

BOVINE RESPIRATORY DISEASE (BRD)

Bovine Respiratory Disease (BRD), sometimes described as “shipping fever,” is the most common and costly disease affecting the North American beef cattle industry. In the broadest sense, BRD refers to any disease of the upper or lower respiratory tracts.

Although commonly associated with the feedlot, BRD can also be a significant problem in cow-calf herds. Several BRD pathogens can also cause abortions in pregnant cows, and BRD is a leading cause of illness, antibiotic treatment and death in nursing calves between three weeks of age and weaning. BRD can be much more difficult to detect and effectively treat in cows and calves on pasture compared to cattle in confined facilities. Delayed BRD diagnosis and treatment increases the risk of secondary bacterial infections, severe illness and death.

BRD accounts for 65-80% of the morbidity (sickness) and 45-75% of the mortality (deaths) in some feedlots.

- Bovine Respiratory Disease (BRD) is the most common and costly disease affecting the North American beef cattle industry
- BRD is one of the leading causes of disease in calves before weaning
- BRD is most prevalent within the first weeks of arrival to the feedlot, but can also occur later in the feeding period
- Classical clinical signs of bacterial BRD include:
 - fever of over 40°C (>104°F)
 - difficulty breathing
 - nasal discharge
 - varying degrees of depression
 - diminished or no appetite (“off feed”)
 - rapid, shallow breathing
 - coughing
- Risk factors include:

- management factors such as poor vaccination, transport, adverse weather, commingling, stressful events (e.g., dehorning, castration, weaning, auction)
- Prevention in cow-calf operations:
 - Ensure calves receive adequate, high-quality colostrum at birth
 - Work with your veterinarian to develop a prevention-based herd-health program
 - Vaccinating against respiratory disease improves the reproductive performance of the cow herd and helps prevent illness in pre-weaned calves
 - Crossbreeding is a cost-effective way of improving traits like fertility and health that are difficult to improve by genetic selection
- Prevention in feedlots:
 - Purchasing directly from cow-calf operators minimizes unnecessary commingling and disease spread among weaned calves
 - Purchasing preconditioned calves from reputable cow-calf operations and feeding them as a group rather than re-sorting on arrival helps reduce the incidence of BRD
 - Appropriately manage newly arrived feedlot cattle based on their BRD risk

BRD is a complex disease involving several interacting factors. For example, researchers can recover many of the bacteria and viruses responsible for BRD from the nasal passages of healthy cattle. However, other factors such as the stresses from transportation, mixing unfamiliar cattle and adverse weather create the right mix of circumstances for BRD to develop. There are three main categories of factors associated with all diseases, and BRD in particular:

- **Host factors**, which refers to the characteristics of an animal that make it more prone to the disease, such as: age, nutritional status, immune status, prior exposure to the pathogens, genetics (e.g., crossbreds generally have better health performance than straightbred cattle)
- **Infectious agents** or pathogens must be present to cause the disease. These can broadly be categorized as viruses, bacteria and parasites:
 - Viruses, including bovine herpes virus (IBR), bovine parainfluenza virus (PI-3), bovine respiratory syncytial virus (BRSV), bovine viral

diarrhea virus (BVD) and bovine coronavirus (BCV). These viruses usually cause the initial BRD infection and predispose the animal to subsequent bacterial BRD infections. Several of these viruses can also cause significant reproductive (BVD, IBR) or diarrhea (BVD, BCV) challenges in cow-calf operations.

- Bacteria, including *Mannheimia haemolytica*, *Pasteurella multocida*, *Histophilus somni* and *Mycoplasma bovis*.
- Parasites, including lungworm.
- The **environment** that the animal is in may increase the risk factors for disease. Animals in overcrowded conditions, in poor air quality (poor ventilation, dust, smoke), sourced from auction markets or stressed by transport, commingling, temperature fluctuations, etc. are more likely to develop the disease

Prevention

DISEASE PREVENTION IN THE COW-CALF HERD

Vaccination: Work with your veterinarian to develop and implement a prevention-based herd health management program for both the breeding herd and calf crop. They will be able to recommend a vaccination program that is appropriate for your herd, your management system and your marketing practices.

Producers can use the [Cost-Benefit of Feeding BRD Vaccinated Calves](#) tool to calculate the costs, risks, and economic benefits of feeding calves that have been vaccinated for BRD compared to calves that have not.

Biosecurity: Your veterinarian can also help you develop an effective biosecurity program to reduce the risk that new diseases will be introduced when new bulls or replacement females are introduced to the herd.

Colostrum: The first few hours of the calf's life are critical to determining whether it survives to weaning and beyond. Without colostrum, the newborn calf's immature immune system can't adequately protect it against diseases like scours. But enough colostrum of adequate quality will give the calf a good start in life that pays health dividends through weaning.

Nutrition: Test your feed and work with a nutritionist to correct any deficiencies or imbalances. Good feed supports good health, and good overall health is key to combatting BRD pathogens. Cows in good **body condition score** (BCS) also produce more and higher-quality colostrum.

Stress: Stress depresses the immune system, makes it harder for the animal to fight off pathogens or take full advantage of protective vaccines. It's impossible to eliminate stress, but castrating, dehorning, branding (if necessary) and vaccinating early in life takes some of the stress off at weaning/processing time in the fall, which is a stressful time already. **Low-stress weaning** practices (like two-stage, fence-line weaning) can improve feed intake and reduce the need for BRD treatments.

Crowding: Cattle are more likely to transmit BRD pathogens when they are in close contact. Transportation, regular handling and sorting (e.g., during processing) and intensive grazing practices may increase the risk of disease spread.⁷

The health benefits of these practices are not restricted to BRD. They help reduce the risk of most, if not all diseases caused by viruses, bacteria or parasites.

Preconditioning appears to have some benefit in preventing BRD, with **weaning** four to six weeks before sale being the most important component of a preconditioning program. The concept of preconditioning calves to decrease stress levels was first introduced in 1967. While there is considerable variation in what constitutes a preconditioning program, the central components entail:

There appears to be agreement that weaning and/or vaccinating at least three weeks prior to shipping is beneficial.

- vaccination for respiratory viruses and bacteria
- vaccination for clostridial bacteria
- weaning 30 to 45 days in advance of a sale
- dehorn and castrate as early in life as practical to reduce growth setbacks and additional stress near weaning
- train calves to feed from a bunk

Some feedlots prefer to “place” calves in winter (January, February) recognizing such groups of calves have very likely been weaned and “bunk broke” prior to arrival and are past the period of highest BRD risk.

After calves arrive at the feedlot

Vaccines for respiratory diseases are routinely administered upon arrival at the feedlot, which may also be a difficult time for a stressed calf to mount an effective immune response. A recent review of the scientific literature found no clear benefit from vaccinating calves upon arrival at the feedlot.⁸ Another review relating to *Mannheimia haemolytica*, *Pasteurella multocida*, and *Histophilus somni* vaccines concluded that there was a potential benefit for vaccinating feedlot cattle against *M. haemolytica* and *P. multocida* but not *H. somni*.⁹

Nutrition may affect incidence of BRD. One review found that increased energy density (concentrates) will improve ADG without adversely affecting the incidence of BRD.¹⁰ Other studies found that the incidence of BRD tended to increase once concentrates exceeded 50% of the diet.¹¹ Similarly, BRD morbidity increased once crude protein exceeded 14%. There is not enough evidence to conclude that injected doses of vitamins A, D and E will reduce BRD. A wide range of studies have also examined supplementing with potassium, thiamine, B-vitamins, copper, zinc, vitamin E, selenium and bypass protein. Although these studies haven’t shown that supplementing with these nutrients significantly reduce the incidence of BRD, it’s likely that significant deficiencies of these nutrients would almost certainly impair animal health.

Metaphylactic treatment strategies using injectable antibiotics can help control BRD in high-risk calves, and likely are more effective than oral antibiotics since stressed cattle may not be eating or drinking regularly.¹² It is important that producers consult with their veterinarian regarding the use of antibiotics for the control and treatment of BRD, especially in terms of avoiding [antibiotic resistance](#).

Good animal husbandry can also help reduce the risk of disease. Providing clean, dry bedding, protection from prevailing winds, avoiding overcrowding, using low-stress handling techniques, proper ventilation of barns and minimizing dust can help to reduce disease.

Treatment

There is a large body of scientific knowledge regarding the beneficial effects of antibiotics for treating BRD. The question is not whether to treat an animal diagnosed with BRD with an antibiotic, but rather, “which antimicrobial works best?” There is no simple answer to this latter question, but your veterinarian is a good place to start.

Ancillary drugs, such as nonsteroidal anti-inflammatories (NSAIDs) and immunomodulators, have been used to treat BRD for decades. However, many of the studies have been small-scale experiments and there is a lack of data from well-designed, large-scale, clinical trials. However, a 2011 study found that meloxicam (NSAID) administered in water 24 hours before castration at the feedlot significantly reduced the number of animals that developed BRD.¹⁴

Even when working with the best recommendations, sometimes treatments fail. Common causes of treatment failure include:

- Disease too far advanced (due to delayed detection and treatment)
- Wrong diagnosis (e.g., calves are sick with a nutritional disease like grain overload)
- Viral infections with no bacterial involvement

- Simultaneous disease process (e.g., overt IBR in feedlot calves, post-calving metritis in cows)
- Inappropriate antibiotic used (i.e., the organism is resistant to the antibiotic chosen)
- Overuse or inappropriate use of ancillary drugs like anti-inflammatory and immunomodulator drugs

Doing necropsies on sick animals early in an outbreak can help to diagnose and treat the problem more quickly and accurately, potentially allowing time to develop protocols to deal with the disease more appropriately.