AGRI MAGAZINE
(International E-Magazine for Agricultural Articles)
Volume: 03, Issue: 07 (July, 2026)
Available online at http://www.agrimagazine.in

The Silent Drain on Dairy Profit: How Mastitis Hurts Farmers, Milk Quality and the Rural Economy

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Mastitis is often treated as an udder-health problem, but its effects extend across the entire dairy chain. It reduces milk yield, lowers processing quality, delays reproduction, increases culling and weakens the economic security of dairy households.

For millions of rural families, dairy farming is more than a livestock enterprise. Milk is produced and sold every day, providing a regular source of cash that is rarely available from seasonal crops. Dairy farming also supports employment in feed supply, animal health services, milk collection, transport, processing and retail. At the same time, milk and milk products supply high-quality protein, minerals and several essential nutrients to the human diet. This combination of nutrition, employment and daily income makes the dairy sector especially important for small and landless households (Douphrate et al., 2013; Fulgoni et al., 2011).

The productivity of this sector, however, is continuously challenged by animal disease, climate stress, changing market conditions and growing expectations for safe, high-quality food (Bhat et al., 2022; Feil et al., 2020). Among the diseases of dairy cattle, mastitis remains one of the most persistent and expensive. It begins as inflammation of the mammary gland, usually following microbial infection, but its consequences are felt in the milk pail, the breeding record, the processing plant and the household economy.

Visible disease and the hidden form

Mastitis may be clinical or subclinical. Clinical mastitis is easier to recognise because the milk may contain flakes, clots or watery secretions, while the udder can become swollen, hot and painful. Severe cases may also produce fever, loss of appetite and general illness. Subclinical mastitis is more deceptive. The milk and udder appear normal, yet inflammation and infection are present. The disease is usually detected only through tests such as the somatic cell count or the California Mastitis Test (Barnum and Newbould, 1961; Ramuada et al., 2024).

Because subclinical mastitis can remain unnoticed for a long period, the cow may continue contributing apparently normal milk to the bulk tank while her production gradually falls. Infected animals may also act as a source of infection for other cows. A systematic review showed that subclinical mastitis is widespread in Indian dairy cattle, although prevalence varies greatly among regions, breeds and management systems (Bangar et al., 2015). The hidden form is therefore not a minor condition; it is a continuing leak in farm profitability.

Why the hidden form matters: A cow can look healthy and still lose milk, produce high-somatic-cell-count milk and spread infection. Routine screening is therefore essential.

The real cost is larger than the treatment bill

A recent global analysis estimated that diseases and health conditions of dairy cattle together cause annual losses of about US$65 billion. Clinical mastitis accounted for approximately

US$13 billion and subclinical mastitis for about US$9 billion of these losses (Rasmussen et al., 2024). These estimates show that mastitis is not only a herd-level health issue; it is a major global constraint on efficient milk production.

The most obvious costs include veterinary consultation, diagnostic tests, medicines and extra labour. Milk from treated cows may have to be discarded during therapy and throughout the specified withdrawal period. Yet the less visible costs are often greater. They include reduced milk yield, lower milk price because of poor quality, repeated disease, additional inseminations, longer calving intervals and premature culling. Even the first mastitis episode in a young cow can reduce later production and lifetime economic performance (Puerto et al., 2021).

Premature culling is particularly expensive because the farmer loses an animal before recovering the full cost of rearing her. A replacement heifer must then be raised or purchased, while the genetic potential and expected future lactations of the affected cow are lost. Thus, the economic effect of mastitis continues long after the visible udder inflammation has disappeared.

Mastitis changes the milk itself

When bacteria enter the mammary gland, immune cells move from the blood into the milk. This increase is measured as the somatic cell count (SCC). At the individual-cow level, an SCC above approximately 200,000 cells per millilitre is commonly regarded as evidence that an intramammary infection may be present. A high SCC is therefore an important early warning of udder inflammation (Sharma et al., 2011; Ramuada et al., 2024).

High-SCC milk is not simply milk containing more cells. Inflammation alters its chemical composition. Lactose, casein and some minerals may decline, while enzymes released from damaged tissue and immune cells break down proteins and fats. The acidity and mineral balance of milk can also change. These changes reduce both nutritional quality and processing performance (Le Maréchal et al., 2011).

The effects become especially clear in a dairy plant. Mastitic milk may coagulate slowly, form a weak curd and produce less cheese. Increased proteolysis and lipolysis can contribute to bitterness, rancidity and other off-flavours. The moisture, texture, ripening behaviour and shelf life of cheese and fermented products may also be affected. A disease that begins in one udder quarter can therefore reduce the value of a much larger volume of pooled milk.

The loss continues through reproduction

Mastitis is also linked with reduced reproductive performance. Bacterial products and inflammatory mediators released during infection may disturb ovarian function, oocyte maturation, fertilisation, embryo implantation and early embryo survival. Fever, reduced feed intake and metabolic stress further weaken reproductive efficiency. Affected cows may require more time to first insemination, show lower conception rates and remain open for longer periods (Kumar et al., 2017).

Every additional open day increases feeding and management costs without producing the expected return from the next lactation. Repeated mastitis and poor fertility together raise the risk of culling. The farmer consequently loses milk from the current lactation and future income from the animal's remaining productive life.

Food safety and responsible antibiotic use

Antibiotics remain important for treating selected bacterial infections, but they must be used under veterinary supervision. Incorrect drug choice, unnecessary treatment, incomplete courses and failure to observe milk-withdrawal periods can create residue problems and contribute to antimicrobial resistance. Antibiotic residues in milk are undesirable for consumers and may interfere with the manufacture of fermented dairy products (Engdaw and Asredie, 2015).

Resistant pathogens are also more difficult and expensive to control. Methicillin-resistant Staphylococcus aureus has been isolated from bovine mastitis, underlining the connection between udder health, antimicrobial stewardship and public health (Esemu et al., 2024). The answer is not to leave infected cows untreated; it is to diagnose accurately, select therapy rationally, follow withdrawal instructions and reduce the need for treatment through prevention.

Protecting profit through prevention

A successful mastitis programme combines daily observation with reliable records. Farmers should examine foremilk for abnormalities, monitor SCC where possible and use cow-side screening tests when subclinical infection is suspected. Teats must be clean and dry before milking, milking equipment should function at the correct vacuum, and post-milking teat disinfection should be applied consistently. Chronically infected cows need special attention so they do not remain a continuing source of infection.

Clean housing, dry bedding, balanced nutrition and heat-stress reduction support the cow's natural defences. Good dry-period management can reduce new infections around calving. Internal teat sealants and antimicrobial dry-cow therapy should be used selectively and under professional guidance. The most effective programme is not based on occasional treatment of visible cases, but on a continuous cycle of prevention, early detection, targeted action and review of herd records.

Take-home message: Mastitis is a production, processing, fertility, food-safety and livelihood problem. Every infection prevented protects milk, income and the productive life of the cow.

Conclusion

The dairy sector converts daily animal care into daily nutrition and income. Mastitis interrupts this cycle at several points: less milk is produced, the milk is less suitable for processing, fertility declines and animals may leave the herd too early. Subclinical mastitis is especially damaging because the loss continues without obvious warning. Regular screening, clean milking, prompt diagnosis and responsible antimicrobial use can transform many of these hidden losses into preventable ones. Protecting udder health is therefore one of the most direct ways to strengthen farmer profitability and the wider dairy economy.

References

1. Bangar, Y. C., Singh, B., Dohare, A. K., & Verma, M. R. (2015). A systematic review and meta-analysis of prevalence of subclinical mastitis in dairy cows in India. Tropical Animal Health and Production, 47(2), 291–297. https://doi.org/10.1007/s11250-014-0718-y.
2. Barnum, D. A., & Newbould, F. H. S. (1961). The use of the California Mastitis Test for the detection of bovine mastitis. Canadian Veterinary Journal, 2.
3. Bhat, R., Di Pasquale, J., Bánkuti, F. I., Siqueira, T. T. da S., Shine, P., & Murphy, M. D. (2022). Global dairy sector: Trends, prospects, and challenges. Sustainability, 14(7), 4193. https://doi.org/10.3390/su14074193.
4. Douphrate, D. I., Hagevoort, G. R., Nonnenmann, M. W., Lunner Kolstrup, C., Reynolds, S. J., Jakob, M., & Kinsel, M. (2013). The dairy industry: A brief description of production practices, trends, and farm characteristics around the world. Journal of Agromedicine, 18(3), 187–197. https://doi.org/10.1080/1059924X.2013.796901.
5. Engdaw, T. A., & Asredie, T. (2015). Antimicrobial residues in cow milk and its public health significance. World Journal of Dairy & Food Sciences, 10(2), 147–153. https://doi.org/10.5829/idosi.wjdfs.2015.10.2.96244.
6. Esemu, S. N., Nya'Nying, S. F., Ndip, L. M., Bessong, P. O., Tanih, N. F., Smith, S. I., & Ndip, R. N. (2024). Isolation and characterization of methicillin-resistant Staphylococcus aureus from bovine mastitis in North West Cameroon: Public health implications. BMC Research Notes, 17(1), 389. https://doi.org/10.1186/s13104-024-07073-3.

7. Fulgoni, V. L., Keast, D. R., Auestad, N., & Quann, E. E. (2011). Nutrients from dairy foods are difficult to replace in diets of Americans. Nutrition Research, 31(10), 759–765. https://doi.org/10.1016/j.nutres.2011.09.017.
8. Kumar, N., Manimaran, A., Kumaresan, A., Jeyakumar, S., Sreela, L., Mooventhan, P., & Sivaram, M. (2017). Mastitis effects on reproductive performance in dairy cattle: A review. Tropical Animal Health and Production, 49(4), 663–673. https://doi.org/ 10.1007/s11250-017-1253-4.
9. Le Maréchal, C., Thiéry, R., Vautor, E., & Le Loir, Y. (2011). Mastitis impact on technological properties of milk and quality of milk products—a review. Dairy Science & Technology, 91(3), 247–282. https://doi.org/10.1007/s13594-011-0009-6.
10. Puerto, M. A., Shepley, E., Cue, R. I., Warner, D., Dubuc, J., & Vasseur, E. (2021). The hidden cost of disease: Impact of the first incidence of mastitis on production and economic indicators of primiparous dairy cows. Journal of Dairy Science, 104(7), 7932–7943. https://doi.org/10.3168/jds.2020-19584.
11. Ramuada, M., Tyasi, T. L., Gumede, L., & Chitura, T. (2024). A practical guide to diagnosing bovine mastitis: A review. Frontiers in Animal Science, 5. https://doi.org /10.3389/fanim.2024.1504873.
12. Rasmussen, P., Barkema, H. W., Osei, P. P., Taylor, J., Shaw, A. P., Conrady, B., et al. (2024). Global losses due to dairy cattle diseases: A comorbidity-adjusted economic analysis. Journal of Dairy Science, 107(9), 6945–6970. https://doi.org/10.3168/jds.2023-24626.
13. Sharma, N., Singh, N. K., & Bhadwal, M. S. (2011). Relationship of somatic cell count and mastitis: An overview. Asian-Australasian Journal of Animal Sciences, 24(3), 429–438. https://doi.org/10.5713/ajas.2011.10233.