Milk Money Fact Sheet 04

Coliform Mastitis

Mike Maroney, DVM

Background:

Escherichia coli, *Enterobacter aerogenes*, *Klebsiella pneumoniae* and *Serratia marcesans* are four common coliform bacteria that cause mastitis. Coliform bacteria are normal inhabitants of soil, digestive tract and manure. They accumulate and multiply in contaminated bedding. Coliform numbers of 1,000,000 or more per gram of bedding increase the likelihood of an udder infection and clinical mastitis. *Klebsiella pneumoniae* is common in sawdust bedding, especially rough-cut sawdust that contains bark or soil.

Coliforms invade the udder through the teat sphincter when teat ends come in contact with coliform bacteria. Once coliform bacteria enter the mammary gland, they either multiply rapidly or remain dormant. As they are destroyed by the cow's immune system, coliforms release endotoxins (poisons) into the cow's body. These endotoxins cause many of the clinical signs associated with coliform mastitis such as high fever, depressed appetite, rapid weight loss, abnormal milk and decreased production.

There is a distinct seasonal pattern of new clinical infections associated with high temperatures, heavy rainfall and unstable weather conditions. Often severe cases occur in older high producing cows early in their lactation.

Symptoms:

All dairy herds have to deal with coliform mastitis to varying degrees due to their widespread existence in the environment. Even though coliforms may cause a high percent of all acute clinical cases, these organisms are responsible for less than five percent of the total infected quarters within a herd at any one time. In 5-15% of these cases, enough endotoxin is released to result in seriously ill cows and death.

Coliform bacteria are responsible for a great number of acute clinical mastitis cases in dairy cows. Severely affected cows may show signs of high fever, udder inflammation (swelling), depressed appetite, dehydration (sunken eyes), diarrhea, decreased production and abnormal milk. Abnormal milk may be watery with clots, however the appearance of abnormal milk is not a good indicator of what type of mastitis pathogen is present. Usually only one quarter per cow is clinically infected at a time. Coliform bacteria are also capable of producing subclinical infections that persist for longer periods of time. It is usually not effective to treat these infections because the majority are eliminated by the cows' immune system.

Diagnosis:

Bacteriological culturing of the milk can be used to determine if mastitis is caused by coliform bacteria. However, in severe clinical cases the results will not be known in time to affect the treatment. Results from previous severe cases can help the veterinarian or herdsperson make better treatment decision.

It is not uncommon to get no growth when culturing abnormal milk from coliform infections because the cow's immune system has destroyed the bacteria by the time the milk sample is collected. On farm culturing has been gaining popularity and allows for results within 24 hours. Other farms employ a culturing strategy where they screen their fresh cows with a CMT paddle and all positive quarters are cultured. If the cow comes down with clinical mastitis in the first ninety days of lactation they then treat according to their subclinical culture results and treatment protocol.

Treatment:

For severe cases, many farms call their herd veterinarian for treatment or to devise a treatment protocol. Intramammary antibiotic therapy has little, if any, effect on improving the outcome of clinical mastitis caused by coliform bacteria.

Most mastitis caused by Gram-negative bacteria (coliforms) is mild or moderate. The immune response of the cow is highly successful in destroying these bacteria. As the bacteria are destroyed, endotoxin, which is a component of their cell wall, is released. Treatment for severe cases generally includes: Fluid therapy, anti-inflammatories, steroids, and systemic antibiotics with Gram-negative activity. Systemic antibiotic are warranted because more than 40% of severely ill animals will experience bacteremia (bacteria circulating in the bloodstream). A recent study indicated more favorable clinical outcomes for cows with severe clinical coliform mastitis that received IM ceftiofur once daily as compared to cows that received only supportive therapy. Treatment with oxytocin and frequent milk out is commonly included in mastitis treatment protocols. However, research has not shown these practices to be effective.

Prevention:

Maintain an adequate amount of bedding in confinement stall barns to provide a dry, comfortable bed for the cows. Grooming of stalls should be performed two to three times a day to remove manure and wet bedding. For sand based stalls it is critical that the back 2 to 3 feet of each stall be cleaned and lev-

eled at each milking. A weekly schedule of replacing sand in the freestalls will ensure the stalls remain full of clean sand. Develop standard operating procedures for maintenance of clean comfortable stalls. Make sure that employees responsible for stall maintenance and scraping alleys understand their role in mastitis prevention and control. Bedding cultures can be helpful to assess whether current practices are sufficient to keep coliform counts low.

The dry period is a time when new subclinical infections can occur. Research indicates that 50% of the clinical coliform infections, occurring in the first 90 days of lactation, actually started in the dry period. The times of greatest risk for acquiring new infections during the dry period are two weeks after dry off and the prefresh/calving period. Therefore the housing and bedding of the cows should be carefully scrutinized for the dry and prefresh groups and the calving pens. If a bedded pack is employed make sure not to overcrowd it.

If pastures are used, make sure that they are in good condition. Having multiple paddocks available allows grasses to recover after wet conditions. For the prefresh group, properly designed freestalls are usually more desirable than a bedded pack because you can control where the cows places her udder during this high-risk period. Many farms are focusing on individual use calving pens with a complete change of bedding with each calving. Internal teat sealants have been shown to be effective in limiting the amount of new infections during the dry period.

To minimize the risk that the milking machine could play a role in coliform mastitis make sure to keep it properly maintained. Regular milking system analysis will ensure that the teat end vacuum is properly set and stable. Stable teat end vacuum will reduce the chance of reverse jetting of bacteria into the mammary gland during milking. Proper premilking teat sanitation will decrease the amount of bacteria in the milk in the event that reverse jetting occurs. Good teat end stimulation (10-20 seconds) and a prep-lag time of one to two minutes will ensure good milk letdown and decrease overall machine on time. Keeping the inflations clean is also very important.

J-5 and similar vaccines are beneficial in limiting the severity of clinical signs from coliform infections. For vaccines to be effective, label directions must be followed. Keep in mind that these vaccines do not prevent new infections and are not a substitute for proper management of housing areas.