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Milking parlour practices

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1. Introduction

Efficient milking requires:

1. Cows should be brought to the milking parlour as clean and as calm as possible
2. A good milking routine
3. Milking equipment in the best possible condition

2. The Environment for the Animal

A clean environment for the animal, whether in cubicles, alleys, warm bed or pasture, makes the milking routine more effective and reduces the risk of mastitis. If the animals also arrive calm, this favours correct milk let-down; stimulation is improved and animals are milked better and faster.

Cows are creatures of habit and therefore like to be treated in the same way every day. Producers or their employees should therefore be aware of the most important things that need to be done in the milking parlour and understand why they need to be done.

The person/people responsible for taking the animals to milking should do so calmly, with no shouting, no sticks, etc. The hormone responsible for milk let-down is oxytocin. However, when animals are nervous, this stimulates another hormone, adrenaline, which has the opposite effect and interrupts milk let-down.

A stressed animal in the milking parlour can mean 20% less milk production.

3. The Waiting Area

If there are waiting areas, they should be large enough for the number of animals to be milked (1.3 m^2/cow), there should be an

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upward slope towards the milking parlour (2 – 3%), and ideally, cows should not have to spend more than 1 h per batch there. The area should have automatic ventilation, with one 1-m diameter fan for every 10 cows.
If the waiting areas have automatic cattle drivers that do the job of the operators, they should move the cows towards the milking calmly.

4. The Milking routine

The aim of any milking routine should be to: Milk clean, dry, well-stimulated cows. There is no one single milking routine for all farms but there are operations that should always be carried out:

Removing the first squirts or "foremilk stripping". This allows us to:

1. Detect clinical mastitis
2. Promote milk let-down

Washing of teats prior to milking or pre-dipping., This allows us to:

1. Promote milk let-down
2. Clean and disinfect the skin of the teats (Time that the product is in contact with the skin of the teats, 15 – 30 s)

Drying the teats with a paper towel so that they are dry when attaching the milking units. This avoids problems such as teat cup slipping.

The cow's teats should be full of milk before the milking units are attached and so we need to **synchronise cisternal with alveolar milk.** This can be achieved with the operations described above.
The time between touching the udder for the first time and attaching the milking unit should be 60 – 90 s.

Correct milking unit attachment is very important: Prevents or minimises entry of air, and so avoids vacuum fluctuations and reverse impacts.

Align the milking units, always towards the cow's head. This achieves more efficient milking and avoids such problems as one teat being poorly milked because the milking unit is twisted around.

Gentle removal of the milking units, shutting off the vacuum beforehand or applying well-synchronised automatic detachers.
Once the milking units are removed, apply **post-milking teat dipping** to remove the film of milk left after milking and disinfect the teat. There are also teat dips on the market called sealers that protect the teats between milking processes.

Always cover 2/3rds of the teat.
Prevent the cows from lying down after milking, for at least 30 minutes.

5. The Milking Machine

The main objective of any milking machine should be to extract the largest amount of milk possible in the shortest possible time while safeguarding the health of the udder.

How do we achieve this?

Applying the term **"milkability"**, i.e. milking will be efficient when we achieve a high milk flow rate after attaching the milking units.
We must adapt the milking machine to the farm and not the other way round.

Before starting milking, the producer or the operators who are going to be in the milking parlour have to be trained to carry out a visual inspection of:

1. The teat cups, to make sure they are not twisted
2. External cleanliness of the milking units, regulators, etc.
3. Air-entry holes in the collectors, to make sure they are clean, not obstructed
4. Teat cup liners, short and long milk and pulse tubes, to make sure there are no breaks

All these matters can be easily corrected before milking starts.
At the point of starting the milking, the operators should observe the state of the cows, i.e. are they kicking, nervous, not tolerating the milking unit, etc? Cows are animals that do speak to us in their own way and one way of expressing themselves is through the behaviour we have just described.

Figure 1. The Milking Routine. A. Washing of teats prior to milking. **B.** Aligning the milking units. **C.** Removal of the milking units.

Dynamic monitoring of the milking machine:
This should be done by a milk quality expert. This involves monitoring parameters during milking such as:

Nominal vacuum level (vacuum gauge) is that installed by the official dealer and can be seen with the machine at full capacity.

Vacuum level in final unit measured with a pulse counter or a digital vacuum gauge with the machine at full capacity.

Vacuum level in milk pipeline measured with a pulse counter or a digital vacuum gauge with the machine at full capacity.

The difference in vacuum between the final unit and the milk pipeline should be no more than 2 kPa.

Regulation sensitivity: to check this, open 1 or 2 milking units (depending on the number of units) to allow air into the system and monitor the fall in vacuum, which should be no more than 2 kPa.

Vacuum level in collector at maximum flow rate measured with a "T" shaped piece placed between the collector and the long milk tube or by inserting a needle into the short milk tube. We take an average of 10 values which gives us the real value.

Measure **the force with which the teat cup collapses;** this is the force (pressure), expressed in kPa, which has to be applied to make the walls of the teat cup liner meet and is measured using a manual vacuum pump and a pulse analyser.

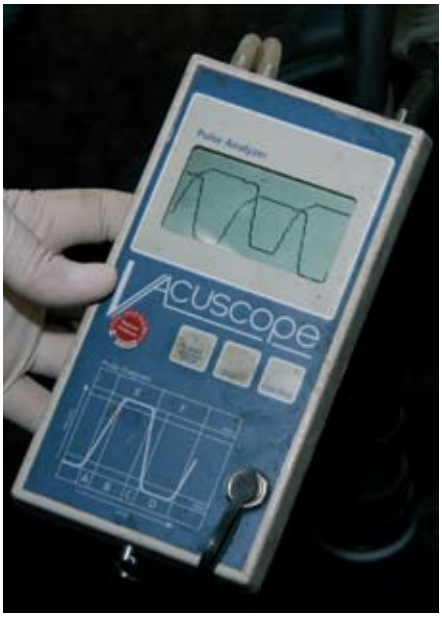

Figure 2. Pulse Analyser

All teat cup liners leave the factory with a predetermined collapse force (for example, 10.5 kPa for rubber liners and 12.5 kPa for silicone) but this diminishes with age, at a much faster rate with rubber, increasing the risk to the tips of the teats (hyperkeratosis). Measuring the force with which the liner collapses tells us whether it is soft or hard. Teat cup liners have a limited life and so must be replaced at the appropriate time; studies have shown that after 2000-3000 milkings, up to 60% of teats can be poorly milked.

Residual vacuum for massage, This value is obtained from the difference between the vacuum in the collector and the force with which the teat cup collapses. This determines the ideal value in order to improve the condition of the teats during milking.

Pulse parameters: rate, irregular pulse, pulse ratio and phase duration. The pulsation is what keeps the blood circulating around the teat and is achieved by the opening (suction phase) and closing (massage phase) of the teat cups approximately 60 times per minute by alternating vacuum and atmospheric pressure in the pulsation chamber. Each pulsation cycle has 4 phases, A, B, C and D, the duration of which is very important in order to ensure good condition of both the tip and the body of the teats. The ideal duration of the phases for a 60/40 pulse ratio and pulse rate of 60 ppm are as follows:

A 150-200 ms
B 400-450 ms
C 100-200 ms
D 200-300 ms
A+B milking phase
C+D resting phase

Removal parameters: prior stimulation, limit of low milk flow rate, final time post-milking.

Additionally, if the milking software programme allows us, we can also look at:

Bimodal curves
Percentage of cows that let down the milk in less than 2 minutes, etc.
Maximum and minimum flows/cow
Average milking times/cow

Among other things, this data allows us to identify which operators milk better or worse, whether animals are well stimulated or not, and whether or not we are rushing the milking too much, etc. With these parameters, our objective is to extract the maximum quantity of milk in as short a time as possible.

Checking for residual milk. This should be monitored in a set number of cows per milking. It should be no more than 400 c/c among 4 teats if measured manually. If measured when reattached, a milking point of 1-1.5 litres would be normal.The objective is to find out whether or not the cows have been well milked or still have milk left an important risk factor for mastitis.

Condition of the teats: changes in skin colour, changes in skin thickness, hyperkeratosis etc. These are changes that can occur short-term and long-term and they are very important for the health of the udders.

At least every 3 months, the tips of the teats should be assessed and checked for hyperkeratosis. This should always be done immediately after the milking unit has been removed.

Hyperkeratosis has a number of different causes. Some examples are:

1. Excess vacuum in the unit at the teats (46 kPa for example)
2. Residual vacuum for massage above or below 26 kPa – 27 kPa
3. Over-milking, especially at the end of milking
4. Incorrect suction/massage phases

Once the milking unit is removed, the opening in the teat takes about 30 minutes to close, although this is not always the case as it also depends on how long the milking unit has been attached to the animal's udder.

If, after removing the milking units, the teats are flaccid, soft, dry and free of pain, we know that the milking machine is working well and that the milking parlour is being properly run.

6. Hyperkeratosis

A small deposit of keratin should not be considered as a risk factor for mammary gland

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infection but simply as a normal physiological response to the milking. However, excess keratinisation of the whole tip of the teat can impede proper circulation of the milk. A large amount of excess keratin prevents the teat from closing properly and can cause up to a third of the length of the channel to remain open between milkings. There is a significant association between callosity and mammary infections.

Bits of the keratin sometimes come off, causing an open wound which can attract *Staphylococcus* and thus add to the risk of infection.

Sphincter eversion is often talked about, when the sphincter muscle helps close the teat canal. However, it is unlikely to protrude to the outside, even in the absence of massive destruction of the teat. What we refer to as eversion, therefore, is actually the hyperkeratosis described above.

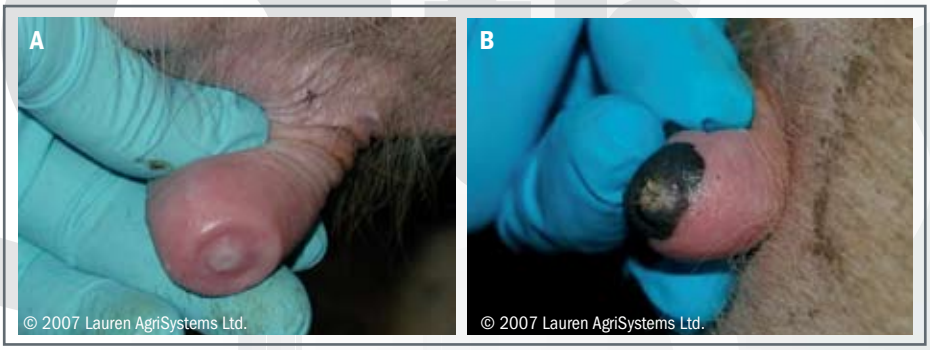

Figure 3. Teat classification. **A.** Normal (Score-1) **B.** Hyperkeratosis (Score-3). The condition of the teats is classified from 0 to 4, with 0 signifying no lesions and 4 indicating a significant degree of hyperkeratosis. A greater risk of mastitis is associated with grades 3 and 4.

7. Conclusions

All the operators should work in the same way and following the same guidelines every day.

All these parameters form part of what signifies good practice in the milking parlour. Once established, follow-up visits should be carried out in order to check that everything is operating correctly.

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