



# WELFARE ISSUES RELATED TO MASTITIS IN DAIRY COWS

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Mastitis is one of the major animal welfare and economic problems in dairy cattle production. Although in recent years there has been a general decline in the incidence of mastitis, **high incidences** such as 25-45% are still being currently reported. Mastitis is a **multifactorial** disease in which the environment, the pathogens and the host (cow) interact with each other.

## MASTITIS CAUSES PRODUCTION AND ECONOMIC LOSSES

Mastitis is one of the most costly diseases affecting dairy cattle. Direct economic costs associated with mastitis include reduced milk yield and quality, increased veterinary costs, discarded milk (during the course of treatment) and somatic cell count (SCC) penalties. The main indirect costs, which are usually underestimated by farmers, are the increased risk of culling and reduced fertility. On average, each case of clinical mastitis causes an estimated loss of around 200 Euros. The cost of subclinical mastitis depends on the number of cows with an increased SCC and is mainly attributed to losses in milk production.

## MASTITIS CLASSIFICATION AND CAUSATIVE AGENTS

Cows with clinical mastitis usually show apparent inflammation of the udder and their milk may contain flakes or blood. Cows with subclinical mastitis do not show a visible udder inflammation and can be diagnosed by means of SCC or California Mastitis test. Mastitis pathogens are classified as either contagious or environmental.

Contagious pathogens, such as *S. aureus*, *S. dysgalactiae* and *S. agalactiae*, survive within the host and typically spread from cow to cow during milking. In contrast, environmental pathogens, such as *E. coli*, *S. uberis*, *S. faecalis* and *Klebsiella* spp. are opportunistic invaders of the mammary gland and can be found in a variety of substrates, including litter, manure, etc.

## MASTITIS IS A PAINFUL DISEASE

Dairy producers and veterinarians consider severe cases of mastitis as one of the most painful conditions in dairy cows. However, it is well known that cows can also experience pain in mild or moderate cases of mastitis. Even subclinical mastitis is accompanied by increased levels of bradykinin, a peptide which mediates the inflammation related to mastitis.

Cows suffering from mastitis show several signs of sickness behaviour (e.g. reduced feed intake and lethargy). Sickness behaviour

is a well-organised adaptive response of the animal to enhance disease resistance and recovery from disease. Pain caused by mastitis may modify the expression of sickness behaviour. In particular, although lying time is usually increased during illness and it is thought to help the animal to save energy, cows with mastitis show a reduction in lying time due to udder pain and this has important negative effects on their welfare and production. It must not be underestimated that resting is a very important behaviour for dairy cattle; healthy cows typically spend approximately 12-13 hours per day resting. Some studies report pronounced changes in the laterality of lying behaviour, since cows decrease the time spent lying on the side of the affected udder quarter.

Several behavioural and physiological indicators of udder pain have been defined. Increased restlessness during milking, such as higher frequency of kicking and stepping during milking has been observed for at least 3 days after mastitis detection.

The distance between the hocks when the cow is standing is wider in cows with mastitis compared to healthy cows, suggesting that there has been a change in the hindleg stance of the cows as a result of the inflamed udder.

Besides reducing rumination, mastitis may also reduce rumen motility, leading to disruption of microbial degradation of ingested feed.

In terms of physiological indicators, acute phase proteins (APP), such as serum amyloid A and haptoglobin rapidly increase in serum and milk during mastitis. APP have been shown to be good indicators of infection, stress, inflammation, and pain associated to mastitis.

### Indicators of pain caused by mastitis in dairy cattle.

Behavioural Indicators	Physiological and production indicators
<b>Increased</b>	<b>Increased</b>
<ul style="list-style-type: none"> <li>Restless during milking</li> <li>Hock-to-hock distance when standing</li> </ul>	<ul style="list-style-type: none"> <li>Heart and respiratory rate</li> <li>Rectal temperature</li> <li>Acute phase proteins</li> </ul>
<b>Decreased</b>	<b>Decreased</b>
<ul style="list-style-type: none"> <li>Time spent lying down</li> <li>Time spent eating</li> <li>Rumination</li> <li>Self-grooming</li> </ul>	<ul style="list-style-type: none"> <li>Milk yield and quality</li> <li>Dry matter intake</li> </ul>

**“All clinical mastitis, both mild and severe, cause pain.”**

## HYPERALGESIA AND ALLODYNIA

Severe cases of mastitis lead to hyperalgesia (increased pain sensitivity) and allodynia (a condition in which a stimulus which is not painful in normal conditions becomes painful). A hyperalgesic state lasting at least four days has also been described in cows with mild or moderate mastitis. Kicking, aggressiveness and lack of milk flow when a cow's udder is gently manipulated during milking are signs of allodynia.

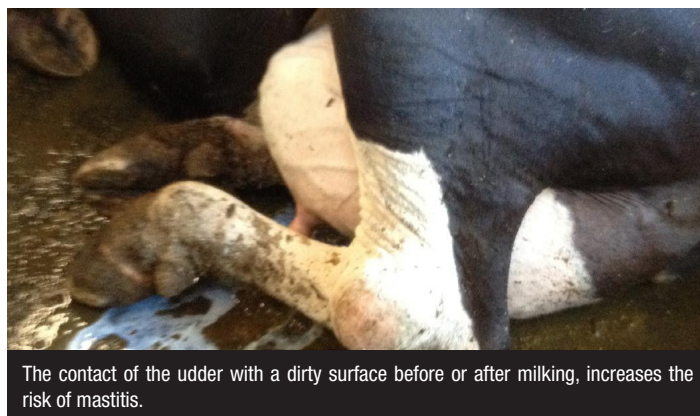
## PREVENTION AND HUSBANDRY RECOMMENDATIONS

The most important risk factors identified in the report published by European Food Safety Authority (EFSA, 2009) are poor bedding hygiene (especially for environmental pathogens) and poorly designed, managed or maintained milking equipment (especially for contagious pathogens). The environment of the cow (especially the lying and walking areas and the milking parlour) should be clean, dry and well ventilated. Prevention and control programmes should be carefully implemented during the milking routine (e.g. adequate teat preparation and disinfection, milking healthy cows first and infected cows later, etc).

Early identification, monitoring and treatment of mastitis cases in both lactation and dry periods are extremely important. Cows with severe systemic mastitis should be housed in a separate area. Adequate nutrition and a non-stressful environment are important to ensure a proper function of the cows' immune system.

## PAIN TREATMENT

A treatment protocol including antibiotics and anti-inflammatory drugs is recommended in cases of clinical mastitis. Efficacy of non-steroidal anti-inflammatory drugs (NSAIDs) in alleviating clinical signs associated with mastitis is stronger than for glucocorticoids which is why NSAIDs can be considered as drugs of choice for this purpose. The use of NSAIDs in cows with experimentally induced mastitis decreases signs of udder inflammation and pain, maintains rumen motility, decreases rectal temperature and heart rate, and in some studies, improves feed intake and milk yield. Although there are few studies on the effect of NSAIDs on naturally occurring mastitis, a reduction of pain has been reported and the use of



The contact of the udder with a dirty surface before or after milking, increases the risk of mastitis.

NSAIDs has been shown to reduce heart and respiratory rate, SCC and culling rate. Overall, cows with mastitis show an earlier recovery from illness when treated with NSAIDs compared with cows that only receive antibiotics.

## SUMMARY

Mastitis is a multifactorial disease and one of the major animal welfare and economic problems in dairy cattle production. All clinical mastitis cause pain and stress. Prevention measures include improving the cows' hygiene and the milking routine. The use of NSAIDs, in addition to antibiotics, is highly recommended as a standard treatment of mastitis as it reduces pain and accelerates recovery.

## REFERENCES

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