Interreg North-West Europe
HappyMoo
European Regional Development Fund

MASTITIS : THE FIRST HEALTH PROBLEM IN DAIRY FARMING

Integrated management for sustainable improvement

INNOVATION

Mastitis : various pathogens and multifactorial risk factors

Mastitis, udder infections affecting one or more quarters, are of two types:

- **clinical** (change in the milk appearance, even impact on the general condition of the animal),
- **sub-clinical** without associated clinical signs : we talk about «**cells**», which is a payment indicator for milk quality..

These infections are caused by **bacteria living in the environment or the udder**. Bacteria originating predominantly from the environment (e.g. *coli bacteria, faecal streptococci*, etc.) generally lead to clinical mastitis, which is sometimes severe and often short-lived. Contamination occurs via a soiled environment (damp litter, etc.). Bacteria that are predominantly found in the mammary gland (e.g. *Staphylococcus aureus, Streptococcus agalactiae and dysgalactiae*) generally result in sub-clinical mastitis (= cells), which may persist over time (e.g. encystment of *Staphylococcus aureus* in the mammary gland). Animals often get contaminated during milking, for example by non-disinfected teat cup liners between each cow, especially if there are teat lesions. Other bacteria may be involved such as *Streptococcus uberis, coagulase-negative Staphylococci*, but there are still debates about the degree and modalities of their involvement in mammary infections.

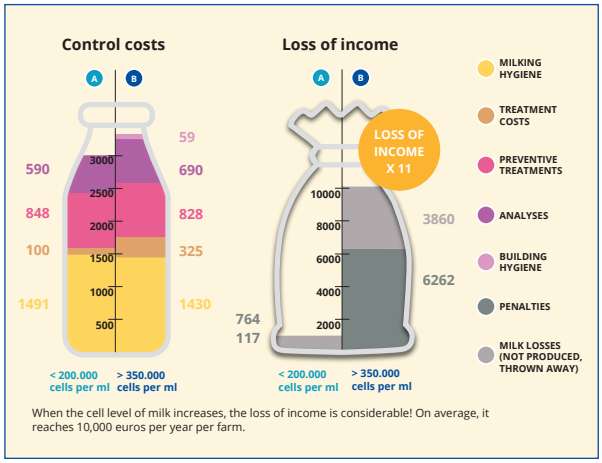
However, the origin of mastitis remains multifactorial. **The main risk factors are housing, milking, and husbandry, including care during mastitis**. Let's not forget about feeding which has an indirect impact on mammary health.

Clinical and sub-clinical mastitis : substantial impacts at all levels

The economic impact depends on many aspects (duration, severity, production level of the animal, days in milk, prevention and control measures implemented, etc.). **The average economic impact of mastitis can range from 50 to over 350 euros per cow per year**. The loss of income for a producer can be up to 30 euros per 1000 L.

Clinical mastitis and subclinical mastitis (= cells) have a negative impact on the production level in primiparous and multiparous cows. These losses vary considerably depending on multiple criteria (days in milk, lactation number, severity, production level...). **Simulators that take into account the specific characteristics of each farm allow a more accurate economic estimation**.

The **inhibitor risk** (such as antibiotic residues) is also increased. The **impact in terms of welfare** is very important **for the farmer** (stress, time lost...) but also **for the animal** (pain, possible drop in ingestion, etc.).



Source: CNIEL, «Mastitis, I anticipate!»

Mastitis detection: direct and indirect screening and diagnostic tools

Stripping foremilk at every milking and on each cow is the best method to detect abnormal milk and so, to detect clinical mastitis. The black bowl is an adequate tool to detect any macroscopic change in the appearance of the milk («lumps»...). Observation and palpation of the quarter can also help detect signs of inflammation (redness, pain, heat, etc.) but it is not an accurate and early method to detect clinical mastitis. **In automatic milking systems, detection involves observation of the cows and the indicators available in the software (conductivity, production, etc.) twice daily.**

An indirect test, the **Californian Mastitis Test (CMT or leucocytest), allows identification of the infected quarter** using gelation and/or changing in the colour of the milk.

Individual bacteriological analysis remains the gold standard method to identify the pathogens involved and guide the epidemiological diagnosis. PCR test kits are also available for tank milk. The interpretation of the analyses must systematically take into account the risk factors identified on the farm as part of a global approach to the mastitis situation.

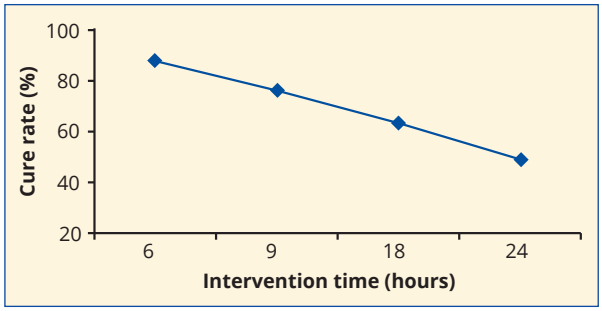
The Happymoo project also worked on the search for biomarkers, indicators of mastitis, to help detect these infections. The results of this project are available on the Happymoo website (link at the end of the document).

Mastitis treatments: which strategy(ies)?

The treatment strategy should be discussed with the veterinarian. The vet will define with the farmer the most appropriate treatment strategies during lactation and at dry-off, as well as the therapeutic alternatives to be used in case of failure. Always ensure **asepsis during intramammary injections** to avoid inoculating bacteria.

Treatment during lactation: early detection, early treatment

Treatment during lactation aims to eliminate pathogens and clinical symptoms while avoiding high cell levels and encystation of some bacteria. **Detection should be very early** to maximise the cure rate and limit the spread of bacteria to other animals. **At the very least, the infected area should be treated intramammarily**. An anti-inflammatory drug is useful in cases of severe inflammation. Sometimes a general treatment is necessary (e.g. colibacillary mastitis). Treatment failed when clinicals signs remains 48 hours after occurrence or if the same quarter is still infected after 3 weeks. In this case, the use of the 2nd treatment is recommended, while continuing the disinfection of the teat cup liners. **Beyond 2 treatments per quarter with different molecules during a lactation, it is uneconomical to treat**; drying off the quarter, drying off the cow with antimicrobial or culling the animal will be the only alternatives.



Source: Xavier Berthelot, Toulouse National Veterinary School

The treatment of cows with a high cell level during lactation is still under discussion and should be a one-off measure especially to limit antimicrobial resistance.

Treatment at dry-off: focus on selective targeted treatment at the animal

Dry-cow treatment aims to cure permanently infected cows and prevent new infections in the dry period. **Antimicrobial treatment is recommended for cows with > 100 000 cells/ml and females that affected by clinical mastitis in the last 3 months.** If the milk from the infected quarter still has a high cell level more than a week after calving, the cow is considered "incurable": permanently drying off the quarter or culling the animal are the only options to avoid cross-contamination of healthy cows.

When there is a risk of contamination during dry-off period, prevention of new infections can be improved using a **teat-sealant** at the time of drying off, either alone or with antimicrobials.

In all cases, **providing good housing and proper nutrition for dry cows is also essential to ensure good efficacy of selective target treatment**.

Integrated mastitis management: zootechnical prevention towards a better health and economy

The long-term control of udder's health on the farm requires a **global and integrated management of mastitis**, in particular via:

- **Early detection** of infected mammary quarters and early intervention,
- Identification and **prioritisation of key risk factors**,
- The implementation of **preventive and curative personalised measures and adaptable by the farmer**. The main points of vigilance are summarised bellow.

The implementation of these measures throughout the year on the whole herd is essential. Indeed, mastitis occurs regardless of the season. In summer, for example, cows are confronted with thermal stress which can have important health repercussions. You will find all the useful advice you need to get through this risky period in the sheet **«Stress in the dairy herd: what impacts and what solutions?"**.

Housing : clean cows during the lactation and the dry period
- Quality of bedding
- Cleaning of exercise and living areas
- Indoor ventilation and lighting

Points to watch out for

- Quality straw in quantity (max 1.2 kg/m2 of straw bed, doubled at cleaning; from 1 to more than 3 kg per cubicle depending on the slurry/manure system)
- (Twice-daily) maintenance of exercise and living areas (trimming, mulching, etc.)
- Surface per cow (1 cubicle/cow, 7 to 8 m2 /cow)
- Clean and dry litter (no drinking troughs on straw areas, cleaning if > 35°C at a depth of 10 cm, a drying agent does not replace a good mulch...)
- **Same rigorous cleanliness of cows during the dry-off and the lactation**

Milking: maintenance of equipment and hygiene
- Maintenance of the milking machine
- Milking hygiene
- Milking practices

Points to watch out for

- **Annual inspection of the milking machine** and automatic cluster removers
- **Manufacturer's recommended teat cup liners change frequency**
- Early detection : elimination of 1st jets
- **Cleaning and disinfection of teat** (individual wipes, pre-foaming...): milk ejection reflex and hygiene
  - In automatic milking systems : cleaning and changing of brushes; scrubbing cup; setting the number and duration of passes
- **Disinfection of teat cup liners between each cow**
- Teat lesions (cosmetic hygiene products)
- Environmental risk : post-milking barrier products
  - In automatic milking systems : inject adjustment
- Classic alternation: acid in the morning/chlorinated alkaline in the evening
  - In automatic milking systems : specific products (e.g. no chlorine in Lely)
- **No air intake,** especially at the end of milking

Breeding management: observation and monitoring of results
- Heifer management
- Animal monitoring : observation, detection, analysis
- Lactation and dry-off treatments
- Culling policy

Points to watch out for

- Prevent succion between heifers,
- Smooth adaptation of heifers to milking and the lactating herd
- **Twice-daily observation of udders or software indicators** (conductivity, production, cells, etc.)
- Bacteriological **analysis**
- **At least monthly individual cell monitoring**
- **Treatment strategies with the veterinarian, rigour and asepsis**
- Implementation or not of a **vaccination** of the herd according to the recommendations of the veterinarian (cost/benefit ratio and ease of implementation)
- **Two-phase drying**: fibrous ration at drying, calving preparation ration with a negative dietary cation-anion balance (DCAB) for the last 3 weeks
- **Aim for a body condition score between 3 and 3.5 at calving**

Food: an indirect impact
- Energy/nitrogen, mineral and vitamin balance of rations
- Transition management
- Water quantity and quality

Points to watch out for

- **Avoid excess nitrogen** (more liquid manure),
- **Avoid energy deficits** (animals more susceptible to disease),
- Avoid excess potassium, sodium and energy before calving (risk of mammary oedema),
- Ensure adequate intake of vitamin E and selenium,
- **Transition** when changing silos, pasture access...
- 10 cm trough length/cow
- At least **1 annual water analysis, whatever the origin;** bacteriological and physico-chemical interpretations (good functioning of the disinfection of the circuits and teat cup liners)

Note: these recommendations are not exhaustive and should be adapted with the livestock advisor.

INFO+

Primiparous cows: the future of the herd to be watched closely!

Within the framework of this integrated management, particular attention must be paid to the primiparous cows, as they are the future of the herd. The way in which heifers are reared determines their future milk performance and their mammary health. For example, it is essential to **prevent suckling** between females. The **energy/nitrogen balance of the heifers** is also essential since an unbalanced intake can lead to an excessive development of fatty tissue compared to the tissue dedicated to milk secretion, which will reduce future production. During lactation, if **stripping foremilk** is not done on the whole herd, it should be done on the first lactations. This way, infections will be detected earlier, which will allow earlier intervention and can improve the chances of recovery. If mastitis is present, **systematic disinfection of the teat cup liners between each cow**, whether or not associated with milking of the primiparous cows first, will contribute to protect these young cows even more.

The HappyMoo project: monitoring tools for happy cows

This document was produced in the framework of the Interreg NWE HappyMoo project, financed by the European Union and co-funded by the Walloon Region in Belgium. The aim of this project was to identify biomarkers, the monitoring of which (in particular by mean infrared spectroscopy in milk) would help to detect health problems in livestock.

Find all the results of the HappyMoo program on the website

https://www.nweurope.eu/projects/project-search/happymoo/

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