Bovine Respiratory Syncytial Virus

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Take Home Message

✔ Bovine respiratory syncytial virus (BRSV) is component of the bovine respiratory disease (BRD) complex.

✔ The virus can infect and cause disease in all ages of cattle, although suckling calves often experience the most severe disease.

✔ Sudden onset of mucous discharge from the nose and eyes with high fever, cough, and progressive difficulty in breathing is typical of BRSV infection in cattle.

✔ However, BRSV may be difficult to differentiate from respiratory disease caused by other agents.

Cause and Spread

BRSV is a fragile virus that is transmitted from animal to animal mainly in aerosolized secretions (1). BRSV is closely related to human respiratory syncytial virus (HRSV); however, there is no evidence that cross-species transmission between cattle and human beings occurs. Transmission of these viruses depends on close contact, since they do not survive very long in the environment. The fragility of the virus makes it difficult to isolate in the laboratory; therefore, BRSV infection is difficult to diagnose in cattle using clinical specimens such as nasal swabs (6).

BRSV gains entry to susceptible cattle through the respiratory tract where it replicates and causes disease (1). This virus can be isolated from cattle without clinical signs, as well a sick cattle, but a chronic carrier state has not been documented. The virus probably persists from outbreak to outbreak in a herd through subclinical or mild infections in adults that may be transmitted to younger susceptible cattle (3).

Serologic surveys indicate that BRSV is a very common virus in cattle populations throughout the world (1). Disease usually occurs in outbreaks in which up to 20% of animals may be affected (4, 5). If cattle have not been previously exposed, disease can occur in all ages of cattle, but is generally more severe in younger cattle from 2 to 5 months of age, when
maternal antibodies are waning (5). Confinement housing and group housing of cattle of multiple ages may widen the age range in which BRSV infection and respiratory disease occur in susceptible cattle (1).

There is some evidence that climatic conditions may affect the occurrence of BRSV infections, which tend to be more prevalent in the fall and winter. Factors that contribute to an increased seasonal incidence may be climatic conditions that favour spread of the virus or seasonal management practices, such as commingling and housing of cattle. Although BRSV outbreaks have been reported in summer, it is speculated that BRSV outbreaks may be precipitated by changes in the weather, such as a drop in temperature or a decrease in atmospheric pressure (1).

Clinical Signs

Clinical signs of BRSV infection usually begin 3 to 5 days after cattle are exposed to the virus. The course of clinical disease may last 1 to 2 weeks. Infected cattle have a watery to thick mucous discharge from the nose and eyes. They have increased rectal temperatures between 40 to 42.5°C (104-108.5°F) and increased breathing rates (>40 per minute). Often they have decreased appetites or go off feed, and appear slightly depressed. Lactating cows may have a sudden drop in milk production. In pastured cattle that are not seen daily, sudden death may be the first sign of BRSV infection.

If the disease progresses cattle may develop a dry cough and have difficulty breathing. Severely affected animals often stand with their heads lowered and necks extended. They frequently breath with open mouths, with tongues hanging to the side of the mouth. Saliva may be frothy and blood tinged. A grunt may be heard at the time of expiration and crackles can be heard by listening to the chest with a stethoscope. Affected cattle are frequently seen near water troughs, but have trouble drinking due to difficult breathing. At this stage, they often appear gaunt and dehydrated, and are reluctant to move. Forced exercise results in severe difficulty breathing and may result in death. Unlike other important virus disease of cattle, bovine herpesvirus-1 (IBR, rednose) and bovine virus diarrhea virus (BVDV), abortion is not a direct result of BRSV infection. BRSV commonly occurs with secondary bacteria, as is often the case with other respiratory virus infections in cattle. Secondary bacterial infections usually result in more severe disease and a poorer prognosis (1).
Treatment

Currently there is no specific antiviral drug approved for the treatment of BRSV infection in cattle. Therefore, therapy for BRSV is supportive. Cattle with respiratory disease often become dehydrated and require oral or intravenous fluids and electrolytes. Cattle with BRSV infections often contract secondary bacterial infections, most frequently *Pasteurella haemolytic*, *Pasteurella multocida*, or *Hemophilus somnus*. Ideally culture and sensitivity of bacterial specimens obtained from swabs or lungs of animals that die should be done before initiation of antimicrobial therapy. If this is not possible, broad spectrum antibiotics such as Exenel®, Trivetrin®, or Micotil®, should be administered under veterinary supervision when respiratory disease is first recognized. Contact your local veterinarian for details.

Anti-inflammatory drugs may be indicated in cattle with severe respiratory signs. Short-term administration of corticosteroids and antihistamines for 1-2 days may alleviate respiratory distress. Corticosteroids have immunosuppressive effects that can enhance the severity of disease caused by BRSV and secondary invaders. Therefore, they should not be used indiscriminately, and treatment should be ceased if there is not a rapid (hours to day) clinical response (1).

Control

Since lung disease caused by BRSV and secondary bacterial infections can be difficult to treat, especially in young calves, control of the disease should be aimed at prevention. BRSV infections may go undetected in older cattle. Therefore in cow-calf operations or dairies, separating young naive calves from older cattle is a simple management tool that can be used to reduce BRSV exposure and disease in calves that are usually most susceptible to severe BRSV infections (1).

BRSV infection can occur in calves with maternal antibodies. However, studies conducted on naturally acquired and experimental BRSV infections, indicate that the occurrence and severity of disease are inversely related to the level of BRSV-specific antibody in the serum of infected calves (6, 7). A study conducted on feeder cattle in Ontario showed lower treatment rates in cattle entering the feedlot with BRSV antibodies (8). These results indicate that serum antibodies, while not preventing infection, can have a disease sparing role in BRSV infections.
Many single and combination modified-live and killed BRSV vaccines are currently on the market for intramuscular administration in cattle. Intranasal vaccines are not commercially available. Recently commercially available modified-live and adjuvanted modified-live vaccines were compared in experimentally infected calves (11). A significant reduction in clinical disease and lung changes was observed in calves vaccinated with either type of live vaccine. Most vaccinated calves shed virus, but significantly less than the unvaccinated controls. Protection of calves was associated with the development of accelerated antibody and cellular immune responses after challenge compared to unvaccinated challenged control calves. These studies demonstrated that currently available live vaccines can protect cattle from clinical disease due to respiratory syncytial virus infection.

It is important to remember that immunity conferred by respiratory syncytial virus infections or vaccination is probably short lived and may only last 3 or 4 months (9). The reason for short lived immunity in BRSV, and its human counterpart HRSV, is not known, but may explain the common occurrence of recurrent infections in vaccinated and unvaccinated individuals (9). Therefore, frequent vaccination may be necessary to control disease in cattle and other species. Vaccination of pregnant cattle with modified-live BRSV vaccines is safe and can increase passive transfer of colostral antibodies to calves (10). There is evidence that calves with maternal antibodies can be primed by vaccination at a young age (2, 10). In most management situations, however, vaccination at branding followed by boosting at weaning and annually would be recommended.

References


