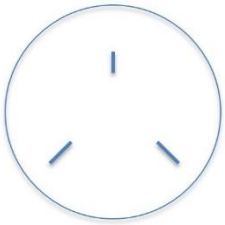
stationary or very slowly progressive and generally do not interfere with vision. It has been suggested that these cataracts are inherited as dominant with incomplete penetrance, but definitive breeding studies are still required to verify this hypothesis.

- progressive cortical

A second type of cataract is a progressive cortical cataract which may involve the entire lens. It is not clear whether this is a distinct entity, or an aberrant form of the posterior polar cataract. This is reported in Labrador Retrievers in the Netherlands.

H. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. Newer versions of the form (since 3/16/21) have boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

I. Persistent hyaloid artery remnant (PHA)

A congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

J. Vitreous degeneration - syneresis

Liquefaction of the vitreous gel, which may predispose to retinal detachment.

K. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-*prcd*

Studies have shown that the principal form of PRA in the Labrador Retriever is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6

years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. In the Labrador Retriever, night blindness usually starts at 4-6 years of age, followed by slow progression and severe visual impairment at 6-8 years. A DNA test is available.

L. Inherited retinal disorder (IRD)
-*ABCA4* (Stargardt's Disease)

Degenerative disease of photoreceptors and RPE caused by an autosomal recessive mutation in the gene *ABCA4.* While the retina does degenerate with progression of the disease, the ophthalmoscopic findings are different from PRA in that tapetal discoloration is present with normal retinal vasculature with this disease. Focal atrophy of the center of the area centralis occurs in young dogs, as well as markedly reduced or absent cone ERG responses with a lack of clinically apparent change in day vision.

M. Achromatopsia Type 2 (ACHM – Type 2) Day blindness/retinal degeneration / CD-*CNGA3*

A congenital form of day blindness. Visual deficits become apparent between 8-10 weeks of age. Normal vision is present in low light conditions. Clinical examination is normal. Cone responses are absent on an electroretinogram. The causative genetic mutation has been determined to be a 3nt deletion in exon 7 of the *CNGA3* gene in Labrador Retrievers. A DNA test is available.

N. Retinal dysplasia (without skeletal defects)

- folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness.

In the Labrador Retriever, the presence of retinal folds may be seen in the heterozygous state described in "Retinal dysplasia – folds or detachment with skeletal defects" below, thus the recommendation against breeding.

The breeding advice for Labrador Retrievers and Samoyeds diagnosed with "retinal dysplasia - folds" will be changed from "No" to "Breeder option" if the owner of the dog provides the registering office with results of the DNA test for the affected dog, showing that it is not a carrier of the COL9A3 mutation.

- geographic

An irregularly shaped area of retinal development containing both areas of thinning and areas of elevation. This form may be associated with visual impairment.

In the Golden Retriever, Labrador Retriever and German Shepherd dog, there is evidence that examination early in life is not reliable at identifying geographic "dysplasia". Therefore, it is recommended that these breeds are (re)examined at 1.5 to 2 years of age for this diagnosis

O. Retinal dysplasia – folds, geographic or detachment with skeletal defects / Dysplasia-*COL9A3*(osd1)

This condition is also known as oculo-skeletal dysplasia (OSD) or dwarfism with retinal dysplasia type 1 (DRD1) in the Labrador Retriever. A similar condition, DRD2, occurs in the Samoyed. The condition is autosomal recessive and homozygous affected dogs have shortened forelimbs ("downhill" conformation) with valgus deformity. They have severe ocular defects including cataract, retinal folds/multifocal retinal dysplasia, vitreal degeneration and retinal detachment. The ocular abnormalities result in blindness in most dogs. Heterozygous dogs can have either a normal ocular exam or have multiple retinal folds, vitreal membranes, or vitreal degeneration suggesting a semi-dominant mechanism with respect to the eyes. It is important to note that generally the retinal folds present in

heterozygous dogs tend to cluster around the major superior blood vessels of the central tapetal region. The condition is caused by a 1 base pair insertion of COL9A3. A DNA test is available.

P. Limbal melanoma

Most limbal melanomas are really epibulbar melanocytomas, but there is a possibility of an extension of an intraocular melanoma extending outward and presenting as a limbal melanoma. An epibulbar melanocytoma originates from the superficial pigment lining the limbus and the lesion may eventually extend into the eye. Metastasis has not been documented and the mass is characterized by large epithelioid cells. The lesion presents as a subconjunctival smooth mass most commonly in the dorsolateral limbal region and extends later into the cornea and posterior on the sclera. Breed predisposition have been noted in the German Shepherd, Labrador and Golden Retriever.

Historical Note:

Central progressive retinal atrophy was previously a condition listed for Labrador Retriever. However, as the condition is no longer identified in the breed, the condition has been removed. Central progressive retinal atrophy was a progressive retinal degeneration in which photoreceptor death occurred secondary to disease of the underlying pigment epithelium. Progression was slow and some animals never lost vision. CPRA occurred in England but was uncommon elsewhere.

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OCULAR DISORDERS REPORT
LABRADOR RETRIEVER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 254,602 #	 %	2019-2023 35,364 #	 %
GLOBE				
.110 MICROPHTHALMOS	62	0.0%	6	0.0%
10.000 GLAUCOMA	28	0.0%	3	0.0%
40.910 KERATOCONJUNCTIVITIS SICCA (KCS)	9	0.0%	4	0.0%
EYELIDS				
20.140 ECTOPIC CILIA	18	0.0%	0	0.0%
20.160 MACROPALPEBRAL FISSURE	86	0.0%	0	0.0%
21.000 ENTROPION	1,118	0.4%	182	0.5%
22.000 ECTROPION	526	0.2%	40	0.1%
25.110 DISTICHIASIS	2,479	1.0%	369	1.0%
32.110 IMPERFORATE LACRIMAL PUNCTUM	35	0.0%	22	0.1%
NICTITANS				
50.210 PLASMOMA/ ATYPICAL PANNUS	0	0.0%	2	0.0%
51.100 CARTILAGE ANOMALY/ EVERSION	12	0.0%	2	0.0%
52.110 GLAND PROLAPSE	39	0.0%	2	0.0%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	9	0.0%	0	0.0%
70.220 EXPOSURE KERATOPATHY SYNDROME	22	0.0%	8	0.0%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	2,486	1.0%	385	1.1%
70.730 DYSTROPHY-ENDOTHELIAL	86	0.0%	9	0.0%
UVEA				
90.250 PIGMENTARY UVEITIS	2	0.0%	2	0.0%
93.110 IRIS HYPOPLASIA	7	0.0%	0	0.0%
93.120 UVEAL CYST-SINGLE	396	0.2%	92	0.3%
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	12	0.0%	0	0.0%
93.150 IRIS COLOBOMA	12	0.0%	0	0.0%
93.170 UVEAL CYST-MULTIPLE	45	0.0%	18	0.1%
93.180 IRIS SPHINCTER DYSPLASIA	2	0.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	7,778	3.1%	1,217	3.4%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	159	0.1%	10	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	164	0.1%	6	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	176	0.1%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	493	0.2%	466	1.3%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	34	0.0%	9	0.0%
93.810 UVEAL MELANOMA	72	0.0%	19	0.1%
95.120 UVEAL CYST-FREE FLOATING	35	0.0%	18	0.1%
97.150 COLOBOMA	1	0.0%	0	0.0%
FUNDUS				
97.110 CHOROIDAL HYPOPLASIA	14	0.0%	0	0.0%
97.120 COLOBOMA	11	0.0%	0	0.0%
120.170 RETINAL DYSPLASIA-FOLDS	5,298	2.1%	320	0.9%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	2,101	0.8%	146	0.4%
120.310 RETINAL ATROPHY-GENERALIZED	995	0.4%	18	0.1%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	73	0.0%	0	0.0%
120.920 RETINAL DETACHMENT	9	0.0%	6	0.0%
120.960 RETINOPATHY	80	0.0%	35	0.1%
120.970 RETINOPATHY - CMR/ CMR-LIKE	0	0.0%	3	0.0%
130.110 MICROPAPILLA	112	0.0%	28	0.1%
130.120 OPTIC NERVE HYPOPLASIA	90	0.0%	4	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	728	0.3%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	11,171	4.4%	1,655	4.7%

OCULAR DISORDERS REPORT
LABRADOR RETRIEVER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 254,602 #	 %	Year Examined: 2019-2023 Total # Dogs: 35,364 #	 %
LENS Continued				
100.301 PUNCTATE-ANTERIOR CORTEX	2,105	0.8%	873	2.5%
100.302 PUNCTATE-POSTERIOR CORTEX	1,540	0.6%	227	0.6%
100.303 PUNCTATE-EQUATORIAL CORTEX	287	0.1%	83	0.2%
100.304 PUNCTATE-ANTERIOR SUTURES	225	0.1%	67	0.2%
100.305 PUNCTATE-POSTERIOR SUTURES	1,240	0.5%	211	0.6%
100.306 PUNCTATE-NUCLEUS	375	0.1%	158	0.4%
100.307 PUNCTATE-CAPSULAR	688	0.3%	301	0.9%
100.311 INCIPIENT-ANTERIOR CORTEX	823	0.3%	174	0.5%
100.312 INCIPIENT-POSTERIOR CORTEX	2,112	0.8%	288	0.8%
100.313 INCIPIENT-EQUATORIAL CORTEX	587	0.2%	102	0.3%
100.314 INCIPIENT-ANTERIOR SUTURES	72	0.0%	7	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	526	0.2%	69	0.2%
100.316 INCIPIENT-NUCLEUS	364	0.1%	78	0.2%
100.317 INCIPIENT-CAPSULAR	339	0.1%	131	0.4%
100.321 INCOMPLETE-ANTERIOR CORTEX	27	0.0%	20	0.1%
100.322 INCOMPLETE-POSTERIOR CORTEX	89	0.0%	45	0.1%
100.323 INCOMPLETE-EQUATORIAL CORTEX	24	0.0%	12	0.0%
100.324 INCOMPLETE-ANTERIOR SUTURES	1	0.0%	0	0.0%
100.325 INCOMPLETE-POSTERIOR SUTURES	16	0.0%	5	0.0%
100.326 INCOMPLETE-NUCLEUS	20	0.0%	16	0.0%
100.327 INCOMPLETE-CAPSULAR	18	0.0%	13	0.0%
100.328 Y-SUTURE TIP OPACITIES	453	0.2%	404	1.1%
100.330 GENERALIZED/ COMPLETE	357	0.1%	7	0.0%
100.340 RESORBING/ HYPERMATURE	5	0.0%	8	0.0%
100.375 SUBLUXATION/ LUXATION	55	0.0%	6	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***12,568***	***4.9%***	***2,895***	***8.2%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	658	0.3%	140	0.4%
110.135 PHPV/ PTVL	162	0.1%	8	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	54	0.0%	23	0.1%
110.320 VITREOUS DEGENERATION-SYNERESIS	873	0.3%	166	0.5%
OTHER				
900.000 OTHER, UNSPECIFIED	1,697	0.7%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	4,352	1.7%	41	0.1%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	2,839	1.1%	1,430	4.0%
NORMAL				
.000 NORMAL GLOBE	217,961	85.6%	28,318	80.1%

LAGOTTO ROMAGNOLO

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Corneal dystrophy				
	- endothelial	Not defined	2	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
D.	Cataract	Not defined	1,2	NO	
E.	Persistent hyaloid artery remnant (PHA)	Not defined	1	Breeder option	
F.	Retinal atrophy				
	- generalized	Not defined	2	NO	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Corneal dystrophy

- endothelial

Corneal endothelial dystrophy is an abnormal loss of the inner lining of the cornea that causes progressive fluid retention (edema). With time the edema results in keratitis and decreased vision. This usually does not occur until the animal is older. **Non-USA population: noted later onset of cataract (> 8 years).

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior

chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region. **Non-USA population: noted later onset of cataract (> 8 years).

E. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

F. Retinal atrophy- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Crasta M, Arteaga K, Barachetti L, et al. A multicenter retrospective evaluation of the prevalence of known and presumed hereditary eye diseases in Lagotto Romagnolo dog breed within a referral population in Italy (2012-2020. Vet. Ophthal. 2022; 25: 426-433. PMID: 35976615. **reference derived from non-USA dog population**

OCULAR DISORDERS REPORT
LAGOTTO ROMAGNOLO

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 681 #	%	2019-2023 1,303 #	%
GLOBE				
.110 MICROPHTHALMOS	0	0.0%	1	0.1%
EYELIDS				
25.110 DISTICHIASIS	58	8.5%	119	9.1%
NICTITANS				
51.100 CARTILAGE ANOMALY/ EVERSION	1	0.1%	0	0.0%
52.110 GLAND PROLAPSE	1	0.1%	0	0.0%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	0	0.0%	1	0.1%
UVEA				
93.120 UVEAL CYST-SINGLE	1	0.1%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	17	2.5%	130	10.0%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	0	0.0%	1	0.1%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	0	0.0%	1	0.1%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	6	0.9%	29	2.2%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	0	0.0%	1	0.1%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	18	2.6%	37	2.8%
100.301 PUNCTATE-ANTERIOR CORTEX	8	1.2%	19	1.5%
100.302 PUNCTATE-POSTERIOR CORTEX	1	0.1%	7	0.5%
100.303 PUNCTATE-EQUATORIAL CORTEX	4	0.6%	4	0.3%
100.304 PUNCTATE-ANTERIOR SUTURES	2	0.3%	3	0.2%
100.305 PUNCTATE-POSTERIOR SUTURES	4	0.6%	5	0.4%
100.306 PUNCTATE-NUCLEUS	2	0.3%	0	0.0%
100.307 PUNCTATE-CAPSULAR	3	0.4%	6	0.5%
100.311 INCIPIENT-ANTERIOR CORTEX	0	0.0%	6	0.5%
100.312 INCIPIENT-POSTERIOR CORTEX	0	0.0%	4	0.3%
100.313 INCIPIENT-EQUATORIAL CORTEX	2	0.3%	4	0.3%
100.315 INCIPIENT-POSTERIOR SUTURES	1	0.1%	0	0.0%
100.316 INCIPIENT-NUCLEUS	0	0.0%	6	0.5%
100.317 INCIPIENT-CAPSULAR	0	0.0%	1	0.1%
100.321 INCOMPLETE-ANTERIOR CORTEX	3	0.4%	0	0.0%
100.322 INCOMPLETE-POSTERIOR CORTEX	2	0.3%	0	0.0%
100.323 INCOMPLETE-EQUATORIAL CORTEX	2	0.3%	1	0.1%
100.326 INCOMPLETE-NUCLEUS	1	0.1%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	2	0.3%	9	0.7%
100.375 SUBLUXATION/ LUXATION	0	0.0%	1	0.1%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***35***	***5.1%***	***66***	***5.1%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	2	0.3%	21	1.6%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	5	0.7%	2	0.2%
120.310 RETINAL ATROPHY-GENERALIZED	0	0.0%	2	0.2%
120.960 RETINOPATHY	0	0.0%	3	0.2%
130.110 MICROPAPILLA	2	0.3%	4	0.3%
OTHER				
900.000 OTHER, UNSPECIFIED	3	0.4%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	0	0.0%	2	0.2%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	17	2.5%	32	2.5%
NORMAL				
.000 NORMAL GLOBE	564	82.8%	961	73.8%

LAKELAND TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder Option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
LAKELAND TERRIER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 253 #	%	Year Examined: 2019-2023 Total # Dogs: 41 #	%
EYELIDS				
25.110 DISTICHIASIS	10	4.0%	4	9.8%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	1	0.4%	0	0.0%
70.730 DYSTROPHY-ENDOTHELIAL	2	0.8%	0	0.0%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	37	14.6%	2	4.9%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	2	0.8%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	4	1.6%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	1	0.4%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	9	3.6%	6	14.6%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	5	2.0%	1	2.4%
100.301 PUNCTATE-ANTERIOR CORTEX	1	0.4%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	0	0.0%	2	4.9%
100.311 INCIPIENT-ANTERIOR CORTEX	3	1.2%	0	0.0%
100.312 INCIPIENT-POSTERIOR CORTEX	4	1.6%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	1	2.4%
100.330 GENERALIZED/ COMPLETE	3	1.2%	1	2.4%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***11***	***4.3%***	***3***	***7.3%***
FUNDUS				
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	1	0.4%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	2	0.8%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	6	2.4%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	0	0.0%	1	2.4%
NORMAL				
.000 NORMAL GLOBE	193	76.3%	27	65.9%

LANCASHIRE HEELER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Persistent pupillary membrane				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/ no strands		1	Passes with no notation	
B.	Lens luxation	Autosomal recessive	2-4	NO	Mutation of the *ADAMTS17* gene
C.	Choroidal hypoplasia (Collie Eye Anomaly) - staphyloma/coloboma - retinal detachment - retinal hemorrhage - optic nerve coloboma	Autosomal recessive	5,6	NO	Deletion in the *NHEJ1* gene

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or from sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma) causing vision impairment or blindness. A mutation in ADAMTS17 has been associated with primary lens luxation. A DNA test is available.

C. Choroidal hypoplasia (Collie Eye Anomaly)
- staphyloma/coloboma
- retinal detachment
- retinal hemorrhage
- optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene NHEJ1. The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Sargan DR, Withers D, Pettitt L, et al. Mapping the mutation causing lens luxation in several terrier breeds. J Hered. 2007;98:534-538. PMID: 17573382 **reference derived from non-USA dog population**

3. Farias FH, Johnson GS, Taylor JF, et al. An ADAMTS17 splice donor site mutation in dogs with primary lens luxation. Invest Ophthalmol Vis Sci. 2010;51:4716-4721. PMID: 20375329

4. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. Vet Ophthalmol. 2011;14:378-384. PMID: 22050825

5. Bedford PG. Collie eye anomaly in the Lancashire Heeler. Vet Rec. 1998;143:354-356. PMID: 9800301 **reference derived from non-USA dog population**

6. Parker HG, Kukekova AV, Akey DT, et al. Breed relationships facilitate fine-mapping studies: a 7.8-kb deletion cosegregates with Collie eye anomaly across multiple dog breeds. Gen Res. 2007;17:1562-1571. PMID: 17916641

OCULAR DISORDERS REPORT
LANCASHIRE HEELER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 153 #	 %	Year Examined: 2019-2023 Total # Dogs: 77 #	 %
EYELIDS				
25.110 DISTICHIASIS	1	0.7%	0	0.0%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	1	0.7%	1	1.3%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	59	38.6%	15	19.5%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	1	0.7%	1	1.3%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	2	1.3%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	1	0.7%	11	14.3%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	1	0.7%	0	0.0%
100.307 PUNCTATE-CAPSULAR	0	0.0%	1	1.3%
100.317 INCIPIENT-CAPSULAR	1	0.7%	0	0.0%
100.375 SUBLUXATION/ LUXATION	1	0.7%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1***	***0.7%***	***1***	***1.3%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	2	1.3%	1	1.3%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	2.0%	1	1.3%
110.320 VITREOUS DEGENERATION-SYNERESIS	2	1.3%	0	0.0%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	1	0.7%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	1	0.7%	0	0.0%
OTHER				
900.100 OTHER-SUSPECTED AS INHERITED	0	0.0%	1	1.3%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	1	0.7%	4	5.2%
NORMAL				
.000 NORMAL GLOBE	102	66.7%	46	59.7%

LAPPONIAN HERDER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC TESTS AVAILABLE
A.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- PRA-*prcd*	Autosomal recessive	1	NO	Mutation of the *prcd* gene
	- PRA-*IFT122*	Autosomal recessive	2	NO	Mutation in *IFT122* gene
B.	Multifocal retinopathy – IRD-*BEST1*(*cmr3)*	Autosomal recessive	3	NO (Breeder option with normal DNA test for *cmr3*)	Mutation of the *BEST1* gene

Description and Comments

A. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-prcd

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited. Studies have shown that the principal form of PRA in the Lapponian Herder is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

- PRA-*IFT122*

Retinal atrophy in the Lapponian Herder also occurs as an autosomal recessive disorder due to a mutation in the gene *IFT122.* The disease is late onset, occurring at 1-5 years of age and possible later, but usually definitively evident by 9 years of age. Progression is slow, with some dogs retaining vision for up to 13 years. Clinical findings include nyctalopia, diffuse tapered hyper-reflectivity and retinal vessel attenuation. A DNA test is available.

B. Multifocal retinopathy - IRD-*BEST1* (*cmr3)*

Canine Multifocal Retinopathy type 3 (*cmr3*) is characterized by numerous distinct (i.e. multifocal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There may be a serous subretinal fluid, or accumulation of subretinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs between 11-20 weeks of age and there is minimal progression in lesion distribution after 1 year of age. The lesions may flatten, leaving areas of retinal thinning and RPE hypertrophy, hyperplasia, and pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE detachments. In the early stages of this disease, most dogs exhibit no noticeable problem with vision or electroretinographic abnormalities despite their abnormal appearing retinas. However, variable degrees of retinal degeneration occur with chronicity.

Cmr3 appears clinically similar to that seen in the Bullmastiff and Coton deTulear, but the mutation in the Bestrophin 1 gene (*BEST1* alias *VMD2*) is different. The multifocal retinopathy seen in the Lapponian Herder is caused by a deletion at position 1,388 and a substitution at position 1,466 and is therefore called *cmr3*. A DNA test is available.

The breeding advice for breeds diagnosed with "CMR/CMR-like retinopathy" will be changed from "No" to "Breeder option" if the owner of the dog provides the registering office with results of the DNA test for the affected dog showing that it is genetically normal, i.e., not a homozygous mutant, for the BEST1 mutation.

References

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the Lapponian Herder. The conditions listed above are currently noted solely due to the availability of a genetic test for the disease.

1. Zangerl B, Goldstein O, Philp AR, et al. Identical mutation in a novel retinal gene causes progressive rod-cone degeneration in dogs and retinitis pigmentosa in humans. *Genomics*. 2006;88:551-563. PMID: 16938425

2. Kaukonen M, Pettinen IT, Wickström K, Arumilli M, Donner J, Juhola IJ, Holopainen S, Turunen JA, Yoshihara M, Kere J, Lohi H. A missense variant in IFT122 associated with a canine model of retinitis pigmentosa. Hum Genet. 2021 Nov;140(11):1569-1579. doi: 10.1007/s00439-021-02266-3. Epub 2021 Feb 19. PMID: 33606121 **reference derived from non-USA dog population**

3. Zangerl B, Wickstrom K, Slavik J, et al. Assessment of canine BEST1 variations identifies new mutations and establishes an independent bestrophinopathy model (cmr3). *Mol Vis*. 2010;16:2791-2804. PMID: 21197113

OCULAR DISORDERS REPORT
LAPPONIAN HERDER

Year Examined:	1993-2018		2019-2023	
Total # Dogs:	1		2	
Diagnostic Name	**#**	**%**	**#**	**%**
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	0	0.0%	1	50.0%
NORMAL				
.000 NORMAL GLOBE	1	100.0%	1	50.0%

LARGE MUNSTERLANDER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the LARGE MUNSTERLANDER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
LARGE MUNSTERLANDER

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	0		4	
Diagnostic Name		#	%	#	%
NORMAL					
.000	NORMAL GLOBE	0		4	100.0%

LEONBERGER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Ectropion	Not defined	1	Breeder option	
B.	Entropion	Not defined	1	Breeder option	
C.	Distichiasis	Not defined	1	Breeder option	
D.	Nictitans cartilage anomaly/eversion	Not defined	1	Breeder option	
E.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
F.	Cataract	Not defined	1, 2	NO	
G.	Persistent hyaloid artery remnant (PHA)	Not defined	1	Breeder option	
H.	Retinal dysplasia				
	– folds	Not defined	1	Breeder option	
I.	Glaucoma	Not defined	3,4	NO	
J.	Pectinate ligament dysplasia	Not defined	3,4	Passes with no notation	

Description and Comments

A. Ectropion

A conformational defect resulting in eversion of the eyelid(s), which may cause ocular irritation due to exposure. It is likely that ectropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

C. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

D. Nictitans cartilage anomaly/eversion

A scroll-like curling of the cartilage of the third eyelid, usually everting the margin. This condition may occur in one or both eyes and may cause mild ocular irritation.

E. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

F. Cataract

Any opacity of the lens and/or its capsule, regardless of size or location within the lens. Cataracts are assumed to be hereditary unless associated with known trauma, ocular inflammation, specific metabolic diseases, or nutritional deficiencies.

G. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

H. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

I. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure which, when sustained even for a brief period of time, causes intraocular damage resulting in blindness. The elevated intraocular pressure occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine breed eye screening exam. Studies from Europe document that glaucoma in the Leonberger has been associated with an abnormality of the iridocorneal angle termed pectinate ligament dysplasia (also known as goniodysgenesis).

J. Pectinate Ligagment Dysplasia

Studies from Europe document that glaucoma in the Leonberger has been associated with an abnormality of the iridocorneal angle termed pectinate ligament dysplasia (also known as goniodysgenesis). This abnormality is not visible during routine ophthalmologic examination using an indirect ophthalmoscope or a slit-lamp microscope. There appears to be an association between pectinate ligament dysplasia and glaucoma, but the mechanism by which the angle defect results in glaucoma has not been determined. It is suspected that mild to severe anterior uveitis impairs outflow of aqueous through the small perforations that are present in the sheet of tissue in the iridocorneal angle; this results in a secondary and often irreversible rise in intraocular pressure that causes blindness. The average age of onset of PACG in Leonbergers is 6 years.

The inheritance of pectinate ligament dysplasia in the Leonberger are not known. Until the inheritance is determined, control should be directed to removing dogs from breeding that have glaucoma and have pectinate ligament dysplasia, as well as those dogs that produce progeny affected with glaucoma.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Heinrich CL, Lakhani KH, Featherstone HJ, et al. Cataract in the UK Leonberger population. *Vet Ophthalmol.* 2006 Sep-Oct;9:350-356. PMID: 16939464 **reference derived from non-USA dog population**

3. Fricker GV, Smith K, Gould DJ. Survey of the incidence of pectinate ligament dysplasia and glaucoma in the UK Leonberger population. *Vet Ophthalmol*. 2016 Sep;19(5):379-85. PMID 26359130. **reference derived from non-USA dog population**

4. Suter A, Shukla AK, Pot SA, et al. Gonioscopic findings in 37 Leonberger dogs in Switzerland from 2019 to 2021. Abstract ECVO 2022. *Vet Ophthalmol*. 2023;00:e1-e-36. PMID 36604307. **reference derived from non-USA dog population**

OCULAR DISORDERS REPORT
LEONBERGER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 2,214 #	%	2019-2023 710 #	%
EYELIDS				
20.160 MACROPALPEBRAL FISSURE	35	1.6%	0	0.0%
21.000 ENTROPION	76	3.4%	30	4.2%
22.000 ECTROPION	35	1.6%	8	1.1%
25.110 DISTICHIASIS	53	2.4%	16	2.3%
32.110 IMPERFORATE LACRIMAL PUNCTUM	1	0.0%	0	0.0%
NICTITANS				
51.100 CARTILAGE ANOMALY/ EVERSION	33	1.5%	13	1.8%
52.110 GLAND PROLAPSE	2	0.1%	1	0.1%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	5	0.2%	0	0.0%
70.730 DYSTROPHY-ENDOTHELIAL	0	0.0%	1	0.1%
UVEA				
93.110 IRIS HYPOPLASIA	2	0.1%	0	0.0%
93.120 UVEAL CYST-SINGLE	18	0.8%	3	0.4%
93.170 UVEAL CYST-MULTIPLE	3	0.1%	2	0.3%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	491	22.2%	168	23.7%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	2	0.1%	1	0.1%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	1	0.0%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	1	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	16	0.7%	7	1.0%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	2	0.1%	0	0.0%
93.810 UVEAL MELANOMA	1	0.0%	0	0.0%
95.120 UVEAL CYST-FREE FLOATING	0	0.0%	1	0.1%
LENS				
100.200 CATARACT, UNSPECIFIED	2	0.1%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	176	7.9%	68	9.6%
100.301 PUNCTATE-ANTERIOR CORTEX	42	1.9%	29	4.1%
100.302 PUNCTATE-POSTERIOR CORTEX	32	1.4%	9	1.3%
100.303 PUNCTATE-EQUATORIAL CORTEX	6	0.3%	0	0.0%
100.304 PUNCTATE-ANTERIOR SUTURES	11	0.5%	3	0.4%
100.305 PUNCTATE-POSTERIOR SUTURES	17	0.8%	5	0.7%
100.306 PUNCTATE-NUCLEUS	23	1.0%	20	2.8%
100.307 PUNCTATE-CAPSULAR	30	1.4%	18	2.5%
100.311 INCIPIENT-ANTERIOR CORTEX	15	0.7%	4	0.6%
100.312 INCIPIENT-POSTERIOR CORTEX	36	1.6%	9	1.3%
100.313 INCIPIENT-EQUATORIAL CORTEX	2	0.1%	2	0.3%
100.314 INCIPIENT-ANTERIOR SUTURES	6	0.3%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	11	0.5%	3	0.4%
100.316 INCIPIENT-NUCLEUS	26	1.2%	15	2.1%
100.317 INCIPIENT-CAPSULAR	11	0.5%	4	0.6%
100.321 INCOMPLETE-ANTERIOR CORTEX	1	0.0%	0	0.0%
100.322 INCOMPLETE-POSTERIOR CORTEX	2	0.1%	2	0.3%
100.326 INCOMPLETE-NUCLEUS	1	0.0%	1	0.1%
100.328 Y-SUTURE TIP OPACITIES	8	0.4%	3	0.4%
100.330 GENERALIZED/ COMPLETE	4	0.2%	0	0.0%
100.375 SUBLUXATION/ LUXATION	8	0.4%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***278***	***12.6%***	***124***	***17.5%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	6	0.3%	8	1.1%
110.135 PHPV/ PTVL	5	0.2%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	0.1%	0	0.0%

OCULAR DISORDERS REPORT
LEONBERGER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 2,214 #	 %	Year Examined: 2019-2023 Total # Dogs: 710 #	 %
VITREOUS Continued				
110.320 VITREOUS DEGENERATION-SYNERESIS	4	0.2%	2	0.3%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	14	0.6%	10	1.4%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	4	0.2%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	5	0.2%	0	0.0%
120.960 RETINOPATHY	1	0.0%	1	0.1%
130.110 MICROPAPILLA	1	0.0%	1	0.1%
130.120 OPTIC NERVE HYPOPLASIA	2	0.1%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	32	1.4%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	53	2.4%	5	0.7%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	40	1.8%	40	5.6%
NORMAL				
.000 NORMAL GLOBE	1,394	63.0%	384	54.1%

LHASA APSO

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Keratoconjunctivitis sicca	Not defined	4	NO	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Cataract	Not defined	1,2	NO	
D.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- PRA-*IMPG2*	Autosomal recessive	3	NO	Mutation in the *IMPG2* gene

Description and Comments

A. Keratoconjunctivitis sicca

An abnormality of the tear film, most commonly a deficiency of the aqueous portion, although the mucin and/or lipid layers may be affected; results in ocular irritation and/or vision impairment.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Cataract

Any opacity of the lens and/or its capsule, regardless of size or location within the lens. Cataracts are assumed to be hereditary unless associated with known trauma, ocular inflammation, specific metabolic diseases, or nutritional deficiencies.

D. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-*IMPG2*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as

Progressive Retinal Atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited. An autosomal recessive mutation in IMPG2, previously known as PRA-type 4, has been described in Lhasa Apsos with retinal atrophy in the United Kingdom. The exact age of onset is unknown and clinical progression has not yet been described. Diagnosed cases ranged in age from 1-12 years, with a median of 7 years of age. Dogs with this mutation have bilateral tapetal hyper-reflectivity with vascular attention. Secondary cataracts are also possible. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Gelatt KN, Mackay EO. Prevalence of primary breed-related cataracts in the dog in North America. *Vet Ophthalmol*. 2005;8:101-111. PMID: 15762923

3. Hitti-Malin RJ, Burmeister LM, Ricketts SL, Lewis TW, Pettitt L, Boursnell M, Schofield EC, Sargan D, Mellersh CS. A LINE-1 insertion situated in the promoter of IMPG2 is associated with autosomal recessive progressive retinal atrophy in Lhasa Apso dogs. BMC Genet. 2020 Sep 7;21(1):100. doi: 10.1186/s12863-020-00911-w. PMID: 32894063; PMCID: PMC7487703. **reference derived from non-USA dog population**

4. O'Neil DG, Brodbelt DC, Keddy A, et al. Keratoconjunctivitis sicca in dogs under primary veterinary care in the UK: an epidemiological study. *JSAP*. 2021; 62: 636-645. PMID: 34134171. **Reference derived from a non-USA dog population.**

OCULAR DISORDERS REPORT
LHASA APSO

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 837 #	 %	2019-2023 123 #	 %
GLOBE				
.110 MICROPHTHALMOS	1	0.1%	0	0.0%
40.910 KERATOCONJUNCTIVITIS SICCA (KCS)	3	0.4%	1	0.8%
EYELIDS				
20.160 MACROPALPEBRAL FISSURE	3	0.4%	0	0.0%
21.000 ENTROPION	12	1.4%	2	1.6%
25.110 DISTICHIASIS	33	3.9%	2	1.6%
32.110 IMPERFORATE LACRIMAL PUNCTUM	1	0.1%	0	0.0%
NICTITANS				
51.100 CARTILAGE ANOMALY/ EVERSION	1	0.1%	0	0.0%
52.110 GLAND PROLAPSE	4	0.5%	0	0.0%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	8	1.0%	0	0.0%
70.220 EXPOSURE KERATOPATHY SYNDROME	21	2.5%	2	1.6%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	16	1.9%	0	0.0%
UVEA				
93.110 IRIS HYPOPLASIA	1	0.1%	0	0.0%
93.120 UVEAL CYST-SINGLE	1	0.1%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	10	1.2%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	1	0.1%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	2	0.2%	0	0.0%
FUNDUS				
97.110 CHOROIDAL HYPOPLASIA	1	0.1%	0	0.0%
120.170 RETINAL DYSPLASIA-FOLDS	5	0.6%	3	2.4%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	3	0.4%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	7	0.8%	0	0.0%
130.110 MICROPAPILLA	1	0.1%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	2	0.2%	0	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	6	0.7%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	28	3.3%	1	0.8%
100.301 PUNCTATE-ANTERIOR CORTEX	7	0.8%	1	0.8%
100.302 PUNCTATE-POSTERIOR CORTEX	5	0.6%	0	0.0%
100.303 PUNCTATE-EQUATORIAL CORTEX	3	0.4%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	1	0.1%	1	0.8%
100.306 PUNCTATE-NUCLEUS	1	0.1%	0	0.0%
100.311 INCIPIENT-ANTERIOR CORTEX	13	1.6%	3	2.4%
100.312 INCIPIENT-POSTERIOR CORTEX	15	1.8%	0	0.0%
100.313 INCIPIENT-EQUATORIAL CORTEX	4	0.5%	0	0.0%
100.314 INCIPIENT-ANTERIOR SUTURES	4	0.5%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	2	0.2%	0	0.0%
100.316 INCIPIENT-NUCLEUS	3	0.4%	0	0.0%
100.322 INCOMPLETE-POSTERIOR CORTEX	0	0.0%	2	1.6%
100.323 INCOMPLETE-EQUATORIAL CORTEX	1	0.1%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	1	0.1%	2	1.6%
100.330 GENERALIZED/ COMPLETE	18	2.2%	1	0.8%
100.375 SUBLUXATION/ LUXATION	1	0.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***83***	***9.9%***	***8***	***6.5%***
VITREOUS				
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	4	0.5%	1	0.8%
110.320 VITREOUS DEGENERATION-SYNERESIS	6	0.7%	1	0.8%
OTHER				
900.100 OTHER-SUSPECTED AS INHERITED	12	1.4%	0	0.0%

OCULAR DISORDERS REPORT
LHASA APSO

Year Examined:	1993-2018		2019-2023	
Total # Dogs:	837		123	
Diagnostic Name	**#**	**%**	**#**	**%**
OTHER Continued				
900.110 OTHER-SUSPECTED AS NOT-INHERITED	22	2.6%	4	3.3%
NORMAL				
.000 NORMAL GLOBE	643	76.8%	99	80.5%

LLEWELLIN SETTER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Cataract	Not defined	1	NO	
B.	Y-suture tip opacity	Not defined	1	Breeder option	

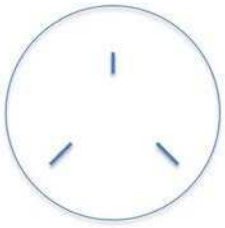
Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

B. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. Newer versions of the form (3/16/21) have boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
LLEWELLIN SETTER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 3 #	 %	Year Examined: 2019-2023 Total # Dogs: 28 #	 %
EYELIDS				
22.000 ECTROPION	0	0.0%	1	3.6%
25.110 DISTICHIASIS	0	0.0%	1	3.6%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	0	0.0%	1	3.6%
100.302 PUNCTATE-POSTERIOR CORTEX	0	0.0%	2	7.1%
100.303 PUNCTATE-EQUATORIAL CORTEX	0	0.0%	1	3.6%
100.305 PUNCTATE-POSTERIOR SUTURES	0	0.0%	1	3.6%
100.306 PUNCTATE-NUCLEUS	0	0.0%	1	3.6%
100.312 INCIPIENT-POSTERIOR CORTEX	0	0.0%	1	3.6%
100.313 INCIPIENT-EQUATORIAL CORTEX	0	0.0%	1	3.6%
100.315 INCIPIENT-POSTERIOR SUTURES	0	0.0%	1	3.6%
100.322 INCOMPLETE-POSTERIOR CORTEX	0	0.0%	1	3.6%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	5	17.9%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***0***	***0.0%***	***9***	***32.1%***
OTHER				
900.110 OTHER-SUSPECTED AS NOT-INHERITED	0	0.0%	2	7.1%
NORMAL				
.000 NORMAL GLOBE	3	100.0%	17	60.7%

LOUISIANA CATAHOULA LEOPARD DOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
B.	Cataract	Not defined	1	NO	

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

Any opacity of the lens and/or its capsule, regardless of size or location within the lens. Cataracts are assumed to be hereditary unless associated with known trauma, ocular inflammation, specific metabolic diseases, or nutritional deficiencies.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
LOUISIANA CATAHOULA LEOPARD DOG

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	421		76	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	5	1.2%	0	0.0%
EYELIDS					
25.110	DISTICHIASIS	3	0.7%	0	0.0%
CORNEA					
70.220	EXPOSURE KERATOPATHY SYNDROME	0	0.0%	1	1.3%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	1	0.2%	0	0.0%
UVEA					
93.110	IRIS HYPOPLASIA	4	1.0%	1	1.3%
93.150	IRIS COLOBOMA	13	3.1%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	43	10.2%	8	10.5%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	1	0.2%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	1	0.2%	0	0.0%
97.150	COLOBOMA	1	0.2%	2	2.6%
FUNDUS					
97.110	CHOROIDAL HYPOPLASIA	2	0.5%	2	2.6%
97.120	COLOBOMA	2	0.5%	0	0.0%
120.170	RETINAL DYSPLASIA-FOLDS	9	2.1%	0	0.0%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	2	0.5%	0	0.0%
120.920	RETINAL DETACHMENT	1	0.2%	0	0.0%
LENS					
100.200	CATARACT, UNSPECIFIED	1	0.2%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	6	1.4%	1	1.3%
100.301	PUNCTATE-ANTERIOR CORTEX	0	0.0%	1	1.3%
100.302	PUNCTATE-POSTERIOR CORTEX	2	0.5%	1	1.3%
100.306	PUNCTATE-NUCLEUS	1	0.2%	0	0.0%
100.307	PUNCTATE-CAPSULAR	1	0.2%	0	0.0%
100.311	INCIPIENT-ANTERIOR CORTEX	5	1.2%	1	1.3%
100.312	INCIPIENT-POSTERIOR CORTEX	3	0.7%	1	1.3%
100.313	INCIPIENT-EQUATORIAL CORTEX	2	0.5%	0	0.0%
100.316	INCIPIENT-NUCLEUS	1	0.2%	0	0.0%
100.322	INCOMPLETE-POSTERIOR CORTEX	2	0.5%	0	0.0%
100.330	GENERALIZED/ COMPLETE	1	0.2%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***19***	***4.5%***	***4***	***5.3%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	2	0.5%	0	0.0%
110.135	PHPV/ PTVL	0	0.0%	1	1.3%
110.320	VITREOUS DEGENERATION-SYNERESIS	2	0.5%	0	0.0%
OTHER					
900.100	OTHER-SUSPECTED AS INHERITED	4	1.0%	0	0.0%
900.110	OTHER-SUSPECTED AS NOT-INHERITED	13	3.1%	2	2.6%
NORMAL					
.000	NORMAL GLOBE	340	80.8%	59	77.6%

LOWCHEN

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
C.	Cataract	Not defined	1	NO	
D.	Vitreous degeneration				
	- syneresis	Not defined	1	Breeder option	
E.	Retinal atrophy				
	- generalized	Not defined	1	NO	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

Any opacity of the lens and/or its capsule, regardless of size or location within the lens. Cataracts are assumed to be hereditary unless associated with known trauma, ocular inflammation, specific metabolic diseases, or nutritional deficiencies.

D. Vitreous degeneration - syneresis

A liquefaction of the vitreous gel which may predispose to retinal detachment and/or glaucoma.

E. Retinal atrophy - generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
LOWCHEN

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1,866 #	%	2019-2023 556 #	%
EYELIDS				
20.140 ECTOPIC CILIA	1	0.1%	0	0.0%
21.000 ENTROPION	1	0.1%	0	0.0%
25.110 DISTICHIASIS	89	4.8%	51	9.2%
GLOBE				
40.910 KERATOCONJUNCTIVITIS SICCA (KCS)	1	0.1%	0	0.0%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	1	0.1%	0	0.0%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	0	0.0%	2	0.4%
70.730 DYSTROPHY-ENDOTHELIAL	2	0.1%	0	0.0%
UVEA				
93.120 UVEAL CYST-SINGLE	1	0.1%	0	0.0%
93.150 IRIS COLOBOMA	1	0.1%	2	0.4%
93.170 UVEAL CYST-MULTIPLE	1	0.1%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	143	7.7%	102	18.3%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	3	0.2%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	3	0.2%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	11	0.6%	22	4.0%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	1	0.1%	0	0.0%
FUNDUS				
97.110 CHOROIDAL HYPOPLASIA	2	0.1%	0	0.0%
120.170 RETINAL DYSPLASIA-FOLDS	3	0.2%	0	0.0%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	1	0.1%	2	0.4%
120.310 RETINAL ATROPHY-GENERALIZED	41	2.2%	1	0.2%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	2	0.1%	0	0.0%
120.960 RETINOPATHY	5	0.3%	1	0.2%
130.110 MICROPAPILLA	1	0.1%	0	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	21	1.1%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	62	3.3%	14	2.5%
100.301 PUNCTATE-ANTERIOR CORTEX	15	0.8%	6	1.1%
100.302 PUNCTATE-POSTERIOR CORTEX	14	0.8%	0	0.0%
100.303 PUNCTATE-EQUATORIAL CORTEX	4	0.2%	3	0.5%
100.304 PUNCTATE-ANTERIOR SUTURES	2	0.1%	1	0.2%
100.305 PUNCTATE-POSTERIOR SUTURES	8	0.4%	1	0.2%
100.306 PUNCTATE-NUCLEUS	2	0.1%	0	0.0%
100.307 PUNCTATE-CAPSULAR	3	0.2%	3	0.5%
100.311 INCIPIENT-ANTERIOR CORTEX	25	1.3%	1	0.2%
100.312 INCIPIENT-POSTERIOR CORTEX	25	1.3%	2	0.4%
100.313 INCIPIENT-EQUATORIAL CORTEX	8	0.4%	1	0.2%
100.314 INCIPIENT-ANTERIOR SUTURES	2	0.1%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	4	0.2%	0	0.0%
100.316 INCIPIENT-NUCLEUS	2	0.1%	0	0.0%
100.317 INCIPIENT-CAPSULAR	2	0.1%	0	0.0%
100.321 INCOMPLETE-ANTERIOR CORTEX	1	0.1%	1	0.2%
100.322 INCOMPLETE-POSTERIOR CORTEX	1	0.1%	0	0.0%
100.323 INCOMPLETE-EQUATORIAL CORTEX	1	0.1%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	2	0.1%	4	0.7%
100.330 GENERALIZED/ COMPLETE	16	0.9%	1	0.2%
100.375 SUBLUXATION/ LUXATION	2	0.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***156***	***8.4%***	***20***	***3.6%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	3	0.2%	3	0.5%

OCULAR DISORDERS REPORT
LOWCHEN

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1,866 #	 %	Year Examined: 2019-2023 Total # Dogs: 556 #	 %
VITREOUS Continued				
110.135 PHPV/ PTVL	1	0.1%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	4	0.2%	3	0.5%
110.320 VITREOUS DEGENERATION-SYNERESIS	50	2.7%	8	1.4%
OTHER				
900.000 OTHER, UNSPECIFIED	13	0.7%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	39	2.1%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	14	0.8%	8	1.4%
NORMAL				
.000 NORMAL GLOBE	1,481	79.4%	363	65.3%

LUCAS TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Lens luxation	Autosomal recessive	1	NO	Mutation of the *ADAMTS17* gene

Description and Comments

A. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the Lucas Terrier. The condition listed above is currently noted solely due to the availability of a genetic test for the disease.

1. Gould D, Pettitt L, McLaughlin B, Holmes N, Forman O, Thomas A, Ahonen S, Lohi H, O'Leary C, Sargan D, Mellersh C. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. Vet Ophthalmol. 2011 Nov;14(6):378-84. PMID: 22050825. ** Non-USA dog population**

OCULAR DISORDERS REPORT
LUCAS TERRIER

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions for this breed.

MAGYAR AGAR

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the MAGYAR AGAR breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
MAGYAR AGAR

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 5 #	 %	Year Examined: 2019-2023 Total # Dogs: 3 #	 %
LENS				
100.316 INCIPIENT-NUCLEUS	0	0.0%	1	33.3%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***0***	***0.0%***	***1***	***33.3%***
NORMAL				
.000 NORMAL GLOBE	5	100.0%	2	66.7%

MALTESE

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	Genetic mutations described
A.	Entropion	Not defined	1	Breeder option	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Cataract	Not defined	1-3	NO	
D.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- PRA-*prcd*	Autosomal recessive	4	NO	Mutation of the *prcd* gene

Description and Comments

A. Entropion

A conformational defect resulting in inversion of the eyelid margin which may cause ocular irritation. It is likely that entropion is influenced by several factors defining the skin and other structures, which make up the eyelids, orbital contents, and conformation of the skull.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Retinal Atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-*prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Maltese is *PRCD* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Gelatt KN, Mackay EO. Prevalence of primary breed-related cataracts in the dog in North America. Vet Ophthalmol. 2005 Mar-Apr;8(2):101-11. doi: 10.1111/j.1463-5224.2005.00352.x. PMID: 15762923.

3. Guandalini A, Di Girolamo N, Corvi R, Santillo D, Andreani V, and Pinzo B. (2018) Epidemiology of ocular disorders presumed to be inherited in three small Italian dog breeds in Italy. *Vet Ophthalmol*, 21 (5): 524-529. Doi.org/10.1111/vop.12542.PMID 29284193 **Reference derived from non-USA dog population. **

4. Donner J, Freyer J, Davison S, et al. Genetic prevalence and clinical relevance of canine Mendelian d isease variants in over one Million dogs. PloS Genet. 2023 Feb 27; 19(2) doi V10.1371/journal.pgen.1010651. Collection 2023 Feb. PMID: 36848397

OCULAR DISORDERS REPORT
MALTESE

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	431		338	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	1	0.2%	2	0.6%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	2	0.5%	1	0.3%
EYELIDS					
21.000	ENTROPION	6	1.4%	7	2.1%
25.110	DISTICHIASIS	13	3.0%	5	1.5%
32.110	IMPERFORATE LACRIMAL PUNCTUM	1	0.2%	0	0.0%
NICTITANS					
52.110	GLAND PROLAPSE	3	0.7%	1	0.3%
CORNEA					
70.220	EXPOSURE KERATOPATHY SYNDROME	3	0.7%	2	0.6%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	2	0.5%	1	0.3%
UVEA					
93.110	IRIS HYPOPLASIA	0	0.0%	1	0.3%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	20	4.6%	5	1.5%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	0	0.0%	1	0.3%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	0	0.0%	1	0.3%
95.120	UVEAL CYST-FREE FLOATING	1	0.2%	0	0.0%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	17	3.9%	7	2.1%
100.301	PUNCTATE-ANTERIOR CORTEX	5	1.2%	6	1.8%
100.302	PUNCTATE-POSTERIOR CORTEX	6	1.4%	1	0.3%
100.303	PUNCTATE-EQUATORIAL CORTEX	3	0.7%	1	0.3%
100.304	PUNCTATE-ANTERIOR SUTURES	1	0.2%	0	0.0%
100.305	PUNCTATE-POSTERIOR SUTURES	4	0.9%	0	0.0%
100.306	PUNCTATE-NUCLEUS	1	0.2%	1	0.3%
100.307	PUNCTATE-CAPSULAR	1	0.2%	1	0.3%
100.311	INCIPIENT-ANTERIOR CORTEX	10	2.3%	11	3.3%
100.312	INCIPIENT-POSTERIOR CORTEX	10	2.3%	1	0.3%
100.313	INCIPIENT-EQUATORIAL CORTEX	3	0.7%	1	0.3%
100.314	INCIPIENT-ANTERIOR SUTURES	0	0.0%	1	0.3%
100.315	INCIPIENT-POSTERIOR SUTURES	1	0.2%	2	0.6%
100.316	INCIPIENT-NUCLEUS	2	0.5%	0	0.0%
100.317	INCIPIENT-CAPSULAR	1	0.2%	1	0.3%
100.321	INCOMPLETE-ANTERIOR CORTEX	1	0.2%	1	0.3%
100.322	INCOMPLETE-POSTERIOR CORTEX	1	0.2%	1	0.3%
100.323	INCOMPLETE-EQUATORIAL CORTEX	1	0.2%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	2	0.5%	2	0.6%
100.330	GENERALIZED/ COMPLETE	4	0.9%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***55***	***12.8%***	***29***	***8.6%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	1	0.2%	1	0.3%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	2	0.5%	1	0.3%
110.320	VITREOUS DEGENERATION-SYNERESIS	12	2.8%	3	0.9%
FUNDUS					
120.170	RETINAL DYSPLASIA-FOLDS	4	0.9%	2	0.6%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	5	1.2%	1	0.3%
120.310	RETINAL ATROPHY-GENERALIZED	5	1.2%	0	0.0%
120.920	RETINAL DETACHMENT	1	0.2%	0	0.0%
OTHER					
900.000	OTHER, UNSPECIFIED	8	1.9%	0	0.0%
900.100	OTHER-SUSPECTED AS INHERITED	6	1.4%	0	0.0%
900.110	OTHER-SUSPECTED AS NOT-INHERITED	9	2.1%	8	2.4%

OCULAR DISORDERS REPORT
MALTESE

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 431 #	 %	Year Examined: 2019-2023 Total # Dogs: 338 #	 %
NORMAL				
.000 NORMAL GLOBE	329	76.3%	278	82.2%

MANCHESTER TERRIER

Standard & Toy Varieties

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Persistent pupillary membranes				
	- lens pigment foci/ no strands	Not defined	1	Passes with no notation	
B.	Cataract	Not defined	1	NO	

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
MANCHESTER TERRIER

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	291		174	
	Diagnostic Name	**#**	**%**	**#**	**%**
EYELIDS					
25.110	DISTICHIASIS	1	0.3%	0	0.0%
CORNEA					
70.730	DYSTROPHY-ENDOTHELIAL	0	0.0%	1	0.6%
UVEA					
93.120	UVEAL CYST-SINGLE	1	0.3%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	19	6.5%	4	2.3%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	1	0.3%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	6	2.1%	13	7.5%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	2	0.7%	0	0.0%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	11	3.8%	6	3.4%
100.301	PUNCTATE-ANTERIOR CORTEX	3	1.0%	1	0.6%
100.302	PUNCTATE-POSTERIOR CORTEX	4	1.4%	2	1.1%
100.303	PUNCTATE-EQUATORIAL CORTEX	2	0.7%	0	0.0%
100.304	PUNCTATE-ANTERIOR SUTURES	2	0.7%	0	0.0%
100.305	PUNCTATE-POSTERIOR SUTURES	3	1.0%	0	0.0%
100.306	PUNCTATE-NUCLEUS	2	0.7%	0	0.0%
100.307	PUNCTATE-CAPSULAR	1	0.3%	4	2.3%
100.311	INCIPIENT-ANTERIOR CORTEX	2	0.7%	1	0.6%
100.312	INCIPIENT-POSTERIOR CORTEX	5	1.7%	1	0.6%
100.313	INCIPIENT-EQUATORIAL CORTEX	2	0.7%	0	0.0%
100.317	INCIPIENT-CAPSULAR	4	1.4%	2	1.1%
100.328	Y-SUTURE TIP OPACITIES	2	0.7%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***30***	***10.3%***	***11***	***6.3%***
VITREOUS					
110.135	PHPV/ PTVL	3	1.0%	1	0.6%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	1.0%	0	0.0%
110.320	VITREOUS DEGENERATION-SYNERESIS	4	1.4%	1	0.6%
FUNDUS					
120.170	RETINAL DYSPLASIA-FOLDS	2	0.7%	0	0.0%
120.310	RETINAL ATROPHY-GENERALIZED	0	0.0%	1	0.6%
120.960	RETINOPATHY	1	0.3%	0	0.0%
OTHER					
900.000	OTHER, UNSPECIFIED	6	2.1%	0	0.0%
900.110	OTHER-SUSPECTED AS NOT-INHERITED	5	1.7%	9	5.2%
NORMAL					
.000	NORMAL GLOBE	238	81.8%	140	80.5%

MAREMMA SHEEPDOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS EXPRESSED
A.	Entropion	Not defined	1	Breeder option	
B.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
C.	Chronic superficial keratitis/pannus	Not defined	1	NO	
D.	Cataract	Not defined	1	NO	
E.	Retinal dysplasia				
	- folds	Not defined	1	Breeder option	

Description and Comments

A. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull. This has been reported in the Italian population of the breed

B. Corneal dystrophy

- epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral. This has been reported in the Italian population of the breed

C. Chronic superficial keratitis/pannus

A bilateral inflammatory disease of the cornea which usually starts as a grayish haze to the ventral or ventrolateral cornea, followed by the formation of a vascularized subepithelial growth that begins to spread toward the central cornea; pigmentation follows the vascularization. If severe, vision impairment occurs. Pannus may be associated with plasma cell infiltration of the nictitans. This has been reported in the Italian population of the breed.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region. This has been reported in the Italian population of the breed.

E. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined. This has been reported in the Italian population of the breed.

References

1. Guandalini A, Di Girolamo N, Santillo D, Andreani V, Corvi R, Bandini M, and Peruccio C. (2017) Epidemiology of ocular disorders presumed to be inherited in three large Italian dog breeds in Italy. *Vet Ophthalmol*, 20: 420-426. doi:10.1111/vop.12442. PMID: 27860098 **This single reference is from non-USA dog population. **

OCULAR DISORDERS REPORT
MAREMMA SHEEPDOG

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 27 #	 %	Year Examined: 2019-2023 Total # Dogs: 12 #	 %
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	2	7.4%	1	8.3%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	3	11.1%	0	0.0%
100.301 PUNCTATE-ANTERIOR CORTEX	1	3.7%	0	0.0%
100.306 PUNCTATE-NUCLEUS	1	3.7%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	1	8.3%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***2***	***7.4%***	***0***	***0.0%***
VITREOUS				
110.320 VITREOUS DEGENERATION-SYNERESIS	1	3.7%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	1	3.7%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	0	0.0%	1	8.3%
NORMAL				
.000 NORMAL GLOBE	21	77.8%	10	83.3%

MARKIESJE

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the MARKIESJE breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
MARKIESJE

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions for this breed.

MASTIFF

(English)

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Entropion	Not defined	1	Breeder option	
B.	Ectropion	Not defined	1	Breeder option	
C.	Distichiasis	Not defined	1	Breeder option	
D.	Uveal cysts				
	- single	Not defined	1	Breeder option	
E.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- iris to cornea	Not defined	1	NO	
	- endothelial opacity/no strands	Not defined	1	NO	
F.	Cataract	Not defined	1	NO	
G.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- ADPRA-*RHO*	Autosomal dominant	2, 3, 6	NO	Mutation in the *RHO* gene
H.	Multifocal retinopathy -IRD-*BEST1*(*cmr1)*	Autosomal recessive	4,5, 6	NO (Breeder option with normal DNA test for *cmr1*)	Mutation in the *BEST1* gene
I.	Retinal dysplasia				
	- folds	Not defined	1	Breeder option	

Description and Comments

A. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull. Entropion in the Mastiff is severe and may require multiple surgical corrections.

B. Ectropion

A conformational defect resulting in eversion of the eyelids, which may cause ocular irritation due to exposure. It is likely that ectropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

C. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

D. Uveal cysts

Fluid filled sacs arising from the posterior surface of the iris, to which they may remain attached or break free and float into the anterior chamber. Usually occur in mature dogs. There is usually no effect on vision unless the cysts are heavily clustered and impinge on the pupillary area. Less frequently, the cysts may rupture and adhere to the cornea or anteriro lens capsule. Multiple cysts may occlude the iridocorneal angle and cause glaucoma.

E. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur. In the Mastiff, the strands often bridge from the iris to the cornea and may potentially cause vision impairment. Thus, the strong recommendations against breeding animals with any form of this abnormality.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

F. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

G. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

-ADPRA-*RHO*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. The ERG is normal at 3-6 months of age, but abnormal by 13 months of age. Increased exposure to bright light causes more rapid loss of neurons. PRA in the Mastiff is inherited as an autosomal dominant trait. The mutation is a single nucleotide transversion of the *RHO* gene. A DNA test is available.

H. Multifocal retinopathy - IRD-*BEST1* (*cmr1)*

Canine Multifocal Retinopathy type 1 (*cmr1*) is characterized by numerous distinct (i.e. multifocal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There may be a serous subretinal fluid, or accumulation of subretinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs between 11-20 weeks of age and there is minimal progression in lesion distribution after 1 year of age. The lesions may flatten, leaving areas of retinal thinning and RPE hypertrophy, hyperplasia, and pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE detachments. In the early stages of this disease, most dogs exhibit no noticeable problem with vision or electroretinographic abnormalities despite their abnormal appearing retinas. However, variable degrees of retinal degeneration occur with chronicity.

Canine Multifocal Retinopathy type 1 is caused by a mutation in the Bestrophin 1 gene (*BEST1*) and is described to be recessively inherited in the Great Pyrenees, Dogue de Bordeaux, Bullmastiff, Mastiff and a number of other mastiff-derived breeds. A DNA test is available.

The breeding advice for breeds diagnosed with "CMR/CMR-like retinopathy" will be changed from "No" to "Breeder option" if the owner of the dog provides the registering office with results of the DNA test for the affected dog showing that it is genetically normal, i.e., not a homozygous mutant, for the BEST1 mutation.

I. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Kijas JW, Miller BJ, Pearce-Kelling SE, et al. Canine models of ocular disease: outcross breedings define a dominant disorder present in the English mastiff and bull mastiff dog breeds. *J Hered*. 2003;94:27-30. PMID: 12692159

3. Miyadera K, Acland GM, Aguirre GD. Genetic and phenotypic variations of inherited retinal diseases in dogs: the power of within- and across-breed studies. *Mamm Genome*. 2012;23:40-61. PMID:22065099

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5. Zangerl B, Wickstrom K, Slavik J, et al. Assessment of canine BEST1 variations identifies new mutations and establishes an independent bestrophinopathy model (cmr3). *Mol Vis*. 2010;16:2791- 2804. PMID: 21197113

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OCULAR DISORDERS REPORT
MASTIFF

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 9,391 #	 %	2019-2023 653 #	 %
GLOBE				
.110 MICROPHTHALMOS	22	0.2%	0	0.0%
10.000 GLAUCOMA	2	0.0%	0	0.0%
40.910 KERATOCONJUNCTIVITIS SICCA (KCS)	5	0.1%	2	0.3%
EYELIDS				
20.160 MACROPALPEBRAL FISSURE	344	3.7%	0	0.0%
21.000 ENTROPION	424	4.5%	61	9.3%
22.000 ECTROPION	666	7.1%	58	8.9%
25.110 DISTICHIASIS	93	1.0%	6	0.9%
NICTITANS				
51.100 CARTILAGE ANOMALY/ EVERSION	12	0.1%	0	0.0%
52.110 GLAND PROLAPSE	19	0.2%	2	0.3%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	3	0.0%	0	0.0%
70.220 EXPOSURE KERATOPATHY SYNDROME	4	0.0%	0	0.0%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	39	0.4%	3	0.5%
70.730 DYSTROPHY-ENDOTHELIAL	52	0.6%	1	0.2%
UVEA				
90.250 PIGMENTARY UVEITIS	1	0.0%	0	0.0%
93.110 IRIS HYPOPLASIA	0	0.0%	1	0.2%
93.120 UVEAL CYST-SINGLE	89	0.9%	11	1.7%
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	7	0.1%	0	0.0%
93.150 IRIS COLOBOMA	3	0.0%	0	0.0%
93.170 UVEAL CYST-MULTIPLE	10	0.1%	5	0.8%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	297	3.2%	19	2.9%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	62	0.7%	2	0.3%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	474	5.0%	15	2.3%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	19	0.2%	1	0.2%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	8	0.1%	3	0.5%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	54	0.6%	7	1.1%
93.810 UVEAL MELANOMA	3	0.0%	0	0.0%
95.120 UVEAL CYST-FREE FLOATING	4	0.0%	2	0.3%
FUNDUS				
97.110 CHOROIDAL HYPOPLASIA	1	0.0%	0	0.0%
120.170 RETINAL DYSPLASIA-FOLDS	679	7.2%	37	5.7%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	52	0.6%	1	0.2%
120.310 RETINAL ATROPHY-GENERALIZED	151	1.6%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	4	0.0%	0	0.0%
120.920 RETINAL DETACHMENT	1	0.0%	0	0.0%
120.960 RETINOPATHY	9	0.1%	1	0.2%
130.110 MICROPAPILLA	4	0.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	2	0.0%	0	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	19	0.2%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	429	4.6%	28	4.3%
100.301 PUNCTATE-ANTERIOR CORTEX	102	1.1%	22	3.4%
100.302 PUNCTATE-POSTERIOR CORTEX	17	0.2%	2	0.3%
100.303 PUNCTATE-EQUATORIAL CORTEX	8	0.1%	0	0.0%
100.304 PUNCTATE-ANTERIOR SUTURES	15	0.2%	1	0.2%
100.305 PUNCTATE-POSTERIOR SUTURES	16	0.2%	2	0.3%
100.306 PUNCTATE-NUCLEUS	21	0.2%	5	0.8%
100.307 PUNCTATE-CAPSULAR	27	0.3%	3	0.5%

OCULAR DISORDERS REPORT
MASTIFF

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 9,391 #	 %	Year Examined: 2019-2023 Total # Dogs: 653 #	 %
LENS Continued				
100.311 INCIPIENT-ANTERIOR CORTEX	77	0.8%	5	0.8%
100.312 INCIPIENT-POSTERIOR CORTEX	43	0.5%	2	0.3%
100.313 INCIPIENT-EQUATORIAL CORTEX	25	0.3%	1	0.2%
100.314 INCIPIENT-ANTERIOR SUTURES	8	0.1%	1	0.2%
100.315 INCIPIENT-POSTERIOR SUTURES	6	0.1%	2	0.3%
100.316 INCIPIENT-NUCLEUS	45	0.5%	7	1.1%
100.317 INCIPIENT-CAPSULAR	12	0.1%	3	0.5%
100.321 INCOMPLETE-ANTERIOR CORTEX	3	0.0%	3	0.5%
100.322 INCOMPLETE-POSTERIOR CORTEX	1	0.0%	2	0.3%
100.326 INCOMPLETE-NUCLEUS	3	0.0%	1	0.2%
100.327 INCOMPLETE-CAPSULAR	2	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	7	0.1%	4	0.6%
100.330 GENERALIZED/ COMPLETE	41	0.4%	0	0.0%
100.340 RESORBING/ HYPERMATURE	1	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION	5	0.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***492***	***5.2%***	***62***	***9.5%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	9	0.1%	2	0.3%
110.135 PHPV/ PTVL	5	0.1%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	10	0.1%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	59	0.6%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	169	1.8%	2	0.3%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	112	1.2%	33	5.1%
NORMAL				
.000 NORMAL GLOBE	6,379	67.9%	418	64.0%

MCNAB

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	Genetic mutations described
A.	Choroidal hypoplasia (Collie Eye Anomaly) - staphyloma/coloboma - retinal detachment - retinal hemorrhage - optic nerve coloboma	Autosomal recessive	1	NO	Mutation in the CEA-*NHEJ1 gene*

Description and Comments

A. Choroidal hypoplasia (Collie Eye Anomaly)
- Staphyloma/coloboma
- Retinal detachment
- Retinal hemorrhage
- Optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1*. The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

References

1. Donner J, Freyer J, Davison S, et al. Genetic prevalence and clinical relevance of canine Mendelian disease variants in over one million dogs. PloS Genet. 2023 Feb 27; 19(2) doi:10.1371/journal.pgen.1010651.eCollection 2023 Feb. PMID: 36848397

OCULAR DISORDERS REPORT
MC NAB

Year Examined:	1993-2018		2019-2023	
Total # Dogs:	3		8	
Diagnostic Name	**#**	**%**	**#**	**%**
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	1	33.3%	0	0.0%
FUNDUS				
97.110 CHOROIDAL HYPOPLASIA	1	33.3%	0	0.0%
NORMAL				
.000 NORMAL GLOBE	2	66.7%	8	100.0%

MI-KI

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	
D.	Vitreous degeneration				
	- syneresis	Not defined	1	Breeder option	
	- anterior chamber	Not defined	1	Breeder option	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make strong recommendations with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Vitreous degeneration

Liquefaction of the vitreous gel which may predispose to retinal detachment.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
MI-KI

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1,664 #	 %	Year Examined: 2019-2023 Total # Dogs: 210 #	 %
EYELIDS				
20.140 ECTOPIC CILIA	1	0.1%	0	0.0%
20.160 MACROPALPEBRAL FISSURE	2	0.1%	0	0.0%
21.000 ENTROPION	11	0.7%	0	0.0%
25.110 DISTICHIASIS	233	14.0%	29	13.8%
GLOBE				
40.910 KERATOCONJUNCTIVITIS SICCA (KCS)	4	0.2%	0	0.0%
NICTITANS				
52.110 GLAND PROLAPSE	3	0.2%	1	0.5%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	1	0.1%	0	0.0%
70.220 EXPOSURE KERATOPATHY SYNDROME	4	0.2%	2	1.0%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	27	1.6%	1	0.5%
70.730 DYSTROPHY-ENDOTHELIAL	1	0.1%	0	0.0%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	189	11.4%	12	5.7%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	3	0.2%	0	0.0%
FUNDUS				
97.110 CHOROIDAL HYPOPLASIA	1	0.1%	0	0.0%
120.170 RETINAL DYSPLASIA-FOLDS	13	0.8%	0	0.0%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	9	0.5%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	7	0.4%	0	0.0%
120.920 RETINAL DETACHMENT	2	0.1%	0	0.0%
120.960 RETINOPATHY	12	0.7%	0	0.0%
130.110 MICROPAPILLA	2	0.1%	1	0.5%
130.120 OPTIC NERVE HYPOPLASIA	2	0.1%	0	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	1	0.1%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	138	8.3%	5	2.4%
100.301 PUNCTATE-ANTERIOR CORTEX	11	0.7%	0	0.0%
100.302 PUNCTATE-POSTERIOR CORTEX	8	0.5%	0	0.0%
100.303 PUNCTATE-EQUATORIAL CORTEX	1	0.1%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	53	3.2%	1	0.5%
100.306 PUNCTATE-NUCLEUS	2	0.1%	0	0.0%
100.307 PUNCTATE-CAPSULAR	3	0.2%	0	0.0%
100.311 INCIPIENT-ANTERIOR CORTEX	5	0.3%	3	1.4%
100.312 INCIPIENT-POSTERIOR CORTEX	7	0.4%	0	0.0%
100.313 INCIPIENT-EQUATORIAL CORTEX	13	0.8%	0	0.0%
100.314 INCIPIENT-ANTERIOR SUTURES	1	0.1%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	24	1.4%	2	1.0%
100.316 INCIPIENT-NUCLEUS	4	0.2%	0	0.0%
100.317 INCIPIENT-CAPSULAR	1	0.1%	0	0.0%
100.322 INCOMPLETE-POSTERIOR CORTEX	1	0.1%	0	0.0%
100.327 INCOMPLETE-CAPSULAR	1	0.1%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	13	0.8%	1	0.5%
100.330 GENERALIZED/ COMPLETE	1	0.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***137***	***8.2%***	***6***	***2.9%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	1	0.1%	2	1.0%
110.135 PHPV/ PTVL	1	0.1%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	41	2.5%	2	1.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	108	6.5%	6	2.9%

OCULAR DISORDERS REPORT
MI-KI

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1,664 #	 %	Year Examined: 2019-2023 Total # Dogs: 210 #	 %
OTHER				
900.000 OTHER, UNSPECIFIED	24	1.4%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	57	3.4%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	56	3.4%	12	5.7%
NORMAL				
.000 NORMAL GLOBE	1,054	63.3%	151	71.9%

MINIATURE AMERICAN SHEPHERD (AKC)/MINIATURE AUSTRALIAN SHEPHERD

It is recommended that this breed be examined prior to pharmacological dilation to best facilitate identification of iris coloboma.

**Due to the breed's ancestry, most of the references cited here are for the Australian Shepherd. The examiner may also find the Australian Shepherd page as a helpful reference for other conditions that may occur but are not yet reported in the Miniature American Shepherd/Miniature Australian Shepherd.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Microphthalmia with multiple ocular defects	Presumed autosomal recessive with incomplete penetrance	2-6	NO	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
D.	Iris coloboma	Not defined	1	NO	
E.	Iris hypoplasia	Not defined	1	Breeder option	
F.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
G.	Cataract				
	- generalized	Not defined	1	NO	
	- *HSF4*	Autosomal co-dominant	7, 8	NO	Mutation of the *HSF4* gene
H.	Persistent hyaloid artery remnant (PHA)	Not defined	1,16	Breeder option	
I.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- PRA-*prcd*	Autosomal recessive	9	NO	Mutation of the *prcd* gene
J.	Cone degeneration - day blindness	Autosomal recessive	10	NO	Mutation of the *CNGB3* gene

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
K.	Multifocal retinopathy - IRD-*BEST1* (*cmr1*)	Autosomal recessive	11,12	NO (Breeder option with normal DNA test for *cmr1*)	Mutation of the *BEST1* gene
L.	Choroidal hypoplasia (Collie Eye Anomaly) - optic nerve coloboma - retinal detachment - retinal hemorrhage - staphyloma/coloboma	Autosomal recessive	13-16	NO	Mutation of the *NHEJ1* gene
M.	Coloboma/staphyloma without microphthalmia	Not defined	1	NO	

Description and Comments

A. Microphthalmia with multiple ocular defects

Microphthalmia is a congenital defect characterized by a small eye with associated defects of the cornea, iris (coloboma), anterior chamber, lens (cataract) and/or retina (dysplasia). In the Australian Shepherd, microphthalmia has long been suspected to be associated with merled coat coloration but a definitive genetic relationship has not been established. The eyes of affected homozygous merle (usually white) dogs have extreme forms of this entity and are usually blind at birth. Affected heterozygous merle-coated dogs demonstrate less severe manifestations.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Iris coloboma

A congenital abnormality in iris development usually characterized by a full-thickness defect in iris tissue, commonly (though not exclusively) located at the 6 o'clock position associated with failure of the closure of the optic fissure. A partial-thickness defect in iris tissue should be recorded ad iris hypoplasia on the eye certification form.

E. Iris hypoplasia

A congenital abnormality in iris development usually characterized by a reduced quantity of tissue identified as a partial-thickness defect in iris tissue. Full-thickness iris hypoplasia is rare and should be recorded as an iris coloboma on the eye certification form.

F. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

G. Cataract

- generalized

Any opacity of the lens and/or its capsule, regardless of size or location within the lens. Cataracts are assumed to be hereditary unless associated with known trauma, ocular inflammation, specific metabolic diseases, or nutritional deficiencies.

- *HSF4*

In the Australian Shepherd, a mutation in *HSF4* (heat shock transcription factor 4), the HSF4-2 mutation, has been shown to increase the likelihood of cataract formation. The mutation is inherited in a co-dominant manner. Dogs with one copy of the mutation develop bilateral posterior cataracts and homozygotes develop a nuclear cataract that typically progresses to a mature cataract. A DNA test is available for this mutation. Other genetic factors can contribute to cataract formation in this breed and will not be detected by this test.

H. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

I. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-*prcd*

Unpublished data from genetics laboratories has shown that the principal form of PRA in the Australian Shepherd is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

J. Cone degeneration - day blindness or hemeralopia

Autosomal recessively inherited early degeneration of the cone photoreceptors. Affected puppies develop day blindness, color blindness, and photophobia between 8 and 12 weeks of age. Affected dogs remain ophthalmoscopically normal their entire life. Electroretinography is required to definitively diagnose the disorder. Genetically, the condition results from a mutation in the *CNGB3* gene. A DNA test is available.

K. Multifocal retinopathy

Canine Multifocal Retinopathy type 1 (*cmr1*) is characterized by numerous distinct (i.e. multifocal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There may be a serous subretinal fluid, or accumulation of subretinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs between 11-20 weeks of age and there is minimal progression in lesion distribution after 1 year of age. The lesions may flatten, leaving areas of retinal thinning and RPE hypertrophy, hyperplasia, and pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE detachments. In the early stages of this disease, most dogs exhibit no noticeable problem with vision or electroretinographic abnormalities despite their abnormal appearing retinas. However, variable degrees of retinal degeneration occur with chronicity.

Canine Multifocal Retinopathy type 1 is caused by a mutation in the Bestrophin 1 gene (*BEST1*) and is described to be recessively inherited in the Great Pyrenees, Dogue de Bordeaux, Bullmastiff, Mastiff, Australian Shepherd and other breeds.

The breeding advice for breeds diagnosed with "CMR/CMR-like retinopathy" will be changed from "No" to "Breeder option" if the owner of the dog provides the registering office with results of the DNA test for the affected dog, showing that it is genetically normal, i.e., not a homozygous mutant, for the *BEST1* mutation.

L. Choroidal hypoplasia (Collie Eye Anomaly)
- staphyloma/coloboma
- retinal detachment
- retinal hemorrhage
- optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1.* The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

M. Coloboma/staphyloma (unassociated with microphthalmia)

A coloboma is a congenital defect which may affect the iris, choroid or optic disc. Iris colobomas are seen as notches in the pupillary margin. Scleral ectasia is defined as a congenital thinning and secondary distention of the sclera; when lined by uveal tissue it is called a staphyloma. These may be anteriorly located, apparent as a bulge beneath the upper eyelid or posteriorly located, requiring visualization with an ophthalmoscope. These conditions may or may not be genetically related to the same anomalies seen associated with microphthalmia (entity "A" above).

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1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

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OCULAR DISORDERS REPORT
MINIATURE AMERICAN(AKC)/MINIATURE AUSTRALIAN SHEPHERD

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	16,621		6,592	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	27	0.2%	2	0.0%
10.000	GLAUCOMA	1	0.0%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	2	0.0%	0	0.0%
EYELIDS					
20.140	ECTOPIC CILIA	0	0.0%	2	0.0%
25.110	DISTICHIASIS	730	4.4%	212	3.2%
32.110	IMPERFORATE LACRIMAL PUNCTUM	2	0.0%	5	0.1%
NICTITANS					
51.100	CARTILAGE ANOMALY/ EVERSION	2	0.0%	1	0.0%
52.110	GLAND PROLAPSE	0	0.0%	1	0.0%
CORNEA					
70.220	EXPOSURE KERATOPATHY SYNDROME	2	0.0%	0	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	180	1.1%	49	0.7%
70.730	DYSTROPHY-ENDOTHELIAL	5	0.0%	2	0.0%
UVEA					
90.250	PIGMENTARY UVEITIS	1	0.0%	0	0.0%
93.110	IRIS HYPOPLASIA	100	0.6%	86	1.3%
93.120	UVEAL CYST-SINGLE	0	0.0%	2	0.0%
93.150	IRIS COLOBOMA	322	1.9%	113	1.7%
93.180	IRIS SPHINCTER DYSPLASIA	10	0.1%	15	0.2%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	1,643	9.9%	830	12.6%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	25	0.2%	12	0.2%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	7	0.0%	2	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	9	0.1%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	2	0.0%	2	0.0%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	4	0.0%	0	0.0%
93.810	UVEAL MELANOMA	1	0.0%	1	0.0%
97.150	COLOBOMA	7	0.0%	1	0.0%
FUNDUS					
97.110	CHOROIDAL HYPOPLASIA	32	0.2%	13	0.2%
97.120	COLOBOMA	8	0.0%	0	0.0%
120.170	RETINAL DYSPLASIA-FOLDS	53	0.3%	15	0.2%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	1	0.0%	0	0.0%
120.310	RETINAL ATROPHY-GENERALIZED	29	0.2%	0	0.0%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%
120.920	RETINAL DETACHMENT	1	0.0%	1	0.0%
120.960	RETINOPATHY	5	0.0%	0	0.0%
130.110	MICROPAPILLA	76	0.5%	14	0.2%
130.120	OPTIC NERVE HYPOPLASIA	21	0.1%	5	0.1%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	195	1.2%	92	1.4%
100.301	PUNCTATE-ANTERIOR CORTEX	37	0.2%	37	0.6%
100.302	PUNCTATE-POSTERIOR CORTEX	16	0.1%	5	0.1%
100.303	PUNCTATE-EQUATORIAL CORTEX	10	0.1%	11	0.2%
100.304	PUNCTATE-ANTERIOR SUTURES	6	0.0%	1	0.0%
100.305	PUNCTATE-POSTERIOR SUTURES	39	0.2%	6	0.1%
100.306	PUNCTATE-NUCLEUS	15	0.1%	19	0.3%
100.307	PUNCTATE-CAPSULAR	18	0.1%	16	0.2%
100.311	INCIPIENT-ANTERIOR CORTEX	32	0.2%	18	0.3%
100.312	INCIPIENT-POSTERIOR CORTEX	31	0.2%	5	0.1%
100.313	INCIPIENT-EQUATORIAL CORTEX	11	0.1%	6	0.1%

OCULAR DISORDERS REPORT
MINIATURE AMERICAN(AKC)/MINIATURE AUSTRALIAN SHEPHERD

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	16,621		6,592	
	Diagnostic Name	#	%	#	%
LENS Continued					
100.315	INCIPIENT-POSTERIOR SUTURES	2	0.0%	0	0.0%
100.316	INCIPIENT-NUCLEUS	7	0.0%	2	0.0%
100.317	INCIPIENT-CAPSULAR	13	0.1%	8	0.1%
100.321	INCOMPLETE-ANTERIOR CORTEX	1	0.0%	3	0.0%
100.322	INCOMPLETE-POSTERIOR CORTEX	4	0.0%	1	0.0%
100.323	INCOMPLETE-EQUATORIAL CORTEX	2	0.0%	0	0.0%
100.326	INCOMPLETE-NUCLEUS	0	0.0%	3	0.0%
100.327	INCOMPLETE-CAPSULAR	1	0.0%	1	0.0%
100.328	Y-SUTURE TIP OPACITIES	14	0.1%	29	0.4%
100.330	GENERALIZED/ COMPLETE	6	0.0%	0	0.0%
100.375	SUBLUXATION/ LUXATION	1	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***251***	***1.5%***	***142***	***2.2%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	64	0.4%	100	1.5%
110.135	PHPV/ PTVL	15	0.1%	1	0.0%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	15	0.1%	14	0.2%
110.320	VITREOUS DEGENERATION-SYNERESIS	69	0.4%	15	0.2%
OTHER					
900.000	OTHER, UNSPECIFIED	129	0.8%	0	0.0%
900.100	OTHER-SUSPECTED AS INHERITED	184	1.1%	7	0.1%
900.110	OTHER-SUSPECTED AS NOT-INHERITED	175	1.1%	208	3.2%
NORMAL					
.000	NORMAL GLOBE	13,749	82.7%	5,051	76.6%

MINIATURE BULL TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- iris to lens	Not defined	1	NO	
	- iris to cornea	Not defined	1	NO	
B.	Cataract	Not defined	1	NO	
C.	Lens luxation	Autosomal recessive	1-4	NO	Mutation of the *ADAMTS17* gene

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment and blindness may occur.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma) causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

Two loci with potentially enhancing effects on the ADAMTS17 mutation are associated with primary lens luxation (PLL) in Australian Miniature Bull Terriers. PLL associated allele of the BICF2G630420272 SNP increases the risk of PLL in the presence of the ADAMTS17 mutation. Candidate genes in the two regions of interest included CPE on chromosome 15 and CTCF on chromosome 1. The ADAMTS17 mutation is also associated with abnormal foot and nail shapes, pedal hyperkeratosis, and persistent pupillary membranes. Association of the ADAMTS17 mutation with possible pedal skeletal abnormalities in the Miniature Bull Terriers supports primary lens luxation in this breed and Marchesani syndrome-like disease in humans as being homologous diseases.

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OCULAR DISORDERS REPORT
MINIATURE BULL TERRIER

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	1,306		77	
	Diagnostic Name	**#**	**%**	**#**	**%**
GLOBE					
.110	MICROPHTHALMOS	3	0.2%	1	1.3%
10.000	GLAUCOMA	1	0.1%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	6	0.5%	0	0.0%
EYELIDS					
22.000	ECTROPION	1	0.1%	0	0.0%
25.110	DISTICHIASIS	1	0.1%	0	0.0%
CORNEA					
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	5	0.4%	0	0.0%
70.730	DYSTROPHY-ENDOTHELIAL	13	1.0%	0	0.0%
UVEA					
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	4	0.3%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	80	6.1%	0	0.0%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	52	4.0%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	82	6.3%	1	1.3%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	8	0.6%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	9	0.7%	2	2.6%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	15	1.1%	2	2.6%
LENS					
100.200	CATARACT, UNSPECIFIED	2	0.2%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	54	4.1%	4	5.2%
100.301	PUNCTATE-ANTERIOR CORTEX	16	1.2%	0	0.0%
100.302	PUNCTATE-POSTERIOR CORTEX	2	0.2%	0	0.0%
100.303	PUNCTATE-EQUATORIAL CORTEX	2	0.2%	0	0.0%
100.305	PUNCTATE-POSTERIOR SUTURES	1	0.1%	1	1.3%
100.306	PUNCTATE-NUCLEUS	1	0.1%	0	0.0%
100.307	PUNCTATE-CAPSULAR	8	0.6%	1	1.3%
100.311	INCIPIENT-ANTERIOR CORTEX	15	1.1%	1	1.3%
100.312	INCIPIENT-POSTERIOR CORTEX	5	0.4%	0	0.0%
100.313	INCIPIENT-EQUATORIAL CORTEX	1	0.1%	1	1.3%
100.314	INCIPIENT-ANTERIOR SUTURES	1	0.1%	0	0.0%
100.317	INCIPIENT-CAPSULAR	12	0.9%	0	0.0%
100.330	GENERALIZED/ COMPLETE	4	0.3%	0	0.0%
100.375	SUBLUXATION/ LUXATION	51	3.9%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***70***	***5.4%***	***4***	***5.2%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	1	0.1%	0	0.0%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	4	0.3%	1	1.3%
110.320	VITREOUS DEGENERATION-SYNERESIS	20	1.5%	1	1.3%
FUNDUS					
120.170	RETINAL DYSPLASIA-FOLDS	3	0.2%	0	0.0%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	1	0.1%	0	0.0%
120.310	RETINAL ATROPHY-GENERALIZED	13	1.0%	0	0.0%
120.960	RETINOPATHY	2	0.2%	0	0.0%
130.110	MICROPAPILLA	12	0.9%	0	0.0%
130.120	OPTIC NERVE HYPOPLASIA	3	0.2%	0	0.0%
OTHER					
900.000	OTHER, UNSPECIFIED	9	0.7%	0	0.0%
900.100	OTHER-SUSPECTED AS INHERITED	33	2.5%	0	0.0%
900.110	OTHER-SUSPECTED AS NOT-INHERITED	24	1.8%	0	0.0%
NORMAL					
.000	NORMAL GLOBE	973	74.5%	68	88.3%

MINIATURE PINSCHER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATION DESCRIBED
A.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
C.	Cataract	Not defined	1	NO	
D.	Vitreous degeneration				
	- syneresis	Not defined	1	Breeder option	

Description and Comments

A. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Vitreous degeneration - syneresis

A liquefaction of the vitreous gel which may predispose to retinal detachment.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
MINIATURE PINSCHER

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	894		275	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	3	0.3%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	1	0.1%	0	0.0%
EYELIDS					
20.140	ECTOPIC CILIA	1	0.1%	0	0.0%
21.000	ENTROPION	3	0.3%	0	0.0%
22.000	ECTROPION	1	0.1%	0	0.0%
25.110	DISTICHIASIS	5	0.6%	1	0.4%
NICTITANS					
52.110	GLAND PROLAPSE	2	0.2%	0	0.0%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	2	0.2%	0	0.0%
70.220	EXPOSURE KERATOPATHY SYNDROME	4	0.4%	2	0.7%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	54	6.0%	5	1.8%
70.730	DYSTROPHY-ENDOTHELIAL	2	0.2%	0	0.0%
UVEA					
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.1%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	27	3.0%	7	2.5%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	1	0.1%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	1	0.1%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	1	0.1%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	10	1.1%	7	2.5%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	4	0.4%	0	0.0%
FUNDUS					
97.120	COLOBOMA	1	0.1%	0	0.0%
120.170	RETINAL DYSPLASIA-FOLDS	3	0.3%	0	0.0%
120.310	RETINAL ATROPHY-GENERALIZED	12	1.3%	0	0.0%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	3	0.3%	0	0.0%
130.110	MICROPAPILLA	3	0.3%	0	0.0%
130.120	OPTIC NERVE HYPOPLASIA	9	1.0%	0	0.0%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	34	3.8%	5	1.8%
100.301	PUNCTATE-ANTERIOR CORTEX	10	1.1%	2	0.7%
100.302	PUNCTATE-POSTERIOR CORTEX	5	0.6%	1	0.4%
100.303	PUNCTATE-EQUATORIAL CORTEX	2	0.2%	0	0.0%
100.304	PUNCTATE-ANTERIOR SUTURES	1	0.1%	0	0.0%
100.305	PUNCTATE-POSTERIOR SUTURES	3	0.3%	0	0.0%
100.306	PUNCTATE-NUCLEUS	4	0.4%	0	0.0%
100.307	PUNCTATE-CAPSULAR	2	0.2%	1	0.4%
100.311	INCIPIENT-ANTERIOR CORTEX	23	2.6%	5	1.8%
100.312	INCIPIENT-POSTERIOR CORTEX	11	1.2%	1	0.4%
100.313	INCIPIENT-EQUATORIAL CORTEX	3	0.3%	1	0.4%
100.314	INCIPIENT-ANTERIOR SUTURES	1	0.1%	0	0.0%
100.315	INCIPIENT-POSTERIOR SUTURES	1	0.1%	0	0.0%
100.316	INCIPIENT-NUCLEUS	0	0.0%	1	0.4%
100.317	INCIPIENT-CAPSULAR	1	0.1%	0	0.0%
100.321	INCOMPLETE-ANTERIOR CORTEX	2	0.2%	4	1.5%
100.322	INCOMPLETE-POSTERIOR CORTEX	1	0.1%	3	1.1%
100.323	INCOMPLETE-EQUATORIAL CORTEX	1	0.1%	1	0.4%
100.330	GENERALIZED/ COMPLETE	7	0.8%	1	0.4%
100.340	RESORBING/ HYPERMATURE	1	0.1%	0	0.0%
100.375	SUBLUXATION/ LUXATION	3	0.3%	0	0.0%

OCULAR DISORDERS REPORT
MINIATURE PINSCHER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 894 #	 %	2019-2023 275 #	 %
LENS Continued				
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***79***	***8.8%***	***21***	***7.6%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	5	0.6%	0	0.0%
110.135 PHPV/ PTVL	2	0.2%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	10	1.1%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	36	4.0%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	12	1.3%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	27	3.0%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	20	2.2%	17	6.2%
NORMAL				
.000 NORMAL GLOBE	659	73.7%	225	81.8%

MINIATURE SCHNAUZER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Microphthalmia with congenital cataract	Autosomal recessive	2-4, 15	NO	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
D.	Cataract	Autosomal recessive	1, 5-8, 15	NO	
E.	Retinal dysplasia with Persistent hyperplastic primary vitreous (PHPV)	Autosomal recessive	10	NO	
F	Retinal atrophy				
	- XLPRA-RPGR (Type A)	X-linked	9, 11	NO	Mutation of the *RPGR* gene
	- PRA-*PPT1*	Autosomal recessive	12	NO	Mutation of the *PPT1* gene
G.	Ceroid lipofuscinosis	Presumed autosomal recessive	13, 14	NO	

Description and Comments

A. Microphthalmia with congenital cataract

Congenital nuclear and posterior cortical lens opacities that progress slowly. In some cases, these cataracts appear similar to the congenital cataracts described in "E" below. An associated abnormality in this defect is microphthalmia that is often mild and is accompanied by a 1-3 mm reduction in the axial length of the globe as determined by ultrasonography. The cataracts often do not become mature and cause blindness until the dogs reach 3-5 years of age. Congenital cataracts and microphthalmia are inherited as an autosomal recessive disorder.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

Congenital cataracts in the Miniature Schnauzer are bilateral and appear prior to 6 weeks of age. At this time they may already involve the entire lens. Others will first appear as posterior subcapsular opacities and usually progress to complete cataracts. These congenital cataracts are inherited as an autosomal recessive trait. Later-onset cataracts may represent a genetically distinct entity. There are other types of cataract in the breed which are also likely hereditary.

Note: It is not certain whether A and F are genetically distinct, or different manifestations of the same entity, as eyes affected with cataracts are often smaller than normal.

E. Retinal dysplasia with persistent hyperplastic primary vitreous (PHPV)

In the Miniature Schnauzer PHPV is associated with retinal dysplasia in some dogs. In this association it may be unilateral or bilateral and most often manifests as small white posterior lens capsule plaques accompanied by white primary vitreous mass extending to the optic disc. Patent hyaloid arteries and posterior lens capsule vessels may also be present.

F. Retinal atrophy

- XLPRA-RPGR Type A

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most forms of PRA are inherited as recessive traits.

A form of PRA in the Miniature Schnauzer was previously characterized and called photoreceptor dysplasia (now called Type A PRA, known to be X-linked in terms of inheritance). The dysplasia results from the abnormal development of visual cells followed by their degeneration. The disorder appears to affect the generation of an electrical signal within the retinal photoreceptor cells. Although fundus abnormalities usually are not present until 2-3 years of age, abnormalities of the electroretinogram can be demonstrated by 8-10 weeks of age. Clinical signs include mildly impaired night vision and variable rate of progression.

Initial studies suggested a mutation in phosducin was responsible, but this was disproven. This disease is extremely rare. The causative gene for Type A PRA has not been published although a DNA test is available. Another more common autosomal recessive form of PRA appears to be present in the Miniature Schnauzer, but the causative gene has not yet been determined; it also affects dogs ~2-4 years of age. Lastly, cases of late-onset PRA in the

breed are recognized clinically but the inheritance pattern is unknown. (G. Aguirre personal communication 2016).

- PRA-*PPT-1*

PPT1 (*HIVP3*) mutations have been identified to segregate with PRA in Miniature Schnauzers. Age of onset is variable, and more than one variant may be causative. Penetrance of the mutation may be incomplete so care should be taken in interpretation of genetic testing results.

G. Ceroid lipofuscinosis

An inherited disease of man and animals characterized by the accumulation of lipopigment in various tissues of the body including the eye. It results in progressive neurologic disease including blindness. (Also called Batten's disease). This disease is very rare.

References

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OCULAR DISORDERS REPORT
MINIATURE SCHNAUZER

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	32,443		5,318	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	24	0.1%	1	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	7	0.0%	1	0.0%
EYELIDS					
21.000	ENTROPION	5	0.0%	9	0.2%
25.110	DISTICHIASIS	657	2.0%	101	1.9%
32.110	IMPERFORATE LACRIMAL PUNCTUM	2	0.0%	4	0.1%
NICTITANS					
51.100	CARTILAGE ANOMALY/ EVERSION	1	0.0%	0	0.0%
52.110	GLAND PROLAPSE	4	0.0%	0	0.0%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	3	0.0%	0	0.0%
70.220	EXPOSURE KERATOPATHY SYNDROME	8	0.0%	6	0.1%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	162	0.5%	22	0.4%
70.730	DYSTROPHY-ENDOTHELIAL	17	0.1%	1	0.0%
UVEA					
90.250	PIGMENTARY UVEITIS	2	0.0%	0	0.0%
93.110	IRIS HYPOPLASIA	2	0.0%	0	0.0%
93.120	UVEAL CYST-SINGLE	1	0.0%	0	0.0%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	10	0.0%	0	0.0%
93.150	IRIS COLOBOMA	1	0.0%	0	0.0%
93.170	UVEAL CYST-MULTIPLE	1	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	538	1.7%	61	1.1%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	52	0.2%	1	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	83	0.3%	6	0.1%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	12	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	132	0.4%	71	1.3%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	13	0.0%	5	0.1%
FUNDUS					
97.110	CHOROIDAL HYPOPLASIA	4	0.0%	1	0.0%
97.120	COLOBOMA	1	0.0%	0	0.0%
120.170	RETINAL DYSPLASIA-FOLDS	69	0.2%	4	0.1%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	49	0.2%	0	0.0%
120.310	RETINAL ATROPHY-GENERALIZED	153	0.5%	3	0.1%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	14	0.0%	0	0.0%
120.920	RETINAL DETACHMENT	2	0.0%	0	0.0%
120.960	RETINOPATHY	6	0.0%	1	0.0%
130.110	MICROPAPILLA	52	0.2%	9	0.2%
130.120	OPTIC NERVE HYPOPLASIA	16	0.0%	2	0.0%
LENS					
100.200	CATARACT, UNSPECIFIED	61	0.2%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	663	2.0%	113	2.1%
100.301	PUNCTATE-ANTERIOR CORTEX	164	0.5%	39	0.7%
100.302	PUNCTATE-POSTERIOR CORTEX	67	0.2%	10	0.2%
100.303	PUNCTATE-EQUATORIAL CORTEX	57	0.2%	5	0.1%
100.304	PUNCTATE-ANTERIOR SUTURES	17	0.1%	0	0.0%
100.305	PUNCTATE-POSTERIOR SUTURES	97	0.3%	23	0.4%
100.306	PUNCTATE-NUCLEUS	22	0.1%	9	0.2%
100.307	PUNCTATE-CAPSULAR	52	0.2%	27	0.5%
100.311	INCIPIENT-ANTERIOR CORTEX	128	0.4%	21	0.4%
100.312	INCIPIENT-POSTERIOR CORTEX	157	0.5%	21	0.4%
100.313	INCIPIENT-EQUATORIAL CORTEX	76	0.2%	11	0.2%

OCULAR DISORDERS REPORT
MINIATURE SCHNAUZER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 32,443 #	 %	Year Examined: 2019-2023 Total # Dogs: 5,318 #	 %
LENS Continued				
100.314 INCIPIENT-ANTERIOR SUTURES	9	0.0%	3	0.1%
100.315 INCIPIENT-POSTERIOR SUTURES	38	0.1%	5	0.1%
100.316 INCIPIENT-NUCLEUS	36	0.1%	10	0.2%
100.317 INCIPIENT-CAPSULAR	34	0.1%	10	0.2%
100.321 INCOMPLETE-ANTERIOR CORTEX	17	0.1%	6	0.1%
100.322 INCOMPLETE-POSTERIOR CORTEX	21	0.1%	11	0.2%
100.323 INCOMPLETE-EQUATORIAL CORTEX	2	0.0%	2	0.0%
100.325 INCOMPLETE-POSTERIOR SUTURES	3	0.0%	2	0.0%
100.326 INCOMPLETE-NUCLEUS	26	0.1%	9	0.2%
100.327 INCOMPLETE-CAPSULAR	2	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	26	0.1%	16	0.3%
100.330 GENERALIZED/ COMPLETE	153	0.5%	4	0.1%
100.340 RESORBING/ HYPERMATURE	1	0.0%	2	0.0%
100.375 SUBLUXATION/ LUXATION	7	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1,240***	***3.8%***	***230***	***4.3%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	47	0.1%	18	0.3%
110.135 PHPV/ PTVL	24	0.1%	1	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	48	0.1%	6	0.1%
110.320 VITREOUS DEGENERATION-SYNERESIS	144	0.4%	11	0.2%
OTHER				
900.000 OTHER, UNSPECIFIED	158	0.5%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	342	1.1%	4	0.1%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	227	0.7%	125	2.4%
NORMAL				
.000 NORMAL GLOBE	29,481	90.9%	4,726	88.9%

MUDI

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Persistent pupillary membranes - iris to iris	Not defined	1	Breeder option	
B.	Cataract	Not defined	1	NO	

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

Any opacity of the lens and/or its capsule, regardless of size or location within the lens. Cataracts are assumed to be hereditary unless associated with known trauma, ocular inflammation, specific metabolic diseases, or nutritional deficiencies.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
MUDI

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 126 #	 %	Year Examined: 2019-2023 Total # Dogs: 323 #	 %
EYELIDS				
25.110 DISTICHIASIS	2	1.6%	3	0.9%
CORNEA				
70.220 EXPOSURE KERATOPATHY SYNDROME	0	0.0%	1	0.3%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	0	0.0%	2	0.6%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	12	9.5%	19	5.9%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	0	0.0%	2	0.6%
FUNDUS				
97.110 CHOROIDAL HYPOPLASIA	0	0.0%	1	0.3%
120.170 RETINAL DYSPLASIA-FOLDS	0	0.0%	1	0.3%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	0	0.0%	1	0.3%
120.310 RETINAL ATROPHY-GENERALIZED	0	0.0%	1	0.3%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	4	3.2%	8	2.5%
100.301 PUNCTATE-ANTERIOR CORTEX	1	0.8%	7	2.2%
100.305 PUNCTATE-POSTERIOR SUTURES	6	4.8%	4	1.2%
100.306 PUNCTATE-NUCLEUS	0	0.0%	1	0.3%
100.307 PUNCTATE-CAPSULAR	0	0.0%	1	0.3%
100.311 INCIPIENT-ANTERIOR CORTEX	0	0.0%	2	0.6%
100.312 INCIPIENT-POSTERIOR CORTEX	0	0.0%	2	0.6%
100.316 INCIPIENT-NUCLEUS	1	0.8%	2	0.6%
100.317 INCIPIENT-CAPSULAR	0	0.0%	1	0.3%
100.328 Y-SUTURE TIP OPACITIES	5	4.0%	5	1.5%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***8***	***6.3%***	***20***	***6.2%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	0	0.0%	1	0.3%
110.320 VITREOUS DEGENERATION-SYNERESIS	0	0.0%	2	0.6%
OTHER				
900.000 OTHER, UNSPECIFIED	1	0.8%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	7	5.6%	19	5.9%
NORMAL				
.000 NORMAL GLOBE	100	79.4%	262	81.1%

MUNSTERLANDER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the MUNSTERLANDER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
MUNSTERLANDER

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	1		1	
Diagnostic Name		**#**	**%**	**#**	**%**
NORMAL					
.000	NORMAL GLOBE	1	100.0%	1	100.0%

NATIVE AMERICAN INDIAN DOG

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the NATIVE AMERICAN INDIAN DOG breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
NATIVE AM. INDIAN DOG

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1 #	 %	Year Examined: 2019-2023 Total # Dogs: 3 #	 %
LENS				
100.326 INCOMPLETE-NUCLEUS	1	100.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1***	***100.0%***	***0***	***0.0%***
NORMAL				
.000 NORMAL GLOBE	0	0.0%	3	100.0%

NATIVE AMERICAN VILLAGE DOG

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the NATIVE AMERICAN VILLAGE DOG breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
NATIVE AM. VILLAGE DOG

Year Examined:	1993-2018		2019-2023	
Total # Dogs:	2		1	
Diagnostic Name	**#**	**%**	**#**	**%**
OTHER				
900.110 OTHER-SUSPECTED AS NOT-INHERITED	1	50.0%	0	0.0%
NORMAL				
.000 NORMAL GLOBE	1	50.0%	1	100.0%

NEAPOLITAN MASTIFF

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Entropion	Not defined	1,2	Breeder option	
B.	Ectropion	Not defined	1	Breeder option	
C.	Gland prolapse-nictitans	Not defined	1	Breeder Option	

Description and Comments

A. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Ectropion

A conformational defect resulting in eversion of the eyelid(s), which may cause ocular irritation due to exposure. It is likely that ectropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

C. Gland prolapse- nictitans

Protrusion of the tear gland associated with the third eyelid. The mode of inheritance of this disorder is unknown. The exposed gland may become irritated and severe chronic inflammation or keratoconjunctivitis sicca/dry eye syndrome may ensue. Commonly referred to as "cherry eye."

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Guandalini A, Di Girolamo N, Santillo D, Andreani V, Corvi R, Bandini M, Peruccio C. Epidemiology of ocular disorders presumed to be inherited in three large Italian dog breeds in Italy. Vet Ophthalmol. 2017 Sep;20(5):420-426. doi: 10.1111/vop.12442. Epub 2016 Nov 11. PMID: 27860098. **reference derived from non-USA dog population**

OCULAR DISORDERS REPORT
NEAPOLITAN MASTIFF

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 85 #	 %	2019-2023 #	 %
EYELIDS				
20.160 MACROPALPEBRAL FISSURE	14	16.5%	0	0.0%
21.000 ENTROPION	19	22.4%	17	37.8%
22.000 ECTROPION	31	36.5%	20	44.4%
25.110 DISTICHIASIS	8	9.4%	3	6.7%
GLOBE				
40.910 KERATOCONJUNCTIVITIS SICCA (KCS)	1	1.2%	0	0.0%
NICTITANS				
51.100 CARTILAGE ANOMALY/ EVERSION	1	1.2%	2	4.4%
52.110 GLAND PROLAPSE	5	5.9%	6	13.3%
CORNEA				
70.220 EXPOSURE KERATOPATHY SYNDROME	3	3.5%	0	0.0%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	1	1.2%	0	0.0%
70.730 DYSTROPHY-ENDOTHELIAL	0	0.0%	1	2.2%
UVEA				
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	1	1.2%	0	0.0%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	1	1.2%	3	6.7%
100.306 PUNCTATE-NUCLEUS	1	1.2%	2	4.4%
100.307 PUNCTATE-CAPSULAR	0	0.0%	1	2.2%
100.311 INCIPIENT-ANTERIOR CORTEX	0	0.0%	1	2.2%
100.313 INCIPIENT-EQUATORIAL CORTEX	1	1.2%	0	0.0%
100.316 INCIPIENT-NUCLEUS	1	1.2%	0	0.0%
100.330 GENERALIZED/ COMPLETE	3	3.5%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***6***	***7.1%***	***4***	***8.9%***
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	2	2.4%	0	0.0%
120.960 RETINOPATHY	1	1.2%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	1	1.2%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	1	1.2%	1	2.2%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	7	8.2%	5	11.1%
NORMAL				
.000 NORMAL GLOBE	29	34.1%	10	22.2%

NEDERLANDSE KOOIKERHONDJE

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Cataract	Not defined	1	NO	

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
NEDERLANDSE KOOIKERHONDJE

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	161		169	
	Diagnostic Name	**#**	**%**	**#**	**%**
CORNEA					
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	0	0.0%	2	1.2%
UVEA					
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	4	2.5%	3	1.8%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	1	0.6%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	0	0.0%	2	1.2%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	10	6.2%	3	1.8%
100.301	PUNCTATE-ANTERIOR CORTEX	1	0.6%	0	0.0%
100.302	PUNCTATE-POSTERIOR CORTEX	1	0.6%	0	0.0%
100.303	PUNCTATE-EQUATORIAL CORTEX	1	0.6%	0	0.0%
100.305	PUNCTATE-POSTERIOR SUTURES	2	1.2%	0	0.0%
100.306	PUNCTATE-NUCLEUS	3	1.9%	0	0.0%
100.307	PUNCTATE-CAPSULAR	3	1.9%	3	1.8%
100.317	INCIPIENT-CAPSULAR	0	0.0%	1	0.6%
100.328	Y-SUTURE TIP OPACITIES	1	0.6%	4	2.4%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***11***	***6.8%***	***4***	***2.4%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	1	0.6%	2	1.2%
110.320	VITREOUS DEGENERATION-SYNERESIS	2	1.2%	4	2.4%
FUNDUS					
120.170	RETINAL DYSPLASIA-FOLDS	0	0.0%	1	0.6%
120.960	RETINOPATHY	1	0.6%	0	0.0%
OTHER					
900.000	OTHER, UNSPECIFIED	2	1.2%	0	0.0%
900.110	OTHER-SUSPECTED AS NOT-INHERITED	9	5.6%	11	6.5%
NORMAL					
.000	NORMAL GLOBE	137	85.1%	142	84.0%

NEW ZEALAND HUNTAWAY

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the NEW ZEALAND HUNTAWAY breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
NEW ZEALAND HUNTAWAY

Diagnostic Name	1993-2018 # (Total # Dogs: 2)	1993-2018 %	2019-2023 # (Total # Dogs: 0)	2019-2023 %
UVEA				
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	1	50.0%	0	
NORMAL				
.000 NORMAL GLOBE	2	100.0%	0	

NEWFOUNDLAND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Glaucoma	Not defined	2	NO	
B.	Entropion	Not defined	1	Breeder option	
C.	Ectropion	Not defined	1	Breeder option	
D.	Uveal cysts				
	- single	Not defined	1	Breeder option	
E.	Cataract	Not defined	1	NO	

Description and Comments

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure which, when sustained even for a brief period of time, causes intraocular damage resulting in blindness. The elevated intraocular pressure occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine breed eye screening examination.

Some Newfoundlands have an abnormality of the iridocorneal angle termed pectinate ligament dysplasia. This abnormality is not visible during routine ophthalmic examination using a slitlamp biomicroscope and an indirect ophthalmoscope. The association between pectinate ligament dysplasia and glaucoma, remains unclear. The inheritance of pectinate ligament dysplasia in the Newfoundland is not known. Until the inheritance is determined, control should be directed towards removing dogs from breeding that have glaucoma and have pectinate ligament dysplasia, as well as those dogs that produce progeny afflicted with glaucoma.

B. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

C. Ectropion

A conformational defect resulting in eversion of the eyelids, which may cause ocular irritation due to exposure. It is likely that ectropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

D. Uveal cysts

A pigmented, fluid-filled epithelial-lined structure arising from the posterior iris or ciliary body epithelium. Cysts may remain attached to the pupil margin, iris, or ciliary body, or may detach and be free-floating within the anterior chamber. They may rupture and adhere to the cornea or anterior lens capsule. Uveal cysts may occur in any breed. Uveal cysts are commonly benign, although they may be associated with other pathologic conditions is various breeds.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Strom AR, Hassig M, Iburg TM, et al. Epidemiology of canine glaucoma presented to University of Zurich from 1995 to 2009. Part 1: Congenital and primary glaucoma (4 and 123 cases). *Vet Ophthalmol*. 2011 Mar;14:121-126. PMID: 21366828 **reference derived from non-USA dog population**

OCULAR DISORDERS REPORT
NEWFOUNDLAND

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 3,382 #	 %	Year Examined: 2019-2023 Total # Dogs: 618 #	 %
GLOBE				
.110 MICROPHTHALMOS	6	0.2%	0	0.0%
10.000 GLAUCOMA	1	0.0%	0	0.0%
40.910 KERATOCONJUNCTIVITIS SICCA (KCS)	1	0.0%	0	0.0%
EYELIDS				
20.160 MACROPALPEBRAL FISSURE	128	3.8%	0	0.0%
21.000 ENTROPION	229	6.8%	50	8.1%
22.000 ECTROPION	238	7.0%	22	3.6%
25.110 DISTICHIASIS	22	0.7%	1	0.2%
32.110 IMPERFORATE LACRIMAL PUNCTUM	0	0.0%	2	0.3%
NICTITANS				
51.100 CARTILAGE ANOMALY/ EVERSION	16	0.5%	2	0.3%
52.110 GLAND PROLAPSE	10	0.3%	5	0.8%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	1	0.0%	1	0.2%
70.220 EXPOSURE KERATOPATHY SYNDROME	2	0.1%	3	0.5%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	1	0.0%	2	0.3%
70.730 DYSTROPHY-ENDOTHELIAL	0	0.0%	2	0.3%
UVEA				
93.120 UVEAL CYST-SINGLE	48	1.4%	11	1.8%
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.0%	0	0.0%
93.170 UVEAL CYST-MULTIPLE	3	0.1%	5	0.8%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	23	0.7%	1	0.2%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	5	0.1%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	5	0.1%	2	0.3%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	1	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	2	0.1%	1	0.2%
93.810 UVEAL MELANOMA	1	0.0%	0	0.0%
95.120 UVEAL CYST-FREE FLOATING	4	0.1%	6	1.0%
LENS				
100.200 CATARACT, UNSPECIFIED	11	0.3%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	110	3.3%	23	3.7%
100.301 PUNCTATE-ANTERIOR CORTEX	14	0.4%	10	1.6%
100.302 PUNCTATE-POSTERIOR CORTEX	14	0.4%	3	0.5%
100.303 PUNCTATE-EQUATORIAL CORTEX	8	0.2%	4	0.6%
100.304 PUNCTATE-ANTERIOR SUTURES	1	0.0%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	12	0.4%	1	0.2%
100.306 PUNCTATE-NUCLEUS	4	0.1%	3	0.5%
100.307 PUNCTATE-CAPSULAR	6	0.2%	5	0.8%
100.311 INCIPIENT-ANTERIOR CORTEX	25	0.7%	2	0.3%
100.312 INCIPIENT-POSTERIOR CORTEX	94	2.8%	14	2.3%
100.313 INCIPIENT-EQUATORIAL CORTEX	23	0.7%	3	0.5%
100.314 INCIPIENT-ANTERIOR SUTURES	3	0.1%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	14	0.4%	1	0.2%
100.316 INCIPIENT-NUCLEUS	14	0.4%	2	0.3%
100.317 INCIPIENT-CAPSULAR	8	0.2%	3	0.5%
100.321 INCOMPLETE-ANTERIOR CORTEX	1	0.0%	3	0.5%
100.322 INCOMPLETE-POSTERIOR CORTEX	6	0.2%	5	0.8%
100.323 INCOMPLETE-EQUATORIAL CORTEX	1	0.0%	0	0.0%
100.325 INCOMPLETE-POSTERIOR SUTURES	0	0.0%	3	0.5%
100.326 INCOMPLETE-NUCLEUS	1	0.0%	1	0.2%
100.328 Y-SUTURE TIP OPACITIES	3	0.1%	0	0.0%
100.330 GENERALIZED/ COMPLETE	38	1.1%	5	0.8%

OCULAR DISORDERS REPORT
NEWFOUNDLAND

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 3,382 #	 %	Year Examined: 2019-2023 Total # Dogs: 618 #	 %
LENS Continued				
100.340 RESORBING/ HYPERMATURE	0	0.0%	1	0.2%
100.375 SUBLUXATION/ LUXATION	1	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***298***	***8.8%***	***69***	***11.2%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	5	0.1%	2	0.3%
110.135 PHPV/ PTVL	4	0.1%	2	0.3%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	4	0.1%	0	0.0%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	28	0.8%	1	0.2%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	2	0.1%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	1	0.0%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%
120.920 RETINAL DETACHMENT	0	0.0%	1	0.2%
120.960 RETINOPATHY	1	0.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	7	0.2%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	29	0.9%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	73	2.2%	4	0.6%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	51	1.5%	27	4.4%
NORMAL				
.000 NORMAL GLOBE	2,554	75.5%	452	73.1%

NORFOLK TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
	- endothelial opacity/no strands	Not defined	1	NO	
C.	Cataract	Not defined	1	NO	
D.	Optic nerve hypoplasia	Not defined	1	NO	

Description and Comments

A. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Optic nerve hypoplasia

A congenital anomaly, which results in a small optic disk diameter and vision loss.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
NORFOLK TERRIER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1,546 #	 %	Year Examined: 2019-2023 Total # Dogs: 351 #	 %
EYELIDS				
20.160 MACROPALPEBRAL FISSURE	1	0.1%	0	0.0%
25.110 DISTICHIASIS	6	0.4%	1	0.3%
32.110 IMPERFORATE LACRIMAL PUNCTUM	0	0.0%	1	0.3%
NICTITANS				
52.110 GLAND PROLAPSE	2	0.1%	2	0.6%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	15	1.0%	6	1.7%
70.730 DYSTROPHY-ENDOTHELIAL	3	0.2%	0	0.0%
UVEA				
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.1%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	336	21.7%	66	18.8%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	2	0.1%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	5	0.3%	2	0.6%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	10	0.6%	15	4.3%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	5	0.3%	4	1.1%
FUNDUS				
97.120 COLOBOMA	1	0.1%	0	0.0%
120.170 RETINAL DYSPLASIA-FOLDS	7	0.5%	1	0.3%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	2	0.1%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	11	0.7%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.1%	0	0.0%
130.110 MICROPAPILLA	12	0.8%	4	1.1%
130.120 OPTIC NERVE HYPOPLASIA	22	1.4%	6	1.7%
LENS				
100.200 CATARACT, UNSPECIFIED	1	0.1%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	45	2.9%	10	2.8%
100.301 PUNCTATE-ANTERIOR CORTEX	6	0.4%	1	0.3%
100.302 PUNCTATE-POSTERIOR CORTEX	5	0.3%	0	0.0%
100.303 PUNCTATE-EQUATORIAL CORTEX	1	0.1%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	8	0.5%	2	0.6%
100.306 PUNCTATE-NUCLEUS	2	0.1%	0	0.0%
100.307 PUNCTATE-CAPSULAR	4	0.3%	2	0.6%
100.311 INCIPIENT-ANTERIOR CORTEX	10	0.6%	3	0.9%
100.312 INCIPIENT-POSTERIOR CORTEX	18	1.2%	3	0.9%
100.313 INCIPIENT-EQUATORIAL CORTEX	6	0.4%	6	1.7%
100.315 INCIPIENT-POSTERIOR SUTURES	2	0.1%	1	0.3%
100.316 INCIPIENT-NUCLEUS	0	0.0%	1	0.3%
100.317 INCIPIENT-CAPSULAR	5	0.3%	1	0.3%
100.321 INCOMPLETE-ANTERIOR CORTEX	0	0.0%	3	0.9%
100.322 INCOMPLETE-POSTERIOR CORTEX	2	0.1%	2	0.6%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	4	1.1%
100.330 GENERALIZED/ COMPLETE	4	0.3%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***74***	***4.8%***	***25***	***7.1%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	8	0.5%	1	0.3%
110.135 PHPV/ PTVL	1	0.1%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	8	0.5%	1	0.3%
OTHER				
900.000 OTHER, UNSPECIFIED	14	0.9%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	38	2.5%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	30	1.9%	11	3.1%

OCULAR DISORDERS REPORT
NORFOLK TERRIER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1,546 #	 %	Year Examined: 2019-2023 Total # Dogs: 351 #	 %
NORMAL				
.000 NORMAL GLOBE	1,094	70.8%	225	64.1%

NORBOTTENSPETS

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Cataract	Not defined	1	NO	

Description and Comments

A. Cataracts

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
NORRBOTTENSPETS

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 113 #	 %	Year Examined: 2019-2023 Total # Dogs: 20 #	 %
EYELIDS				
25.110 DISTICHIASIS	2	1.8%	0	0.0%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	1	0.9%	0	0.0%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	7	6.2%	1	5.0%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	1	0.9%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	2	1.8%	0	0.0%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	6	5.3%	2	10.0%
100.302 PUNCTATE-POSTERIOR CORTEX	2	1.8%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	1	0.9%	1	5.0%
100.306 PUNCTATE-NUCLEUS	1	0.9%	1	5.0%
100.311 INCIPIENT-ANTERIOR CORTEX	7	6.2%	0	0.0%
100.312 INCIPIENT-POSTERIOR CORTEX	9	8.0%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	1	0.9%	0	0.0%
100.316 INCIPIENT-NUCLEUS	3	2.7%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	1	5.0%
100.330 GENERALIZED/ COMPLETE	1	0.9%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***25***	***22.1%***	***2***	***10.0%***
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	2	1.8%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	2	1.8%	0	0.0%
OTHER				
900.100 OTHER-SUSPECTED AS INHERITED	3	2.7%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	1	0.9%	0	0.0%
NORMAL				
.000 NORMAL GLOBE	85	75.2%	17	85.0%

NORTH AMERICAN SHEPHERD

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the NORTH AMERICAN SHEPHERD breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
NORTH AMERICAN SHEPHERD

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	6		0	
Diagnostic Name		#	%	#	%
VITREOUS					
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	16.7%	0	
NORMAL					
.000	NORMAL GLOBE	5	83.3%	0	

NORTHERN INUIT

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Retinal dysplasia				
	- folds/geographic/ detached (with skeletal defects)	Autosomal recessive	1,2	Breeder option (Requires Normal genetic test for mutation in COL9A3 gene)	Mutation in the *COL9A3* gene

Description and Comments

A. Retinal dysplasia - folds or detachment with skeletal defects

This condition is also known as oculo-skeletal dysplasia (OSD) or dwarfism with retinal dysplasia type 1 (DRD1) also occurs in the Labrador Retriever. A similar condition, DRD2, occurs in the Samoyed. The condition is autosomal recessive and homozygous affected dogs have shortened forelimbs ("downhill" conformation) with valgus deformity. They have severe ocular defects including cataract, retinal folds/multifocal retinal dysplasia, vitreal degeneration and retinal detachment. The ocular abnormalities result in blindness in most dogs. Heterozygous dogs can have either a normal ocular exam or have multiple retinal folds, vitreal membranes, or vitreal degeneration suggesting a semi-dominant mechanism with respect to the eyes. It is important to note that generally the retinal folds present in heterozygous dogs tend to cluster around the major superior blood vessels of the central tapetal region. The condition is caused by a 1 base pair insertion of *COL9A3.* A DNA test is available.

References

1. Stavinohova R, Hartley C, Burmeister LM, Ricketts SL, Pettitt L, Tetas Pont R, Hitti RJ, Schofield E, Oliver JAC, Mellersh CS. Clinical, histopathological and genetic characterisation of oculoskeletal dysplasia in the Northern Inuit Dog. PLoS One. 2019 Aug 15;14(8):e0220761. doi: 10.1371/journal.pone.0220761. PMID: 31415586; PMCID: PMC6695176. **Reference (2) from non-USA dog population**

2. Iwabe S, Dufour VL, Guzmán JM, Holle DM, Cohen JA, Beltran WA, Aguirre GD. Focal/multifocal and geographic retinal dysplasia in the dog-In vivo retinal microanatomy analyses. Vet Ophthalmol. 2020 Mar;23(2):292-304. doi: 10.1111/vop.12725. Epub 2019 Nov 20. PMID: 31746146; PMCID: PMC7071990.

OCULAR DISORDERS REPORT
NORTHERN INUIT

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 10 #	 %	Year Examined: 2019-2023 Total # Dogs: 21 #	 %
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	1	10.0%	1	4.8%
100.301 PUNCTATE-ANTERIOR CORTEX	0	0.0%	1	4.8%
100.302 PUNCTATE-POSTERIOR CORTEX	1	10.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1***	***10.0%***	***1***	***4.8%***
NORMAL				
.000 NORMAL GLOBE	9	90.0%	20	95.2%

NORWEGIAN BUHUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Cataract				
	- generalized	Not defined	1, 3	NO	
	- pulverulent	Presumed autosomal dominant	2, 3	Breeder option	

Description and Comments

A. Cataract

- generalized

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

- pulverulent

With the pulverulent cataract in the Norwegian Buhund, initial lens changes may be visible as early as 6.5 weeks of age as small dots parallel to the suture lines behind the nucleus. By the age of 4 to 5.5 years, the opacities progress to involve the fetal nucleus which then resembles a ball of candy floss. The adult nucleus and the cortex remain clear. An autosomal dominant mode of inheritance with a high degree of penetrance has been suggested.

Rates of progression of these cataracts can vary, and have been noted to develop in older animals (over the age of 7) that were previously documented to be free from this condition.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Bjerkas E and Haaland MB. Pulverulent nuclear cataract in the Norwegian Buhund. *J Small Anim Pract.* 1995;36:471-474. **reference derived from non-USA dog population**

3. Kristiansen E, Revold T, Lingaas F, Narfstrom K, Pedersen PB, Kielland C, Dahl S, Ropstad EO. (2017), Cataracts in the Norwegian Buhund – current prevalence and characteristics. Vet Ophthalmol, 20: 460-467. doi.10.1111/vop.12449. PMID: 28044393 **reference derived from non-USA dog population**

OCULAR DISORDERS REPORT
NORWEGIAN BUHUND

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 815 #	 %	Year Examined: 2019-2023 Total # Dogs: 314 #	 %
GLOBE				
10.000 GLAUCOMA	1	0.1%	0	0.0%
EYELIDS				
25.110 DISTICHIASIS	2	0.2%	1	0.3%
CORNEA				
70.220 EXPOSURE KERATOPATHY SYNDROME	0	0.0%	1	0.3%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	7	0.9%	2	0.6%
UVEA				
93.110 IRIS HYPOPLASIA	1	0.1%	0	0.0%
93.120 UVEAL CYST-SINGLE	0	0.0%	1	0.3%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	2	0.2%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	1	0.1%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	2	0.2%	2	0.6%
93.810 UVEAL MELANOMA	0	0.0%	1	0.3%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	94	11.5%	43	13.7%
100.301 PUNCTATE-ANTERIOR CORTEX	11	1.3%	6	1.9%
100.302 PUNCTATE-POSTERIOR CORTEX	12	1.5%	7	2.2%
100.303 PUNCTATE-EQUATORIAL CORTEX	1	0.1%	1	0.3%
100.304 PUNCTATE-ANTERIOR SUTURES	2	0.2%	1	0.3%
100.305 PUNCTATE-POSTERIOR SUTURES	15	1.8%	7	2.2%
100.306 PUNCTATE-NUCLEUS	28	3.4%	18	5.7%
100.307 PUNCTATE-CAPSULAR	1	0.1%	3	1.0%
100.311 INCIPIENT-ANTERIOR CORTEX	7	0.9%	1	0.3%
100.312 INCIPIENT-POSTERIOR CORTEX	21	2.6%	10	3.2%
100.313 INCIPIENT-EQUATORIAL CORTEX	2	0.2%	1	0.3%
100.315 INCIPIENT-POSTERIOR SUTURES	12	1.5%	3	1.0%
100.316 INCIPIENT-NUCLEUS	18	2.2%	8	2.5%
100.321 INCOMPLETE-ANTERIOR CORTEX	1	0.1%	0	0.0%
100.322 INCOMPLETE-POSTERIOR CORTEX	1	0.1%	0	0.0%
100.323 INCOMPLETE-EQUATORIAL CORTEX	1	0.1%	0	0.0%
100.325 INCOMPLETE-POSTERIOR SUTURES	1	0.1%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	14	1.7%	4	1.3%
100.330 GENERALIZED/ COMPLETE	6	0.7%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***140***	***17.2%***	***66***	***21.0%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	1	0.1%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	0	0.0%	4	1.3%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	10	1.2%	1	0.3%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	0	0.0%	2	0.6%
120.310 RETINAL ATROPHY-GENERALIZED	3	0.4%	2	0.6%
120.960 RETINOPATHY	5	0.6%	4	1.3%
120.970 RETINOPATHY - CMR/ CMR-LIKE	0	0.0%	1	0.3%
OTHER				
900.000 OTHER, UNSPECIFIED	14	1.7%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	20	2.5%	3	1.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	25	3.1%	16	5.1%
NORMAL				
.000 NORMAL GLOBE	594	72.9%	216	68.8%

NORWEGIAN ELKHOUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Glaucoma (POAG)	Autosomal recessive	2-6	NO	Mutation of the *ADAMTS10* gene
B.	Distichiasis	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands		1	Passes with no notation	
D.	Cataract	Not defined	1	NO	
E.	Y-suture tip opacity	Not defined	1	Breeder option	
F.	Retinal atrophy				
	- PRA-*prcd*	Autosomal recessive	16	NO	Mutation of the *prcd* gene
	- PRA-Rod dysplasia (*rd*)**	Autosomal recessive	7-10	NO	
	- PRA-STK38L (*erd*)**	Autosomal recessive	11-15	NO	Mutation of the *STK38L* gene
H.	Retinal dysplasia				
	- folds	Not defined	1	Breeder option	

Description and Comments

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated intraocular pressure occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of the IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine screening exam for certification.

In the Norwegian Elkhound, glaucoma appears to be familial. In most cases the drainage angle is reported to be open. A mutation has been found in *ADAMTS10* in some Norwegian Elkhounds with glaucoma, but a genetic test is not yet available.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Persistent pupillary membranes (PPMs)

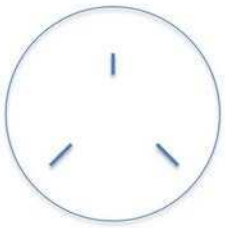
Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. Newer versions of the form (since 3/16/21) have boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

Retinal atrophy

- PRA-*prcd*

Studies have shown that PRA in the Norwegian Elkhound is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA

test is available.

- PRA-Rod dysplasia (*rd*)**

Inappropriate development of the visual cells resulting in vision impairment in dim light by 6 months and total blindness at 3-5 years. Ophthalmoscopic signs may be evident after 5 months of age, with signs of retinal vascular thinning after 2 years. An ERG can provide a diagnosis as early as 6 weeks of age. In the Norwegian Elkhound, this is an autosomal recessive trait.

- PRA-STK38L (*erd*)**

Another form of PRA reported in the Norwegian Elkhound. Animals are night blind at 6 weeks and blind by 1 year of age. Clinical signs are evident by 6 months. On histopathologic examination there is an abnormal structural development of the photoreceptors followed by rapid rod/cone degeneration. The mutation is found in the *STK38L* gene and is inherited as an autosomal recessive trait. While a DNA test is available, no Norwegian Elkhounds are thought to exist with this mutation anymore.

Although previously described, these diseases do not exist in the current population after being identified in a small number of dogs and described in the literature.

F. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

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OCULAR DISORDERS REPORT
NORWEGIAN ELKHOUND

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	2,716		188	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	4	0.1%	0	0.0%
10.000	GLAUCOMA	2	0.1%	0	0.0%
EYELIDS					
20.160	MACROPALPEBRAL FISSURE	16	0.6%	0	0.0%
21.000	ENTROPION	5	0.2%	0	0.0%
22.000	ECTROPION	14	0.5%	0	0.0%
25.110	DISTICHIASIS	46	1.7%	2	1.1%
32.110	IMPERFORATE LACRIMAL PUNCTUM	2	0.1%	0	0.0%
NICTITANS					
51.100	CARTILAGE ANOMALY/ EVERSION	1	0.0%	0	0.0%
52.110	GLAND PROLAPSE	1	0.0%	0	0.0%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	2	0.1%	0	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	10	0.4%	3	1.6%
UVEA					
93.120	UVEAL CYST-SINGLE	6	0.2%	0	0.0%
93.170	UVEAL CYST-MULTIPLE	1	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	37	1.4%	0	0.0%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	11	0.4%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	7	0.3%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	4	0.1%	7	3.7%
LENS					
100.200	CATARACT, UNSPECIFIED	23	0.8%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	114	4.2%	21	11.2%
100.301	PUNCTATE-ANTERIOR CORTEX	11	0.4%	5	2.7%
100.302	PUNCTATE-POSTERIOR CORTEX	10	0.4%	2	1.1%
100.303	PUNCTATE-EQUATORIAL CORTEX	4	0.1%	2	1.1%
100.304	PUNCTATE-ANTERIOR SUTURES	2	0.1%	1	0.5%
100.305	PUNCTATE-POSTERIOR SUTURES	14	0.5%	2	1.1%
100.306	PUNCTATE-NUCLEUS	6	0.2%	5	2.7%
100.307	PUNCTATE-CAPSULAR	4	0.1%	3	1.6%
100.311	INCIPIENT-ANTERIOR CORTEX	12	0.4%	3	1.6%
100.312	INCIPIENT-POSTERIOR CORTEX	39	1.4%	1	0.5%
100.313	INCIPIENT-EQUATORIAL CORTEX	25	0.9%	2	1.1%
100.314	INCIPIENT-ANTERIOR SUTURES	3	0.1%	0	0.0%
100.315	INCIPIENT-POSTERIOR SUTURES	8	0.3%	0	0.0%
100.316	INCIPIENT-NUCLEUS	10	0.4%	3	1.6%
100.317	INCIPIENT-CAPSULAR	9	0.3%	0	0.0%
100.321	INCOMPLETE-ANTERIOR CORTEX	1	0.0%	1	0.5%
100.323	INCOMPLETE-EQUATORIAL CORTEX	0	0.0%	1	0.5%
100.325	INCOMPLETE-POSTERIOR SUTURES	0	0.0%	1	0.5%
100.326	INCOMPLETE-NUCLEUS	1	0.0%	0	0.0%
100.327	INCOMPLETE-CAPSULAR	1	0.0%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	4	0.1%	6	3.2%
100.330	GENERALIZED/ COMPLETE	7	0.3%	0	0.0%
100.375	SUBLUXATION/ LUXATION	4	0.1%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***190***	***7.0%***	***32***	***17.0%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	7	0.3%	2	1.1%
110.135	PHPV/ PTVL	2	0.1%	0	0.0%
110.320	VITREOUS DEGENERATION-SYNERESIS	8	0.3%	0	0.0%
FUNDUS					
120.170	RETINAL DYSPLASIA-FOLDS	50	1.8%	0	0.0%

OCULAR DISORDERS REPORT
NORWEGIAN ELKHOUND

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 2,716 #	 %	Year Examined: 2019-2023 Total # Dogs: 188 #	 %
FUNDUS Continued				
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	2	0.1%	1	0.5%
120.310 RETINAL ATROPHY-GENERALIZED	10	0.4%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%
130.110 MICROPAPILLA	0	0.0%	1	0.5%
130.120 OPTIC NERVE HYPOPLASIA	3	0.1%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	22	0.8%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	32	1.2%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	30	1.1%	17	9.0%
NORMAL				
.000 NORMAL GLOBE	2,320	85.4%	128	68.1%

NORWEGIAN LUNDEHUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the NORWEGIAN LUNDEHUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
NORWEGIAN LUNDEHUND

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	50		4	
	Diagnostic Name	**#**	**%**	**#**	**%**
UVEA					
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	13	26.0%	2	50.0%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	1	2.0%	0	0.0%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	8	16.0%	0	0.0%
100.301	PUNCTATE-ANTERIOR CORTEX	1	2.0%	0	0.0%
100.302	PUNCTATE-POSTERIOR CORTEX	2	4.0%	0	0.0%
100.311	INCIPIENT-ANTERIOR CORTEX	2	4.0%	0	0.0%
100.313	INCIPIENT-EQUATORIAL CORTEX	1	2.0%	0	0.0%
100.315	INCIPIENT-POSTERIOR SUTURES	2	4.0%	0	0.0%
100.330	GENERALIZED/ COMPLETE	3	6.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***11***	***22.0%***	***0***	***0.0%***
VITREOUS					
110.320	VITREOUS DEGENERATION-SYNERESIS	2	4.0%	0	0.0%
OTHER					
900.000	OTHER, UNSPECIFIED	1	2.0%	0	0.0%
NORMAL					
.000	NORMAL GLOBE	31	62.0%	2	50.0%

NORWICH TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma) causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
NORWICH TERRIER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 3,483 #	%	2019-2023 541 #	%
EYELIDS				
20.160 MACROPALPEBRAL FISSURE	1	0.0%	0	0.0%
22.000 ECTROPION	1	0.0%	0	0.0%
25.110 DISTICHIASIS	27	0.8%	8	1.5%
32.110 IMPERFORATE LACRIMAL PUNCTUM	2	0.1%	0	0.0%
NICTITANS				
52.110 GLAND PROLAPSE	4	0.1%	0	0.0%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	20	0.6%	3	0.6%
70.730 DYSTROPHY-ENDOTHELIAL	4	0.1%	0	0.0%
UVEA				
93.110 IRIS HYPOPLASIA	0	0.0%	1	0.2%
93.120 UVEAL CYST-SINGLE	1	0.0%	0	0.0%
93.150 IRIS COLOBOMA	1	0.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	192	5.5%	14	2.6%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	4	0.1%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	8	0.2%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	1	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	5	0.1%	5	0.9%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	5	0.1%	2	0.4%
FUNDUS				
97.120 COLOBOMA	2	0.1%	0	0.0%
120.170 RETINAL DYSPLASIA-FOLDS	7	0.2%	2	0.4%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	4	0.1%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	14	0.4%	0	0.0%
120.960 RETINOPATHY	7	0.2%	0	0.0%
130.110 MICROPAPILLA	1	0.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	8	0.2%	0	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	5	0.1%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	81	2.3%	12	2.2%
100.301 PUNCTATE-ANTERIOR CORTEX	17	0.5%	2	0.4%
100.302 PUNCTATE-POSTERIOR CORTEX	12	0.3%	0	0.0%
100.303 PUNCTATE-EQUATORIAL CORTEX	5	0.1%	3	0.6%
100.304 PUNCTATE-ANTERIOR SUTURES	1	0.0%	1	0.2%
100.305 PUNCTATE-POSTERIOR SUTURES	9	0.3%	0	0.0%
100.306 PUNCTATE-NUCLEUS	4	0.1%	1	0.2%
100.307 PUNCTATE-CAPSULAR	5	0.1%	3	0.6%
100.311 INCIPIENT-ANTERIOR CORTEX	22	0.6%	0	0.0%
100.312 INCIPIENT-POSTERIOR CORTEX	21	0.6%	4	0.7%
100.313 INCIPIENT-EQUATORIAL CORTEX	13	0.4%	3	0.6%
100.314 INCIPIENT-ANTERIOR SUTURES	1	0.0%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	6	0.2%	0	0.0%
100.316 INCIPIENT-NUCLEUS	16	0.5%	3	0.6%
100.317 INCIPIENT-CAPSULAR	3	0.1%	2	0.4%
100.321 INCOMPLETE-ANTERIOR CORTEX	1	0.0%	0	0.0%
100.322 INCOMPLETE-POSTERIOR CORTEX	2	0.1%	0	0.0%
100.323 INCOMPLETE-EQUATORIAL CORTEX	1	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	1	0.0%	4	0.7%
100.330 GENERALIZED/ COMPLETE	13	0.4%	0	0.0%
100.340 RESORBING/ HYPERMATURE	0	0.0%	1	0.2%
100.375 SUBLUXATION/ LUXATION	1	0.0%	0	0.0%

OCULAR DISORDERS REPORT
NORWICH TERRIER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 3,483 #	 %	Year Examined: 2019-2023 Total # Dogs: 541 #	 %
LENS Continued				
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***157***	***4.5%***	***23***	***4.3%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	3	0.1%	0	0.0%
110.135 PHPV/ PTVL	1	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	11	0.3%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	28	0.8%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	52	1.5%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	27	0.8%	15	2.8%
NORMAL				
.000 NORMAL GLOBE	3,095	88.9%	472	87.2%

NOVA SCOTIA DUCK TOLLING RETRIEVER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- iris to lens	Not defined	1	NO	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
D.	Cataract	Not defined	1	NO	
E.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- PRA-*prcd*	Autosomal recessive	2	NO	Mutation of the *prcd* gene
F.	Choroidal hypoplasia (Collie eye anomaly) - staphyloma/coloboma - retinal detachment - retinal hemorrhage - optic nerve coloboma	Autosomal recessive	3,4	NO	Mutation of the CEA-*NHEJ1* gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

In the Nova Scotia Duck Tolling Retriever, many of the PPMs identified on routine screening examinations bridge from the iris to the lens where they are associated with focal cataract. This may result in vision impairment.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-*prcd*

Studies have shown that the principal form of PRA in the Nova Scotia Duck Tolling Retriever is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

F. Choroidal hypoplasia (Collie eye anomaly)
- staphyloma/coloboma
- retinal detachment
- retinal hemorrhage
- optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie eye anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1.* The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Zangerl B, Goldstein O, Philp AR, et al. Identical mutation in a novel retinal gene causes progressive rod-cone degeneration in dogs and retinitis pigmentosa in humans. *Genomics*. 2006 Nov;88:551-563. PMID: 16938425

3. Parker HG, Kukekova AV, Akey DT, et al. Breed relationships facilitate fine-mapping studies: a 7.8-kb deletion cosegregates with Collie eye anomaly across multiple dog breeds. *Genome Res*. 2007 Nov;17:1562-1571. PMID:17916641

4. Brown EA, Thomasy SM, Murphy CJ, Bannasch DL. Genetic analysis of optic nerve head coloboma in the Nova Scotia Duck Tolling Retriever identifies discordance with the NHEJ1 intronic deletion (collie eye anomaly mutation). Vet Ophthalmol. 2018 Mar;21(2):144-150. doi: 10.1111/vop.12488. Epub 2017 Jul 12. PMID: 28702949.

OCULAR DISORDERS REPORT
NOVA SCOTIA DUCK TOLLING RETRIEVER

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	6,246		1,424	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	1	0.0%	2	0.1%
10.000	GLAUCOMA	1	0.0%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	1	0.0%	0	0.0%
EYELIDS					
20.140	ECTOPIC CILIA	1	0.0%	0	0.0%
21.000	ENTROPION	0	0.0%	1	0.1%
25.110	DISTICHIASIS	771	12.3%	160	11.2%
32.110	IMPERFORATE LACRIMAL PUNCTUM	12	0.2%	5	0.4%
NICTITANS					
51.100	CARTILAGE ANOMALY/ EVERSION	5	0.1%	0	0.0%
52.110	GLAND PROLAPSE	5	0.1%	0	0.0%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	0	0.0%	1	0.1%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	166	2.7%	36	2.5%
70.730	DYSTROPHY-ENDOTHELIAL	4	0.1%	0	0.0%
UVEA					
93.120	UVEAL CYST-SINGLE	21	0.3%	4	0.3%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.0%	0	0.0%
93.170	UVEAL CYST-MULTIPLE	1	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	137	2.2%	48	3.4%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	53	0.8%	1	0.1%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	2	0.0%	1	0.1%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	8	0.1%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	165	2.6%	119	8.4%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	2	0.0%	0	0.0%
95.120	UVEAL CYST-FREE FLOATING	1	0.0%	1	0.1%
FUNDUS					
97.110	CHOROIDAL HYPOPLASIA	2	0.0%	0	0.0%
120.170	RETINAL DYSPLASIA-FOLDS	51	0.8%	8	0.6%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	13	0.2%	2	0.1%
120.310	RETINAL ATROPHY-GENERALIZED	97	1.6%	1	0.1%
120.920	RETINAL DETACHMENT	1	0.0%	1	0.1%
120.960	RETINOPATHY	2	0.0%	0	0.0%
130.110	MICROPAPILLA	13	0.2%	0	0.0%
130.120	OPTIC NERVE HYPOPLASIA	13	0.2%	1	0.1%
LENS					
100.200	CATARACT, UNSPECIFIED	18	0.3%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	366	5.9%	84	5.9%
100.301	PUNCTATE-ANTERIOR CORTEX	56	0.9%	13	0.9%
100.302	PUNCTATE-POSTERIOR CORTEX	32	0.5%	5	0.4%
100.303	PUNCTATE-EQUATORIAL CORTEX	19	0.3%	4	0.3%
100.304	PUNCTATE-ANTERIOR SUTURES	2	0.0%	4	0.3%
100.305	PUNCTATE-POSTERIOR SUTURES	21	0.3%	7	0.5%
100.306	PUNCTATE-NUCLEUS	35	0.6%	20	1.4%
100.307	PUNCTATE-CAPSULAR	40	0.6%	28	2.0%
100.311	INCIPIENT-ANTERIOR CORTEX	22	0.4%	6	0.4%
100.312	INCIPIENT-POSTERIOR CORTEX	38	0.6%	5	0.4%
100.313	INCIPIENT-EQUATORIAL CORTEX	22	0.4%	1	0.1%
100.314	INCIPIENT-ANTERIOR SUTURES	3	0.0%	0	0.0%
100.315	INCIPIENT-POSTERIOR SUTURES	7	0.1%	3	0.2%
100.316	INCIPIENT-NUCLEUS	12	0.2%	3	0.2%

OCULAR DISORDERS REPORT
NOVA SCOTIA DUCK TOLLING RETRIEVER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 6,246 #	 %	Year Examined: 2019-2023 Total # Dogs: 1,424 #	 %
LENS Continued				
100.317 INCIPIENT-CAPSULAR	12	0.2%	11	0.8%
100.321 INCOMPLETE-ANTERIOR CORTEX	3	0.0%	0	0.0%
100.322 INCOMPLETE-POSTERIOR CORTEX	2	0.0%	0	0.0%
100.327 INCOMPLETE-CAPSULAR	1	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	16	0.3%	37	2.6%
100.330 GENERALIZED/ COMPLETE	7	0.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***352***	***5.6%***	***110***	***7.7%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	22	0.4%	12	0.8%
110.135 PHPV/ PTVL	8	0.1%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.0%	1	0.1%
110.320 VITREOUS DEGENERATION-SYNERESIS	12	0.2%	3	0.2%
OTHER				
900.000 OTHER, UNSPECIFIED	98	1.6%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	280	4.5%	2	0.1%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	146	2.3%	77	5.4%
NORMAL				
.000 NORMAL GLOBE	4,615	73.9%	913	64.1%

OLD ENGLISH SHEEPDOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Microphthalmia with multiple ocular anomalies	Not defined	2	NO	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
D.	Cataract	Not defined	1,3	NO	
E.	Retinal dysplasia				
	- folds	Not defined	1	Breeder option	

Description and Comments

A. Microphthalmia with multiple congenital ocular defects

Microphthalmia is a developmental anomaly in which the eyeball is abnormally small. This is often associated with other ocular malformations, including defects of the cornea, anterior chamber, lens and/or retina.

Microphthalmia with cataract and retinal abnormalities including retinal detachment, has been reported in litters of Old English Sheepdogs. Lesions were non-progressive. However, blindness did result in some dogs. The mode of inheritance is unknown, but affected dogs should not be bred.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be

associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region. In one study of 66 interrelated Old English Sheepdogs, an autosomal recessive mode of inheritance was suggested. Retinal detachment was an associated finding in 5/43 affected dogs in this study. The location of the opacity within the lens and the age of onset was highly variable.

E. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Barrie K. Posterior lenticonus, microphthalmia, cataracts and retinal folds in Old English Sheepdogs. *J Am Anim Hosp Assoc*. 1979;15:715.

3. Koch SA. Cataracts in interrelated Old English Sheepdogs. *J Am Vet Med Assoc*. 1972 Feb 1;160:299-301. PMID 5061880

OCULAR DISORDERS REPORT
OLD ENGLISH SHEEPDOG

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	5,619		929	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	10	0.2%	0	0.0%
10.000	GLAUCOMA	4	0.1%	0	0.0%
EYELIDS					
20.140	ECTOPIC CILIA	1	0.0%	0	0.0%
20.160	MACROPALPEBRAL FISSURE	1	0.0%	0	0.0%
21.000	ENTROPION	13	0.2%	0	0.0%
22.000	ECTROPION	2	0.0%	0	0.0%
25.110	DISTICHIASIS	95	1.7%	18	1.9%
32.110	IMPERFORATE LACRIMAL PUNCTUM	3	0.1%	2	0.2%
NICTITANS					
51.100	CARTILAGE ANOMALY/ EVERSION	1	0.0%	0	0.0%
52.110	GLAND PROLAPSE	1	0.0%	0	0.0%
CORNEA					
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	21	0.4%	8	0.9%
UVEA					
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.0%	0	0.0%
93.150	IRIS COLOBOMA	1	0.0%	0	0.0%
93.170	UVEAL CYST-MULTIPLE	2	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	524	9.3%	157	16.9%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	8	0.1%	4	0.4%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	9	0.2%	1	0.1%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	10	0.2%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	3	0.1%	3	0.3%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	3	0.1%	0	0.0%
93.810	UVEAL MELANOMA	1	0.0%	0	0.0%
97.150	COLOBOMA	0	0.0%	1	0.1%
FUNDUS					
97.110	CHOROIDAL HYPOPLASIA	3	0.1%	1	0.1%
97.120	COLOBOMA	1	0.0%	0	0.0%
120.170	RETINAL DYSPLASIA-FOLDS	94	1.7%	3	0.3%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	8	0.1%	1	0.1%
120.310	RETINAL ATROPHY-GENERALIZED	13	0.2%	0	0.0%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	9	0.2%	0	0.0%
120.960	RETINOPATHY	5	0.1%	0	0.0%
130.110	MICROPAPILLA	22	0.4%	3	0.3%
130.120	OPTIC NERVE HYPOPLASIA	15	0.3%	0	0.0%
LENS					
100.200	CATARACT, UNSPECIFIED	35	0.6%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	304	5.4%	69	7.4%
100.301	PUNCTATE-ANTERIOR CORTEX	78	1.4%	32	3.4%
100.302	PUNCTATE-POSTERIOR CORTEX	13	0.2%	2	0.2%
100.303	PUNCTATE-EQUATORIAL CORTEX	12	0.2%	1	0.1%
100.304	PUNCTATE-ANTERIOR SUTURES	10	0.2%	2	0.2%
100.305	PUNCTATE-POSTERIOR SUTURES	9	0.2%	5	0.5%
100.306	PUNCTATE-NUCLEUS	19	0.3%	6	0.6%
100.307	PUNCTATE-CAPSULAR	24	0.4%	28	3.0%
100.311	INCIPIENT-ANTERIOR CORTEX	50	0.9%	9	1.0%
100.312	INCIPIENT-POSTERIOR CORTEX	49	0.9%	5	0.5%
100.313	INCIPIENT-EQUATORIAL CORTEX	18	0.3%	3	0.3%
100.314	INCIPIENT-ANTERIOR SUTURES	12	0.2%	1	0.1%
100.315	INCIPIENT-POSTERIOR SUTURES	14	0.2%	1	0.1%

OCULAR DISORDERS REPORT
OLD ENGLISH SHEEPDOG

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 5,619 #	 %	2019-2023 929 #	 %
LENS Continued				
100.316 INCIPIENT-NUCLEUS	34	0.6%	9	1.0%
100.317 INCIPIENT-CAPSULAR	7	0.1%	3	0.3%
100.321 INCOMPLETE-ANTERIOR CORTEX	3	0.1%	1	0.1%
100.322 INCOMPLETE-POSTERIOR CORTEX	4	0.1%	1	0.1%
100.326 INCOMPLETE-NUCLEUS	2	0.0%	2	0.2%
100.327 INCOMPLETE-CAPSULAR	0	0.0%	1	0.1%
100.328 Y-SUTURE TIP OPACITIES	3	0.1%	5	0.5%
100.330 GENERALIZED/ COMPLETE	61	1.1%	3	0.3%
100.340 RESORBING/ HYPERMATURE	2	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION	6	0.1%	1	0.1%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***456***	***8.1%***	***115***	***12.4%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	18	0.3%	2	0.2%
110.135 PHPV/ PTVL	3	0.1%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	0.1%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	26	0.5%	1	0.1%
OTHER				
900.000 OTHER, UNSPECIFIED	35	0.6%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	78	1.4%	2	0.2%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	69	1.2%	24	2.6%
NORMAL				
.000 NORMAL GLOBE	4,431	78.9%	643	69.2%

OLDE ENGLISH BULDOGGE

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the OLDE ENGLISH BULLDOGGE breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
OLDE ENGLISH BULLDOGGE

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	26		19	
	Diagnostic Name	#	%	#	%
EYELIDS					
21.000	ENTROPION	2	7.7%	0	0.0%
25.110	DISTICHIASIS	8	30.8%	2	10.5%
UVEA					
93.110	IRIS HYPOPLASIA	1	3.8%	0	0.0%
93.120	UVEAL CYST-SINGLE	1	3.8%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	1	3.8%	0	0.0%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	1	3.8%	0	0.0%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	1	3.8%	0	0.0%
100.302	PUNCTATE-POSTERIOR CORTEX	1	3.8%	0	0.0%
100.315	INCIPIENT-POSTERIOR SUTURES	1	3.8%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***2***	***7.7%***	***0***	***0.0%***
FUNDUS					
120.170	RETINAL DYSPLASIA-FOLDS	1	3.8%	1	5.3%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	1	3.8%	0	0.0%
OTHER					
900.110	OTHER-SUSPECTED AS NOT-INHERITED	2	7.7%	0	0.0%
NORMAL					
.000	NORMAL GLOBE	11	42.3%	16	84.2%

OTTERHOUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the OTTERHOUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
OTTERHOUND

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 8 #	 %	Year Examined: 2019-2023 Total # Dogs: 11 #	 %
UVEA				
93.120 UVEAL CYST-SINGLE	1	12.5%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	1	12.5%	0	0.0%
LENS				
100.301 PUNCTATE-ANTERIOR CORTEX	0	0.0%	1	9.1%
100.302 PUNCTATE-POSTERIOR CORTEX	0	0.0%	1	9.1%
100.311 INCIPIENT-ANTERIOR CORTEX	0	0.0%	1	9.1%
100.312 INCIPIENT-POSTERIOR CORTEX	0	0.0%	1	9.1%
100.313 INCIPIENT-EQUATORIAL CORTEX	0	0.0%	1	9.1%
100.316 INCIPIENT-NUCLEUS	0	0.0%	1	9.1%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***0***	***0.0%***	***6***	***54.5%***
OTHER				
900.110 OTHER-SUSPECTED AS NOT-INHERITED	0	0.0%	1	9.1%
NORMAL				
.000 NORMAL GLOBE	7	87.5%	9	81.8%

PAPILLON

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
D.	Cataract	Not defined	1	NO	
E.	Vitreous degeneration				
	- syneresis	Not defined	1	Breeder option	
F.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- PRA-*CNGB1*	Autosomal recessive	2-7	NO	Mutation in the *CNGB1* gene
G.	Inherited retinal disease (IRD)	Autosomal dominant (suspected)	8	NO	unknown

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment

or blindness may occur.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

Nuclear and posterior cortical cataracts have been reported in the Papillon.

E. Vitreous degeneration - syneresis

A liquefaction of the vitreous gel, which may predispose to retinal detachment resulting in blindness.

F. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- *CNGB1*

A degenerative disease of the photoreceptors which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. In one study of 707 dogs in Sweden, an autosomal recessive mode of inheritance was suggested. Clinical onset is reported at 5-6 years of age. In approximately 70% of cases of PRA in the Papillon, a *CNGB1* mutation is present, leading to an abnormal *CNGA1* protein in the rod outer segments. Affected dogs have a residual desensitized rod response on dark-adapted ERG and can develop multifocal bullous retinal detachments before marked retinal degeneration is apparent. The mode of transmission is autosomal recessive. A genetic test is available.

G. Inherited retinal disease (IRD)

A subset of Papillons have an inherited retinal disorder (IRD), suspected to be autosomal dominant inheritance pattern, which is characterized by a reduced b wave amplitude and an exaggerated photopic post b-wave negative response ERG. Vision testing (advanced maze testing) showed delayed performance in bright light conditions. This subset of affected Papillons had no evidence of retinal degeneration on fundic exam or OCT noted for up to 8.5 years of age. The only clinical feature is mild visual impairment.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

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3. Narfstrom K, Ekesten B. Electroretinographic evaluation of Papillons with and without hereditary retinal degeneration. *Am J Vet Res.* 1998;59:221-226.PMID 9492941

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5. Winkler PA, Ekenstedt KJ, Occelli LM, et al. A large animal model for CNGB1 autosomal recessive retinitis pigmentosa. *PLoS One.* 2013;8:e72229. PMID: 23977260

6. Marinho LF, Ocelli LM, Bortolino M, et al. Development of retinal bullae in dogs with retinal atrophy. Vet Ophthalmol 2022; 25(2):109-117. PMID34708922

7. Petersen-Jones SM, Pasmanter N, Occelli LM, Querubin JR, Winkler PA. Residual rod function in CNGB1 mutant dogs. Doc Ophthalmol. 2022 Dec;145(3):237-246. doi: 10.1007/s10633-022-09899-3. Epub 2022 Sep 15. PMID: 36107278.

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OCULAR DISORDERS REPORT
PAPILLON

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	11,496		1,484	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	9	0.1%	2	0.1%
10.000	GLAUCOMA	1	0.0%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	1	0.0%	1	0.1%
EYELIDS					
21.000	ENTROPION	20	0.2%	3	0.2%
25.110	DISTICHIASIS	167	1.5%	28	1.9%
32.110	IMPERFORATE LACRIMAL PUNCTUM	8	0.1%	4	0.3%
NICTITANS					
52.110	GLAND PROLAPSE	3	0.0%	0	0.0%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	5	0.0%	1	0.1%
70.220	EXPOSURE KERATOPATHY SYNDROME	2	0.0%	4	0.3%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	123	1.1%	20	1.3%
70.730	DYSTROPHY-ENDOTHELIAL	4	0.0%	0	0.0%
UVEA					
93.110	IRIS HYPOPLASIA	2	0.0%	1	0.1%
93.120	UVEAL CYST-SINGLE	4	0.0%	0	0.0%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.0%	0	0.0%
93.170	UVEAL CYST-MULTIPLE	1	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	353	3.1%	56	3.8%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	8	0.1%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	9	0.1%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	6	0.1%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	18	0.2%	7	0.5%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	7	0.1%	2	0.1%
93.810	UVEAL MELANOMA	1	0.0%	4	0.3%
FUNDUS					
97.110	CHOROIDAL HYPOPLASIA	0	0.0%	1	0.1%
97.120	COLOBOMA	2	0.0%	0	0.0%
120.170	RETINAL DYSPLASIA-FOLDS	69	0.6%	7	0.5%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	14	0.1%	2	0.1%
120.310	RETINAL ATROPHY-GENERALIZED	115	1.0%	7	0.5%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	8	0.1%	0	0.0%
120.920	RETINAL DETACHMENT	2	0.0%	0	0.0%
120.960	RETINOPATHY	3	0.0%	3	0.2%
130.110	MICROPAPILLA	8	0.1%	0	0.0%
130.120	OPTIC NERVE HYPOPLASIA	12	0.1%	0	0.0%
LENS					
100.200	CATARACT, UNSPECIFIED	19	0.2%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	382	3.3%	68	4.6%
100.301	PUNCTATE-ANTERIOR CORTEX	87	0.8%	24	1.6%
100.302	PUNCTATE-POSTERIOR CORTEX	23	0.2%	8	0.5%
100.303	PUNCTATE-EQUATORIAL CORTEX	14	0.1%	2	0.1%
100.304	PUNCTATE-ANTERIOR SUTURES	10	0.1%	4	0.3%
100.305	PUNCTATE-POSTERIOR SUTURES	17	0.1%	5	0.3%
100.306	PUNCTATE-NUCLEUS	36	0.3%	14	0.9%
100.307	PUNCTATE-CAPSULAR	22	0.2%	13	0.9%
100.311	INCIPIENT-ANTERIOR CORTEX	92	0.8%	14	0.9%
100.312	INCIPIENT-POSTERIOR CORTEX	58	0.5%	10	0.7%
100.313	INCIPIENT-EQUATORIAL CORTEX	36	0.3%	7	0.5%
100.314	INCIPIENT-ANTERIOR SUTURES	6	0.1%	0	0.0%

OCULAR DISORDERS REPORT
PAPILLON

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 11,496 #	 %	Year Examined: 2019-2023 Total # Dogs: 1,484 #	 %
LENS Continued				
100.315 INCIPIENT-POSTERIOR SUTURES	10	0.1%	0	0.0%
100.316 INCIPIENT-NUCLEUS	23	0.2%	7	0.5%
100.317 INCIPIENT-CAPSULAR	13	0.1%	2	0.1%
100.321 INCOMPLETE-ANTERIOR CORTEX	3	0.0%	5	0.3%
100.322 INCOMPLETE-POSTERIOR CORTEX	5	0.0%	6	0.4%
100.323 INCOMPLETE-EQUATORIAL CORTEX	1	0.0%	2	0.1%
100.326 INCOMPLETE-NUCLEUS	4	0.0%	1	0.1%
100.327 INCOMPLETE-CAPSULAR	0	0.0%	1	0.1%
100.328 Y-SUTURE TIP OPACITIES	7	0.1%	2	0.1%
100.330 GENERALIZED/ COMPLETE	45	0.4%	5	0.3%
100.340 RESORBING/ HYPERMATURE	1	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION	5	0.0%	1	0.1%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***525***	***4.6%***	***130***	***8.8%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	44	0.4%	4	0.3%
110.135 PHPV/ PTVL	14	0.1%	1	0.1%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	41	0.4%	8	0.5%
110.320 VITREOUS DEGENERATION-SYNERESIS	290	2.5%	21	1.4%
OTHER				
900.000 OTHER, UNSPECIFIED	77	0.7%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	204	1.8%	4	0.3%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	110	1.0%	65	4.4%
NORMAL				
.000 NORMAL GLOBE	9,864	85.8%	1,188	80.1%

PARSON RUSSELL TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
C.	Cataract	Not defined	1, 2	NO	
D.	Lens luxation	Autosomal recessive	3, 4	NO	Mutation in the *ADAMTS17* gene
E.	Vitreous degeneration				
	- syneresis	Not defined	1	Breeder option	
F.	Persistent hyaloid artery remnant (PHA)	Not defined	1	Breeder option	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation may result in blinding retinal detachment and/or elevated intraocular pressure (glaucoma) causing vision impairment, pain, and blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

E. Vitreous degeneration - syneresis

Liquefaction of the vitreous gel which may predispose to retinal detachment resulting in blindness.

F. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Oberbauer AM, Hollingsworth SR, Belanger JM, et al. Inheritance of cataracts and primary lens luxation in Jack Russell Terriers. *Am J Vet Res*. 2008;69:222-227. PMID 18241019

3. Farias FH, Johnson GS, Taylor JF, et al. An ADAMTS17 splice donor site mutation in dogs with primary lens luxation. *Invest Ophthalmol Vis Sci*. 2010;51:4716-4721. PMID 20375329

4. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol*. 2011;14:378-384. PMID: 22050825 **reference from non-USA dog population*

OCULAR DISORDERS REPORT
PARSON RUSSELL TERRIER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 2,850 #	%	2019-2023 234 #	%
EYELIDS				
25.110 DISTICHIASIS	71	2.5%	7	3.0%
NICTITANS				
52.110 GLAND PROLAPSE	1	0.0%	0	0.0%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	14	0.5%	0	0.0%
70.730 DYSTROPHY-ENDOTHELIAL	2	0.1%	0	0.0%
UVEA				
93.110 IRIS HYPOPLASIA	0	0.0%	1	0.4%
93.120 UVEAL CYST-SINGLE	2	0.1%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	186	6.5%	33	14.1%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	1	0.0%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	3	0.1%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	1	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	7	0.2%	4	1.7%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	5	0.2%	0	0.0%
FUNDUS				
97.120 COLOBOMA	1	0.0%	0	0.0%
120.170 RETINAL DYSPLASIA-FOLDS	9	0.3%	1	0.4%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	2	0.1%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	25	0.9%	2	0.9%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%
120.920 RETINAL DETACHMENT	1	0.0%	0	0.0%
120.960 RETINOPATHY	1	0.0%	1	0.4%
130.110 MICROPAPILLA	2	0.1%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	2	0.1%	0	0.0%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	91	3.2%	17	7.3%
100.301 PUNCTATE-ANTERIOR CORTEX	20	0.7%	10	4.3%
100.302 PUNCTATE-POSTERIOR CORTEX	10	0.4%	3	1.3%
100.303 PUNCTATE-EQUATORIAL CORTEX	4	0.1%	1	0.4%
100.304 PUNCTATE-ANTERIOR SUTURES	5	0.2%	1	0.4%
100.305 PUNCTATE-POSTERIOR SUTURES	12	0.4%	3	1.3%
100.306 PUNCTATE-NUCLEUS	7	0.2%	0	0.0%
100.307 PUNCTATE-CAPSULAR	7	0.2%	5	2.1%
100.311 INCIPIENT-ANTERIOR CORTEX	17	0.6%	0	0.0%
100.312 INCIPIENT-POSTERIOR CORTEX	42	1.5%	3	1.3%
100.313 INCIPIENT-EQUATORIAL CORTEX	7	0.2%	0	0.0%
100.314 INCIPIENT-ANTERIOR SUTURES	1	0.0%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	15	0.5%	3	1.3%
100.316 INCIPIENT-NUCLEUS	1	0.0%	0	0.0%
100.317 INCIPIENT-CAPSULAR	10	0.4%	3	1.3%
100.321 INCOMPLETE-ANTERIOR CORTEX	1	0.0%	0	0.0%
100.322 INCOMPLETE-POSTERIOR CORTEX	3	0.1%	1	0.4%
100.328 Y-SUTURE TIP OPACITIES	2	0.1%	1	0.4%
100.330 GENERALIZED/ COMPLETE	11	0.4%	0	0.0%
100.375 SUBLUXATION/ LUXATION	1	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***173***	***6.1%***	***33***	***14.1%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	5	0.2%	10	4.3%
110.135 PHPV/ PTVL	1	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	9	0.3%	0	0.0%

OCULAR DISORDERS REPORT
PARSON RUSSELL TERRIER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 2,850 #	 %	Year Examined: 2019-2023 Total # Dogs: 234 #	 %
VITREOUS Continued				
110.320 VITREOUS DEGENERATION-SYNERESIS	36	1.3%	1	0.4%
OTHER				
900.000 OTHER, UNSPECIFIED	39	1.4%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	97	3.4%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	41	1.4%	19	8.1%
NORMAL				
.000 NORMAL GLOBE	2,438	85.5%	151	64.5%

PATTERDALE TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Lens luxation	Autosomal recessive	1	NO	Mutation in the *ADAMTS17* gene

Description and Comments

A. Lens Luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the Patterdale Terrier. The condition listed above is currently noted solely due to the availability of a genetic test for the disease.

1. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol*. 2011; 14: 378-384. PMID: 22050825 **non-USA dog population**

OCULAR DISORDERS REPORT
PATTERDALE TERRIER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 19 #	%	Year Examined: 2019-2023 Total # Dogs: 1 #	%
EYELIDS				
25.110 DISTICHIASIS	1	5.3%	0	0.0%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	1	5.3%	0	0.0%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	1	5.3%	0	0.0%
NORMAL				
.000 NORMAL GLOBE	17	89.5%	1	100.0%

PEKINGESE

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1-3	Breeder option	
B.	Entropion	Not defined	1	Breeder option	
C.	Exposure keratopathy syndrome	Not defined	1,4,5	Breeder option	
D.	Cataract	Not defined	1	NO	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

C. Exposure keratopathy syndrome

A corneal disease involving all or part of the cornea, resulting from inadequate blinking. This results from a combination of anatomic features including shallow orbits, exophthalmos, macroblepharon and lagophthalmos. Macroblepharon is defined as an exceptionally large palpebral fissure, macroblepharon in conjunction with laxity of the lateral canthal structures may lead to lower lid ectropion and upper lid entropion. Either of these conditions may lead to severe ocular irritation.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Barnett KC. Comparative aspects of canine hereditary eye disease. *Adv Vet Sci Comp Med.* 1976;20:39-67.

3. Gelatt KN. Pediatric ophthalmology in small animal practice. *Vet Clin North Am.* 1973;3:321.

4. Carrington SD, Bedford PG, Guillon JP, Woodward EG. Biomicroscopy of the tear film: the tear film of the pekingese dog. Vet Rec 1989; 124 (13): 323-328. PMID: 2718323

5. Palmer SV, Espinheira Gomes F, McArt JAA. Ophthalmic disorders in a referral population of seven breeds of brachycephalic dogs: 970 cases (2008-2017). J Am Vet Med Assoc 2021; 259(11): 1318-1324. PMID: 34727059

OCULAR DISORDERS REPORT
PEKINGESE

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 235 #	 %	2019-2023 113 #	 %
GLOBE				
.110 MICROPHTHALMOS	1	0.4%	0	0.0%
40.910 KERATOCONJUNCTIVITIS SICCA (KCS)	1	0.4%	4	3.5%
EYELIDS				
20.140 ECTOPIC CILIA	2	0.9%	0	0.0%
20.160 MACROPALPEBRAL FISSURE	12	5.1%	0	0.0%
21.000 ENTROPION	21	8.9%	23	20.4%
22.000 ECTROPION	2	0.9%	0	0.0%
25.110 DISTICHIASIS	24	10.2%	4	3.5%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	7	3.0%	0	0.0%
70.220 EXPOSURE KERATOPATHY SYNDROME	35	14.9%	13	11.5%
UVEA				
90.250 PIGMENTARY UVEITIS	0	0.0%	1	0.9%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	0	0.0%	1	0.9%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	1	0.4%	0	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	3	1.3%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	5	2.1%	1	0.9%
100.301 PUNCTATE-ANTERIOR CORTEX	3	1.3%	2	1.8%
100.302 PUNCTATE-POSTERIOR CORTEX	2	0.9%	1	0.9%
100.303 PUNCTATE-EQUATORIAL CORTEX	1	0.4%	1	0.9%
100.305 PUNCTATE-POSTERIOR SUTURES	1	0.4%	0	0.0%
100.311 INCIPIENT-ANTERIOR CORTEX	5	2.1%	1	0.9%
100.312 INCIPIENT-POSTERIOR CORTEX	3	1.3%	0	0.0%
100.313 INCIPIENT-EQUATORIAL CORTEX	5	2.1%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	3	1.3%	0	0.0%
100.316 INCIPIENT-NUCLEUS	1	0.4%	0	0.0%
100.330 GENERALIZED/ COMPLETE	2	0.9%	0	0.0%
100.340 RESORBING/ HYPERMATURE	0	0.0%	1	0.9%
100.375 SUBLUXATION/ LUXATION	2	0.9%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***29***	***12.3%***	***6***	***5.3%***
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	1	0.4%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	3	1.3%	0	0.0%
130.110 MICROPAPILLA	1	0.4%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	1	0.4%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	6	2.6%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	11	4.7%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	10	4.3%	11	9.7%
NORMAL				
.000 NORMAL GLOBE	127	54.0%	71	62.8%

PEMBROKE WELSH CORGI

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS AVAILALIB
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- iris to cornea	Not defined	1	NO	
	- endothelial opacities/no strands	Not defined	1	NO	
C.	Cataract	Not defined	1	NO	
D.	Retinal dysplasia				
	- folds	Not defined	1	Breeder option	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Persistent pupillary membranes are a significant problem in this breed with frequent documentation of strands bridging from the iris to the cornea noted on routine screening eye examinations. These may be associated with corneal opacity which may result in vision impairment, thus the recommendation against breeding Pembroke Welsh Corgis with PPM.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
PEMBROKE WELSH CORGI

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	21,414		4,204	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	19	0.1%	4	0.1%
10.000	GLAUCOMA	1	0.0%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	7	0.0%	2	0.0%
EYELIDS					
20.140	ECTOPIC CILIA	3	0.0%	0	0.0%
22.000	ECTROPION	1	0.0%	0	0.0%
25.110	DISTICHIASIS	360	1.7%	57	1.4%
32.110	IMPERFORATE LACRIMAL PUNCTUM	7	0.0%	7	0.2%
NICTITANS					
51.100	CARTILAGE ANOMALY/ EVERSION	1	0.0%	0	0.0%
52.110	GLAND PROLAPSE	2	0.0%	1	0.0%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	3	0.0%	0	0.0%
70.220	EXPOSURE KERATOPATHY SYNDROME	2	0.0%	0	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	68	0.3%	18	0.4%
70.730	DYSTROPHY-ENDOTHELIAL	71	0.3%	3	0.1%
UVEA					
90.250	PIGMENTARY UVEITIS	0	0.0%	1	0.0%
93.110	IRIS HYPOPLASIA	5	0.0%	2	0.0%
93.120	UVEAL CYST-SINGLE	8	0.0%	1	0.0%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	8	0.0%	0	0.0%
93.150	IRIS COLOBOMA	5	0.0%	0	0.0%
93.170	UVEAL CYST-MULTIPLE	3	0.0%	3	0.1%
93.180	IRIS SPHINCTER DYSPLASIA	1	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	4,011	18.7%	656	15.6%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	73	0.3%	9	0.2%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	424	2.0%	38	0.9%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	15	0.1%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	3	0.0%	3	0.1%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	70	0.3%	34	0.8%
95.120	UVEAL CYST-FREE FLOATING	0	0.0%	1	0.0%
FUNDUS					
97.110	CHOROIDAL HYPOPLASIA	5	0.0%	0	0.0%
120.170	RETINAL DYSPLASIA-FOLDS	1,257	5.9%	156	3.7%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	178	0.8%	11	0.3%
120.310	RETINAL ATROPHY-GENERALIZED	36	0.2%	3	0.1%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	3	0.0%	0	0.0%
120.920	RETINAL DETACHMENT	6	0.0%	0	0.0%
120.960	RETINOPATHY	10	0.0%	7	0.2%
120.970	RETINOPATHY - CMR/ CMR-LIKE	0	0.0%	1	0.0%
130.110	MICROPAPILLA	6	0.0%	0	0.0%
130.120	OPTIC NERVE HYPOPLASIA	9	0.0%	0	0.0%
LENS					
100.200	CATARACT, UNSPECIFIED	79	0.4%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	488	2.3%	106	2.5%
100.301	PUNCTATE-ANTERIOR CORTEX	84	0.4%	22	0.5%
100.302	PUNCTATE-POSTERIOR CORTEX	74	0.3%	10	0.2%
100.303	PUNCTATE-EQUATORIAL CORTEX	38	0.2%	7	0.2%
100.304	PUNCTATE-ANTERIOR SUTURES	4	0.0%	1	0.0%
100.305	PUNCTATE-POSTERIOR SUTURES	33	0.2%	4	0.1%
100.306	PUNCTATE-NUCLEUS	80	0.4%	25	0.6%

OCULAR DISORDERS REPORT
PEMBROKE WELSH CORGI

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 21,414 #	 %	Year Examined: 2019-2023 Total # Dogs: 4,204 #	 %
LENS Continued				
100.307 PUNCTATE-CAPSULAR	45	0.2%	29	0.7%
100.311 INCIPIENT-ANTERIOR CORTEX	122	0.6%	8	0.2%
100.312 INCIPIENT-POSTERIOR CORTEX	192	0.9%	19	0.5%
100.313 INCIPIENT-EQUATORIAL CORTEX	74	0.3%	10	0.2%
100.314 INCIPIENT-ANTERIOR SUTURES	7	0.0%	2	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	21	0.1%	5	0.1%
100.316 INCIPIENT-NUCLEUS	214	1.0%	27	0.6%
100.317 INCIPIENT-CAPSULAR	30	0.1%	7	0.2%
100.321 INCOMPLETE-ANTERIOR CORTEX	9	0.0%	4	0.1%
100.322 INCOMPLETE-POSTERIOR CORTEX	14	0.1%	3	0.1%
100.323 INCOMPLETE-EQUATORIAL CORTEX	6	0.0%	2	0.0%
100.325 INCOMPLETE-POSTERIOR SUTURES	1	0.0%	0	0.0%
100.326 INCOMPLETE-NUCLEUS	23	0.1%	15	0.4%
100.327 INCOMPLETE-CAPSULAR	2	0.0%	1	0.0%
100.328 Y-SUTURE TIP OPACITIES	8	0.0%	10	0.2%
100.330 GENERALIZED/ COMPLETE	78	0.4%	3	0.1%
100.340 RESORBING/ HYPERMATURE	1	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION	9	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1,231***	***5.7%***	***204***	***4.9%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	76	0.4%	30	0.7%
110.135 PHPV/ PTVL	23	0.1%	11	0.3%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	8	0.0%	3	0.1%
110.320 VITREOUS DEGENERATION-SYNERESIS	91	0.4%	8	0.2%
OTHER				
900.000 OTHER, UNSPECIFIED	125	0.6%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	313	1.5%	8	0.2%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	276	1.3%	104	2.5%
NORMAL				
.000 NORMAL GLOBE	15,129	70.7%	3,025	72.0%

PERRO DE PRESA CANARIO

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Multifocal retinopathy - IRD-*BEST1* (*cmr1)*	Autosomal recessive	1,2	NO (Breeder option with normal DNA test for *cmr1*)	Mutation of the *BEST1* gene

Description and Comments

A. Multifocal retinopathy IRD-*BEST1* (*cmr1)*

Canine Multifocal Retinopathy type 1 (*cmr1*) is characterized by numerous distinct (i.e. multifocal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There may be a serous subretinal fluid, or accumulation of subretinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs between 11-20 weeks of age and there is minimal progression in lesion distribution after 1 year of age. The lesions may flatten, leaving areas of retinal thinning and RPE hypertrophy, hyperplasia, and pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE detachments. In the early stages of this disease, most dogs exhibit no noticeable problem with vision or electroretinographic abnormalities despite their abnormal appearing retinas. However, variable degrees of retinal degeneration occur with chronicity.

Canine Multifocal Retinopathy type 1 is caused by a mutation in the Bestrophin 1 gene (*BEST1*) and is described to be recessively inherited in a number of mastiff derived breeds. Documentation of *cmr1* in Perro de presa canario breed has not yet been published in the scientific literature but noted based on data from Optigen via personal communication with Sue Pearce-Kelling. The reference cited here is included since it is the seminal paper describing the mutation. A DNA test is available.

The breeding advice for breeds diagnosed with "CMR/CMR-like retinopathy" will be changed from "No" to "Breeder option" if the owner of the dog provides the registering office with results of the DNA test for the affected dog, showing that it is genetically normal, i.e., not a homozygous mutant, for the *BEST1* mutation.

References

1. Guziewicz KE, Zangerl B, Lindauer SJ, et al. Bestrophin gene mutations cause canine multifocal retinopathy: a novel animal model for best disease. *Invest Ophthalmol Vis Sci.* 2007 May;48:1959-1967. PMID: 17460247

2. Personal communication with Sue Pearce Kelling and Optigen on September 21, 2023

OCULAR DISORDERS REPORT
PERRO DE PRESA CANARIO

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	10		12	
	Diagnostic Name	#	%	#	%
GLOBE					
10.000	GLAUCOMA	1	10.0%	0	0.0%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	2	20.0%	0	0.0%
100.302	PUNCTATE-POSTERIOR CORTEX	1	10.0%	0	0.0%
100.305	PUNCTATE-POSTERIOR SUTURES	1	10.0%	0	0.0%
100.307	PUNCTATE-CAPSULAR	1	10.0%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	1	10.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***3***	***30.0%***	***0***	***0.0%***
OTHER					
900.100	OTHER-SUSPECTED AS INHERITED	1	10.0%	0	0.0%
NORMAL					
.000	NORMAL GLOBE	7	70.0%	12	100.0%

PERUVIAN INCA ORCHID

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the PERUVIAN INCA ORCHID breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
PERUVIAN INCA ORCHID

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	57		25	
	Diagnostic Name	**#**	**%**	**#**	**%**
GLOBE					
.110	MICROPHTHALMOS	2	3.5%	0	0.0%
UVEA					
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	2	3.5%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	0	0.0%	1	4.0%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	1	1.8%	0	0.0%
100.305	PUNCTATE-POSTERIOR SUTURES	1	1.8%	0	0.0%
100.306	PUNCTATE-NUCLEUS	1	1.8%	0	0.0%
100.311	INCIPIENT-ANTERIOR CORTEX	3	5.3%	1	4.0%
100.312	INCIPIENT-POSTERIOR CORTEX	1	1.8%	0	0.0%
100.315	INCIPIENT-POSTERIOR SUTURES	1	1.8%	0	0.0%
100.316	INCIPIENT-NUCLEUS	1	1.8%	0	0.0%
100.321	INCOMPLETE-ANTERIOR CORTEX	1	1.8%	0	0.0%
100.322	INCOMPLETE-POSTERIOR CORTEX	1	1.8%	0	0.0%
100.326	INCOMPLETE-NUCLEUS	1	1.8%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***11***	***19.3%***	***1***	***4.0%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	0	0.0%	1	4.0%
FUNDUS					
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	1	1.8%	1	4.0%
120.310	RETINAL ATROPHY-GENERALIZED	3	5.3%	0	0.0%
120.960	RETINOPATHY	2	3.5%	0	0.0%
OTHER					
900.000	OTHER, UNSPECIFIED	1	1.8%	0	0.0%
900.100	OTHER-SUSPECTED AS INHERITED	1	1.8%	0	0.0%
900.110	OTHER-SUSPECTED AS NOT-INHERITED	1	1.8%	1	4.0%
NORMAL					
.000	NORMAL GLOBE	47	82.5%	21	84.0%

PETIT BASSET GRIFFON VENDEEN

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Glaucoma				
	- POAG	Autosomal recessive	2-4	NO	Mutation in the *ADAMTS17* gene
B.	Corneal dystrophy				
	- endothelial/stromal	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- iris to cornea	Not defined	1	NO	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
	- endothelial opacity/no strands	Not defined	1	NO	
D.	Cataract	Not defined	1	NO	
E.	Lens luxation	Autosomal recessive	3,4	NO	Mutation in the *ADAMTS17* gene
F.	Retinal dysplasia				
	- folds	Not defined	1	Breeder option	

Description and Comments

A. Glaucoma

An elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests are part of a routine breed eye screening exam.

Primary Open Angle Glaucoma (POAG) in the Petit Basset Griffon Vendeen is caused by an inversion with a breakpoint disrupting the *ADAMTS17* gene. Pectinate ligament abnormalities are not present on gonioscopy and the iridocorneal angle remains open. The initial clinical features are noted around 3-4 years and include a small rise in intraocular pressure accompanied by lens subluxation. Retinal degeneration and optic nerve cupping noted in late stages when globe enlargement and vision disruption has occurred. A DNA test is available.

B. Corneal dystrophy - endothelial/stromal

Corneal endothelial dystrophy is an abnormal loss of the inner lining of the cornea that causes progressive fluid retention (edema). With time the edema results in keratitis and decreased vision. This usually does not occur until the animal is older.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Lens Luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

F. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Forman OP, Pettitt L, Komaromy AM, et al. A Novel Genome-Wide Association Study Approach Using Genotyping by Exome Sequencing Leads to the Identification of a Primary Open Angle Glaucoma Association Inversion Disrupting ADAMTS17; PLoS one, 2015: 10(12):e0143546. PMID 26683476

3. Jeanes EC, Oliver JAC, Ricketts SL, Gould DJ, Mellersh CS. Glaucoma-causing *ADAMTS17* mutations are also reproducibly associated with height in two domestic dog breeds: selection for short stature may have contributed to increased prevalence of glaucoma. Canine Genet Epidemiol. 2019 May 17;6:5. doi: 10.1186/s40575-019-0071-6. PMID: 31131111. **reference derived from non-USA dog population**

4. Bedford, PGC. Open-angle glaucoma in the Petit Basset Griffon Vendeen. Vet Ophthalmol. 2017: 20 98-

102. doi.10.1111/vop.12369. PMID 26945802**reference derived from non-USA dog population**

OCULAR DISORDERS REPORT
PETIT BASSET GRIFFON VENDEEN

Year Examined:	1993-2018		2019-2023	
Total # Dogs:	2,568		160	
Diagnostic Name	**#**	**%**	**#**	**%**
GLOBE				
10.000 GLAUCOMA	3	0.1%	1	0.6%
EYELIDS				
21.000 ENTROPION	3	0.1%	0	0.0%
25.110 DISTICHIASIS	11	0.4%	0	0.0%
NICTITANS				
52.110 GLAND PROLAPSE	1	0.0%	0	0.0%
CORNEA				
70.220 EXPOSURE KERATOPATHY SYNDROME	1	0.0%	0	0.0%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	17	0.7%	0	0.0%
70.730 DYSTROPHY-ENDOTHELIAL	26	1.0%	0	0.0%
UVEA				
93.120 UVEAL CYST-SINGLE	3	0.1%	0	0.0%
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	2	0.1%	0	0.0%
93.150 IRIS COLOBOMA	1	0.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	497	19.4%	15	9.4%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	36	1.4%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	222	8.6%	3	1.9%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	15	0.6%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	19	0.7%	6	3.8%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	71	2.8%	16	10.0%
95.120 UVEAL CYST-FREE FLOATING	1	0.0%	0	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	2	0.1%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	113	4.4%	7	4.4%
100.301 PUNCTATE-ANTERIOR CORTEX	42	1.6%	3	1.9%
100.302 PUNCTATE-POSTERIOR CORTEX	7	0.3%	0	0.0%
100.303 PUNCTATE-EQUATORIAL CORTEX	4	0.2%	0	0.0%
100.304 PUNCTATE-ANTERIOR SUTURES	4	0.2%	1	0.6%
100.305 PUNCTATE-POSTERIOR SUTURES	19	0.7%	2	1.3%
100.306 PUNCTATE-NUCLEUS	3	0.1%	0	0.0%
100.307 PUNCTATE-CAPSULAR	22	0.9%	3	1.9%
100.311 INCIPIENT-ANTERIOR CORTEX	25	1.0%	2	1.3%
100.312 INCIPIENT-POSTERIOR CORTEX	7	0.3%	0	0.0%
100.313 INCIPIENT-EQUATORIAL CORTEX	5	0.2%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	6	0.2%	0	0.0%
100.316 INCIPIENT-NUCLEUS	3	0.1%	1	0.6%
100.317 INCIPIENT-CAPSULAR	13	0.5%	0	0.0%
100.326 INCOMPLETE-NUCLEUS	1	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	4	0.2%	3	1.9%
100.330 GENERALIZED/ COMPLETE	12	0.5%	0	0.0%
100.375 SUBLUXATION/ LUXATION	10	0.4%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***175***	***6.8%***	***12***	***7.5%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	13	0.5%	1	0.6%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	4	0.2%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	9	0.4%	0	0.0%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	113	4.4%	5	3.1%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	11	0.4%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	3	0.1%	0	0.0%
130.110 MICROPAPILLA	4	0.2%	0	0.0%

OCULAR DISORDERS REPORT
PETIT BASSET GRIFFON VENDEEN

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	2,568		160	
Diagnostic Name		#	%	#	%
OTHER					
900.000	OTHER, UNSPECIFIED	38	1.5%	0	0.0%
900.100	OTHER-SUSPECTED AS INHERITED	81	3.2%	0	0.0%
900.110	OTHER-SUSPECTED AS NOT-INHERITED	48	1.9%	6	3.8%
NORMAL					
.000	NORMAL GLOBE	1,643	64.0%	109	68.1%

PHARAOH HOUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
B.	Cataract	Not defined	1	NO	

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
PHARAOH HOUND

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 462 #	 %	Year Examined: 2019-2023 Total # Dogs: 133 #	 %
EYELIDS				
25.110 DISTICHIASIS	7	1.5%	2	1.5%
NICTITANS				
52.110 GLAND PROLAPSE	1	0.2%	0	0.0%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	4	0.9%	0	0.0%
UVEA				
93.120 UVEAL CYST-SINGLE	1	0.2%	0	0.0%
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.2%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	34	7.4%	13	9.8%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	1	0.2%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	12	2.6%	10	7.5%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	1	0.2%	0	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	1	0.2%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	27	5.8%	9	6.8%
100.301 PUNCTATE-ANTERIOR CORTEX	7	1.5%	2	1.5%
100.302 PUNCTATE-POSTERIOR CORTEX	3	0.6%	1	0.8%
100.303 PUNCTATE-EQUATORIAL CORTEX	1	0.2%	2	1.5%
100.305 PUNCTATE-POSTERIOR SUTURES	2	0.4%	1	0.8%
100.306 PUNCTATE-NUCLEUS	1	0.2%	1	0.8%
100.307 PUNCTATE-CAPSULAR	5	1.1%	2	1.5%
100.311 INCIPIENT-ANTERIOR CORTEX	2	0.4%	2	1.5%
100.312 INCIPIENT-POSTERIOR CORTEX	3	0.6%	0	0.0%
100.313 INCIPIENT-EQUATORIAL CORTEX	3	0.6%	0	0.0%
100.314 INCIPIENT-ANTERIOR SUTURES	0	0.0%	1	0.8%
100.315 INCIPIENT-POSTERIOR SUTURES	4	0.9%	0	0.0%
100.316 INCIPIENT-NUCLEUS	1	0.2%	2	1.5%
100.322 INCOMPLETE-POSTERIOR CORTEX	1	0.2%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	2	0.4%	0	0.0%
100.330 GENERALIZED/ COMPLETE	1	0.2%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***35***	***7.6%***	***14***	***10.5%***
VITREOUS				
110.320 VITREOUS DEGENERATION-SYNERESIS	0	0.0%	3	2.3%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	3	0.6%	1	0.8%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	2	0.4%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	3	0.6%	0	0.0%
120.960 RETINOPATHY	3	0.6%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	4	0.9%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	7	1.5%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	4	0.9%	8	6.0%
NORMAL				
.000 NORMAL GLOBE	372	80.5%	92	69.2%

PICARDY SPANIEL

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the PICARDY SPANIEL breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
PICARDY SPANIEL

Year Examined:	1993-2018		2019-2023	
Total # Dogs:	0		1	
Diagnostic Name	**#**	**%**	**#**	**%**
NORMAL				
.000 NORMAL GLOBE	0		1	100.0%

PLOTT

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the PLOTT breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
PLOTT

Year Examined:	1993-2018		2019-2023	
Total # Dogs:	7		8	
Diagnostic Name	**#**	**%**	**#**	**%**
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	0	0.0%	1	12.5%
OTHER				
900.110 OTHER-SUSPECTED AS NOT-INHERITED	0	0.0%	1	12.5%
NORMAL				
.000 NORMAL GLOBE	7	100.0%	7	87.5%

POINTER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Cataract	Not defined	1	NO	

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
POINTER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 778 #	 %	Year Examined: 2019-2023 Total # Dogs: 142 #	 %
EYELIDS				
21.000 ENTROPION	5	0.6%	0	0.0%
22.000 ECTROPION	1	0.1%	0	0.0%
25.110 DISTICHIASIS	4	0.5%	0	0.0%
NICTITANS				
52.110 GLAND PROLAPSE	1	0.1%	0	0.0%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	10	1.3%	2	1.4%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	12	1.5%	0	0.0%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	1	0.1%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	1	0.1%	0	0.0%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	1	0.1%	0	0.0%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	21	2.7%	1	0.7%
100.302 PUNCTATE-POSTERIOR CORTEX	1	0.1%	1	0.7%
100.303 PUNCTATE-EQUATORIAL CORTEX	1	0.1%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	1	0.1%	1	0.7%
100.306 PUNCTATE-NUCLEUS	6	0.8%	0	0.0%
100.312 INCIPIENT-POSTERIOR CORTEX	3	0.4%	1	0.7%
100.313 INCIPIENT-EQUATORIAL CORTEX	1	0.1%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	1	0.1%	1	0.7%
100.317 INCIPIENT-CAPSULAR	1	0.1%	1	0.7%
100.321 INCOMPLETE-ANTERIOR CORTEX	1	0.1%	0	0.0%
100.322 INCOMPLETE-POSTERIOR CORTEX	1	0.1%	1	0.7%
100.326 INCOMPLETE-NUCLEUS	1	0.1%	1	0.7%
100.328 Y-SUTURE TIP OPACITIES	1	0.1%	1	0.7%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***18***	***2.3%***	***7***	***4.9%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	1	0.1%	0	0.0%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	7	0.9%	0	0.0%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	4	0.5%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	2	0.3%	0	0.0%
130.110 MICROPAPILLA	4	0.5%	1	0.7%
130.120 OPTIC NERVE HYPOPLASIA	1	0.1%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	7	0.9%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	6	0.8%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	16	2.1%	4	2.8%
NORMAL				
.000 NORMAL GLOBE	695	89.3%	129	90.8%

POLISH LOWLAND SHEEPDOG

(Polski Owczarek Nizinny)

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
C	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
D.	Cataract	Not defined	1	NO	
E.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- PRA-rod-cone degeneration (*rcd4*)	Autosomal recessive	2, 4,5	NO	Mutation in the *C2orf71* gene
F.	Ceroid lipofuscinosis	Not defined	3	NO	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-rod-cone degeneration (*rcd4*)

A form of PRA, similar to that found in Gordon and Irish setters, has also been found in the the Polish Lowland Sheepdog. This form of PRA has been referred to as late-onset, slowly progressive PRA (LOPRA). Slight vascular attenuation, first seen between 4.5 -6 years of age precedes tapetal hyperreflectivity. All fundic changes were bilaterally symmetric and progressed slowly eventually causing clinical blindness, bilateral complete vascular attenuation, and tapetal hyperreflectivity by 12 years of age, on average. Almost all affected dogs were homozygous for the rcd4 mutation in *C2orf71* gene. A DNA test is available.

F. Ceroid lipofuscinosis

A systemic metabolic disorder that affects the retina and retinal pigment epithelium with accumulation of lipopigments resulting in retinal degeneration.

Historical Note:

Central progressive retinal atrophy was previously a condition listed for this breed. However as the condition is no longer identified in the breed, the condition has been removed. Central progressive retinal atrophy was a progressive retinal degeneration in which photoreceptor death occurred secondary to disease of the underlying pigment epithelium. Progression was slow and some animals never lost vision. CPRA occurred in England, but was uncommon elsewhere.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Downs LM, Bell JS, Freeman J, et al. Late-onset progressive retinal atrophy in the Gordon and Irish Setter breeds is associated with a frameshift mutation in C2orf71. *Anim Genet*. 2012;44:169-177. PMID: 22686255

3. Narfstrom K, Wrigstad A, Ekesten B, et al. Neuronal ceroid lipofuscinosis: clinical and morphologic findings in nine affected Polish Owczarek Nizinny (PON) dogs. *Vet Ophthalmol*. 2007;10:111-120. PMID: 17324167 **reference derived non-USA dog population**

4. Karlskov-Mortensen P, Proschowsky HF, Gao F, Fredholm M. Identification of the mutation causing progressive retinal atrophy in Old Danish Pointing Dog. Anim Genet. 2018 Jun;49(3):237-241. doi:

10.1111/age.12659. Epub 2018 Apr 6. PMID: 29624701.

5. Svensson M, Olsen L, Winkler PA, Peterson-Jones S, et al. Progressive Retinal Atrophy in the Polski Owczarek Nizinny dog: a clinical and genetic study. Vet Ophthal 2016; 19(3): 195-205. https://doi.org/10.1111/vop.12284 PMID: 26009980

OCULAR DISORDERS REPORT
POLISH LOWLAND SHEEPDOG

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	1,199		151	
	Diagnostic Name	#	%	#	%
EYELIDS					
21.000	ENTROPION	0	0.0%	1	0.7%
25.110	DISTICHIASIS	18	1.5%	6	4.0%
32.110	IMPERFORATE LACRIMAL PUNCTUM	2	0.2%	0	0.0%
CORNEA					
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	33	2.8%	10	6.6%
70.730	DYSTROPHY-ENDOTHELIAL	1	0.1%	0	0.0%
UVEA					
93.120	UVEAL CYST-SINGLE	2	0.2%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	86	7.2%	14	9.3%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	50	4.2%	11	7.3%
100.301	PUNCTATE-ANTERIOR CORTEX	17	1.4%	11	7.3%
100.302	PUNCTATE-POSTERIOR CORTEX	10	0.8%	2	1.3%
100.303	PUNCTATE-EQUATORIAL CORTEX	2	0.2%	0	0.0%
100.304	PUNCTATE-ANTERIOR SUTURES	3	0.3%	2	1.3%
100.305	PUNCTATE-POSTERIOR SUTURES	3	0.3%	0	0.0%
100.306	PUNCTATE-NUCLEUS	2	0.2%	0	0.0%
100.307	PUNCTATE-CAPSULAR	4	0.3%	2	1.3%
100.311	INCIPIENT-ANTERIOR CORTEX	8	0.7%	1	0.7%
100.312	INCIPIENT-POSTERIOR CORTEX	4	0.3%	1	0.7%
100.313	INCIPIENT-EQUATORIAL CORTEX	2	0.2%	2	1.3%
100.315	INCIPIENT-POSTERIOR SUTURES	3	0.3%	0	0.0%
100.316	INCIPIENT-NUCLEUS	2	0.2%	3	2.0%
100.317	INCIPIENT-CAPSULAR	3	0.3%	0	0.0%
100.321	INCOMPLETE-ANTERIOR CORTEX	3	0.3%	2	1.3%
100.322	INCOMPLETE-POSTERIOR CORTEX	0	0.0%	1	0.7%
100.328	Y-SUTURE TIP OPACITIES	1	0.1%	0	0.0%
100.330	GENERALIZED/ COMPLETE	1	0.1%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***67***	***5.6%***	***27***	***17.9%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	1	0.1%	0	0.0%
110.320	VITREOUS DEGENERATION-SYNERESIS	2	0.2%	0	0.0%
FUNDUS					
120.170	RETINAL DYSPLASIA-FOLDS	10	0.8%	0	0.0%
120.310	RETINAL ATROPHY-GENERALIZED	20	1.7%	3	2.0%
120.920	RETINAL DETACHMENT	0	0.0%	1	0.7%
120.960	RETINOPATHY	1	0.1%	0	0.0%
OTHER					
900.000	OTHER, UNSPECIFIED	5	0.4%	0	0.0%
900.100	OTHER-SUSPECTED AS INHERITED	25	2.1%	1	0.7%
900.110	OTHER-SUSPECTED AS NOT-INHERITED	5	0.4%	5	3.3%
NORMAL					
.000	NORMAL GLOBE	993	82.8%	103	68.2%

POLISH TATRA SHEEPDOG

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the POLISH TATRA SHEEPDOG breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
POLISH TATRA SHEEPDOG

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 2 #	 %	2019-2023 0 #	 %
LENS				
100.301 PUNCTATE-ANTERIOR CORTEX	1	50.0%	0	
100.302 PUNCTATE-POSTERIOR CORTEX	1	50.0%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***2***	***100.0%***	***0***	
NORMAL				
.000 NORMAL GLOBE	1	50.0%	0	

POMERANIAN

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Entropion	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
D.	Cataract	Not defined	1	NO	
E.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- PRA-PDE6A (*rcd3*)	Autosomal recessive	2	NO	Mutation in the *PDE6A* gene
	- PRA-*PRCD*	Autosomal recessive	2	NO	Mutation in the *PRCD* gene
	- PRA- *NECAP*	Autosomal recessive	2	NO	Mutation in the *NECAP1* gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull. Selection should be directed against entropion and toward head conformation that minimizes or eliminates the likelihood of the defect.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of

age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or from sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.
Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-PDE6A (*rcd3*)

PRA is an autosomal recessive trait caused by a one base pair deletion in the gene encoding the alpha subunit of cyclic GMP phosphodiesterase (rcd3). PRA begins early in life with clinical signs of night blindness and a lack of rod ERG responses is seen at 6-8 weeks of age. Dogs are completely blind by 2-3 years of age when ophthalmoscopic signs are first visible. The mutation is found in the *PDE6A* gene. A DNA test is available.

- PRA-*PRCD*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Pomeranian is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

-PRA-*NECAP1*

The Pomeranian breed has been identified as homozygous affected by a mutation in the *NECAP1* gene, which has originally been identified in Giant Schnauzers with PRA. Proposed mode of inheritance is autosomal recessive, and affected animals presented with clinical signs of PRA at 4-5 years of age.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Donner J, Freyer J, Davison S, et al. Genetic prevalence and clinical relevance of canine Mendelian disease variants in over one Million dogs. PloS Genet. 2023 Feb 27; 19(2) doi: 10.1371/journal.pgen.1010651.eCollection 2023 Feb. PMID: 36848397

OCULAR DISORDERS REPORT
POMERANIAN

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	1,465		1,423	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	3	0.2%	3	0.2%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	1	0.1%	0	0.0%
EYELIDS					
20.140	ECTOPIC CILIA	1	0.1%	0	0.0%
21.000	ENTROPION	9	0.6%	85	6.0%
22.000	ECTROPION	1	0.1%	0	0.0%
25.110	DISTICHIASIS	60	4.1%	56	3.9%
32.110	IMPERFORATE LACRIMAL PUNCTUM	1	0.1%	1	0.1%
NICTITANS					
52.110	GLAND PROLAPSE	0	0.0%	1	0.1%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	1	0.1%	0	0.0%
70.220	EXPOSURE KERATOPATHY SYNDROME	2	0.1%	3	0.2%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	3	0.2%	6	0.4%
70.730	DYSTROPHY-ENDOTHELIAL	2	0.1%	0	0.0%
UVEA					
93.110	IRIS HYPOPLASIA	0	0.0%	1	0.1%
93.150	IRIS COLOBOMA	1	0.1%	1	0.1%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	91	6.2%	133	9.3%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	3	0.2%	3	0.2%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	4	0.3%	1	0.1%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	8	0.5%	25	1.8%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	2	0.1%	2	0.1%
93.810	UVEAL MELANOMA	1	0.1%	0	0.0%
97.150	COLOBOMA	1	0.1%	0	0.0%
FUNDUS					
97.110	CHOROIDAL HYPOPLASIA	0	0.0%	2	0.1%
120.170	RETINAL DYSPLASIA-FOLDS	6	0.4%	2	0.1%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	3	0.2%	0	0.0%
120.310	RETINAL ATROPHY-GENERALIZED	17	1.2%	1	0.1%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	2	0.1%	0	0.0%
120.920	RETINAL DETACHMENT	1	0.1%	0	0.0%
120.960	RETINOPATHY	2	0.1%	0	0.0%
130.120	OPTIC NERVE HYPOPLASIA	2	0.1%	0	0.0%
LENS					
100.200	CATARACT, UNSPECIFIED	1	0.1%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	35	2.4%	14	1.0%
100.301	PUNCTATE-ANTERIOR CORTEX	8	0.5%	8	0.6%
100.302	PUNCTATE-POSTERIOR CORTEX	2	0.1%	2	0.1%
100.303	PUNCTATE-EQUATORIAL CORTEX	3	0.2%	1	0.1%
100.304	PUNCTATE-ANTERIOR SUTURES	2	0.1%	0	0.0%
100.305	PUNCTATE-POSTERIOR SUTURES	3	0.2%	0	0.0%
100.306	PUNCTATE-NUCLEUS	5	0.3%	1	0.1%
100.307	PUNCTATE-CAPSULAR	2	0.1%	3	0.2%
100.311	INCIPIENT-ANTERIOR CORTEX	17	1.2%	2	0.1%
100.312	INCIPIENT-POSTERIOR CORTEX	8	0.5%	0	0.0%
100.313	INCIPIENT-EQUATORIAL CORTEX	5	0.3%	6	0.4%
100.315	INCIPIENT-POSTERIOR SUTURES	0	0.0%	1	0.1%
100.316	INCIPIENT-NUCLEUS	3	0.2%	2	0.1%
100.317	INCIPIENT-CAPSULAR	2	0.1%	3	0.2%
100.322	INCOMPLETE-POSTERIOR CORTEX	1	0.1%	1	0.1%
100.326	INCOMPLETE-NUCLEUS	0	0.0%	1	0.1%

OCULAR DISORDERS REPORT
POMERANIAN

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1,465 #	 %	Year Examined: 2019-2023 Total # Dogs: 1,423 #	 %
LENS Continued				
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	2	0.1%
100.330 GENERALIZED/ COMPLETE	11	0.8%	1	0.1%
100.340 RESORBING/ HYPERMATURE	1	0.1%	0	0.0%
100.375 SUBLUXATION/ LUXATION	0	0.0%	1	0.1%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***74***	***5.1%***	***32***	***2.2%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	4	0.3%	3	0.2%
110.135 PHPV/ PTVL	1	0.1%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	4	0.3%	6	0.4%
110.320 VITREOUS DEGENERATION-SYNERESIS	16	1.1%	4	0.3%
OTHER				
900.000 OTHER, UNSPECIFIED	10	0.7%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	28	1.9%	1	0.1%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	23	1.6%	44	3.1%
NORMAL				
.000 NORMAL GLOBE	1,193	81.4%	1,056	74.2%

POODLE

(Standard)

*Up until 2022, the toy/miniature/standard poodle conditions were assessed as a group, therefore statistics prior to this date may not reflect the real incidence within the breed subgroups. From 2021, the Standard Poodle is assessed separately from the Toy & Miniature varieties, and conditions may be added or removed from each page as statistics start to be generated.

*Additionally, many references previously listed under the Standard Poodle are particular for Miniature and Toy variants, so have been removed from this page, but remain on the Miniature/Toy page.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Entropion	Not defined	1	Breeder option	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
D.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
E.	Cataract	Not defined	1, 2-4	NO	
F.	Y-suture tip opacity	Not defined	1	Breeder option	
G.	Vitreous degeneration				
	- syneresis	Not defined	1	Breeder option	
H.	Retinal dysplasia				
	- folds	Not defined	1	Breeder option	
I.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- PRA *prcd*	Autosomal recessive	6	NO	Mutation in the *prcd* gene
	- PRA rod-cone dysplasia type 4 (*rcd4*)	Autosomal recessive	5	NO	Mutation in the *C2orf71* gene

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
J.	Achromatopsia Type 2 (day blindness/retinal degeneration)	Autosomal recessive	7	NO	Mutation has not been published in this breed
K.	Micropapilla	Not defined	1	Breeder option	
L.	Polymicrogyria	Not defined / autosomal recessive?	8	NO?	

Description and Comments

A. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

E. Cataract

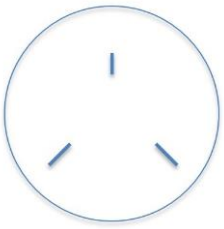
A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

The Poodle cataract can involve the lens cortex and lens nucleus. The rate and degree of progression are variable. A

familial form of cataract has been described in the Standard Poodle, beginning with an equatorial opacity initially observed in dogs prior to 2 years of age.

F. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. Newer versions of the form (since 3/16/21) have boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

G. Vitreous degeneration - syneresis

A liquefaction of the vitreous gel which may predispose to retinal detachment and/or glaucoma. Either condition may cause blindness.

H. Retinal Dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and the more severe forms of retinal dysplasia is undetermined.

I. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-*prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that PRA in the Poodle is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Labrador Retrievers, English and American Cocker Spaniels, and

others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available. It is important to note that in all breeds in which a molecular diagnostic test for the disease is available, it is possible to have dogs diagnosed clinically as affected, yet the DNA test results are normal. This suggests that other genetic causes of PRA exist or that the diagnosed affected dog has an acquired disease that mimics the inherited disorder.

- PRA rod-cone dysplasia, type 4 (*rcd4*)

A form of PRA identified in the Gordon and Irish Setter breeds. Clinical night blindness is observed on average as late as 10 years of age and progresses to total blindness. This form of PRA has been referred to as late-onset PRA (LOPRA). The disorder is caused by a mutation present in the *C2orf71* gene. A DNA test is now available that will unequivocally identify genetically normal, affected and carrier dogs. The test is accurate only for this mutation and will not identify other forms of PRA.

J. Achromatopsia Type 2 (ACHM – Type 2) Day blindness/retinal degeneration

An autosomal recessive disorder of standard poodles and 'Doodles' (where the mix-bred dogs are backcrossed to standard poodles that carry the genetic defect); the disease also has been referred to as achromatopsia. The salient clinical findings is profound visual difficulty in bright light, day blindness, with subjective normal night vision. In the early stages of the disease, fundus examination is normal with some dogs showing focal hyperreflectivity of the cone-rich fovea like region of the retina; the photopic ERG is not recordable. In some older dogs, there is progression resulting in poor/absent vision under both dim and bright light conditions, markedly abnormal or non-recordable ERG, and a fundus appearance indicative of late stage retinal degeneration and indistinguishable from progressive retinal atrophy.

A mutation in the CNGA3 gene has been identified in the Labrador Retriever and German Shepherd.

K. Micropapilla

Micropapilla refers to a small optic disc which is not associated with vision impairment. Optic nerve hypoplasia refers to a congenital defect of the optic nerve which causes blindness and abnormal pupil response in the affected eye. May be difficult to differentiate between micropapilla and optic nerve hypoplasia on a routine (dilated) screening ophthalmoscopic exam.

L. Polymicrogyria

Polymycrogyria is a condition of abnormal cerebrocortical development, creating small, disorganized gyri, and resulting in cortical blindness with or without additional neurological deficits. Affected animals may present as young as 7 weeks up to several years of age. While the underlying cause remains unknown, there appears to be a breed predilection for Standard Poodles, postulating a genetic factor. Additional reported neurologic signs include ataxia (hypermetria), nystagmus, seizures, proprioceptive deficits, mentation changes, and small repetitive behaviors likely indicative of complex partial motor seizures (circling, lip smacking). Magnetic resonance imaging (MRI) demonstrates abnormal gyral patterns, most notable on T2-weighted imaging. *<Prognosis is grave, with most patients being euthanized due to progressive neurologic impairment.>*

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Rubin LF, Flowers RD. Inherited cataract in a family of Standard Poodles. *J Am Vet Med Assoc*. 1972;161:207-208.PMID: 5036188.

3. Barnett KC, Startup FG. Hereditary cataract in the standard poodle. *Vet Rec*. 1985;117:15-16.

4. Gelatt KN, Mackay EO. Prevalence of primary breed-related cataracts in the dog in North America. *Vet Ophthalmol*. 2005;8:101-111. PMID: 15762923.

5. Personal communication with Susan Pearce-Kelling based on unpublished data from OptiGen Labs.

6. Downs LM, Hitti R, Pregnolato S, Mellersh CS. Genetic screening for PRA-associated mutations in multiple dog breeds shows that PRA is heterogeneous within and between breeds. *Vet Ophtho* 2014;17;2:126-130. PMID: 24255994. Also: Corrigendum in: *Vet Ophtho* 2014 17;4: 309-310.

7. Personal communication with Gus Aguirre, advisor to Genetics Committee.

8. Journey C, Haddad J, Crawford N, Miller AD, Van Winkle TJ, Vite CH, Sponeberg P, Inzana KD, Cook CR, Britt L, O'Brien DP. Polymicrogyria in Standard Poodles. *J of Vet Internal Medicine* 2009; 23: 871-874 PMID 19566852.

OCULAR DISORDERS REPORT
POODLE, STANDARD

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	26,648		26,520	
	Diagnostic Name	**#**	**%**	**#**	**%**
GLOBE					
.110	MICROPHTHALMOS	4	0.0%	0	0.0%
10.000	GLAUCOMA	4	0.0%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	12	0.0%	0	0.0%
EYELIDS					
20.140	ECTOPIC CILIA	4	0.0%	0	0.0%
21.000	ENTROPION	96	0.4%	84	0.3%
22.000	ECTROPION	4	0.0%	0	0.0%
25.110	DISTICHIASIS	416	1.6%	400	1.5%
32.110	IMPERFORATE LACRIMAL PUNCTUM	28	0.1%	20	0.1%
NICTITANS					
50.210	PLASMOMA/ ATYPICAL PANNUS	4	0.0%	0	0.0%
51.100	CARTILAGE ANOMALY/ EVERSION	48	0.2%	36	0.1%
CORNEA					
70.220	EXPOSURE KERATOPATHY SYNDROME	4	0.0%	12	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	148	0.6%	132	0.5%
70.730	DYSTROPHY-ENDOTHELIAL	12	0.0%	0	0.0%
UVEA					
90.250	PIGMENTARY UVEITIS	4	0.0%	0	0.0%
93.110	IRIS HYPOPLASIA	0	0.0%	16	0.1%
93.120	UVEAL CYST-SINGLE	8	0.0%	12	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	644	2.4%	636	2.4%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	8	0.0%	16	0.1%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	8	0.0%	4	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	632	2.4%	596	2.2%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	12	0.0%	20	0.1%
93.810	UVEAL MELANOMA	12	0.0%	0	0.0%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	1,808	6.8%	1,116	4.2%
100.301	PUNCTATE-ANTERIOR CORTEX	960	3.6%	556	2.1%
100.302	PUNCTATE-POSTERIOR CORTEX	192	0.7%	92	0.3%
100.303	PUNCTATE-EQUATORIAL CORTEX	232	0.9%	120	0.5%
100.304	PUNCTATE-ANTERIOR SUTURES	140	0.5%	80	0.3%
100.305	PUNCTATE-POSTERIOR SUTURES	336	1.3%	68	0.3%
100.306	PUNCTATE-NUCLEUS	140	0.5%	96	0.4%
100.307	PUNCTATE-CAPSULAR	384	1.4%	320	1.2%
100.311	INCIPIENT-ANTERIOR CORTEX	180	0.7%	196	0.7%
100.312	INCIPIENT-POSTERIOR CORTEX	136	0.5%	92	0.3%
100.313	INCIPIENT-EQUATORIAL CORTEX	172	0.6%	120	0.5%
100.314	INCIPIENT-ANTERIOR SUTURES	8	0.0%	24	0.1%
100.315	INCIPIENT-POSTERIOR SUTURES	44	0.2%	32	0.1%
100.316	INCIPIENT-NUCLEUS	80	0.3%	64	0.2%
100.317	INCIPIENT-CAPSULAR	60	0.2%	60	0.2%
100.321	INCOMPLETE-ANTERIOR CORTEX	28	0.1%	32	0.1%
100.322	INCOMPLETE-POSTERIOR CORTEX	28	0.1%	20	0.1%
100.323	INCOMPLETE-EQUATORIAL CORTEX	36	0.1%	8	0.0%
100.326	INCOMPLETE-NUCLEUS	20	0.1%	20	0.1%
100.327	INCOMPLETE-CAPSULAR	8	0.0%	4	0.0%
100.328	Y-SUTURE TIP OPACITIES	212	0.8%	232	0.9%
100.330	GENERALIZED/ COMPLETE	20	0.1%	4	0.0%
100.340	RESORBING/ HYPERMATURE	8	0.0%	0	0.0%
100.375	SUBLUXATION/ LUXATION	4	0.0%	4	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***3,212***	***12.1%***	***2,008***	***7.6%***

OCULAR DISORDERS REPORT
POODLE, STANDARD

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 26,648 #	 %	Year Examined: 2019-2023 Total # Dogs: 26,520 #	 %
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	72	0.3%	44	0.2%
110.135 PHPV/ PTVL	16	0.1%	4	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	12	0.0%	4	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	48	0.2%	68	0.3%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	116	0.4%	68	0.3%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	0	0.0%	12	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	32	0.1%	16	0.1%
120.920 RETINAL DETACHMENT	8	0.0%	0	0.0%
120.960 RETINOPATHY	32	0.1%	12	0.0%
120.970 RETINOPATHY - CMR/ CMR-LIKE	0	0.0%	4	0.0%
130.110 MICROPAPILLA	100	0.4%	72	0.3%
130.120 OPTIC NERVE HYPOPLASIA	8	0.0%	0	0.0%
OTHER				
900.100 OTHER-SUSPECTED AS INHERITED	92	0.3%	12	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	1,240	4.7%	996	3.8%
NORMAL				
.000 NORMAL GLOBE	20,932	78.5%	21,852	82.4%

POODLE

(Miniature and Toy varieties)

*Up until 2022, the toy/miniature/standard poodle conditions were assessed as a group, therefore statistics prior to this date may not reflect the real incidence within the breed subgroups. From 2021, the Standard Poodle is assessed separately from the Toy & Miniature varieties, and conditions may be added or removed from each page as statistics start to be generated.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Imperforate lacrimal punctum	Not defined	1	Breeder option	
C.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
D.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- iris to lens	Not defined	1	NO	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
E.	Cataract	Not defined	1, 2-4	NO	
F.	Y-suture tip opacity	Not defined	1	Breeder option	
G.	Persistent hyaloid artery remnant (PHA)	Not defined	1	NO	
H.	Vitreous degeneration				
	- syneresis	Not defined	1	Breeder option	
I.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- PRA-*prcd*	Autosomal recessive	5-13	NO	Mutation in the *prcd* gene
	- PRA-rod-cone dysplasia type 4 (*rcd4*)	Autosomal recessive	14	NO	Mutation in the *C2orf71* gene
J.	Micropapilla	Not defined	1	Breeder option	
K.	Optic nerve hypoplasia	Not defined	1	NO	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Imperforate lacrimal punctum

Development anomaly resulting in an imperforate opening of the lacrimal puncta. An imperforate lower punctum may result in epiphora, an overflow of tears onto the face.

C. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

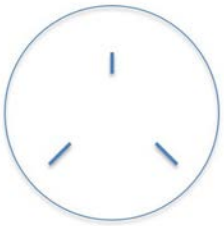
E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

The Poodle cataract can involve the lens cortex and lens nucleus. The rate and degree of progression are variable. A familial form of cataract has been described in the Standard Poodle, beginning with an equatorial opacity initially observed in dogs prior to 2 years of age.

F. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. Newer versions of the form (since 3/16/21) have boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as:

"E2" or "posterior suture tip opacities." This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

G. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

H. Vitreous degeneration - syneresis

A liquefaction of the vitreous gel which may predispose to retinal detachment and/or glaucoma. Either condition may cause blindness.

I. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-*prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that PRA in the Poodle is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. In the Miniature Poodle, night blindness usually occurs at 3-5 years of age, followed by complete blindness between 5-7 years. A DNA test is available. It is important to note that in all breeds in which a molecular diagnostic test for the disease is available, it is possible to have dogs diagnosed clinically as affected, yet the DNA test results are normal. This suggests that other genetic causes of PRA exist or that the diagnosed affected dog has an acquired disease that mimics the inherited disorder.

- PRA-Rod-cone dysplasia, type 4 (*rcd4*)

A form of PRA identified in the Gordon and Irish Setter breeds. Clinical night blindness is observed on average as late as 10 years of age and progresses to total blindness. This form of PRA has been referred to as late-onset PRA (LOPRA). The disorder is caused by a mutation present in the *C2orf71* gene. A DNA test is now available that will unequivocally identify genetically normal, affected and carrier dogs. The test is accurate only for this mutation and will not identify other forms of PRA.

J. Micropapilla

Micropapilla refers to a small optic disc which is not associated with vision impairment. Optic nerve hypoplasia refers to a congenital defect of the optic nerve which causes blindness and abnormal pupil response in the affected eye. May be difficult to differentiate between micropapilla and optic nerve hypoplasia on a routine (dilated) screening ophthalmoscopic exam.

K. Optic nerve hy

A congenital defect of the optic nerve which causes blindness and abnormal pupil response in the affected eye, as well as small optic disk diameter. May be difficult to differentiate from micropapilla on a routine (dilated) screening ophthalmoscopic exam.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Rubin LF, Flowers RD. Inherited cataract in a family of Standard Poodles. J Am Vet Med Assoc. 1972;161:207-208. PMID: 5036188.

3. Barnett KC, Startup FG. Hereditary cataract in the standard poodle. Vet Rec. 1985;117:15-16. PMID: 4024442.

4. Gelatt KN, Mackay EO. Prevalence of primary breed-related cataracts in the dog in North America. Vet Ophthalmol. 2005;8:101-111. PMID: 15762923.

5. Barnett KC. Hereditary retinal atrophy in the Poodle. Vet Rec. 1962;74:672-675.

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14. Personal communication on data from OptiGen with Sue Pearce-Kelling based on unpublished data.

OCULAR DISORDERS REPORT
POODLE, TOY AND MINIATURE

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	16,728		19,996	
	Diagnostic Name	**#**	**%**	**#**	**%**
GLOBE					
.110	MICROPHTHALMOS	8	0.0%	24	0.1%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	4	0.0%	12	0.1%
EYELIDS					
20.140	ECTOPIC CILIA	24	0.1%	24	0.1%
21.000	ENTROPION	12	0.1%	24	0.1%
22.000	ECTROPION	4	0.0%	0	0.0%
25.110	DISTICHIASIS	1,892	11.3%	2,032	10.2%
32.110	IMPERFORATE LACRIMAL PUNCTUM	24	0.1%	64	0.3%
NICTITANS					
52.110	GLAND PROLAPSE	0	0.0%	8	0.0%
CORNEA					
70.220	EXPOSURE KERATOPATHY SYNDROME	20	0.1%	12	0.1%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	92	0.5%	76	0.4%
70.730	DYSTROPHY-ENDOTHELIAL	4	0.0%	0	0.0%
UVEA					
93.110	IRIS HYPOPLASIA	0	0.0%	12	0.1%
93.120	UVEAL CYST-SINGLE	4	0.0%	4	0.0%
93.150	IRIS COLOBOMA	4	0.0%	8	0.0%
93.170	UVEAL CYST-MULTIPLE	0	0.0%	4	0.0%
93.180	IRIS SPHINCTER DYSPLASIA	4	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	1,780	10.6%	1,556	7.8%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	100	0.6%	32	0.2%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	16	0.1%	4	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	208	1.2%	444	2.2%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	0	0.0%	16	0.1%
97.150	COLOBOMA	8	0.0%	0	0.0%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	748	4.5%	588	2.9%
100.301	PUNCTATE-ANTERIOR CORTEX	380	2.3%	248	1.2%
100.302	PUNCTATE-POSTERIOR CORTEX	140	0.8%	80	0.4%
100.303	PUNCTATE-EQUATORIAL CORTEX	76	0.5%	60	0.3%
100.304	PUNCTATE-ANTERIOR SUTURES	16	0.1%	20	0.1%
100.305	PUNCTATE-POSTERIOR SUTURES	248	1.5%	80	0.4%
100.306	PUNCTATE-NUCLEUS	28	0.2%	24	0.1%
100.307	PUNCTATE-CAPSULAR	140	0.8%	148	0.7%
100.311	INCIPIENT-ANTERIOR CORTEX	136	0.8%	180	0.9%
100.312	INCIPIENT-POSTERIOR CORTEX	148	0.9%	72	0.4%
100.313	INCIPIENT-EQUATORIAL CORTEX	64	0.4%	24	0.1%
100.314	INCIPIENT-ANTERIOR SUTURES	4	0.0%	16	0.1%
100.315	INCIPIENT-POSTERIOR SUTURES	44	0.3%	56	0.3%
100.316	INCIPIENT-NUCLEUS	24	0.1%	16	0.1%
100.317	INCIPIENT-CAPSULAR	32	0.2%	24	0.1%
100.321	INCOMPLETE-ANTERIOR CORTEX	56	0.3%	36	0.2%
100.322	INCOMPLETE-POSTERIOR CORTEX	60	0.4%	60	0.3%
100.323	INCOMPLETE-EQUATORIAL CORTEX	16	0.1%	8	0.0%
100.324	INCOMPLETE-ANTERIOR SUTURES	4	0.0%	0	0.0%
100.325	INCOMPLETE-POSTERIOR SUTURES	4	0.0%	8	0.0%
100.326	INCOMPLETE-NUCLEUS	0	0.0%	8	0.0%
100.327	INCOMPLETE-CAPSULAR	8	0.0%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	128	0.8%	236	1.2%
100.330	GENERALIZED/ COMPLETE	48	0.3%	36	0.2%
100.340	RESORBING/ HYPERMATURE	8	0.0%	8	0.0%

OCULAR DISORDERS REPORT
POODLE, TOY AND MINIATURE

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 16,728 #	 %	Year Examined: 2019-2023 Total # Dogs: 19,996 #	 %
LENS Continued				
100.375 SUBLUXATION/ LUXATION	8	0.0%	4	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1,684***	***10.1%***	***1,212***	***6.1%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	108	0.6%	84	0.4%
110.135 PHPV/ PTVL	20	0.1%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	48	0.3%	40	0.2%
110.320 VITREOUS DEGENERATION-SYNERESIS	180	1.1%	104	0.5%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	8	0.0%	20	0.1%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	8	0.0%	4	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	36	0.2%	16	0.1%
120.920 RETINAL DETACHMENT	12	0.1%	8	0.0%
120.960 RETINOPATHY	16	0.1%	24	0.1%
130.110 MICROPAPILLA	220	1.3%	124	0.6%
130.120 OPTIC NERVE HYPOPLASIA	172	1.0%	124	0.6%
OTHER				
900.100 OTHER-SUSPECTED AS INHERITED	56	0.3%	24	0.1%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	692	4.1%	488	2.4%
NORMAL				
.000 NORMAL GLOBE	10,796	64.5%	14,404	72.0%

POODLE

(Unspecified variety)

*Up until 2022, the toy/miniature/standard poodle conditions were assessed as a group, therefore statistics prior to this date may not reflect the real incidence within the breed subgroups. From 2021, the Standard Poodle is assessed separately from the Toy & Miniature varieties, and conditions may be added or removed from each page as statistics start to be generated.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Entropion	Not defined	1	Breeder option	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
D.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- iris to lens	Not defined	1	NO	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
E.	Cataract	Not defined	1-4	NO	
F.	Y-suture tip opacity	Not defined	1	Breeder option	
G.	Vitreous degeneration				
	- syneresis	Not defined	1	Breeder option	
H.	Retinal dysplasia				
	- folds	Not defined	1	Breeder option	
I.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- PRA-*prcd*	Autosomal recessive	5-14	NO	Mutation in the *prcd* gene
	- PRA-rod-cone dysplasia type 4 (*rcd4*)	Autosomal recessive	15	NO	Mutation in the *C2orf71* gene

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
J.	Achromatopsia Type 2 (day blindness /retinal degeneration)	Autosomal recessive	16	NO	Mutation has not been published in this breed *only in Standards
K.	Micropapilla	Not defined	1	Breeder option	
L.	Optic nerve hypoplasia	Not defined	1	NO	

Description and Comments

A. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

E. Cataract

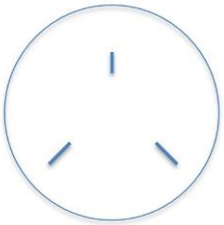
A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

The Poodle cataract can involve the lens cortex and lens nucleus. The rate and degree of progression are variable. A familial form of cataract has been described in the Standard Poodle, beginning with an equatorial opacity initially

observed in dogs prior to 2 years of age.

F. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. Newer versions of the form (since 3/16/21) have boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

G. Vitreous degeneration - syneresis

A liquefaction of the vitreous gel which may predispose to retinal detachment and/or glaucoma. Either condition may cause blindness.

H. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and the more severe forms of retinal dysplasia is undetermined.

I. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-*prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that PRA in the Poodle is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected.

In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available. It is important to note that in all breeds in which a molecular diagnostic test for the disease is available, it is possible to have dogs diagnosed clinically as affected, yet the DNA test results are normal. This suggests that other genetic causes of PRA exist or that the diagnosed affected dog has an acquired disease that mimics the inherited disorder.

- PRA-rod-cone dysplasia, type 4 (*rcd4*)

A form of PRA identified in the Gordon and Irish Setter breeds. Clinical night blindness is observed on average as late as 10 years of age and progresses to total blindness. This form of PRA has been referred to as late-onset PRA (LOPRA). The disorder is caused by a mutation present in the *C2orf71* gene. A DNA test is now available that will unequivocally identify genetically normal, affected and carrier dogs. The test is accurate only for this mutation and will not identify other forms of PRA.

J. Achromatopsia Type 2 (ACHM – Type 2) Day blindness/retinal degeneration

An autosomal recessive disorder of standard poodles and 'Doodles' (where the mix-bred dogs are backcrossed to standard poodles that carry the genetic defect); the disease also has been referred to as achromatopsia. The salient clinical findings is profound visual difficulty in bright light, day blindness, with subjective normal night vision. In the early stages of the disease, fundus examination is normal with some dogs showing focal hyperreflectivity of the cone-rich fovea like region of the retina; the photopic ERG is not recordable. In some older dogs, there is progression resulting in poor/absent vision under both dim and bright light conditions, markedly abnormal or non-recordable ERG, and a fundus appearance indicative of late stage retinal degeneration and indistinguishable from progressive retinal atrophy.

A mutation in the CNGA3 gene has been identified in the Labrador Retriever and German Shepherd.

K. Micropapilla

Micropapilla refers to a small optic disc which is not associated with vision impairment. Optic nerve hypoplasia refers to a congenital defect of the optic nerve which causes blindness and abnormal pupil response in the affected eye. May be difficult to differentiate between micropapilla and optic nerve hypoplasia on a routine (dilated) screening ophthalmoscopic exam.

L. Optic Nerve Hypoplasia

A congenital defect of the optic nerve which causes blindness and abnormal pupil response in the affected eye. May be unable to differentiate from micropapilla on a routine (dilated) screening ophthalmoscopic exam.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Rubin LF, Flowers RD. Inherited cataract in a family of Standard Poodles. *J Am Vet Med Assoc*. 1972;161:207-208. PMID: 5036188.

3. Barnett KC, Startup FG. Hereditary cataract in the standard poodle. *Vet Rec*. 1985;117:15-16. PMID: 4024442.

4. Gelatt KN, Mackay EO. Prevalence of primary breed-related cataracts in the dog in North America. *Vet Ophthalmol*. 2005;8:101-111. PMID: 15762923.

5. Barnett KC. Hereditary retinal atrophy in the Poodle. *Vet Rec*. 1962;74:672-675.

6. Barnett KC. Two forms of hereditary and progressive retinal atrophy in the dog. I. The Miniature Poodle. II. The Labrador retriever. *J Am Anim Hosp Assoc*. 1965:234-245.

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9. Sandberg MA, Pawlyk BS, Berson EL. Full-field electroretinograms in Miniature Poodles with progressive rod-cone degeneration. *Invest Ophthalmol Vis Sci*. 1986;27:1179-1184. PMID: 3721798.

10. Aguirre G, O'Brien P. Morphological and biochemical studies of canine progressive rod-cone degeneration. 3H-fucose autoradiography. *Invest Ophthalmol Vis Sci*. 1986;27:635-655. PMID: 3700016.

11. Aguirre GD, Acland GM. Variation in retinal degeneration phenotype inherited at the prcd locus. *Exp Eye Res*. 1988;46:663-687. PMID: 3164273.

12. Kemp CM, Jacobson SG. Rhodopsin levels in the central retinas of normal Miniature Poodles and those with progressive rod-cone degeneration. *Exp Eye Res*. 1992;54:947-956. PMID: 1521585.

13. Zangerl B, Goldstein O, Philp AR, et al. Identical mutation in a novel retinal gene causes progressive rod-cone degeneration in dogs and retinitis pigmentosa in humans. *Genomics*. 2006;88:551-563. PMID: 16938425

14. Downs LM, Hitti R, Pregnolato S, Mellersh CS. Genetic screening for PRA-associated mutations in multiple dog breeds shows that PRA is heterogeneous within and between breeds. *Vet Ophtho* 2014;17;2:126-130. PMID: 24255994. Also: Corrigendum in: *Vet Ophtho* 2014 17;4: 309-310.

15. Personal communication with Susan Pearce-Kelling based on unpublished data from OptiGen Labs

16. Personal communication with Gus Aguirre, advisor to Genetics Committee

OCULAR DISORDERS REPORT
POODLE, UNSPECIFIED VARIETY

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 173,632 #	%	2019-2023 8,568 #	%
GLOBE				
.110 MICROPHTHALMOS	80	0.0%	24	0.3%
10.000 GLAUCOMA	20	0.0%	0	0.0%
40.910 KERATOCONJUNCTIVITIS SICCA (KCS)	32	0.0%	4	0.0%
EYELIDS				
20.110 EYELID DERMOID	4	0.0%	0	0.0%
20.140 ECTOPIC CILIA	140	0.1%	8	0.1%
20.160 MACROPALPEBRAL FISSURE	4	0.0%	0	0.0%
21.000 ENTROPION	448	0.3%	28	0.3%
22.000 ECTROPION	20	0.0%	0	0.0%
25.110 DISTICHIASIS	11,044	6.4%	252	2.9%
32.110 IMPERFORATE LACRIMAL PUNCTUM	8	0.0%	16	0.2%
NICTITANS				
51.100 CARTILAGE ANOMALY/ EVERSION	124	0.1%	0	0.0%
52.110 GLAND PROLAPSE	72	0.0%	0	0.0%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	156	0.1%	0	0.0%
70.220 EXPOSURE KERATOPATHY SYNDROME	104	0.1%	4	0.0%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	980	0.6%	36	0.4%
70.730 DYSTROPHY-ENDOTHELIAL	32	0.0%	0	0.0%
UVEA				
90.250 PIGMENTARY UVEITIS	8	0.0%	0	0.0%
93.110 IRIS HYPOPLASIA	4	0.0%	8	0.1%
93.120 UVEAL CYST-SINGLE	28	0.0%	4	0.0%
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	20	0.0%	0	0.0%
93.150 IRIS COLOBOMA	20	0.0%	0	0.0%
93.170 UVEAL CYST-MULTIPLE	0	0.0%	4	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	5,060	2.9%	588	6.9%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	304	0.2%	20	0.2%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	120	0.1%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	156	0.1%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	304	0.2%	232	2.7%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	12	0.0%	0	0.0%
93.810 UVEAL MELANOMA	4	0.0%	0	0.0%
97.150 COLOBOMA	0	0.0%	4	0.0%
FUNDUS				
97.110 CHOROIDAL HYPOPLASIA	12	0.0%	0	0.0%
97.120 COLOBOMA	44	0.0%	0	0.0%
120.170 RETINAL DYSPLASIA-FOLDS	476	0.3%	8	0.1%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	80	0.0%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	2,300	1.3%	24	0.3%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	108	0.1%	0	0.0%
120.960 RETINOPATHY	20	0.0%	4	0.0%
130.110 MICROPAPILLA	456	0.3%	40	0.5%
130.120 OPTIC NERVE HYPOPLASIA	772	0.4%	36	0.4%
LENS				
100.200 CATARACT, UNSPECIFIED	1,536	0.9%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	8,956	5.2%	188	2.2%
100.301 PUNCTATE-ANTERIOR CORTEX	1,668	1.0%	68	0.8%
100.302 PUNCTATE-POSTERIOR CORTEX	716	0.4%	8	0.1%
100.303 PUNCTATE-EQUATORIAL CORTEX	464	0.3%	24	0.3%
100.304 PUNCTATE-ANTERIOR SUTURES	196	0.1%	20	0.2%

OCULAR DISORDERS REPORT
POODLE, UNSPECIFIED VARIETY

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 173,632 #	 %	Year Examined: 2019-2023 Total # Dogs: 8,568 #	 %
LENS Continued				
100.305 PUNCTATE-POSTERIOR SUTURES	464	0.3%	28	0.3%
100.306 PUNCTATE-NUCLEUS	140	0.1%	20	0.2%
100.307 PUNCTATE-CAPSULAR	172	0.1%	72	0.8%
100.311 INCIPIENT-ANTERIOR CORTEX	1,808	1.0%	52	0.6%
100.312 INCIPIENT-POSTERIOR CORTEX	1,504	0.9%	48	0.6%
100.313 INCIPIENT-EQUATORIAL CORTEX	960	0.6%	20	0.2%
100.314 INCIPIENT-ANTERIOR SUTURES	140	0.1%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	332	0.2%	24	0.3%
100.316 INCIPIENT-NUCLEUS	248	0.1%	16	0.2%
100.317 INCIPIENT-CAPSULAR	136	0.1%	32	0.4%
100.321 INCOMPLETE-ANTERIOR CORTEX	0	0.0%	16	0.2%
100.322 INCOMPLETE-POSTERIOR CORTEX	16	0.0%	20	0.2%
100.323 INCOMPLETE-EQUATORIAL CORTEX	12	0.0%	0	0.0%
100.324 INCOMPLETE-ANTERIOR SUTURES	0	0.0%	8	0.1%
100.325 INCOMPLETE-POSTERIOR SUTURES	0	0.0%	4	0.0%
100.326 INCOMPLETE-NUCLEUS	0	0.0%	4	0.0%
100.328 Y-SUTURE TIP OPACITIES	32	0.0%	88	1.0%
100.330 GENERALIZED/ COMPLETE	1,676	1.0%	12	0.1%
100.340 RESORBING/ HYPERMATURE	4	0.0%	4	0.0%
100.375 SUBLUXATION/ LUXATION	104	0.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***12,192***	***7.0%***	***500***	***5.8%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	244	0.1%	28	0.3%
110.135 PHPV/ PTVL	88	0.1%	12	0.1%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	128	0.1%	8	0.1%
110.320 VITREOUS DEGENERATION-SYNERESIS	1,064	0.6%	20	0.2%
OTHER				
900.000 OTHER, UNSPECIFIED	1,732	1.0%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	3,500	2.0%	4	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	912	0.5%	352	4.1%
NORMAL				
.000 NORMAL GLOBE	141,908	81.7%	6,604	77.1%

PORCELAINE HOUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the PORCELAINE HOUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
PORCELAINE HOUND

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	24		25	
Diagnostic Name		#	%	#	%
OTHER					
900.110	OTHER-SUSPECTED AS NOT-INHERITED	1	4.2%	0	0.0%
NORMAL					
.000	NORMAL GLOBE	23	95.8%	25	100.0%

PORTUGUESE PODENGO

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Lens Luxation	Autosomal recessive	1	NO	*ADAMTS17*

Description and Comments

A. Lens Luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma) causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

1. Tzouganakis I, Tsvetanova A, Jeanes EC, Mellersh CS, Gould DJ. Investigation of the allele frequency of the G>A intron 10 *ADAMTS17* mutation causing primary lens luxation in the Portuguese Podengo breed. *Vet Ophthalmol*. 2022;25:85–89. doi:10.1111/vop.12960 PMID:34870369 ***reference derived from non-USA dog population***

OCULAR DISORDERS REPORT
PORTUGUESE PODENGO

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	49		9	
	Diagnostic Name	**#**	**%**	**#**	**%**
EYELIDS					
20.140	ECTOPIC CILIA	1	2.0%	0	0.0%
25.110	DISTICHIASIS	1	2.0%	0	0.0%
UVEA					
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	3	6.1%	0	0.0%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	2	4.1%	0	0.0%
100.301	PUNCTATE-ANTERIOR CORTEX	1	2.0%	0	0.0%
100.313	INCIPIENT-EQUATORIAL CORTEX	0	0.0%	1	11.1%
100.321	INCOMPLETE-ANTERIOR CORTEX	0	0.0%	1	11.1%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***1***	***2.0%***	***2***	***22.2%***
VITREOUS					
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	2.0%	0	0.0%
FUNDUS					
120.170	RETINAL DYSPLASIA-FOLDS	1	2.0%	0	0.0%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	0	0.0%	2	22.2%
120.960	RETINOPATHY	1	2.0%	0	0.0%
OTHER					
900.000	OTHER, UNSPECIFIED	1	2.0%	0	0.0%
900.110	OTHER-SUSPECTED AS NOT-INHERITED	2	4.1%	0	0.0%
NORMAL					
.000	NORMAL GLOBE	43	87.8%	6	66.7%

PORTUGUESE PODENGO PEQUENO

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	
D.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- PRA-*prcd*	Autosomal recessive	2	NO	Mutation in the *prcd* gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataracts

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA *prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Other forms of retinal degeneration that are not *prcd* are recognized in the Portuguese Podengo Pequeno. The currently available genetic test will not detect these other forms of PRA.

References

1. ACVO Genetics Committee and Data from OFA All-Breeds Report.

2. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: PLoS Genet. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

OCULAR DISORDERS REPORT
PORTUGUESE PODENGO PEQUENO

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	323		196	
	Diagnostic Name	#	%	#	%
EYELIDS					
20.140	ECTOPIC CILIA	0	0.0%	1	0.5%
25.110	DISTICHIASIS	14	4.3%	23	11.7%
CORNEA					
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	3	0.9%	2	1.0%
UVEA					
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	14	4.3%	13	6.6%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	1	0.3%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	1	0.3%	1	0.5%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	9	2.8%	11	5.6%
100.301	PUNCTATE-ANTERIOR CORTEX	3	0.9%	3	1.5%
100.302	PUNCTATE-POSTERIOR CORTEX	1	0.3%	1	0.5%
100.303	PUNCTATE-EQUATORIAL CORTEX	6	1.9%	3	1.5%
100.304	PUNCTATE-ANTERIOR SUTURES	1	0.3%	1	0.5%
100.305	PUNCTATE-POSTERIOR SUTURES	1	0.3%	1	0.5%
100.306	PUNCTATE-NUCLEUS	2	0.6%	0	0.0%
100.307	PUNCTATE-CAPSULAR	1	0.3%	1	0.5%
100.311	INCIPIENT-ANTERIOR CORTEX	5	1.5%	1	0.5%
100.312	INCIPIENT-POSTERIOR CORTEX	2	0.6%	2	1.0%
100.313	INCIPIENT-EQUATORIAL CORTEX	1	0.3%	0	0.0%
100.315	INCIPIENT-POSTERIOR SUTURES	2	0.6%	0	0.0%
100.316	INCIPIENT-NUCLEUS	2	0.6%	4	2.0%
100.317	INCIPIENT-CAPSULAR	1	0.3%	0	0.0%
100.325	INCOMPLETE-POSTERIOR SUTURES	1	0.3%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	1	0.3%	3	1.5%
100.330	GENERALIZED/ COMPLETE	1	0.3%	1	0.5%
100.340	RESORBING/ HYPERMATURE	1	0.3%	0	0.0%
100.375	SUBLUXATION/ LUXATION	3	0.9%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***31***	***9.6%***	***18***	***9.2%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	2	0.6%	0	0.0%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	6	1.9%	3	1.5%
110.320	VITREOUS DEGENERATION-SYNERESIS	11	3.4%	3	1.5%
FUNDUS					
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	0	0.0%	1	0.5%
120.310	RETINAL ATROPHY-GENERALIZED	5	1.5%	0	0.0%
120.960	RETINOPATHY	3	0.9%	0	0.0%
OTHER					
900.100	OTHER-SUSPECTED AS INHERITED	0	0.0%	2	1.0%
900.110	OTHER-SUSPECTED AS NOT-INHERITED	12	3.7%	5	2.6%
NORMAL					
.000	NORMAL GLOBE	244	75.5%	141	71.9%

PORTUGUESE POINTER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the PORTUGUESE POINTER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
PORTUGUESE POINTER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 11 #	%	2019-2023 0 #	%
LENS				
100.311 INCIPIENT-ANTERIOR CORTEX	1	9.1%	0	
100.316 INCIPIENT-NUCLEUS	1	9.1%	0	
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***2***	***18.2%***	***0***	
NORMAL				
.000 NORMAL GLOBE	9	81.8%	0	

PORTUGUESE WATER DOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Microphthalmia with multiple ocular defects	Autosomal recessive	2-3	NO	Mutation is not yet published
B.	Distichiasis	Not defined	1	Breeder option	
C.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
D.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
E.	Cataract	Not defined	1	NO	
F.	Y-suture tip opacities	Not defined	1	Breeder option	
G.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- PRA-*prcd*	Autosomal recessive	5	NO	Mutation in the *prcd* gene
	-PRA-early onset / *CCDC66*	Autosomal recessive	4	NO	Mutation in the *CCDC66* gene
H.	Retinal dysplasia				
	- folds	Not defined	1	Breeder option	

Description and Comments

A. Microphthalmia with multiple congenital ocular defects

This is a congenital abnormality present bilaterally and characterized by a small globe and associated ocular defects which can affect the cornea, anterior chamber, lens and/or retina. These associated defects may be variable in severity. Several cases have been identified, all of which appeared to have a common ancestry. All affected animals so far identified have been the progeny of dogs that were phenotypically normal, suggesting that the defect is not dominantly inherited.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity.

The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Persistent pupillary membranes (PPMs)

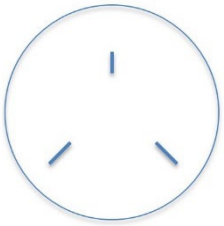
Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

F. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. Newer versions of the form (since 3/16/21) have boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

G. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-*prcd*

Studies have shown that the principal form of PRA in the Portuguese Water Dog is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

- PRA-early onset - *CCDC66*

A second, earlier onset form of PRA has also been identified recently in the Portuguese Water Dog. The onset of visual deficits occurs at 2-3 years of age, and, dogs show advanced retinal degeneration at the time visual deficits are recognized. The condition appears inherited as autosomal recessive. A DNA test is available.

H. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Case records (1986-1994), Section of Medical Genetics, School of Veterinary Medicine, University of Pennsylvania.

3. Shaw GC, Tse MPY, Miller AD. Microphthalmia With Multiple Anterior Segment Defects in Portuguese Water Dogs. *Vet Pathol* 2019 56(2): 269-273. PMID: 30131012.

4. Murgiano L, Becker D, Spector C, Carlin K, Santana E, Niggel JK, Jagannathan V, Leeb T, Pearce-Kelling S, Aguirre GD, Miyadera K. CCDC66 frameshift variant associated with a new form of early-onset progressive retinal atrophy in Portuguese Water Dogs. *Sci Rep* 2020 Dec 3;10(1):21162. doi: 10.1038/s41598-020-77980-5. PMID: 33273526; PMCID: PMC7712861.

5. Zangerl B, Goldstein O, Philp AR, et al. Identical mutation in a novel retinal gene causes progressive rod-cone degeneration in dogs and retinitis pigmentosa in humans. *Genomics* 2006;88:551-563. Epub 2006/08/30. PMID: 16938425.

OCULAR DISORDERS REPORT
PORTUGUESE WATER DOG

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	34,494		7,186	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	28	0.1%	6	0.1%
10.000	GLAUCOMA	6	0.0%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	8	0.0%	3	0.0%
EYELIDS					
20.140	ECTOPIC CILIA	3	0.0%	0	0.0%
20.160	MACROPALPEBRAL FISSURE	1	0.0%	0	0.0%
21.000	ENTROPION	63	0.2%	15	0.2%
22.000	ECTROPION	3	0.0%	0	0.0%
25.110	DISTICHIASIS	1,241	3.6%	232	3.2%
32.110	IMPERFORATE LACRIMAL PUNCTUM	1	0.0%	3	0.0%
NICTITANS					
51.100	CARTILAGE ANOMALY/ EVERSION	1	0.0%	0	0.0%
52.110	GLAND PROLAPSE	1	0.0%	0	0.0%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	4	0.0%	0	0.0%
70.220	EXPOSURE KERATOPATHY SYNDROME	7	0.0%	1	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	290	0.8%	104	1.4%
70.730	DYSTROPHY-ENDOTHELIAL	7	0.0%	0	0.0%
UVEA					
93.110	IRIS HYPOPLASIA	4	0.0%	4	0.1%
93.120	UVEAL CYST-SINGLE	11	0.0%	2	0.0%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	2	0.0%	0	0.0%
93.150	IRIS COLOBOMA	1	0.0%	1	0.0%
93.170	UVEAL CYST-MULTIPLE	2	0.0%	0	0.0%
93.180	IRIS SPHINCTER DYSPLASIA	0	0.0%	1	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	2,209	6.4%	562	7.8%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	46	0.1%	14	0.2%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	35	0.1%	2	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	43	0.1%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	76	0.2%	36	0.5%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	10	0.0%	3	0.0%
93.810	UVEAL MELANOMA	6	0.0%	4	0.1%
95.120	UVEAL CYST-FREE FLOATING	1	0.0%	0	0.0%
FUNDUS					
97.110	CHOROIDAL HYPOPLASIA	2	0.0%	0	0.0%
120.170	RETINAL DYSPLASIA-FOLDS	292	0.8%	52	0.7%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	19	0.1%	3	0.0%
120.310	RETINAL ATROPHY-GENERALIZED	177	0.5%	1	0.0%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	3	0.0%	0	0.0%
120.920	RETINAL DETACHMENT	3	0.0%	0	0.0%
120.960	RETINOPATHY	4	0.0%	4	0.1%
130.110	MICROPAPILLA	19	0.1%	1	0.0%
130.120	OPTIC NERVE HYPOPLASIA	11	0.0%	1	0.0%
LENS					
100.200	CATARACT, UNSPECIFIED	69	0.2%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	2,274	6.6%	475	6.6%
100.301	PUNCTATE-ANTERIOR CORTEX	664	1.9%	285	4.0%
100.302	PUNCTATE-POSTERIOR CORTEX	140	0.4%	43	0.6%
100.303	PUNCTATE-EQUATORIAL CORTEX	91	0.3%	30	0.4%
100.304	PUNCTATE-ANTERIOR SUTURES	58	0.2%	25	0.3%
100.305	PUNCTATE-POSTERIOR SUTURES	113	0.3%	23	0.3%

OCULAR DISORDERS REPORT
PORTUGUESE WATER DOG

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 34,494 #	 %	2019-2023 7,186 #	 %
LENS Continued				
100.306 PUNCTATE-NUCLEUS	33	0.1%	15	0.2%
100.307 PUNCTATE-CAPSULAR	106	0.3%	70	1.0%
100.311 INCIPIENT-ANTERIOR CORTEX	150	0.4%	46	0.6%
100.312 INCIPIENT-POSTERIOR CORTEX	107	0.3%	20	0.3%
100.313 INCIPIENT-EQUATORIAL CORTEX	121	0.4%	29	0.4%
100.314 INCIPIENT-ANTERIOR SUTURES	15	0.0%	2	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	21	0.1%	7	0.1%
100.316 INCIPIENT-NUCLEUS	30	0.1%	3	0.0%
100.317 INCIPIENT-CAPSULAR	31	0.1%	17	0.2%
100.321 INCOMPLETE-ANTERIOR CORTEX	16	0.0%	9	0.1%
100.322 INCOMPLETE-POSTERIOR CORTEX	15	0.0%	6	0.1%
100.323 INCOMPLETE-EQUATORIAL CORTEX	7	0.0%	4	0.1%
100.324 INCOMPLETE-ANTERIOR SUTURES	1	0.0%	0	0.0%
100.325 INCOMPLETE-POSTERIOR SUTURES	1	0.0%	1	0.0%
100.326 INCOMPLETE-NUCLEUS	3	0.0%	1	0.0%
100.327 INCOMPLETE-CAPSULAR	1	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	81	0.2%	67	0.9%
100.330 GENERALIZED/ COMPLETE	80	0.2%	2	0.0%
100.340 RESORBING/ HYPERMATURE	3	0.0%	1	0.0%
100.375 SUBLUXATION/ LUXATION	12	0.0%	2	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1,876***	***5.4%***	***639***	***8.9%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	57	0.2%	19	0.3%
110.135 PHPV/ PTVL	19	0.1%	1	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	7	0.0%	9	0.1%
110.320 VITREOUS DEGENERATION-SYNERESIS	45	0.1%	12	0.2%
OTHER				
900.000 OTHER, UNSPECIFIED	313	0.9%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	538	1.6%	2	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	500	1.4%	227	3.2%
NORMAL				
.000 NORMAL GLOBE	28,490	82.6%	5,499	76.5%

PUDELPOINTER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the PUDELPOINTER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
PUDELPOINTER

Year Examined:	1993-2018		2019-2023	
Total # Dogs:	5		6	
Diagnostic Name	**#**	**%**	**#**	**%**
OTHER				
900.110 OTHER-SUSPECTED AS NOT-INHERITED	1	20.0%	0	0.0%
NORMAL				
.000 NORMAL GLOBE	4	80.0%	6	100.0%

PUG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Keratoconjunctivitis sicca	Not defined	5	NO	
B.	Entropion	Not defined	1	Breeder option	
C.	Distichiasis	Not defined	1	Breeder option	
D.	Pigmentary Keratitis/Pigmentary Keratopathy	Not defined	1-3	Breeder option	
E.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
F.	Cataract	Not defined	1, 4	NO	
G.	Vitreous degeneration				
	- syneresis	Not defined	1	Breeder option	

Description and Comments

A. Keratoconjunctivitis sicca

An abnormality of the tear film, most commonly a deficiency of the aqueous portion, although the mucin and/or lipid layers may be affected; results in ocular irritation and/or vision impairment.

B. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull. In the Pug, entropion usually involves the medial canthal margin of the lower eyelid(s).

C. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

D. Pigmentary keratitis/keratopathy

A condition characterized by variable degrees of superficial vascularization, fibrosis and/or pigmentation of the cornea. May be associated with excessive exposure/irritation of the globe due to shallow orbits, lower eyelid medial entropion, lagophthalmos and macropalpebral fissure.

The breed standard indicates the Pug should have a "large massive round head with very large, bold and prominent eyes." These characteristics give rise to the ocular exposure and irritative problems common in the breed.

Pigmentary keratopathy is a condition reported in Pugs in which the cornea becomes pigmented, often resulting in vision impairment. Development of pigmentary keratopathy is associated in some studies with low tear production (STT) and medial eyelid entropion.

E. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally in the neonatal period. These strands may bridge from iris to iris, iris to cornea, iris to lens, or from sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

F. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

G. Vitreous degeneration - syneresis

Liquefaction of the vitreous gel which may predispose to retinal detachment.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Labelle AL, Dresser CB, Hamor RE, Allender MC, Disney JL. Characteristics of, prevalence of, and risk factors for corneal pigmentation (pigmentary keratopathy) in Pugs. *J Am Vet Med Assoc*. 2013; 243:667-674. PMID: 23971846

3. Maini S, Everson R, Dawson C, Change YM, Hartley C, Sanchez RF. Pigmentary keratitis in pugs in the United Kingdom: prevalence and associated features. *BMC Vet Res* 2019; 15(1): 384. PMID: 31666065 ***reference derived from non-USA population***

4. Gelatt KN, Mackay EO. Prevalence of primary breed-related cataracts in the dog in North America. *Vet Ophthalmol*. 2005;8:101-111. PMID: 15762923

5. O'Neil DG, Brodbelt DC, Keddy A, et al. Keratoconjunctivitis sicca in dogs under primary veterinary care in the UK: an epidemiological study. *JSAP*. 2021; 62: 636-645. PMID: 34134171. **Reference derived from a non-USA dog population.**

OCULAR DISORDERS REPORT
PUG

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	2,963		986	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	3	0.1%	0	0.0%
10.000	GLAUCOMA	0	0.0%	1	0.1%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	8	0.3%	3	0.3%
EYELIDS					
20.110	EYELID DERMOID	1	0.0%	0	0.0%
20.140	ECTOPIC CILIA	15	0.5%	4	0.4%
20.160	MACROPALPEBRAL FISSURE	67	2.3%	0	0.0%
21.000	ENTROPION	527	17.8%	123	12.5%
22.000	ECTROPION	11	0.4%	0	0.0%
25.110	DISTICHIASIS	258	8.7%	54	5.5%
32.110	IMPERFORATE LACRIMAL PUNCTUM	0	0.0%	1	0.1%
NICTITANS					
50.210	PLASMOMA/ ATYPICAL PANNUS	1	0.0%	0	0.0%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	80	2.7%	0	0.0%
70.220	EXPOSURE KERATOPATHY SYNDROME	986	33.3%	421	42.7%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	14	0.5%	1	0.1%
70.730	DYSTROPHY-ENDOTHELIAL	4	0.1%	0	0.0%
UVEA					
90.250	PIGMENTARY UVEITIS	1	0.0%	1	0.1%
93.120	UVEAL CYST-SINGLE	1	0.0%	0	0.0%
93.150	IRIS COLOBOMA	3	0.1%	0	0.0%
93.170	UVEAL CYST-MULTIPLE	1	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	321	10.8%	99	10.0%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	8	0.3%	1	0.1%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	16	0.5%	3	0.3%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	1	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	1	0.0%	0	0.0%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	9	0.3%	2	0.2%
93.810	UVEAL MELANOMA	0	0.0%	1	0.1%
FUNDUS					
97.120	COLOBOMA	1	0.0%	0	0.0%
120.170	RETINAL DYSPLASIA-FOLDS	21	0.7%	1	0.1%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	12	0.4%	0	0.0%
120.310	RETINAL ATROPHY-GENERALIZED	3	0.1%	0	0.0%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%
130.110	MICROPAPILLA	0	0.0%	2	0.2%
130.120	OPTIC NERVE HYPOPLASIA	1	0.0%	0	0.0%
LENS					
100.200	CATARACT, UNSPECIFIED	4	0.1%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	63	2.1%	10	1.0%
100.301	PUNCTATE-ANTERIOR CORTEX	14	0.5%	0	0.0%
100.302	PUNCTATE-POSTERIOR CORTEX	6	0.2%	2	0.2%
100.303	PUNCTATE-EQUATORIAL CORTEX	6	0.2%	0	0.0%
100.304	PUNCTATE-ANTERIOR SUTURES	2	0.1%	0	0.0%
100.305	PUNCTATE-POSTERIOR SUTURES	9	0.3%	1	0.1%
100.306	PUNCTATE-NUCLEUS	10	0.3%	3	0.3%
100.307	PUNCTATE-CAPSULAR	6	0.2%	2	0.2%
100.311	INCIPIENT-ANTERIOR CORTEX	20	0.7%	4	0.4%
100.312	INCIPIENT-POSTERIOR CORTEX	20	0.7%	2	0.2%
100.313	INCIPIENT-EQUATORIAL CORTEX	8	0.3%	0	0.0%

OCULAR DISORDERS REPORT
PUG

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 2,963 #	 %	Year Examined: 2019-2023 Total # Dogs: 986 #	 %
LENS Continued				
100.315 INCIPIENT-POSTERIOR SUTURES	8	0.3%	1	0.1%
100.316 INCIPIENT-NUCLEUS	4	0.1%	4	0.4%
100.317 INCIPIENT-CAPSULAR	7	0.2%	0	0.0%
100.321 INCOMPLETE-ANTERIOR CORTEX	3	0.1%	1	0.1%
100.322 INCOMPLETE-POSTERIOR CORTEX	3	0.1%	1	0.1%
100.324 INCOMPLETE-ANTERIOR SUTURES	1	0.0%	0	0.0%
100.325 INCOMPLETE-POSTERIOR SUTURES	2	0.1%	0	0.0%
100.326 INCOMPLETE-NUCLEUS	1	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	2	0.2%
100.330 GENERALIZED/ COMPLETE	13	0.4%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***147***	***5.0%***	***21***	***2.1%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	16	0.5%	3	0.3%
110.135 PHPV/ PTVL	3	0.1%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	4	0.1%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	27	0.9%	4	0.4%
OTHER				
900.000 OTHER, UNSPECIFIED	36	1.2%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	165	5.6%	7	0.7%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	119	4.0%	52	5.3%
NORMAL				
.000 NORMAL GLOBE	1,179	39.8%	402	40.8%

PULI

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/ no strands	Not defined	1	Passes with no notation	
B.	Cataract	Not defined	1	NO	

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
PULI

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1,192 #	 %	Year Examined: 2019-2023 Total # Dogs: 149 #	 %
EYELIDS				
20.110 EYELID DERMOID	1	0.1%	0	0.0%
20.140 ECTOPIC CILIA	1	0.1%	0	0.0%
20.160 MACROPALPEBRAL FISSURE	1	0.1%	0	0.0%
21.000 ENTROPION	8	0.7%	0	0.0%
25.110 DISTICHIASIS	7	0.6%	0	0.0%
CORNEA				
70.220 EXPOSURE KERATOPATHY SYNDROME	5	0.4%	0	0.0%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	18	1.5%	0	0.0%
70.730 DYSTROPHY-ENDOTHELIAL	1	0.1%	0	0.0%
UVEA				
93.120 UVEAL CYST-SINGLE	1	0.1%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	271	22.7%	20	13.4%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	14	1.2%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	8	0.7%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	7	0.6%	5	3.4%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	1	0.1%	2	1.3%
LENS				
100.200 CATARACT, UNSPECIFIED	3	0.3%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	69	5.8%	5	3.4%
100.301 PUNCTATE-ANTERIOR CORTEX	10	0.8%	5	3.4%
100.302 PUNCTATE-POSTERIOR CORTEX	4	0.3%	1	0.7%
100.303 PUNCTATE-EQUATORIAL CORTEX	1	0.1%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	12	1.0%	2	1.3%
100.306 PUNCTATE-NUCLEUS	5	0.4%	0	0.0%
100.307 PUNCTATE-CAPSULAR	4	0.3%	1	0.7%
100.311 INCIPIENT-ANTERIOR CORTEX	12	1.0%	1	0.7%
100.312 INCIPIENT-POSTERIOR CORTEX	4	0.3%	3	2.0%
100.313 INCIPIENT-EQUATORIAL CORTEX	7	0.6%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	1	0.1%	0	0.0%
100.316 INCIPIENT-NUCLEUS	3	0.3%	0	0.0%
100.317 INCIPIENT-CAPSULAR	1	0.1%	0	0.0%
100.321 INCOMPLETE-ANTERIOR CORTEX	1	0.1%	0	0.0%
100.322 INCOMPLETE-POSTERIOR CORTEX	3	0.3%	0	0.0%
100.327 INCOMPLETE-CAPSULAR	0	0.0%	1	0.7%
100.328 Y-SUTURE TIP OPACITIES	3	0.3%	4	2.7%
100.330 GENERALIZED/ COMPLETE	7	0.6%	0	0.0%
100.375 SUBLUXATION/ LUXATION	1	0.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***78***	***6.5%***	***14***	***9.4%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	2	0.2%	1	0.7%
110.135 PHPV/ PTVL	1	0.1%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.1%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	1	0.1%	0	0.0%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	51	4.3%	0	0.0%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	3	0.3%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	4	0.3%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	2	0.2%	0	0.0%
130.110 MICROPAPILLA	2	0.2%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	3	0.3%	0	0.0%

OCULAR DISORDERS REPORT
PULI

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1,192 #	 %	Year Examined: 2019-2023 Total # Dogs: 149 #	 %
OTHER				
900.000 OTHER, UNSPECIFIED	13	1.1%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	46	3.9%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	9	0.8%	9	6.0%
NORMAL				
.000 NORMAL GLOBE	797	66.9%	107	71.8%

PUMI

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the PUMI breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
PUMI

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 124 #	 %	Year Examined: 2019-2023 Total # Dogs: 59 #	 %
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	1	0.8%	0	0.0%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	7	5.6%	4	6.8%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	3	2.4%	1	1.7%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	5	4.0%	1	1.7%
100.301 PUNCTATE-ANTERIOR CORTEX	1	0.8%	0	0.0%
100.306 PUNCTATE-NUCLEUS	1	0.8%	2	3.4%
100.315 INCIPIENT-POSTERIOR SUTURES	1	0.8%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***3***	***2.4%***	***2***	***3.4%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	2	1.6%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	1	0.8%	0	0.0%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	2	1.6%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	1	0.8%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	2	1.6%	4	6.8%
NORMAL				
.000 NORMAL GLOBE	112	90.3%	49	83.1%

PYRENEAN MASTIFF

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
PYRENEAN MASTIFF

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 6 #	 %	Year Examined: 2019-2023 Total # Dogs: 21 #	 %
EYELIDS				
21.000 ENTROPION	1	16.7%	1	4.8%
22.000 ECTROPION	2	33.3%	1	4.8%
25.110 DISTICHIASIS	1	16.7%	1	4.8%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	2	33.3%	5	23.8%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	0	0.0%	3	14.3%
100.302 PUNCTATE-POSTERIOR CORTEX	0	0.0%	1	4.8%
100.307 PUNCTATE-CAPSULAR	0	0.0%	1	4.8%
100.316 INCIPIENT-NUCLEUS	1	16.7%	2	9.5%
100.375 SUBLUXATION/ LUXATION	0	0.0%	1	4.8%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1***	***16.7%***	***4***	***19.0%***
VITREOUS				
110.320 VITREOUS DEGENERATION-SYNERESIS	0	0.0%	1	4.8%
OTHER				
900.110 OTHER-SUSPECTED AS NOT-INHERITED	1	16.7%	0	0.0%
NORMAL				
.000 NORMAL GLOBE	0	0.0%	11	52.4%

PYRENEAN SHEPHERD

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DISCOVERED
A.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
B.	Cataract	Not defined	1	NO	
C.	Choroidal hypoplasia	Not defined	1	NO	
D.	Retinal dysplasia				
	- folds	Not defined	1	Breeder option	
E.	Persistent hyperplastic primary vitreous (PHPV) / Persistent hyperplastic tunica vasculosa lentis (PHTVL)	Not defined	1	NO	

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Choroidal hypoplasia

Inadequate development of the choroid present at birth and non-progressive. This condition is more commonly identified in the Collie breed where it is a manifestation of "Collie Eye Anomaly."

D. Retinal dysplasia – folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

E. Persistent hyperplastic primary vitreous (PHPV)/Persistent hyperplastic tunica vasculosa lentis (PHTVL)

Persistent hyperplastic primary vitreous is a congenital defect resulting from abnormalities in the development and regression of the hyaloid artery (the primary vitreous) and the interaction of this blood vessel with the posterior lens capsule/cortex during embryogenesis. This condition is often associated with persistent hyperplastic tunica vasculosa lentis which results from failure of regression of the embryologic vascular network which surrounds the developing lens.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
PYRENEAN SHEPHERD

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 582 #	 %	Year Examined: 2019-2023 Total # Dogs: 257 #	 %
GLOBE				
.110 MICROPHTHALMOS	0	0.0%	2	0.8%
EYELIDS				
21.000 ENTROPION	0	0.0%	1	0.4%
25.110 DISTICHIASIS	2	0.3%	0	0.0%
32.110 IMPERFORATE LACRIMAL PUNCTUM	1	0.2%	1	0.4%
NICTITANS				
52.110 GLAND PROLAPSE	1	0.2%	0	0.0%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	2	0.3%	2	0.8%
UVEA				
93.110 IRIS HYPOPLASIA	2	0.3%	1	0.4%
93.150 IRIS COLOBOMA	1	0.2%	1	0.4%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	28	4.8%	6	2.3%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	1	0.2%	0	0.0%
FUNDUS				
97.110 CHOROIDAL HYPOPLASIA	21	3.6%	5	1.9%
120.170 RETINAL DYSPLASIA-FOLDS	12	2.1%	3	1.2%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	1	0.2%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	1	0.2%	0	0.0%
120.920 RETINAL DETACHMENT	0	0.0%	1	0.4%
130.110 MICROPAPILLA	0	0.0%	2	0.8%
130.120 OPTIC NERVE HYPOPLASIA	0	0.0%	1	0.4%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	13	2.2%	5	1.9%
100.301 PUNCTATE-ANTERIOR CORTEX	5	0.9%	1	0.4%
100.302 PUNCTATE-POSTERIOR CORTEX	2	0.3%	1	0.4%
100.303 PUNCTATE-EQUATORIAL CORTEX	1	0.2%	0	0.0%
100.304 PUNCTATE-ANTERIOR SUTURES	1	0.2%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	4	0.7%	0	0.0%
100.307 PUNCTATE-CAPSULAR	0	0.0%	1	0.4%
100.311 INCIPIENT-ANTERIOR CORTEX	5	0.9%	3	1.2%
100.312 INCIPIENT-POSTERIOR CORTEX	1	0.2%	1	0.4%
100.313 INCIPIENT-EQUATORIAL CORTEX	2	0.3%	1	0.4%
100.315 INCIPIENT-POSTERIOR SUTURES	1	0.2%	0	0.0%
100.316 INCIPIENT-NUCLEUS	8	1.4%	1	0.4%
100.317 INCIPIENT-CAPSULAR	0	0.0%	1	0.4%
100.322 INCOMPLETE-POSTERIOR CORTEX	4	0.7%	2	0.8%
100.325 INCOMPLETE-POSTERIOR SUTURES	0	0.0%	1	0.4%
100.326 INCOMPLETE-NUCLEUS	2	0.3%	1	0.4%
100.328 Y-SUTURE TIP OPACITIES	1	0.2%	0	0.0%
100.375 SUBLUXATION/ LUXATION	1	0.2%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***36***	***6.2%***	***14***	***5.4%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	5	0.9%	3	1.2%
110.135 PHPV/ PTVL	0	0.0%	5	1.9%
110.320 VITREOUS DEGENERATION-SYNERESIS	1	0.2%	1	0.4%
OTHER				
900.000 OTHER, UNSPECIFIED	9	1.5%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	11	1.9%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	13	2.2%	11	4.3%
NORMAL				
.000 NORMAL GLOBE	482	82.8%	214	83.3%

RAT TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Lens luxation	Autosomal recessive	1, 2	NO	Mutation in the *ADAMTS17* gene

Description and Comments

A. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

1. Sargan DR, Withers D, Pettitt L, Squire M, Gould DJ, Mellersh CS. Mapping the mutation causing lens luxation in several terrier breeds. *Journal of Heredity*. 2007;98:534-538. PMID: 17573382.

2. Gould D, Pettitt L, McLaughlin B, Holmes N, Forman Ol, Thomas A, Ahonen S, Lohi H, O'Leary C, Sargan D, Mellersh CS. *ADAMTS17* mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol*. 2011;14:378-384. PMID: 22050825.

OCULAR DISORDERS REPORT
RAT TERRIER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 326 #	 %	Year Examined: 2019-2023 Total # Dogs: 83 #	 %
EYELIDS				
25.110 DISTICHIASIS	5	1.5%	2	2.4%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	13	4.0%	2	2.4%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	1	0.3%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	2	0.6%	0	0.0%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	5	1.5%	2	2.4%
100.301 PUNCTATE-ANTERIOR CORTEX	1	0.3%	0	0.0%
100.303 PUNCTATE-EQUATORIAL CORTEX	2	0.6%	0	0.0%
100.306 PUNCTATE-NUCLEUS	1	0.3%	1	1.2%
100.311 INCIPIENT-ANTERIOR CORTEX	3	0.9%	0	0.0%
100.312 INCIPIENT-POSTERIOR CORTEX	3	0.9%	0	0.0%
100.313 INCIPIENT-EQUATORIAL CORTEX	2	0.6%	1	1.2%
100.315 INCIPIENT-POSTERIOR SUTURES	1	0.3%	0	0.0%
100.316 INCIPIENT-NUCLEUS	1	0.3%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	1	0.3%	1	1.2%
100.330 GENERALIZED/ COMPLETE	5	1.5%	0	0.0%
100.375 SUBLUXATION/ LUXATION	6	1.8%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***19***	***5.8%***	***2***	***2.4%***
VITREOUS				
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	0.9%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	3	0.9%	0	0.0%
FUNDUS				
120.310 RETINAL ATROPHY-GENERALIZED	1	0.3%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	3	0.9%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	3	0.9%	3	3.6%
NORMAL				
.000 NORMAL GLOBE	287	88.0%	73	88.0%

REDBONE COONHOUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the REDBONE COONHOUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
REDBONE COONHOUND

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 46 #	 %	Year Examined: 2019-2023 Total # Dogs: 23 #	 %
EYELIDS				
21.000 ENTROPION	1	2.2%	1	4.3%
25.110 DISTICHIASIS	1	2.2%	0	0.0%
NICTITANS				
52.110 GLAND PROLAPSE	1	2.2%	0	0.0%
UVEA				
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	1	2.2%	0	0.0%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	1	2.2%	1	4.3%
100.301 PUNCTATE-ANTERIOR CORTEX	1	2.2%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	0	0.0%	1	4.3%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1***	***2.2%***	***1***	***4.3%***
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	0	0.0%	1	4.3%
120.310 RETINAL ATROPHY-GENERALIZED	1	2.2%	0	0.0%
120.960 RETINOPATHY	1	2.2%	0	0.0%
OTHER				
900.110 OTHER-SUSPECTED AS NOT-INHERITED	1	2.2%	1	4.3%
NORMAL				
.000 NORMAL GLOBE	40	87.0%	19	82.6%

RHODESIAN RIDGEBACK

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Entropion	Not defined	2	NO	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
D.	Cataract	Not defined	1	NO	
E.	Y-suture tip opacity	Not defined	1	Breeder option	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

In the Rhodesian Ridgeback, the Breed Club has requested that entropion is considered a fail (Breeding Advice NO).

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

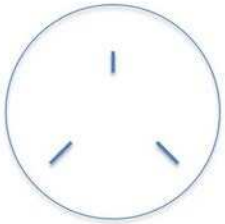
Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. Newer versions of the form (since 3/16/21) have boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Breed club request to ACVO Genetics Committee, 2008.

OCULAR DISORDERS REPORT
RHODESIAN RIDGEBACK

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	5,345		1,548	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	2	0.0%	0	0.0%
EYELIDS					
20.140	ECTOPIC CILIA	0	0.0%	1	0.1%
21.000	ENTROPION	15	0.3%	4	0.3%
22.000	ECTROPION	1	0.0%	0	0.0%
25.110	DISTICHIASIS	144	2.7%	39	2.5%
32.110	IMPERFORATE LACRIMAL PUNCTUM	0	0.0%	1	0.1%
NICTITANS					
51.100	CARTILAGE ANOMALY/ EVERSION	5	0.1%	5	0.3%
52.110	GLAND PROLAPSE	3	0.1%	0	0.0%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	6	0.1%	0	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	29	0.5%	10	0.6%
UVEA					
93.110	IRIS HYPOPLASIA	1	0.0%	0	0.0%
93.120	UVEAL CYST-SINGLE	6	0.1%	0	0.0%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	4	0.1%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	309	5.8%	71	4.6%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	7	0.1%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	2	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	1	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	97	1.8%	73	4.7%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	5	0.1%	0	0.0%
93.810	UVEAL MELANOMA	3	0.1%	0	0.0%
97.150	COLOBOMA	1	0.0%	1	0.1%
LENS					
100.200	CATARACT, UNSPECIFIED	4	0.1%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	249	4.7%	50	3.2%
100.301	PUNCTATE-ANTERIOR CORTEX	24	0.4%	4	0.3%
100.302	PUNCTATE-POSTERIOR CORTEX	61	1.1%	18	1.2%
100.303	PUNCTATE-EQUATORIAL CORTEX	8	0.1%	2	0.1%
100.304	PUNCTATE-ANTERIOR SUTURES	3	0.1%	2	0.1%
100.305	PUNCTATE-POSTERIOR SUTURES	50	0.9%	8	0.5%
100.306	PUNCTATE-NUCLEUS	0	0.0%	2	0.1%
100.307	PUNCTATE-CAPSULAR	35	0.7%	18	1.2%
100.311	INCIPIENT-ANTERIOR CORTEX	10	0.2%	3	0.2%
100.312	INCIPIENT-POSTERIOR CORTEX	95	1.8%	34	2.2%
100.313	INCIPIENT-EQUATORIAL CORTEX	13	0.2%	8	0.5%
100.315	INCIPIENT-POSTERIOR SUTURES	19	0.4%	4	0.3%
100.316	INCIPIENT-NUCLEUS	6	0.1%	1	0.1%
100.317	INCIPIENT-CAPSULAR	25	0.5%	12	0.8%
100.321	INCOMPLETE-ANTERIOR CORTEX	0	0.0%	4	0.3%
100.322	INCOMPLETE-POSTERIOR CORTEX	4	0.1%	7	0.5%
100.323	INCOMPLETE-EQUATORIAL CORTEX	0	0.0%	2	0.1%
100.324	INCOMPLETE-ANTERIOR SUTURES	1	0.0%	0	0.0%
100.325	INCOMPLETE-POSTERIOR SUTURES	1	0.0%	2	0.1%
100.326	INCOMPLETE-NUCLEUS	0	0.0%	1	0.1%
100.328	Y-SUTURE TIP OPACITIES	27	0.5%	24	1.6%
100.330	GENERALIZED/ COMPLETE	3	0.1%	1	0.1%
100.375	SUBLUXATION/ LUXATION	3	0.1%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***362***	***6.8%***	***133***	***8.6%***

OCULAR DISORDERS REPORT
RHODESIAN RIDGEBACK

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 5,345 #	 %	Year Examined: 2019-2023 Total # Dogs: 1,548 #	 %
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	5	0.1%	8	0.5%
110.135 PHPV/ PTVL	1	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	9	0.2%	1	0.1%
110.320 VITREOUS DEGENERATION-SYNERESIS	8	0.1%	2	0.1%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	7	0.1%	5	0.3%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	1	0.0%	1	0.1%
120.310 RETINAL ATROPHY-GENERALIZED	5	0.1%	2	0.1%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	2	0.0%	0	0.0%
130.110 MICROPAPILLA	1	0.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	1	0.0%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	51	1.0%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	92	1.7%	2	0.1%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	76	1.4%	33	2.1%
NORMAL				
.000 NORMAL GLOBE	4,430	82.9%	1,201	77.6%

ROTTWEILER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A	Entropion	Not defined	2	NO	
B.	Uveal cysts				
	- single	Not defined	1	Breeder option	
	- multiple	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
D.	Cataract	Not defined	1	NO	
E.	POANV / MOD-*RAB3GAP1* (polyneuropathy, ocular abnormalities neuronal vacuolation) - Microphthalmia - Cataracts - PPM (iris to iris)	Autosomal Recessive	3	NO	Mutation in the *RAB3GAP1: c.743delC* gene

Description and Comments

A. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

In the Rottweiler, the Breed Club has requested that entropion is considered a fail (Breeding Advice NO).

B. Uveal cysts

A pigmented, fluid-filled epithelial-lined structure arising from the posterior iris or ciliary body epithelium. Cysts may remain attached to the pupil margin, iris, or ciliary body, or may detach and be free-floating within the anterior chamber. They may rupture and adhere to the cornea or anterior lens capsule. Uveal cysts may occur in any breed. Uveal cysts are commonly benign, although they may be associated with other pathologic conditions is various breeds.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of

age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

A variety of cataracts have been observed in this breed ranging from the posterior polar cataract similar to that in the Golden Retriever and cataracts involving multiple areas of the nucleus and cortex. Further studies need to be performed as to the exact mode of inheritance, but it is our recommendation that the individually afflicted dog should not be bred.

E. POANV (Polyneuropathy with ocular abnormalities and neuronal vacuolation) / MOD – *RAB3GAP1*

An autosomal recessive condition resulting in juvenile polyneuropathy that presents as laryngeal paralysis and weakness. Patients have concurrent ophthalmic abnormalities including microphthalmia, incomplete cataracts (primarily nuclear) and iris-to-iris PPMs. Neuronal vacuolation was identified on histopathology. Affected dogs were found to be homozygous for the *RAB3GAP1: c.743delC* mutation. Patients with this variant are not reported to survive past 6 months. Also reported in the Black Russian Terrier.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Breed club request to ACVO genetics committee, 2022

3. Mhlanga-Mutangadura T, Johnson GS, Ashwini A, Shelton GD, Wennogle SA, Johnson GC, Kuroki K, O'Brien DP. A Homozygous *RAB3GAP1:c.743delC* Mutation in Rottweilers with Neuronal Vacuolation and Spinocerebellar Degeneration. *Journal of Vet Int Med* 2016;30:813-818 PMID: 26968732.

OCULAR DISORDERS REPORT
ROTTWEILER

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	16,610		2,867	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	3	0.0%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	3	0.0%	0	0.0%
EYELIDS					
20.140	ECTOPIC CILIA	1	0.0%	0	0.0%
20.160	MACROPALPEBRAL FISSURE	10	0.1%	0	0.0%
21.000	ENTROPION	132	0.8%	21	0.7%
22.000	ECTROPION	31	0.2%	1	0.0%
25.110	DISTICHIASIS	101	0.6%	10	0.3%
32.110	IMPERFORATE LACRIMAL PUNCTUM	1	0.0%	0	0.0%
NICTITANS					
51.100	CARTILAGE ANOMALY/ EVERSION	4	0.0%	0	0.0%
52.110	GLAND PROLAPSE	17	0.1%	0	0.0%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	3	0.0%	1	0.0%
70.220	EXPOSURE KERATOPATHY SYNDROME	2	0.0%	1	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	153	0.9%	26	0.9%
70.730	DYSTROPHY-ENDOTHELIAL	7	0.0%	1	0.0%
UVEA					
93.110	IRIS HYPOPLASIA	12	0.1%	6	0.2%
93.120	UVEAL CYST-SINGLE	270	1.6%	83	2.9%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.0%	0	0.0%
93.150	IRIS COLOBOMA	58	0.3%	8	0.3%
93.170	UVEAL CYST-MULTIPLE	42	0.3%	44	1.5%
93.180	IRIS SPHINCTER DYSPLASIA	0	0.0%	1	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	130	0.8%	21	0.7%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	40	0.2%	7	0.2%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	58	0.3%	9	0.3%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	8	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	201	1.2%	132	4.6%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	16	0.1%	5	0.2%
93.810	UVEAL MELANOMA	4	0.0%	1	0.0%
95.120	UVEAL CYST-FREE FLOATING	21	0.1%	7	0.2%
LENS					
100.200	CATARACT, UNSPECIFIED	229	1.4%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	1,001	6.0%	217	7.6%
100.301	PUNCTATE-ANTERIOR CORTEX	246	1.5%	154	5.4%
100.302	PUNCTATE-POSTERIOR CORTEX	319	1.9%	39	1.4%
100.303	PUNCTATE-EQUATORIAL CORTEX	15	0.1%	4	0.1%
100.304	PUNCTATE-ANTERIOR SUTURES	28	0.2%	11	0.4%
100.305	PUNCTATE-POSTERIOR SUTURES	100	0.6%	8	0.3%
100.306	PUNCTATE-NUCLEUS	50	0.3%	22	0.8%
100.307	PUNCTATE-CAPSULAR	106	0.6%	46	1.6%
100.311	INCIPIENT-ANTERIOR CORTEX	135	0.8%	39	1.4%
100.312	INCIPIENT-POSTERIOR CORTEX	575	3.5%	99	3.5%
100.313	INCIPIENT-EQUATORIAL CORTEX	43	0.3%	16	0.6%
100.314	INCIPIENT-ANTERIOR SUTURES	13	0.1%	6	0.2%
100.315	INCIPIENT-POSTERIOR SUTURES	83	0.5%	11	0.4%
100.316	INCIPIENT-NUCLEUS	64	0.4%	7	0.2%
100.317	INCIPIENT-CAPSULAR	53	0.3%	18	0.6%
100.321	INCOMPLETE-ANTERIOR CORTEX	7	0.0%	2	0.1%
100.322	INCOMPLETE-POSTERIOR CORTEX	14	0.1%	6	0.2%

OCULAR DISORDERS REPORT
ROTTWEILER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 16,610 #	 %	2019-2023 2,867 #	 %
LENS Continued				
100.323 INCOMPLETE-EQUATORIAL CORTEX	1	0.0%	1	0.0%
100.325 INCOMPLETE-POSTERIOR SUTURES	2	0.0%	1	0.0%
100.326 INCOMPLETE-NUCLEUS	1	0.0%	4	0.1%
100.327 INCOMPLETE-CAPSULAR	4	0.0%	3	0.1%
100.328 Y-SUTURE TIP OPACITIES	25	0.2%	16	0.6%
100.330 GENERALIZED/ COMPLETE	50	0.3%	1	0.0%
100.375 SUBLUXATION/ LUXATION	3	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***2,138***	***12.9%***	***498***	***17.4%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	31	0.2%	5	0.2%
110.135 PHPV/ PTVL	8	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	11	0.1%	6	0.2%
110.320 VITREOUS DEGENERATION-SYNERESIS	61	0.4%	9	0.3%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	142	0.9%	15	0.5%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	50	0.3%	11	0.4%
120.310 RETINAL ATROPHY-GENERALIZED	182	1.1%	2	0.1%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%
120.920 RETINAL DETACHMENT	1	0.0%	1	0.0%
120.960 RETINOPATHY	25	0.2%	10	0.3%
120.970 RETINOPATHY - CMR/ CMR-LIKE	0	0.0%	1	0.0%
130.110 MICROPAPILLA	17	0.1%	3	0.1%
130.120 OPTIC NERVE HYPOPLASIA	17	0.1%	1	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	137	0.8%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	336	2.0%	9	0.3%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	334	2.0%	154	5.4%
NORMAL				
.000 NORMAL GLOBE	13,025	78.4%	1,980	69.1%

RUSSELL TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	
D.	Lens luxation	Autosomal recessive	2	NO	Mutation in the *ADAMTS17* gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation in the Jack Russell and Parsons Russell Terriers, among other breeds, but not specifically the Russell Terrier. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Gould D, Pettitt L, McLaughlin B, Holmes N, Forman N, Thomas A, Ahonen S, Lohi H, O'Leary C, Sargan D, Mellersh C. *ADAMTS17* mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol* 2011; 14: 378-384. PMID:22050825.

OCULAR DISORDERS REPORT
RUSSELL TERRIER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 491 #	 %	2019-2023 251 #	 %
EYELIDS				
25.110 DISTICHIASIS	16	3.3%	12	4.8%
32.110 IMPERFORATE LACRIMAL PUNCTUM	1	0.2%	0	0.0%
GLOBE				
40.910 KERATOCONJUNCTIVITIS SICCA (KCS)	1	0.2%	0	0.0%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	1	0.2%	1	0.4%
UVEA				
93.120 UVEAL CYST-SINGLE	1	0.2%	0	0.0%
93.150 IRIS COLOBOMA	1	0.2%	0	0.0%
93.180 IRIS SPHINCTER DYSPLASIA	1	0.2%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	24	4.9%	21	8.4%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	1	0.2%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	2	0.4%	2	0.8%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	22	4.5%	21	8.4%
100.301 PUNCTATE-ANTERIOR CORTEX	13	2.6%	7	2.8%
100.302 PUNCTATE-POSTERIOR CORTEX	0	0.0%	1	0.4%
100.303 PUNCTATE-EQUATORIAL CORTEX	2	0.4%	1	0.4%
100.304 PUNCTATE-ANTERIOR SUTURES	2	0.4%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	6	1.2%	3	1.2%
100.306 PUNCTATE-NUCLEUS	0	0.0%	5	2.0%
100.307 PUNCTATE-CAPSULAR	3	0.6%	2	0.8%
100.311 INCIPIENT-ANTERIOR CORTEX	0	0.0%	3	1.2%
100.312 INCIPIENT-POSTERIOR CORTEX	0	0.0%	1	0.4%
100.313 INCIPIENT-EQUATORIAL CORTEX	0	0.0%	1	0.4%
100.317 INCIPIENT-CAPSULAR	0	0.0%	3	1.2%
100.321 INCOMPLETE-ANTERIOR CORTEX	1	0.2%	1	0.4%
100.322 INCOMPLETE-POSTERIOR CORTEX	4	0.8%	1	0.4%
100.323 INCOMPLETE-EQUATORIAL CORTEX	1	0.2%	0	0.0%
100.325 INCOMPLETE-POSTERIOR SUTURES	1	0.2%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	1	0.2%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***33***	***6.7%***	***29***	***11.6%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	2	0.4%	4	1.6%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.2%	3	1.2%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	3	0.6%	5	2.0%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	1	0.2%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	1	0.2%	0	0.0%
130.110 MICROPAPILLA	1	0.2%	2	0.8%
OTHER				
900.000 OTHER, UNSPECIFIED	2	0.4%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	19	3.9%	11	4.4%
NORMAL				
.000 NORMAL GLOBE	405	82.5%	178	70.9%

RUSSIAN TOY

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/ no strands	Not defined	1	Passes with no notation	

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
RUSSIAN TOY

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 82 #	 %	Year Examined: 2019-2023 Total # Dogs: 129 #	 %
EYELIDS				
25.110 DISTICHIASIS	1	1.2%	2	1.6%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	1	1.2%	0	0.0%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	6	7.3%	9	7.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	6	7.3%	12	9.3%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	1	1.2%	0	0.0%
97.150 COLOBOMA	1	1.2%	0	0.0%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	3	3.7%	0	0.0%
100.301 PUNCTATE-ANTERIOR CORTEX	3	3.7%	0	0.0%
100.303 PUNCTATE-EQUATORIAL CORTEX	1	1.2%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	2	2.4%	0	0.0%
100.307 PUNCTATE-CAPSULAR	2	2.4%	0	0.0%
100.316 INCIPIENT-NUCLEUS	0	0.0%	1	0.8%
100.328 Y-SUTURE TIP OPACITIES	1	1.2%	1	0.8%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***8***	***9.8%***	***1***	***0.8%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	1	1.2%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	4	4.9%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	3	3.7%	1	0.8%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	0	0.0%	1	0.8%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	0	0.0%	1	0.8%
120.310 RETINAL ATROPHY-GENERALIZED	0	0.0%	2	1.6%
120.960 RETINOPATHY	1	1.2%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	2	2.4%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	3	3.7%	4	3.1%
NORMAL				
.000 NORMAL GLOBE	59	72.0%	101	78.3%

RUSSIAN TSVETNAYA BOLONKA
(BOLONKA ZVETNA)

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the RUSSIAN TSVETNAYA BOLONKA breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
RUSSIAN TSVETNAYA BOLONKA

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	116		31	
	Diagnostic Name	**#**	**%**	**#**	**%**
EYELIDS					
25.110	DISTICHIASIS	1	0.9%	0	0.0%
GLOBE					
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	1	0.9%	0	0.0%
CORNEA					
70.220	EXPOSURE KERATOPATHY SYNDROME	2	1.7%	0	0.0%
UVEA					
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	1	0.9%	1	3.2%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	5	4.3%	0	0.0%
100.301	PUNCTATE-ANTERIOR CORTEX	1	0.9%	2	6.5%
100.305	PUNCTATE-POSTERIOR SUTURES	3	2.6%	0	0.0%
100.307	PUNCTATE-CAPSULAR	1	0.9%	0	0.0%
100.313	INCIPIENT-EQUATORIAL CORTEX	1	0.9%	0	0.0%
100.315	INCIPIENT-POSTERIOR SUTURES	3	2.6%	0	0.0%
100.317	INCIPIENT-CAPSULAR	0	0.0%	1	3.2%
100.328	Y-SUTURE TIP OPACITIES	5	4.3%	2	6.5%
100.375	SUBLUXATION/ LUXATION	1	0.9%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***9***	***7.8%***	***3***	***9.7%***
VITREOUS					
110.135	PHPV/ PTVL	1	0.9%	0	0.0%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	9	7.8%	2	6.5%
110.320	VITREOUS DEGENERATION-SYNERESIS	8	6.9%	0	0.0%
OTHER					
900.000	OTHER, UNSPECIFIED	1	0.9%	0	0.0%
900.100	OTHER-SUSPECTED AS INHERITED	2	1.7%	0	0.0%
900.110	OTHER-SUSPECTED AS NOT-INHERITED	3	2.6%	4	12.9%
NORMAL					
.000	NORMAL GLOBE	93	80.2%	20	64.5%

RUSSO-EUROPEAN (RUSSIAN-EUROPEAN) LAIKA

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Glaucoma				
	- POAG	Presumed autosomal recessive	1	NO	Mutation in the *ADAMTS10* gene

Description and Comments

A. Glaucoma

Glaucoma is an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine breed eye screening exam.

Primary open angle glaucoma is present in the East-Siberian Laika breed (closely related to the Russo-European Laika), and extensive studies in other breeds have demonstrated its inheritance as autosomal recessive. By one year of age, the intraocular pressure (IOP) is elevated, but the filtration angle is open (early glaucoma). Animals with moderate glaucoma show sustained elevations of IOP, focal disinsertions of the lens zonules and focal closures of the iridocorneal angle. Later the globe enlarges, the lens luxates and the eyes become blind and show the effects of chronic glaucoma. The causative mutation in *ADAMTS10* causes an arginine for glycine substitution at position 661. A DNA test is available.

References

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the Russo-European Laika. The condition listed above is currently noted solely due to the availability of a genetic test for the disease.

1. Donner J, Anderson H, Davison S, Hughes AM, Bouirmane J, Lindqvist J, Lytle KM, Ganesan B, Ottka C, Ruotanen P, Kaukonen M, Forman OP, Fretwell N, Cole CA, Lohi H. Frequency and distribution of 152 genetic disease variants in over 100,000 mixed breed and purebred dogs. *PLoS Genet*. 2018 Apr 30;14(4):e1007361. doi: 10.1371/journal.pgen.1007361. Erratum in: *PLoS Genet*. 2019 Jan 18;15(1):e1007938. PMID: 29708978; PMCID: PMC5945203.

OCULAR DISORDERS REPORT
RUSSO-EUROPEAN LAIKA

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions for this breed.

SAINT BERNARD

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Multiple ocular anomalies	Not defined	3	NO	
A.	Ectropion	Not defined	1	Breeder option	
B.	Entropion	Not defined	1, 2	Breeder option	
C.	Distichiasis	Not defined	1	Breeder option	
D.	Persistent pupillary membrane				
	- iris to iris	Not defined	1	Breeder option	
E.	Cataract	Not defined	1	NO	

Description and Comments

A. Multiple ocular anomalies

A case report describes five Saint-Bernard Puppies (8-10 weeks old) that were born blind. Clinical and histopathologic investigations revealed multiple ocular anomalies including microphthalmia, aphakia, acornea, retinal dysplasia with detachment and optic nerve hypoplasia. A hereditary cause was suspected given that 3 affected puppies from different litters shared the same sire, but was not definitively proven beyond that.

B. Ectropion

A conformational defect resulting in eversion of the eyelids which may cause ocular irritation. It is likely that ectropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

C. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull. In this breed, entropion is associated with an exceptionally large palpebral fissure.

D. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

E. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

F. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Priester WA. Congenital ocular defects in cattle, horses, cats, and dogs. *J Am Vet Med Assoc*. 1972 Jun 1;160:1504-1511. PMID: 4623843

3. Martin CL, Leipold HW. Aphakia and multiple ocular defects in Saint Bernard puppies. Vet Med Small Anim Clin 1974; 69(4): 448-453. PMID: 4206317

OCULAR DISORDERS REPORT
SAINT BERNARD

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 307 #	 %	Year Examined: 2019-2023 Total # Dogs: 194 #	 %
EYELIDS				
20.160 MACROPALPEBRAL FISSURE	21	6.8%	0	0.0%
21.000 ENTROPION	74	24.1%	44	22.7%
22.000 ECTROPION	99	32.2%	50	25.8%
25.110 DISTICHIASIS	18	5.9%	10	5.2%
NICTITANS				
51.100 CARTILAGE ANOMALY/ EVERSION	1	0.3%	0	0.0%
52.110 GLAND PROLAPSE	1	0.3%	0	0.0%
CORNEA				
70.220 EXPOSURE KERATOPATHY SYNDROME	1	0.3%	0	0.0%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	2	0.7%	0	0.0%
UVEA				
93.120 UVEAL CYST-SINGLE	2	0.7%	0	0.0%
93.170 UVEAL CYST-MULTIPLE	2	0.7%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	33	10.7%	9	4.6%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	1	0.3%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	2	0.7%	0	0.0%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	1	0.3%	0	0.0%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	16	5.2%	12	6.2%
100.301 PUNCTATE-ANTERIOR CORTEX	3	1.0%	6	3.1%
100.302 PUNCTATE-POSTERIOR CORTEX	3	1.0%	3	1.5%
100.303 PUNCTATE-EQUATORIAL CORTEX	2	0.7%	4	2.1%
100.305 PUNCTATE-POSTERIOR SUTURES	1	0.3%	0	0.0%
100.306 PUNCTATE-NUCLEUS	3	1.0%	0	0.0%
100.307 PUNCTATE-CAPSULAR	1	0.3%	1	0.5%
100.311 INCIPIENT-ANTERIOR CORTEX	5	1.6%	1	0.5%
100.312 INCIPIENT-POSTERIOR CORTEX	5	1.6%	0	0.0%
100.313 INCIPIENT-EQUATORIAL CORTEX	6	2.0%	3	1.5%
100.316 INCIPIENT-NUCLEUS	5	1.6%	1	0.5%
100.317 INCIPIENT-CAPSULAR	1	0.3%	1	0.5%
100.321 INCOMPLETE-ANTERIOR CORTEX	1	0.3%	0	0.0%
100.326 INCOMPLETE-NUCLEUS	1	0.3%	0	0.0%
100.327 INCOMPLETE-CAPSULAR	0	0.0%	1	0.5%
100.328 Y-SUTURE TIP OPACITIES	1	0.3%	1	0.5%
100.330 GENERALIZED/ COMPLETE	9	2.9%	1	0.5%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***46***	***15.0%***	***22***	***11.3%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	3	1.0%	1	0.5%
110.135 PHPV/ PTVL	1	0.3%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	0	0.0%	1	0.5%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	5	1.6%	0	0.0%
130.110 MICROPAPILLA	1	0.3%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	1	0.3%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	3	1.0%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	10	3.3%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	18	5.9%	4	2.1%
NORMAL				
.000 NORMAL GLOBE	118	38.4%	97	50.0%

SALUKI

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Cataract	Not defined	1	NO	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
SALUKI

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 312 #	 %	2019-2023 81 #	 %
EYELIDS				
21.000 ENTROPION	0	0.0%	1	1.2%
25.110 DISTICHIASIS	2	0.6%	5	6.2%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	1	0.3%	0	0.0%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	7	2.2%	4	4.9%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	3	1.0%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	2	0.6%	0	0.0%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	1	0.3%	0	0.0%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	20	6.4%	7	8.6%
100.301 PUNCTATE-ANTERIOR CORTEX	2	0.6%	0	0.0%
100.302 PUNCTATE-POSTERIOR CORTEX	4	1.3%	0	0.0%
100.303 PUNCTATE-EQUATORIAL CORTEX	1	0.3%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	1	0.3%	1	1.2%
100.306 PUNCTATE-NUCLEUS	2	0.6%	0	0.0%
100.307 PUNCTATE-CAPSULAR	3	1.0%	2	2.5%
100.312 INCIPIENT-POSTERIOR CORTEX	1	0.3%	2	2.5%
100.313 INCIPIENT-EQUATORIAL CORTEX	2	0.6%	0	0.0%
100.316 INCIPIENT-NUCLEUS	1	0.3%	0	0.0%
100.317 INCIPIENT-CAPSULAR	0	0.0%	2	2.5%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	6	7.4%
100.330 GENERALIZED/ COMPLETE	2	0.6%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***19***	***6.1%***	***7***	***8.6%***
VITREOUS				
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	8	2.6%	4	4.9%
110.320 VITREOUS DEGENERATION-SYNERESIS	2	0.6%	0	0.0%
FUNDUS				
120.310 RETINAL ATROPHY-GENERALIZED	2	0.6%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	1	0.3%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	5	1.6%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	0	0.0%	5	6.2%
NORMAL				
.000 NORMAL GLOBE	264	84.6%	58	71.6%

SAMOYED

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Glaucoma	Not defined	2-7	NO	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1, 8	Breeder option	
D.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
E.	Cataract	Not defined	1	NO	
F.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- XLPRA-*RPGR* (XLPRA1)	X-linked recessive	9, 10	NO	Mutation in the *RPGR* gene
G.	Retinal dysplasia (without skeletal defects)				
	- folds	Presumed autosomal recessive	1	NO (Breeder option requires Normal genetic test for mutation in *COL9A2* gene)	Mutation in the *COL9A2* gene
H.	Retinal dysplasia (with skeletal defects) / Dysplasia-*COL9A2* (osd2)				
	- folds/geographic/ detached	Autosomal recessive with incomplete dominance for the eyes	11-14	NO	Mutation in the *COL9A2* gene
I.	Uveodermatologic syndrome	Not defined	15, 16	NO	

Description and Comments

A. Glaucoma

An elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests are part of a routine breed eye screening exam.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

F. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- XLPRA-*RPGR* (*XLPRA1*)

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. In the Samoyed, one form of PRA, known as XLPRA1, is due to a mutation in the *RPGR* gene and is inherited as a recessive, sex-linked trait. A DNA test is available.

G. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness.

In the Samoyed, the presence of retinal folds may be seen in the heterozygous state described in "I" below. Thus the recommendation against breeding. The breeding advice for Labrador Retrievers and Samoyeds diagnosed with "retinal dysplasia - folds" will be changed from "No" to "Breeder option" if the owner of the dog provides the registering office with results of the DNA test for the affected dog showing that it is not a carrier of the *COL9A2* mutation.

H. Retinal dysplasia - folds with skeletal defects in homozygous affected dogs / Dysplasia-COL9A2 (osd2)

This condition is also known as oculo-skeletal dysplasia (OSD) or dwarfism with retinal dysplasia type 2 (DRD2) in the Samoyed. A similar condition, DRD1, occurs in the Labrador Retriever. The condition is autosomal recessive and homozygous affected dogs have shortened forelimbs (“downhill” conformation) with valgus deformity. They have severe ocular defects including cataract, retinal folds/multifocal retinal dysplasia, vitreal degeneration and retinal detachment. The ocular abnormalities result in blindness in most dogs. Heterozygous dogs can have either a normal ocular exam or have multiple retinal folds, vitreal membranes, or vitreal degeneration suggesting a semi-dominant mechanism with respect to the eyes. It is important to note that generally the retinal folds present in heterozygous dogs tend to cluster around the major superior blood vessels of the central tapetal region. The condition is caused by a 1,267 bp deletion of *COL9A2.* A DNA test is available.

I. Uveodermatologic syndrome

Uveodermatologic syndrome in the Samoyed bears many similarities to a condition in people called Vogt-Koyanagi-Harada (or VKH) syndrome. Thus, the condition in dogs is often referred to as VKH or VKH-like syndrome. It is an immune-mediated disease in which pigmented cells (melanocytes) in the eye and in the skin are destroyed by white blood cells (lymphocytes). The first clinical signs are usually inflammation of the intraocular structures (or uveitis) in both eyes. Adhesions between the iris and lens (posterior synechiae) and the peripheral iris and cornea (peripheral anterior synechiae) develop rapidly. Other complications include cataract development, retinal degeneration, retinal separation or detachment, optic disc atrophy and secondary glaucoma. The uveitis is very difficult to control medically and ultimately results in blindness in most affected dogs. Whitening of the hair (poliosis) and skin (vitiligo) may also be noted in advanced cases. Some veterinary ophthalmologists feel there is a prevalence of this entity in the Samoyed. Additional studies are needed to validate this experience and explore the possibility of a genetic basis.

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1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

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OCULAR DISORDERS REPORT
SAMOYED

Diagnostic Name		Year Examined: 1993-2018 Total # Dogs: 26,409 #	 %	Year Examined: 2019-2023 Total # Dogs: 5,557 #	 %
GLOBE					
.110	MICROPHTHALMOS	23	0.1%	1	0.0%
10.000	GLAUCOMA	10	0.0%	1	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	15	0.1%	3	0.1%
EYELIDS					
20.140	ECTOPIC CILIA	7	0.0%	2	0.0%
20.160	MACROPALPEBRAL FISSURE	1	0.0%	0	0.0%
21.000	ENTROPION	6	0.0%	0	0.0%
22.000	ECTROPION	3	0.0%	1	0.0%
25.110	DISTICHIASIS	1,477	5.6%	193	3.5%
32.110	IMPERFORATE LACRIMAL PUNCTUM	20	0.1%	8	0.1%
NICTITANS					
51.100	CARTILAGE ANOMALY/ EVERSION	5	0.0%	0	0.0%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	4	0.0%	0	0.0%
70.220	EXPOSURE KERATOPATHY SYNDROME	2	0.0%	0	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	952	3.6%	224	4.0%
70.730	DYSTROPHY-ENDOTHELIAL	17	0.1%	0	0.0%
UVEA					
93.120	UVEAL CYST-SINGLE	10	0.0%	3	0.1%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.0%	0	0.0%
93.150	IRIS COLOBOMA	1	0.0%	0	0.0%
93.170	UVEAL CYST-MULTIPLE	1	0.0%	0	0.0%
93.180	IRIS SPHINCTER DYSPLASIA	0	0.0%	1	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	533	2.0%	106	1.9%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	29	0.1%	10	0.2%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	40	0.2%	7	0.1%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	16	0.1%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	13	0.0%	5	0.1%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	14	0.1%	4	0.1%
93.810	UVEAL MELANOMA	1	0.0%	0	0.0%
95.120	UVEAL CYST-FREE FLOATING	2	0.0%	0	0.0%
97.150	COLOBOMA	3	0.0%	2	0.0%
FUNDUS					
97.110	CHOROIDAL HYPOPLASIA	4	0.0%	0	0.0%
97.120	COLOBOMA	7	0.0%	0	0.0%
120.170	RETINAL DYSPLASIA-FOLDS	538	2.0%	69	1.2%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	205	0.8%	34	0.6%
120.310	RETINAL ATROPHY-GENERALIZED	56	0.2%	1	0.0%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	10	0.0%	0	0.0%
120.920	RETINAL DETACHMENT	2	0.0%	0	0.0%
120.960	RETINOPATHY	9	0.0%	2	0.0%
130.110	MICROPAPILLA	19	0.1%	3	0.1%
130.120	OPTIC NERVE HYPOPLASIA	15	0.1%	2	0.0%
LENS					
100.200	CATARACT, UNSPECIFIED	100	0.4%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	860	3.3%	204	3.7%
100.301	PUNCTATE-ANTERIOR CORTEX	153	0.6%	101	1.8%
100.302	PUNCTATE-POSTERIOR CORTEX	189	0.7%	33	0.6%
100.303	PUNCTATE-EQUATORIAL CORTEX	17	0.1%	2	0.0%
100.304	PUNCTATE-ANTERIOR SUTURES	16	0.1%	8	0.1%
100.305	PUNCTATE-POSTERIOR SUTURES	75	0.3%	14	0.3%

OCULAR DISORDERS REPORT
SAMOYED

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 26,409 #	 %	Year Examined: 2019-2023 Total # Dogs: 5,557 #	 %
LENS Continued				
100.306 PUNCTATE-NUCLEUS	35	0.1%	13	0.2%
100.307 PUNCTATE-CAPSULAR	93	0.4%	52	0.9%
100.311 INCIPIENT-ANTERIOR CORTEX	106	0.4%	32	0.6%
100.312 INCIPIENT-POSTERIOR CORTEX	281	1.1%	45	0.8%
100.313 INCIPIENT-EQUATORIAL CORTEX	30	0.1%	8	0.1%
100.314 INCIPIENT-ANTERIOR SUTURES	7	0.0%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	59	0.2%	4	0.1%
100.316 INCIPIENT-NUCLEUS	43	0.2%	13	0.2%
100.317 INCIPIENT-CAPSULAR	43	0.2%	14	0.3%
100.321 INCOMPLETE-ANTERIOR CORTEX	3	0.0%	3	0.1%
100.322 INCOMPLETE-POSTERIOR CORTEX	22	0.1%	12	0.2%
100.325 INCOMPLETE-POSTERIOR SUTURES	3	0.0%	0	0.0%
100.326 INCOMPLETE-NUCLEUS	2	0.0%	3	0.1%
100.327 INCOMPLETE-CAPSULAR	6	0.0%	2	0.0%
100.328 Y-SUTURE TIP OPACITIES	16	0.1%	13	0.2%
100.330 GENERALIZED/ COMPLETE	66	0.2%	0	0.0%
100.340 RESORBING/ HYPERMATURE	2	0.0%	1	0.0%
100.375 SUBLUXATION/ LUXATION	4	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1,351***	***5.1%***	***360***	***6.5%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	27	0.1%	9	0.2%
110.135 PHPV/ PTVL	14	0.1%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	99	0.4%	4	0.1%
OTHER				
900.000 OTHER, UNSPECIFIED	176	0.7%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	451	1.7%	7	0.1%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	355	1.3%	170	3.1%
NORMAL				
.000 NORMAL GLOBE	21,574	81.7%	4,490	80.8%

SCHAPENDOES

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Cataract	Not defined	1	NO	
B.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- PRA-*CCDC66*	Autosomal recessive	2, 3	NO	Mutation in the *CCDC66* gene

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

B. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-*CCDC66*

A degenerative disease of the photoreceptors which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

In the Schapendoes the age of onset is between 2-5 years of age. The causal mutation is a single base pair insertion in exon 6 of the gene coiled-coil domain containing 66 (*CCDC66)* that leads to a stop codon. The mutation is inherited as an autosomal recessive trait. A DNA test is available.

References

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OCULAR DISORDERS REPORT
SCHAPENDOES

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	111		42	
	Diagnostic Name	#	%	#	%
EYELIDS					
25.110	DISTICHIASIS	2	1.8%	0	0.0%
CORNEA					
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	0	0.0%	1	2.4%
UVEA					
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	1	0.9%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	1	0.9%	1	2.4%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	6	5.4%	8	19.0%
100.301	PUNCTATE-ANTERIOR CORTEX	5	4.5%	6	14.3%
100.302	PUNCTATE-POSTERIOR CORTEX	1	0.9%	1	2.4%
100.304	PUNCTATE-ANTERIOR SUTURES	0	0.0%	1	2.4%
100.305	PUNCTATE-POSTERIOR SUTURES	0	0.0%	2	4.8%
100.311	INCIPIENT-ANTERIOR CORTEX	3	2.7%	0	0.0%
100.312	INCIPIENT-POSTERIOR CORTEX	2	1.8%	1	2.4%
100.315	INCIPIENT-POSTERIOR SUTURES	2	1.8%	0	0.0%
100.317	INCIPIENT-CAPSULAR	0	0.0%	1	2.4%
100.328	Y-SUTURE TIP OPACITIES	2	1.8%	2	4.8%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***13***	***11.7%***	***12***	***28.6%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	2	1.8%	1	2.4%
110.320	VITREOUS DEGENERATION-SYNERESIS	1	0.9%	0	0.0%
FUNDUS					
120.170	RETINAL DYSPLASIA-FOLDS	0	0.0%	3	7.1%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	1	0.9%	0	0.0%
OTHER					
900.100	OTHER-SUSPECTED AS INHERITED	6	5.4%	0	0.0%
900.110	OTHER-SUSPECTED AS NOT-INHERITED	0	0.0%	3	7.1%
NORMAL					
.000	NORMAL GLOBE	88	79.3%	26	61.9%

SCHIPPERKE

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
SCHIPPERKE

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	1,614		324	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	1	0.1%	0	0.0%
EYELIDS					
21.000	ENTROPION	0	0.0%	1	0.3%
25.110	DISTICHIASIS	50	3.1%	8	2.5%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	1	0.1%	0	0.0%
70.220	EXPOSURE KERATOPATHY SYNDROME	1	0.1%	0	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	3	0.2%	1	0.3%
70.730	DYSTROPHY-ENDOTHELIAL	2	0.1%	0	0.0%
UVEA					
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	143	8.9%	23	7.1%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	6	0.4%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	2	0.1%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	10	0.6%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	7	0.4%	4	1.2%
LENS					
100.200	CATARACT, UNSPECIFIED	4	0.2%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	75	4.6%	6	1.9%
100.301	PUNCTATE-ANTERIOR CORTEX	24	1.5%	1	0.3%
100.302	PUNCTATE-POSTERIOR CORTEX	2	0.1%	0	0.0%
100.303	PUNCTATE-EQUATORIAL CORTEX	6	0.4%	0	0.0%
100.304	PUNCTATE-ANTERIOR SUTURES	2	0.1%	0	0.0%
100.305	PUNCTATE-POSTERIOR SUTURES	3	0.2%	0	0.0%
100.306	PUNCTATE-NUCLEUS	14	0.9%	0	0.0%
100.307	PUNCTATE-CAPSULAR	1	0.1%	2	0.6%
100.311	INCIPIENT-ANTERIOR CORTEX	25	1.5%	3	0.9%
100.312	INCIPIENT-POSTERIOR CORTEX	11	0.7%	0	0.0%
100.313	INCIPIENT-EQUATORIAL CORTEX	9	0.6%	2	0.6%
100.314	INCIPIENT-ANTERIOR SUTURES	1	0.1%	0	0.0%
100.315	INCIPIENT-POSTERIOR SUTURES	1	0.1%	0	0.0%
100.316	INCIPIENT-NUCLEUS	7	0.4%	2	0.6%
100.317	INCIPIENT-CAPSULAR	2	0.1%	1	0.3%
100.321	INCOMPLETE-ANTERIOR CORTEX	1	0.1%	1	0.3%
100.322	INCOMPLETE-POSTERIOR CORTEX	1	0.1%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	4	0.2%	0	0.0%
100.330	GENERALIZED/ COMPLETE	8	0.5%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***122***	***7.6%***	***12***	***3.7%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	1	0.1%	0	0.0%
110.135	PHPV/ PTVL	1	0.1%	0	0.0%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	2	0.1%	0	0.0%
110.320	VITREOUS DEGENERATION-SYNERESIS	21	1.3%	4	1.2%
FUNDUS					
120.170	RETINAL DYSPLASIA-FOLDS	11	0.7%	0	0.0%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	4	0.2%	1	0.3%
120.310	RETINAL ATROPHY-GENERALIZED	17	1.1%	0	0.0%
120.920	RETINAL DETACHMENT	1	0.1%	0	0.0%
120.960	RETINOPATHY	2	0.1%	0	0.0%
OTHER					
900.000	OTHER, UNSPECIFIED	16	1.0%	0	0.0%
900.100	OTHER-SUSPECTED AS INHERITED	51	3.2%	0	0.0%
900.110	OTHER-SUSPECTED AS NOT-INHERITED	31	1.9%	8	2.5%

OCULAR DISORDERS REPORT
SCHIPPERKE

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1,614 #	%	Year Examined: 2019-2023 Total # Dogs: 324 #	%
NORMAL				
.000 NORMAL GLOBE	1,278	79.2%	269	83.0%

SCOTTISH DEERHOUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the SCOTTISH DEERHOUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
SCOTTISH DEERHOUND

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 25 #	 %	Year Examined: 2019-2023 Total # Dogs: 21 #	 %
GLOBE				
.110 MICROPHTHALMOS	1	4.0%	0	0.0%
EYELIDS				
25.110 DISTICHIASIS	5	20.0%	0	0.0%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	4	16.0%	2	9.5%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	1	4.0%	1	4.8%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	1	4.0%	0	0.0%
LENS				
100.307 PUNCTATE-CAPSULAR	0	0.0%	1	4.8%
100.312 INCIPIENT-POSTERIOR CORTEX	1	4.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1***	***4.0%***	***1***	***4.8%***
OTHER				
900.110 OTHER-SUSPECTED AS NOT-INHERITED	1	4.0%	0	0.0%
NORMAL				
.000 NORMAL GLOBE	19	76.0%	18	85.7%

SCOTTISH TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- iris to lens	Not defined	1	NO	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
B.	Cataract	Not defined	1	NO	
C.	Ligneous conjunctivitis	Not defined	2,3	NO	mutation in *PLG* gene

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Ligneous conjunctivitis

A rare type of conjunctivitis characterized by the formation of thick membranes covering conjunctiva of the nictitans and eyelids of affected dogs. This condition has been diagnosed in four unrelated Doberman Pinschers, three of which had life-threatening systemic disease. In Scottish Terriers, it is associated with a single nucleotide polymorphism in the plasminogen (PLG) gene.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

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PMID:22890402

3. Ainsworth S, Carter SS, Fisher C, Dawson J, Makrides L, Nuttall T, Mason SL. Ligneous membranitis in Scottish Terriers is associated with a single nucleotide polymorphism in the plasminogen (PLG) gene. *Anim Genet*. 2015 46(6):707-710. PMID: 26360520

OCULAR DISORDERS REPORT
SCOTTISH TERRIER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 896 #	 %	2019-2023 173 #	 %
EYELIDS				
25.110 DISTICHIASIS	3	0.3%	1	0.6%
GLOBE				
40.910 KERATOCONJUNCTIVITIS SICCA (KCS)	1	0.1%	0	0.0%
NICTITANS				
52.110 GLAND PROLAPSE	2	0.2%	0	0.0%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	1	0.1%	0	0.0%
70.220 EXPOSURE KERATOPATHY SYNDROME	2	0.2%	1	0.6%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	6	0.7%	0	0.0%
70.730 DYSTROPHY-ENDOTHELIAL	2	0.2%	0	0.0%
UVEA				
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	3	0.3%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	262	29.2%	55	31.8%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	43	4.8%	6	3.5%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	10	1.1%	3	1.7%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	3	0.3%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	113	12.6%	60	34.7%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	9	1.0%	3	1.7%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	83	9.3%	4	2.3%
100.301 PUNCTATE-ANTERIOR CORTEX	9	1.0%	2	1.2%
100.302 PUNCTATE-POSTERIOR CORTEX	2	0.2%	0	0.0%
100.303 PUNCTATE-EQUATORIAL CORTEX	4	0.4%	0	0.0%
100.304 PUNCTATE-ANTERIOR SUTURES	2	0.2%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	5	0.6%	0	0.0%
100.306 PUNCTATE-NUCLEUS	5	0.6%	2	1.2%
100.307 PUNCTATE-CAPSULAR	4	0.4%	3	1.7%
100.311 INCIPIENT-ANTERIOR CORTEX	7	0.8%	1	0.6%
100.312 INCIPIENT-POSTERIOR CORTEX	6	0.7%	0	0.0%
100.313 INCIPIENT-EQUATORIAL CORTEX	3	0.3%	0	0.0%
100.314 INCIPIENT-ANTERIOR SUTURES	1	0.1%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	2	0.2%	0	0.0%
100.316 INCIPIENT-NUCLEUS	9	1.0%	0	0.0%
100.317 INCIPIENT-CAPSULAR	3	0.3%	3	1.7%
100.321 INCOMPLETE-ANTERIOR CORTEX	1	0.1%	0	0.0%
100.322 INCOMPLETE-POSTERIOR CORTEX	1	0.1%	0	0.0%
100.326 INCOMPLETE-NUCLEUS	1	0.1%	0	0.0%
100.327 INCOMPLETE-CAPSULAR	1	0.1%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	2	0.2%	0	0.0%
100.330 GENERALIZED/ COMPLETE	5	0.6%	0	0.0%
100.375 SUBLUXATION/ LUXATION	1	0.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***71***	***7.9%***	***11***	***6.4%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	1	0.1%	1	0.6%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.1%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	4	0.4%	1	0.6%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	5	0.6%	2	1.2%
120.310 RETINAL ATROPHY-GENERALIZED	8	0.9%	0	0.0%
130.110 MICROPAPILLA	0	0.0%	1	0.6%

OCULAR DISORDERS REPORT
SCOTTISH TERRIER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 896 #	 %	Year Examined: 2019-2023 Total # Dogs: 173 #	 %
OTHER				
900.000 OTHER, UNSPECIFIED	13	1.5%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	60	6.7%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	24	2.7%	10	5.8%
NORMAL				
.000 NORMAL GLOBE	453	50.6%	69	39.9%

SEALYHAM TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	
D.	Lens luxation	Autosomal recessive	2-5	NO	Mutation in the *ADAMTS17* gene
E.	Retinal atrophy				
	- generalized	Not defined	3	NO	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma) causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

E. Retinal Atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Formston C. Observations on subluxation and luxation of the crystalline lens in the dog. *J Comp Pathol*. 1945;55:168-186.

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4. Curtis R, Barnett KC. Primary lens luxation in the dog. *J Small Anim Pract*. 1980;21:657-668. PMID: 6969820

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OCULAR DISORDERS REPORT
SEALYHAM TERRIER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 516 #	 %	Year Examined: 2019-2023 Total # Dogs: 41 #	 %
EYELIDS				
25.110 DISTICHIASIS	28	5.4%	4	9.8%
NICTITANS				
52.110 GLAND PROLAPSE	1	0.2%	0	0.0%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	37	7.2%	3	7.3%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	2	0.4%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	1	0.2%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	2	0.4%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	3	0.6%	0	0.0%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	1	0.2%	0	0.0%
FUNDUS				
97.120 COLOBOMA	1	0.2%	0	0.0%
120.170 RETINAL DYSPLASIA-FOLDS	9	1.7%	0	0.0%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	1	0.2%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	11	2.1%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.2%	0	0.0%
120.960 RETINOPATHY	0	0.0%	1	2.4%
130.110 MICROPAPILLA	1	0.2%	1	2.4%
130.120 OPTIC NERVE HYPOPLASIA	1	0.2%	0	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	2	0.4%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	21	4.1%	0	0.0%
100.301 PUNCTATE-ANTERIOR CORTEX	5	1.0%	0	0.0%
100.302 PUNCTATE-POSTERIOR CORTEX	3	0.6%	0	0.0%
100.303 PUNCTATE-EQUATORIAL CORTEX	1	0.2%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	2	0.4%	0	0.0%
100.307 PUNCTATE-CAPSULAR	5	1.0%	0	0.0%
100.311 INCIPIENT-ANTERIOR CORTEX	3	0.6%	0	0.0%
100.312 INCIPIENT-POSTERIOR CORTEX	8	1.6%	0	0.0%
100.313 INCIPIENT-EQUATORIAL CORTEX	1	0.2%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	1	0.2%	0	0.0%
100.316 INCIPIENT-NUCLEUS	2	0.4%	0	0.0%
100.317 INCIPIENT-CAPSULAR	2	0.4%	0	0.0%
100.330 GENERALIZED/ COMPLETE	7	1.4%	0	0.0%
100.375 SUBLUXATION/ LUXATION	5	1.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***42***	***8.1%***	***0***	***0.0%***
VITREOUS				
110.135 PHPV/ PTVL	2	0.4%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.2%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	5	1.0%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	4	0.8%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	10	1.9%	1	2.4%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	3	0.6%	1	2.4%
NORMAL				
.000 NORMAL GLOBE	427	82.8%	30	73.2%

SEPPALA SIBERIAN SLED DOG

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the SEPPALA SIBERIAN SLED DOG breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
SEPPALA SIBERIAN SLED DOG

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	1		15	
	Diagnostic Name	#	%	#	%
CORNEA					
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	0	0.0%	1	6.7%
UVEA					
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	0	0.0%	4	26.7%
LENS					
100.312	INCIPIENT-POSTERIOR CORTEX	0	0.0%	1	6.7%
100.330	GENERALIZED/ COMPLETE	0	0.0%	1	6.7%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***0***	***0.0%***	***2***	***13.3%***
NORMAL					
.000	NORMAL GLOBE	1	100.0%	8	53.3%

SERBIAN HOUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the SERBIAN HOUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
SERBIAN HOUND

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions for this breed.

SHETLAND SHEEPDOG

(Sheltie)

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Corneal dystrophy				
	- epithelial / stromal	Not defined	1, 2	Breeder option	
C.	Sheltie corneal dystrophy	Not defined	3	NO	
D.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
E.	Cataract	Not defined	1	NO	
F.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- PRA-*CNGA1*	Autosomal recessive	4	NO	Mutation in the *CNGA1* gene
	- PRA-*BBS2*-Shetland Sheepdog	Autosomal recessive	10	NO	Mutation in the *BBS2* gene
	- Slowly progressive retinopathy	Not defined	5	NO	
G.	Choroidal hypoplasia (Collie eye anomaly / CEA-*NHEJ1*) - optic nerve coloboma - retinal detachment - retinal hemorrhage - staphyloma/coloboma	Autosomal recessive	6-9	NO	Mutation in the *NHEJ1* gene

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Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded. Breeding discretion is advised.

Distichiasis in the Shetland Sheepdog usually involves stiff lashes which require permanent epilation.

B. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Sheltie corneal dystrophy

The corneal changes in the Shetland Sheepdog are characterized grossly by multifocal, central, subepithelial and superficial stromal, grey-white, circular or irregular rings. Some affected animals develop corneal erosions. The preocular tear film in the majority of dogs is unstable and requires symptomatic therapy to keep the patients comfortable. Further studies are necessary to define this disorder.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms are seen in the Shetland sheepdog and pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

F. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-*CNGA1*

One form of PRA in the Shetland Sheepdog is caused by a 4bp exonic deletion in *CNGA1.* However, multiple forms of PRA exist in the breed and slowly progressive retinopathy is also not genetically linked to this mutation. A DNA test is available; however it will only detect this mutation.

- PRA-*BBS2*-Shetland Sheepdog

A novel form of PRA has been linked to a missense variant (single nucleotide variant in exon 11) in the Bardet-Biedl Syndrome 2 gene (*BBS2*). This disease is syndromic with facial abnormalities.

- Slowly progressive retinopathy

A retinal disease that is poorly defined. May be a variant of PRA.

G. Choroidal hypoplasia (Collie eye anomaly / CEA-*NHEJ1*)
- staphyloma/coloboma

- retinal detachment
- retinal hemorrhage
- optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie eye anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1.* The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

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7. Parker HG, Kukekova AV, Akey DT, Goldstein O, Kirkness EF, Baysac KC, Mosher DS, Aguirre GD, Acland GM, Ostrander EA. Breed relationships facilitate fine-mapping studies: a 7.8-kb deletion cosegregates with Collie eye anomaly across multiple dog breeds. *Gen Res*. 2007;17:1562-1571. PMID: 17916641.

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OCULAR DISORDERS REPORT
SHETLAND SHEEPDOG

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 41,772 #	%	2019-2023 4,616 #	%
GLOBE				
.110 MICROPHTHALMOS	70	0.2%	9	0.2%
10.000 GLAUCOMA	2	0.0%	0	0.0%
40.910 KERATOCONJUNCTIVITIS SICCA (KCS)	7	0.0%	0	0.0%
EYELIDS				
20.140 ECTOPIC CILIA	9	0.0%	0	0.0%
21.000 ENTROPION	8	0.0%	0	0.0%
22.000 ECTROPION	10	0.0%	0	0.0%
25.110 DISTICHIASIS	2,654	6.4%	225	4.9%
32.110 IMPERFORATE LACRIMAL PUNCTUM	6	0.0%	2	0.0%
NICTITANS				
51.100 CARTILAGE ANOMALY/ EVERSION	7	0.0%	0	0.0%
52.110 GLAND PROLAPSE	4	0.0%	0	0.0%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	9	0.0%	0	0.0%
70.220 EXPOSURE KERATOPATHY SYNDROME	5	0.0%	2	0.0%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	1,137	2.7%	94	2.0%
70.730 DYSTROPHY-ENDOTHELIAL	35	0.1%	2	0.0%
70.750 SHELTIE CORNEAL DYSTROPHY	0	0.0%	2	0.0%
UVEA				
90.250 PIGMENTARY UVEITIS	1	0.0%	0	0.0%
93.110 IRIS HYPOPLASIA	7	0.0%	1	0.0%
93.120 UVEAL CYST-SINGLE	20	0.0%	1	0.0%
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	5	0.0%	0	0.0%
93.150 IRIS COLOBOMA	28	0.1%	0	0.0%
93.170 UVEAL CYST-MULTIPLE	3	0.0%	2	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	1,790	4.3%	211	4.6%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	125	0.3%	5	0.1%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	204	0.5%	10	0.2%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	29	0.1%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	19	0.0%	8	0.2%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	23	0.1%	13	0.3%
93.810 UVEAL MELANOMA	1	0.0%	0	0.0%
95.120 UVEAL CYST-FREE FLOATING	4	0.0%	0	0.0%
97.150 COLOBOMA	11	0.0%	1	0.0%
FUNDUS				
97.110 CHOROIDAL HYPOPLASIA	140	0.3%	31	0.7%
97.120 COLOBOMA	82	0.2%	0	0.0%
120.170 RETINAL DYSPLASIA-FOLDS	96	0.2%	12	0.3%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	17	0.0%	6	0.1%
120.310 RETINAL ATROPHY-GENERALIZED	220	0.5%	4	0.1%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	18	0.0%	0	0.0%
120.920 RETINAL DETACHMENT	1	0.0%	2	0.0%
120.960 RETINOPATHY	24	0.1%	1	0.0%
130.110 MICROPAPILLA	19	0.0%	1	0.0%
130.120 OPTIC NERVE HYPOPLASIA	25	0.1%	1	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	73	0.2%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	672	1.6%	92	2.0%
100.301 PUNCTATE-ANTERIOR CORTEX	111	0.3%	28	0.6%
100.302 PUNCTATE-POSTERIOR CORTEX	83	0.2%	11	0.2%
100.303 PUNCTATE-EQUATORIAL CORTEX	37	0.1%	5	0.1%

OCULAR DISORDERS REPORT
SHETLAND SHEEPDOG

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 41,772 #	 %	Year Examined: 2019-2023 Total # Dogs: 4,616 #	 %
LENS Continued				
100.304 PUNCTATE-ANTERIOR SUTURES	15	0.0%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	17	0.0%	3	0.1%
100.306 PUNCTATE-NUCLEUS	66	0.2%	25	0.5%
100.307 PUNCTATE-CAPSULAR	51	0.1%	21	0.5%
100.311 INCIPIENT-ANTERIOR CORTEX	162	0.4%	23	0.5%
100.312 INCIPIENT-POSTERIOR CORTEX	106	0.3%	20	0.4%
100.313 INCIPIENT-EQUATORIAL CORTEX	61	0.1%	6	0.1%
100.314 INCIPIENT-ANTERIOR SUTURES	6	0.0%	1	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	13	0.0%	0	0.0%
100.316 INCIPIENT-NUCLEUS	39	0.1%	5	0.1%
100.317 INCIPIENT-CAPSULAR	41	0.1%	10	0.2%
100.321 INCOMPLETE-ANTERIOR CORTEX	6	0.0%	3	0.1%
100.322 INCOMPLETE-POSTERIOR CORTEX	6	0.0%	4	0.1%
100.323 INCOMPLETE-EQUATORIAL CORTEX	4	0.0%	3	0.1%
100.326 INCOMPLETE-NUCLEUS	1	0.0%	3	0.1%
100.327 INCOMPLETE-CAPSULAR	5	0.0%	2	0.0%
100.328 Y-SUTURE TIP OPACITIES	8	0.0%	4	0.1%
100.330 GENERALIZED/ COMPLETE	48	0.1%	1	0.0%
100.340 RESORBING/ HYPERMATURE	1	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION	7	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***952***	***2.3%***	***174***	***3.8%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	98	0.2%	6	0.1%
110.135 PHPV/ PTVL	22	0.1%	1	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	4	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	148	0.4%	17	0.4%
OTHER				
900.000 OTHER, UNSPECIFIED	243	0.6%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	578	1.4%	7	0.2%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	391	0.9%	161	3.5%
NORMAL				
.000 NORMAL GLOBE	35,173	84.2%	3,748	81.2%

SHIBA INU

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Glaucoma	Not defined	2, 3	NO	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
D.	Cataract	Not defined	1	NO	
E.	Y-suture tip opacity	Not defined	1	Breeder option	

Description and Comments

A. Glaucoma

An elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests are part of a routine breed eye screening exam.

A recent study found that a *SRBD1* polymorphism in exon 4 plays an important role in the development of glaucoma in the Shiba Inu. A genetic test is not yet available.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

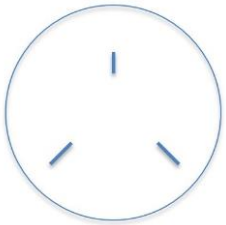
Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. Newer versions of the form (since 3/16/21) have boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

References

1. ACVO Genetics Committee and Data from OFA All-Breeds Report.

2. Kanemaki N, Tchedre KT, Imayasu M, Kawarai S, Sakaguchi M, Yoshino A, Itoh N, Meguro A, Mizuki N. Dogs and humans share a common susceptibility gene *SRBD1* for glaucoma risk. *PloS ONE*. 2013;8:e74372. PMID: 24040232.

3. Kato K, Sasaki N, Matsunaga S, Mochizuki M, Nishimura R, Ogawa H. Possible association of glaucoma with pectinate ligament dysplasia and narrowing of the iridocorneal angle in Shiba Inu dogs in Japan. *Vet Ophthalmol*. 2006;9:71-75. PMID: 16497230.

OCULAR DISORDERS REPORT
SHIBA INU

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	5,040		1,259	
	Diagnostic Name	#	%	#	%
GLOBE					
10.000	GLAUCOMA	2	0.0%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	1	0.0%	0	0.0%
EYELIDS					
20.140	ECTOPIC CILIA	4	0.1%	1	0.1%
20.160	MACROPALPEBRAL FISSURE	6	0.1%	0	0.0%
21.000	ENTROPION	12	0.2%	0	0.0%
25.110	DISTICHIASIS	120	2.4%	24	1.9%
32.110	IMPERFORATE LACRIMAL PUNCTUM	2	0.0%	0	0.0%
NICTITANS					
52.110	GLAND PROLAPSE	2	0.0%	0	0.0%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	4	0.1%	0	0.0%
70.220	EXPOSURE KERATOPATHY SYNDROME	10	0.2%	0	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	35	0.7%	2	0.2%
70.730	DYSTROPHY-ENDOTHELIAL	10	0.2%	1	0.1%
UVEA					
93.120	UVEAL CYST-SINGLE	1	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	207	4.1%	52	4.1%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	16	0.3%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	1	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	1	0.0%	2	0.2%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	50	1.0%	40	3.2%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	3	0.1%	0	0.0%
95.120	UVEAL CYST-FREE FLOATING	1	0.0%	0	0.0%
LENS					
100.200	CATARACT, UNSPECIFIED	10	0.2%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	222	4.4%	60	4.8%
100.301	PUNCTATE-ANTERIOR CORTEX	15	0.3%	6	0.5%
100.302	PUNCTATE-POSTERIOR CORTEX	22	0.4%	9	0.7%
100.303	PUNCTATE-EQUATORIAL CORTEX	4	0.1%	1	0.1%
100.304	PUNCTATE-ANTERIOR SUTURES	4	0.1%	0	0.0%
100.305	PUNCTATE-POSTERIOR SUTURES	75	1.5%	37	2.9%
100.306	PUNCTATE-NUCLEUS	2	0.0%	1	0.1%
100.307	PUNCTATE-CAPSULAR	11	0.2%	6	0.5%
100.311	INCIPIENT-ANTERIOR CORTEX	38	0.8%	8	0.6%
100.312	INCIPIENT-POSTERIOR CORTEX	25	0.5%	5	0.4%
100.313	INCIPIENT-EQUATORIAL CORTEX	13	0.3%	5	0.4%
100.314	INCIPIENT-ANTERIOR SUTURES	4	0.1%	0	0.0%
100.315	INCIPIENT-POSTERIOR SUTURES	17	0.3%	10	0.8%
100.316	INCIPIENT-NUCLEUS	6	0.1%	1	0.1%
100.317	INCIPIENT-CAPSULAR	6	0.1%	4	0.3%
100.322	INCOMPLETE-POSTERIOR CORTEX	1	0.0%	1	0.1%
100.327	INCOMPLETE-CAPSULAR	0	0.0%	1	0.1%
100.328	Y-SUTURE TIP OPACITIES	36	0.7%	86	6.8%
100.330	GENERALIZED/ COMPLETE	19	0.4%	0	0.0%
100.375	SUBLUXATION/ LUXATION	4	0.1%	1	0.1%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***272***	***5.4%***	***95***	***7.5%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	22	0.4%	10	0.8%
110.135	PHPV/ PTVL	4	0.1%	0	0.0%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	0.1%	0	0.0%

OCULAR DISORDERS REPORT
SHIBA INU

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 5,040 #	 %	Year Examined: 2019-2023 Total # Dogs: 1,259 #	 %
VITREOUS Continued				
110.320 VITREOUS DEGENERATION-SYNERESIS	29	0.6%	1	0.1%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	10	0.2%	5	0.4%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	2	0.0%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	29	0.6%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%
120.960 RETINOPATHY	2	0.0%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	7	0.1%	2	0.2%
OTHER				
900.000 OTHER, UNSPECIFIED	31	0.6%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	96	1.9%	1	0.1%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	59	1.2%	43	3.4%
NORMAL				
.000 NORMAL GLOBE	4,207	83.5%	964	76.6%

SHIH TZU

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Keratoconjunctivitis sicca	Not defined	2,9	NO	
B.	Glaucoma	Not defined	3	NO	
C.	Entropion	Not defined	1	Breeder option	
D.	Distichiasis	Not defined	1	Breeder option	
E.	Ectopic cilia	Not defined	1	Breeder option	
F.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
G.	Exposure keratopathy syndrome	Not defined	1	Breeder option	
H.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
I.	Cataract	Not defined	1	NO	
J.	Y-tip suture opacities	Not defined	1	Breeder option	
K.	Vitreous degeneration				
	- anterior chamber	Not defined	1, 4, 5	Breeder option	
	- syneresis	Not defined	1	Breeder option	
L.	Retinal detachment	Not defined	4, 6	NO	
M.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- PRA-*JPH2*	Autosomal recessive	8	NO**	Mutation in *JPH2* gene
N.	Optic nerve hypoplasia	Not defined	7	NO	
O.	Retinal degeneration	Not defined	6	NO	

Description and Comments

A. Keratoconjunctivitis sicca (KCS)

An abnormality of the tear film, most commonly a deficiency of the aqueous portion, although the mucin and/or lipid layers may be affected; results in ocular irritation and/or vision impairment.

B. Glaucoma

An elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests are part of a routine breed eye screening exam.

A recent study found that a *SRBD1* polymorphism in intron 1 plays an important role in the development of glaucoma in the Shih Tzu. A genetic test is not yet available.

C. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

D. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded. Breeding discretion is advised.

E. Ectopic cilia

Hair emerging through the eyelid conjunctiva. Ectopic cilia occur more frequently in younger dogs and cause discomfort and corneal disease.

F. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

G. Exposure keratopathy syndrome

A condition characterized by variable degrees of superficial vascularization, fibrosis and/or pigmentation of the cornea. May be associated with excessive exposure/irritation of the globe due to shallow orbits, lower eyelid medial entropion, lagophthalmos and macropalpebral fissure.

H. Persistent pupillary membranes (PPMs)

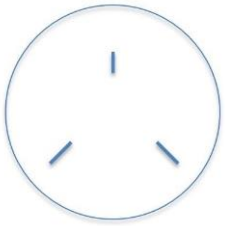
Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

I. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

J. Y-tip suture opacities

These are prominent (or "highlighted" or "more dense") distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a "peace sign" as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the "Lens" section of the CAER form. Newer versions of the form (since 3/16/21) have boxes that say, "posterior Y-suture tip opacities" which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures" AND ALSO MARK "suspect not inherited/significance unknown" (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: "E2" or "posterior suture tip opacities." This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

K. Vitreous degeneration

A liquefaction of the vitreous gel which may predispose to retinal detachment. Forms may include presentation into the anterior chamber, or simply contained within the posterior segment (syneresis).

L. Retinal detachment

A separation of the sensory retina from the underlying tissue. It results in blindness when complete.

M. Retinal atrophy

- **generalized**

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-*JPH2*

A homozygous nonsense mutation has been identified in the JPH2 gene of Shih Tzu dogs with PRA (from Thailand). JPH2 has been previously found to be expressed in several excitable cells/tissues, including retinal photoreceptors, making it a candidate gene for PRA in Shih Tzus. The data in this paper were derived from a small population of dogs.

N. Optic nerve hypoplasia

A congenital defect of the optic nerve which causes blindness and abnormal pupil response in the affected eye. May be unable to differentiate from micropapilla on a routine (dilated) screening ophthalmoscopic exam.

O. Retinal degeneration

A unilateral or bilateral retinal disease which can be progressive. When bilateral, the ophthalmoscopic lesions are sometimes asymmetrical, particularly in the early stages of the disease. Fundus examination shows initially single or multiple focal retinal lesions that appear active (local infiltrative inflammation or granulation) or inactive. The lesions can progress resulting in widespread retinal atrophy. The end-stage ophthalmoscopic lesions vary and may appear indistinguishable from PRA, or may be more characteristic of an inflammatory retinopathy. The asymmetry of the fundus abnormalities and the presence of inflammatory lesions in the retina and choroid help to differentiate this disorder from PRA. The mode of inheritance of this disease is not known; however, studies of different families suggest that it is possibly inherited. An intriguing aspect of the disease has been the preponderance of affected males compared to females. This has been confirmed in a recent unpublished survey.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Sanchez RF, Innocent G, Mould J, et al. Canine keratoconjunctivitis sicca: disease trends in a review of 229 cases. *J Small Anim Pract*. 2007;48:211-217. ** study derived from non-USA dog population** PMID: 17381766

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OCULAR DISORDERS REPORT
SHIH TZU

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 2,982 #	 %	2019-2023 1,142 #	 %
GLOBE				
.110 MICROPHTHALMOS	6	0.2%	1	0.1%
40.910 KERATOCONJUNCTIVITIS SICCA (KCS)	26	0.9%	5	0.4%
EYELIDS				
20.140 ECTOPIC CILIA	41	1.4%	5	0.4%
20.160 MACROPALPEBRAL FISSURE	57	1.9%	0	0.0%
21.000 ENTROPION	197	6.6%	128	11.2%
22.000 ECTROPION	4	0.1%	0	0.0%
25.110 DISTICHIASIS	516	17.3%	151	13.2%
32.110 IMPERFORATE LACRIMAL PUNCTUM	6	0.2%	1	0.1%
NICTITANS				
51.100 CARTILAGE ANOMALY/ EVERSION	1	0.0%	0	0.0%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	25	0.8%	0	0.0%
70.220 EXPOSURE KERATOPATHY SYNDROME	181	6.1%	66	5.8%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	35	1.2%	4	0.4%
70.730 DYSTROPHY-ENDOTHELIAL	4	0.1%	0	0.0%
UVEA				
93.110 IRIS HYPOPLASIA	0	0.0%	1	0.1%
93.120 UVEAL CYST-SINGLE	5	0.2%	0	0.0%
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.0%	0	0.0%
93.150 IRIS COLOBOMA	5	0.2%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	52	1.7%	12	1.1%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	5	0.2%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	5	0.2%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	3	0.1%	1	0.1%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	0	0.0%	1	0.1%
FUNDUS				
97.110 CHOROIDAL HYPOPLASIA	1	0.0%	0	0.0%
97.120 COLOBOMA	2	0.1%	0	0.0%
120.170 RETINAL DYSPLASIA-FOLDS	12	0.4%	1	0.1%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	4	0.1%	1	0.1%
120.310 RETINAL ATROPHY-GENERALIZED	41	1.4%	2	0.2%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	9	0.3%	0	0.0%
120.920 RETINAL DETACHMENT	2	0.1%	1	0.1%
120.960 RETINOPATHY	4	0.1%	0	0.0%
130.110 MICROPAPILLA	0	0.0%	1	0.1%
130.120 OPTIC NERVE HYPOPLASIA	11	0.4%	0	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	16	0.5%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	72	2.4%	11	1.0%
100.301 PUNCTATE-ANTERIOR CORTEX	23	0.8%	2	0.2%
100.302 PUNCTATE-POSTERIOR CORTEX	10	0.3%	2	0.2%
100.303 PUNCTATE-EQUATORIAL CORTEX	5	0.2%	2	0.2%
100.304 PUNCTATE-ANTERIOR SUTURES	5	0.2%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	22	0.7%	3	0.3%
100.306 PUNCTATE-NUCLEUS	3	0.1%	0	0.0%
100.307 PUNCTATE-CAPSULAR	6	0.2%	4	0.4%
100.311 INCIPIENT-ANTERIOR CORTEX	24	0.8%	6	0.5%
100.312 INCIPIENT-POSTERIOR CORTEX	21	0.7%	2	0.2%
100.313 INCIPIENT-EQUATORIAL CORTEX	15	0.5%	4	0.4%
100.314 INCIPIENT-ANTERIOR SUTURES	1	0.0%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	8	0.3%	1	0.1%

OCULAR DISORDERS REPORT
SHIH TZU

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 2,982 #	%	2019-2023 1,142 #	%
LENS Continued				
100.316 INCIPIENT-NUCLEUS	8	0.3%	1	0.1%
100.317 INCIPIENT-CAPSULAR	2	0.1%	3	0.3%
100.321 INCOMPLETE-ANTERIOR CORTEX	2	0.1%	2	0.2%
100.322 INCOMPLETE-POSTERIOR CORTEX	1	0.0%	1	0.1%
100.323 INCOMPLETE-EQUATORIAL CORTEX	0	0.0%	2	0.2%
100.326 INCOMPLETE-NUCLEUS	2	0.1%	0	0.0%
100.327 INCOMPLETE-CAPSULAR	0	0.0%	1	0.1%
100.328 Y-SUTURE TIP OPACITIES	2	0.1%	19	1.7%
100.330 GENERALIZED/ COMPLETE	25	0.8%	1	0.1%
100.340 RESORBING/ HYPERMATURE	0	0.0%	1	0.1%
100.375 SUBLUXATION/ LUXATION	4	0.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***199***	***6.7%***	***38***	***3.3%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	20	0.7%	2	0.2%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	37	1.2%	13	1.1%
110.320 VITREOUS DEGENERATION-SYNERESIS	146	4.9%	34	3.0%
OTHER				
900.000 OTHER, UNSPECIFIED	43	1.4%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	99	3.3%	8	0.7%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	128	4.3%	102	8.9%
NORMAL				
.000 NORMAL GLOBE	1,777	59.6%	725	63.5%

SHIKOKU

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
SHIKOKU

Diagnostic Name		Year Examined: 1993-2018 Total # Dogs: 38 #	 %	Year Examined: 2019-2023 Total # Dogs: 42 #	 %
EYELIDS					
25.110	DISTICHIASIS	0	0.0%	1	2.4%
UVEA					
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	19	50.0%	12	28.6%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	3	7.9%	2	4.8%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	4	10.5%	0	0.0%
100.307	PUNCTATE-CAPSULAR	3	7.9%	0	0.0%
100.317	INCIPIENT-CAPSULAR	2	5.3%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***5***	***13.2%***	***0***	***0.0%***
OTHER					
900.100	OTHER-SUSPECTED AS INHERITED	0	0.0%	1	2.4%
900.110	OTHER-SUSPECTED AS NOT-INHERITED	1	2.6%	6	14.3%
NORMAL					
.000	NORMAL GLOBE	12	31.6%	23	54.8%

SHILOH SHEPHERD

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	

Description and Comments

A. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
SHILOH SHEPHERD

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 305 #	 %	Year Examined: 2019-2023 Total # Dogs: 64 #	 %
EYELIDS				
25.110 DISTICHIASIS	2	0.7%	1	1.6%
NICTITANS				
50.210 PLASMOMA/ ATYPICAL PANNUS	1	0.3%	1	1.6%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	3	1.0%	1	1.6%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	35	11.5%	8	12.5%
70.730 DYSTROPHY-ENDOTHELIAL	1	0.3%	0	0.0%
UVEA				
93.120 UVEAL CYST-SINGLE	2	0.7%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	3	1.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	1	0.3%	0	0.0%
95.120 UVEAL CYST-FREE FLOATING	0	0.0%	1	1.6%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	13	4.3%	2	3.1%
100.301 PUNCTATE-ANTERIOR CORTEX	1	0.3%	1	1.6%
100.302 PUNCTATE-POSTERIOR CORTEX	1	0.3%	0	0.0%
100.303 PUNCTATE-EQUATORIAL CORTEX	0	0.0%	1	1.6%
100.305 PUNCTATE-POSTERIOR SUTURES	2	0.7%	0	0.0%
100.307 PUNCTATE-CAPSULAR	1	0.3%	0	0.0%
100.312 INCIPIENT-POSTERIOR CORTEX	1	0.3%	0	0.0%
100.314 INCIPIENT-ANTERIOR SUTURES	1	0.3%	0	0.0%
100.326 INCOMPLETE-NUCLEUS	1	0.3%	0	0.0%
100.330 GENERALIZED/ COMPLETE	1	0.3%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***9***	***3.0%***	***2***	***3.1%***
FUNDUS				
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	2	0.7%	1	1.6%
OTHER				
900.000 OTHER, UNSPECIFIED	1	0.3%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	4	1.3%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	4	1.3%	2	3.1%
NORMAL				
.000 NORMAL GLOBE	256	83.9%	50	78.1%

SHORTY BULL

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the SHORTY BULL breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
SHORTY BULL

Year Examined:	1993-2018		2019-2023	
Total # Dogs:	2		2	
Diagnostic Name	**#**	**%**	**#**	**%**
LENS				
100.316 INCIPIENT-NUCLEUS	0	0.0%	1	50.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***0***	***0.0%***	***1***	***50.0%***
NORMAL				
.000 NORMAL GLOBE	2	100.0%	1	50.0%

SIBERIAN HUSKY

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Glaucoma	Not defined	2-4	NO	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Corneal dystrophy				
	- epithelial/stromal	Presumed autosomal recessive	1, 5-8	NO	
D.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
E.	Cataract	Not defined	1, 4	NO	
F.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	XLPRA-*RPGR* (*XLPRA2*)	X-linked	9, 10	NO	Mutation in the *RPGR* gene
G.	Cone degeneration - (achromatopsia)	Autosomal recessive	11	NO	Mutation in the *CNGB3* gene
H.	Uveodermatologic syndrome	Not defined	12-14	NO	

Description and Comments

A. Glaucoma

An elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine breed eye screening exam.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded. Breeding discretion is advised.

C. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

In the Siberian Husky, the opacities are bilaterally symmetrical, round to oval and ring shaped. They occur early in life (0.5-2 years) and may progress to cause significant vision loss. When seen, it may be beneficial to feed a low fat diet and recheck the eyes the following year to see if the opacities resolve, ruling out inherited corneal dystrophy.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

In the Siberian Husky, cataracts begin in the axial posterior cortex at approximately one year of age. Progression is variable and vision impairment may occur. In cases with rapid progression, secondary lens-induced uveitis and glaucoma may be associated with partial cataract resorption.

F. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-*RPGR*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. In the Siberian Husky, one form of PRA, known as XLPRA1, is due to a mutation in the *RPGR* gene and is inherited as a recessive, sex-linked trait. A DNA test is available.

G. Cone degeneration - hemeralopia/achromatopsia

Autosomal recessively inherited early degeneration of the cone photoreceptors. Afflicted puppies develop day-blindness, colorblindness, and photophobia between 8 and 12 weeks of age. Afflicted dogs remain ophthalmoscopically normal their entire life. Electroretinography is required to definitively diagnose the disorder. A missense mutation in the same gene (*CNGB3*) that has been identified in CD-affected Alaskan Malamute-derived dogs has been detected in German Shorthaired Pointers affected with a clinically identical allelic disorder. A DNA test is available.

H. Uveodermatologic syndrome

Uveodermatologic syndrome in the Siberian Husky bears many similarities to a condition in people called Vogt-Koyanagi-Harada (or VKH) syndrome. Thus, the condition in dogs is often referred to as VKH or VKH-like syndrome. It is an immune-mediated disease in which pigmented cells (melanocytes) in the eye and in the skin are destroyed by white blood cells (lymphocytes). The first clinical signs are usually inflammation of the intraocular structures (or uveitis) in both eyes. Adhesions between the iris and lens (posterior synechia) and the peripheral iris and cornea (peripheral anterior synechia) develop rapidly. Other complications include cataract development, retinal degeneration, retinal separation or detachment, optic disc atrophy and secondary glaucoma. The uveitis is very difficult to control medically

and ultimately results in blindness in most affected dogs. Whitening of the hair (poliosis) and skin (vitiligo) may also be noted in advanced cases. The genetics of this condition are unclear, but some genetic predisposition is indicated by the higher prevalence of this disorder in Siberian Huskies compared with other dog breeds. Affected dogs are generally young, ranging in age between 1-1/2 to 4 years.

References

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OCULAR DISORDERS REPORT
SIBERIAN HUSKY

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 41,639 #	%	2019-2023 5,653 #	%
GLOBE				
.110 MICROPHTHALMOS	7	0.0%	0	0.0%
10.000 GLAUCOMA	14	0.0%	2	0.0%
40.910 KERATOCONJUNCTIVITIS SICCA (KCS)	3	0.0%	1	0.0%
EYELIDS				
20.110 EYELID DERMOID	4	0.0%	0	0.0%
20.140 ECTOPIC CILIA	3	0.0%	0	0.0%
20.160 MACROPALPEBRAL FISSURE	1	0.0%	0	0.0%
21.000 ENTROPION	20	0.0%	2	0.0%
22.000 ECTROPION	4	0.0%	0	0.0%
25.110 DISTICHIASIS	435	1.0%	44	0.8%
32.110 IMPERFORATE LACRIMAL PUNCTUM	3	0.0%	4	0.1%
NICTITANS				
51.100 CARTILAGE ANOMALY/ EVERSION	2	0.0%	0	0.0%
52.110 GLAND PROLAPSE	2	0.0%	0	0.0%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	22	0.1%	1	0.0%
70.220 EXPOSURE KERATOPATHY SYNDROME	3	0.0%	1	0.0%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	1,064	2.6%	92	1.6%
70.730 DYSTROPHY-ENDOTHELIAL	37	0.1%	2	0.0%
UVEA				
93.110 IRIS HYPOPLASIA	4	0.0%	1	0.0%
93.120 UVEAL CYST-SINGLE	20	0.0%	2	0.0%
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.0%	0	0.0%
93.150 IRIS COLOBOMA	9	0.0%	0	0.0%
93.170 UVEAL CYST-MULTIPLE	1	0.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	1,008	2.4%	157	2.8%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	28	0.1%	4	0.1%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	55	0.1%	6	0.1%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	6	0.0%	1	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	22	0.1%	10	0.2%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	18	0.0%	2	0.0%
93.810 UVEAL MELANOMA	1	0.0%	1	0.0%
95.120 UVEAL CYST-FREE FLOATING	1	0.0%	0	0.0%
97.150 COLOBOMA	3	0.0%	1	0.0%
FUNDUS				
97.110 CHOROIDAL HYPOPLASIA	57	0.1%	11	0.2%
97.120 COLOBOMA	16	0.0%	0	0.0%
120.170 RETINAL DYSPLASIA-FOLDS	94	0.2%	12	0.2%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	56	0.1%	9	0.2%
120.310 RETINAL ATROPHY-GENERALIZED	168	0.4%	5	0.1%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	27	0.1%	0	0.0%
120.920 RETINAL DETACHMENT	2	0.0%	6	0.1%
120.960 RETINOPATHY	38	0.1%	16	0.3%
120.970 RETINOPATHY - CMR/ CMR-LIKE	0	0.0%	1	0.0%
130.110 MICROPAPILLA	3	0.0%	2	0.0%
130.120 OPTIC NERVE HYPOPLASIA	7	0.0%	0	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	576	1.4%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	773	1.9%	145	2.6%
100.301 PUNCTATE-ANTERIOR CORTEX	126	0.3%	47	0.8%
100.302 PUNCTATE-POSTERIOR CORTEX	224	0.5%	23	0.4%

OCULAR DISORDERS REPORT
SIBERIAN HUSKY

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 41,639 #	 %	2019-2023 5,653 #	 %
LENS Continued				
100.303 PUNCTATE-EQUATORIAL CORTEX	45	0.1%	7	0.1%
100.304 PUNCTATE-ANTERIOR SUTURES	15	0.0%	4	0.1%
100.305 PUNCTATE-POSTERIOR SUTURES	117	0.3%	12	0.2%
100.306 PUNCTATE-NUCLEUS	58	0.1%	33	0.6%
100.307 PUNCTATE-CAPSULAR	86	0.2%	38	0.7%
100.311 INCIPIENT-ANTERIOR CORTEX	152	0.4%	36	0.6%
100.312 INCIPIENT-POSTERIOR CORTEX	1,360	3.3%	123	2.2%
100.313 INCIPIENT-EQUATORIAL CORTEX	79	0.2%	15	0.3%
100.314 INCIPIENT-ANTERIOR SUTURES	18	0.0%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	265	0.6%	3	0.1%
100.316 INCIPIENT-NUCLEUS	103	0.2%	12	0.2%
100.317 INCIPIENT-CAPSULAR	108	0.3%	30	0.5%
100.321 INCOMPLETE-ANTERIOR CORTEX	11	0.0%	12	0.2%
100.322 INCOMPLETE-POSTERIOR CORTEX	117	0.3%	73	1.3%
100.323 INCOMPLETE-EQUATORIAL CORTEX	9	0.0%	7	0.1%
100.324 INCOMPLETE-ANTERIOR SUTURES	2	0.0%	2	0.0%
100.325 INCOMPLETE-POSTERIOR SUTURES	7	0.0%	7	0.1%
100.326 INCOMPLETE-NUCLEUS	21	0.1%	24	0.4%
100.327 INCOMPLETE-CAPSULAR	12	0.0%	3	0.1%
100.328 Y-SUTURE TIP OPACITIES	13	0.0%	21	0.4%
100.330 GENERALIZED/ COMPLETE	474	1.1%	7	0.1%
100.340 RESORBING/ HYPERMATURE	2	0.0%	1	0.0%
100.375 SUBLUXATION/ LUXATION	15	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***3,987***	***9.6%***	***519***	***9.2%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	56	0.1%	16	0.3%
110.135 PHPV/ PTVL	7	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	39	0.1%	4	0.1%
OTHER				
900.000 OTHER, UNSPECIFIED	354	0.9%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	761	1.8%	4	0.1%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	706	1.7%	294	5.2%
NORMAL				
.000 NORMAL GLOBE	35,050	84.2%	4,542	80.3%

SILKEN WINDHOUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Cataract	Not defined	1	NO	
B.	Vitreous degeneration				
	- syneresis	Not defined	1	Breeder option	
C.	Choroidal hypoplasia (Collie Eye Anomaly / CAE-*NHJE1*) - staphyloma/coloboma - retinal detachment - retinal hemorrhage - optic nerve coloboma	Autosomal recessive	2-3	NO	Mutation in the *NHEJ1* gene

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

B. Vitreous degeneration - syneresis

A liquefaction of the vitreous gel which may predispose to retinal detachment.

C. Choroidal hypoplasia (Collie Eye Anomaly / CAE-*NHEJ1*)
- Staphyloma/coloboma
- Retinal detachment
- Retinal hemorrhage
- Optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1.* The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Personal communication with Susan Pearce-Kelling based on unpublished data from OptiGen Labs

3. Parker HG, Kukekova AV, Akey DT, Goldstein O, Kirkness EF, Baysac KC, Mosher DS, Aguirre GD, Acland GM, Osrander EA. Breed relationships facilitate fine-mapping studies: a 7.8-kb deletion cosegregates with Collie eye anomaly across multiple dog breeds. *Genome Res*. 2007;17:1562-1571. PMID: 17916641.**reference included despite breed not being listed so as to describe condition**

OCULAR DISORDERS REPORT
SILKEN WINDHOUND

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 539 #	 %	Year Examined: 2019-2023 Total # Dogs: 588 #	 %
GLOBE				
.110 MICROPHTHALMOS	0	0.0%	3	0.5%
EYELIDS				
25.110 DISTICHIASIS	5	0.9%	3	0.5%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	0	0.0%	1	0.2%
UVEA				
93.110 IRIS HYPOPLASIA	0	0.0%	1	0.2%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	2	0.4%	4	0.7%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	0	0.0%	1	0.2%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	0	0.0%	2	0.3%
FUNDUS				
97.110 CHOROIDAL HYPOPLASIA	1	0.2%	1	0.2%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	3	0.6%	2	0.3%
120.310 RETINAL ATROPHY-GENERALIZED	1	0.2%	3	0.5%
120.960 RETINOPATHY	4	0.7%	2	0.3%
130.110 MICROPAPILLA	0	0.0%	1	0.2%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	22	4.1%	25	4.3%
100.301 PUNCTATE-ANTERIOR CORTEX	2	0.4%	6	1.0%
100.302 PUNCTATE-POSTERIOR CORTEX	2	0.4%	1	0.2%
100.303 PUNCTATE-EQUATORIAL CORTEX	1	0.2%	3	0.5%
100.305 PUNCTATE-POSTERIOR SUTURES	4	0.7%	2	0.3%
100.306 PUNCTATE-NUCLEUS	1	0.2%	0	0.0%
100.307 PUNCTATE-CAPSULAR	7	1.3%	5	0.9%
100.311 INCIPIENT-ANTERIOR CORTEX	2	0.4%	8	1.4%
100.312 INCIPIENT-POSTERIOR CORTEX	0	0.0%	2	0.3%
100.313 INCIPIENT-EQUATORIAL CORTEX	1	0.2%	1	0.2%
100.315 INCIPIENT-POSTERIOR SUTURES	3	0.6%	2	0.3%
100.316 INCIPIENT-NUCLEUS	0	0.0%	2	0.3%
100.317 INCIPIENT-CAPSULAR	1	0.2%	4	0.7%
100.327 INCOMPLETE-CAPSULAR	0	0.0%	1	0.2%
100.328 Y-SUTURE TIP OPACITIES	5	0.9%	12	2.0%
100.330 GENERALIZED/ COMPLETE	0	0.0%	2	0.3%
100.340 RESORBING/ HYPERMATURE	0	0.0%	1	0.2%
100.375 SUBLUXATION/ LUXATION	0	0.0%	1	0.2%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***24***	***4.5%***	***40***	***6.8%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	0	0.0%	1	0.2%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	5	0.9%	4	0.7%
110.320 VITREOUS DEGENERATION-SYNERESIS	6	1.1%	5	0.9%
OTHER				
900.000 OTHER, UNSPECIFIED	2	0.4%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	1	0.2%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	18	3.3%	20	3.4%
NORMAL				
.000 NORMAL GLOBE	487	90.4%	501	85.2%

SILKY TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Entropion	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	
D.	Vitreous degeneration				
	- anterior chamber	Not defined	1	Breeder option	
	- syneresis	Not defined	1	Breeder option	
E.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- PRA-*prcd*	Autosomal recessive	2	NO	Mutation in the *prcd* gene

Description and Comments

A. Entropion

A conformational defect resulting in an "in rolling" of one or more of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally in the neonatal period. These strands may bridge from iris to iris, iris to cornea, iris to lens, or from sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membranes, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Vitreous degeneration

Liquefaction of the vitreous gel which may predispose to retinal detachment. Forms may include presentation into the anterior chamber, or simply contained within the posterior segment (syneresis).

E. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-*prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

Studies have shown that the principal form of PRA in the Silky Terrier is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Zangerl B, Goldstein O, Philp AR, Lindauer SJP, Pearce-Kelling SE, Mullins RF, Graphodatsky AS, Ripoll D, Felix JS, Stone EM, Acland GM, Aguirre GD. Identical mutation in a novel retinal gene causes progressive rod-cone degeneration in dogs and retinitis pigmentosa in humans. *Genomics*. 2006;88:551-563. PMID: 16938425.

OCULAR DISORDERS REPORT
SILKY TERRIER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 838 #	 %	Year Examined: 2019-2023 Total # Dogs: 198 #	 %
EYELIDS				
21.000 ENTROPION	1	0.1%	8	4.0%
25.110 DISTICHIASIS	3	0.4%	0	0.0%
32.110 IMPERFORATE LACRIMAL PUNCTUM	0	0.0%	2	1.0%
NICTITANS				
52.110 GLAND PROLAPSE	1	0.1%	0	0.0%
CORNEA				
70.220 EXPOSURE KERATOPATHY SYNDROME	0	0.0%	1	0.5%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	8	1.0%	0	0.0%
UVEA				
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.1%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	60	7.2%	8	4.0%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	1	0.1%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	3	0.4%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	0	0.0%	1	0.5%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	2	0.2%	0	0.0%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	2	0.2%	0	0.0%
FUNDUS				
97.110 CHOROIDAL HYPOPLASIA	3	0.4%	0	0.0%
120.170 RETINAL DYSPLASIA-FOLDS	5	0.6%	0	0.0%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	1	0.1%	1	0.5%
120.310 RETINAL ATROPHY-GENERALIZED	9	1.1%	0	0.0%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.1%	0	0.0%
120.960 RETINOPATHY	1	0.1%	0	0.0%
130.110 MICROPAPILLA	2	0.2%	0	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	4	0.5%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	43	5.1%	11	5.6%
100.301 PUNCTATE-ANTERIOR CORTEX	14	1.7%	2	1.0%
100.302 PUNCTATE-POSTERIOR CORTEX	4	0.5%	4	2.0%
100.303 PUNCTATE-EQUATORIAL CORTEX	10	1.2%	0	0.0%
100.304 PUNCTATE-ANTERIOR SUTURES	1	0.1%	1	0.5%
100.305 PUNCTATE-POSTERIOR SUTURES	4	0.5%	3	1.5%
100.306 PUNCTATE-NUCLEUS	5	0.6%	1	0.5%
100.307 PUNCTATE-CAPSULAR	3	0.4%	2	1.0%
100.311 INCIPIENT-ANTERIOR CORTEX	14	1.7%	6	3.0%
100.312 INCIPIENT-POSTERIOR CORTEX	18	2.1%	4	2.0%
100.313 INCIPIENT-EQUATORIAL CORTEX	12	1.4%	0	0.0%
100.314 INCIPIENT-ANTERIOR SUTURES	1	0.1%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	3	0.4%	0	0.0%
100.316 INCIPIENT-NUCLEUS	2	0.2%	0	0.0%
100.317 INCIPIENT-CAPSULAR	1	0.1%	1	0.5%
100.321 INCOMPLETE-ANTERIOR CORTEX	2	0.2%	0	0.0%
100.322 INCOMPLETE-POSTERIOR CORTEX	2	0.2%	0	0.0%
100.323 INCOMPLETE-EQUATORIAL CORTEX	1	0.1%	0	0.0%
100.324 INCOMPLETE-ANTERIOR SUTURES	0	0.0%	1	0.5%
100.328 Y-SUTURE TIP OPACITIES	1	0.1%	8	4.0%
100.330 GENERALIZED/ COMPLETE	22	2.6%	1	0.5%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***123***	***14.7%***	***26***	***13.1%***
VITREOUS				
110.135 PHPV/ PTVL	0	0.0%	1	0.5%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	5	0.6%	6	3.0%

OCULAR DISORDERS REPORT
SILKY TERRIER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 838 #	 %	Year Examined: 2019-2023 Total # Dogs: 198 #	 %
VITREOUS Continued				
110.320 VITREOUS DEGENERATION-SYNERESIS	36	4.3%	9	4.5%
OTHER				
900.000 OTHER, UNSPECIFIED	12	1.4%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	24	2.9%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	12	1.4%	14	7.1%
NORMAL				
.000 NORMAL GLOBE	624	74.5%	143	72.2%

SKYE TERRIER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the SKYE TERRIER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
SKYE TERRIER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 10 #	 %	Year Examined: 2019-2023 Total # Dogs: 6 #	 %
EYELIDS				
25.110 DISTICHIASIS	1	10.0%	0	0.0%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	0	0.0%	1	16.7%
100.307 PUNCTATE-CAPSULAR	0	0.0%	1	16.7%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***0***	***0.0%***	***1***	***16.7%***
OTHER				
900.000 OTHER, UNSPECIFIED	1	10.0%	0	0.0%
NORMAL				
.000 NORMAL GLOBE	9	90.0%	5	83.3%

SLOUGHI

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Cataract	Not defined	1	NO	
B.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- PRA-*PDE6B* (*rcd1a*)	Autosomal recessive	2, 3	NO	Mutation in the *PDE6B* gene

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membranes, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

B. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-*PDE6Bi* (*rcd1a*)

In the Sloughi, the disease is due to an 8-bp insertion in exon 21 of the *PDE6B* gene causing the *rcd1a* form of PRA. The disease is genetically distinct from that in the Irish Setter and has a later age of onset. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Dekomien G, Runte M, Godde R, Epplen JT. Generalized progressive retinal atrophy of Sloughi dogs is due to an 8-bp insertion in exon 21 of the PDE6B gene. *Cytogenet Cell Genet.* 2000;90:261-267. PMID:11124530.

3. Dekomien G, Runte M, Gödde R, Epplen JT. Short Communication: Exclusion of the PDE6A gene for generalized progressive retinal atrophy in 11 breeds of dog. *Animal Genetics* 2000. 31;135-139. PMID:11124530.

OCULAR DISORDERS REPORT
SLOUGHI

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 34 #	 %	2019-2023 85 #	 %
EYELIDS				
25.110 DISTICHIASIS	0	0.0%	3	3.5%
NICTITANS				
51.100 CARTILAGE ANOMALY/ EVERSION	1	2.9%	0	0.0%
UVEA				
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	2	5.9%	0	0.0%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	1	2.9%	6	7.1%
100.301 PUNCTATE-ANTERIOR CORTEX	0	0.0%	4	4.7%
100.303 PUNCTATE-EQUATORIAL CORTEX	0	0.0%	1	1.2%
100.306 PUNCTATE-NUCLEUS	0	0.0%	1	1.2%
100.307 PUNCTATE-CAPSULAR	0	0.0%	1	1.2%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	1	1.2%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***0***	***0.0%***	***7***	***8.2%***
VITREOUS				
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	2.9%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	1	2.9%	0	0.0%
NORMAL				
.000 NORMAL GLOBE	33	97.1%	76	89.4%

SLOVAKIAN WIREHAIRED POINTER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the SLOVAKIAN WIREHAIRED POINTER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
SLOVAKIAN WIREHAIRED POINTER

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	1		2	
Diagnostic Name		**#**	**%**	**#**	**%**
EYELIDS					
25.110	DISTICHIASIS	0	0.0%	2	100.0%
LENS					
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	1	50.0%
NORMAL					
.000	NORMAL GLOBE	1	100.0%	0	0.0%

SMALL MUNSTERLANDER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the SMALL MUNSTERLANDER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
SMALL MUNSTERLANDER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 24 #	 %	Year Examined: 2019-2023 Total # Dogs: 4 #	 %
EYELIDS				
22.000 ECTROPION	1	4.2%	0	0.0%
25.110 DISTICHIASIS	0	0.0%	1	25.0%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	2	8.3%	0	0.0%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	1	4.2%	2	50.0%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	3	12.5%	0	0.0%
100.302 PUNCTATE-POSTERIOR CORTEX	3	12.5%	0	0.0%
100.307 PUNCTATE-CAPSULAR	1	4.2%	0	0.0%
100.312 INCIPIENT-POSTERIOR CORTEX	1	4.2%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***5***	***20.8%***	***0***	***0.0%***
VITREOUS				
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	4.2%	0	0.0%
NORMAL				
.000 NORMAL GLOBE	16	66.7%	2	50.0%

SMOOTH FOX TERRIER*

*The Smooth Fox Terrier and the Wire Fox Terrier were originally considered two varieties of the same breed. They became separate breeds in 1985. It is likely that the same genetic diseases exist in both breeds.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Glaucoma	Not defined	1, 2	NO	
B.	Persistent pupillary membrane				
	- iris - iris	Not defined	1	Breeder option	
C.	Lens luxation	Autosomal recessive	1, 3-7	NO	Mutation in the *ADAMTS17* gene

Description and Comments

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of the intraocular pressure (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine breed eye screening exam.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Martin CL and Wyman M. Primary glaucoma in the dog. *Vet Clin North Am*. 1978 May;8:257-286. PMID:685069.

3. Lawson DD. Luxation of the crystalline lens in the dog. *J Small Anim Pract.* 1969;10:461.PMID:5387868.

4. Curtis R and Barnett KC. Primary lens luxation in the dog. *J Small Anim Pract*. 1980 Dec;21:657- 668. PMID:6969820.

5. Hodgman SFJ. Abnormalities and defects in pedigree dogs: I. An investigation into the existence of abnormalities in pedigree dogs in British Isles. *J Small Anim Pract*. 1963;4:447. https://doi.org/10.1111/j.1748-5827.1963.tb01301.x

6. Formston C. Observations on subluxation and luxation of the crystalline lens in the dog. *Journal of Comparative Pathology*. 1945;55:168. Unable to find PMID.

7. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. Vet Ophthalmol. 2011; 14: 378-384. PMID:22050825.lux

OCULAR DISORDERS REPORT
SMOOTH FOX TERRIER

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	318		90	
	Diagnostic Name	**#**	**%**	**#**	**%**
CORNEA					
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	0	0.0%	1	1.1%
UVEA					
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	14	4.4%	8	8.9%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	1	0.3%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	1	0.3%	2	2.2%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	1	0.3%	2	2.2%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	1	0.3%	1	1.1%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	3	0.9%	2	2.2%
100.311	INCIPIENT-ANTERIOR CORTEX	1	0.3%	0	0.0%
100.312	INCIPIENT-POSTERIOR CORTEX	2	0.6%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	1	1.1%
100.330	GENERALIZED/ COMPLETE	2	0.6%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***5***	***1.6%***	***0***	***0.0%***
VITREOUS					
110.320	VITREOUS DEGENERATION-SYNERESIS	3	0.9%	1	1.1%
FUNDUS					
120.170	RETINAL DYSPLASIA-FOLDS	3	0.9%	0	0.0%
120.310	RETINAL ATROPHY-GENERALIZED	3	0.9%	0	0.0%
120.960	RETINOPATHY	0	0.0%	1	1.1%
OTHER					
900.000	OTHER, UNSPECIFIED	1	0.3%	0	0.0%
900.100	OTHER-SUSPECTED AS INHERITED	6	1.9%	0	0.0%
900.110	OTHER-SUSPECTED AS NOT-INHERITED	6	1.9%	1	1.1%
NORMAL					
.000	NORMAL GLOBE	280	88.1%	75	83.3%

SOFT-COATED WHEATEN TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Microphthalmos	Autosomal recessive	2, 3	NO	Mutation in the *RBP4* gene
B.	Distichiasis	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1, 4	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
D.	Cataract	Not defined	1, 4	NO	

Description and Comments

A. Microphthalmos

Microphthalmia is a congenital defect characterized by a small eye often associated with other ocular malformations, including defects of the cornea, anterior chamber, lens and/or retina. A genetic test is available.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore is not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Kaukonen M, Woods S, Ahonen S. et al. Maternal inheritance of a recessive RBP for defect in canine congenital eyes disease. *Cell Reports* 2018; 23:2643–2652. PMID: 29847795.

3. Kaukonen M, Woods S, Ahonen S, Lemberg S, Hellman M, Hytönen MK, Permi P, Glaser T, Lohi H. Maternal Inheritance of a Recessive RBP4 Defect in Canine Congenital Eye Disease. Cell Rep. 2018 May 29;23(9):2643-2652. doi: 10.1016/j.celrep.2018.04.118. PMID: 29847795; PMCID: PMC6546432.

4. Van der Woerdt A. Multiple ocular anomalies in two related litters of Soft-Coated Wheaten Terriers. *Prog Vet Comp Ophthal*. 1995;5:78.

OCULAR DISORDERS REPORT
SOFT COATED WHEATEN TERRIER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 8,079 #	%	Year Examined: 2019-2023 Total # Dogs: 1,087 #	%
GLOBE				
.110 MICROPHTHALMOS	0	0.0%	1	0.1%
10.000 GLAUCOMA	2	0.0%	0	0.0%
EYELIDS				
20.140 ECTOPIC CILIA	0	0.0%	1	0.1%
20.160 MACROPALPEBRAL FISSURE	1	0.0%	0	0.0%
21.000 ENTROPION	1	0.0%	0	0.0%
25.110 DISTICHIASIS	155	1.9%	22	2.0%
32.110 IMPERFORATE LACRIMAL PUNCTUM	10	0.1%	2	0.2%
NICTITANS				
52.110 GLAND PROLAPSE	3	0.0%	0	0.0%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	56	0.7%	5	0.5%
UVEA				
93.120 UVEAL CYST-SINGLE	15	0.2%	0	0.0%
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	3	0.0%	0	0.0%
93.150 IRIS COLOBOMA	1	0.0%	0	0.0%
93.170 UVEAL CYST-MULTIPLE	0	0.0%	1	0.1%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	278	3.4%	65	6.0%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	18	0.2%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	3	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	76	0.9%	62	5.7%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	8	0.1%	1	0.1%
95.120 UVEAL CYST-FREE FLOATING	4	0.0%	0	0.0%
97.150 COLOBOMA	0	0.0%	2	0.2%
FUNDUS				
97.110 CHOROIDAL HYPOPLASIA	17	0.2%	2	0.2%
97.120 COLOBOMA	1	0.0%	0	0.0%
120.170 RETINAL DYSPLASIA-FOLDS	71	0.9%	5	0.5%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	4	0.0%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	14	0.2%	1	0.1%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%
120.960 RETINOPATHY	2	0.0%	0	0.0%
130.110 MICROPAPILLA	14	0.2%	2	0.2%
130.120 OPTIC NERVE HYPOPLASIA	5	0.1%	2	0.2%
LENS				
100.200 CATARACT, UNSPECIFIED	24	0.3%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	381	4.7%	69	6.3%
100.301 PUNCTATE-ANTERIOR CORTEX	64	0.8%	25	2.3%
100.302 PUNCTATE-POSTERIOR CORTEX	12	0.1%	13	1.2%
100.303 PUNCTATE-EQUATORIAL CORTEX	20	0.2%	4	0.4%
100.304 PUNCTATE-ANTERIOR SUTURES	14	0.2%	4	0.4%
100.305 PUNCTATE-POSTERIOR SUTURES	7	0.1%	4	0.4%
100.306 PUNCTATE-NUCLEUS	7	0.1%	3	0.3%
100.307 PUNCTATE-CAPSULAR	27	0.3%	19	1.7%
100.311 INCIPIENT-ANTERIOR CORTEX	38	0.5%	9	0.8%
100.312 INCIPIENT-POSTERIOR CORTEX	34	0.4%	5	0.5%
100.313 INCIPIENT-EQUATORIAL CORTEX	21	0.3%	5	0.5%
100.314 INCIPIENT-ANTERIOR SUTURES	3	0.0%	1	0.1%
100.315 INCIPIENT-POSTERIOR SUTURES	14	0.2%	0	0.0%
100.316 INCIPIENT-NUCLEUS	20	0.2%	2	0.2%
100.317 INCIPIENT-CAPSULAR	20	0.2%	6	0.6%
100.321 INCOMPLETE-ANTERIOR CORTEX	3	0.0%	3	0.3%

OCULAR DISORDERS REPORT
SOFT COATED WHEATEN TERRIER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 8,079 #	 %	Year Examined: 2019-2023 Total # Dogs: 1,087 #	 %
LENS Continued				
100.322 INCOMPLETE-POSTERIOR CORTEX	3	0.0%	3	0.3%
100.324 INCOMPLETE-ANTERIOR SUTURES	0	0.0%	1	0.1%
100.328 Y-SUTURE TIP OPACITIES	4	0.0%	6	0.6%
100.330 GENERALIZED/ COMPLETE	35	0.4%	0	0.0%
100.340 RESORBING/ HYPERMATURE	0	0.0%	1	0.1%
100.375 SUBLUXATION/ LUXATION	4	0.0%	1	0.1%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***366***	***4.5%***	***108***	***9.9%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	73	0.9%	10	0.9%
110.135 PHPV/ PTVL	6	0.1%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	0.0%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	12	0.1%	2	0.2%
OTHER				
900.000 OTHER, UNSPECIFIED	49	0.6%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	184	2.3%	2	0.2%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	97	1.2%	49	4.5%
NORMAL				
.000 NORMAL GLOBE	6,937	85.9%	805	74.1%

SPANISH GREYHOUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the SPANISH GREYHOUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
SPANISH GREYHOUND

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	2		1	
Diagnostic Name		**#**	**%**	**#**	**%**
NORMAL					
.000	NORMAL GLOBE	2	100.0%	1	100.0%

SPANISH MASTIFF

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the SPANISH MASTIFF breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
SPANISH MASTIFF

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	1		0	
Diagnostic Name		#	%	#	%
NORMAL					
.000	NORMAL GLOBE	1	100.0%	0	

SPANISH WATER DOG

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Cataract	Not defined	1	NO	
B.	Retinal atrophy				
	- generalized	Presumed autosomal recessive	1	NO	
	- PRA early onset	Autosomal recessive	2	NO	Mutation in the *PDE6B* gene
	- PRA *prcd*	Autosomal recessive	3	NO	Mutation in the *prcd* gene

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

B. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-early onset

A second, earlier onset form of PRA has also been identified recently in the Spanish Water Dog. The onset of visual deficits occurs at 2-3 years of age, and, dogs show advanced retinal degeneration at the time visual deficits are recognized. The condition appears inherited as autosomal recessive. A DNA test is available.

- PRA-*prcd*

Studies have shown that one form of PRA in the Spanish Water Dog is PRCD which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

1. ACVO Genetics Committee and Data from OFA All-Breeds Report.

2. Winkler PA, Ramsey HD, Petersen-Jones SM. A novel mutation in PDE6B in Spanish Water Dogs with early-onset progressive retinal atrophy. Vet Ophthalmol. 2020 Sep;23(5):792-796. doi: 10.1111/vop.12792. Epub 2020 Jul 8. PMID: 32639685.

3. Personal communication with Sue Pearce-Kelling based on data from OptiGen

OCULAR DISORDERS REPORT
SPANISH WATER DOG

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 363 #	 %	Year Examined: 2019-2023 Total # Dogs: 211 #	 %
EYELIDS				
25.110 DISTICHIASIS	3	0.8%	4	1.9%
NICTITANS				
52.110 GLAND PROLAPSE	1	0.3%	0	0.0%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	3	0.8%	0	0.0%
UVEA				
93.120 UVEAL CYST-SINGLE	0	0.0%	1	0.5%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	13	3.6%	1	0.5%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	0	0.0%	1	0.5%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	1	0.3%	1	0.5%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	19	5.2%	9	4.3%
100.301 PUNCTATE-ANTERIOR CORTEX	1	0.3%	2	0.9%
100.302 PUNCTATE-POSTERIOR CORTEX	1	0.3%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	0	0.0%	1	0.5%
100.306 PUNCTATE-NUCLEUS	8	2.2%	8	3.8%
100.307 PUNCTATE-CAPSULAR	2	0.6%	1	0.5%
100.313 INCIPIENT-EQUATORIAL CORTEX	2	0.6%	1	0.5%
100.316 INCIPIENT-NUCLEUS	1	0.3%	3	1.4%
100.317 INCIPIENT-CAPSULAR	1	0.3%	0	0.0%
100.321 INCOMPLETE-ANTERIOR CORTEX	0	0.0%	1	0.5%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	1	0.5%
100.330 GENERALIZED/ COMPLETE	0	0.0%	1	0.5%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***16***	***4.4%***	***18***	***8.5%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	1	0.3%	2	0.9%
110.320 VITREOUS DEGENERATION-SYNERESIS	2	0.6%	0	0.0%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	8	2.2%	0	0.0%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	4	1.1%	1	0.5%
120.310 RETINAL ATROPHY-GENERALIZED	8	2.2%	0	0.0%
130.110 MICROPAPILLA	0	0.0%	2	0.9%
OTHER				
900.000 OTHER, UNSPECIFIED	4	1.1%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	7	1.9%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	14	3.9%	11	5.2%
NORMAL				
.000 NORMAL GLOBE	301	82.9%	176	83.4%

SPINONE ITALIANO

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Entropion	Not defined	1	Breeder option	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder options	
D.	Cataract	Not defined	1	NO	

Description and Comments

A. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull. In this breed, entropion is associated with an exceptionally large palpebral fissure.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded. Breeding discretion is advised.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
SPINONE ITALIANO

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	2,350		315	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	1	0.0%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	1	0.0%	0	0.0%
EYELIDS					
20.160	MACROPALPEBRAL FISSURE	3	0.1%	0	0.0%
21.000	ENTROPION	31	1.3%	4	1.3%
22.000	ECTROPION	18	0.8%	1	0.3%
25.110	DISTICHIASIS	30	1.3%	7	2.2%
NICTITANS					
51.100	CARTILAGE ANOMALY/ EVERSION	3	0.1%	0	0.0%
52.110	GLAND PROLAPSE	3	0.1%	0	0.0%
CORNEA					
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	0	0.0%	1	0.3%
UVEA					
90.250	PIGMENTARY UVEITIS	1	0.0%	0	0.0%
93.120	UVEAL CYST-SINGLE	1	0.0%	0	0.0%
93.150	IRIS COLOBOMA	1	0.0%	0	0.0%
93.170	UVEAL CYST-MULTIPLE	1	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	108	4.6%	24	7.6%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	4	0.2%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	1	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	3	0.1%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	8	0.3%	1	0.3%
95.120	UVEAL CYST-FREE FLOATING	1	0.0%	0	0.0%
LENS					
100.200	CATARACT, UNSPECIFIED	2	0.1%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	121	5.1%	19	6.0%
100.301	PUNCTATE-ANTERIOR CORTEX	14	0.6%	5	1.6%
100.302	PUNCTATE-POSTERIOR CORTEX	4	0.2%	1	0.3%
100.303	PUNCTATE-EQUATORIAL CORTEX	2	0.1%	0	0.0%
100.304	PUNCTATE-ANTERIOR SUTURES	3	0.1%	0	0.0%
100.305	PUNCTATE-POSTERIOR SUTURES	9	0.4%	2	0.6%
100.306	PUNCTATE-NUCLEUS	23	1.0%	5	1.6%
100.307	PUNCTATE-CAPSULAR	7	0.3%	5	1.6%
100.311	INCIPIENT-ANTERIOR CORTEX	15	0.6%	1	0.3%
100.312	INCIPIENT-POSTERIOR CORTEX	6	0.3%	0	0.0%
100.313	INCIPIENT-EQUATORIAL CORTEX	6	0.3%	1	0.3%
100.314	INCIPIENT-ANTERIOR SUTURES	2	0.1%	0	0.0%
100.315	INCIPIENT-POSTERIOR SUTURES	7	0.3%	0	0.0%
100.316	INCIPIENT-NUCLEUS	15	0.6%	3	1.0%
100.317	INCIPIENT-CAPSULAR	6	0.3%	1	0.3%
100.321	INCOMPLETE-ANTERIOR CORTEX	1	0.0%	0	0.0%
100.322	INCOMPLETE-POSTERIOR CORTEX	1	0.0%	0	0.0%
100.326	INCOMPLETE-NUCLEUS	1	0.0%	1	0.3%
100.328	Y-SUTURE TIP OPACITIES	6	0.3%	3	1.0%
100.330	GENERALIZED/ COMPLETE	5	0.2%	0	0.0%
100.375	SUBLUXATION/ LUXATION	3	0.1%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***129***	***5.5%***	***25***	***7.9%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	2	0.1%	1	0.3%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	7	0.3%	1	0.3%
110.320	VITREOUS DEGENERATION-SYNERESIS	14	0.6%	0	0.0%
FUNDUS					
120.170	RETINAL DYSPLASIA-FOLDS	10	0.4%	1	0.3%

OCULAR DISORDERS REPORT
SPINONE ITALIANO

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 2,350 #	%	2019-2023 315 #	%
FUNDUS Continued				
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	1	0.0%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	1	0.0%	0	0.0%
130.110 MICROPAPILLA	1	0.0%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	22	0.9%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	62	2.6%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	30	1.3%	8	2.5%
NORMAL				
.000 NORMAL GLOBE	2,019	85.9%	249	79.0%

STABYHOUN

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the STABYHOUN breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
STABYHOUN

Year Examined:	1993-2018		2019-2023	
Total # Dogs:	5		9	
Diagnostic Name	**#**	**%**	**#**	**%**
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	0	0.0%	1	11.1%
LENS				
100.312 INCIPIENT-POSTERIOR CORTEX	1	20.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	0	0.0%	2	22.2%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1***	***20.0%***	***0***	***0.0%***
FUNDUS				
120.310 RETINAL ATROPHY-GENERALIZED	1	20.0%	0	0.0%
OTHER				
900.110 OTHER-SUSPECTED AS NOT-INHERITED	0	0.0%	1	11.1%
NORMAL				
.000 NORMAL GLOBE	4	80.0%	6	66.7%

STAFFORDSHIRE BULL TERRIER*

*Please note that since 1972 the AKC considers the Staffordshire Bull Terrier a different breed from the American Staffordshire Terrier.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
C.	Cataract				
	- generalized	Not defined	1	NO	
	- *HSF4*	Autosomal recessive	2-4	NO	Mutation in the *HSF4* gene
D.	Persistent hyperplastic primary vitreous (PHPV)	Not defined	5, 6	NO	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore is not noted on the certificate.

C. Cataract

- generalized

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to

be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

- HSF4

In the Staffordshire Bull Terrier, cataracts usually develop by one year of age. There is initial opacification of the suture lines progressing to nuclear and cortical cataract formation; complete cataracts and blindness develop by three years of age. The condition is inherited as an autosomal recessive mutation in the *HSF4* gene (*HSF4-1*). A DNA test is available.

D. Persistent hyperplastic primary vitreous (PHPV)

A congenital defect resulting from abnormalities in the development and regression of the hyaloid artery (the primary vitreous) and the interaction of this blood vessel with the posterior lens capsule/cortex during embryogenesis. This condition is often associated with persistent tunica vasculosa lentis (PTVL) which results from failure of regression of the embryologic vascular network which surrounds the developing lens.

The majority of affected dogs have a retrolental fibrovascular plaque and variable lenticular defects which include posterior lenticonus/globus, colobomata, intralenticular hemorrhage and/or secondary cataracts. Vision impairment may result. The disease is an inherited disorder in the breed, but the mode of inheritance has not been defined. The results of current studies cannot rule out autosomal recessive or a dominant trait with incomplete penetrance.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Barnett KC. Hereditary cataract in the dog. *J Small Anim Pract*. 1978;19:109-120.

3. Barnett KC. The diagnosis and differential diagnosis of cataract in the dog. *J Small Anim Pract*. 1985;26:305-316. https://doi.org/10.1111/j.1748-5827.1985.tb02204.x

4. Mellersh CS, Pettitt L, Forman OP, et al.Identification of mutations in HSF4 in dogs of three different breeds with hereditary cataracts.. *Vet Ophthalmol*. 2006;9(5):369-378. PMID: 16939467

5. Curtis R, Barnett KC, Leon A. Persistent hyperplastic primary vitreous in the Staffordshire Bull Terrier. *Vet Rec*. 1984;115:385. PMID: 6506414.

6. Leon A, Curtis R, Barnett K. Hereditary persistent hyperplastic primary vitreous in the Staffordshire Bull Terrier. *J Am Anim Hosp Assoc*. 1986;22:765-774.

OCULAR DISORDERS REPORT
STAFFORDSHIRE BULL TERRIER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1,133 #	%	2019-2023 642 #	%
EYELIDS				
21.000 ENTROPION	0	0.0%	3	0.5%
25.110 DISTICHIASIS	89	7.9%	36	5.6%
NICTITANS				
52.110 GLAND PROLAPSE	0	0.0%	1	0.2%
CORNEA				
70.220 EXPOSURE KERATOPATHY SYNDROME	0	0.0%	1	0.2%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	4	0.4%	6	0.9%
UVEA				
93.120 UVEAL CYST-SINGLE	5	0.4%	1	0.2%
93.170 UVEAL CYST-MULTIPLE	1	0.1%	1	0.2%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	31	2.7%	16	2.5%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	2	0.2%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	12	1.1%	18	2.8%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	1	0.1%	1	0.2%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	43	3.8%	22	3.4%
100.301 PUNCTATE-ANTERIOR CORTEX	12	1.1%	8	1.2%
100.302 PUNCTATE-POSTERIOR CORTEX	3	0.3%	5	0.8%
100.303 PUNCTATE-EQUATORIAL CORTEX	4	0.4%	2	0.3%
100.304 PUNCTATE-ANTERIOR SUTURES	1	0.1%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	5	0.4%	4	0.6%
100.307 PUNCTATE-CAPSULAR	5	0.4%	10	1.6%
100.311 INCIPIENT-ANTERIOR CORTEX	7	0.6%	2	0.3%
100.312 INCIPIENT-POSTERIOR CORTEX	10	0.9%	2	0.3%
100.313 INCIPIENT-EQUATORIAL CORTEX	5	0.4%	1	0.2%
100.314 INCIPIENT-ANTERIOR SUTURES	1	0.1%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	2	0.2%	1	0.2%
100.316 INCIPIENT-NUCLEUS	0	0.0%	1	0.2%
100.317 INCIPIENT-CAPSULAR	5	0.4%	6	0.9%
100.321 INCOMPLETE-ANTERIOR CORTEX	0	0.0%	1	0.2%
100.328 Y-SUTURE TIP OPACITIES	3	0.3%	2	0.3%
100.330 GENERALIZED/ COMPLETE	1	0.1%	0	0.0%
100.340 RESORBING/ HYPERMATURE	1	0.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***62***	***5.5%***	***43***	***6.7%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	4	0.4%	7	1.1%
110.135 PHPV/ PTVL	0	0.0%	1	0.2%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	0	0.0%	2	0.3%
110.320 VITREOUS DEGENERATION-SYNERESIS	20	1.8%	3	0.5%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	6	0.5%	5	0.8%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	6	0.5%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	2	0.2%	1	0.2%
120.960 RETINOPATHY	0	0.0%	1	0.2%
120.970 RETINOPATHY - CMR/ CMR-LIKE	0	0.0%	1	0.2%
OTHER				
900.000 OTHER, UNSPECIFIED	9	0.8%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	20	1.8%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	25	2.2%	31	4.8%
NORMAL				
.000 NORMAL GLOBE	912	80.5%	501	78.0%

STANDARD SCHNAUZER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
C.	Cataract	Not defined	1	NO	
D.	Y-suture tip opacity	Not defined	1	Breeder option	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

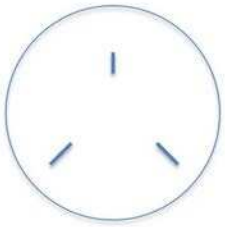
C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membranes, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

There are apparently several forms of cataracts in the Standard Schnauzer: 1) posterior cortex and posterior/total nucleus involvement, with slow progression; 2) dense posterior polar opacity near the sub-capsular region which progresses rapidly to very dense posterior polar plaques in young animals; 3) dense posterior polar opacity like that reported in young animals but found in older animals with variable progression.

D. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. Newer versions of the form (since 3/16/21) have boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
STANDARD SCHNAUZER

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	3,439		723	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	1	0.0%	0	0.0%
10.000	GLAUCOMA	2	0.1%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	1	0.0%	0	0.0%
EYELIDS					
20.140	ECTOPIC CILIA	1	0.0%	0	0.0%
25.110	DISTICHIASIS	68	2.0%	5	0.7%
NICTITANS					
50.210	PLASMOMA/ ATYPICAL PANNUS	0	0.0%	1	0.1%
51.100	CARTILAGE ANOMALY/ EVERSION	3	0.1%	0	0.0%
52.110	GLAND PROLAPSE	2	0.1%	0	0.0%
CORNEA					
70.220	EXPOSURE KERATOPATHY SYNDROME	0	0.0%	1	0.1%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	27	0.8%	3	0.4%
70.730	DYSTROPHY-ENDOTHELIAL	1	0.0%	0	0.0%
UVEA					
93.120	UVEAL CYST-SINGLE	2	0.1%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	15	0.4%	5	0.7%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	4	0.1%	2	0.3%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	3	0.1%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	2	0.1%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	10	0.3%	8	1.1%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	1	0.0%	0	0.0%
LENS					
100.200	CATARACT, UNSPECIFIED	2	0.1%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	133	3.9%	29	4.0%
100.301	PUNCTATE-ANTERIOR CORTEX	29	0.8%	14	1.9%
100.302	PUNCTATE-POSTERIOR CORTEX	9	0.3%	6	0.8%
100.303	PUNCTATE-EQUATORIAL CORTEX	7	0.2%	4	0.6%
100.304	PUNCTATE-ANTERIOR SUTURES	4	0.1%	2	0.3%
100.305	PUNCTATE-POSTERIOR SUTURES	16	0.5%	4	0.6%
100.306	PUNCTATE-NUCLEUS	12	0.3%	1	0.1%
100.307	PUNCTATE-CAPSULAR	19	0.6%	3	0.4%
100.311	INCIPIENT-ANTERIOR CORTEX	17	0.5%	4	0.6%
100.312	INCIPIENT-POSTERIOR CORTEX	14	0.4%	5	0.7%
100.313	INCIPIENT-EQUATORIAL CORTEX	19	0.6%	6	0.8%
100.314	INCIPIENT-ANTERIOR SUTURES	2	0.1%	0	0.0%
100.315	INCIPIENT-POSTERIOR SUTURES	2	0.1%	2	0.3%
100.316	INCIPIENT-NUCLEUS	9	0.3%	0	0.0%
100.317	INCIPIENT-CAPSULAR	5	0.1%	3	0.4%
100.321	INCOMPLETE-ANTERIOR CORTEX	1	0.0%	0	0.0%
100.322	INCOMPLETE-POSTERIOR CORTEX	1	0.0%	1	0.1%
100.323	INCOMPLETE-EQUATORIAL CORTEX	1	0.0%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	10	0.3%	8	1.1%
100.330	GENERALIZED/ COMPLETE	13	0.4%	1	0.1%
100.375	SUBLUXATION/ LUXATION	1	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***182***	***5.3%***	***56***	***7.7%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	4	0.1%	4	0.6%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	5	0.1%	0	0.0%
110.320	VITREOUS DEGENERATION-SYNERESIS	13	0.4%	2	0.3%
FUNDUS					
120.170	RETINAL DYSPLASIA-FOLDS	31	0.9%	3	0.4%

OCULAR DISORDERS REPORT
STANDARD SCHNAUZER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 3,439 #	 %	Year Examined: 2019-2023 Total # Dogs: 723 #	 %
FUNDUS Continued				
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	4	0.1%	1	0.1%
120.310 RETINAL ATROPHY-GENERALIZED	24	0.7%	1	0.1%
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.0%	0	0.0%
130.110 MICROPAPILLA	5	0.1%	5	0.7%
130.120 OPTIC NERVE HYPOPLASIA	3	0.1%	2	0.3%
OTHER				
900.000 OTHER, UNSPECIFIED	31	0.9%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	71	2.1%	1	0.1%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	44	1.3%	50	6.9%
NORMAL				
.000 NORMAL GLOBE	3,035	88.3%	601	83.1%

SUSSEX SPANIEL

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Ectropion	Not defined	1	Breeder option	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	
D.	Persistent hyaloid artery remnant	Not defined	1	Breeder option	
E.	Retinal dysplasia				
	- folds	Not defined	1	Breeder option	

Description and Comments

A. Ectropion

A conformational defect resulting in eversion of the eyelid(s), which may cause ocular irritation due to exposure. It is likely that ectropion is influenced by several genes (polygenic) defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

E. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
SUSSEX SPANIEL

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 465 #	 %	Year Examined: 2019-2023 Total # Dogs: 96 #	 %
EYELIDS				
20.160 MACROPALPEBRAL FISSURE	23	4.9%	0	0.0%
21.000 ENTROPION	1	0.2%	0	0.0%
22.000 ECTROPION	33	7.1%	0	0.0%
25.110 DISTICHIASIS	24	5.2%	7	7.3%
NICTITANS				
52.110 GLAND PROLAPSE	1	0.2%	0	0.0%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	2	0.4%	0	0.0%
UVEA				
93.110 IRIS HYPOPLASIA	3	0.6%	0	0.0%
93.150 IRIS COLOBOMA	8	1.7%	1	1.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	3	0.6%	3	3.1%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	7	1.5%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	1	0.2%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	2	0.4%	2	2.1%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	17	3.7%	1	1.0%
100.302 PUNCTATE-POSTERIOR CORTEX	1	0.2%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	1	0.2%	0	0.0%
100.307 PUNCTATE-CAPSULAR	1	0.2%	1	1.0%
100.312 INCIPIENT-POSTERIOR CORTEX	2	0.4%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	2	0.4%	0	0.0%
100.316 INCIPIENT-NUCLEUS	4	0.9%	0	0.0%
100.317 INCIPIENT-CAPSULAR	6	1.3%	6	6.3%
100.322 INCOMPLETE-POSTERIOR CORTEX	2	0.4%	1	1.0%
100.328 Y-SUTURE TIP OPACITIES	1	0.2%	0	0.0%
100.330 GENERALIZED/ COMPLETE	2	0.4%	2	2.1%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***21***	***4.5%***	***10***	***10.4%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	39	8.4%	10	10.4%
110.135 PHPV/ PTVL	4	0.9%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	1	0.2%	0	0.0%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	43	9.2%	7	7.3%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	2	0.4%	0	0.0%
130.110 MICROPAPILLA	1	0.2%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	1	0.2%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	10	2.2%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	20	4.3%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	8	1.7%	3	3.1%
NORMAL				
.000 NORMAL GLOBE	296	63.7%	62	64.6%

SWEDISH LAPPHUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- PRA-*prcd*	Autosomal recessive	1	NO	Mutation in the *prcd* gene

Description and Comments

A. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-*prcd*

Studies have shown that the principal form of PRA in the Swedish Lapphund is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

References

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the Swedish Lapphund. The condition listed above is currently noted solely due to the availability of a genetic test for the disease.

1. Zangerl B, Goldstein O, Philp AR, et al. Identical mutation in a novel retinal gene causes progressive rod-cone degeneration in dogs and retinitis pigmentosa in humans. *Genomics*. 2006 Nov;88:551-563.PMID: 6938425

OCULAR DISORDERS REPORT
SWEDISH LAPPHUND

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 8 #	 %	Year Examined: 2019-2023 Total # Dogs: 11 #	 %
UVEA				
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	1	12.5%	0	0.0%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	1	12.5%	0	0.0%
100.301 PUNCTATE-ANTERIOR CORTEX	1	12.5%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	1	12.5%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	1	12.5%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	1	12.5%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***3***	***37.5%***	***0***	***0.0%***
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	0	0.0%	1	9.1%
120.310 RETINAL ATROPHY-GENERALIZED	1	12.5%	0	0.0%
NORMAL				
.000 NORMAL GLOBE	4	50.0%	10	90.9%

SWEDISH VALLHUND

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
C.	Cataract	Not defined	1	NO	
D.	Y-suture tip opacities	Not defined	1	Breeder option	
E.	Vitreous degeneration				
	- syneresis	Not defined	1	Breeder option	
F.	Retinal dysplasia				
	- folds	Not defined	1	Breeder option	
G.	Retinopathy	Autosomal recessive	1-4	NO	Mutation in the *MERTK* gene
H.	Retinal atrophy				
	- generalized	Not defined	1	NO	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

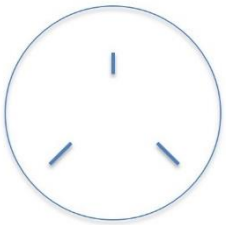
Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

D. Y-suture tip opacity

These are prominent (or "highlighted" or "more dense") distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a "peace sign" as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the "Lens" section of the CAER form. Newer versions of the form (since 3/16/21) have boxes that say, "posterior Y-suture tip opacities" which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures" AND ALSO MARK "suspect not inherited/significance unknown" (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: "E2" or "posterior suture tip opacities." This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

E. Vitreous degeneration - syneresis

Liquefaction of the vitreous gel which may predispose to retinal detachment.

F. Retinal dysplasia – folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown.

G. Retinopathy

Swedish Vallhunds have a unique form of retinal degeneration compared to most forms of PRA. The condition is multifocal rather than diffuse and the age of onset and rate of progression vary dramatically, even between littermates. The clinical signs progress in three stages. (A. Komaromy, personal communication 2016)

Stage one usually occurs between 2-3 years of age and is characterized by mottling or multifocal brown discoloration of the tapetal fundus – this should be marked as retinopathy even though visual deficits are not yet noted.

In stage two, geographic thinning of the retina can be seen and subtle night vision deficits are observed.

In stage three, the retinal thinning becomes more generalized with small islands of retinal sparing and deficits are noted in both photopic and scotopic vision. The disease has been associated with a mutation in the *MERTK* gene on canine chromosome 17. Dogs homozogous for the mutation have an 18 fold increased risk of developing the retinopathy. However, the actual causative mutation has not yet been identified.

H. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Cooper AE, Ahonen S, Rowlan JS, et al. A novel form of progressive retinal atrophy in Swedish Vallhund dogs. *PloS one*. 2014;9:e106610. PMID: 25198798.

3. Ahonen SJ, Arumilli M, Seppala E, et al. Increased expression of MERTK is associated with a unique form of canine retinopathy. *PloS one*. 2014;9:e114552. PMID: 25517981.

4. Everson R, Pettitt L, Forman OP, et al. An intronic LINE-1 insertion in MERTK is strongly associated with retinopathy in Swedish Vallhund Dogs. PLoS one. 2017; 12(8):e0183021 PMID: 28813472

OCULAR DISORDERS REPORT
SWEDISH VALLHUND

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1,648 #	 %	2019-2023 274 #	 %
EYELIDS				
20.140 ECTOPIC CILIA	1	0.1%	0	0.0%
25.110 DISTICHIASIS	38	2.3%	3	1.1%
GLOBE				
40.910 KERATOCONJUNCTIVITIS SICCA (KCS)	1	0.1%	0	0.0%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	22	1.3%	8	2.9%
UVEA				
93.120 UVEAL CYST-SINGLE	5	0.3%	0	0.0%
93.140 CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.1%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	298	18.1%	56	20.4%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	10	0.6%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	3	0.2%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	1	0.1%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	11	0.7%	3	1.1%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	1	0.1%	0	0.0%
93.810 UVEAL MELANOMA	2	0.1%	0	0.0%
95.120 UVEAL CYST-FREE FLOATING	1	0.1%	0	0.0%
FUNDUS				
97.110 CHOROIDAL HYPOPLASIA	1	0.1%	0	0.0%
120.170 RETINAL DYSPLASIA-FOLDS	24	1.5%	4	1.5%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	5	0.3%	1	0.4%
120.310 RETINAL ATROPHY-GENERALIZED	46	2.8%	3	1.1%
120.960 RETINOPATHY	51	3.1%	15	5.5%
120.970 RETINOPATHY - CMR/ CMR-LIKE	0	0.0%	1	0.4%
130.110 MICROPAPILLA	5	0.3%	0	0.0%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	237	14.4%	20	7.3%
100.301 PUNCTATE-ANTERIOR CORTEX	26	1.6%	5	1.8%
100.302 PUNCTATE-POSTERIOR CORTEX	8	0.5%	3	1.1%
100.303 PUNCTATE-EQUATORIAL CORTEX	5	0.3%	1	0.4%
100.304 PUNCTATE-ANTERIOR SUTURES	1	0.1%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	37	2.2%	7	2.6%
100.306 PUNCTATE-NUCLEUS	41	2.5%	8	2.9%
100.307 PUNCTATE-CAPSULAR	10	0.6%	6	2.2%
100.311 INCIPIENT-ANTERIOR CORTEX	22	1.3%	5	1.8%
100.312 INCIPIENT-POSTERIOR CORTEX	5	0.3%	0	0.0%
100.313 INCIPIENT-EQUATORIAL CORTEX	10	0.6%	0	0.0%
100.314 INCIPIENT-ANTERIOR SUTURES	4	0.2%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	6	0.4%	0	0.0%
100.316 INCIPIENT-NUCLEUS	18	1.1%	4	1.5%
100.321 INCOMPLETE-ANTERIOR CORTEX	2	0.1%	0	0.0%
100.322 INCOMPLETE-POSTERIOR CORTEX	0	0.0%	1	0.4%
100.323 INCOMPLETE-EQUATORIAL CORTEX	1	0.1%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	13	0.8%	14	5.1%
100.330 GENERALIZED/ COMPLETE	7	0.4%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***203***	***12.3%***	***40***	***14.6%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	0	0.0%	2	0.7%
110.135 PHPV/ PTVL	1	0.1%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	11	0.7%	1	0.4%
110.320 VITREOUS DEGENERATION-SYNERESIS	42	2.5%	5	1.8%

OCULAR DISORDERS REPORT
SWEDISH VALLHUND

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1,648 #	 %	Year Examined: 2019-2023 Total # Dogs: 274 #	 %
OTHER				
900.000 OTHER, UNSPECIFIED	47	2.9%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	73	4.4%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	76	4.6%	17	6.2%
NORMAL				
.000 NORMAL GLOBE	1,008	61.2%	155	56.6%

TAMASKAN

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the TAMASKAN breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
TAMASKAN

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 75 #	 %	Year Examined: 2019-2023 Total # Dogs: 77 #	 %
EYELIDS				
25.110 DISTICHIASIS	1	1.3%	1	1.3%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	0	0.0%	3	3.9%
UVEA				
93.120 UVEAL CYST-SINGLE	0	0.0%	1	1.3%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	1	1.3%	1	1.3%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	0	0.0%	1	1.3%
95.120 UVEAL CYST-FREE FLOATING	1	1.3%	0	0.0%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	0	0.0%	1	1.3%
100.302 PUNCTATE-POSTERIOR CORTEX	1	1.3%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	1	1.3%	0	0.0%
100.312 INCIPIENT-POSTERIOR CORTEX	1	1.3%	0	0.0%
100.316 INCIPIENT-NUCLEUS	0	0.0%	1	1.3%
100.322 INCOMPLETE-POSTERIOR CORTEX	1	1.3%	2	2.6%
100.327 INCOMPLETE-CAPSULAR	1	1.3%	1	1.3%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***5***	***6.7%***	***4***	***5.2%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	1	1.3%	0	0.0%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	0	0.0%	1	1.3%
120.960 RETINOPATHY	1	1.3%	0	0.0%
OTHER				
900.100 OTHER-SUSPECTED AS INHERITED	0	0.0%	1	1.3%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	2	2.7%	3	3.9%
NORMAL				
.000 NORMAL GLOBE	65	86.7%	63	81.8%

TEDDY ROOSEVELT TERRIER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the TEDDY ROOSEVELT TERRIER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
TEDDY ROOSEVELT TERRIER

Year Examined:	1993-2018		2019-2023	
Total # Dogs:	5		11	
Diagnostic Name	**#**	**%**	**#**	**%**
LENS				
100.311 INCIPIENT-ANTERIOR CORTEX	1	20.0%	0	0.0%
100.312 INCIPIENT-POSTERIOR CORTEX	1	20.0%	0	0.0%
100.313 INCIPIENT-EQUATORIAL CORTEX	1	20.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***3***	***60.0%***	***0***	***0.0%***
VITREOUS				
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	20.0%	0	0.0%
OTHER				
900.110 OTHER-SUSPECTED AS NOT-INHERITED	2	40.0%	0	0.0%
NORMAL				
.000 NORMAL GLOBE	1	20.0%	11	100.0%

TENTERFIELD TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Lens luxation	Autosomal recessive	1	NO	Mutation in the *ADAMTS17* gene

Description and Comments

A. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the Tenterfield Terrier. The condition listed above is currently noted solely due to the availability of a genetic test for the disease.

1. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol*. 2011; 14: 378-384. PMID: 22050825.

OCULAR DISORDERS REPORT
TENTERFIELD TERRIER

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions for this breed.

TIBETAN MASTIFF

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
B.	Cataract	Not defined	1	NO	

Description and Comments

A. Persistent pupillary membranes (PPM)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
TIBETAN MASTIFF

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 77 #	 %	Year Examined: 2019-2023 Total # Dogs: 42 #	 %
EYELIDS				
21.000 ENTROPION	3	3.9%	0	0.0%
22.000 ECTROPION	0	0.0%	1	2.4%
25.110 DISTICHIASIS	3	3.9%	5	11.9%
NICTITANS				
51.100 CARTILAGE ANOMALY/ EVERSION	0	0.0%	1	2.4%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	1	1.3%	1	2.4%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	10	13.0%	3	7.1%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	5	6.5%	1	2.4%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	2	2.6%	1	2.4%
100.301 PUNCTATE-ANTERIOR CORTEX	1	1.3%	0	0.0%
100.302 PUNCTATE-POSTERIOR CORTEX	2	2.6%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	1	1.3%	1	2.4%
100.307 PUNCTATE-CAPSULAR	1	1.3%	1	2.4%
100.312 INCIPIENT-POSTERIOR CORTEX	0	0.0%	1	2.4%
100.315 INCIPIENT-POSTERIOR SUTURES	1	1.3%	0	0.0%
100.317 INCIPIENT-CAPSULAR	2	2.6%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	1	1.3%	2	4.8%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***8***	***10.4%***	***3***	***7.1%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	0	0.0%	1	2.4%
OTHER				
900.000 OTHER, UNSPECIFIED	2	2.6%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	2	2.6%	2	4.8%
NORMAL				
.000 NORMAL GLOBE	54	70.1%	29	69.0%

TIBETAN SPANIEL

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Entropion	Not defined	1	Breeder option	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
D.	Cataract	Not defined	1	NO	
E.	Y-suture tip opacity	Not defined	1	Breeder option	
F.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- PRA *FAM161A*	Autosomal recessive	2-4	NO	Mutation in the *FAM161A* gene

Descriptions and Comments

A. Entropion

A conformational defect resulting in an "in rolling" of one or more of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time. It is difficult to make a strong recommendation with regards to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded and breeding discretion is advised.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

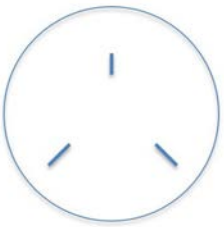
Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Y-suture tip opacity

These are prominent (or "highlighted" or "more dense") distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a "peace sign" as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the "Lens" section of the CAER form. Newer versions of the form (since 3/16/21) have boxes that say, "posterior Y-suture tip opacities" which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures" AND ALSO MARK "suspect not inherited/significance unknown" (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: "E2" or "posterior suture tip opacities." This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

F. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-*FAM161A*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. In most breeds PRA is inherited as an autosomal recessive trait.

In the Tibetan Spaniel, a mutation in *FAM161A* causes a later onset (4-5 years) of PRA. This form is being called progressive retinal atrophy 3 (PRA3) and appears to be the causative mutation in about 60% of Tibetan Spaniels with PRA. This form is inherited as an autosomal recessive trait. A DNA test for PRA3 is available. This test will not detect PRA caused by other genetic mutations. At least one other form of PRA appears to be present in the Tibetan Spaniel.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Bjerkas E. Progressive retinal atrophy in dogs in Norway. *Norsk Veterinaertidsskrift*. 1991;103:601-610. **reference derived from non-USA dog population**

3. Bjerkas E, Narfstrom K. Progressive retinal atrophy in the Tibetan spaniel in Norway and Sweden. Vet. Record. 1994; 134(15): 377-9. PMID: 8009801 **reference derived from non-USA dog population**

4. Downs LM, Mellersh CS. An Intronic SINE insertion in FAM161A that causes exon-skipping is associated with progressive retinal atrophy in Tibetan Spaniels and Tibetan Terriers. *PLoS One*. 2014;9:e93990. PMID: 24705771. **reference derived from non-USA dog population**

OCULAR DISORDERS REPORT
TIBETAN SPANIEL

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 3,441 #	%	2019-2023 375 #	%
GLOBE				
.110 MICROPHTHALMOS	2	0.1%	0	0.0%
40.910 KERATOCONJUNCTIVITIS SICCA (KCS)	2	0.1%	1	0.3%
EYELIDS				
20.140 ECTOPIC CILIA	4	0.1%	0	0.0%
20.160 MACROPALPEBRAL FISSURE	5	0.1%	0	0.0%
21.000 ENTROPION	90	2.6%	2	0.5%
22.000 ECTROPION	2	0.1%	0	0.0%
25.110 DISTICHIASIS	292	8.5%	19	5.1%
32.110 IMPERFORATE LACRIMAL PUNCTUM	1	0.0%	2	0.5%
NICTITANS				
51.100 CARTILAGE ANOMALY/ EVERSION	2	0.1%	0	0.0%
52.110 GLAND PROLAPSE	6	0.2%	1	0.3%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	8	0.2%	0	0.0%
70.220 EXPOSURE KERATOPATHY SYNDROME	19	0.6%	4	1.1%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	10	0.3%	0	0.0%
70.730 DYSTROPHY-ENDOTHELIAL	1	0.0%	0	0.0%
UVEA				
93.110 IRIS HYPOPLASIA	1	0.0%	0	0.0%
93.120 UVEAL CYST-SINGLE	3	0.1%	0	0.0%
93.150 IRIS COLOBOMA	4	0.1%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	66	1.9%	11	2.9%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	5	0.1%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	4	0.1%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	7	0.2%	5	1.3%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	1	0.0%	0	0.0%
93.810 UVEAL MELANOMA	2	0.1%	0	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	9	0.3%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	83	2.4%	12	3.2%
100.301 PUNCTATE-ANTERIOR CORTEX	6	0.2%	2	0.5%
100.302 PUNCTATE-POSTERIOR CORTEX	4	0.1%	2	0.5%
100.303 PUNCTATE-EQUATORIAL CORTEX	2	0.1%	0	0.0%
100.304 PUNCTATE-ANTERIOR SUTURES	2	0.1%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	14	0.4%	3	0.8%
100.306 PUNCTATE-NUCLEUS	1	0.0%	1	0.3%
100.307 PUNCTATE-CAPSULAR	5	0.1%	3	0.8%
100.311 INCIPIENT-ANTERIOR CORTEX	21	0.6%	1	0.3%
100.312 INCIPIENT-POSTERIOR CORTEX	12	0.3%	1	0.3%
100.313 INCIPIENT-EQUATORIAL CORTEX	6	0.2%	0	0.0%
100.314 INCIPIENT-ANTERIOR SUTURES	2	0.1%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	5	0.1%	1	0.3%
100.316 INCIPIENT-NUCLEUS	8	0.2%	2	0.5%
100.317 INCIPIENT-CAPSULAR	2	0.1%	1	0.3%
100.321 INCOMPLETE-ANTERIOR CORTEX	0	0.0%	1	0.3%
100.325 INCOMPLETE-POSTERIOR SUTURES	1	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	11	0.3%	8	2.1%
100.330 GENERALIZED/ COMPLETE	1	0.0%	0	0.0%
100.375 SUBLUXATION/ LUXATION	1	0.0%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***101***	***2.9%***	***18***	***4.8%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	8	0.2%	3	0.8%

OCULAR DISORDERS REPORT
TIBETAN SPANIEL

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 3,441 #	%	Year Examined: 2019-2023 Total # Dogs: 375 #	%
VITREOUS Continued				
110.135 PHPV/ PTVL	1	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	0.1%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	13	0.4%	1	0.3%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	9	0.3%	0	0.0%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	1	0.0%	3	0.8%
120.310 RETINAL ATROPHY-GENERALIZED	29	0.8%	0	0.0%
120.960 RETINOPATHY	4	0.1%	1	0.3%
130.120 OPTIC NERVE HYPOPLASIA	2	0.1%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	32	0.9%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	76	2.2%	1	0.3%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	42	1.2%	14	3.7%
NORMAL				
.000 NORMAL GLOBE	2,801	81.4%	296	78.9%

TIBETAN TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
D.	Cataract	Not defined	1	NO	
E.	Lens luxation	Autosomal recessive	2-7	NO	Mutation in the *ADAMTS17* gene
F.	Retinal atrophy				
	- generalized	Presumed autosomal recessive	1	NO	
	-PRA *FAM161A*	Autosomal recessive	3, 8-11	NO	Mutation in the *FAM161A* gene
	- PRA Rod-cone dysplasia (*rcd4*)	Autosomal recessive	13	NO	Mutation in the *C2orf71* gene
G.	Ceroid lipofuscinosis	Not defined	12, 13	NO	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time. It is difficult to make a strong recommendation with regards to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded and breeding discretion is advised.

B. Corneal dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months

of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

F. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. Except for X-linked PRA in the Siberian Husky and Samoyed, in most breeds studied to date, PRA is inherited as an autosomal recessive trait.

-PRA-*FAM161A*

There are ERG studies to indicate that there is depression of the B wave at 10-12 weeks of age in the second variety and slower depression in the first variety. Some may have no obvious signs at 5-6 years of age, only to develop clinical signs at 6-7 years of age. It is logical that any animal found with signs of bilateral atrophy should not be bred. Members of the family of the affected animal should be carefully screened. Perhaps, ERG in animals less than 4 years of age is logical, especially if the animal is intended for breed foundation.

In the Tibetan Terrier a mutation in *FAM161A* causes a later onset (4-5 years) of PRA. This form is being called progressive retinal atrophy 3 (PRA3). This form is inherited as an autosomal recessive trait. A DNA test for PRA3 is available. This test will not detect PRA caused by other genetic mutations. At least one other form of PRA appears to be present in the Tibetan Terrier.

-PRA-rod-cone dysplasia, type 4 (*rcd4*)

A form of PRA initially identified in the Gordon and Irish Setter breeds. Clinical night blindness is observed on average as late as 10 years of age and progresses to total blindness. This form of PRA has been referred to as late-onset PRA (LOPRA). The disorder is caused by a mutation present in the *C2orf71* gene. A mutation-based gene test is now available that will unequivocally identify genetically normal, affected and carrier dogs. The test is accurate only for this mutation and is of no value in identifying other forms of PRA.

G. Ceroid Lipofuscinosis

An inherited disease of man and animal characterized by the accumulation of lipopigment in various tissues of

the body including the eye. It results in progressive neurologic disease. In the Tibetan Terrier, moderate visual impairment can occur in low-light conditions.

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OCULAR DISORDERS REPORT
TIBETAN TERRIER

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	9,069		783	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	4	0.0%	0	0.0%
10.000	GLAUCOMA	3	0.0%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	0	0.0%	1	0.1%
EYELIDS					
21.000	ENTROPION	1	0.0%	0	0.0%
25.110	DISTICHIASIS	123	1.4%	10	1.3%
32.110	IMPERFORATE LACRIMAL PUNCTUM	4	0.0%	2	0.3%
NICTITANS					
52.110	GLAND PROLAPSE	4	0.0%	0	0.0%
CORNEA					
70.220	EXPOSURE KERATOPATHY SYNDROME	3	0.0%	1	0.1%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	93	1.0%	9	1.1%
70.730	DYSTROPHY-ENDOTHELIAL	1	0.0%	0	0.0%
UVEA					
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	528	5.8%	59	7.5%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	22	0.2%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	40	0.4%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	10	0.1%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	61	0.7%	23	2.9%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	14	0.2%	2	0.3%
93.810	UVEAL MELANOMA	1	0.0%	0	0.0%
95.120	UVEAL CYST-FREE FLOATING	0	0.0%	1	0.1%
FUNDUS					
97.110	CHOROIDAL HYPOPLASIA	1	0.0%	0	0.0%
97.120	COLOBOMA	1	0.0%	0	0.0%
120.170	RETINAL DYSPLASIA-FOLDS	12	0.1%	1	0.1%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	5	0.1%	0	0.0%
120.310	RETINAL ATROPHY-GENERALIZED	124	1.4%	3	0.4%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	3	0.0%	0	0.0%
120.920	RETINAL DETACHMENT	0	0.0%	1	0.1%
120.960	RETINOPATHY	10	0.1%	0	0.0%
130.110	MICROPAPILLA	2	0.0%	0	0.0%
130.120	OPTIC NERVE HYPOPLASIA	5	0.1%	1	0.1%
LENS					
100.200	CATARACT, UNSPECIFIED	34	0.4%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	429	4.7%	51	6.5%
100.301	PUNCTATE-ANTERIOR CORTEX	138	1.5%	29	3.7%
100.302	PUNCTATE-POSTERIOR CORTEX	47	0.5%	1	0.1%
100.303	PUNCTATE-EQUATORIAL CORTEX	20	0.2%	4	0.5%
100.304	PUNCTATE-ANTERIOR SUTURES	21	0.2%	8	1.0%
100.305	PUNCTATE-POSTERIOR SUTURES	12	0.1%	0	0.0%
100.306	PUNCTATE-NUCLEUS	19	0.2%	7	0.9%
100.307	PUNCTATE-CAPSULAR	31	0.3%	6	0.8%
100.311	INCIPIENT-ANTERIOR CORTEX	72	0.8%	6	0.8%
100.312	INCIPIENT-POSTERIOR CORTEX	73	0.8%	5	0.6%
100.313	INCIPIENT-EQUATORIAL CORTEX	40	0.4%	1	0.1%
100.314	INCIPIENT-ANTERIOR SUTURES	13	0.1%	0	0.0%
100.315	INCIPIENT-POSTERIOR SUTURES	14	0.2%	1	0.1%
100.316	INCIPIENT-NUCLEUS	11	0.1%	0	0.0%
100.317	INCIPIENT-CAPSULAR	7	0.1%	6	0.8%
100.321	INCOMPLETE-ANTERIOR CORTEX	11	0.1%	2	0.3%

OCULAR DISORDERS REPORT
TIBETAN TERRIER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 9,069 #	 %	Year Examined: 2019-2023 Total # Dogs: 783 #	 %
LENS Continued				
100.322 INCOMPLETE-POSTERIOR CORTEX	6	0.1%	2	0.3%
100.323 INCOMPLETE-EQUATORIAL CORTEX	5	0.1%	0	0.0%
100.325 INCOMPLETE-POSTERIOR SUTURES	0	0.0%	2	0.3%
100.326 INCOMPLETE-NUCLEUS	1	0.0%	1	0.1%
100.327 INCOMPLETE-CAPSULAR	0	0.0%	2	0.3%
100.328 Y-SUTURE TIP OPACITIES	2	0.0%	4	0.5%
100.330 GENERALIZED/ COMPLETE	41	0.5%	1	0.1%
100.340 RESORBING/ HYPERMATURE	1	0.0%	2	0.3%
100.375 SUBLUXATION/ LUXATION	17	0.2%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***617***	***6.8%***	***86***	***11.0%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	6	0.1%	1	0.1%
110.135 PHPV/ PTVL	2	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	7	0.1%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	34	0.4%	1	0.1%
OTHER				
900.000 OTHER, UNSPECIFIED	82	0.9%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	149	1.6%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	84	0.9%	41	5.2%
NORMAL				
.000 NORMAL GLOBE	7,681	84.7%	609	77.8%

TOY AUSTRALIAN SHEPHERD

It is recommended that this breed be examined prior to pharmacological dilation to best facilitate identification of iris coloboma.

*Due to the breed's ancestry, most of the references cited here are for the Australian Shepherd and Miniature American/Miniature Australian Shepherd. The examiner may also find those breed pages as a helpful reference for other conditions that may occur but are not yet reported in the Toy Australian Shepherd.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DETECTED
A.	Microphthalmia with multiple ocular defects	Presumed autosomal recessive with incomplete penetrance	2-6	NO	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Iris coloboma	Not defined	1	NO	
D.	Iris hypoplasia	Not defined	1	Breeder option	
E.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
F.	Cataract				
	- generalized	Not defined	1	NO	
	- *HSF4-2*	Autosomal co-dominant	7, 8	NO	Mutation in the *HSF4-2* gene
G.	Retinal atrophy				
	- generalized				
	- PRA-*prcd*	Autosomal recessive	9	NO	Mutation in the *prcd* gene
H.	Cone degeneration - day blindness	Autosomal recessive	10	NO	Mutation in the *CNGB3* gene
I.	Multifocal retinopathy - IRD-*BEST1* (*cmr1*)	Autosomal recessive	11	NO (Breeder option with normal DNA test for *cmr1*)	Mutation in the *BEST1* gene
J.	Choroidal hypoplasia (Collie Eye Anomaly) - Optic nerve coloboma - Retinal detachment - Retinal hemorrhage - Staphyloma/coloboma	Autosomal recessive	12-15	NO	Mutation in the *NHEJ1* gene

Description and Comments

A. Microphthalmia with multiple ocular defects

Microphthalmia is a congenital defect characterized by a small eye with associated defects of the cornea, iris (coloboma), anterior chamber, lens (cataract) and/or retina (dysplasia). In the Australian Shepherd, microphthalmia has long been suspected to be associated with merled coat coloration but a definitive genetic relationship has not been established. The eyes of affected homozygous merle (usually white) dogs have extreme forms of this entity and are usually blind at birth. Affected heterozygous merle-coated dogs demonstrate less severe manifestations.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

C. Iris coloboma

A congenital abnormality in iris development usually characterized by a full-thickness defect in iris tissue, commonly (though not exclusively) located at the 6 o'clock position associated with failure of closure of the optic fissure. A partial-thickness defect in iris tissue should be recorded as iris hypoplasia on the OFA form. While this condition has not met breed statistics in the toy Australian shepherd, its presence still warrants a “do not breed” recommendation due to the breed’s ancestry and the lesion’s significance in Australian shepherds and miniature American/miniature Australian shepherds.

D. Iris hypoplasia

A congenital abnormality in iris development usually characterized by a reduced quantity of tissue identified as a partial-thickness defect in iris tissue. Full-thickness iris hypoplasia is rare and should be recorded as an iris coloboma on the OFA form.

E. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

F. Cataract

Any opacity of the lens and/or its capsule, regardless of size or location within the lens. Cataracts are assumed to be hereditary unless associated with known trauma, ocular inflammation, specific metabolic diseases, or nutritional deficiencies.

In the Australian Shepherd, a mutation in *HSF4* (heat shock transcription factor 4), the HSF4-2 mutation, has been shown to increase the likelihood of cataract formation. The mutation is inherited in a co-dominant manner. Dogs with one copy of the mutation develop bilateral posterior cataracts and homozygotes develop a nuclear cataract that typically progresses to a mature cataract. A DNA test is available for this mutation. Other genetic factors can contribute to cataract formation in this breed and will not be detected by this test.

G. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-*prcd*

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited. Unpublished data from genetics laboratories has shown that the principal form of PRA in the Australian Shepherd is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels, and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

H. Cone degeneration - day blindness or hemeralopia

Autosomal recessively inherited early degeneration of the cone photoreceptors (achromatopsia) has been reported in miniature Australian shepherds. To date, this has not yet been reported in the toy Australian shepherd. Affected puppies develop day-blindness, colorblindness, and photophobia between 8 and 12 weeks of age. Affected dogs remain ophthalmoscopically normal their entire life. Electroretinography is required to definitively diagnose the disorder. Genetically, the condition results from a mutation in the *CNGB3* gene. A DNA test is available, but it is predicted that the prevalence of this condition is low.

I. Multifocal retinopathy

Canine Multifocal Retinopathy type 1 (*cmr1*) is characterized by numerous distinct (i.e. multifocal), roughly circular patches of elevated retina (multifocal bullous retinal detachments). There may be a serous subretinal fluid, or accumulation of subretinal material that produces gray-tan-pink colored lesions. These lesions, looking somewhat like blisters, vary in location and size, although typically they are present in both eyes of the affected dog.

The disease generally develops in young dogs between 11-20 weeks of age and there is minimal progression in the initial serous lesions after 1 year of age. The lesions may flatten, leaving areas of retinal thinning and RPE hypertrophy, hyperplasia, and pigmentation. Discrete areas of tapetal hyper-reflectivity may be seen in areas of previous retinal and RPE detachments. Most dogs initially exhibit no noticeable problem with vision or electroretinographic abnormalities despite their abnormal appearing retinas, though the retina will continue to degenerate over time thus eventually causing vision impairment.

Canine Multifocal Retinopathy type 1 is caused by a mutation in the Bestrophin 1 gene (*BEST1*) and is described to be recessively inherited in the Great Pyrenees, Dogue de Bordeaux, Bullmastiff, Mastiff, Australian Shepherd and other breeds.

The breeding advice for Australian Shepherds diagnosed with “multifocal retinopathy” will be changed from "No" to "Breeder option" if the owner of the dog provides the registering office with results of the DNA test for the affected dog, showing that it is genetically normal, i.e. not a homozygous mutant, for the *BEST1* mutation.

J. Choroidal hypoplasia (Collie Eye Anomaly)

- staphyloma/coloboma
- retinal detachment
- retinal hemorrhage
- optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as "Collie Eye Anomaly." The choroidal hypoplasia component is caused by a 7799 base pair deletion with the gene *NHEJ1.* The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

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13. Lowe JK, Kukekova AV, Kirkness EF, et al. Linkage mapping of the primary disease locus for Collie eye anomaly. *Genomics*. 2003;82:86-95. PMID: 12809679

14. Parker HG, Kukekova AV, Akey DT, et al. Breed relationships facilitate fine-mapping studies: a 7.8-kb deletion cosegregates with Collie eye anomaly across multiple dog breeds. *Genome research*. 2007;17:1562-1571. PMID: 17916641

15. Munyard KA, Sherry CR, Sherry L. A retrospective evaluation of congenital ocular defects in Australian Shepherd dogs in Australia. *Vet Ophthalmol*. 2007;10:19-22. PMID: 17204124. **reference derived from non-USA dog population**

OCULAR DISORDERS REPORT
TOY AUSTRALIAN SHEPHERD

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	1,022		222	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	4	0.4%	0	0.0%
EYELIDS					
25.110	DISTICHIASIS	51	5.0%	16	7.2%
CORNEA					
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	3	0.3%	2	0.9%
UVEA					
93.110	IRIS HYPOPLASIA	17	1.7%	11	5.0%
93.150	IRIS COLOBOMA	18	1.8%	5	2.3%
93.180	IRIS SPHINCTER DYSPLASIA	3	0.3%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	110	10.8%	21	9.5%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	7	0.7%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	2	0.2%	2	0.9%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	0	0.0%	1	0.5%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	1	0.1%	0	0.0%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	1	0.1%	0	0.0%
FUNDUS					
97.110	CHOROIDAL HYPOPLASIA	0	0.0%	1	0.5%
120.170	RETINAL DYSPLASIA-FOLDS	3	0.3%	0	0.0%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	1	0.1%	0	0.0%
120.310	RETINAL ATROPHY-GENERALIZED	1	0.1%	0	0.0%
130.110	MICROPAPILLA	11	1.1%	0	0.0%
130.120	OPTIC NERVE HYPOPLASIA	2	0.2%	0	0.0%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	13	1.3%	2	0.9%
100.301	PUNCTATE-ANTERIOR CORTEX	2	0.2%	0	0.0%
100.302	PUNCTATE-POSTERIOR CORTEX	1	0.1%	0	0.0%
100.303	PUNCTATE-EQUATORIAL CORTEX	1	0.1%	0	0.0%
100.305	PUNCTATE-POSTERIOR SUTURES	2	0.2%	2	0.9%
100.306	PUNCTATE-NUCLEUS	1	0.1%	3	1.4%
100.307	PUNCTATE-CAPSULAR	1	0.1%	0	0.0%
100.311	INCIPIENT-ANTERIOR CORTEX	4	0.4%	1	0.5%
100.312	INCIPIENT-POSTERIOR CORTEX	1	0.1%	1	0.5%
100.313	INCIPIENT-EQUATORIAL CORTEX	2	0.2%	0	0.0%
100.317	INCIPIENT-CAPSULAR	2	0.2%	0	0.0%
100.321	INCOMPLETE-ANTERIOR CORTEX	0	0.0%	2	0.9%
100.327	INCOMPLETE-CAPSULAR	0	0.0%	1	0.5%
100.330	GENERALIZED/ COMPLETE	1	0.1%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***18***	***1.8%***	***10***	***4.5%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	5	0.5%	0	0.0%
110.135	PHPV/ PTVL	2	0.2%	0	0.0%
110.320	VITREOUS DEGENERATION-SYNERESIS	3	0.3%	0	0.0%
OTHER					
900.000	OTHER, UNSPECIFIED	6	0.6%	0	0.0%
900.100	OTHER-SUSPECTED AS INHERITED	8	0.8%	0	0.0%
900.110	OTHER-SUSPECTED AS NOT-INHERITED	8	0.8%	12	5.4%
NORMAL					
.000	NORMAL GLOBE	860	84.1%	152	68.5%

TOY FOX TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Cataract	Not defined	1	NO	
B.	Lens luxation	Autosomal recessive	2	NO	Mutation in the ADAMTS17 gene

Description and Comments

A. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

B. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness. A mutation in ADAMTS17 has been associated with primary lens luxation. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. Vet Ophthalmol. 2011 Nov;14:378-384. PMID: 22050825.

OCULAR DISORDERS REPORT
TOY FOX TERRIER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 217 #	 %	Year Examined: 2019-2023 Total # Dogs: 23 #	 %
EYELIDS				
25.110 DISTICHIASIS	2	0.9%	0	0.0%
32.110 IMPERFORATE LACRIMAL PUNCTUM	1	0.5%	0	0.0%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	1	0.5%	0	0.0%
70.730 DYSTROPHY-ENDOTHELIAL	1	0.5%	0	0.0%
UVEA				
93.110 IRIS HYPOPLASIA	0	0.0%	1	4.3%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	19	8.8%	2	8.7%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	2	0.9%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	1	0.5%	0	0.0%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	3	1.4%	1	4.3%
100.302 PUNCTATE-POSTERIOR CORTEX	0	0.0%	1	4.3%
100.311 INCIPIENT-ANTERIOR CORTEX	6	2.8%	0	0.0%
100.312 INCIPIENT-POSTERIOR CORTEX	2	0.9%	0	0.0%
100.313 INCIPIENT-EQUATORIAL CORTEX	0	0.0%	1	4.3%
100.316 INCIPIENT-NUCLEUS	0	0.0%	1	4.3%
100.321 INCOMPLETE-ANTERIOR CORTEX	1	0.5%	1	4.3%
100.322 INCOMPLETE-POSTERIOR CORTEX	0	0.0%	1	4.3%
100.375 SUBLUXATION/ LUXATION	1	0.5%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***9***	***4.1%***	***5***	***21.7%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	1	0.5%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.5%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	3	1.4%	0	0.0%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	7	3.2%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	2	0.9%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	2	0.9%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	2	0.9%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	3	1.4%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	7	3.2%	1	4.3%
NORMAL				
.000 NORMAL GLOBE	174	80.2%	17	73.9%

TREEING WALKER

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the TREEING WALKER breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
TREEING WALKER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 9 #	 %	Year Examined: 2019-2023 Total # Dogs: 7 #	 %
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	1	11.1%	1	14.3%
100.303 PUNCTATE-EQUATORIAL CORTEX	1	11.1%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	0	0.0%	1	14.3%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***1***	***11.1%***	***1***	***14.3%***
OTHER				
900.110 OTHER-SUSPECTED AS NOT-INHERITED	2	22.2%	0	0.0%
NORMAL				
.000 NORMAL GLOBE	7	77.8%	6	85.7%

VIZSLA

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Glaucoma	Not defined	2	NO	
B.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
D.	Cataract	Not defined	1	NO	

Description and Comments

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated intraocular pressure occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of the IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests are part of a routine screening exam for certification.

B. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore is not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Strom AR, Hassig M, Iburg TM, et al. Epidemiology of canine glaucoma presented to University of Zurich from 1995 to 2009. Part 1: Congenital and primary glaucoma (4 and 123 cases). *Vet Ophthalmol*. 2011 Mar;14:121-126. PMID: 21366828.**reference derived from non-USA dog population**

OCULAR DISORDERS REPORT
VIZSLA

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 3,679 #	 %	Year Examined: 2019-2023 Total # Dogs: 1,542 #	 %
GLOBE				
10.000 GLAUCOMA	0	0.0%	1	0.1%
40.910 KERATOCONJUNCTIVITIS SICCA (KCS)	1	0.0%	1	0.1%
EYELIDS				
20.140 ECTOPIC CILIA	1	0.0%	1	0.1%
21.000 ENTROPION	3	0.1%	2	0.1%
22.000 ECTROPION	3	0.1%	0	0.0%
25.110 DISTICHIASIS	32	0.9%	13	0.8%
32.110 IMPERFORATE LACRIMAL PUNCTUM	1	0.0%	0	0.0%
NICTITANS				
51.100 CARTILAGE ANOMALY/ EVERSION	4	0.1%	0	0.0%
52.110 GLAND PROLAPSE	7	0.2%	0	0.0%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	51	1.4%	11	0.7%
70.730 DYSTROPHY-ENDOTHELIAL	2	0.1%	0	0.0%
UVEA				
93.120 UVEAL CYST-SINGLE	1	0.0%	1	0.1%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	73	2.0%	42	2.7%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	13	0.4%	1	0.1%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	1	0.0%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	144	3.9%	140	9.1%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	1	0.0%	2	0.1%
95.120 UVEAL CYST-FREE FLOATING	1	0.0%	0	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	4	0.1%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	128	3.5%	36	2.3%
100.301 PUNCTATE-ANTERIOR CORTEX	24	0.7%	13	0.8%
100.302 PUNCTATE-POSTERIOR CORTEX	24	0.7%	8	0.5%
100.303 PUNCTATE-EQUATORIAL CORTEX	5	0.1%	5	0.3%
100.305 PUNCTATE-POSTERIOR SUTURES	6	0.2%	1	0.1%
100.306 PUNCTATE-NUCLEUS	10	0.3%	3	0.2%
100.307 PUNCTATE-CAPSULAR	31	0.8%	15	1.0%
100.311 INCIPIENT-ANTERIOR CORTEX	21	0.6%	7	0.5%
100.312 INCIPIENT-POSTERIOR CORTEX	32	0.9%	15	1.0%
100.313 INCIPIENT-EQUATORIAL CORTEX	22	0.6%	10	0.6%
100.314 INCIPIENT-ANTERIOR SUTURES	2	0.1%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	4	0.1%	0	0.0%
100.316 INCIPIENT-NUCLEUS	3	0.1%	1	0.1%
100.317 INCIPIENT-CAPSULAR	9	0.2%	1	0.1%
100.324 INCOMPLETE-ANTERIOR SUTURES	0	0.0%	1	0.1%
100.325 INCOMPLETE-POSTERIOR SUTURES	0	0.0%	1	0.1%
100.326 INCOMPLETE-NUCLEUS	1	0.0%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	4	0.1%	1	0.1%
100.330 GENERALIZED/ COMPLETE	2	0.1%	0	0.0%
100.375 SUBLUXATION/ LUXATION	2	0.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***200***	***5.4%***	***81***	***5.3%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	4	0.1%	2	0.1%
110.135 PHPV/ PTVL	1	0.0%	0	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	8	0.2%	8	0.5%
110.320 VITREOUS DEGENERATION-SYNERESIS	13	0.4%	3	0.2%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	3	0.1%	4	0.3%

OCULAR DISORDERS REPORT
VIZSLA

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 3,679 #	 %	Year Examined: 2019-2023 Total # Dogs: 1,542 #	 %
FUNDUS Continued				
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	0	0.0%	1	0.1%
120.310 RETINAL ATROPHY-GENERALIZED	5	0.1%	1	0.1%
120.960 RETINOPATHY	4	0.1%	3	0.2%
130.120 OPTIC NERVE HYPOPLASIA	1	0.0%	1	0.1%
OTHER				
900.000 OTHER, UNSPECIFIED	51	1.4%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	74	2.0%	2	0.1%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	85	2.3%	77	5.0%
NORMAL				
.000 NORMAL GLOBE	3,151	85.6%	1,205	78.1%

VOLPINO ITALIANO

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Lens luxation	Autosomal recessive	1	NO	Mutation in the ADAMTS17 gene

Description and Comments

A. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma), causing vision impairment or blindness. A mutation in ADAMTS17 has been associated with primary lens luxation. A DNA test is available.

References

There are no breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the Volpino Italiano. The condition listed above is currently noted solely due to the availability of a genetic test for the disease.

1. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. Vet Ophthalmol. 2011; 14: 378-384. PMID:22050825.

OCULAR DISORDERS REPORT
VOLPINO ITALIANO

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	1		0	
Diagnostic Name		#	%	#	%
NORMAL					
.000	NORMAL GLOBE	1	100.0%	0	

WACHTELHUND

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the WACHTELHUND breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
WACHTELHUND

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 2 #	 %	Year Examined: 2019-2023 Total # Dogs: 1 #	 %
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	0	0.0%	1	100.0%
100.306 PUNCTATE-NUCLEUS	0	0.0%	1	100.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***0***	***0.0%***	***1***	***100.0%***
NORMAL				
.000 NORMAL GLOBE	2	100.0%	0	0.0%

WEIMARANER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Nictitans cartilage anomaly	Not defined	1	Breeder option	
C.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
D.	Persistent pupillary membranes				
	-iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
E.	Cataract	Not defined	1	NO	
F.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	-PRA *RPGR*	X-linked	2	NO	Mutation in the *RPGR* gene

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regards to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded. Breeding discretion is advised.

In the Weimaraner, because there is significant clinical disease associated with the abnormal hairs, breeding should be discouraged.

B. Nictitans cartilage anomaly

A scroll-like curling of the cartilage of the nictitans (third eyelid), usually everting the margin. This condition may occur in one or both eyes and may cause mild ocular irritation.

C. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited

and bilateral.

D. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

E. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

F. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. With limited exceptions, most PRAs are recessively inherited.

- PRA-*RPGR*

A recent study has shown that the principal form of PRA in the Weimaraner is a mutation in the Retinitis Pigmentosa GTPase Regulator (RPGR) gene, which was found have an X-linked inheritance pattern and appears to affect dogs at a younger age (~2.5 years in 3 affected males) in the current study. Other breeds have been shown to have a naturally occurring X-linked RP which include the Siberian husky and Samoyed breeds. The disease begins clinically with signs of night blindness. The prevalence in the outbred population is likely very low.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Kropatsch R, Akkad D, Frank M, et al. A large deletion in RPGR causes XLPRA in Weimarener dogs. Canine Genetics and Epidemiol. 2016; 3:7. PMID: 27398221 **reference derived from non-USA dog population**

OCULAR DISORDERS REPORT
WEIMARANER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1,969 #	 %	2019-2023 489 #	 %
EYELIDS				
21.000 ENTROPION	3	0.2%	1	0.2%
25.110 DISTICHIASIS	573	29.1%	119	24.3%
32.110 IMPERFORATE LACRIMAL PUNCTUM	2	0.1%	0	0.0%
NICTITANS				
51.100 CARTILAGE ANOMALY/ EVERSION	16	0.8%	3	0.6%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	33	1.7%	8	1.6%
70.730 DYSTROPHY-ENDOTHELIAL	6	0.3%	0	0.0%
UVEA				
93.120 UVEAL CYST-SINGLE	6	0.3%	1	0.2%
93.150 IRIS COLOBOMA	2	0.1%	0	0.0%
93.170 UVEAL CYST-MULTIPLE	1	0.1%	1	0.2%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	17	0.9%	5	1.0%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	3	0.2%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	5	0.3%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	6	0.3%	5	1.0%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	2	0.1%	0	0.0%
93.810 UVEAL MELANOMA	1	0.1%	0	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	2	0.1%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	117	5.9%	40	8.2%
100.301 PUNCTATE-ANTERIOR CORTEX	25	1.3%	21	4.3%
100.302 PUNCTATE-POSTERIOR CORTEX	7	0.4%	4	0.8%
100.303 PUNCTATE-EQUATORIAL CORTEX	12	0.6%	5	1.0%
100.304 PUNCTATE-ANTERIOR SUTURES	1	0.1%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	4	0.2%	0	0.0%
100.306 PUNCTATE-NUCLEUS	14	0.7%	2	0.4%
100.307 PUNCTATE-CAPSULAR	11	0.6%	7	1.4%
100.311 INCIPIENT-ANTERIOR CORTEX	48	2.4%	13	2.7%
100.312 INCIPIENT-POSTERIOR CORTEX	15	0.8%	5	1.0%
100.313 INCIPIENT-EQUATORIAL CORTEX	24	1.2%	8	1.6%
100.314 INCIPIENT-ANTERIOR SUTURES	3	0.2%	0	0.0%
100.315 INCIPIENT-POSTERIOR SUTURES	2	0.1%	0	0.0%
100.316 INCIPIENT-NUCLEUS	6	0.3%	6	1.2%
100.317 INCIPIENT-CAPSULAR	4	0.2%	10	2.0%
100.321 INCOMPLETE-ANTERIOR CORTEX	3	0.2%	1	0.2%
100.322 INCOMPLETE-POSTERIOR CORTEX	1	0.1%	1	0.2%
100.323 INCOMPLETE-EQUATORIAL CORTEX	2	0.1%	1	0.2%
100.326 INCOMPLETE-NUCLEUS	0	0.0%	2	0.4%
100.328 Y-SUTURE TIP OPACITIES	2	0.1%	0	0.0%
100.330 GENERALIZED/ COMPLETE	5	0.3%	0	0.0%
100.375 SUBLUXATION/ LUXATION	2	0.1%	1	0.2%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***189***	***9.6%***	***86***	***17.6%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	4	0.2%	2	0.4%
110.135 PHPV/ PTVL	1	0.1%	1	0.2%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	2	0.1%	4	0.8%
110.320 VITREOUS DEGENERATION-SYNERESIS	1	0.1%	3	0.6%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	2	0.1%	0	0.0%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	4	0.2%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	6	0.3%	0	0.0%

OCULAR DISORDERS REPORT
WEIMARANER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1,969 #	 %	Year Examined: 2019-2023 Total # Dogs: 489 #	 %
FUNDUS Continued				
120.960 RETINOPATHY	1	0.1%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	12	0.6%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	53	2.7%	2	0.4%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	37	1.9%	20	4.1%
NORMAL				
.000 NORMAL GLOBE	1,239	62.9%	290	59.3%

WELSH SHEEPDOG

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the WELSH SHEEPDOG breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
WELSH SHEEPDOG

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	1		0	
Diagnostic Name		#	%	#	%
NORMAL					
.000	NORMAL GLOBE	1	100.0%	0	

WELSH SPRINGER SPANIEL

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Glaucoma	Presumed autosomal dominant	2-4	NO	
B.	Entropion	Not defined	1	Breeder option	
C.	Distichiasis	Not defined	1	Breeder option	
D.	Corneal dystrophy				
	- epithelial/stromal	Not defined	1	Breeder option	
E.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
F.	Cataract	Presumed autosomal recessive	1, 5, 6	NO	
G.	Retinal dysplasia				
	- folds	Not defined	1	Breeder option	

Description and Comments

A. Glaucoma

An elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of IOP (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests is part of a routine breed eye screening exam. Due to the increased incidence of PLD in the breed and the increased progression observed with age, it may be prudent to perform repeated gonioscopy examinations over time.

Primary angle closure glaucoma has been reported in the Welsh Springer Spaniel. Females are affected more than males. Onset ranges from 10 weeks to 10 years. At the iridocorneal angle, the pectinate ligaments appear sparse and wispy in contrast to the sturdy fibers seen in other breeds. A dominant mode of inheritance is reported.

B. Entropion

A conformational defect resulting in an "in-rolling" of one or both of the eyelids which may cause ocular irritation. It is likely that entropion is influenced by several genes (polygenic), defining the skin and other structures which make up the eyelids, the amount and weight of the skin covering the head and face, the orbital contents, and the conformation of the skull.

C. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established, although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

D. Corneal Dystrophy - epithelial/stromal

A non-inflammatory corneal opacity (white to gray) present in one or more of the corneal layers; usually inherited and bilateral.

E. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

F. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

In the Welsh Springer Spaniel, lesions may be seen as early as 8-12 weeks of age and progress rapidly to complete cataract, impairing vision. A recessive mode of inheritance is reported.

G. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Cottrell B, Barnett K. Primary glaucoma in the Welsh Springer Spaniel. *J Small Anim Pract*. 1988;29:185-199. https://doi.org/10.1111/j.1748-5827.1988.tb02276.x

3. Gelatt KN, MacKay EO. Prevalence of the breed-related glaucomas in pure-bred dogs in North America. *Vet Ophthalmol*. 2004;7:97-111. Epub 2004/02/26. PMID: 14982589.

4. Oliver JA, Ekiri A, Mellersh. Prevalence and Progression of Pectinate Ligament Dysplasia in the Welsh Springer Spaniel. J Sm Anim Pract. 2016;57: 416-421. PMID: 27251455. **reference derived from non-USA dog population**

5. Barnett KC. Hereditary cataract in the Welsh Springer Spaniel. *J Small Anim Pract*. 1980;21:621-625. Epub 1980/11/01. PMID: 7230748. **reference derived from non-USA dog population**

6. Barnett KC. The diagnosis and differential diagnosis of cataract in the dog. *J Small Anim Pract*. 1985;26:305. https://doi.org/10.1111/j.1748-5827.1985.tb02204.x. **reference derived from non-USA dog population**

OCULAR DISORDERS REPORT
WELSH SPRINGER SPANIEL

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	3,016		580	
	Diagnostic Name	#	%	#	%
GLOBE					
10.000	GLAUCOMA	1	0.0%	0	0.0%
EYELIDS					
21.000	ENTROPION	52	1.7%	7	1.2%
22.000	ECTROPION	3	0.1%	0	0.0%
25.110	DISTICHIASIS	367	12.2%	99	17.1%
32.110	IMPERFORATE LACRIMAL PUNCTUM	3	0.1%	0	0.0%
CORNEA					
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	60	2.0%	9	1.6%
70.730	DYSTROPHY-ENDOTHELIAL	2	0.1%	0	0.0%
UVEA					
93.120	UVEAL CYST-SINGLE	1	0.0%	1	0.2%
93.150	IRIS COLOBOMA	1	0.0%	0	0.0%
93.170	UVEAL CYST-MULTIPLE	1	0.0%	1	0.2%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	706	23.4%	146	25.2%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	3	0.1%	4	0.7%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	1	0.0%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	1	0.0%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	8	0.3%	3	0.5%
95.120	UVEAL CYST-FREE FLOATING	1	0.0%	0	0.0%
97.150	COLOBOMA	1	0.0%	0	0.0%
FUNDUS					
97.120	COLOBOMA	2	0.1%	0	0.0%
120.170	RETINAL DYSPLASIA-FOLDS	32	1.1%	5	0.9%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	4	0.1%	0	0.0%
120.310	RETINAL ATROPHY-GENERALIZED	9	0.3%	0	0.0%
130.110	MICROPAPILLA	3	0.1%	2	0.3%
130.120	OPTIC NERVE HYPOPLASIA	7	0.2%	0	0.0%
LENS					
100.200	CATARACT, UNSPECIFIED	6	0.2%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	150	5.0%	26	4.5%
100.301	PUNCTATE-ANTERIOR CORTEX	25	0.8%	15	2.6%
100.302	PUNCTATE-POSTERIOR CORTEX	8	0.3%	3	0.5%
100.303	PUNCTATE-EQUATORIAL CORTEX	4	0.1%	0	0.0%
100.304	PUNCTATE-ANTERIOR SUTURES	5	0.2%	6	1.0%
100.305	PUNCTATE-POSTERIOR SUTURES	3	0.1%	0	0.0%
100.306	PUNCTATE-NUCLEUS	10	0.3%	2	0.3%
100.307	PUNCTATE-CAPSULAR	9	0.3%	4	0.7%
100.311	INCIPIENT-ANTERIOR CORTEX	6	0.2%	1	0.2%
100.312	INCIPIENT-POSTERIOR CORTEX	5	0.2%	0	0.0%
100.313	INCIPIENT-EQUATORIAL CORTEX	5	0.2%	0	0.0%
100.316	INCIPIENT-NUCLEUS	2	0.1%	0	0.0%
100.317	INCIPIENT-CAPSULAR	2	0.1%	2	0.3%
100.321	INCOMPLETE-ANTERIOR CORTEX	1	0.0%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	1	0.0%	1	0.2%
100.330	GENERALIZED/ COMPLETE	1	0.0%	0	0.0%
100.375	SUBLUXATION/ LUXATION	1	0.0%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***92***	***3.1%***	***33***	***5.7%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	10	0.3%	1	0.2%
110.135	PHPV/ PTVL	1	0.0%	0	0.0%
110.320	VITREOUS DEGENERATION-SYNERESIS	5	0.2%	0	0.0%

OCULAR DISORDERS REPORT
WELSH SPRINGER SPANIEL

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 3,016 #	 %	Year Examined: 2019-2023 Total # Dogs: 580 #	 %
OTHER				
900.000 OTHER, UNSPECIFIED	19	0.6%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	54	1.8%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	39	1.3%	22	3.8%
NORMAL				
.000 NORMAL GLOBE	1,935	64.2%	319	55.0%

WELSH TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
B.	Lens luxation	Autosomal recessive	2	NO	Mutation in the *ADAMTS17* gene
C.	Y-suture tip opacities	Not defined	1	Breeder option	

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

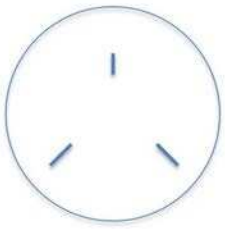
Lens pigment foci/no strands is considered an insignificant finding and therefore is not noted on the certificate.

B. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma) causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

C. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. Newer versions of the form (since 3/16/21) have boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true

sutural cataracts - which would either be breeder option or failing.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol*. 2011 Nov;14:378-384. PMID: 22050825.

OCULAR DISORDERS REPORT
WELSH TERRIER

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	373		90	
	Diagnostic Name	**#**	**%**	**#**	**%**
GLOBE					
10.000	GLAUCOMA	1	0.3%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	1	0.3%	0	0.0%
EYELIDS					
20.140	ECTOPIC CILIA	1	0.3%	0	0.0%
25.110	DISTICHIASIS	13	3.5%	2	2.2%
CORNEA					
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	4	1.1%	0	0.0%
70.730	DYSTROPHY-ENDOTHELIAL	3	0.8%	1	1.1%
UVEA					
93.170	UVEAL CYST-MULTIPLE	0	0.0%	1	1.1%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	30	8.0%	12	13.3%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	2	0.5%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	3	0.8%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	4	1.1%	17	18.9%
LENS					
100.200	CATARACT, UNSPECIFIED	1	0.3%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	22	5.9%	5	5.6%
100.301	PUNCTATE-ANTERIOR CORTEX	2	0.5%	1	1.1%
100.302	PUNCTATE-POSTERIOR CORTEX	2	0.5%	0	0.0%
100.307	PUNCTATE-CAPSULAR	1	0.3%	2	2.2%
100.311	INCIPIENT-ANTERIOR CORTEX	3	0.8%	0	0.0%
100.312	INCIPIENT-POSTERIOR CORTEX	2	0.5%	0	0.0%
100.313	INCIPIENT-EQUATORIAL CORTEX	1	0.3%	1	1.1%
100.317	INCIPIENT-CAPSULAR	2	0.5%	1	1.1%
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	5	5.6%
100.375	SUBLUXATION/ LUXATION	3	0.8%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***14***	***3.8%***	***5***	***5.6%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	0	0.0%	1	1.1%
FUNDUS					
120.170	RETINAL DYSPLASIA-FOLDS	1	0.3%	0	0.0%
OTHER					
900.000	OTHER, UNSPECIFIED	6	1.6%	0	0.0%
900.100	OTHER-SUSPECTED AS INHERITED	13	3.5%	0	0.0%
900.110	OTHER-SUSPECTED AS NOT-INHERITED	1	0.3%	5	5.6%
NORMAL					
.000	NORMAL GLOBE	304	81.5%	53	58.9%

WEST HIGHLAND WHITE TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Keratoconjunctivitis sicca	Not defined	2-4	NO	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1, 5	Breeder option	
	-iris to lens	Not defined	1	NO	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
C.	Cataract	Presumed autosomal recessive	1, 5	NO	
D.	Y-suture tip opacity	Not defined	1	Breeder option	
E.	Retinal dysplasia				
	- folds	Not defined	1	Breeder option	

Description and Comments

A. Keratoconjunctivitis sicca

An abnormality of the tear film, most commonly a deficiency of the aqueous portion, although the mucin and/or lipid layers may be affected; results in ocular irritation and/or vision impairment. In the West Highland White Terrier, this disease has been reported more commonly in females than males.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

In the West Highland White Terrier, these membranes, when present, often bridge from the iris to the lens and may result in cataract with vision impairment.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

C. Cataract

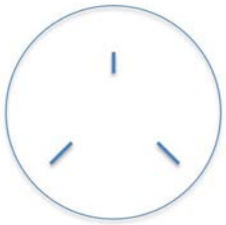
A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

The cataract described in the West Highland White Terrier initially involves the posterior Y sutures and may

infrequently progress, resulting in vision impairment. The age of onset is less than 6 months of age. A recessive mode of inheritance is suggested by the pedigrees which have been studied.

D. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. Newer versions of the form (since 3/16/21) have boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

E. Retinal dysplasia - folds

Linear, triangular, curved or curvilinear foci of retinal folding that may be single or multiple. When seen in puppies, this condition may partially or completely resolve with maturity. Its significance to vision is unknown. There are two other forms of retinal dysplasia (geographic, detached) which are known to be inherited in other breeds and, in their most severe form, cause blindness. The genetic relationship between folds and more severe forms of retinal dysplasia is undetermined.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Sansom J, Barnett KC, Neumann W, et al. Treatment of keratoconjunctivitis sicca in dogs with cyclosporine ophthalmic ointment: a European clinical field trial. *Vet Rec*. 1995; 137: 504-507.

3. O'Neil DG, Brodbelt DC, Keddy A, et al. Keratoconjunctivitis sicca in dogs under primary veterinary care in the UK: an epidemiological study. *JSAP*. 2021; 62: 636-645. PMID: 34134171. **Reference derived from a non-USA dog population.**

4. Kaswan RL, Martin CL, Chapman WL, Jr. Keratoconjunctivitis sicca: histopathologic study of nictitating membrane and lacrimal glands from 28 dogs. *Am J Vet Res*. 1984; 45: 112-118. PMID: 6703444

5. Narfstrom K. Cataract in the West Highland White Terrier. *J Small Anim Pract*. 1981; 22: 467-471. PMID: 7289590. **reference derived from non-USA dog population**

OCULAR DISORDERS REPORT
WEST HIGHLAND WHITE TERRIER

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	1,615		517	
	Diagnostic Name	**#**	**%**	**#**	**%**
GLOBE					
.110	MICROPHTHALMOS	5	0.3%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	3	0.2%	0	0.0%
EYELIDS					
25.110	DISTICHIASIS	3	0.2%	4	0.8%
32.110	IMPERFORATE LACRIMAL PUNCTUM	2	0.1%	0	0.0%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	1	0.1%	0	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	1	0.1%	1	0.2%
70.730	DYSTROPHY-ENDOTHELIAL	3	0.2%	0	0.0%
UVEA					
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	136	8.4%	36	7.0%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	24	1.5%	3	0.6%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	6	0.4%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	21	1.3%	14	2.7%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	4	0.2%	1	0.2%
LENS					
100.200	CATARACT, UNSPECIFIED	21	1.3%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	130	8.0%	33	6.4%
100.301	PUNCTATE-ANTERIOR CORTEX	25	1.5%	9	1.7%
100.302	PUNCTATE-POSTERIOR CORTEX	13	0.8%	4	0.8%
100.303	PUNCTATE-EQUATORIAL CORTEX	5	0.3%	2	0.4%
100.304	PUNCTATE-ANTERIOR SUTURES	2	0.1%	0	0.0%
100.305	PUNCTATE-POSTERIOR SUTURES	36	2.2%	12	2.3%
100.306	PUNCTATE-NUCLEUS	11	0.7%	3	0.6%
100.307	PUNCTATE-CAPSULAR	24	1.5%	14	2.7%
100.311	INCIPIENT-ANTERIOR CORTEX	38	2.4%	2	0.4%
100.312	INCIPIENT-POSTERIOR CORTEX	26	1.6%	4	0.8%
100.313	INCIPIENT-EQUATORIAL CORTEX	5	0.3%	0	0.0%
100.314	INCIPIENT-ANTERIOR SUTURES	2	0.1%	0	0.0%
100.315	INCIPIENT-POSTERIOR SUTURES	6	0.4%	4	0.8%
100.316	INCIPIENT-NUCLEUS	15	0.9%	5	1.0%
100.317	INCIPIENT-CAPSULAR	13	0.8%	7	1.4%
100.321	INCOMPLETE-ANTERIOR CORTEX	3	0.2%	1	0.2%
100.322	INCOMPLETE-POSTERIOR CORTEX	3	0.2%	1	0.2%
100.325	INCOMPLETE-POSTERIOR SUTURES	4	0.2%	0	0.0%
100.326	INCOMPLETE-NUCLEUS	1	0.1%	0	0.0%
100.327	INCOMPLETE-CAPSULAR	0	0.0%	1	0.2%
100.328	Y-SUTURE TIP OPACITIES	24	1.5%	27	5.2%
100.330	GENERALIZED/ COMPLETE	30	1.9%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***283***	***17.5%***	***69***	***13.3%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	2	0.1%	0	0.0%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	4	0.2%	0	0.0%
110.320	VITREOUS DEGENERATION-SYNERESIS	9	0.6%	0	0.0%
FUNDUS					
120.170	RETINAL DYSPLASIA-FOLDS	54	3.3%	18	3.5%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	3	0.2%	0	0.0%
120.310	RETINAL ATROPHY-GENERALIZED	16	1.0%	0	0.0%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.1%	0	0.0%
120.920	RETINAL DETACHMENT	2	0.1%	0	0.0%
120.960	RETINOPATHY	1	0.1%	2	0.4%

OCULAR DISORDERS REPORT
WEST HIGHLAND WHITE TERRIER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1,615 #	 %	Year Examined: 2019-2023 Total # Dogs: 517 #	 %
OTHER				
900.000 OTHER, UNSPECIFIED	33	2.0%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	17	1.1%	1	0.2%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	41	2.5%	10	1.9%
NORMAL				
.000 NORMAL GLOBE	1,163	72.0%	372	72.0%

WHIPPET

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
B.	Cataract	Not defined	1	NO	
C.	Vitreous degeneration				
	- anterior chamber	Not defined	1	Breeder option	
	- syneresis	Not defined	1, 2	Breeder option	
D.	Choroidal hypoplasia (Collie Eye Anomaly) - staphyloma/coloboma - retinal detachment - retinal hemorrhage - optic nerve coloboma	Autosomal recessive	3	NO	Mutation in the *NHEJ1* gene
E.	Inherited retinal disorder (IRD)				
	Inherited retinal disorder - IRD *CABP4*	Autosomal recessive	4, 5	NO	Mutation in the *CABP4* gene

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

C. Vitreous degeneration

A liquefaction of the vitreous gel which may predispose to retinal detachment. This is a significant problem in the Whippet.

D. Choroidal hypoplasia (Collie Eye Anomaly)

- staphyloma/coloboma
- retinal detachment
- retinal hemorrhage
- optic nerve coloboma

A spectrum of malformations present at birth and ranging from inadequate development of the choroid (choroidal hypoplasia) to defects of the choroid, sclera, and/or optic nerve (coloboma/staphyloma) to complete retinal detachment (with or without hemorrhage). Mildly affected animals will have no detectable vision deficit.

This disorder is collectively referred to as “Collie Eye Anomaly” and has been identified in the longhaired Whippet. The choroidal hypoplasia component is caused by a 7799 base pairs deletion with the gene *NHEJ1.* The mutation is a recessive trait. A DNA test is available and is diagnostic only for the choroidal hypoplasia component of CEA. For colobomas to develop, an additional mutation in a second gene has to be present; that gene is still unknown.

E. Inherited Retinal Disorder (IRD)

- IRD *CABP4*

This is an autosomal recessive inherited retinopathy that has been identified in Whippets from Brazil. Affected dogs were observed to have visual deficits in dim light (1-6 months) with retinal changes at an early stage showing multifocal retinal bulla from 5-8 months of age, which was also observed via OCT. The bulla however resolved by 18 months of age. Dogs at 3 months of age had early signs of retinal degeneration, mainly mild vascular attenuation. Between 6-12 months of age, affected dogs had moderate signs of retinal degeneration (vascular attenuation and retinal thinning) and around 2 years of age, affected dogs had marked generalized tapetal hyperreflectivity and vascular attenuation. ERGs of the affected dogs were diminished (lack of b wave in both scotopic and photopic settings) as early as 1-3 months, and a severely diminished response by 1 year of age and completely absent waveform by 6 years of age.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Krishnan, H., et al. (2020). "Vitreous degeneration and associated ocular abnormalities in the dog." Vet Ophthalmol 23(2): 219-224. PMID: 31464365

3. Parker HG, Kukekova AV, Akey DT, et al. Breed relationships facilitate fine-mapping studies: a 7.8-kb deletion cosegregates with Collie eye anomaly across multiple dog breeds. *Genome research*. 2007;17:1562-1571. PMID: 17916641.

4. Somma A, Moreno J, Sato M, et al. Characterization of a novel form of Progressive Retinal Atrophy in Whippet dogs: a clinical, electroretinographic, and breeding study. Vet Ophthmol. 2017; 20(5): 450-459. PMID: 27896899.

5. Beckwith-Cohen B, Winkler PA, Occelli LM, et al. CABP 4 gene augmentation restores vision in Whippets with autosomal recessive retinal degeneration. ACVO abstract 2022. *Vet Ophthalmol. 2023; 26:e1-e-22.* PMID 3654374

OCULAR DISORDERS REPORT
WHIPPET

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	12,674		3,108	
	Diagnostic Name	#	%	#	%
GLOBE					
.110	MICROPHTHALMOS	1	0.0%	0	0.0%
40.910	KERATOCONJUNCTIVITIS SICCA (KCS)	0	0.0%	1	0.0%
EYELIDS					
20.140	ECTOPIC CILIA	2	0.0%	0	0.0%
22.000	ECTROPION	1	0.0%	0	0.0%
25.110	DISTICHIASIS	9	0.1%	4	0.1%
NICTITANS					
50.210	PLASMOMA/ ATYPICAL PANNUS	1	0.0%	0	0.0%
52.110	GLAND PROLAPSE	1	0.0%	0	0.0%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	5	0.0%	2	0.1%
70.220	EXPOSURE KERATOPATHY SYNDROME	0	0.0%	1	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	43	0.3%	7	0.2%
70.730	DYSTROPHY-ENDOTHELIAL	6	0.0%	0	0.0%
UVEA					
93.110	IRIS HYPOPLASIA	2	0.0%	0	0.0%
93.120	UVEAL CYST-SINGLE	16	0.1%	7	0.2%
93.140	CORNEAL ENDOTHELIAL PIGMENT WITHOUT PPM	1	0.0%	0	0.0%
93.170	UVEAL CYST-MULTIPLE	2	0.0%	5	0.2%
93.180	IRIS SPHINCTER DYSPLASIA	2	0.0%	0	0.0%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	126	1.0%	46	1.5%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	10	0.1%	0	0.0%
93.730	PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	11	0.1%	0	0.0%
93.740	PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	16	0.1%	0	0.0%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	9	0.1%	13	0.4%
93.760	PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	6	0.0%	3	0.1%
93.810	UVEAL MELANOMA	1	0.0%	0	0.0%
95.120	UVEAL CYST-FREE FLOATING	1	0.0%	6	0.2%
FUNDUS					
97.110	CHOROIDAL HYPOPLASIA	19	0.1%	0	0.0%
97.120	COLOBOMA	4	0.0%	0	0.0%
120.170	RETINAL DYSPLASIA-FOLDS	33	0.3%	12	0.4%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	5	0.0%	6	0.2%
120.310	RETINAL ATROPHY-GENERALIZED	43	0.3%	12	0.4%
120.910	RETINAL DETACHMENT WITHOUT DIALYSIS	4	0.0%	0	0.0%
120.920	RETINAL DETACHMENT	1	0.0%	0	0.0%
120.960	RETINOPATHY	10	0.1%	2	0.1%
120.970	RETINOPATHY - CMR/ CMR-LIKE	0	0.0%	1	0.0%
130.110	MICROPAPILLA	3	0.0%	1	0.0%
130.120	OPTIC NERVE HYPOPLASIA	3	0.0%	0	0.0%
LENS					
100.200	CATARACT, UNSPECIFIED	11	0.1%	0	0.0%
100.210	CATARACT-SIGNIFICANCE UNKNOWN	476	3.8%	135	4.3%
100.301	PUNCTATE-ANTERIOR CORTEX	96	0.8%	41	1.3%
100.302	PUNCTATE-POSTERIOR CORTEX	29	0.2%	9	0.3%
100.303	PUNCTATE-EQUATORIAL CORTEX	53	0.4%	13	0.4%
100.304	PUNCTATE-ANTERIOR SUTURES	12	0.1%	6	0.2%
100.305	PUNCTATE-POSTERIOR SUTURES	25	0.2%	11	0.4%
100.306	PUNCTATE-NUCLEUS	31	0.2%	18	0.6%
100.307	PUNCTATE-CAPSULAR	23	0.2%	24	0.8%
100.311	INCIPIENT-ANTERIOR CORTEX	76	0.6%	24	0.8%

OCULAR DISORDERS REPORT
WHIPPET

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 12,674 #	 %	Year Examined: 2019-2023 Total # Dogs: 3,108 #	 %
LENS Continued				
100.312 INCIPIENT-POSTERIOR CORTEX	41	0.3%	5	0.2%
100.313 INCIPIENT-EQUATORIAL CORTEX	65	0.5%	12	0.4%
100.314 INCIPIENT-ANTERIOR SUTURES	3	0.0%	2	0.1%
100.315 INCIPIENT-POSTERIOR SUTURES	12	0.1%	1	0.0%
100.316 INCIPIENT-NUCLEUS	19	0.1%	2	0.1%
100.317 INCIPIENT-CAPSULAR	22	0.2%	4	0.1%
100.321 INCOMPLETE-ANTERIOR CORTEX	7	0.1%	2	0.1%
100.322 INCOMPLETE-POSTERIOR CORTEX	5	0.0%	1	0.0%
100.323 INCOMPLETE-EQUATORIAL CORTEX	3	0.0%	1	0.0%
100.326 INCOMPLETE-NUCLEUS	0	0.0%	2	0.1%
100.328 Y-SUTURE TIP OPACITIES	22	0.2%	24	0.8%
100.330 GENERALIZED/ COMPLETE	16	0.1%	2	0.1%
100.375 SUBLUXATION/ LUXATION	34	0.3%	2	0.1%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***549***	***4.3%***	***180***	***5.8%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	23	0.2%	25	0.8%
110.135 PHPV/ PTVL	12	0.1%	1	0.0%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	130	1.0%	49	1.6%
110.320 VITREOUS DEGENERATION-SYNERESIS	557	4.4%	72	2.3%
OTHER				
900.000 OTHER, UNSPECIFIED	114	0.9%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	234	1.8%	2	0.1%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	189	1.5%	161	5.2%
NORMAL				
.000 NORMAL GLOBE	11,128	87.8%	2,607	83.9%

WHITE SHEPHERD

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the WHITE SHPEHERD breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
WHITE SHEPHERD

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	57		15	
	Diagnostic Name	#	%	#	%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	2	3.5%	0	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	4	7.0%	3	20.0%
UVEA					
93.170	UVEAL CYST-MULTIPLE	0	0.0%	1	6.7%
93.720	PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	1	1.8%	0	0.0%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	4	7.0%	0	0.0%
100.303	PUNCTATE-EQUATORIAL CORTEX	1	1.8%	0	0.0%
100.305	PUNCTATE-POSTERIOR SUTURES	1	1.8%	0	0.0%
100.306	PUNCTATE-NUCLEUS	2	3.5%	0	0.0%
100.312	INCIPIENT-POSTERIOR CORTEX	0	0.0%	1	6.7%
100.317	INCIPIENT-CAPSULAR	1	1.8%	0	0.0%
100.328	Y-SUTURE TIP OPACITIES	1	1.8%	0	0.0%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***5***	***8.8%***	***1***	***6.7%***
FUNDUS					
120.170	RETINAL DYSPLASIA-FOLDS	1	1.8%	0	0.0%
130.110	MICROPAPILLA	2	3.5%	1	6.7%
130.120	OPTIC NERVE HYPOPLASIA	1	1.8%	0	0.0%
OTHER					
900.100	OTHER-SUSPECTED AS INHERITED	0	0.0%	1	6.7%
900.110	OTHER-SUSPECTED AS NOT-INHERITED	5	8.8%	0	0.0%
NORMAL					
.000	NORMAL GLOBE	37	64.9%	11	73.3%

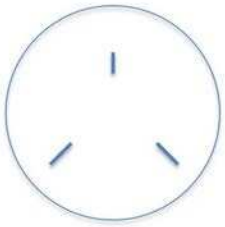
WHITE SWISS SHEPHERD

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Y-suture tip opacity	Not defined	1	Breeder option	

Description and Comments

A. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. Newer versions of the form (since 3/16/21) have boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
WHITE SWISS SHEPHERD

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	14		56	
	Diagnostic Name	#	%	#	%
EYELIDS					
25.110	DISTICHIASIS	0	0.0%	2	3.6%
CORNEA					
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	0	0.0%	6	10.7%
UVEA					
93.170	UVEAL CYST-MULTIPLE	1	7.1%	0	0.0%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	1	7.1%	5	8.9%
100.301	PUNCTATE-ANTERIOR CORTEX	1	7.1%	2	3.6%
100.307	PUNCTATE-CAPSULAR	1	7.1%	0	0.0%
100.311	INCIPIENT-ANTERIOR CORTEX	0	0.0%	1	1.8%
100.316	INCIPIENT-NUCLEUS	1	7.1%	1	1.8%
100.328	Y-SUTURE TIP OPACITIES	0	0.0%	6	10.7%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***3***	***21.4%***	***4***	***7.1%***
OTHER					
900.110	OTHER-SUSPECTED AS NOT-INHERITED	0	0.0%	1	1.8%
NORMAL					
.000	NORMAL GLOBE	11	78.6%	39	69.6%

WINDSPRITE

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the WINDSPRITE breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
WINDSPRITE

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 15 #	 %	Year Examined: 2019-2023 Total # Dogs: 126 #	 %
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	0	0.0%	1	0.8%
UVEA				
97.150 COLOBOMA	0	0.0%	1	0.8%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	0	0.0%	2	1.6%
100.311 INCIPIENT-ANTERIOR CORTEX	0	0.0%	2	1.6%
100.312 INCIPIENT-POSTERIOR CORTEX	0	0.0%	1	0.8%
100.313 INCIPIENT-EQUATORIAL CORTEX	0	0.0%	1	0.8%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***0***	***0.0%***	***4***	***3.2%***
VITREOUS				
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	0	0.0%	1	0.8%
110.320 VITREOUS DEGENERATION-SYNERESIS	0	0.0%	2	1.6%
OTHER				
900.110 OTHER-SUSPECTED AS NOT-INHERITED	0	0.0%	3	2.4%
NORMAL				
.000 NORMAL GLOBE	15	100.0%	117	92.9%

WIRE FOX TERRIER*

*The Wire Fox Terrier and the Smooth Fox Terrier were originally considered two varieties of the same breed. They became separate breeds in 1985. It is likely that the same genetic diseases exist in both breeds.

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Glaucoma	Not defined	2	NO	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
C.	Cataract	Not defined	1	NO	
D.	Lens luxation	Autosomal recessive	3	NO	Mutation in the *ADAMTS17* gene

Description and Comments

A. Glaucoma

Glaucoma is characterized by an elevation of intraocular pressure (IOP) which, when sustained, causes intraocular damage resulting in blindness. The elevated IOP occurs because the fluid cannot leave through the iridocorneal angle. Diagnosis and classification of glaucoma requires measurement of the intraocular pressure (tonometry) and examination of the iridocorneal angle (gonioscopy). Neither of these tests are part of a routine breed eye screening exam.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region. The cataracts observed in Wire Fox Terrier begin in the posterior subcapsular region and are progressive.

D. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma) causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Martin CL, Wyman M. Primary glaucoma in the dog. *Vet Clin North Am*. 1978;8:257-286.

3. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol*. 2011;14:378-384. PMID: 22050825.

OCULAR DISORDERS REPORT
WIRE FOX TERRIER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 327 #	 %	Year Examined: 2019-2023 Total # Dogs: 28 #	 %
GLOBE				
.110 MICROPHTHALMOS	1	0.3%	0	0.0%
EYELIDS				
25.110 DISTICHIASIS	9	2.8%	0	0.0%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	3	0.9%	0	0.0%
70.730 DYSTROPHY-ENDOTHELIAL	1	0.3%	0	0.0%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	112	34.3%	7	25.0%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	5	1.5%	0	0.0%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	5	1.5%	0	0.0%
93.740 PERSISTENT PUPILLARY MEMBRANES - IRIS TO SHEETS	1	0.3%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	0	0.0%	3	10.7%
LENS				
100.200 CATARACT, UNSPECIFIED	4	1.2%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	2	0.6%	0	0.0%
100.301 PUNCTATE-ANTERIOR CORTEX	3	0.9%	0	0.0%
100.304 PUNCTATE-ANTERIOR SUTURES	1	0.3%	0	0.0%
100.311 INCIPIENT-ANTERIOR CORTEX	5	1.5%	0	0.0%
100.312 INCIPIENT-POSTERIOR CORTEX	5	1.5%	0	0.0%
100.313 INCIPIENT-EQUATORIAL CORTEX	2	0.6%	0	0.0%
100.314 INCIPIENT-ANTERIOR SUTURES	1	0.3%	0	0.0%
100.321 INCOMPLETE-ANTERIOR CORTEX	1	0.3%	0	0.0%
100.322 INCOMPLETE-POSTERIOR CORTEX	1	0.3%	0	0.0%
100.326 INCOMPLETE-NUCLEUS	1	0.3%	0	0.0%
100.330 GENERALIZED/ COMPLETE	8	2.4%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***32***	***9.8%***	***0***	***0.0%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	1	0.3%	0	0.0%
110.320 VITREOUS DEGENERATION-SYNERESIS	1	0.3%	0	0.0%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	1	0.3%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	4	1.2%	1	3.6%
OTHER				
900.000 OTHER, UNSPECIFIED	3	0.9%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	12	3.7%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	1	0.3%	0	0.0%
NORMAL				
.000 NORMAL GLOBE	188	57.5%	19	67.9%

WIREHAIRED POINTING GRIFFON

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Distichiasis	Not defined	1	Breeder option	
B.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
C.	Cataract				
	- generalized	Not defined	1	NO	
	- *FYCO1*	Presumed autosomal recessice	2	NO	Mutation of the *FYCO1* gene
D.	Y-suture tip opacity	Not defined	1	Breeder option	
E.	Persistent hyaloid artery/remnant (PHA)	Not defined	1	Breeder option	

Description and Comments

A. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regard to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded; breeding discretion is advised.

B. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

C. Cataract

- generalized

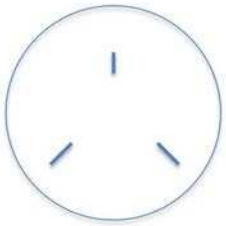
A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

- FYCO1

A mutation in the FYCO1 gene has been associated with juvenile cataract in this breed. Studies suggest that the mode of inheritance is autosomal recessive.

D. Y-suture tip opacity

These are prominent (or “highlighted” or “more dense”) distal portions of the posterior sutures that may occur in the posterior cortex to occasionally on the posterior lens capsule. This is not a true cataract, so there is no lens fiber disruption (no feathering or bulbous tips). It may be in the shape of a “peace sign” as diagrammed here, but occasionally a patient may have 4-5 suture lines and therefore more suture tip opacities. They may be present only at one suture tip of one eye or up to all three (or more, as stated above) suture tips in both eyes in a given dog. They are more commonly found in multiples or at least bilaterally symmetrical. They may be visible only with biomicroscopy or sometimes with retroillumination. They do not appear to progress (unless mis-diagnosed) and are considered essentially a variation of normal or possibly familial, as they are seen more commonly in certain breeds.



These should be marked under the “Lens” section of the CAER form. Newer versions of the form (since 3/16/21) have boxes that say, “posterior Y-suture tip opacities” which should be marked. If working with an older version of the form, there are 2 places to mark within the lens section as cataract bubbles: "punctate posterior sutures” AND ALSO MARK "suspect not inherited/significance unknown” (without which they technically fail or at least require further information before coding). This diagnosis should ALSO be accompanied by drawings (like below) and/or have comments such as: “E2” or “posterior suture tip opacities.” This helps differentiate them from 1) prominent but otherwise normal full suture lines – which should just be commented on and are treated as normal, and 2) true sutural cataracts - which would either be breeder option or failing.

E. Persistent hyaloid artery remnant (PHA)

Congenital defect resulting from abnormalities in the development and regression of the hyaloid artery. The blood vessel remnant can be present in the vitreous as a small patent vascular strand (PHA) or as a non-vascular strand that appears gray-white (persistent hyaloid remnant).

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Garces GR, Cristen M, Loechel, et al. FYCO1 frameshift deletion in Wirehaired Pointing Griffon dogs with juvenile cataract. *Genes (Basel)*; 2022 Feb; 13(2):334. PMID: 35205377 **reference derived from non-USA dog population**

OCULAR DISORDERS REPORT
WIREHAIRED POINTING GRIFFON

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	685		516	
	Diagnostic Name	**#**	**%**	**#**	**%**
GLOBE					
.110	MICROPHTHALMOS	1	0.1%	0	0.0%
EYELIDS					
21.000	ENTROPION	4	0.6%	1	0.2%
25.110	DISTICHIASIS	8	1.2%	4	0.8%
NICTITANS					
51.100	CARTILAGE ANOMALY/ EVERSION	1	0.1%	0	0.0%
52.110	GLAND PROLAPSE	1	0.1%	0	0.0%
CORNEA					
70.210	CHRONIC SUPERFICIAL KERATITIS/ PANNUS	1	0.1%	0	0.0%
70.700	DYSTROPHY-EPITHELIAL/ STROMAL	1	0.1%	1	0.2%
70.730	DYSTROPHY-ENDOTHELIAL	3	0.4%	0	0.0%
UVEA					
93.110	IRIS HYPOPLASIA	1	0.1%	1	0.2%
93.710	PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	10	1.5%	13	2.5%
93.750	PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	1	0.1%	8	1.6%
LENS					
100.210	CATARACT-SIGNIFICANCE UNKNOWN	53	7.7%	27	5.2%
100.301	PUNCTATE-ANTERIOR CORTEX	15	2.2%	12	2.3%
100.302	PUNCTATE-POSTERIOR CORTEX	3	0.4%	2	0.4%
100.303	PUNCTATE-EQUATORIAL CORTEX	0	0.0%	2	0.4%
100.304	PUNCTATE-ANTERIOR SUTURES	1	0.1%	1	0.2%
100.305	PUNCTATE-POSTERIOR SUTURES	5	0.7%	2	0.4%
100.306	PUNCTATE-NUCLEUS	12	1.8%	4	0.8%
100.307	PUNCTATE-CAPSULAR	6	0.9%	1	0.2%
100.311	INCIPIENT-ANTERIOR CORTEX	4	0.6%	4	0.8%
100.312	INCIPIENT-POSTERIOR CORTEX	5	0.7%	1	0.2%
100.313	INCIPIENT-EQUATORIAL CORTEX	1	0.1%	2	0.4%
100.316	INCIPIENT-NUCLEUS	6	0.9%	2	0.4%
100.317	INCIPIENT-CAPSULAR	0	0.0%	2	0.4%
100.321	INCOMPLETE-ANTERIOR CORTEX	0	0.0%	2	0.4%
100.322	INCOMPLETE-POSTERIOR CORTEX	0	0.0%	2	0.4%
100.328	Y-SUTURE TIP OPACITIES	7	1.0%	9	1.7%
100.345	***SIGNIFICANT CATARACTS (SUMMARY)***	***58***	***8.5%***	***39***	***7.6%***
VITREOUS					
110.120	PERSISTENT HYALOID ARTERY	1	0.1%	9	1.7%
110.200	VITREOUS DEGENERATION-ANTERIOR CHAMBER	3	0.4%	3	0.6%
110.320	VITREOUS DEGENERATION-SYNERESIS	6	0.9%	4	0.8%
FUNDUS					
120.170	RETINAL DYSPLASIA-FOLDS	5	0.7%	2	0.4%
120.180	RETINAL DYSPLASIA-GEOGRAPHIC	1	0.1%	1	0.2%
120.960	RETINOPATHY	1	0.1%	0	0.0%
OTHER					
900.000	OTHER, UNSPECIFIED	6	0.9%	0	0.0%
900.100	OTHER-SUSPECTED AS INHERITED	3	0.4%	0	0.0%
900.110	OTHER-SUSPECTED AS NOT-INHERITED	18	2.6%	18	3.5%
NORMAL					
.000	NORMAL GLOBE	580	84.7%	423	82.0%

WIREHAIRED VIZSLA

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
B.	Cataract	Not defined	1	NO	

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
WIREHAIRED VIZSLA

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 177 #	 %	Year Examined: 2019-2023 Total # Dogs: 137 #	 %
EYELIDS				
25.110 DISTICHIASIS	0	0.0%	1	0.7%
NICTITANS				
52.110 GLAND PROLAPSE	3	1.7%	0	0.0%
CORNEA				
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	0	0.0%	1	0.7%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	11	6.2%	8	5.8%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	14	7.9%	12	8.8%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	22	12.4%	8	5.8%
100.301 PUNCTATE-ANTERIOR CORTEX	6	3.4%	1	0.7%
100.302 PUNCTATE-POSTERIOR CORTEX	1	0.6%	0	0.0%
100.303 PUNCTATE-EQUATORIAL CORTEX	1	0.6%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	2	1.1%	0	0.0%
100.306 PUNCTATE-NUCLEUS	2	1.1%	3	2.2%
100.307 PUNCTATE-CAPSULAR	7	4.0%	2	1.5%
100.312 INCIPIENT-POSTERIOR CORTEX	0	0.0%	2	1.5%
100.315 INCIPIENT-POSTERIOR SUTURES	0	0.0%	1	0.7%
100.316 INCIPIENT-NUCLEUS	1	0.6%	0	0.0%
100.317 INCIPIENT-CAPSULAR	0	0.0%	2	1.5%
100.322 INCOMPLETE-POSTERIOR CORTEX	0	0.0%	1	0.7%
100.328 Y-SUTURE TIP OPACITIES	1	0.6%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***20***	***11.3%***	***12***	***8.8%***
VITREOUS				
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	1	0.6%	1	0.7%
110.320 VITREOUS DEGENERATION-SYNERESIS	1	0.6%	0	0.0%
FUNDUS				
120.910 RETINAL DETACHMENT WITHOUT DIALYSIS	1	0.6%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	4	2.3%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	1	0.6%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	8	4.5%	6	4.4%
NORMAL				
.000 NORMAL GLOBE	136	76.8%	103	75.2%

WORKING KELPIE

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the WORKING KELPIE breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
WORKING KELPIE

	Year Examined:	1993-2018		2019-2023	
	Total # Dogs:	1		2	
Diagnostic Name		#	%	#	%
NORMAL					
.000	NORMAL GLOBE	1	100.0%	2	100.0%

XOLOITZCUINTLI

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Persistent pupillary membranes - lens pigment foci/no strands	Not defined	1	Passes with no notation	
B.	Cataract	Not defined	1	NO	

Description and Comments

A. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

B. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

OCULAR DISORDERS REPORT
XOLOITZCUINTLI

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 107 #	 %	2019-2023 199 #	 %
EYELIDS				
25.110 DISTICHIASIS	1	0.9%	1	0.5%
CORNEA				
70.220 EXPOSURE KERATOPATHY SYNDROME	0	0.0%	2	1.0%
UVEA				
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	4	3.7%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	1	0.9%	8	4.0%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	1	0.9%	7	3.5%
100.301 PUNCTATE-ANTERIOR CORTEX	0	0.0%	4	2.0%
100.302 PUNCTATE-POSTERIOR CORTEX	1	0.9%	0	0.0%
100.305 PUNCTATE-POSTERIOR SUTURES	0	0.0%	5	2.5%
100.311 INCIPIENT-ANTERIOR CORTEX	3	2.8%	0	0.0%
100.312 INCIPIENT-POSTERIOR CORTEX	7	6.5%	1	0.5%
100.313 INCIPIENT-EQUATORIAL CORTEX	3	2.8%	0	0.0%
100.317 INCIPIENT-CAPSULAR	3	2.8%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	1	0.9%	3	1.5%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***17***	***15.9%***	***10***	***5.0%***
VITREOUS				
110.320 VITREOUS DEGENERATION-SYNERESIS	0	0.0%	2	1.0%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	0	0.0%	1	0.5%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	1	0.9%	0	0.0%
OTHER				
900.100 OTHER-SUSPECTED AS INHERITED	1	0.9%	0	0.0%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	1	0.9%	4	2.0%
NORMAL				
.000 NORMAL GLOBE	91	85.0%	170	85.4%

YAKUTIAN LAIKA

There are insufficient breed eye screening examination statistics providing detailed descriptions of hereditary ocular conditions of the YAKUTIAN LAIKA breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
YAKUTIAN LAIKA

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 9 #	 %	Year Examined: 2019-2023 Total # Dogs: 32 #	 %
UVEA				
93.120 UVEAL CYST-SINGLE	1	11.1%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	1	11.1%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	0	0.0%	1	3.1%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	0	0.0%	1	3.1%
100.301 PUNCTATE-ANTERIOR CORTEX	0	0.0%	1	3.1%
100.306 PUNCTATE-NUCLEUS	0	0.0%	1	3.1%
100.322 INCOMPLETE-POSTERIOR CORTEX	0	0.0%	1	3.1%
100.323 INCOMPLETE-EQUATORIAL CORTEX	0	0.0%	1	3.1%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***0***	***0.0%***	***4***	***12.5%***
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	1	11.1%	0	0.0%
OTHER				
900.110 OTHER-SUSPECTED AS NOT-INHERITED	0	0.0%	1	3.1%
NORMAL				
.000 NORMAL GLOBE	8	88.9%	27	84.4%

YORKSHIRE TERRIER

	DISORDER	INHERITANCE	REFERENCE	BREEDING ADVICE	GENETIC MUTATIONS DESCRIBED
A.	Keratoconjunctivitis sicca	Not defined	2	NO	
B.	Distichiasis	Not defined	1	Breeder option	
C.	Persistent pupillary membranes				
	- iris to iris	Not defined	1	Breeder option	
	- lens pigment foci/no strands	Not defined	1	Passes with no notation	
D.	Cataract	Not defined	1	NO	
E.	Lens luxation	Autosomal recessive	3	NO	Mutation in the *ADAMTS17* gene
F.	Retinal atrophy				
	- generalized	Not defined	1	NO	
	- PRA-*prcd*	Autosomal recessive	4	NO	Mutation in the *prcd* gene

Description and Comment

A. Keratoconjunctivitis sicca

An abnormality of the tear film, most commonly a deficiency of the aqueous portion, although the mucin and/or lipid layers may be affected; results in ocular irritation and/or vision impairment. There is evidence that Yorkshire Terriers sometimes present with severe, congenital, unilateral keratoconjunctivitis sicca (KCS) and it is suspected this is due to hypoplasia or aplasia of the gland.

B. Distichiasis

Eyelashes abnormally located on the eyelid margin which may cause ocular irritation. Distichiasis may occur at any time in the life of a dog. It is difficult to make a strong recommendation with regards to breeding dogs with this entity. The hereditary basis has not been established although it seems probable due to the high incidence in some breeds. Reducing the incidence is a logical goal. When diagnosed, distichiasis should be recorded. Breeding discretion is advised.

C. Persistent pupillary membranes (PPMs)

Persistent blood vessel remnants in the anterior chamber of the eye which fail to regress normally by 3 months of age. These strands may bridge from iris to iris, iris to cornea, iris to lens, or form sheets of tissue in the anterior chamber. The last three forms pose the greatest threat to vision and when severe, vision impairment or blindness may occur.

Lens pigment foci/no strands is considered an insignificant finding and therefore not noted on the certificate.

D. Cataract

A partial or complete opacity of the lens and/or its capsule. In cases where cataracts are complete and affect both eyes, blindness results. The prudent approach is to assume cataracts to be hereditary except in cases known to be associated with trauma, other causes of ocular inflammation, specific metabolic diseases, persistent pupillary membrane, persistent hyaloid, or nutritional deficiencies. Cataracts may involve the lens completely (diffuse) or in a localized region.

E. Lens luxation

Partial (subluxation) or complete displacement of the lens from the normal anatomic site behind the pupil. Lens luxation not associated with trauma or inflammation is presumed to be inherited. Lens luxation may result in elevated intraocular pressure (glaucoma) causing vision impairment or blindness. A mutation in *ADAMTS17* has been associated with primary lens luxation. A DNA test is available.

F. Retinal atrophy

- generalized

A degenerative disease of the retinal visual cells which progresses to blindness. This abnormality, also known as progressive retinal atrophy or PRA, may be detected by electroretinogram (not part of a routine eye screening examination) before it is apparent clinically. PRA is inherited as an autosomal recessive trait in most breeds.

- PRA-*prcd*

Studies have shown that one form of PRA in the Yorkshire terrier is *prcd* which is a late-onset form of PRA inherited as autosomal recessive. The mutation is allelic to that present in Miniature Poodles, Labrador Retrievers, English and American Cocker Spaniels and others. The locus is termed the progressive rod-cone degeneration (*prcd*) gene and at least 30+ breeds are affected. In most affected dogs to date, the disease is recognized clinically in dogs 3-6 years of age or older. This photoreceptor degeneration is characterized by slow death of visual cells following their normal development. The disease begins clinically with signs of night blindness followed by day blindness. A DNA test is available.

Other forms of retinal degeneration are recognized in the breed. The currently available genetic tests will not detect these other forms of PRA.

References

1. ACVO Genetics Committee and/or Data from OFA All-Breeds Report.

2. Herrera HD, Weichsler N, Gomez JR, et al. Severe, unilateral, unresponsive keratoconjunctivitis sicca in 16 juvenile Yorkshire Terriers. *Vet Ophthalmol.* 2007;10:285-288. PMID: 17760706.

3. Gould D, Pettitt L, McLaughlin B, et al. ADAMTS17 mutation associated with primary lens luxation is widespread among breeds. *Vet Ophthalmol.* 2011;14:378-384. PMID: 22050825.

4. Based on personal communication with Sue Pearce Kelling and OptiGen

OCULAR DISORDERS REPORT
YORKSHIRE TERRIER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1,896 #	%	Year Examined: 2019-2023 Total # Dogs: 936 #	%
GLOBE				
.110 MICROPHTHALMOS	5	0.3%	1	0.1%
10.000 GLAUCOMA	1	0.1%	0	0.0%
40.910 KERATOCONJUNCTIVITIS SICCA (KCS)	6	0.3%	1	0.1%
EYELIDS				
21.000 ENTROPION	0	0.0%	2	0.2%
25.110 DISTICHIASIS	38	2.0%	9	1.0%
32.110 IMPERFORATE LACRIMAL PUNCTUM	0	0.0%	1	0.1%
NICTITANS				
52.110 GLAND PROLAPSE	1	0.1%	0	0.0%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	4	0.2%	0	0.0%
70.220 EXPOSURE KERATOPATHY SYNDROME	4	0.2%	0	0.0%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	15	0.8%	2	0.2%
70.730 DYSTROPHY-ENDOTHELIAL	1	0.1%	0	0.0%
UVEA				
93.110 IRIS HYPOPLASIA	1	0.1%	1	0.1%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	186	9.8%	69	7.4%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	4	0.2%	1	0.1%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	6	0.3%	0	0.0%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	22	1.2%	17	1.8%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	2	0.1%	0	0.0%
LENS				
100.200 CATARACT, UNSPECIFIED	23	1.2%	0	0.0%
100.210 CATARACT-SIGNIFICANCE UNKNOWN	57	3.0%	13	1.4%
100.301 PUNCTATE-ANTERIOR CORTEX	38	2.0%	14	1.5%
100.302 PUNCTATE-POSTERIOR CORTEX	13	0.7%	1	0.1%
100.303 PUNCTATE-EQUATORIAL CORTEX	6	0.3%	2	0.2%
100.304 PUNCTATE-ANTERIOR SUTURES	5	0.3%	1	0.1%
100.305 PUNCTATE-POSTERIOR SUTURES	7	0.4%	2	0.2%
100.306 PUNCTATE-NUCLEUS	3	0.2%	3	0.3%
100.307 PUNCTATE-CAPSULAR	3	0.2%	6	0.6%
100.311 INCIPIENT-ANTERIOR CORTEX	30	1.6%	20	2.1%
100.312 INCIPIENT-POSTERIOR CORTEX	19	1.0%	16	1.7%
100.313 INCIPIENT-EQUATORIAL CORTEX	19	1.0%	1	0.1%
100.314 INCIPIENT-ANTERIOR SUTURES	3	0.2%	19	2.0%
100.315 INCIPIENT-POSTERIOR SUTURES	3	0.2%	21	2.2%
100.316 INCIPIENT-NUCLEUS	3	0.2%	13	1.4%
100.317 INCIPIENT-CAPSULAR	1	0.1%	1	0.1%
100.321 INCOMPLETE-ANTERIOR CORTEX	6	0.3%	5	0.5%
100.322 INCOMPLETE-POSTERIOR CORTEX	3	0.2%	2	0.2%
100.323 INCOMPLETE-EQUATORIAL CORTEX	1	0.1%	0	0.0%
100.324 INCOMPLETE-ANTERIOR SUTURES	1	0.1%	0	0.0%
100.325 INCOMPLETE-POSTERIOR SUTURES	1	0.1%	0	0.0%
100.326 INCOMPLETE-NUCLEUS	2	0.1%	0	0.0%
100.328 Y-SUTURE TIP OPACITIES	2	0.1%	1	0.1%
100.330 GENERALIZED/ COMPLETE	29	1.5%	1	0.1%
100.375 SUBLUXATION/ LUXATION	1	0.1%	0	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***219***	***11.6%***	***128***	***13.7%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	2	0.1%	3	0.3%
110.135 PHPV/ PTVL	4	0.2%	1	0.1%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	8	0.4%	6	0.6%

OCULAR DISORDERS REPORT
YORKSHIRE TERRIER

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 1,896 #	 %	Year Examined: 2019-2023 Total # Dogs: 936 #	 %
VITREOUS Continued				
110.320 VITREOUS DEGENERATION-SYNERESIS	19	1.0%	6	0.6%
FUNDUS				
120.170 RETINAL DYSPLASIA-FOLDS	8	0.4%	0	0.0%
120.310 RETINAL ATROPHY-GENERALIZED	56	3.0%	2	0.2%
120.920 RETINAL DETACHMENT	1	0.1%	2	0.2%
120.960 RETINOPATHY	5	0.3%	0	0.0%
130.110 MICROPAPILLA	1	0.1%	0	0.0%
130.120 OPTIC NERVE HYPOPLASIA	3	0.2%	0	0.0%
OTHER				
900.000 OTHER, UNSPECIFIED	19	1.0%	0	0.0%
900.100 OTHER-SUSPECTED AS INHERITED	26	1.4%	2	0.2%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	36	1.9%	25	2.7%
NORMAL				
.000 NORMAL GLOBE	1,422	75.0%	737	78.7%

HYBRID

There are insufficient breed eye screen examination statistics providing detailed descriptions of hereditary ocular conditions of the HYBRID breed. Therefore, there are no conditions listed with breeding advice.

OCULAR DISORDERS REPORT
HYBRID

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 13,082 #	%	2019-2023 18,942 #	%
GLOBE				
.110 MICROPHTHALMOS	14	0.1%	10	0.1%
40.910 KERATOCONJUNCTIVITIS SICCA (KCS)	2	0.0%	0	0.0%
EYELIDS				
20.140 ECTOPIC CILIA	2	0.0%	2	0.0%
21.000 ENTROPION	40	0.3%	32	0.2%
22.000 ECTROPION	10	0.1%	4	0.0%
25.110 DISTICHIASIS	322	2.5%	466	2.5%
32.110 IMPERFORATE LACRIMAL PUNCTUM	8	0.1%	10	0.1%
NICTITANS				
50.210 PLASMOMA/ ATYPICAL PANNUS	2	0.0%	4	0.0%
51.100 CARTILAGE ANOMALY/ EVERSION	10	0.1%	16	0.1%
CORNEA				
70.210 CHRONIC SUPERFICIAL KERATITIS/ PANNUS	4	0.0%	4	0.0%
70.220 EXPOSURE KERATOPATHY SYNDROME	6	0.0%	16	0.1%
70.700 DYSTROPHY-EPITHELIAL/ STROMAL	70	0.5%	78	0.4%
UVEA				
90.250 PIGMENTARY UVEITIS	0	0.0%	2	0.0%
93.110 IRIS HYPOPLASIA	10	0.1%	10	0.1%
93.120 UVEAL CYST-SINGLE	18	0.1%	32	0.2%
93.150 IRIS COLOBOMA	2	0.0%	2	0.0%
93.170 UVEAL CYST-MULTIPLE	8	0.1%	16	0.1%
93.180 IRIS SPHINCTER DYSPLASIA	2	0.0%	0	0.0%
93.710 PERSISTENT PUPILLARY MEMBRANES - IRIS TO IRIS	440	3.4%	830	4.4%
93.720 PERSISTENT PUPILLARY MEMBRANES - IRIS TO LENS	10	0.1%	12	0.1%
93.730 PERSISTENT PUPILLARY MEMBRANES - IRIS TO CORNEA	8	0.1%	10	0.1%
93.750 PERSISTENT PUPILLARY MEMBRANES - LENS PIGMENT FOCI NO STRANDS	160	1.2%	420	2.2%
93.760 PERSISTENT PUPILLARY MEMBRANES - ENDOTHELIAL OPACITY NO STRANDS	4	0.0%	10	0.1%
93.810 UVEAL MELANOMA	2	0.0%	2	0.0%
95.120 UVEAL CYST-FREE FLOATING	4	0.0%	2	0.0%
97.150 COLOBOMA	0	0.0%	10	0.1%
FUNDUS				
97.110 CHOROIDAL HYPOPLASIA	10	0.1%	18	0.1%
120.170 RETINAL DYSPLASIA-FOLDS	80	0.6%	84	0.4%
120.180 RETINAL DYSPLASIA-GEOGRAPHIC	30	0.2%	34	0.2%
120.310 RETINAL ATROPHY-GENERALIZED	24	0.2%	18	0.1%
120.920 RETINAL DETACHMENT	4	0.0%	2	0.0%
120.960 RETINOPATHY	18	0.1%	4	0.0%
130.110 MICROPAPILLA	30	0.2%	26	0.1%
130.120 OPTIC NERVE HYPOPLASIA	6	0.0%	10	0.1%
LENS				
100.210 CATARACT-SIGNIFICANCE UNKNOWN	282	2.2%	434	2.3%
100.301 PUNCTATE-ANTERIOR CORTEX	116	0.9%	148	0.8%
100.302 PUNCTATE-POSTERIOR CORTEX	86	0.7%	68	0.4%
100.303 PUNCTATE-EQUATORIAL CORTEX	26	0.2%	38	0.2%
100.304 PUNCTATE-ANTERIOR SUTURES	30	0.2%	30	0.2%
100.305 PUNCTATE-POSTERIOR SUTURES	50	0.4%	72	0.4%
100.306 PUNCTATE-NUCLEUS	50	0.4%	32	0.2%
100.307 PUNCTATE-CAPSULAR	76	0.6%	140	0.7%
100.311 INCIPIENT-ANTERIOR CORTEX	72	0.6%	102	0.5%
100.312 INCIPIENT-POSTERIOR CORTEX	86	0.7%	108	0.6%
100.313 INCIPIENT-EQUATORIAL CORTEX	42	0.3%	56	0.3%
100.314 INCIPIENT-ANTERIOR SUTURES	2	0.0%	6	0.0%

OCULAR DISORDERS REPORT
HYBRID

Diagnostic Name	Year Examined: 1993-2018 Total # Dogs: 13,082 #	 %	Year Examined: 2019-2023 Total # Dogs: 18,942 #	 %
LENS Continued				
100.315 INCIPIENT-POSTERIOR SUTURES	26	0.2%	28	0.1%
100.316 INCIPIENT-NUCLEUS	28	0.2%	28	0.1%
100.317 INCIPIENT-CAPSULAR	30	0.2%	68	0.4%
100.321 INCOMPLETE-ANTERIOR CORTEX	20	0.2%	26	0.1%
100.322 INCOMPLETE-POSTERIOR CORTEX	30	0.2%	42	0.2%
100.323 INCOMPLETE-EQUATORIAL CORTEX	8	0.1%	4	0.0%
100.324 INCOMPLETE-ANTERIOR SUTURES	0	0.0%	4	0.0%
100.325 INCOMPLETE-POSTERIOR SUTURES	6	0.0%	2	0.0%
100.326 INCOMPLETE-NUCLEUS	10	0.1%	8	0.0%
100.327 INCOMPLETE-CAPSULAR	2	0.0%	12	0.1%
100.328 Y-SUTURE TIP OPACITIES	50	0.4%	162	0.9%
100.330 GENERALIZED/ COMPLETE	16	0.1%	22	0.1%
100.340 RESORBING/ HYPERMATURE	8	0.1%	6	0.0%
100.375 SUBLUXATION/ LUXATION	2	0.0%	6	0.0%
100.345 SIGNIFICANT CATARACTS (SUMMARY)	***820***	***6.3%***	***1,050***	***5.5%***
VITREOUS				
110.120 PERSISTENT HYALOID ARTERY	26	0.2%	76	0.4%
110.135 PHPV/ PTVL	4	0.0%	10	0.1%
110.200 VITREOUS DEGENERATION-ANTERIOR CHAMBER	16	0.1%	28	0.1%
110.320 VITREOUS DEGENERATION-SYNERESIS	86	0.7%	114	0.6%
OTHER				
900.100 OTHER-SUSPECTED AS INHERITED	30	0.2%	22	0.1%
900.110 OTHER-SUSPECTED AS NOT-INHERITED	334	2.6%	458	2.4%
NORMAL				
.000 NORMAL GLOBE	10,822	82.7%	15,642	82.6%