

Testing for Mastitis using the DHI milk sample

The **Mastitis 3** test, which identifies the presence of the three major mastitis pathogens commonly referred to as the 'contagious' pathogens, specifically *Staph aureus*, *Strep. agalactiae* and *Mycoplasma bovis*, can be done using the same milk sample currently collected by DHI. This new test is based on **polymerase chain reaction (PCR)** technology.

What is PCR?

PCR is a technique widely used in molecular biology which detects very small amounts of a particular sequence of DNA. PCR technology has been a major scientific advance and an important tool for many kinds of basic research, and for diagnosis of human and animal diseases. Because of its high sensitivity, PCR permits detection soon after infection and often even before the onset of disease.

Specific to mastitis, the **Mastitis 3** PCR test identifies the presence of *Staph aureus*, *Strep. agalactiae* and *Mycoplasma bovis* bacteria DNA in the milk sample. For samples where *Staph. aureus* is detected, the presence or absence of the β lactamase gene, (which conveys penicillin resistance) is also reported. The test does not rely on the ability of the bacteria to grow (ie. Culture), in a lab environment and will identify the presence of the target DNA, even if the bacteria is dead, hence the ability to use the preserved DHI sample. This is a major advancement in mastitis testing considering that a high percentage of samples submitted from clinical cows show 'no growth' in traditional culturing.

The PCR test has been validated for use in raw and preserved (DHI) milk samples. Using this test with DHI samples is extremely convenient and can be integrated with routine somatic cell count (SCC) monitoring. In addition to convenience, rapid turn around of results (1 day once samples are in the lab), improved accuracy and enhanced results reporting, including already captured DHI cow information (SCC history, milk production level, etc.), is of benefit.

Testing Options and Results

Producers have the ability to test:

1. The entire herd
2. Selected cows, such as newly purchased cows or cows displaying clinical signs of mastitis, or
3. Cows that exceed a certain producer selected SCC level, where those samples will be redirected from the SCC analyzer to the **Mastitis 3** test.

The test is quantitative and positive results are reported as +, ++ and +++ based on the amount of bacteria DNA present in the sample. Also, valuable information about each cow (DIM, SCC, milk production, etc.), is displayed on the easy to read report.

Producers should work closely with their veterinarian to design mastitis best management practices, determine a testing plan for their herd, test results interpretation and implementation of an action plan for test positive cows.

Mastitis

As all dairy producers know, mastitis is an age-old problem and even today it continues to be the most significant disease of dairy cattle, costing the Canadian dairy industry millions of dollars annually. Early infection detection, even before clinical signs are present is extremely important for managing this disease.

The following is an excerpt from National Mastitis Council (NMC) Factsheet. For more information visit NMC at www.nmconline.org or the Canadian Bovine Mastitis Research Network at www.mastitisnetwork.org.

A Practical Look at Contagious Mastitis

Introduction

Pathogenic microorganisms that most frequently cause mastitis can be divided into two groups based on their source: environmental pathogens and contagious pathogens. The major contagious pathogens are *Streptococcus agalactiae*, *Staphylococcus aureus*, and *Mycoplasma* spp. With the exception of some mycoplasmal infections that may originate in other body sites and spread systemically, these three organisms gain entrance into the mammary gland through the teat canal. Contagious organisms are well adapted to survival and growth in the mammary gland and frequently cause infections lasting weeks, months or years. The infected gland is the main source of these organisms in a dairy herd and transmission of contagious pathogens to uninfected quarters and cows occurs mainly during milking time.

Organisms - *Staphylococcus aureus*

Staphylococcus aureus can be difficult to eradicate, but is definitely controllable. Infected udders are the most important source of infection. The organism readily colonizes teat skin lesions and the teat canal, and eventually passes into the mammary gland. The organism may also survive at other sites on the cow. Mastitis caused by *Staph. aureus* produces significant damage to milk-producing tissues, and decreases milk production with reported losses of 45% per quarter and 15% per infected cow. Recurring signs of mild clinical mastitis often causes additional losses. High bacteria counts in bulk milk are generally not seen with *Staph. aureus* mastitis. However, as the number of infected cows increases, the bulk milk SCC increases, resulting in decreased milk quality. Herds with bulk tank milk SCC greater than 300,000 to 500,000 cells/ml often have a high prevalence of *Staph. aureus* infected quarters.

Management Programs

Transmission of pathogens that cause contagious mastitis from infected cows to uninfected herdmates most generally occurs at milking time. Management factors important in transmitting contagious pathogens include the milking machine, milkers' hands, teat washing materials and treatment procedures. Spread of contagious pathogens can be greatly reduced by good udder hygiene and postmilking teat dipping.

Control Procedures - *Staphylococcus aureus*

Staphylococcus aureus commonly produces long-lasting infections that can persist through the lactation and into subsequent lactations. To prevent *Staph. aureus* intramammary infections, it is necessary to limit the spread of this organism from cow to cow and to reduce to a minimum the number of infected cows in a herd. To attain these objectives, milk from infected cows should never come in contact with uninfected cows. *Staphylococcus aureus* infected cows should be identified and milked last, or milked with a separate unit from those used on uninfected cows. Clinical mastitis sometimes occurs following prolonged subclinical infections. Antibiotic therapy during lactation may improve the clinical condition but usually does not eliminate infection. Dry cow therapy may give better results than treatment during lactation, but even then, chronic infections can persist into subsequent lactations. *Staphylococcus aureus* infection status of cows should be one of the considerations when culling decisions are made.

Maintaining a *Staph. aureus*-free herd is possible but may be challenging as *Staph. aureus* may reappear even in a closed herd. To achieve a "*Staph. aureus*-free" status, every infected cow must be identified and handled as described in the preceding paragraph. The "uninfected" herd should be closely monitored by individual SCC and testing.

Summary - Controlling Contagious Mastitis

- 1. Prepare teats properly prior to milking.** Udders should be dry, and teats should be cleaned and dried prior to machine attachment using single-service paper towels or individual cloth towels which have been laundered and dried after each milking.
- 2. Use adequately sized, properly functioning milking equipment.** Use milking machines in a proper manner on properly prepared cows. Avoid unnecessary air admission into the teat cups during unit attachment, machine stripping and unit take-off that can cause irregular vacuum fluctuations.
- 3. Disinfect teats.** Use an effective product after every milking. Postmilking teat disinfection is the single most effective practice to reduce the rate of new intramammary infection by contagious pathogens.
- 4. Assess clinical cases for treatment decisions.** Most cases of clinical mastitis other than those caused by *Strep. agalactiae*, are only minimally affected by antibiotic therapy during lactation. Work together with the herd veterinarian to design a management protocol for mild, moderate, and severe cases of clinical mastitis.
- 5. Use dry cow therapy.** Treat each quarter of every cow at drying off with a single dose of a commercially formulated, approved dry cow treatment product.
- 6. Consider culling chronically infected cows.** Cows which are infected with *Strep. agalactiae*, *Staph. aureus*, or *Mycoplasma* spp. present a risk to noninfected cows in the herd.
- 7. Maintain a closed herd.** If new animals are purchased, test them before adding them to the herd.
- 8. Establish an active milk quality program with the herd veterinarian.**