The Veterinary Link

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Bovine respiratory disease

Part I

Bovine respiratory disease is also known as BRD, pneumonia, undifferentiated BRD and a few other names. A number of factors combine to initiate most cases of BRD. These factors are stress (shipment, social interaction and nutrition), viral infection and bacterial infection. BRD is generally considered to be a disease of feedlot cattle that are trucked to a confinement feeding facility and exposed to new animals and new feed and water sources. Age is also a factor, with recently weaned calves and light stocker calves having higher morbidity (sickness) and mortality (death) rates than yearling cattle.

Economics of BRD

BRD is the primary cause of sickness and death in feedlot operations. In Kansas State University (K-State) research, 67% to 82% of illness in feedlot cattle was due to respiratory disease. Death loss ranged from 0.57% to 1.07% of all feedlot cattle with respiratory disease, accounting for 46% to 67% of deaths.

Death losses, although very visible, are usually exceeded in economic importance by loss in growth rate and carcass value of calves that become ill and recover. A trial from 1994 reported that calves treated for BRD early in the feeding period gained 0.14 pound (lb.) less per day during the entire feeding period compared to penmates that remained healthy. A study in Nebraska showed similar losses, with average daily gain (ADG) being 0.18 lb. less in cattle with lung lesions at harvest compared to those without lung damage.

Pathogens causing BRD

A number of viruses and bacteria have been associated with BRD. In healthy cattle, exposure to any one of these pathogens (germs) would not likely cause disease. Interactions among pathogens and depression of the immune system due to environmental, nutritional or management stress seem to be necessary to cause BRD.

Environmental stressors include heat or cold stress, dust, and fumes toxic to the lining of the respiratory tract. Dehydration, exhaustion, rough handling and mixing cattle into new social groups are examples of management stressors. Failure to provide adequate water, energy, protein or minerals causes nutritional stress.

Viral infection usually precedes bacterial pneumonia, though it is not required for BRD. Infectious bovine rhinotracheitis (IBR), bovine viral diarrhea (BVD) and parainfluenza-3 virus (PI_3) are known to cause damage to the lining of the respiratory tract, which causes inflammation and damage to the pulmonary clearance mechanism and allows suitable sites for bacterial replication. The damage is not confined to the upper respiratory tract, but extends to the lung bronchi and alveoli.

In general, bacteria do not serve as a cause of BRD in healthy, unstressed cattle. Damage to the lining of the lung and immune suppression are required for bacteria to colonize the lung and cause pneumonia.

Mannheimia haemolytica is the most commonly isolated bacterial agent in fatal cases of BRD. Pasteurella multocida has also been isolated from fatal BRD cases, especially in younger cattle. Both of these bacteria normally reside in the upper respiratory tract and are able to invade the lung only if defense mechanisms break down. Clinical signs of BRD usually develop within 14 days following environmental or management stressors.

Haemophilus somnus has been reported to cause fatal BRD in some areas, and mycoplasma and chlamydia species of bacteria are isolated from some cases of BRD, usually along with other bacterial pathogens known to cause pneumonia *(P. multocida or M. haemolytica)*.

Arrival processing

Proper handling and management of cattle during processing is essential to minimize stress, to reduce the risk of injury and to detect sick cattle as soon as possible. Processing should not be delayed for more than 24 to 36 hours after arrival. Longer delays result in higher rates of illness and do not take full advantage of the protection offered by vaccines or preventive medications.

Body temperatures should be taken as the cattle are processed if they have been rested overnight. Body temperatures of cattle just unloaded from the truck are not reliable indicators of illness. It is important to process cattle in small groups, so no animal is out of its pen for more than 30 minutes. Process early in the morning to avoid higher environmental temperatures later in the day and to avoid artificially elevated body temperatures taken in the afternoon. An electronic thermometer is essential.

Calves with a body temperature of 104° F or greater or showing other signs of illness should be separated from the group and kept in a hospital pen where they will receive a treatment program as outlined by the veterinarian working with you. Even though body temperature can be a valuable indicator of illness, too much reliance can be placed on rectal temperature. The appearance and history of the calf should be considered in deciding whether the calf is actually ill.

It is tempting to use all available vaccines and bacterins to minimize disease. But many calves entering backgrounding or stocker operations are highly stressed and may be able to respond to only a limited number of antigens. The presence of colostrum-derived antibodies may also limit immunization against some diseases. Therefore, when outlining a vaccination program, the veterinarian must consider:

- risk of disease;
- stress level of calves;
- age of calves and presence of colostral antibodies;
- stress induced by vaccination;
- efficacy of the vaccine;
- vaccination history; and
- the time of onset of disease after arrival.

Vaccination programs should be tailored to meet the needs of calves of various ages, stress levels and origins. The benefit of vaccination upon arrival is uncertain in some cases. Using bacterins or killed-virus vaccines to provide protective immunity when given on arrival is usually not very successful. However, it has been demonstrated that modified-live-virus (MLV) vaccines will likely provide protective immunity within days. The respiratory diseases with available effective vaccines include IBR, BVD and PI_3. Modern pasteurella *(Mannheimia)* vaccines are thought to be effective if given well in advance of stressors leading to BRD.

Part II

Early detection of BRD is important in order to increase the likelihood that treatment will be effective. If BRD cases are identified early, modern treatment plans are likely to succeed; but if BRD cases are not detected until late in the disease course, all treatment plans are likely to fail. The result of late detection of BRD cases is an increase in the number of re-pulls, chronics, railers and dead cattle.

Finding sick cattle

Feed and/or hay should be present in the bunk prior to the cattle being observed. This allows producers to identify the cattle that aren't coming up to the bunk. Producers should observe and listen for a period of time before they enter the pen, so that undisturbed activity and coughing can be evaluated. Once producers enter the pen, they should try to determine if any animal looks or acts sick.

Sick cattle may lack rumen fill or show signs of nasal discharge or increased respiratory rate and/or difficulty.

Rumen fill is important to evaluate because sick cattle often do not eat, and cattle that do not eat often become sick. Sick cattle may also tank up on water but refuse to eat hay or grain. These calves are gaunt high in the flank, but have a pendulous belly.

Rumen fill is more difficult to evaluate in cattle that have been on feed for awhile because they are slower to go off of feed when they get sick, and the increased fat cover obscures the extent of "gauntness."

Thick nasal discharge is a common indication of respiratory disease; however, clear nasal discharge is not an indication of BRD.

Sick animals may act differently than

Finding sick cattle

- Observe cattle for signs of illness soon after feed is delivered to the bunk.
- Observe and listen for a few minutes prior to entering the pen — note the level of coughing and the cattle that are not eating.
- Slowly and quietly move cattle away from the feedbunk, and then let them return.

Cattle that look sick have:

- thick nasal discharge;
- lack of rumen fill (gaunt); and a
- pendulous belly (they fill up on water, but refuse feed or hay).

Cattle that act sick show a:

- decreased interest in surroundings;
- tendency to hold head and/or ears down; and/or
- reluctance to move (move without "purpose").

Avoid making mistakes

- Observe cattle before entering the pen; some sick animals will "perk up" when moved around.
- Some cattle that are not necessarily sick tend to attract attention because they:
  - have been treated previously;
  - have less fat cover than penmates; and/or
  - are of a different color or type than penmates.

their healthy penmates, as displayed by a decreased interest in their surroundings, lowered head and ear position, and reluctance to move. When the cattle are slowly moved around the pen, sick cattle often filter to the back of the group or even begin to lag behind or stop walking altogether. Mild to moderately affected cattle may improve their attitudes when being moved around the pen with the group, so cattle need to be observed while standing quietly, as well as on the move.

Previously treated calves, animals that have less fat cover than their penmates, and cattle that are a different breed or color than the majority of the pen often grab the attention of producers who are looking for sick calves. These cattle may not be sick at all, they just attract attention because they have a different appearance or they are easily recognized.

Weather greatly impacts the number of cattle that may become sick with BRD. The number of cattle needing treatment for pneumonia typically increases two to three days after they get wet. Any environmental extreme will increase the incidence of sickness, but getting wet will cause the greatest and most consistent increase.

Some producers mass medicate high-risk cattle at or near arrival with injectable, long-acting antibiotics in an effort to reduce the number and severity of sick animals. This strategy is cost-effective in some situations. If fresh cattle are received, and if there is sufficient skilled labor available, this practice may not be cost-effective. When there is a shortage of labor, or when employees are not highly skilled at detecting sick cattle early, mass medication may be a useful management tool.

It is of greatest benefit when it is used on high-risk, exposed cattle that are assembled from several sources or on extremely stressed calves. In many instances, one mass medication treatment will be as effective as a three-day program. Timing is important because mass medication administered too far in advance of the onset of illness or too late will be ineffective. The selection of antimicrobials should be based on previous culture and sensitivity data or on clinical response.

Treating calves with respiratory disease

Once cattle are identified as needing treatment for BRD, they are moved to a treatment area and treated with at least a three-day protocol of antibiotics. The antibiotics should reach effective concentrations in diseased lungs and should be effective against the bacterial organism that is causing pneumonia. Several very good antibiotic choices exist; however, the final determination of what product to use is based on how the antibiotic distributes itself in the calf's body, laboratory determination of susceptibility of the bacterial organisms to the antibiotic, and previous clinical response on that particular farm.

Sick cattle are usually placed on a higher roughage diet than cattle in the home pen. The diet is routinely 60%-70% concentrate with at least a 15% all-natural protein level. Fresh hay and water are always available. Once calves have recovered, they are placed on increasingly higher concentrate diets to prepare them to return to their home pen. Cattle that don't respond to therapy with improved appetite, weight gain and respiratory function are determined to be nonresponders or chronics, and they are often sold as realizers.

Cattle that respond to treatment and return to their home pen, only to be pulled out of the pen at a later date for a second case of BRD, are called "re-pulls." A high incidence of chronics indicates that the cattle were not identified early in the disease process. A high incidence of re-pulls indicates that either the cattle were not evaluated properly at the end of the initial treatment period, or the initial treatment was not adequately effective.