Persistent Bovine Virus Diarrhea Infection in Cattle

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Bovine Viral Diarrhea -- The Virus and the Disease

Bovine Viral Diarrhea Virus (BVDV) causes several different disease syndromes including failure of conception, persistent infection, abortion, congenital defects, stillbirths, and pre- and post-natal growth retardation. BVDV infection is often a component of Bovine Respiratory Disease (BRD) by causing an impairment of the immune system. Infection in the immune competent animal causes a broad range of clinical signs ranging from the more common subclinical syndrome with serum antibody production as the only evidence of infection to a severe intestinal disease with or without hemorrhages and possible death.

Mucosal Disease occurs when the non-cytopathic BVDV in the persistently infected (PI) animal mutates to the cytopathic form or the animal is exposed to a closely related cytopathic form of BVDV. Diarrhea, ulceration of oral and nasal mucus membranes, erosive lesions of the coronary band and interdigital skin (between the claws), and death are signs of mucosal disease. This syndrome affects all ages of PI cattle and may display as an acute or chronic disease process, but either form will end in death of the animal.

Persistent Infection or Immune Tolerance

BVDV infection in the non-immune pregnant cow/heifer causes a viremia (systemic infection) with the virus crossing the placental barrier and infecting the developing fetus. If the fetus is infected with the non-cytopathic BVDV from 50 to 120 days gestation, its immature immune system will not recognize the virus as a foreign antigen (protein). Because the immune system of the fetus now recognizes the virus as part of its make-up, the virus will remain in the calf as long as it lives, i.e. PI. Persistently infected animals continually shed large amounts of BVDV in all body secretions (nasal, saliva, semen, feces, etc.). These animals serve as a major reservoir of virus for within the herd as well as the mechanism for maintaining BVDV in the cattle population.

Signs and Symptoms of Persistent Infection

Indications of BVDV infection in a herd may be very subtle with an occasional abortion, or one or two light birth weight calves. BVDV infection may also increase the incidence and severity of calfhood scours or BRD in pre- and post-weaning periods.

Persistently infected calves present in varying degrees of health. Often their birthweight is less than their peers. They continue to be less thrifty and usually succumb to a secondary disease process or develop mucosal disease and die prior to becoming two years old. More discomforting, they may appear perfectly normal, breed, calve, and produce more PI calves thereby perpetuating themselves and the BVDV.

Diagnosis

Diagnosing BVD is a process that needs to include your veterinarian. He/she will use the herd history, clinical signs, blood tests, pathology findings, and virus isolation to arrive at the diagnosis.

Virus isolation is the most reliable and most widely used method to diagnose BVDV infection. The buffy coat layer (white blood cells) of whole blood is used to isolate the virus early in the disease process of an immunocompetent animal, in recently vaccinated animals, and young nursing calves that may have maternal colostral antibodies. Buffy coat virus isolation at the Oklahoma Animal Disease Diagnostic Laboratory (OADDL) has a turn around time of approximately 14 days at a laboratory fee of $15.00 per animal. Microplate virus isolation using serum is used to identify BVDV virus in non-vaccinated adult cattle and calves older than 3 months of age. BVDV MICROPLATE VIRUS ISOLOATION for PI CATTLE IDENTIFICATION at the OADDL has a turn around time of 3 - 5 days with a laboratory fee of $3.75 per animal with price breaks for multiple samples. Immunohistochemistry (special staining to identify the virus) testing of skin samples (ear-notch) is used to identify BVDV PI infection in all ages of cattle. The size of skin needed is small (1/3 of a V cattle ear notch) is sufficient. It must be fixed in formalin solution. The turn around time is approximately 5 days (prior arrangements necessary) and the cost is $5.00.

Animals identified as positive will be retested in 3-4 weeks. Animals that are found positive for BVDV at both test times are considered persistently infected. All PI animals should be isolated immediately and disposed of. They should not be allowed to enter marketing channels. All cattle not PI should be properly vaccinated according to your veterinarian's recommendations.

Disease Prevention

1. Intra-herd biosecurity: Early diagnosis of diseases. If BVDV infection is established as a cause of disease in the herd, it is important the source of infection is identified. If herd history, disease process, and laboratory results indicate the possibility of persistently infected animals in the herd, they should be identified, isolated and eliminated from the herd. It is impossible to establish an effective vaccination program for BVD prevention in the presence of persistently infected animals.

2. Because the prevalence rate is about 1% in the cattle population of the United States it is extremely important to do a complete herd test. The one you fail to test may be the PI animal.

3. Inter-herd biosecurity: Purchased herd replacements should be isolated and tested for BVDV by virus isolation prior to entering the herd.

4. Using whole blood or serum samples to diagnose BVDV infection by virus isolation should not be confused with serologic (serum) testing to determine the presence of BVDV antibodies [serum neutralization (SN)]. The presence of BVDV antibodies means the animal was exposed

to that virus and its immune system produced antibodies to eliminate the disease. Serologic testing to determine if an animal is PI is of little to no value.

5. A vaccination program established with the help of your veterinarian.

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