

# Mastitis-Causing Pathogens and How They Get on Your Farm

Mastitis is one of the most prevalent health issues in the dairy industry today.

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Photo credit Carly Becker, Penn State Extension

Milk yield, milk quality, and animal welfare are all areas of concern when a cow has mastitis. Mastitis is an inflammation of the mammary gland and is the most common disease of dairy cattle. Mastitis can occur when pathogens enter the teat canal causing an infection or from physical trauma to the udder or teat. Mastitis-causing pathogens can be spread through on-farm practices like milking or through direct contact with unhygienic environments. The negative effects associated with mastitis include reduced milk yield, cow performance, profitability, welfare, and longevity (Puerto et al., 2021).

In a study in 2015 using an economic modeling tool, researchers reported that the overall cost per case of clinical mastitis (exhibiting signs of mastitis) in the first 30 days in milk (DIM) is approximately \$444 (Rollin et al., 2015). This economic loss stems from both direct and indirect costs. Direct costs associated with mastitis include diagnostics, therapeutics, non-saleable milk, veterinary service, labor, and death loss. However, economic costs associated with mastitis are often underestimated due to the indirect costs that are hard to quantify and often have longer term effects, like discarded milk, future milk production loss, loss of bonuses due to poor milk quality, and increased culling risk. The \$444 per mastitis case is only accounting for clinical cases within the first 30 DIM, subclinical mastitis (no visible signs) and infections occurring post 30 DIM are not accounted for, meaning the actual cost of mastitis is much more significant than has previously been reported.

The greatest cost associated with clinical mastitis is milk production loss. The amount of milk lost can vary depending on breed, parity, herd size, and region. In general, for every 100,000 cells/mL increase over 200,000 cells/mL, milk production can drop 2.5%. In addition, the type of pathogen that is causing the infection can contribute to different losses in production. Some pathogens can cause a more severe or chronic (reoccurring) infection compared to others. The most common mastitis-causing bacterial pathogens are *Staphylococcus aureus*, *Escherichia coli*, *coagulase-negative staphylococci* (CNS), *Streptococcus dysgalactiae*, *Streptococcus uberis*, and *Streptococcus agalactiae*. A majority of pathogens can be split into two categories, contagious or environmental. Below is a list of pathogens and how they cause mastitis.

## Contagious

- *Staphylococcus aureus* - Causes one of the most common types of chronic mastitis and is usually a subclinical infection. The major reservoirs are infected udders, teat canals, and teat lesions, but have also been found on teat skin, muzzles, and nostrils. The bacteria can be spread to uninfected quarters by teat cup liners, milkers' hands, washcloths, and flies. Damaged skin and teat lesions are where bacteria like to colonize (Dairy-Cattle, 2019).
- *Streptococcus agalactiae* - Usually causes a subclinical mastitis infection. Infected cows and heifers are always the source of new infections. This pathogen can only grow and multiply in the udder but does have the ability to survive for short periods on hands, milking equipment, and teat skin (Cornell, 2022).
- *Mycoplasma spp.* - Can be spread from cow to cow through aerosol transmission and invade the udder following the presence of bacteria in the bloodstream. *Mycoplasma spp.* can be present in both young and mature animals. Often, the source of the pathogen is from purchased animals with unknown health status. Infected udders, respiratory tracts, and urogenital tracts are the primary sources of this pathogen.
- *Streptococcus dysgalactiae* - considered both a contagious and an environmental mastitis-causing pathogen. These organisms can spread from cow to cow at milking time and are commonly found in the cow's environment. The reservoirs are infected udders, manure, and other organic matter, including bedding (Petersson-Wolfe and Currin, 2012).

## Environmental

- *Escherichia coli* - Found in organic matter, including bedding and manure. *E. coli* will infect the mammary glands through environmental contact (Dairy-Cattle, 2019).
- *Coagulase-negative staphylococci* (CNS) - A pathogen that originates from skin flora and occasionally can be found in the environment. A new infection can occur during milking where irregular vacuum fluctuations can force bacteria up into the teat canal (Swartz and Petersson-Wolfe, 2016).
- *Streptococcus uberis* - Can cause both clinical and subclinical mastitis. This pathogen is predominantly found in manure and organic matter, including bedding materials. *Streptococcus uberis* has also been found on the lips, tonsils, rumen, rectum, respiratory tract, urogenital tract, infected wounds, and abscesses, on the teat orifice, teat canal, and teat skin. Fecal contamination of the housing environment is the major mechanism of spreading of this pathogen.
- *Klebsiella* - A common source of *Klebsiella* is wood based bedding products but can also be found in recycled manure or sand bedding. Manure and moisture in bedding enhances *Klebsiella* growth. Cows that survive clinical *Klebsiella* mastitis may develop chronic mastitis and are often culled for high SCC and production loss (Cornell, 2022).

*Staphylococcus aureus*, *Streptococcus uberis*, *Streptococcus dysgalactiae*, and *Escherichia coli* are responsible for nearly 80% of mastitis cases around the world (Dos Reis et al., 2011). Where cows live, mastitis-causing pathogens will always be present. With good management and excellent milking protocols, the risk of mastitis cases and high SCC cows can be reduced. Here is a list of tips to reduce the incidence of mastitis on your farm:

1. Keep a clean and dry housing environment
2. Use proper milking procedures—from the start of manual stimulation to unit attachment should be 60 to 120 seconds to allow the appropriate time for milk letdown:
  - a. Wipe all teats with a clean, single-use towel
  - b. Dip teats with a disinfectant pre-dip
  - c. Forestrip 3 to 5 squirts of milk from each quarter to check for signs of clinical mastitis
  - d. Wipe all teats again with a clean, single-use towel
  - e. Properly attach unit
  - f. Apply a barrier post-dip on all teats
3. Be sure that the vacuum pump is set at the correct level to prevent teat end damage
4. Keep alleys and walkways clean
5. Store bedding in a clean and dry place—if bedding quality is a concern, certain labs can test bedding for bacteria load
6. Chronic mastitis cows should be milked last
7. Work with a veterinarian to develop an appropriate vaccination and mastitis treatment protocols

Mastitis is one of the most prevalent health issues in the dairy industry today. Not only does it contribute to a huge economic loss but mastitis is a painful disease and has direct welfare implications for the cow. Improving management practices and farm sanitation practices can help prevent new cases of mastitis and reduce the use of antibiotics.

## Resources

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### Expertise

- Animal comfort and well being
- Heat stress management
- Milk quality
- Calf and heifer management
- Grazing management