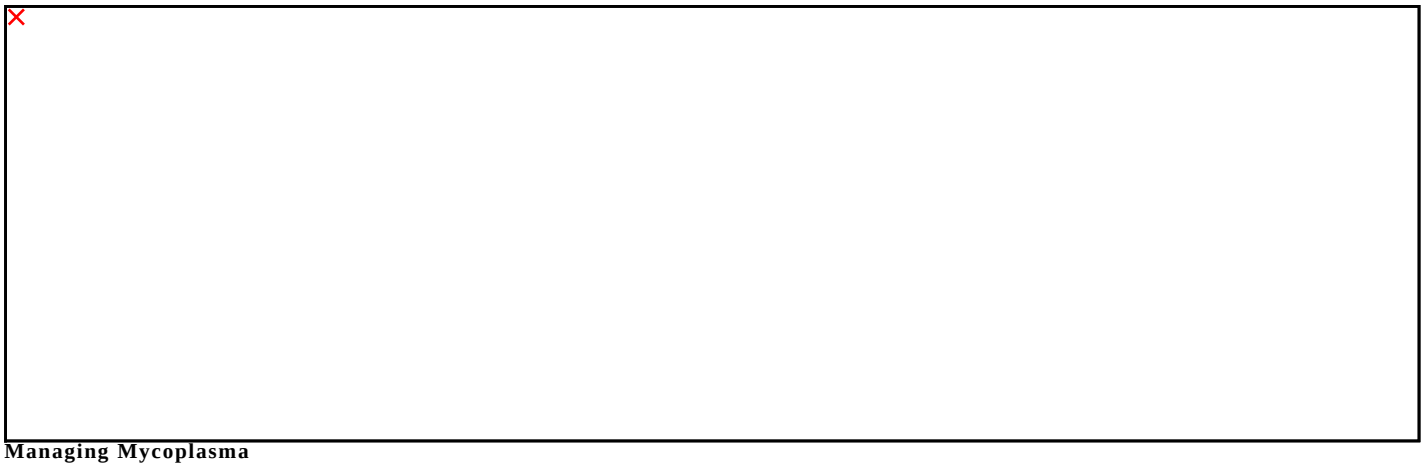

Managing Mycoplasma

Project Code: 7.40
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Project Title:

Does Bovine Respiratory Disease Treatment Strategy Influence the Expression of Chronic Pneumonia and Polyarthritis Syndrome?

Researchers:

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Background

The Mycoplasma bovis bacterium is involved in bovine respiratory disease complex (BRD) and plays a role in chronic pneumonia and polyarthritis syndrome (CPPS). This disease is responsible for 25-40% of feedlot calf mortality and has surpassed shipping fever as the leading cause of death loss in high-risk fall-placed feedlot calves in Canada.

There are several theories to explain why CPPS has increased in prevalence. Undifferentiated bovine respiratory disease is now managed differently than in the past. Animals are often returned to their home pen immediately after being treated rather than staying in the sick pe for a few days. This means that their temperature is often not taken again to determine whether they have responded to treatment. Secondly, the preventative use of long-acting antimicrobials has helped to reduced sickness early in the feeding period. These products may eliminate other lung pathogens such as Mannheimia haemolytica and Pasteurella multocida and create an opportunity for M. bovis to take over and cause CPPS. The BVD virus may also play a role; it suppresses the immune system of cattle, so the risk of CPPS may also be higher when persistently BVD infected calves are present.

Objectives

This research project examined the effects of two different management practices on the occurrence of CPPS: 1) the prophylactic use of antimicrobials in newly arrived feedlot calves to prevent illness and 2) the therapeutic use of antimicrobials to treat sick calves.

What they did

A total of 3,786 auction-mart calves were placed in a Saskatchewan feedlot in the fall of 2007 and 2008. Calves were implanted, dewormed and vaccinated with 8-way clostridial, IBR, PI-3, BVD, BRSV, and BRD on arrival. An ear notch was collected from each animal to test for BVD, and a nasopharyngeal swab was collected from very deep in the nostril to test for M. bovis.

Calves were assigned to one of four experimental treatment groups. Preventative antimicrobial use on arrival was compared by giving oxytetracycline to one group of calves; a second group was not given oxy tetracycline. These two groups were then divided to compare disease treatment strategies in sick calves. Half of the calves that developed respiratory disease were given 6ml florfenicol subcutaneously and returned to the pen. The other half were given 3ml florfenicol intramuscularly, kept in a sick pen, given another 3ml after 48 hours, and returned to their home pen.

A second nasal swab was collected from all animals that became sick, and nasal, lung and joint samples were collected from all animals that died. M. bovis was cultured from these samples and DNA was compared to see whether the same strain of M. bovis was consistently responsible for pneumonia and arthritis in all cattle. These samples were also tested for resistance to 10 different antimicrobials.

What they learned

Overall BRD treatment rates (7.1%) and mortality rates (1.8%) were lower than expected. The BVD virus was detected in only 4 calves (0.1%).

Preventative and disease treatment: BRD treatment rates were 30% higher for calves that did not receive oxytetracycline on arrival than for calves that did receive oxytetracycline on arrival. Preventative use of oxytetracycline did not reduce BRD re-treatment, arthritis treatment, or mortality rates. Rates of BRD treatment, BRD re-treatment, arthritis treatment, and mortality were the same in calves that were treated and returned to the pen as those that were treated and held in the sick pen for 48 hours. Differences between the preventative and disease treatment groups would likely have been more obvious if BRD incidence had been higher.

M. bovis prevalence: Fewer than 5% of calves were infected with M. bovis when they arrived at the feedlot. Approximately one third of cattle that were treated and recovered were infected with M. bovis. Over half of the cattle that died were infected with M. bovis at the time they were treated, and close to two thirds were infected by the time they died.

M. bovis strains: A total of 54 different strains of M. bovis were identified. These strains could be grouped into 20 clusters of strains that shared more than 95% genetic similarity. Only three clusters were found in both years of the study. This indicates that no particular strain is to blame for CPPS.

Antimicrobial resistance: Because M. bovis does not have a cell wall, it is naturally resistant to some antimicrobials such as ampicillin (Polyflex), ceftiofur (Excenel / Excede), and tilmicosin (Micotil). In contrast, all strains of M. bovis were equally susceptible to oxy- or chlortetracycline, enrofloxacin (Baytril), and tulathromycin (Draxxin). This suggests that antimicrobial resistance is not responsible for the increasing incidence of CPPS in feedlot cattle.

What it means

M. bovis may be an "opportunistic pathogen". For example, healthy animals can successfully clear an M. bovis infection. But if the animal is weakened by stress, M. bovis may compound respiratory problems started by other pathogens. Alternatively, if shipping fever is being treated more successfully, animals may survive this acute pneumonia with damaged lungs, which could provide an opportunity for M. bovis to establish an infection.

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