

Bovine Viral Diarrhea Virus Persistent Infection (BVD-PI) Ear Notch Testing Program for Cattle Herds

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Bovine Virus Diarrhea Virus (BVDV) infection in cattle herds can result in major economic loss from poor reproductive performance (reduced percent pregnant, increased abortion and stillbirth) or poor calf performance (increased calf sickness and death loss). Cattle persistently infected with BVDV (BVD-PI) are the primary reservoir for BVDV infection in cattle herds, and thus are the major focus of control programs.

[BVD Certification and Eradication Program \(BVDCEP\)](#)

The Washington Animal Disease Diagnostic Laboratory (WADDL) at Washington State University is implementing a "BVD-PI Ear Notch Testing Program" designed for whole herd testing to aid cattle producers in identification and removal of BVD-PI animals. The testing program is based on the most current information available. However, herds should be examined on a case-by-case basis as whole herd testing may not be warranted in some situations.

Which animals to sample?

Calves:

1. All calves born alive. Testing and removal of BVD-PI calves must occur before exposure of females in the breeding herd to bulls or before artificial insemination in order to prevent contact between BVD-PI calves and pregnant dams. Depending upon individual herd management schemes the sampling could occur most conveniently during calving or before turnout to summer or winter range.
2. All aborted calves
3. All purchased grafted calves

Cows:

1. All cows with BVD-PI positive calf
2. All open cows not sold
3. Cows not calved at time of sampling
4. All cows that lose calf and calf not sampled

New Entries:

1. Purchased open heifers
2. Purchased pregnant heifers and cows (also test calf when born)
3. Bulls

Sample to take?

Ear notch samples are optimal

- Easy to collect and ship (minimal equipment)
- Not affected by presence of maternal antibody
- Same sample can be tested by multiple test methods (PCR and antigen-capture ELISA)
- Can be shipped "dry" in test tube or stored frozen

Submit "pig ear notcher" size ear notch (dime-size) in blood serum tube (Red top tube) (**One ear notch per tube**). **Label each tube with individual animal identification number**

What laboratory tests will be used for BVD-PI detection?

- Polymerase Chain Reaction (PCR): Not BVD-PI specific Used to test pooled samples to reduce cost of testing
- Antigen-ELISA: BVD-PI "specific" is a one time test; Used to test individual samples from a PCR positive pool in order to identify individual BVD-PI animal.

Samples will be tested singly or pooled at WADDL depending upon number of cattle tested (See Table below).

Pooled samples (up to 36) will be tested by PCR and individual samples from positive pools tested by antigen-capture ELISA

What do the laboratory test results mean?

BVD PCR negative pool	No BVD-PI animals in pool
BVD PCR positive pool	BVD-PI or BVD-TI animal(s) present in pool requiring testing of individual samples within positive pool by antigen-capture ELISA
BVD antigen capture ELISA positive individual	BVD-PI animal (98% accurate). If valuable breeding animal may want to follow up with second sample in 2-3 weeks to confirm

BVD antigen capture ELISA negative individual	Not BVD-PI animal
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How much will it cost?

BVD-PI (Persistent Infection) Ear Notch Testing Program			
Number of Cattle Tested	PCR Pool Size	PCR Charge per Head**	Ag-ELISA charge per Head**
<12 samples	No Pooling	NA	\$5.00
12-35 samples	12	\$3.95	\$1.75 *
36-99 samples	up to 36	\$2.95	\$1.75 *
100 or more samples	up to 36	\$1.95	\$1.75 *

* BVD Ag-ELISA testing on individual samples within a PCR positive pool

**Non-Washington state samples will be assessed a 50% surcharge.

Additional Information

What is BVDV?

Bovine Viral Diarrhea Virus (BVDV) is one of several world-wide pestiviruses known to infect domestic and wild ruminants, camelids, and swine. For cattle producers the virus causes economic losses through decreased weight gains, decreased milk production, reproductive losses, and death. There are many BVD virus types (cytopathic and non-cytopathic). BVDV typing does not predict disease severity, and all BVDV types are detected by current test methods. There are two categories of BVDV infection.

- **Transient (acute) infection ("TI")**
 - Short term (weeks)
 - Acquired after birth
 - TI cattle become immune and clear virus
 - >95% of BVD infections are TI
 - TI cattle minor source of virus spread in herd
- **Persistent (chronic) infection ("PI")**
 - Life long infection
 - Acquired in utero. Thus, only fetal infection results in BVD-PI.
 - PI cattle never become immune
 - <5% of BVD infection are PI
 - PI cattle major source of virus spread in herd!
 - Over 90% of BVD-PI calves are born from normal dams (no prior BVDV exposure)

What is BVD clinical disease?

Most BVDV infection problems in cattle herds go unnoticed since 70-90% of BVD infections are subclinical (do not result in observable disease). When present, the most common disease caused by BVD virus infection in cattle herds is poor reproductive performance including, abortions, poor conception rates, stillbirths, and weak calves. In addition, BVD virus infection causes suppression of the bovine immune system resulting in increased susceptibility to other infectious diseases. In cow-calf herds the immunosuppressive effect of BVD is normally noticed as increased calf death loss (from scours and pneumonia) and poor weaning weight. In feedlot animals this is noticed primarily as increased death loss and incidence of respiratory disease (pneumonia). Lastly, BVD virus infection alone can cause diarrhea with oral ulcers and bleeding disorders.

How is BVDV transmitted?

The main source of BVDV in cattle herds is BVD-PI animals. Virus in BVD-PI animals is shed in all body secretions including nasal discharge, saliva, tears, milk, feces, urine and semen. Transmission occurs via ingestion, inhalation, and fomites (non-living sources such as boots and vehicles). Some common ways BVDV can enter cattle herds are:

- Purchasing replacements at auction
- Purchase of pregnant cow/heifer with PI calf
- Introducing replacements or show stock without quarantine
- Failure to maintain BVD vaccination program
- Failure to test replacements for BVD PI
- Contaminated semen or embryos
- Borrowed or escaped bulls

Why test and remove BVD-PI animals from a cattle herd?

Persistently infected (PI) cattle are the major source of BVD infection and disease in cattle because they shed huge amount of BVD virus throughout their lives. The major economic loss associated with BVD in cow-calf operations is loss of income due to loss of calves either before birth (abortion), at birth (weak calves) or between birth and weaning (BVD-induced immunosuppression make calves more susceptible to common calf disease such as pneumonia and scours). Thus removal of BVD-PI animals from a cattle herd should result in:

- Improve reproductive performance in herd
- Improve pre-weaning performance in herd (weaning weights and calves weaned)
- Lower calf treatment costs and calf death loss
- Provide more marketable cattle (BVD free certified herd status)

Can BVDV infection be eradicated from a herd with vaccination?

No, BVD vaccination alone (with either modified-live or killed vaccines) cannot keep a cattle herd free of BVD-PI cattle nor completely control BVD infection according to the Academy of Veterinary Consultants and American Association of Bovine Practitioners. Both groups promote a three-pronged approach to BVD control, a combination of BVD-PI testing and removal, vaccination and biosecurity.

Can I identify BVD-PI without laboratory testing?

Approximately 50% of BVD-PI calves are sick "poor-doers" that die before 1 year of age. However, the other 50% of BVD-PI cattle appear healthy as calves, grow normally and enter breeding herds or feedlots unnoticed. Despite looking healthy these subclinical BVD-PI animals still shed high levels of BVD virus and require

laboratory testing to identify.

How do I get BVD virus out of my cattle herd.

Current recommendations from the Academy of Veterinary Consultants and American Association of Bovine Practitioners for control of BVD virus infection in cattle herds focus on identification and removal of BVD-PI animals. Control measures should include:

- Diagnosis and removal of BVD-PI cattle
- Vaccination to reduce BVD infection rate (Vaccination will not eliminate BVD virus from cattle herds)
- Biosecurity to prevent introduction of BVD-PI animals

What testing strategy should be used?

Testing for BVD-PI cattle is different than testing for many other diseases because PI status stays the same throughout the animal's life. Thus, BVD-PI testing is usually done only once. A BVD-PI test may be repeated to confirm a positive (since current laboratory testing by antigen-ELISA or IHC has a small percentage of false positive results)

Meet with your veterinarian to determine your BVD goals and exposure risk. Various testing strategies for whole herd testing exist. Below is a common example.

1. Prior to start of breeding season, test all calves and non-pregnant females without calves. Isolate pregnant females until they calve and test their calves.
2. Prior to start of breeding season, test all bulls and replacement heifers not previously tested for BVD-PI status.
3. Maintain documentation of BVD-PI test results.

What do I do with a positive BVD-PI test result?

Quarantine animal until second confirmatory test is run (BVD-PI "specific" laboratory tests, such as antigen-ELISA and IHC, have a low (approximately 2%) false positive rate). A second ear notch sample taken 2-3 weeks after the initial test will ensure whether or not the BVDV infection is persistent.

Ethically deal with confirmed BVD-PI animal by euthanizing animal, selling animal to slaughter, or sending animals to feedlot that feeds BVD-PI cattle. **Don't sell your problem to someone else.**

Mother of BVD-PI calf should be tested for BVD-PI status. There is a small chance (approximately 10%) that the cow is also BVD-PI. Cows with BVD-PI calves that are not BVD-PI need not be culled. Remember, a negative BVD-PI animal is negative BVD-PI for life.

How do I prevent BVD virus from re-entering my cattle herd?

The following management procedures could reduce re-introduction of BVD virus into a typical cattle herd.

- Maintain closed herd (not always practical)
- Don't purchase replacements from auction
- Buy certified free or BVD PI tested livestock
- Quarantine new arrivals and show stock for 30 days and test new arrivals for BVD PI
- Test purchased pregnant animal and its calf at birth
- Keep records (reproduction and health)
- Address health problems
- Determine why cows abort, why calves are sick, and why animals die

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Last Edited

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