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TECHNICAL BULLETIN

Mycoplasma bovis

Introduction

Mycoplasma bovis is now recognized as a significant cattle pathogen, and primarily associated with respiratory disease, arthritis, otitis and mastitis. Acute infections often become chronic resulting in poor performance, culling and death loss.

Infected animals respond to antibiotics best if given early; treatment of chronic animals is often unrewarding. Preventing herd or pen outbreaks includes reducing stress, identifying and culling infected animals, and vaccination.

History

In 1961, *Mycoplasma (M.) bovis* was first isolated in the United States from a cow with severe mastitis. In the nearly 50 years since, it has become a common pathogen associated with a variety of cattle diseases. In a Canadian feedlot study, *M. bovis* was the second most isolated pathogen from fatal cases of bovine respiratory disease. *Mannheimia haemolytica* was the most frequent isolate.¹

M. bovis does not possess a cell wall, thus they don't Gram stain. It is generally easy to culture with growth occurring in 24-48 hours, but some isolates may take longer. Colonies of *M. bovis* have a "fried egg" appearance on solid media; they can be confirmed as mycoplasma by using PCR. The cytoplasmic membrane contains variable surface proteins (Vsp) and lipoproteins.² Different isolates of *M. bovis* can change in their expression of these Vsp.

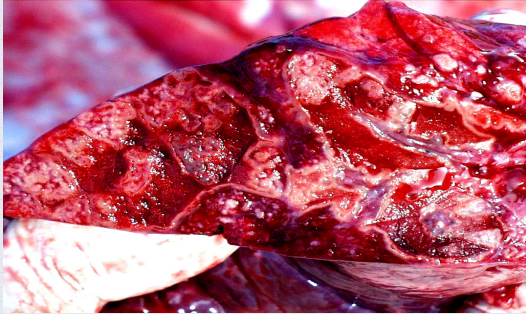
M. bovis will colonize mucous membranes where it interacts with endothelial cell receptors. Colonization occurs mostly in the lung, upper respiratory tract, and mammary gland.

M. bovis is a potent stimulator of inflammatory responses. It is unclear whether lesions occur due to direct colonization or due to the immune system's response to colonization. Virulence factors include: the cytoplasmic membrane, a slime layer, extracellular enzymes, and toxins. Mycoplasma lipoproteins are potent stimulators of macrophages. Binding to macrophages may initiate or even exacerbate inflammation. Hematogenous spread of mycoplasma from the lung to joints or middle ear is aided by the organism hiding in macrophages or dendritic cells. Mycoplasma may depress immunity, resulting in low white cell counts (leucopenia).



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Symptoms - Animals with uncomplicated *M. bovis* pneumonia exhibit mild depression, respiratory distress, muscle weakness and low fevers. An average of temps from several *M. bovis* challenge trials were 103.4° F.³ Lameness or otitis (resulting in head tilt) occurs in some animals 7 to 14 days following respiratory symptoms. The arthritis may present itself as sore joints with leg/joint swelling. The front legs seem to be more likely to exhibit arthritis than the hind legs.³ Infection of the mammary gland may result in clinical and sub-clinical mastitis with associated increases in somatic cell counts.⁴



Granulomas in lung parenchyma typical of *Mycoplasma bovis*

Lesions - Fibrogranulomatous lesions in the lungs are unique to *M. bovis*. *M. bovis* can be found in interstitial pneumonia lesions or with mixed infections exhibiting typical lung consolidation. Tenosynovitis and arthritis are seen in lame animals.

Diagnosis - Small micro-abscesses in the lung are considered by some as pathognomonic. Culture and identification of *M. bovis* confirms the organism is present. Culturing bulk tank milk or individual cows is used to diagnose.

Treatment - Since mycoplasmas do not have a cell wall, many antibiotics are not effective. Treatment early in the course of disease is more rewarding than treating chronic cases. There are some tendencies toward resistance to macrolides and tetracyclines. Florfenicol and tulathromycin are products labeled for treatment of *M. bovis*.

Prevention - Reducing stress when transporting and mixing calves is recommended to help control bovine respiratory disease in general, including *M. bovis*. Crowding may contribute to stress and the spread of infection. Healthy animals benefit by separating them from chronically infected animals. In dairies, culturing milk, then culling or separating *M. bovis* infected cows is a control strategy. Also, it is recommended not to feed unpasteurized milk to calves. "Vaccination has provided best results when used in young calves and two or more doses of autogenous vaccines were given." says Ricardo Rosenbusch, DVM, PhD, Iowa State University. (Bovine Veterinarian, Feb., 2002)

Herd Specific Bacterins

MVP Laboratories can assist the veterinarian in developing an autogenous bacterin specific for a herd or operation. Isolates or tissues can be sent to MVP for analysis. *M. bovis* isolates vary greatly when it comes to surface proteins (Vsp). MVP can determine if VspA, VspO, VspL, VspC and other surface proteins are expressed by the *M. bovis* isolated from a case of respiratory disease or mastitis. Based on these critical epitopes, they then help the submitting veterinarian choose the best isolate (or isolates) to use in making an autogenous bacterin for their client. Bacterins combining *M. bovis* with other pathogens such as *M. haemolytica* can be made by us as well. MVP will match the antigens with a BQA-friendly Emulsigen® adjuvant.

¹ Booker CW, et. al. Microbiological and histopathological findings in cases of fatal bovine respiratory disease of feedlot cattle in western Canada. Canadian Veterinary Journal, May 2008. 49(5): 473-481.

² McVey, Scott. *Mycoplasma Bovis*: Potential interactions with convalescent and vaccine immune responses. Proceedings Academy of Veterinary Consultants, Spring 2009, 13-23

³ Lechtenberg, Kelly; Latta, Tom. Applied mycoplasmaology and mycoplasma – a practitioner's approach. Proceedings Academy of Veterinary Consultants, Spring 2009, 149-157

⁴ Wilson, DJ, et. al. Unusual history and initial clinical signs of *Mycoplasma bovis* mastitis and arthritis in first-lactation cows in a closed commercial dairy herd. JAVMA 2007, 230 (10): 1519-1523

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