

Section 5



Milk Quality Bacterial Contamination

by Bernadette O'Brien



Introduction

Silage, faeces, animal bedding and soil contain large numbers of bacteria. The challenge is to reduce numbers entering raw milk to a minimum. Milk contaminated with bacteria from teat surfaces will, in turn contaminate milking machine clusters, milk receivers, milk pipelines and the bulk tank. Without adequate cleaning, contamination will build up, particularly in hard to clean areas, such as pipeline joints.

- ① What makes up an effective dairy hygiene programme?
- ② How does my milking plant regime compare with best practice?
- ③ What are the key points for bulk tank hygiene?

Bacterial growth in milk

Key performance indicator



EU legislation indicates that total bacterial count (TBC) in milk should be less than 100,000/ml. However, ideally and on many farms, a TBC of less than 15,000/ml can be reached. Thermophilic bacteria counts of greater than 1,000/ml are generally penalised. However, ideally this count should be less than 200/ml and depending on the product mix, non-detectable levels may be required by some processors.

1 What makes up an effective dairy hygiene programme?

Checklist

For an effective dairy hygiene programme:



Pre-milking hygiene

1. Clip hair on tails post-calving, mid-lactation and at drying off (minimum).
2. Clip hair on udders once per year, post-calving or near the end of lactation.
3. Maintain entry and exit to paddocks, areas around troughs and gates, and the collecting yard in a clean condition and without surface water.
3. Keep the milking parlour and dairy tidy, clean and hygienic.
4. Ensure cubicle beds are clean and dry.

Udder hygiene

1. Wash your hands and preferably wear gloves during milking.
2. Inspect foremilk for signs of clinical mastitis.
3. It is considered 'best practice' to wash and dry cows before milking, however, it is strongly recommended to wash and dry cows when cows are indoors or on out-wintering pads.
4. If teats are washed, it is absolutely necessary to dry teats with a paper towel.
5. Teats should not be hosed as the cows are coming into the parlour.

Checklist



UDDER HYGIENE SCORING CHART

| SCORE 1: | SCORE 2: | SCORE 3: | SCORE 4: |
|--------------|-------------------------|----------------------------|-----------------------|
| Free of dirt | Slightly dirty 2-10% | Moderately dirty 10-30% | Caked-on dirt >30% |

(Source: Milk Money Programme, UW-Madison)

An udder hygiene score should be carried out weekly using the chart. Ideally all cows in the herd should be scored at 1 or 2. It is definitely NOT good management practice to have greater than 20% of the herd score 3 or 4.

Milking plant hygiene

An effective cleaning routine for the milking plant may be an automatic or manual system, it may involve a hot wash system consisting of at least one hot circulation cleaning per day or a cold circulation cleaning with one hot circulation cleaning carried out per week. Larger plants and those with accessories, e.g. milk metres should receive hot circulation cleaning. Irrespective of the cleaning system used, the detergent cleaning product should be selected from the Teagasc tested list of products (www.teagasc.ie).

2 How does my milking plant regime compare with best practice?

Example of manual hot circulation cleaning

- Wash jettors and outside of clusters and attach clusters to jettors.
- Rinse plant with 14 litres of cold water per cluster. Remove milk filter post-rinse.
- Mix an approved alkaline chlorine detergent-steriliser at the recommended use rate in hot water at 75-80°C allowing 9 litres of solution per cluster.
- Circulate the solution for 10 minutes.
- After the circulation wash, rinse the plant with 14 litres of rinse water per cluster.
- Ensure that milklines are drained completely before milking.

Descale/milk stone removal

- Regularly descale with acid wash routine for hot circulation cleaning (weekly recommended).
- Use a solution of approved milkstone remover (acid detergent), preferably in hot water for 5 to 10 minutes and flush to waste with cold water.
- Follow with the usual alkaline chlorine detergent steriliser wash, preferably in hot water at about 60°C.
- Follow by flushing plant with 14 litres of cold water per cluster.

Key risks



- Use only detergent cleaning products from the Teagasc list and use according to manufacturer's recommendations.
- Check water temperatures regularly (75-80°C before and 43-49°C after circulation).
- A circulation rate of 3.5,-4.5 litres/min/unit is required.
- If the detergent-steriliser contains chlorine the solution should be rinsed from the plant directly after circulation and (not left in plant until next milking).
- Monitor the rate of usage of the detergent product.
- Automatic washers should be serviced annually.
- Renew the cleaning solution after two milkings.
- Change rubberware at least annually.
- Avoid storage of warm water (plate cooler) for machine cleaning.

3 What are the key points for bulk tank hygiene?

- Ensure that washer is connected to the tank and that refrigeration is turned off.
- Put the correct amount of detergent in detergent bowl and replace it on the holder.
- Start the wash programme according to the manufacturer's instructions.

Risk points



- Ensure that tanks are serviced regularly and include checking of the thermostat.
- Check that spray heads are giving good spray coverage.
- Check filters on water intake valves regularly and clean if necessary.
- When inspecting totally enclosed tanks for cleanliness, pay particular attention to the lid and vent pipes, which, if unclean can readily contaminate the milk; also check milk outlet and inlet pipe of tank.

Milk cooling and storage

Milk leaves the udder at approximately 35°C, but only rapid cooling to a storage temperature of around 4°C prevents or minimises bacterial growth.

Critical factors

- Initial bacterial count must be low.
- Cooling rate must be fast.
- Storage temperature must be low (3-4°C).
- Storage time must be minimised.

TBC targets

<1,000/ml as milk leaves the udder
 <3,000/ml as milk leaves the milking machine
 <5,000/ml in the bulk tank

Both storage temperature and time are important. Milk with an initial TBC of 5,000/ml and stored at 4°C would be expected to have a TBC of 10,000/ml or 30,000/ml after 2 or 3 days storage, respectively.

If the target is to achieve a grade of <30,000/ml in milk stored at 4°C for 2 or 3 days, then an initial milk TBC of 15,000/ml or of 3,750/ml are required, respectively. Attention to detail is required in order to achieve initial TBCs of this magnitude.

It is vital to recognise that cooling is a complement to, not a substitute for, hygienic milking conditions.

Checklist for milk storage



- Slow initial cooling is not advised, tank specification must be correct.
- Fast cooling rate is necessary, avoid high blend temperatures.
- Plate cooling helps (35°C reduced to 18°C approximately).
- Accurate temperature control is essential during storage (3-4°C).

Key performance indicator



Milk temperature should reach ~ 4-5°C within 30 min of milking.

