

Popular Article

Mastitis A Global Threat to Dairy Herd and Farmers

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Abstract

Bovine mastitis, an inflammation of the mammary gland, is the most common disease of dairy cattle causing economic losses due to reduced yield and poor quality of milk. The etiological agents include a variety of gram-positive and gram-negative bacteria, and can be either contagious (e.g., *Staphylococcus aureus*, *Streptococcus agalactiae*, *Mycoplasma* spp.) or environmental (e.g., *Escherichia coli*, *Enterococcus* spp., coagulase-negative *Staphylococcus*, *Streptococcus uberis*). Improving sanitation such as enhanced milking hygiene, implementation of post-milking teat disinfection, maintenance of milking machines are general measures to prevent new cases of mastitis, but treatment of active mastitis infection is dependent mainly on antibiotics. However, the extensive use of antibiotics increased concerns about emergence of antibiotic-resistant pathogens and that led the dairy industries to reduce the use of antibiotics and adopt the preventive measures to reduce the spread of mastitis and antibiotic use.

Introduction

Bovine mastitis (*mast* = breast; *itis* = inflammation), It is an inflammatory disease of cow and buffalo mammary gland caused by various infectious or non-infectious etiological agents. Mastitis must have been one of the first observed diseases of farm animals when cattle were domesticated over 5000 years ago. Since, then it has been an ever-existing problem for all those who kept and milked dairy cattle and buffaloes. Milk production alone involves more than 70 million producers in India, each raising one or two cows/ buffaloes primarily for their livelihood. bovine mastitis remains one of the important production diseases of dairy animals which directly or indirectly affect the economy of the farmers and ultimately affect the economy of the country. It is considered the most common disease leading to economic loss in dairy industries due to reduced yield and poor quality of milk.



The occurrence of disease is an outcome of interplay between the infectious agents and management practices stressing the defense of udder. According to Kennedy and Miller (1993), mastitis is expressed by tissue injury caused by tissue invasive or toxigenic organisms, which become dominant due to upset of balance in microbial population. It is a complex disease resulting from interplay between infectious agents and management practice and environmental factors. The most important changes in the milk include discoloration and presence of clots and large number of leukocytes. The disease leads to accountable economic losses by reduced milk yield (up to 70 %), milk discard after treatment (9%), cost of Veterinary services (7 %) and premature culling (14 %) of animal (Bhikane and kawitkar, 2000).

A number of factors affecting susceptibility to mastitis are: -

- Physiological status of cow.
- Level of milk production.
- Parity of cow.
- Inherent feature.
- Environmental condition

Etiology

Mastitis is a multi-etiological complex disease. More than 250 infectious causes of bovine mastitis are known to date and in large animals the most common pathogens are the mastitis causing bacterial species are *Escherichia Coli*, *Staphylococcus aureus*, *Streptococcus agalactiae*, and *Corynebacterium bovis* and also due to fungal, yeast or viral infection. Over use of antibiotics and poor sanitation leads to yeast mastitis (Ganguly, 2018). The infection is spread at milking time when bacteria contaminated milk from an infected gland comes in contact with an uninfected gland, and the bacteria enter the teat canal. CNS is a recently emerging pathogen causing bovine mastitis. The predominance of a bacterial species may vary according to the geographical region under scrutiny. *S. aureus* is one of the significant pathogens causing mastitis in dairy ruminants in many countries. Generally, the mastitis due to fungi and yeast is uncommon or rare. But a low prevalence of fungal mastitis of 2 to 7% has been reported. The prevalence of mycotic mastitis is usually very low (1-12% of all mastitis causes) but sometimes it can occur in enzootic proportions.



Mastitis can be categorized in two major groups:

- **Contagious mastitis:** - The causative organisms living on the skin of the teat and inside the udder. They can be transmitted from one cow to another during milking.
- **Environmental mastitis:** - The causative organism not live on the skin or in the udder but enter the teat canal when the cow comes in contact with contaminated environment. These pathogenic organisms found in faeces, bedding material and feed.

MODE OF TRANSMISSION

- Through teat canal.
- Fly and insects.
- Contaminated bedding materials.
- Contaminated milker's hands and cloths.
- Contaminated machine cup by affected

Quarter.Symptom:

The most obvious symptoms of clinical mastitis are abnormalities in:

- The udder such as swelling, heat, hardness, redness, or pain; and
- The milk such as a watery appearance, flakes, clots, or pus.

Other symptoms, depending upon the severity of the illness and how systemic it has become, can also include:

- A reduction in milk yield.
- An increase in body temperature.
- The lack of appetite.
- Sunken eyes.
- Signs of diarrhoea and dehydration.
- A reduction in mobility, due to the pain of a swollen udder or simply due to feeling unwell.
- Changes in milk composition even in cows with subclinical mastitis can result in significant changes in the protein composition in milk. While overall protein content may be unaffected, changes in the *types* of protein present may be affected by the leaching of (low-quality) blood serum proteins into milk; **casein**, an important protein found in healthy milk can be significantly reduced in sub-mastitic cows, and a further complication is that casein is closely linked with **calcium** levels in milk production.



According to symptom mastitis divided into two groups: -

1. Clinical Mastitis: -

It is characterized by visible change in milk, udder or teats. It is further classified as: -

• **Per acute mastitis: –**

Characterized by painful swelling of udder, fever(105-1060F) shivering, anorexia, depression,cessation of milk secretion and blood-stained exudates from teat canal.

• **Acute mastitis: –**

It is similar to Per acute mastitis but systemic sign like fever, depression is not seen, Udder become swollen and milk secretion changed to curdy yellow material or brown fluid with flakes or clots. Infection may be in one quarter or entire udder.

• **Sub-acute mastitis: –**

There is a variable change in the milk but no Practical changes seen in udder and visible systemic sign. Cultures of milk only show presence of pathogenic bacteria.

• **Chronic mastitis: –**

It occurs due to persistent infection of udder. Udder becomes hard due to fibrosis. The quartersmay become thickened, firm, nodular and atrophic.

2. sub-clinical mastitis: –

It is characterized as change in milk composition without any visible change in udder or milk. Sub-clinical mastitis reducing milk production, decrease milk quality and suppress reproductive performance. A high somatic cell count (SCC) is indicative of sub-clinical mastitis.



**Mastitis affected
teat**



Diagnostic Technique

Observation and Physical examination of the udder. Test of milk by different test method like Strip cup test, PH test, Chloride test, California mastitis test (CMT), Bromothymol blue test (BTB), Bromocresol purple test, White side test, Hotis test, Biosensing, Isolation and identification of the organism, Cultural examinations, Biochemical test, Serological test, Electrical conductivity test (EC test), Somatic cell count (SCC)

Treatment

- Remove secretion as much as possible from affected quarter. Sterile test siphon may be used to drain out the milk/secretion

- Intramammary (IMM) antibiotic for 3-5 days.

(Milk should not be used for human consumption at least 72 hours after last infusion)

- Systemic antibiotics (IV, IM, SC) for 3-5 days.
- Systemic anti-inflammatory drug for 3-5 days.
- Antihistaminic drug.
- Corticosteroid may be given to check fibrosis.
- Enzyme like Serratopeptidase and Hylase to digest the pus.
- Immunomodulator preparation containing Vit.- E and Se for 4 days.
- Topical application of anti-inflammatory ointment twice a day for 5-7 days.
- Drying off quarters which do not respond to treatment by silver nitrate solution or coppersulphate solution.

Preventive Measures

- Washing the udder and hand of milker with antiseptic before and after milking.
- Infected cow/teat should be milked at last.
- First strip of milk should not allow falling on the floor. It should be stripped in separate container.
- Mastitis milk should be properly disposed. 5% phenol may be added to the infected milk at the time of disposal.
- Dipping of all teats following each milking with Iodophor solution containing 1% available iodine or Hypochlorite solution.
- The animal should not allow lie down immediately after milking for an hour by engaging with feed and fodder.
- Cleaning and disinfecting milking machine after each milking.
- Dry cow therapy to prevent occurrence of mastitis after parturition.
- Newly purchased cows should be kept and milked separately until screened for mastitis (CMT).



- Cow should allow soft bedding following parturition.
- Concrete floor predisposed to mastitis. Bedding should be done with straw, saw dust or sand. Sand is the best, since it has lower bacterial content.
- The non-responsive quarter should be permanently dried up.

Vaccination

Vaccinating cattle can be deemed as a preventive mastitis treatment in herds. Most vaccines are designed to target *Staph. aureus*, *Strep. agalactiae*, and *E. coli*. However, vaccines are yet to provide reliable protection.

Conclusion

Mastitis remains one of the most economically devastating diseases in dairy cows. Vaccination is one tool that could be used to prevent mastitis. However, regardless of the type of vaccine used, it alone is not necessarily effective or economical especially in dairy herds with high mastitis rates. The combination of vaccination and the application of other infection control procedures, such as excellent milking hygiene procedures, treatment of clinical cases, segregation, and culling of known infected cows are important preventative measures that usually result in a significant reduction in the incidence and duration of intramammary infections.

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