



March 2007

AH/Beef/2007-01

## Control or Eradication of BVD from a Beef Herd

*Clell V Bagley, DVM; Douglas S. Hammon, DVM, Ph.D;*  
and *James J. England, DVM, Ph.D., University of Idaho*

Bovine virus diarrhea (BVD) is caused by a virus, which is present in many beef herds and is an extremely costly disease. Acute outbreaks may occur in animals not previously exposed to BVD, resulting in respiratory or digestive disease, weight loss and production loss. BVD suppresses the immune response of cattle and enables other diseases to have a greater impact on the herd, even without causing an acute outbreak.

BVD is a cause of severe reproductive losses including early embryonic death, abortion, birth defects and persistently infected calves. New strains of BVD may be introduced into the herd through purchase of breeding animals, which may cause a serious BVD outbreak.

### Forms of BVD

- Benign Infection/ Subclinical
- Persistently Infected (PI)
- Fatal Mucosal Disease
- Reproductive Failure
  - Decreased follicular development
  - Abortion – early embryonic death
- Birth Defects
- Respiratory Disease
- Weak Calf Syndrome/ Immune suppression
- Diarrhea



Figure 1. A BVD, PI calf on the left, and a normal appearing herd mate on the right, which also could be a PI calf.

The tools are now available to eradicate BVD from a beef herd and to keep it out, if the herd is reasonably isolated. Eradicating BVD will reduce losses and greatly improve the potential for herd profitability. However, before beginning an eradication program the producer must recognize the importance of keeping BVD out once it has been eradicated. A producer must be committed to preventing re-introduction of BVD into the herd, otherwise the eradication efforts and costs will have been wasted.

It has been almost impossible to eradicate BVD from a herd in the past because of difficulty in identifying persistently infected (PI) cattle. This is because a PI animal is infected as a fetus between day 18 to 125 after conception. Instead of dying or being aborted this type of infected calf survives but is permanently infected with the BVD virus. The PI animals are the primary reservoir for the BVD virus and the major source of infection in the herd. The immune system of these animals does not respond to the BVD virus and as a result, the virus continues to multiply, infect cells in the animal, and be excreted (shed) from the animal throughout its life.

Although some PI calves are weak at birth, grow slowly and finally die, approximately half of all BVD PI calves appear normal, cannot be distinguished by outward appearance, and may survive for several years. This characteristic makes these cattle especially dangerous to the rest of the herd.

**Key Point:** *Identification and Strict Culling of all BVD PI Animals is essential to successful eradication of BVD from cattle herd.*

PI animals do not shed virus continuously, but often shed virus in large amounts when under stress. The quantity of virus shed may overcome the natural or vaccine immunity of other cattle in the herd, so they develop acute BVD. Perhaps the greatest hazard is that the virus shed may infect a fetus, either within the PI cow or in a previously uninfected cow. This fetus may then become a PI calf and continue the cycle of infectivity in the herd.

The basic questions for each producer are:

1. Is my herd infected with BVD?
2. Can I eradicate BVD and keep it out of my herd or do I have to be content with just controlling it with management to reduce its impact?

BVD is a very complicated disease and it will be to your advantage to involve a veterinarian as you plan toward

control or eradication. Some general information and guidelines follow but each producer needs a plan that is specific for the individual operation.

## Is My Herd Infected with BVD?

Herds can be considered at low risk if they have excellent reproductive performance (a high percent of cows exposed to a bull actually weaning a calf), and if the appropriate herd samples have been submitted to a diagnostic laboratory to search for BVD and it has not been detected.

Herds at high risk of being infected are those that have previously had a laboratory confirmed diagnosis of BVD infection in herd animals; have reduced reproductive performance despite good nutrition and bull fertility; and have a high rate of calf illness and death despite good nutrition and sanitation.

Many herds have some infected animals, but, not all herds do. So, for some herds it may be advisable to conduct a herd screening test prior to launching into an extensive effort to eliminate PI animals. The easiest screening method to determine if BVD is present in the herd is to test for BVD antibody. Do this by selecting 10 calves at six months of age or older, which are unvaccinated and which have been in direct contact with the animals in the herd. If some of these calves have a positive titer, it indicates the presence of acutely infected or PI cattle. If all are negative, it indicates an absence of any cattle shedding the BVD virus and the herd is probably free of BVD. (This test for antibody involves collection of blood, separation of the serum and then a test is conducted on the serum for antibody titer.)

## Control or Eradication of BVD

In order to eradicate BVD and keep it out of the herd, the herd must be relatively isolated from other cattle. For herds which mix together for common grazing eradication is not a reasonable option unless all of the other producers involved also participate in the eradication program. In a common grazing herd it is very likely that BVD exposure will occur and cattle in the supposed “free” herd would again become infected.

## Control of BVD

If a beef herd is not isolated from most other cattle then BVD eradication is unlikely because some pregnant

animals may become exposed to the virus and continue the PI cycle. Those producers may choose to just control BVD and minimize losses to it, rather than trying to eradicate it from the herd. The primary tool for control is a proper vaccination program for BVD. Some herds may also be able to benefit by identifying and removing PI animals.

A producer should vaccinate all replacement heifers with a modified live virus (MLV) vaccine after the heifers are six months of age but at least one to two months before breeding. Protecting heifers is essential. If possible, cows should be vaccinated annually, 30 days before beginning breeding.

The MLV vaccines have been most effective in preventing fetal infection and PI calves. Vaccines are now available which have been shown to be effective in providing fetal protection and it would certainly be advisable to use one of those. Some MLV vaccines are also approved for use in pregnant cows, if they have previously received it. However, if these are used late in the reproductive process the exposure of the fetus to BVD may already have occurred and some PI calves may be present in the pregnant cows. Some MLV-BVD vaccines are not approved for use in pregnant cows and may cause abortion and fetal defects.

Studies have shown that over 95 percent of fetal infections with BVD come from exposure of dams to PI animals. The dams of most PI, newborn calves are BVD negative, indicating the dams themselves are not PI. Vaccination will reduce the incidence but is not 100 percent effective in preventing fetal infections, so vaccination alone will not eradicate BVD.

**Key Point:** *Vaccination, without identification of, and removal of BVD PI animals, may not prevent all BVD problems from developing in cattle herds.*

## BVD Eradication Program

A BVD eradication program has three important parts. The following program and procedures are recommended to eradicate the BVD virus from a herd and keep it out:

### 1. Enhance immunity with vaccination

Vaccinate as described above under "Control of BVD."

### 2. Eliminate Persistently Infected (PI) carriers

These animals are the main reservoirs of BVD infection in the herd. Test to identify all PI animals and

then cull them from the herd, to slaughter only. It has now become possible to identify BVD infected cattle by collecting a small piece of skin, usually with an ear notcher, and the laboratory performs an immunohistochemistry test on this skin. The tissue needs to be preserved in buffered formalin and the laboratory test conducted within one month of collection, to avoid test failures.

The immunohistochemistry test will show the presence of virus at the time of testing but cannot differentiate acutely infected from PI animals, so further testing may be needed to confirm those PI and avoid needless culling.

### Testing Individual Animals for BVDV

- **What test should be used?**
  - ✓ Immunohistochemistry on skin samples
  - ✓ Virus Isolation/ serology
- **What animals should be tested?**
  - ✓ Young stock
  - ✓ Purchased Animals (Cows, Heifers, Replacement Bulls)
- **When should animals be tested?**
  - ✓ Prior to purchase or upon arrival (for purchased animals)
  - ✓ Prior to mixing with breeding/ pregnant cows

**Note:** Other methods of testing are also available but are more complicated and expensive. A "test at weaning" program could be implemented but some of the dams would already be carrying infected, PI calves so this would delay progress for another year.

\* Test after calving and before the breeding season (use a skin sample, such as an ear notch) The following categories should include all cattle in the herd except the dams of calves that tested negative:

- Test all calves present in the herd. The dams of negative calves do not have to be tested as they will be negative also. This plan results in reduced test costs, compared to testing every animal. Test dams of any calves that are positive on the skin test (use the skin test for dams).
- Test all cows without calves; any which calve later should be isolated from bred cows until the calf is tested (soon after birth) and found negative

- Test all bulls
- Test all replacement heifers (yet to be bred)

\* Re-Test: If desired, all animals which tested positive on the test above could be re-tested. This re-test would rule out any cattle which were acutely infected, so they were not culled needlessly; only those persistently infected need to be culled. Preferably, wait 30 days between the two tests, but this test needs to be completed prior to breeding. It is advisable to use a whole blood and virus isolation test for the second test.

All positive animals should be considered as PI animals and should be sold to slaughter only or euthanized. Be sure they are all removed from the herd before any breeding.

\* Test all calves by the skin test again the next year, to find and remove any PI animals, in case something was missed and a fetus became exposed.

### **3. Implement a plan for BVD Biosecurity (to keep BVD out)**

\*Prevent direct contact with non-tested cattle by co-mingling and test all in-coming animals to be sure they are not PI carriers.)

\*Prevent new infections or exposure to BVD virus (especially of pregnant animals)

- Isolate and test bulls at purchase (or before purchase); return them if positive
- Use semen only from test negative bulls
- Buy only non-bred heifers; isolate and test at purchase (or prior); return if positive (or, purchase from proven BVD-free herds)
- Keep free herd separate from all other cattle
- Avoid fence line contact as much as possible
- Keep cattle separate from sheep and ruminant wildlife
- Establish an effective biosecurity program for personnel, clothing, footwear and vehicles
- Continue to vaccinate at least the replacement heifers with a MLV BVD vaccine

## **Conclusion**

Implementation of a BVD eradication program involves significant planning, labor and financial costs for testing. But, for those herds which are sufficiently isolated and that can manage a systematic program, the future benefits will be well worth the initial costs.

Utah State University is committed to providing an environment free from harassment and other forms of illegal discrimination based on race, color, religion, sex, national origin, age (40 and older), disability, and veteran's status. USU's policy also prohibits discrimination on the basis of sexual orientation in employment and academic related practices and decisions.

Utah State University employees and students cannot, because of race, color, religion, sex, national origin, age, disability, or veteran's status, refuse to hire; discharge; promote; demote; terminate; discriminate in compensation; or discriminate regarding terms, privileges, or conditions of employment, against any person otherwise qualified. Employees and students also cannot discriminate in the classroom, residence halls, or in on/off campus, USU-sponsored events and activities.

This publication is issued in furtherance of Cooperative Extension work. Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Noelle Cockett, Vice President for Extension and Agriculture, Utah State University.