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Author

Hoar, Bruce R.

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BOVINE VIRUS DIARRHEA (BVD)

Bruce R. Hoar, School of Veterinary Medicine, Department of Medicine and Epidemiology, University of California, Davis

Bovine virus diarrhea (BVD) is a complicated disease to discuss as it can result in a wide variety of disease problems from very mild to very severe. BVD can be one of the most devastating diseases cattle encounter and one of the hardest to get rid of when it attacks a herd. The viruses that cause BVD have been grouped into two *genotypes*, Type I and Type II. The disease syndrome caused by the two genotypes is basically the same, however disease caused by Type II infection is often more severe. The various disease syndromes noted in cattle infected with BVD virus are mainly attributed to the age of the animal when it became infected and to certain characteristics of the virus involved.

Diseases caused by BVD infection

Fetal BVD infections (infection of the unborn calf): The result of a fetal infection with the BVD virus is usually determined by the age of the fetus at the time of infection. The virus is capable of passing from an infected cow to the unborn fetus which is particularly vulnerable to the BVD virus during the first 6 months of pregnancy. Death of the fetus is common if the infection occurs during the first 120 days of pregnancy and the cow will lose the pregnancy. However, if the fetus survives an early infection, it will be born without a detectable antibody titer and be persistently infected (PI) with the BVD virus. During the first 120 days of gestation, the fetus has an underdeveloped immune system and does not recognize the BVD virus as foreign. The fetus does not mount an immune response against the virus, remains infected, and does not have a detectable anti-BVD titer. It is not uncommon for the surviving fetus to be malformed; blindness, skeletal abnormalities and under-developed brains are common defects noted in such calves. A BVD PI calf may appear normal, be weak at birth, grow poorly, be susceptible to respiratory diseases, and die before they can be weaned. They may also **grow normally, reach breeding age, and produce more persistently BVD infected calves** (The virus is passed from generation to generation). PI carriers can only be created by infection with BVD virus during the first 110-120 days of pregnancy. These animals shed billions of virus particles every day in their urine, feces, and saliva, and are a source of infection for other animals in the herd. If the fetus becomes infected after 120 days of pregnancy, there may be an abortion but usually, because this aged fetus has a more developed immune system and can elicit an immune response against the BVD virus, a healthy calf is born that has a good level of BVD antibody titer.

Subclinical BVD infections: Most animals that become infected with BVD never show signs of disease caused by the virus; however infection can lower the animal's resistance to other infections, which could result in illness. For example, in feedlot calves, BVD infection may go unnoticed, but the lungs become susceptible to infection with bacteria such as *Mannheimia haemolytica*

(previously called *Pasteurella haemolytica*) and other agents that cause “shipping fever”. Some people believe that BVD is one of the most significant disease organisms involved with respiratory disease of cattle.

Severe acute BVD infections: This disease syndrome is usually (but not always) associated with Type II BVD virus infection. The affected animals will exhibit high fevers (107-110 F), occasional diarrhea, respiratory disease, and they will not eat. Peracute BVD can affect cattle of all ages and often results in death of the animal within 48 hours of disease onset regardless of age.

Acute BVD infections: The classic, acute form of BVD is characterized by a fever of 104-106 F, discharge from the nose and eyes, erosions of the muzzle and in the mouth, and diarrhea that may contain mucus and blood. Diarrhea is usually present in every herd that has an outbreak of acute BVD, but diarrhea is not present in every animal that has acute BVD. The percentage of the herd exhibiting clinical disease and dying can vary extremely; however, if "secondary infections" are controlled, most animals survive the acute disease. This syndrome usually occurs in cattle 6 to 24 months of age.

Acute Mucosal disease: An animal persistently infected with BVD virus is not able to mount any defense against becoming subsequently infected with a different BVD virus. When a BVD infection is superimposed on a PI animal, mucosal disease usually results. Acute mucosal disease is characterized by fever, profuse, watery diarrhea, erosions of the mouth, lack of appetite, discharge from the eyes and nose, and occasionally lameness. Secondary infections, such as pneumonia and mastitis, are common. Cattle with acute mucosal disease usually die within 3 to 10 days.

Chronic Mucosal disease: Some cattle that develop mucosal disease do not die as soon as expected but rather become chronically infected. Cattle with chronic mucosal disease are poor doers, and may have persistently loose stools or intermittent diarrhea, chronic bloat, decreased appetite, weight loss, erosions between the claws, or non-healing skin lesions. Discharge from the eyes and nose, bald spots due to loss of hair, and long-term lameness are also common. Cattle with chronic mucosal disease rarely survive beyond 18 months and ultimately die.

Treatment and Prevention of BVD infections

There is no effective treatment for infection with BVD, but most cases are subclinical and self-limiting. Antibiotics, fluid and supportive therapy may be indicated to control secondary infections. Offering highly palatable feed could tempt sick animals to eat needed nutrients. Vaccination of susceptible cattle has been the principal approach to the prevention and control of BVD. However, preventing the introduction of BVD into your herd and identifying and eliminating PI animals from your herd are important steps to take to control the disease.

Vaccinate calves: Calves should be vaccinated twice with a modified live virus (MLV) vaccine before leaving the herd of origin. Ideally, BVD vaccinations should be completed in the calves at least 30 days prior to weaning, but whatever program you initiate needs to fit with your management system. Check with your veterinarian for specific recommendations for your herd.

Vaccinate the cow herd: It is difficult to provide blanket recommendations for vaccinating the cow herd, but some general guidelines can be given. Unvaccinated heifers and cows should be properly vaccinated **before breeding** to ensure protection for the fetus. All bulls should be properly vaccinated before putting them out with the cows or heifers and new additions should be properly vaccinated **before adding** them to the herd. Modified live virus vaccines can be safely used in open cows (there are new MLV vaccines safe for pregnant cows if the cows have been previously vaccinated with certain products) and provide long-lasting protection. Killed vaccines are safe for all cattle, but usually don't provide as strong an immune response and may need more frequent booster vaccinations. Again, check with your veterinarian for specific recommendations.

Prevent introduction of BVD into your herd: BVD virus is shed from cattle in the feces and in secretions from the nose and mouth. BVD is also readily transmitted by aerosol droplets and direct contact. Avoiding contact with other cattle is therefore an important step to take to prevent infection from entering your herd. "Good fences make good neighbors". It is especially important to keep pregnant cows less than 120 days pregnant separated from other cattle. New introductions into your herd need to be tested for PI status.

Eliminate PI animals from your herd: Until recently, testing cattle for PI infection was prohibitively expensive but now there are tools available making it feasible to test for and eliminate these "typhoid Mary" animals from the herd. There are two types of test available, one using a skin sample and one using a blood sample:

Immunohistochemistry – for this test, a small notch of skin is taken from the edge of the ear, easily done using a pig ear-notching tool. The triangular piece of skin removed should be ¼ to ½ inches per side. Depending on the laboratory the sample will be sent to, the removed skin is placed either in a vial containing formalin or an individual plastic bag. All samples must be clearly labeled with the animals' identification number.

PCR – this test requires that a blood sample in a "purple top" tube be taken and submitted. Again, all samples must be clearly labeled with the individual animal ID.

Samples can be sent to a number of different laboratories; three are listed below. Be sure to contact the lab and talk to your veterinarian before taking and sending samples – if you take the wrong samples, all your work may be wasted. Be aware that it is possible to have "false positive" results – some animals may test positive when they are not truly persistently infected, and may need to be re-tested. Your veterinarian can help interpret the results of the testing. (Thank you to Dr. John Maas for the following information)

