Bovine Viral Diarrhea Virus (BVD)

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Description:

Bovine viral diarrhea virus (BVD) is a viral infection of domestic ruminants worldwide. BVD is responsible for significant economic losses due to decreased milk production, reproductive problems, treatment costs, and mortality. Cost estimates in herds with BVD range from $24 to $200 per cow per year. BVD often interacts with other disease of the respiratory and digestive tract and can affect multiple organ systems. The clinical scenario that occurs when a herd is infected with BVD depends on the level of immune protection in the herd and the strain of the infecting virus. One of the problematic aspects associated with BVD is the presence of persistently infected (PI) cattle. However, there are now tests to identify PI cattle making it possible to control the disease.

Etiology:

Bovine viral diarrhea virus is an RNA virus of the Pestivirus genus. The most important reservoir of infection in cattle is the presence of persistently infected (PI) cattle. If a susceptible pregnant cow becomes infected with BVD during the first trimester of her pregnancy (between 42 and 125 days), the fetus can become infected with BVD and the result is the birth of a persistently infected (PI) calf. This animal will carry the virus for life, shed high levels of BVD virus from all body orifices and its body will not mount an immune response to the virus because it is immunotolerant. Often PI animals are sickly since the infection can impair their normal immune function, but some survive and become lactating cows. This is problematic for two reasons; they go on to produce PI calves and they serve as a reservoir of infection in the herd. The other source of BVD within a herd is acutely infected cattle. Animals with acute, transient infections can spread BVD to other cattle, but they shed virus at a much lower level and for a shorter period of time than PI animals. This type of horizontal transmission of BVD occurs between cattle in close contact when susceptible cattle are directly exposed to infectious secretions. Veterinarians, farm workers and equipment contaminated with BVD virus can also serve as fomites and spread the disease. Finally, BVD can be spread via infected semen and embryo transfer, but this is rather uncommon and the primary source of infection remains PI cattle.

Symptoms:

The clinical manifestations of BVD are numerous and variable making it difficult to categorize them. BVD can infect a single organ, multiple organ systems, or combine with other infectious agents including respiratory, digestive, and lymphoid pathogens. One generalization about BVD is that it has an immunosuppressive effect. This is one reason why it is implicated with
so many other disease processes. BVD viral infection in susceptible postnatal calves usually
does not cause clinical signs because maternal antibodies in the colostrum protect young
calves. Once maternal antibodies wane, infected calves can begin to show signs of BVD. This
is usually around 23 days, but depends on the quantity of antibodies consumed. Once
animals begin to show signs, they usually fall into one of the following broad disease
categories:

1. Respiratory
2. Digestive Tract
3. Thrombocytopenic or Hemorrhagic
4. Mucosal
5. Reproductive

**Diagnosis:**

Diagnosing BVD can be achieved in a variety of ways using a variety of tests. The best way
to identify BVD in cattle is with an ear notch antigen-ELISA test. This is an easy and effective
way to identify animals with acute infections and PI animals. Ear notch samples are optimal
for the following reasons:

- Easy to collect and ship (can be shipped “dry” in test tube or stored frozen)
- Highly specific for BVD so it won’t give false positives
- Not affected by presence of maternal antibody
- Same sample can be tested by multiple test methods including PCR and antigen-
capture ELISA

To collect an ear notch sample, submit “pig ear notcher” size ear notch (dime-size) in a Red
top blood serum tube (one ear notch per tube) labeled with each individual animals
identification number. It is important to keep track of individual samples and to know which
calves came from which dam. This is because any positive cows need to be culled in addition
to any positive calves and their dams.

An additional method of testing is to do PCR on a pooled sample form multiple animals. This
method reduces the cost of testing and makes it possible to only use ELISA testing on
animals within a positive pooled sample.

Testing animals should be done routinely including all newborn calves, incoming cattle, and
cattle that leave and then return for some reason. The following information can help
determine what animals to test and when:

**Calves**

1. Test all calves born alive. Testing and removal of PI calves must occur before exposure
   of females in the breeding herd, bulls, and artificial insemination in order to prevent
   contact between BVD-PI calves and pregnant dams. This testing could occur most
conveniently during calving or before turnout to summer or winter range.
2. Test all aborted calves
3. Test all purchased grafted calves

Cows

1. Test all cows with a BVD-PI positive calf identified at calving
2. Test all open cows not sold. Many producers choose to do BVD testing on heifers when they are being handled for other management procedures such as brucellosis testing.
3. Test all cows not tested during the sampling at calving
4. Test all cows that lose a calf or if their calf is not sampled

New Entries:

1. Test all purchased open heifers
2. Test all purchased pregnant heifers and cows (and also test their calves when they are born)
3. Test all bulls and be sure that the semen comes from BVD tested bulls
4. Test all animals returning from shows, fairs, or contract growing facilities and isolate them for 2 weeks until it is clear that they do not have a contagious disease

Prevention:

The three main measures to control BVD are testing, vaccinating, and isolating animals. No, BVD vaccination alone (with either modified-live or killed vaccines) can keep a cattle herd free of BVD-PI cattle or completely control BVD infection. Prevention measures should include:

- Maintaining a closed herd whenever possible
- Do not purchase replacement at auction where they might be infected with BVD
- Only buy certified BVD-free or BVD-PI tested cattle
- Always test and quarantine (for 30 days) new arrivals to the herd
- Determine the cause of abortions within the herd
- Vaccinate animals against BVD virus

Vaccination is an important aspect of controlling BVD virus in cattle herds. Vaccinations against BVD come as either modified life or killed vaccines. There are advantages and disadvantages to each.

Killed Vaccine: The killed vaccine for BVD is safe to use in pregnant animals. However, this vaccine must be boosted 2-3 weeks after the initial inoculation in animals being vaccinated for the first time. Additionally, the killed vaccine has a shorter duration of immunity and must be
repeated every 4-6 months in order to maintain good levels of immunity within cattle.

**Modified Live Vaccine:** The modified live vaccine is not safe to use in pregnant cattle. However, it does stimulate both cell-mediated and humoral immunity and has a longer duration of immunity. The modified live vaccine only needs to be given once annually and does not require a booster like the killed vaccine does. Because the modified live vaccine stimulated the entire immune system, it is recommended that every animal receive a modified live vaccine at least once in its life, preferably when it is 3-6 months old.

It is important to remember that even a good vaccination program won't prevent all BVD infections and it is still possible for vaccinated pregnant cattle to become infected with a field strain of BVD. Fortunately, both forms of BVD vaccine do a very good job of preventing shedding of virus and spread of infection to fetuses.

**Treatment:**

There is currently no effective treatment that can alter the course of BVD infection in cattle. Fortunately, most BVD virus infections are subclinical and self-limiting in otherwise healthy cattle. If treatment is attempted, it should include antibiotics, B vitamins, and fluids because this may help to control secondary infections and provide supportive therapy. Sick animals need proper nutrition, so feed rations can be enhanced for increased palatability in an attempt to get the sick animal to eat.

Related Links

[The Beef Blog, Purdue Animal Sciences](http://www.beefblog.purdue.edu)[1]
[droverscattlenetwork.com](http://www.droverscattlenetwork.com)[2]

Sources:


Merck Veterinary Manual Online:
http://www.merckvetmanual.com/mvm/index.jsp?cfile=htm/bc/121213.htm&word...

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