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Bovine Respiratory Disease Associated with Mannheimia Haemolytica or Pasteurella Multocida [1]

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Bovine respiratory disease (BRD) associated with either Mannheimia haemolytica or Pasteurella multocida is often due to secondary bacterial invasion by these organisms. Secondary bacterial invasions are infections caused by bacteria that invade tissue after an initiating event, such as a previous viral infection, which has established conditions that allow these secondary bacteria to invade tissue and cause disease. These secondary bacterial invaders are commonly found in the environment and are associated with healthy animals. Under normal conditions, they cause no problems.

Two bacteria, *Mannheimia haemolytica* (*f Pasteurella haemolytica*) and *Pasteurella multocida*, are often associated with bovine respiratory disease (BRD) or shipping fever in cattle and are often referred to as secondary bacterial invaders. *Mannheimia haemolytica*, the bacteria most frequently isolated from pneumonic lungs in cattle, and *Pasteurella multocida* often compound respiratory disease initiated by other pathogens (viruses, bacteria, mycoplasma). These two bacteria are considered as part of the normal bacterial flora found in the upper respiratory tract of most cattle but are not considered as normal flora of the lungs. As long as these two organisms only inhabit the pharynx or upper respiratory tract, clinical respiratory disease, or BRD associated with them is uncommon. The animal's normal bodily defenses keep these bacteria in check: in a healthy animal, they replicate slowly, are destroyed by antibodies and removed by macrophages. Respiratory tract infections (pneumonia) due to these two bacteria occur when the organism is inhaled. Under conditions of impaired pulmonary defenses, a severe necrotizing fibrinous pleuropneumonia develops. Spread of these organisms is by direct contact, or by ingestion of feed and water contaminated by nasal and oral discharges from infected cattle. Therefore these two bacteria are easily spread between cattle, especially when calves are crowded (as in shipment) or closely confined (as in a dairy calf nursery).

Pneumonia associated with either *Mannheimia haemolytica* or *Pasteurella multocida* often occurs when the animal's normal defenses are compromised. Examples of compromised defense mechanisms include, damage to the cells lining the upper respiratory tract by viruses such as infectious bovine

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rhinotracheitis virus (IBR), parainfluenza virus (PI-3), or bovine respiratory syncytial virus (BRSV). Damage to the tracheal lining could also occur due to inhaled irritants such as exhaust fumes or dust. The respiratory defense mechanism could also be depressed due to immunosuppression associated with bovine viral diarrhea (BVD) virus. The production of mucosal antibodies against these bacteria could be suppressed due to environmental or nutritional stress. When the defenses are compromised, the bacteria become attached to the lining of the respiratory tract (colonize), reproduce rapidly, and spread throughout the lungs. The severity of the disease depends upon the pathogenicity of the bacterial organism(s) and the associated infections (IBR, PI-3, BVD, and BRSV, other viruses or bacteria). *M. haemolytica* is often associated with the more acute cases of BRD, while *P. multocida* is often associated with the longer-lasting cases of BRD.

The first clinical signs observed in calves affected by either bacterium are vague and often limited to a slight depression and lack of interest in eating. As the disease progresses, the calf refuses to eat, becomes depressed, exhibits lowered or drooped head and ears, and suffers increasing nasal discharge which changes in consistency from thin and clear to thick yellow and viscous. Body temperature may rise to as high as 107°F, with breathing often rapid and labored. A cough may be noted early in the disease; however, as lung damage increases, coughing and breathing become very painful for the animal. The labored breathing and associated pain cause the calf to stand with its elbows positioned away from the chest wall. An affected animal will often be reluctant to move and may stand with its head and neck extended. If the disease process is not stopped, the lungs become irreversibly damaged, the body temperature drops to below normal and the animal usually dies.

Pneumonia associated with either *M. haemolytica*, or *P. multocida* can develop and progress very rapidly. If the first sign of the disease (lack of interest in food) goes unnoticed and the start of treatment is delayed, the outcome of the disease becomes much poorer. Delay in detection and treatment becomes a major factor in the severity and duration of sickness in calves. If the calf survives and has significant lung damage, this irreversible lung damage is often associated with poor performance. If, on the other hand, a calf is identified as sick, treated early and responds to treatment, it will often recover and perform normally.

Treatment and Prevention

The foundation of antimicrobial therapy for bacterial bronchopneumonia is, treat early, treat long enough, and treat with the appropriate antimicrobial agent. Treating early is more important than which antibiotic labeled to treat bovine respiratory disease (BRD) is chosen for therapy. It should be remembered that a major reason for treatment failure is the presence of lesions that are too far advanced for successful therapy. The role of antimicrobial therapy in treating bacterial bronchopneumonia is to control or stop bacterial replication. Recover for an animal suffering from BRD is assisted by the use of an appropriate antibiotic, but requires and active immune system.

In general, for treatment of BRD associated with these bacteria:

1. Effective antibacterial treatment must start very early in the disease process and must be continued for 1 to 2 days after the animal appears to be normal.

2. Use an antibiotic that is labeled for use in cattle infected with *Mannheimia haemolytica* or *Pasteurella multocida*. Producers should work with their veterinarians when selecting appropriate antibiotics to treat pneumonia in cattle within their herds.

3. Use the proper dosage of the chosen antibiotic as well as the route of administration.

4. Use only one antibiotic at a time when treating cattle for BRD.

5. If an animal does not respond to the initial treatment; the selection of an appropriate antibiotic should be evaluated as should the disease status of the animal. (Treating again with the same antibiotic is often acceptable; the problem is often not the 1.choice of an appropriate antibiotic, but the duration of therapy.)

6. Adequate shelter and nutrition are essential.

7. Supportive therapy such as oral fluids, may also be indicated.

Prevention

Respiratory disease associated with *Mannheimia haemolytica* and *Pasteurella multocida* is usually associated with stresses and other diseases. These two bacteria are major contributors to the bovine respiratory disease complex. It is known that IBR, BVD, PI-3 and BRSV infections reduce an animals innate respiratory tract defenses. Preventing BRD associated with these two bacteria is focused on minimizing stress, providing adequate nutrition and internal parasite control, establishing an effective and early immunization program (preconditioning), and maintaining biosecurity by minimizing exposure to diseased and unfamiliar cattle. Beef cattle do get stressed, and viral respiratory infections are common across the United States. Bovine respiratory disease may not be eliminated, but through proper management and animal health practices, its severity can be minimized.