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BVDV – Bovine Virus Diarrhea Virus

Bovine Virus Diarrhea is a significant disease in cattle throughout the world. Sweden and Denmark have instituted eradication programs of testing, removal of PI (persistently infected) animals and strict biosecurity restrictions. The Academy of Veterinary Consultants have adopted the resolution: "That the beef and dairy industries adopt measures to control and target eventual eradication of BVDV from North America". The BVDV has been found to cause clinical disease in sheep. Wild ruminants (mule deer, elk and bison) may harbor and transmit the virus without exhibiting significant disease.

The Bovine Viral Diarrhea Virus (BVDV) can cause a variety of clinical diseases. Primary acute infection may affect both the respiratory and the intestinal system, resultant in the shedding of active virus. The BVDV causes an immune suppression by destroying white blood cells. Dual respiratory infections respond poorly to treatment and have a higher mortality when caused by BVDV and any combination of other pathogens: IBR (Infectious Bovine Rhinotracheitis virus), BRSV (Bovine Respiratory Syncytial virus), *Mannheimia haemolytica*, *Pasteurella multocida*. This synergistic effect is likely due to the immunosuppression by the BVDV. A chronically infected animal with a suppressed immune system may be diagnosed as mucosal disease and eventually die. The BVDV may only survive in the environment for a short period of time, however, these chronically infected and persistently infected animals are a constant source of virus for other animals in close contact.

The effect on the developing fetus depends upon the stage of gestation. The viremia from an acute infection or exposure in the pregnant heifer/cow during the first 60 days of gestation can cause death of the embryo with few noticeable signs other than being open or late in calving. Abortion can occur throughout the pregnancy and BVDV is frequently isolated in cases of late term abortions or stillbirths. Fetal exposure to BVDV between the fourth and sixth month of gestation may result in congenital defects.

Of primary concern is the Persistent Infection (PI) that occurs when a fetus is exposed to a non-cytopathic strain of BVDV between 60 and 120 days of gestation. Non-cytopathic strains of the virus do not cause fetal death and because the fetal immune system does not recognize the virus as a foreign organism, the fetus is carried to term and will continue to shed the virus throughout its life. Often the PI individual is noticed as the "poor doing" or "unthrifty" calf. However, the PI individual may also be an unnoticed heifer or bull that stays in the herd for a period of time, continuing to be a reservoir of virus. It is estimated that potentially 1% of all cattle are persistently infected. Pregnant females, who are not adequately immunized, and calves less than 6 months of age, with waning maternal antibodies, are quite susceptible to this constant virus exposure.

Control efforts are hampered by the fact that the BVDV readily mutates as it replicates in the animal. There are over 140 identified strains though we currently deal with just a few in natural disease and vaccine production. The biotype designation, cytopathic (CP) or non-cytopathic (NCP) is based on the visual effects of how the virus grows on cells in the laboratory. The majority of the viruses isolated from infected animals are non-cytopathic. The BVDV has been categorized into different genotypes and subtypes: type 1a, type 1b and type 2 BVDV. Each subtype has a predilection for different organs in the body and differs in the severity of disease associated with each.

Different manufacturers use various combinations of the virus antigens in their vaccine production. Currently there are many studies being conducted to determine the immune response provided by the different strains, biotypes and genotypes of BVDV in different vaccines. A primary goal is to provide adequate fetal protection in the pregnant female. Diagnostic laboratory testing can provide your veterinarian with data to advise which vaccine antigens should be most effective in protecting your herd. There are advantages to the use of either the killed virus (KV) or the modified live virus (MLV) vaccines. KV vaccines require two primary doses spaced three to four weeks apart and are safe in pregnant females or calves nursing pregnant females. MLV vaccines tend to stimulate a longer lasting immunity and it is being recommended that female replacement cattle receive at least two MLV vaccinations prior to first breeding. As with all vaccines, these products should be used according to the product label instructions and indications in conjunction with your local veterinarian's counsel. Vaccines are an



important part of disease control when used in conjunction with effective biosecurity.

Several diagnostic tests are available to determine the presence of BVDV in a herd. Serological testing on blood samples has limitations due to confusing titers from vaccinations. Virus isolation can be quite specific but is more costly and requires more laboratory time. Immuno-histochemistry (IHC) on a skin biopsy or ear-notch is a reliable and cost-effective diagnostic tool to identify and eliminate the PI calf shortly after birth or provide assurance that the new replacement heifers or new bull are not an unsuspected PI virus shedder. Quarantine of new animals before inclusion in the herd allows time for diagnostic testing to determine the presence of virus or PI. Quarantine allows the animals to be properly immunized in accordance with the health plan for the herd. Biosecurity must consider the exposure to neighboring livestock and wildlife. Biosecurity is most effective when it becomes a community effort with all of the producers utilizing a unified plan.