

## Mycoplasma in Beef Cattle

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Mycoplasma is a tiny bacterium that has a long history of causing disease in the cattle industry. Beginning in the early 2000s, it has emerged as an important entity in Virginia.

### Introduction

Mycoplasma was first isolated from cattle with pneumonia and arthritis at the Pasteur Institute 100 years ago. One strain of Mycoplasma was the cause of Contagious Bovine Pleuropneumonia (CBPP), one of the first diseases eradicated in the United States.

The current manifestation of the disease was first reported in the United States in the 1970s, but there were very few cases recognized in Virginia. In the summer of 2000, there was an explosion of new cases. Now the disease is widespread and individual cases can occur in almost any herd. Severe outbreaks can be devastating to producers. It is possible there was a low level of Mycoplasma *bovis* (*M. bovis*) present before 2000 that went undetected.

In a 2006 study, Mycoplasma *bovis* was present in 46 percent of cattle with normal lungs (Gagea, *et al.*, 2006a), 85 percent of cattle with acute fibrinous pneumonia, and 98 percent of cattle with chronic pneumonia (Gagea, *et al.*, 2006b). Mycoplasma grows slowly and requires a special medium so that if cultures are not performed specifically for the bacterium it will not be identified. Mycoplasma pneumonia primarily affects stocker and feeder calves but is occasionally found in nursing calves on cow-calf operations.

### Transmission

There are many species of Mycoplasma but Mycoplasma pneumonia is most commonly caused by the

bacterium *M. bovis*. The most likely method of spread for Mycoplasma is from calf-to-calf. This can occur by direct calf-to-calf contact, or through the air when calves are closely confined. Drenching and balling guns can spread the disease between calves. Even though *M. bovis* can live in the environment for short periods of time, spread of the disease by contamination of barns, feed troughs, trucks, etc. is not thought to be an important means of transmission.

As long as Mycoplasma remains in the upper respiratory tract it causes no clinical signs of disease. When the bacterium enters the lungs it causes a pneumonia that is somewhat different from the shipping fever pneumonia that most beef producers recognize. From the respiratory tract *M. bovis* can travel through the bloodstream where it is capable of entering joints, organs, and nerves (Maeda, *et al.*, 2003). In beef cattle, Mycoplasma most commonly goes to the joints where it can cause a crippling arthritis and tenosynovitis (inflammation of the tendons and fluid in the joint). Mycoplasma can also infect the ears, eyes, udder, and genital tract.

### Clinical signs

#### Pneumonia

Mycoplasma *bovis* can, by itself, cause respiratory disease. However, the disease most often occurs when an initial stressor causes calves to develop traditional Bovine Respiratory Disease Complex (BRDC or shipping fever), and Mycoplasmosis develops seven to 14 days later. In this situation, because it is the third development in the disease complex it is often called a tertiary disease.

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Bovine viral diarrhea virus (BVDV) has also been shown to suppress the immune system of cattle and predispose them to *M. bovis* pneumonia and other respiratory diseases.

*Mycoplasma* weakens the cattle’s immune system, and inhibits the respiratory tract’s own defenses against disease (Smith, 2002, p 559). Common clinical signs are a harsh hacking cough, a low-grade fever, mildly increased respiratory rate, mild depression, and runny eyes. Because *Mycoplasma* does not produce toxins like *Mannheimia haemolytica*, these calves initially do not look as sick as other calves with pneumonia. They are alert and have a fair appetite. However, if they are not treated early their condition will worsen dramatically and be much harder to treat. It may take seven to 14 days after the respiratory tract is infected before calves show dramatic clinical signs, and by this stage significant and often permanent damage has been done to the lungs. This scenario results in higher calf deaths and more “chronics.” Necropsy findings associated with *Mycoplasma* include small abscesses throughout the lung that have the appearance of scattered rice. Calves with pneumonia due to *Mycoplasma* do not respond as well to standard treatments for BRDC, and often relapse up to one month after initial treatment.



Lungs of a calf that died from *Mycoplasma pneumoniae*, microabscesses are seen throughout the lung tissue.



Cross section of lung tissue with *Mycoplasma pneumoniae* abscesses

### Arthritis

Some calves with pneumonia due to *M. bovis* will develop a severe arthritis two to four weeks later. Different strains of *M. bovis* have different likelihoods of causing joint problems so some outbreaks have many lame calves while others have none. Affected calves will have swollen joints that are so painful that they will be reluctant to walk to the feed and water bunks. By the time the infection reaches the calf’s joints, severe lung damage has probably occurred. In rare cases, calves can have joint involvement without any signs of pneumonia.

The carpus (knee) and stifle are the most commonly affected joints, but any joint can be involved. Calves can be lame in one or more joints.



Swollen right carpus (knee) of a calf with *Mycoplasma* arthritis



Stifle joint of a calf with *Mycoplasma* arthritis showing severe inflammation of the joint capsule while the joint surface is smooth and undamaged

The joint swelling primarily comes from inflammation of the joint capsule and the tissues surrounding the joint. The cartilage-covered bone surfaces in the joint, which heal poorly, are minimally affected. This is very important for the prognosis of affected calves, as even joints that are severely affected often recover.

## Other clinical signs

A small percentage of beef cattle that have Mycoplasma pneumonia will develop ear infections, or otitis. Affected calves will have drooped ear(s) with yellow pus draining from one or both ears. In rare cases, Mycoplasma invades into the inner ear causing a head tilt, circling or falling to one side, or the inability to rise with the affected side toward the ground (Smith, 2002, p 951).

Mycoplasma can also cause abortions, infertility, mastitis, and inflammation of the eyes in beef cattle, but cases are rare.



Calf with drooped ear due to mycoplasma otitis

## Diagnosis

A definitive diagnosis of Mycoplasma pneumonia is difficult because *M. bovis* can be cultured from the nasal secretions and upper airways of normal calves. In order to be sure that *M. bovis* is contributing to the pneumonia, it needs to be recovered from the lungs of calves. As mentioned before, this requires a special culture medium. *M. bovis* should be suspected when joint swelling or single drooped ears are noted in a group of calves that have had pneumonia, or when the pneumonia is unresponsive to treatment. It is important to remember that some strains of *M. bovis* may not cause lameness or drooped ears, so it is very possible to have Mycoplasmosis without these additional signs. In the U.S., *M. bovis* has become the most common respiratory pathogen of cattle that do not respond well to treatment.

## Treatment

Mycoplasma is very difficult to treat because many commonly used antibiotics do not work well. Penicillin, Polyflex<sup>®</sup>, Naxcel<sup>®</sup>, Excenel<sup>®</sup>, and Excede<sup>®</sup> kill bacteria by destroying the cell wall. Since Mycoplasma does not have a normal cell wall, these antibiotics are ineffective in treating it. Micotil<sup>®</sup> shows little or no activity against Mycoplasma as well.

Oxytetracycline (the active ingredient in LA-200<sup>®</sup>, Biomyacin 200<sup>®</sup>, Tetradure 200<sup>®</sup>, and other generics) has produced mixed results in treating Mycoplasma. In one study 50 percent of *M. bovis* isolates were resistant to oxytetracycline. Tulathromycin (Draxxin<sup>®</sup>) is the only drug approved for Mycoplasma, and in one study, was the drug most likely to be effective (Godinho, *et al.*, 2005). Draxxin<sup>®</sup> provides the most convenient treatment of Mycoplasmosis because one dose provides seven to 14 days of therapeutic blood concentrations against Mycoplasma and *Mannheimia haemolytica*, *Pasturella multocida*, and *Histophilus somni*, all causes of BRDC. Other drugs that show good results are Nufloir<sup>®</sup> and Adspec<sup>®</sup>. Baytril<sup>®</sup> and A180<sup>®</sup> can also be effective in treating Mycoplasma when there is a mixed infection with *M. haemolytica* and Mycoplasma.

**The two most important factors in the treatment of Mycoplasma are early recognition and prolonged treatment.** Calves treated early in the course of the disease respond fairly well. The need for longer treatment than usual for BRDC is underscored by the fact that without extended therapy, 30 percent to 70 percent

of the calves can relapse and require treatment again. Each time a calf relapses it will have more lung damage and be less likely to recover. Current recommendations are to provide continuous therapeutic levels of antibiotics to calves with *Mycoplasma pneumonia* for 10 to 14 days.

Chlortetracycline at a rate of 0.25 to 1.0 grams per 100 pounds of body weight per day can be added to the feed to extend the therapy protocol to the recommended 10 to 14 days. If a *Mycoplasma* infection is suspected, a veterinarian should be consulted in developing a treatment protocol that will fit these guidelines and best meet the needs of the operation. Using antibiotics to treat swollen joints is usually unrewarding once the pneumonia has been controlled. The most effective treatment for arthritic calves is to provide easy access to feed and water to prevent starvation and dehydration. It may also be necessary to run these animals to feed and water several times daily until they have begun to recover. The most fortunate aspect of this disease is that it appears, given enough time, a large number of calves will recover. It can take weeks to months for the joints to fully recover and the cattle to start gaining weight.

## Prevention

Because a large percentage of normal cattle have *M. bovis* in their upper respiratory tract, it is next to impossible for stocker operations, which obtain all their cattle from outside sources, to implement biosecurity measures to prevent *Mycoplasma* from entering their farms. However, cow-calf producers should observe a strict biosecurity protocol when bringing in new additions to the herd.

Since Mycoplasmosis often occurs after BRDC, the most important aspect of prevention of *Mycoplasma pneumonia* is to reduce the stressors to which cattle are exposed. The same practices that lower the risk of BRDC work best to decrease the risk of Mycoplasmosis. Good vaccination, nutrition, and mineral programs strengthen the immune system of calves making them less likely to develop BRDC and Mycoplasmosis. The number of cattle purchased at any one time should not exceed the capacity of the facilities. Poor-quality or high-risk calves should not be acquired unless they can be watched closely and easily handled for treatment. Also, drenching and balling guns should be disinfected between each use when dosing several calves in a row. Recognizing and treating sick animals early not only

decreases the number of “chronics” and calf deaths, but also decreases the spread among populations of cattle.

The vaccines currently available against *M. bovis* have not been shown to be effective in beef cattle.

## Summary

*Mycoplasma* is a major cause of pneumonia and associated lameness in beef cattle. The frequency and severity of disease has been growing rapidly over the last decade. Early recognition and treatment of sick animals, as well as good overall management programs will decrease the incidence and severity of disease. If a *Mycoplasma* problem is suspected, work closely with your veterinarian. This is a disease that can have disastrous economic and management effects on a farm if not addressed quickly and aggressively.

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