

Avenues for livestock development in remote areas: the case of the Greek prefecture of Evros

Georgios Tsantopoulos¹, Christos Karelakis² Spyridon Mamalis³ and Konstantina Armenou⁴

¹Department of Forestry and Management of the Environment and Natural Resources, Democritus University of Thrace, Greece, e-mail: tsantopo@fmenr.duth.gr

²Department of Agricultural Development, Democritus University of Thrace, Greece, e-mail: chkarel@agro.duth.gr

³Department of Business Administration, Kavala Institute of Technology, Greece, e-mail: mamalis@teikav.edu.gr

⁴Directorate of Agricultural Economics and Veterinary Orestiada, Greece, e-mail: armenou@pamth.gov.gr

Abstract. The research was conducted in the prefecture of Evros aiming to examine the attitudes, opinions and perceptions of farmers on the main problems they confront and confine the livestock development in the prefecture. It comprises a sociological survey carried out using a structured questionnaire and employing the method of personal interviews. The sampling method was the simple random sampling and the analysis of the survey data was carried out via descriptive statistics, Friedman's test and factor analysis. The results indicate that livestock farming in the prefecture is declining and this is mainly due to the impact of the economic crisis and the outbreak of the epidemic crisis. Livestock farmers show confidence towards public services and they are willing to be informed about the disease prevention and hygiene conditions. They also feel that they do not participate in subsidized programs due to the economic crisis, the lack of capital to cover their own participation and bureaucracy issues.

Keywords: livestock, communication, regional development, Evros prefecture.

1 Introduction

Livestock farming plays nowadays a leading role in the economies of several countries attracting large investments (Aggelopoulos et.al. 2016; Boyazoglu, 2002). Still, inefficient farm management can contribute to the degradation of pastures and the pollution of water resources and the loss of biodiversity. By contrast, with good management, livestock farming can make a positive contribution to natural resources by enhancing soil quality and improving biodiversity. International scholars have studied the economics and sustainability of the livestock sector, as well as the potential for further improving its competitiveness. Aggelopoulos et. al., (2010)

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argued that the most important problem in the sheep and goat sector is the high production costs that affects its competitiveness. Theocharopoulos et. al., (2007) estimated the costs of input use and determined the technical efficiency in livestock farms. They identified the possibilities of reducing the production cost based on improving the technical efficiency of the farms, to tackle the abolition of subsidies within the reformed CAP of 2003. Fousekis et. al., (2001) determined the overall efficiency of livestock farms, whereas Galanopoulos et. al. (2011) in their study report that moving sheep and goat farming, despite its declining trend, is still a major income source for the remote and mountainous areas. The results of their survey have also denoted that the technical efficiency is very low in moving herds and this is mainly due to the subsidies and the small-scale farms.

The development of livestock farming is not only about infrastructure, equipment and the genetic improvement of livestock, but also concerns the behaviour of livestock farmers regarding animal husbandry, as well as their knowledge of zootechnical management and the improvement of trust relationships with public veterinary services (Te Velde et al., 2002; Vanhonacker et al., 2008; Dwyer, 2009; Aggelopoulos et al., 2016). Potential conflicts may therefore exist between the search for profit and good animal health in livestock farming systems (Stott et al., 2005). Mishkin (1992) argued that the activity of economies is worsening, when there are information problems. The same holds for farmers who, by receiving incorrect or confused information, have low trust making amendments and innovations in the traditional forms of livestock development. Thus, they do not make any investments, especially during the economic crisis, and they do not participate in collective schemes such as cooperatives; resulting in their economic stagnation. The misinformation of livestock farmers makes them unaware, which consequently leads them to injudicious and mistaken decisions with negative results for both their herds and their incomes.

Proper and timely information of the livestock farmers of the Evros prefecture, at the time of the outbreak of the epizootic crisis, regarding the symptoms of the diseases and their consequences would result in gathering and disseminating vital information for protecting their herds and limiting the spread of diseases. In addition, timely information would have suppressed rumours - which were non-existent - which created panic and confusion and made it difficult for state authorities to control and restrict the herds, activate emergency response units and provide specific activity information (for example, compulsory encroachment for as long as the restrictive measures were in force). At the same time, the level of education of livestock farmers in the prefecture remains low that makes the development of livestock farming difficult to compete directly with foreign markets and especially, those of the neighbouring "cheap" market of Bulgaria. For this reason, it is imperative that the livestock farmers in the prefecture to continue their training and education, as it is generally accepted that optimized production of quality products depends on the knowledge and ability of the farmers. Modern necessities require informed and responsible livestock farmers, in control of their farms and capable to manage them in the most appropriate and profitable way (Stefakakis, 2015).

Lack of communication skills confines the improvement of the information services provided (Shaffril, et al., 2010). In other words, the provision of effective information, scientific support and technical training on rural infrastructure and

education, through educational actions, workshops, information gatherings, would provide livestock farmers with the necessary first-level equipment to engage actively in farm management (Mboera et al., 2010). It would also be helpful to create an online training base for the training needs of those employed in general with the primary sector (Bellos and Pappas, 2011).

Bearing in mind the aforementioned, the objective of the study is to capture farmers' views on a range of issues related to the economic situation of their farms and offer policy makers the effective means to handle the problems and the way farmers communicate. More specifically, the study examines the impact of the economic crisis on livestock farming, the interest of livestock farmers to use subsidized programs to confront the crisis, the communication methods from which they choose to be informed, as well as individual livestock issues they are interested in. The next section provides the methodological steps taken in the study, followed by the main results in the third section. Section four discusses the results of the study and concludes.

2 Materials and Methods

The population under study consisted of livestock farmers in the Evros prefecture and particularly farmers from two out of the six municipalities of the prefecture, Didimoticho and Orestiada. Primary data were gathered through a quantitative survey (structured questionnaire) to livestock farmers in the prefecture, by means of the simple random sampling method. According to the livestock census (late 2015) from the Directorate of Agricultural Economics and Veterinary in Orestiada, there were a total of 30,072 sheep and goats in 473 livestock farms, 15,250 of which were bred in the Municipality of Didymoteicho and 14,822 in the Municipality of Orestiada, primarily for milk production (Armenou, 2017). Sheep and goat farms continue to have traditional features such as grazing livestock in pasture land, traditional forms of stables, well-known pens made of natural materials. The milking of the animals is done by hand and the economy of the farms is based mainly on milk production for cheese and on the fattening and sale of the sheep (Armenou, 2017). Since the end of 1990, the sheep-goat farming has been growing in the prefecture as a new method of breeding animals, but it involves a small number of producers. This type of farms is mainly based on young age farmers and old ones as well, with key characteristics the modern buildings, where there is a mechanical milking parlour that guarantees the hygiene of production. Moreover, these farms are characterized by an embedded form of breeding and a relatively large number of animals (Dadousis, 2007). Reviewing the extant literature, the sample size was estimated to 170 livestock farmers and data were collected through a personal interview (structured questionnaire). The data were then analysed via the SPSS statistical program, employing the methods of α -Cronbach coefficient, the descriptive statistics, the Friedman's non-parametric criterion, and the Principal Component Analysis (Hair et al., 1995; Sharma, 1996). Particularly, the structure of the livestock farmer's perceptions was assessed through Principal Component Analysis (PCA) with Varimax rotation of the factorial axes in the answers given.

3 Results

This section presents the results of the study. Regarding the socio-economics of the respondents, the majority of the farmers were men (77.1%), who had the main responsibility for the farm decisions and operation. They had mostly low educational level, since 54.1% received only primary education, or not even that. More than half of them (57.7%) were aged over 51 years old and 83.5% were married with two or three children. Furthermore, 61.2% of livestock farmers had dairy farming, the 18.8% had farms for meat production and 20.0% had mixed livestock farms. As concerns the type of farming and the number of animals, most farms comprised of sheep and goats with 149.87 animals on average, followed by goats with an average animal per farm of 106.15 and sheep with 102.78 animals on average (Table 1).

Table 1. Percentages regarding type of farms and animals in each farm.

Type of farm	Percent (%)	Animals per farm (average)
Sheep	41.81	102.78
Cattle	27.12	48.17
Goats	23.16	106.15
Sheep and goats	4.52	149.87
Pigs	3.39	59.50

3.1 Economic crisis and impacts

Table 2 illustrates the changes in both livestock and livestock farmers' income due to the economic crisis. The results indicate that there has been a decrease over the last five years, with the more pronounced decline in income.

Table 2. Percentages regarding changes of animal capital and income in the last five years.

	Percentage (%)	
	Income change	Animal capital change
Increase	10.0	12.4
Decrease	64.1	55.9
Stable	25.9	31.8
Total	100.0	100.0

More than half of the breeders (55.9%) have reduced their livestock and 64.1% have seen their income shrink. This has been exacerbated by both the economic crisis and the outbreak of zoonoses along with the low demand for livestock products. The production cost was most affected by the economic crisis (70.0% of livestock farmers), while 46.4% of them argued that the demand for their products appears to have declined to a very low level after the emergence of economic crisis (Table 3).

Table 3. Percentages regarding the impacts of the economic crisis on product's demand, production cost and animal feeding cost.

	Percentage (%)		
	Product demand	Production cost	Animal feeding cost
Very decreased	13.5	0.0	0.6
Decreased	32.9	0.6	7.6
Neutral	26.5	8.2	58.2
Increased	26.5	70.0	22.4
Very Increased	0.6	21.2	11.2
Total	100.0	100.0	100.0

3.2 Subsidized programs

Despite the rising feeding costs and even more the production costs, the 57.1% of livestock farmers were not willing to join a subsidized program (Table 4). The disincentives for their participation to a subsidized program were examined via the non-parametric Friedman's test (Table 5). According to the results, the main deterrent, averaging 5.20, is the economic crisis, followed by the lack of capital to cover own stake, with a median of 5.10. An important factor, with a rating of 4.11, is the farmer's age. It is worth mentioning that elderly farmers are now willing to join time-consuming subsidized programs, which at the time of the crisis involve some economic risk.

Table 4. Frequencies and percentages regarding to the interest of livestock farmers in joining a subsidized program.

Interest in joining a subsidized program	Frequencies	Percent (%)
Yes	73	42.9
No	97	57.1
Total	170	100.0

Table 5. Friedman test for the disincentives for joining a subsidized program.

Disincentive	Mean rank
Low subsidy rate	2.41
Bureaucracy	4.08
Lack of capital to cover own stake	5.10
Lack of information for the terms and conditions	3.86
Late payments	3.24
Start of the economic crisis	5.20
Age	4.11
N= 97 Chi-Square= 169.055 df= 6 Asymp. Sig = 0.000	

In addition, the views on the lack of interest of farmers in joining a subsidized program were gauged through a multivariate statistical analysis using the Factor Analysis method. The aim was to replace the variables with new inconsistent factors, fewer in number. The analysis highlighted two factors explaining a total of 75.71% of the total variance and a value of Keiser-Meyer-Olkin index of 0.835. It is suggested that the KMO should be greater than 0.80, however, values higher than 0.60 are considered tolerable (Sharma, 1996). Table 6 gives the item loads, which are the partial correlation coefficients of the seven variables with each of the two factors derived from the post-rotation analysis. The greater the load of a variable on a factor, the more this factor is responsible for the overall variance of the degrees in the considered variable. Accordingly, the first factor included the items “late payments”, “low subsidy rate”, “bureaucracy” and the “lack of information on terms and conditions”. The second factor comprised the variables, “start of the economic crisis”, “lack of capital to cover own stake” and “age”.

Table 6: Factor analysis for the disincentives for joining a subsidized program.

Disincentive	Factors	
	1	2
Late payments	0.901	0.247
Low subsidy rate	0.839	0.091
Bureaucracy	0.745	0.472
Lack of information on terms and conditions	0.607	0.581
Start of the economic crisis	0.177	0.906
Lack of capital to cover own stake	0.216	0.894
Age	-0.510	-0.523

3.3 Information

As concerns issues for which livestock farmers would like additional information, the non-parametric Friedman's test was applied (Table 7). The results denote that the most important issue, with a rating of 5.89, is the transmission and prevention of diseases, followed by the improvement of the sanitary conditions in the farm, with a 4.94 ranking average. It is noteworthy that respondents were not interested in being informed about innovative ways of producing livestock products, education and training and organic farming, ranking them in the last positions. This may be due to the small size of livestock farms in the prefecture that do not have high returns, as well as the age and educational level of farmers, which inhibits the adoption of innovative practices.

Table 7 Friedman test for evaluating issues that need more information.

Issues	Mean Rank
Transmission and prevention of diseases	5.89
Ways to promote livestock products and to participate in exhibitions at home and abroad	3.91
Improve hygiene in the farm	4.94
Organic livestock breeding	2.22
Subsidized livestock-farming programs	4.12
Innovative ways of producing livestock products	3.55
Education and training	3.37

N= 160 Chi-Square= 357.707 df = 6 Asymp. Sig = 0.000

The classification of the media and the bodies chosen by livestock farmers to obtain information on livestock farming issues was emerged after the application of the non-parametric Friedman test. Table 8 illustrates that the main source of information was the veterinary services, with an average rank of 8.48, followed by television with a rank of 7.09, whilst in the last place was the municipality authorities, with an average of 3.79. It is noteworthy that in a very low position (4.02 ranking average) were the meetings/conferences that farmers do not attend, either because they do not have time or because they do not have the appropriate educational level to attend.

Table 8. Friedman test for evaluating information sources for livestock issues.

Information sources	Mean rank
Internet	5.11
Newspapers	5.55
Magazines	5.29
Television	7.09
Radio	4.36
Meetings/Conferences	4.02
Veterinary services	8.48
Municipality	3.79
Private bodies	6.50
Cooperatives	4.81

N= 170 Chi-Square= 565.575 df = 9 Asymp. Sig = 0.000

It should be noted that even though the cooperatives are considered a moderately important player, it is in fact a significant information authority for livestock farmers, bearing in mind that the members of the local livestock cooperative have only sheep and goats, and therefore only these members have an opinion for the quantity and type of information provided.

Finally, as far as who farmers trust to obtain information initiatives on agricultural and livestock issues, the results showed that the Directorate of Agricultural

Economics and Veterinary Affairs comes first and second the cooperatives, while there is little trust in information from the municipalities. It is worth mentioning that 23.5% of the respondents also want the University to be involved in their information process, since they consider that its departments are directly related to the agricultural and livestock sector in the prefecture (Table 9).

Table 9. Percentages regarding the bodies farmers trust to obtain information.

	Percentage (%)
Directorate of Agricultural Economics and Veterinary Affairs	93.5
University	23.5
Private veterinary doctors	20.6
Cooperatives	24.7
Municipality	11.2

4 Discussion - Conclusion

The objective of the present study was to explore a range of issues that concern livestock farmers and to propose a more effective communication strategy between livestock farmers and stakeholders. Particular attention needs to be paid to supporting the livestock farming, as it is one of the most important economic sectors in Greece and in the EU. The sector provides income to thousands of rural families and it is a significant element for rural development, particularly in mountainous and less-favoured areas.

The results of the study imply that most livestock farmers do not have the basic education, either because they have completed only primary school or they have gone through only a few classes in primary school, and their occupation with livestock farming is mostly the result of lacking the qualifications and alternative professional solutions, with relatively old farmers' ages. Concerning the type of farming and the number of animals, it appears that most farms, but not with the largest number of animals per farm, are sheep farms. Larger farms involve mainly sheep and goats, but they consist a very small number in the wider area. According to Koutsou, et al., (2013), mainly small herds are kept in the prefecture that do not exceed 200 to 300 sheep and goats demonstrating the prevalence of small to medium sized dairy farms.

Intriguingly, livestock farmers expressed a distrust towards their involvement in subsidized programs, which is largely due to the economic crisis and the lack of capital. In addition, it can be attributed to the lack of clear and reliable information on the terms and conditions of implementing such programs and the lack of confidence in state authorities. The latter, combined with the lack of trained livestock farmers, comprise an impediment to the development of livestock farming in the prefecture (Dadousis, 2007). Farmers, in their majority, consider feed costs to be neutral and this is because they produce their own livestock feed. Nevertheless, it should be noted that the compulsory encroachment of animals (due to the diseases) creates additional animal feeding needs, which they have not computed, and this

squeezes their income as they are forced to buy more animal feed. According to Karelakis et al., (2012), sheep farmers in the Eastern Macedonia and Thrace have shown that in times of crisis, they are making changes that have to do mainly with breeding practices, such as changes in animal nutrition and with management practices like grazing, milking management, self-production of feed, whilst they do not reduce the inputs purchased.

The main sources of information pertain to the veterinary services, television and private veterinarians, as they are the only convenient means to get informed in the prefecture. The lack of information and support mechanisms isolates more the livestock farms regardless of their size and production characteristics (Siardos and Koutsouris 2002). Livestock farmers in the prefecture are watching agricultural-livestock broadcasts on local TV channels, with particular interest, as they deal with interest issues and they appeal to private veterinarians because there are no public to serve them. They believe the information they receive from these three media agencies is reliable, but the veterinary services have a predominant position on the reliability of the information they take. Still, the livestock cooperative could also be an important tool and a useful source of information for farmers, as they trust the information they get from the cooperative, simply because the cooperative has as members only the sheep and goat farmers of the prefecture. There is a continuing need for farmers to cooperate with each other for the creation of a variety of organizations, such as cooperatives, in order to act collectively and tackle problems of production, processing and selling of products. The cooperation with the relevant authorities generates an additional advantage as the farmer feels that he belongs to a "group" and that his / her social status is upgraded. The inability of cooperation between sheep and goat farmers is a weak link that confines the whole effort (Vakakis, 2007). Local farmers do not use the internet as a means for information, since most of them are digitally illiterate. However, the international literature suggests that the Internet does not serve solely technological purposes but mainly information, communication (Kurt 2003) and online commercial and financial transactions.

Finally, livestock farmers in the prefecture trust the Directorate of Agricultural Economics and Veterinary Affairs to take up information initiatives on specific livestock issues and have less confidence in the cooperative and the Department of the University located in the city of Orestiada. Although the University is considered as a reliable knowledge transmitter, there is no such trust on behalf of the farmers, and this may be due either to the lack of specialists in zootechnics or to the lack of trust-building relationships between members of the university community and the farmers.

Conclusively, it is worth to mention that there is a declining trend for livestock farming and there is a need to support it. Initiatives can be undertaken by several stakeholders but, in particular, by the Directorate of Agricultural Economy and Veterinary that is trusted by the local livestock farmers. These initiatives should be promoted through local TV stations, posters and brochures, through the various public services and focus mainly on funding programs for farm modernization, disease transmission and improved hygiene in their farms. Livestock farmers should also be trained in the use of information and communication technologies. Using these tools, and especially internet services, the information of livestock farmers may

be strengthened. Internet-based information can constantly gain ground over traditional media (television, radio print media) since it can enhance the two-way communication between knowledge-producing people such as Universities, Institutes, research centres and disseminates this knowledge to livestock farmers.

References

1. Aggelopoulos, S., Galanopoulos, K., Tabakis, N. (2010) Financing of farms for Agricultural Sustainable Development: The Case of Greece. *Journal of Environmental Protection and Ecology*, 12 (3A), p. 1433-1442.
2. Aggelopoulos, S., Karelakis, C., Tsantopoulos, G., Pavludi, A., Seitani P. (2016). Farmers' perceptions and attitudes towards the development of the sheep and goat sector in the Greek region of Evros. *SpringerPlus*, 5:1134
3. Armenou, K. (2017) Communication strategies for livestock development after economic crisis: The case of the livestock farms of Evros. Postgraduate Dissertation. Department of Forestry and Management of Environment and Natural Resources, DUTH.
4. Bellos, G., Pappas D. (2011) The contribution of the Centers for Animal Genetics to the support and development of livestock farming. *Agriculture – Livestock farming*, 8, p. 58-70.
5. Boyazoglu, J. (2002) Livestock research and environmental sustainability with special reference to the Mediterranean basin. *Small Ruminant Research*, 45, p. 193-200.
6. Dadousis, K. (2007) Livestock farming in the Evros prefecture. *Newspaper Tharros*, 484 - 486.
7. Dwyer, C.M. (2009) Welfare of sheep: providing for welfare in an extensive environment. *Small Ruminant Research*, 86, p. 14–21.
8. Fousekis, P., Spathis, P., Tsimboukas, K. (2001) Assessing the Efficiency of Sheep Farming in mountainous Area of Greece. A non-parametric approach. *Agricultural Economic Review*, (2) 2, p. 5-14.
9. Galanopoulos, K., Abas, Z., Laga, V., Hatziminaoglou, I., Boyazoglu J. (2011) The technical efficiency of transhumance sheep and goat farms and the effect of EU subsidies: Do small farms benefit more than large farms? *Small Ruminant Research*, 100 (1), p. 1–7.
10. Hair, J., Anderson, R., Tatham, R. Black, W. (1995) *Multivariate data analysis with Readings*, 4th Edition. USA: Prentice Hall International.
11. Karelakis, C., Abas, Z. Polymeros, K. (2012) Management tactics of livestock farms in a period of economic crisis. 12th Panhellenic Conference on Rural Economy ATh., 22-24 November 2012, Thessaloniki.
12. Koutsou, S., Ragkos, A., Manousidis, Θ., Abas, Z., Lagka, B. (2013) Family and collective management strategies to confront the crisis in rural areas: The case of sheep and goat farms. 11th Regular Scientific Conference - 2013 (ERSA - GR) "Agricultural Economy, Countryside, Space, Regional and Local Development",

- Patra, 14-15 June, http://grsa.prd.uth.gr/conf2013/77_koutsou_etal_ersagr13.pdf.
13. Mboera, L.E., Shayo, E.H., Senkoro, K.P., Rumisha, S.F., Mlozi, M.R., Mayala, B.K. (2010) Knowledge, perceptions and practices of farming communities on linkages between malaria and agriculture in Mvomero District, Tanzania. *Journal Acya Tropica*, 113. p. 139-144.
 14. Mishkin F. S. (1992) Anatomy of a Financial Crisis. *Journal of Evolutionary Economics*, V2, (2), p. 115-130.
 15. Shaffril, M.H.A., Asmuni, A., Ismail, A. (2010) The ninth Malaysian plan and agriculture extension officer competency: A combination for intensification of paddy industry in Malaysia. *The Journal of International Social Research*, 3 (10), p. 450-458
 16. Sharma, S. (1996) *Applied Multivariate Techniques*. New York: John Wiley & Sons Inc.
 17. Siardos, G., Koutsouris, A. (2002) *Sustainable Agriculture and Development*. Thessaloniki: Zigos.
 18. Stefakakis, A. (2015) Hygiene and well-living conditions of animals and production optimization. *Proceedings of the 5th Panhellenic Conference on Animal Production Technology*, Thessaloniki.
 19. Stott, A.W., Milne, C.E., Goddard, P., Waterhouse, A. (2005) Effect of alternative management strategies on profit and animal welfare in extensive sheep production systems in Great Britain. *Livestock Production Science*, 97, p. 161–171.
 20. Te Velde, H., Aarts, N., Van Woerkum, C. (2002) Dealing with ambivalence: farmers' and consumers' perceptions of animal welfare in livestock breeding. *Journal of Agricultural and Environmental Ethics*, 15, p. 203–219.
 21. Theocharopoulos, A., Melfou, K., Papanagiotou, E. (2007) A microeconomic approach for agricultural development: A DEA application to Greek sheep farms. *New Medit - Mediterranean Journal of Economics. Agriculture and Environment*, 6(4), p. 48-54.
 22. Vakakis, F. (2007) Sheep and goat farming. Key Productive Activity for Sustainable Development of Rural Areas. *Agriculture – Livestock farming*, 5, p. 62-70.
 23. Vanhonacker, F., Verbeke, W., Van Poucke, E., Tuytens, F.A.M. (2008) Do citizens and farmers interpret the concept of farm animal welfare differently? *Livestock Science*, 116, p. 126–136.