

How Mycoplasma Spreads

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Project Title:

Mycoplasma bovis Pneumonia and Arthritis in Feedlot Cattle

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Background

The Mycoplasma bovis bacterium has become an important cause of pneumonia and death in Canadian feedlot calves in recent years. M. bovis is involved in both the bovine respiratory disease (BRD) complex and the chronic pneumonia and polyarthritis syndrome (CPPS) in high-risk Fall-placed feedlot calves. Exactly how the organism spreads and triggers pneumonia isn't known. This has made it difficult to develop effective prevention and control measures. One challenge has been that some calves carry M. bovis in their lungs but do not develop pneumonia, while other infected calves develop a severe and ultimately fatal pneumonia.

Objectives

To determine whether the strain or numbers of M. bovis in the lung differ between healthy calves and those with mycoplasma pneumonia.

What they did

A total of 130 newly weaned, non-preconditioned heifer calves were sourced from auction marts and placed in an Ontario feedlot. All calves were given a shot of oxytetracycline and vaccinated against bovine rhinotracheitis, BVD (Types I and II), PI-3 and BRSV at processing. Lung fluid samples were collected from 60 head at arrival. Heifers that developed acute respiratory disease within two weeks of arrival were sampled again and treated. A healthy control heifer was sampled for each sick heifer sampled. The treated and control heifers were sampled again 60 days after arrival. Lung samples were cultured for M. bovis, and bacterial DNA was analyzed to determine the number and type of M. bovis bacteria present in sick vs. healthy heifers at each sampling time.

What they learned

Fewer than 2% of calves were infected with M. bovis at arrival; this increased to 72% within two weeks, and 86% by 60 days after arrival. This suggests that M. bovis infection is uncommon in non-stressed calves prior to weaning, but that the bacteria spread rapidly among calves after they arrive at the feedlot.

Healthy calves were just as likely to be infected with M. bovis as calves with pneumonia. The concentration of M. bovis bacteria in the lungs of both groups was also similar. This indicates that the presence and number of M. bovis bacteria in the lung are not the only factors that determine which calves develop pneumonia.

Thirteen strains of M. bovis were identified, and the same strains were present in both healthy and sick calves. To verify this, the researchers analyzed M. bovis samples from feedlot cattle sampled in a previous BCRC study. As in the present study, the genetic patterns in the M. bovis isolated from lungs with pneumonia were similar to those isolated from healthy lungs. Research is ongoing to identify whether virulence differs between the strains.

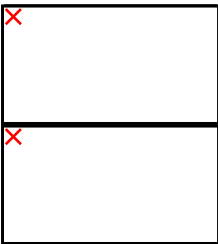
Several heifers were found to be infected with M. bovis at both two weeks and 60 days after arrival, but only one of these heifers was infected by the same strain of M. bovis at both time points. This suggests that the calves were able to eliminate one strain of M. bovis, but were susceptible to re-infection by a different strain.

What it means

This study improves our understanding of how M. bovis enters and spreads within beef feedlots. Calves can successfully clear an M. bovis infection without becoming ill. Mycoplasma pneumonia may not develop unless calves are also stressed or infected with other pathogens. The fact that different strains of M. bovis have been identified in calves with pneumonia suggests that an effective mycoplasma vaccine will need to provide immunity to multiple strains of M. bovis.

These results indicate that minimizing stress, viral infection, and other forms of pneumonia (such as shipping fever) are key to minimizing the occurrence mycoplasma pneumonia in feedlot calves.

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