

# Contagious Mastitis

## Bulk milk testing: Frequently Asked Questions

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## What is contagious mastitis?

Mastitis is the most common disease affecting dairy cattle worldwide. It is characterized by inflammation of the mammary gland, usually caused by a bacterial infection, which leads to abnormal milk and decreased milk yield.

It costs nearly \$650 CAD per cow, per year for a typical Canadian dairy farm. Most of this cost is attributed to the subclinical form of the disease that impacts milk yield. Mastitis treatment, management and control also impacts a farm's overall profitability, and it can also be a life-threatening condition for cows.

Mastitis is typically classified according to its clinical presentation (clinical and subclinical). Clinical mastitis is a strong inflammatory response characterized by visibly abnormal milk (e.g. clots, abnormal colour) with or without apparent changes in the udder (redness, swelling, pain, heat). Subclinical mastitis, which is the most common form, is characterized by infection without visible milk changes. With respect to causative agents and primary source of infections, mastitis can also be classified as either contagious or environmental. Contagious mastitis pathogens are primarily transmitted from cow to cow during milking. Environmental bacteria usually enter the udder from the cow's environment.

Among contagious pathogens, *Staphylococcus aureus* and *Streptococcus agalactiae* are frequent agents causing mastitis worldwide. Infections are typically subclinical and chronic, but clinical episodes may also occur. Typical infections by *Strep ag* and *Staph aureus* are not life threatening; most economic impacts occur due to decreased milk production. While *Staph aureus* is present in many/most Canadian dairy herds, infection with *Strep ag* is rare.

*Mycoplasma* spp., including *Mycoplasma bovis*, are commonly found in cows' nasal cavities and reproductive tracts. Under favourable conditions, these bacteria can enter the mammary gland from a cow's blood. They can also be transmitted from cow to cow during milking, behaving like contagious pathogens. Outbreaks of mastitis caused by *Mycoplasma* spp. are generally seen several weeks after outbreaks of respiratory disease on farms. In general, mastitis caused by *M. bovis* do not respond to antimicrobial treatments. A large Canada-wide survey conducted in 2015 showed a very low prevalence (~0%) of *Mycoplasma bovis* in Ontario dairy herds, but recent changes in dairy herd management have turned mycoplasma mastitis into an emerging disease in Canada.

*Prototheca* is a type of algae found in the environment and udder of infected cows. Infections can spread from cow to cow during milking and through the environment. Once a cow is infected with *Prototheca*, there is no effective treatment. Mastitis caused by *Prototheca* is generally mild, and spontaneous dry off of infected quarters is relatively common.

## How does the DNA Diagnostic Mastit 4® qPCR work?

The DNA Diagnostic Mastit 4® qPCR detects DNA of pathogens directly in bulk milk. qPCR stands for *quantitative polymerase chain reaction*, which is a biochemical technology that detects specific segments of DNA in samples. As each bacterial species has its own unique DNA, the assay is very specific. It is unlikely to get a positive reaction with DNA that is not from the target bacteria. The DNA Diagnostic Mastit 4® qPCR will detect the following bacterial species in bulk milk samples: *Staph aureus*, *Strep ag*, *Mycoplasma bovis* and *Prototheca*.

## How will my results appear?

Based on bulk tank results, herds will be classified as "low-risk" or "high-risk" for each pathogen. Each herd will receive four risk status results, one for each pathogen.

## What do my results mean?

Result interpretation will depend on the bacteria. Since there are imperfections with the testing, herds will be classified as either low-risk or high-risk for each pathogen. In general, the test is very good at detecting herds that have at least one cow infected with *Strep ag*. Nearly 95% of herds with at least one *Strep ag*-infected cow will test positive in bulk tank milk. Further, virtually all herds that test positive for *Strep ag* will have at least one infected cow.

With *Staph aureus*, a relatively higher percentage of infected cows is necessary to get a positive bulk tank milk test. Research shows nearly 30% of cows need to be infected with *Staph aureus* to obtain a positive bulk tank milk result. Many herds with few infected cows will test negative. *Staph aureus* in the bulk tank as inferred from a positive test does not necessarily mean cows have intramammary infections; *Staph aureus* can also be present on cows' skin. Positive *Prototheca* results should be interpreted cautiously. *Prototheca* can enter a bulk milk sample from the teat of infected cows or from the environment (teat skin, equipment etc.). It is important bulk milk testing results for *S. aureus* and *Prototheca* are considered alongside clinical signs in cows, as well as the herd bulk tank somatic cell count.

As for *Mycoplasma bovis*, bulk milk testing has a very high specificity; most herds with no *Mycoplasma bovis* infected cows will test negative. The test has low sensitivity so many herds with infected cows will also test negative. This may be due to bacteria generally being present in low numbers, and milk from infected cows being diluted with milk from uninfected cows (the dilution effect). This brings the total concentration of bacteria in bulk tank to very low levels that cannot be detected by the test. *Mycoplasma* are shed intermittently, meaning milk from positive cows can also be negative at any specific time.

## What do I do now?

Mastitis is a multifactorial disease, closely related to the production system and environment in which cows are kept. There are many factors that may increase the risk or prevent mastitis from occurring. In general, good milking hygiene and proper environment management are key elements to any successful mastitis control plan. Conducting an on-farm mastitis risk assessment with your herd veterinarian can identify practices that promote the spread of contagious mastitis. Farmers should consider reviewing their milking routine, regardless of testing results, with their herd vet.

With bulk milk testing, due to the nature of the test and pathogens involved, results obtained for *Strep ag* and *Mycoplasma bovis* will be the most relevant. It is unlikely bulk milk samples testing positive for these bacteria will be obtained from herds that do not have at least one infected cow. In addition, the two pathogens are highly contagious; they can rapidly spread within a herd if left unchecked.

Low-risk herds with no recent history of respiratory disease outbreaks should continue as normal. These herds are strongly encouraged to develop or continue implementing biosecurity protocols to prevent *Strep ag* and *Mycoplasma bovis*. Testing all incoming animals before they arrive on farm is highly recommended. Non-lactating cattle can be blood tested for *Mycoplasma bovis* using ELISAs. When purchasing cattle, consider requesting bulk tank milk cultures or PCRs from the herd of origin.

Since mastitis caused by *Mycoplasma spp.* generally appears weeks after *Mycoplasma*-associated outbreaks of respiratory disease on farms, low-risk herds with recent (< 2-4 weeks) outbreaks should consult their herd vet to rule out *Mycoplasma spp.* as a potential causative agent.

High-risk herds should minimize the spread of *Strep ag* or *Mycoplasma bovis* within the herd. Sick cows or cows with mastitis must be milked last and not be housed with fresh cows. Do not feed calves unpasteurized milk from mastitis-infected cows since some will be infected by *Mycoplasma bovis*. Calves fed contaminated milk may develop pneumonia and joint infections. A significant reduction of the within-herd prevalence of *Strep ag* or *Mycoplasma bovis* can occur by implementing good milking practices, which includes proper pre-milking and teat sanitation, as well as post-milking teat hygiene. Maintaining milking equipment, antimicrobial treatment of clinical mastitis and blanket dry cow therapy are highly effective in controlling mastitis caused by *Strep ag*. Culture of composite milk samples should be used to identify cows with *Strep ag* infections for treatment during lactation. Mastitis caused by *Mycoplasma bovis* is generally unresponsive to treatment; producers should consider culling positive cows, if feasible. Positive herds should also focus on routine sampling and screening purchased cattle.

Your test results will be strictly confidential and will be provided to you via DFO correspondence. DFO takes the privacy of producer information seriously. For this reason, only aggregate test results will be made public.

**REMEMBER** ... once your results are available, you should consult your herd veterinarian and review the test results in the context of your herd biosecurity protocols and disease control strategies.



## Take home messages

- Results for *Strep ag* and *Mycoplasma bovis* are the most relevant.
- Low-risk herds should continue to focus on keeping *Strep ag* and *Mycoplasma bovis* out of the herd. Testing all incoming animals before they arrive on farm is highly recommended.
- High risk herds should minimize the spread of *Strep ag* or *Mycoplasma bovis* while identifying infected cows.

## Where can I get more information about mastitis?

Further information about mastitis can be found at:

[National Mastitis Council](#)<sup>1</sup>

[Ontario's SCC 200](#)<sup>2</sup>

[Canadian Mastitis Network](#)<sup>3</sup>

[Mastitis in Cattle – Merck Manual](#)<sup>4</sup>

## Weblinks

<sup>1</sup>National Mastitis Council (<http://www.nmconline.org/>)

<sup>2</sup>Ontario's SCC 200 (<http://www.scc200.ca/>)

<sup>3</sup>Canadian Mastitis Network (<http://www.mastitisnetwork.org/>)

<sup>4</sup>Mastitis in Cattle – Merck Manual

(<https://www.merckvetmanual.com/reproductive-system/mastitis-in-large-animals/mastitis-in-cattle>)

<sup>5</sup>Dairy at Guelph (<https://dairyatguelph.ca/contact/>)

## Disclaimer

*The content of this FAQ document was current at the time of its preparation (Feb. 2, 2022) and is believed to represent the best information about the presence of bovine mastitis in dairy herds. Neither Dairy Farmers of Ontario or University of Guelph nor any of their funding partners or content providers shall be held liable for any improper or incorrect use of information described and/or contained herein, and assumes no responsibility for any direct, indirect incidental, special, exemplary, or consequential damages that anyone incurs from use of this information.*

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