Infectious Bovine Rhinotracheitis and Bovine Virus Diarrhea

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INFECTIOUS BOVINE RHINOTRACHEITIS

Infectious bovine rhinotracheitis (IBR), a herpesvirus, produces a disease of varying clinical manifestations. The disease is widespread in the United States and causes serious economic loss to the livestock industry.

Transmission

The infectious bovine rhinotracheitis virus is transferred readily by contact and contamination. It is introduced most often to a herd by the addition of infected animals. It can be spread by obviously sick cattle or by cattle shedding virus in the absence of clinical signs. Intermittent recurrence of virus shedding occasionally occurs long after apparent recovery, indicating that the virus exists as a latent infection.

Forms of the Disease

Six clinical syndromes, in addition to the inapparent form of the disease, are associated with IBR virus infection.

“Rednose”

This is the respiratory form of IBR. It is characterized by fever, profuse nasal discharge, distressed breathing, decreased appetite, and depression. Outbreaks vary from mild to severe.

Conjunctivitis

This ocular form of the disease is characterized by inflamed mucous membranes of the eyes, tearing, and pus in the corners of the eyes. White discoloration of the cornea occurs in some cases. Conjunctivitis may be the only manifestation of the disease, or it may be seen with the respiratory form.

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Infectious Pustular Vulvovaginitis (IPV)

Pustules and inflammation of the vulva and vagina cause a swollen vulva, vaginal discharge, tail switching, and depressed appetite. Lesions similar to those in the vagina occur on the penis and prepuce of infected bulls. This form of IBR may be transmitted by natural breeding.

Encephalitis

Inflammation of the brain is seen in calves up to the age of yearlings and causes depression, circling, progressive incoordination, coma, and death. This is not a common form of the disease in the United States.

Neonatal Viremia

Calves less than 1 mo of age may develop a fatal, generalized disease characterized by fever, nasal discharge, and lesions of the upper gastrointestinal tract.

Abortion

Abortion may be produced by either natural infection or by vaccination with some vaccines. Abortions typically occur 3 to 6 wk following vaccination or the clinical signs of the disease but may occur during an outbreak or up to 90 days following an outbreak. Abortions most often occur in the last trimester of gestation.

Diagnosis

The clinical signs and postmortem lesions of IBR may be sufficient for a tentative diagnosis. The laboratory may be able to confirm the diagnosis from the following specimens: nasal, ocular or vaginal swabs for virus isolation attempts, paired serum samples (one blood sample is collected early in the course of the disease and a second one is collected 3 wk later), aborted fetus and placenta, or frozen sections from tissues collected at postmortem examination for fluorescent antibody studies.
Treatment

Antibiotic therapy to prevent or treat secondary bacterial infections (viruses are not susceptible to antibiotics) and supportive treatment may be helpful.

Prevention

Three types of vaccines are available for the prevention of IBR. Each vaccine has distinct advantages and disadvantages, and there are situations in which only one of the three might be feasible. The advice of a veterinarian is invaluable in establishing a vaccination program. He is familiar with the herd history, the local problem, and the vaccines currently available.

Modified live virus (MLV). This is an intramuscular vaccine. Pregnant cattle should not be vaccinated because this vaccine can cause abortion. If adult vaccination is necessary, it should be accomplished following calving and not later than 3 wk prior to breeding.

Beef calves may be vaccinated between 2 wk of age and 3 wk prior to weaning. They may be vaccinated upon arrival in the feedlot or after they become acclimated to the feedlot for 2 or more wk. Veterinary advice and supervision are recommended.

All calves vaccinated prior to 6 mo of age should be given a second vaccination in the feedlot. Early vaccination may not produce satisfactory immunity and a second vaccination is necessary because colostrum from immune dams supplies a passive immunity to the calf which may last until 4 to 6 mo of age. The antibodies supplied by this passive immunity neutralize the virus particles contained in the vaccine.

Replacement heifers should be vaccinated or given a second vaccination between 6 and 12 mo of age and not later than 3 wk prior to breeding. A single vaccination at 6 mo of age or older probably confers adequate immunity for the lifetime of most cattle. A second vaccination, or annual revaccination, may be indicated in some herds.

Do not vaccinate in the face of severe stress. Vaccination and handling are an additional stress. Neutralizing antibodies are not in the blood until 9 days following vaccination. It takes at least this long for immunity to develop.

Many veterinarians prefer to maintain vaccinated animals separate from pregnant cattle for 3 wk following vaccination.

Intranasal IBR vaccine. This is a modified live virus vaccine which is sprayed into the nasal cavity. A local response to the vaccine in the nasal passages results in early immunity. Calves may be vaccinated as early as 2 days of age. This vaccine has been approved for use in pregnant cattle. The duration of immunity is not known. Annual revaccination is recommended.

Inactivated IBR vaccine. This is a “killed” vaccine. This vaccine eliminates the possibility of abortion, vaccine-caused illness, and shedding vaccine virus. Two injections are required, and the duration of immunity is unknown. Thus, annual revaccination is recommended. In a small percentage of vaccinated cattle, severe and sometimes fatal allergic reactions have occurred.

BOVINE VIRUS DIARRHEA

Bovine virus diarrhea (BVD), a togavirus, causes an acute or chronic disease of cattle characterized by fever, diarrhea, and erosions of the mucous membranes of the digestive tract. This disease occurs throughout the United States, and the likelihood of exposure is high. However, most exposed cattle have a mild or unobserved infection (rarely recognized as BVD) which results in immunity. If first exposure occurs during the first 2 trimesters of pregnancy, abortion or fetal damage may result.

Transmission

Bovine virus diarrhea is caused by a hardy virus readily transferred on contaminated boots, feed sacks, and equipment. The BVD virus spreads rapidly, and all animals in a herd may be exposed by the time the disease first is recognized.

Forms of the Disease

Cattle infected with BVD virus may respond with a variety of clinical signs and lesions. An inapparent or mild infection is also common.

Bovine virus diarrhea usually occurs as a sudden outbreak infecting most of the herd. However, only a small percent of the herd may have clinical signs such as: fever, depression, and decreased appetite; nasal discharge, ocular discharge, rapid respiration and cough; exces-
sive salivation; diarrhea; and erosions of the lips, mouth, and gastrointestinal tract.

Less common clinical signs include: lameness (cracking between the toes (interdigital lesions), swelling and erosions at the top of the hoof (coronary band), chronic founder following recovery); a corneal opacity (as in pinkeye) occurring several days after the onset of illness; a rough, dry scruffy skin (hyperkeratosis); and erosions or scabs on the vulva.

Bovine virus diarrhea frequently is diagnosed as a respiratory disease, with clinical signs of fever, rapid respiration, cough, nasal discharge, and crusted nose. There may be no oral lesions, and diarrhea may be minimal or absent.

A sporadic fatal form of mucosal disease is believed to be the result of the inability of the infected animal to produce adequate protective antibodies to the BVD virus. This form of the disease also may occur rarely following vaccination. The fatal form of mucosal disease may progress slowly, taking weeks to months in its course through a herd. Only a few animals are sick at any one time. Early signs include a mucous ocular and nasal discharge, depression and loss of appetite followed by severe erosions of the muzzle and mouth, a watery diarrhea and dehydration. Death usually occurs within 10 days, but chronic cases may linger several months.

The BVD virus has a severe effect upon the fetus even though the infection may be so mild as to go unnoticed in the pregnant cow. Abortions may occur 3 to 6 wk or longer following infection or vaccination. Newborn calves may show weakness, incoordination, lesions of the mouth, eye defects, diarrhea, stunted growth, and high mortality. Defective development of the cerebellum of the brain and cataracts of the lens of the eye often are seen in calves born from dams infected during mid-gestation.

**Diagnosis**

The clinical signs and lesions often suggest bovine virus diarrhea, but postmortem examination and laboratory tests may be necessary to establish a definitive diagnosis. The following specimens are used in laboratory diagnosis: blood samples taken at the time of the acute disease and again 3 wk later (paired serum samples); the aborted fetus and placenta; ocular (eye), nasal (nose), and rectal swabs, tissues (spleen, intestine, lymph node) and citrated blood for virus isolation; or frozen tissue sections examined utilizing a fluorescent antibody technique.

Bovine virus diarrhea must be differentiated from conditions which cause mucosal erosions or necrosis (rinderpest, the vesicular diseases, malignant catarrhal fever, bovine bluetongue, bovine papular stomatitis), conditions which cause diarrhea (rinderpest, winter dysentery, salmonellosis, coccidiosis, and some toxicoses), and conditions which cause nasal discharge and rapid breathing (rinderpest, vesicular disease, malignant catarrhal fever, bovine bluetongue, and IBR).

**Treatment**

There is no specific treatment for BVD. However, antibiotics, sulfonamides, astringents, and supportive therapy may be indicated.

**Prevention**

Prevention of BVD is dependent upon developing an immune cow herd. The only products currently available are modified live virus vaccines for intramuscular use. The BVD virus spreads rapidly, and vaccination is not recommended during an acute outbreak.

Pregnant cattle should not be vaccinated. If adult vaccination is necessary, it should be accomplished following calving and at least 3 wk prior to breeding.

Calves may be vaccinated between 1 day of age and 3 wk prior to weaning. They may be vaccinated upon arrival in the feedlot or after they become acclimated to the feedlot for 2 or more wk. Veterinary consultation and supervision are important to a successful vaccination program. (Occasional severe post-vaccination disease occurs, and there is some controversy over the use of this vaccine.) All calves vaccinated prior to weaning should be given a second vaccination in the feedlot. Colostrum from immune dams supplies a passive immunity to the calf which may last until 5 to 9 mo of age. This is the reason early vaccination may not produce satisfactory immunity and a second vaccination is necessary.

Replacement heifers should be vaccinated or given a second vaccination between 9 and 12 mo of age and not later than 3 wk prior to...
breeding. A single vaccination at this age, or older, probably confers adequate immunity for the productive life of most cows. A second vaccination may be considered at the discretion of the herd veterinarian.

Do not vaccinate in the face of severe stress. Vaccination and handling are additional stresses. Circulating antibodies may not be in the blood until 21 days after vaccination. It may take this long for immunity to develop.

Replacement dairy heifers should be vaccinated at 9 to 12 mo of age. The heifer is old enough at 9 mo of age so that she will no longer have any colostral immunity and a single vaccination will probably confer lifelong immunity. There is an increased margin of safety because vaccination at 12 mo of age is still 2 mo or more before the heifer will be bred.

GENERALIZATIONS WHICH AFFECT IBR AND BVD VACCINATION RECOMMENDATIONS

1. The IBR and BVD viruses are distributed widely and established permanently in cattle in this country. A number of surveys have shown over 35% of the cattle to have circulating antibodies to the IBR virus and over 55% of the cattle to have circulating antibodies to the BVD virus.

2. Most cattle kept for breeding purposes eventually will be exposed to one or both of these viruses.

3. Infection may produce clinical illness, or it may be so mild as to be unobserved.

4. Infection can result in abortion, but not all animals infected during pregnancy abort. Abortions and congenital anomalies (calves with abnormalities at birth) may follow subclinical infection.

5. Pregnant cattle will not abort if they are immune at the time of exposure.

6. No vaccination procedure is completely safe or 100% effective.

7. Immunity following successful vaccination with intramuscular modified live virus vaccine or natural infection with either IBR or BVD may be lifelong in many cattle. (Inactivated IBR vaccines require annual vaccination. Intranasal vaccine immunity trials will not be completed for several years, and annual vaccination is recommended.)

8. Pregnant cattle or cattle about to be bred should not be vaccinated with intramuscular IBR or BVD modified live virus vaccines. (Intranasal IBR vaccine is approved for pregnant cattle.)

9. Passive immunity acquired by ingestion of colostrum from an immune cow can protect against early calfhood infections but also may interfere with successful vaccination of calves. (Intranasal IBR vaccine may be effective in calves as young as 2 days of age even though they have colostral antibodies, but additional studies are needed.)

10. Vaccination during herd outbreaks is not recommended.

11. Vaccination of adult cattle with intramuscular modified live virus vaccine is generally not recommended.

12. Vaccination of cattle within 3 wk of the time they are to be bred is not recommended.

13. Calfhood vaccination is recommended between 9 and 12 mo of age. Colostrally acquired immunity disappears at varying ages: IBR, 4 to 6 mo of age; BVD, 5 to 9 mo of age.

The duration of modified-live-virus vaccine-induced immunity may be life-long in most cattle. Calfhood vaccination provides protection prior to breeding age and avoids vaccination just prior to breeding. A good calfhood vaccination program involving all replacement heifers will result in an immune herd without adult vaccination.

14. The livestock owner should depend on the advice of the local veterinarian. Different vaccination programs and vaccines are indicated in different situations.

EPITOME

Replacement heifers for both dairy and beef cattle herds should be vaccinated for IBR and BVD with modified live virus vaccines between 9 and 12 mo of age.

The herd veterinarian is the best qualified person to give advice and help in diagnosing and treating infectious diseases, establishing a vaccination program, determining the feasibility of vaccination, and selecting the vaccine.

REFERENCES


