

Mycoplasma in Dairy Cattle

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Mycoplasma is a tiny bacterium that can cause mastitis, metritis, pneumonia, drooped ears, and lameness in dairy cattle. While this bacterium has existed for more than 100 years, the current disease was first recognized in the 1960s and 1970s, and has only recently become a problem in Virginia. There has been a steady rise in the frequency and severity of disease associated with *Mycoplasma* in the last ten years. *Mycoplasma* is a highly contagious disease that can have devastating economic effects on a dairy farm due to decreased milk production, additional veterinary costs, culling of cows, calf loss, and treatment cost. All dairy animals can be infected, including calves, heifers, dry cows and lactating cows.

***Mycoplasma* Mastitis**

Transmission

Several species of *Mycoplasma* have been identified in dairy cattle. *Mycoplasma bovis* is not only the most common, but also appears to cause the most severe clinical signs. In most cases, *Mycoplasma* enters a herd through purchased infected animals. *Mycoplasma* is a contagious cause of mastitis; therefore, once *Mycoplasma* is present on a farm, further spread between cows occurs primarily at milking. Milking an infected cow allows the organism to get into the milking unit, exposing the next cow to be milked to the organism. It can also be spread by the milker's hands during udder preparation, or infusion of contaminated intramammary antibiotics. It is not known at this time if calves that have had *Mycoplasma pneumonia* will harbor the bacterium in their udder and develop *Mycoplasma* mastitis when they freshen.

The bacterium can be shed in the milk in large numbers before clinical signs appear with relatively few organisms required to infect a quarter. These factors may help explain why 25 percent to 30 percent or more of a dairy herd can become infected during an outbreak of *Mycoplasma* (Bayoumi *et al.*, 1988).

Infected raw milk fed to calves can spread the bacteria from cows to calves. Once *Mycoplasma* spreads to the calf-rearing facility it is difficult to eradicate, as the older calves continually infect younger animals.

Clinical Signs

Mycoplasma causes a clinical contagious mastitis that usually appears as a swollen quarter that is sensitive to the touch and has decreased milk production. This is followed by abnormal milk 1 to 3 days later. Often, the milk initially has visible particles that progress to pus, eventually becoming watery with fine particles that form sediment. Affected cows generally do not appear sick and maintain good appetites. Frequently, more than one quarter is affected. *Mycoplasma* often will invade quarters that are already infected with other organisms. The incidence of *Mycoplasma* mastitis also appears to be greater in the winter (Gonzalez *et al.*, 1992).

Somatic cell counts (SCC) are often elevated in cows infected with *Mycoplasma*, but normal SCC are possible. This characteristic means that it is possible for cattle that are not showing clinical signs and have normal SCC to be a source of infection for other cows. Cows nearly always have subclinical infections with *Mycoplasma* after recovering from clinical cases. Cows that have never been noted to have clinical cases may also have subclinical *Mycoplasma* infections.

Diagnosis

Mycoplasma mastitis should be suspected if there is an increase in the number of cases of mastitis that are unresponsive to treatment. A dramatic increase in the bulk-tank SCC may also be a sign of a *Mycoplasma* problem. Diagnosis of *Mycoplasma* mastitis is made by culturing the bacterium from the milk. Standard milk culturing will not detect the presence of *Mycoplasma*. Special media are required, making it necessary to specifically request *Mycoplasma* culturing. Cows with *Mycoplasma* mastitis are often infected with other organisms, potentially delaying diagnosis if more common pathogens are isolated and *Mycoplasma* is not suspected. Although cows with subclinical *Mycoplasma* mastitis may shed the organism intermittently, cows with clinical signs from *Mycoplasma* mastitis are most likely shedding the bacteria. Therefore, to increase the likelihood of detecting *Mycoplasma* mastitis in a herd where it is suspected, **all cows with clinical signs of mastitis should be cultured for *Mycoplasma***. It takes approximately 7 days to receive the culture results.

Treatment

Most experts agree that there is no effective treatment for *Mycoplasma* mastitis. If other organisms are present, they should be cultured and treated. If the immune status of the animal is good, cows may eventually eliminate the infection, but the time period for this to occur is extremely variable. Additionally, infected cows may develop normal milk but still be subclinically infected (and therefore able to shed the bacteria) well into the next lactation (Byrne *et al.*, 2005).

Prevention

An important aspect of prevention is the thorough screening of animals before they enter the herd. Requesting cultures for *Mycoplasma* on the individual cow or from bulk milk tank samples before purchasing new cows is highly recommended. Three to five samples should culture negative for *Mycoplasma* over the 1 to 2 months prior to adding the new animal to your herd. Although this seems like a lot of testing, the consequences of introducing *Mycoplasma* into a dairy herd can be disastrous. The source of the cow introductions should be considered in determining the number of cultures performed. Pregnant heifers can carry *Mycoplasma* in their udders and become clinically infected after they calve. Consequently, heifers should also be cultured.

At freshening, the measures taken to prevent other contagious causes of mastitis (such as *Staph aureus* and *Strep agalactiae*) will also help in the prevention of *Mycoplasma* infections. Recommended preventative measures include:

- Automatic milking detachers
- Sand bedding
- Dip cups instead of spraying
- Pre- and postdipping
- Good overall sanitation during udder preparation and milking

Damaged teat ends make it easier for organisms to invade the udder. If there are a large number of damaged teat ends (approximately 20 percent to 25 percent), or a sudden increase in the number of damaged teat ends, the milking equipment vacuum should be checked. It is also important to use commercially prepared, single-use mastitis preparations and only place the very tip of the applicator into the teat. Again, good hygiene during the treatment procedure is critical. Bulk-tank cultures can be performed on a routine basis (ex. every month) to ensure *Mycoplasma* is not likely present on the farm.

Control

If *Mycoplasma* is suspected in the herd, aggressive and often expensive measures are necessary to prevent a disastrous outbreak of mastitis. For herds of fewer than 200 cows, bulk-tank samples may be collected and submitted for culture of *Mycoplasma*. Herds larger than 200 cows must submit group samples for accurate results. If the bulk-tank culture is positive for *Mycoplasma*, you should culture all cows individually to identify infected animals. Another option is to pool or combine samples from 10 cows and culture the pooled samples, saving the individual samples and keeping them refrigerated. If a pooled sample is positive, then all of the individual samples from that pool are cultured and the positive cow(s) can be identified. This sampling technique can save money if the incidence of *Mycoplasma* is low. Since *Mycoplasma* can be shed intermittently, several cultures are necessary to prove a cow is *Mycoplasma* negative.

In situations where a low number of cows culture positive, it is recommended to cull all positive cows. Replacement animal numbers, farm finances, stocking density, and expansion plans are some of the factors to consider when determining if culling all positive cows is feasible.

Team meetings with farm owners, managers, workers, and your veterinarian can help make this decision.

However, if a high percentage of the herd is affected and culling is not possible, it is essential to separate the positive cows from the negative cows. Because milk spread appears to be the most important factor, *Mycoplasma* positive cows should be milked with a separate milking unit (or milked last). They should also be housed separately. If segregation is attempted, it must be strictly enforced to avoid disastrous consequences.

During an outbreak of *Mycoplasma*, use iodine-based products to sanitize the milking equipment, and to dip teats. Every farm will have different challenges and circumstances. Owners of infected herds must work closely with a veterinarian to formulate a plan to eradicate *Mycoplasma* from the farm. Regular team meetings with the veterinarian, farm manager, milkers, and all farm staff members are extremely important to keep everyone informed of the overall plan and progress.

***Mycoplasma* in Calves**

Transmission

Baby calves are most likely exposed to *Mycoplasma* by drinking colostrum or waste milk from cows with *Mycoplasma* mastitis. However, once *Mycoplasma* gets into a calf-rearing facility, it is very easily spread from calf to calf through the air. This sets up a never-ending chain of infection as older calves infect the new calves moving into the facility. This route of infection becomes more important for calves that are more closely confined. Nursing bottles or buckets and drenching and balling guns are also capable of spreading the disease from one calf to another. Beef animals may also shed the organism.

Nearly all herds with *Mycoplasma* mastitis see disease in calves. While most calves in infected herds will become infected with *Mycoplasma*, not all of these calves should get sick. Signs should be mild if calves are well managed and there is little stress. *Mycoplasma* enters the nose and throat and lives there for a time. During periods of stress for the calf, the organism can move down into the lungs where it causes a severe pneumonia. From the respiratory tract it can enter the bloodstream, where it is capable of entering joints, organs, nerves, and possibly mammary glands. In dairy cattle, *Mycoplasma* often will cause a severe ear infection and sometimes arthritis.

Clinical Signs

Mycoplasma can start to cause respiratory symptoms in calves as early as 2 weeks of age. Common clinical signs are a harsh hacking cough, low-grade fever, mild depression, and runny eyes. Initially, *Mycoplasma* causes subtle clinical signs and infected calves have good appetites so they can go unnoticed until significant, and often permanent, damage has occurred to the lungs. In this case, these calves become “chronics,” and although they may survive, the odds of them becoming productive lactating dairy cows are slim.

Many calves will develop a severe ear infection (otitis). Typically, a single drooped ear when the calf is at rest is the earliest clinical sign. In this case, respiratory damage is already occurring, but the respiratory signs are not obvious yet. These calves will have yellow pus draining from one or both ears, and their ear(s) will droop down. In rare cases, the bacterium invades the inner ear and calves will exhibit a head tilt, circling or falling to one side, or will lay down with the affected side towards the ground (Smith, 2002).

In some cases, calves will develop a severe arthritis 2 to 4 weeks after the respiratory signs occur. These calves will have swollen joints that are so painful that they will be reluctant to walk. Calves can be lame in one or more joints. The higher joints (knees, hocks, stifles, and elbows) are most often affected. In herds with a severe *Mycoplasma* problem, calves can become sick at a younger age, and have severe clinical signs early.

Diagnosis

A definitive diagnosis of *Mycoplasma* pneumonia requires culturing the lungs of affected calves. If they have otitis, the discharge can also be cultured for *Mycoplasma*. A special culture medium is required to find *Mycoplasma*, meaning you must specifically request a culture for it. If a large number of calves are showing respiratory signs, otitis, and arthritis that are unresponsive to treatment, a *Mycoplasma* problem should be highly suspected.

Treatment

Mycoplasma is very difficult to treat in calves as well. Several of the commonly used antibiotics do not work well for *Mycoplasma*. Penicillin, Polyflex[®], Naxcel[®], Excenel[®], and Excede[®] kill bacteria by destroying their cell walls. Since *Mycoplasma* does not have a normal cell wall, these antibiotics are ineffective in treating the organism. Micotil[®] shows little or no activity against *Mycoplasma* as well.

Oxytetracycline has produced mixed results in treating *Mycoplasma* in calves. Tulathromycin (Draxxin®) is the only drug approved for *Mycoplasma* and in one study, was the drug most likely to work (Butler *et al.*, 2000). Draxxin® provides the most convenient treatment of mycoplasmosis because one dose provides 7 to 14 days of therapeutic blood levels. **Draxxin® cannot be used in female dairy cattle 20 months of age or older.** Other drugs that show good results are Nuflo® and Adspec®.

The two most important factors in the successful treatment of *Mycoplasma* infected calves are early recognition and prolonged treatment. Calves that are treated early in the course of the disease respond fairly well, but need to be treated for 10 to 14 days or 50 percent to 70 percent will relapse and require treatment again. Each time a calf relapses it will have more lung damage and be less likely to recover.

Ear infections also need to be treated for a longer period of time. If problems with *Mycoplasma* are suspected, it is critical that you work with a veterinarian to develop a treatment protocol that will fit these guidelines and best meet the needs of your farm. Using antibiotics to treat swollen joints is usually unrewarding as long as the calves no longer have pneumonia. The most effective treatment for these calves is to provide easy access to feed and water so they will not starve or dehydrate. It may also be necessary to run these animals to feed and water several times a day until they have begun to recover. The most fortunate aspect of this disease is that it appears that a large number of these calves will recover if given enough time. It can take months for the joints to fully recover and the cattle to start gaining weight.

Prevention

The 2002 National Animal Health Monitoring System (NAHMS) Dairy Survey showed that 87.2 percent of dairy farms in the United States feed waste milk to their newborn calves. Even though this may appear cost effective, baby calves can be exposed to *Mycoplasma* by drinking waste milk or colostrum. This can lead to sick and dying calves, as well as propagate the further spread of *Mycoplasma*. The cost of calf illness and losses from feeding *Mycoplasma*-infected waste milk often outweigh the cost savings seen from purchasing less milk replacer. One option is feeding newborns colostrum replacements such as Secure® or Aquire® instead of colostrum. Calf-milk replacer is the safest alternative for unweaned calves to drink, but waste milk may be used if it is pasteurized on the farm to 65°C for 1 hour (Butler *et*

al., 2000). Pasteurizing effectively kills *Mycoplasma* as well as the other major pathogens of calfhoo diseases. Equipment used to feed pasteurized waste milk must be kept clean to realize the benefits of pasteurization.

Summary

Mycoplasma is a costly and difficult problem to deal with once it has entered the herd. It causes a contagious mastitis in the lactating dairy herd as well as a severe otitis, pneumonia, and arthritis in calves and heifers. New arrivals, heifers, and lactating cows with mastitis should all be screened for *Mycoplasma*. Monthly bulk-tank samples can also be screened for *Mycoplasma*. Routine screening is particularly important for open herds. *Mycoplasma* should be suspected when there is a large number of mastitis cases that are unresponsive to treatment or if unresponsive pneumonia, otitis, and arthritis occurs in the calves. Working closely with a veterinarian to set up a monitoring and/or treatment program specifically for the herd is recommended for all modern dairies.

References

1. Bayoumi F., Farver T., Bushnell B., Oliveria M., Enzootic Mycoplasmal mastitis in a large dairy during and eight year period. *Journal of the American Veterinary Medical Association* 1988 192:905-909.
 2. Gonzalez R., Sears P., Merrill P., Hayes G., Mastitis due to *Mycoplasma* in the state of New York during the period 1972-1990. *Cornell Vet* 1992: 82:29-40.
 3. Byrne w., Markey B., McCormack R., Egan J., Ball H., Sachse K. Persistence of *Mycoplasma bovis* infection in the mammary glands of lactating cows inoculated experimentally. *The Veterinary Record* 2005 June 11; 156(24): 767-71.
 4. Smith BP. Diseases of the nervous system: *Large Animal Internal Medicine*, 3rd ed., St. Louis, Mosby, 2002, pp 951.
 5. 2002 Report on National Animal Health Monitoring System (NAHMS) Dairy Survey. USDA APHIS, Veterinary Services.
 6. Butler J., Sickles S., Johann C., Rosenbusch R. Pasteurization of discard *Mycoplasma* mastitic milk used to feed calves: thermal effects on various *Mycoplasma*. *Journal of Dairy Science* 2000 Oct; 83(10): 2285-8.
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