

# Persistently Infected BVD Cattle - A Cow/Calf Perspective

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Programs are popping up around the country to investigate the role of screening cattle for persistent infection of the bovine viral diarrhea virus (BVD-PIs). This is a disease that costs the U.S. cattle industry an estimated \$2 billion annually.

The focus of these programs is mostly on “whole herd” screening of cattle herds for PI cattle. It’s usually an effort in finding needles in a haystack – but “needles” that can do a lot of damage on individual ranches and greatly impinge on the reputation of a cattle herd.

Programs to identify PI cattle also emphasize how important ranch biosecurity is in preventing BVD and in the “elimination” of PI calves. These programs also emphasize the relationship between sickness in cattle and the quality of the end product.

This becomes a “management-over-medicine” approach based on the words of Dr. Gary Smith, meats scientist from Colorado State University, and arguably the world’s foremost authority on beef supply chain management. “Each time you treat an animal for a sickness in a feedyard you run the risk of losing a quality grade and a tenderness score.” This statement by Dr. Smith underscores the link between animal health management and quality beef production systems.

## Collaborators and Analysis

Through the Montana BVD-PI cattle project, we’ve contracted with Animal Profiling International (API), Portland, OR, (<http://www.animalprofiling.com>) to be our laboratory collaborator. API was chosen through a competitive bid process considering three major project requirements:

1. Price of laboratory analysis. API is the least-cost provider.

2. Turnaround time. API promises “next business day” screening results. This means that with an overnight shipment, a rancher or feeder can usually expect results before suppertime the next day. Ranchers often say this is the most valuable component of testing – especially when tissue samples are taken at branding.
3. Technical assistance. Dr. Bruce Hoffman, DVM, Manhattan, MT, president of API is available to assist project participants with their PI screening and BVD management questions.

The cost of screening through API is \$1.95/head (in shipments greater than 99 samples) using “pooled” polymerase chain reaction (PCR) analysis. Samples from multiple animals are pooled together in a strategy that takes advantage of the high sensitivity of the assay while reducing the cost per animal tested.

Simply put, we want to remove PI animals from cow herds before they can spread BVD virus and perpetuate this troublesome herd health issue. To help control BVD nearly every authority on BVD recommends proper vaccination of the cow herd with a modified-live virus vaccine prior to breeding – along with screening or testing for PI cattle.

## “Creation” of PI Calves

For a producer to manage and control of BVD in their cattle herds they must consider the two ways the virus passes from one animal to another. The first manner is through *horizontal transmission* – when a transiently (temporarily) infected animal releases the virus in its nasal and other secretions and the virus enters a susceptible animal through the mouth or respiratory tract. The second manner is through *vertical transmission* of the BVD virus from an

infected dam through the bloodstream and placenta to her fetus during pregnancy.

The main negative health effects of BVD virus are that it can inhibit conception and cause abortion in susceptible females, and it suppresses the immune system; making infected animals more susceptible to other diseases. In some cases, BVD's effect on the immune system is more critical than the actual acute effects of the BVD virus. This makes controlling BVD at the ranch all the more critical and cost-effective. We must also remember that BVD is strictly a cattle management problem and has no human health implications.

Research tells us that at the ranch the impact of at least one PI animal in a herd has been conservatively reported to range from \$14-24/cow/year.

Persistently infected calves can develop in the uterus of the dam if the heifer or cow is exposed to the BVD virus during the first part of gestation – about 40-125 days after conception. In fact, this is the only way a PI animal is “created.” Also, once a calf is born PI with the BVD virus, it will always be a PI animal. If an animal is not PI at birth, it can never become PI. Persistently infected females of breeding age are not only a source of horizontal transfer of BVD virus, but will always produce a PI calf.

Although a high percentage of PI calves die at or near birth – or at least by weaning – many PI calves that survive can be healthy-appearing and enter the breeding herd or be offered for sale. Persistently infected animals usually have a very high and persistent amount of virus circulating in their blood and other fluids, and BVD virus is shed continually. These animals are very efficient transmitters of BVD virus. Screening should be conducted before cows are bred to reduce the risk of exposing fetuses to PI carriers.

The scientific literature indicates that persistent infection has a clustered distribution, which means a few herds may contain several PI cattle but most herds contain only normal, non-PI cattle. Clustering of multiple PI animals in a herd is primarily due to exposure of numerous susceptible dams to a PI or transiently infected source of the BVD virus. Therefore,

the target of the ranch-based screening projects has been to keep PI cattle out of breeding herds.

Of course, aborted fetuses, dead calves, deformed calves, heifers that won't breed or stay bred, or other suspect cattle should be tested for PI status routinely, unless the cause of death is known. Tissue from freshly dead cattle can be submitted for analysis.

## **Marketing/Merchandizing Considerations**

Feedlots and heifer development operations present a special biosecurity challenge because the opportunity to introduce BVD-PI animals into these systems is increased when cattle are commingled from multiple sources.

There are out-of-state cattle feeders screening all calves coming into their feedyards for PI status. Some feeders are asking ranchers to screen their herds before or at weaning. In Montana, we just entered a ranch into our project that was encouraged by his feeder to screen his calves before shipping. In that case, the order buyer is sharing the cost of screening with the rancher.

We've also seen Montana PI project calves show up on video sale listings and market websites as being “PI” screened. We expect more post-weaning screening activity as the fall progresses. At least one auction market operator is saying that PI-screened calves were already “easier to sell” this fall. We've had calls from out-of-state cattle feeders who are asking for a list of ranchers who are entered in the screening project.

It's highly recommend that all ranchers – seedstock and commercial – who market breeding cattle screen those animals for PI status prior to sale if they were not previously screened. This will provide adequate assurances to both buyer and seller that breeding animals – bulls and replacement cows and heifers – are PI-free. If the animal's health management history is unknown, buyers have every right to ask that they're screened for PI status prior to delivery.

We are not necessarily recommending perpetual

PI screening from a cow-calf management standpoint. We're suggesting that once a rancher screens a herd according to our project protocol (whole herd screening), he or she can be *reasonably assured* of a PI-free cattle herd given the following basic management regime:

- A proper vaccination protocol based on use of modified-live vaccines.
- A sound biosecurity program.
- Screening of any new additions to the herd.

There may be justification on a herd-by-herd basis for continued testing of calves from younger cows (2 and 3-year-olds) if there is:

1. A significant breach in biosecurity (i.e., fence line contact with suspect animals or the neighbor's bull getting in) and/or,
2. A rancher suspects there's risk for other reasons (i.e., questions of vaccine efficacy, in-common grazing situations, unusual sicknesses or breeding failures, etc.).

## The 2007 Montana Project

We feel Montana cattle ranchers, individually and collectively, should feel proud of the leadership they've demonstrated in this voluntary industry-driven approach to animal health management. While they're helping themselves improve the health of their individual cattle herds, they deserve to be recognized and rewarded for their work. If you'd like more information about this project, feel free to give us a call.

It's full speed ahead for the 2007 Montana BVD-PI Herd Screening Project. The project is designed to improve the overall health of Montana's cow herd and add value to the state's calf crop. Through 2007 the project will provide technical assistance, limited financial support, and a screening supply "kit" to all Montana ranchers who want to screen their BVD-PI cattle.

As with the 2006 Pilot Project, the 2007

screening project is supported by the Montana Stockgrowers Association and is funded through the Montana Beef Network. With enough buy-in from ranchers this disease can be all but eradicated from a state's cow herd. The goal for 2007 is to screen at least 100,000 calves in Montana.

We must emphasize that BVD-PI screening should be part of a program involving vaccination, biosecurity, and overall herd health management. The screening protocol assists the producer in finding all PI animals in the herd and also assures that new arrivals are BVD-PI free.

The authors of this project wish to thank James A. Kennedy, DVM, MS, Colorado State University Veterinary Diagnostic Lab, Rocky Ford Branch, Rocky Ford, CO, for his guidance and assistance in developing this project. Under Dr. Kennedy's pioneering leadership, the State of Colorado is entering the third year of the Colorado Voluntary BVD Control Program.

## Key Points in Finding BVD-PIs

- Test animals before bull turn out to avoid exposure of a PI during breeding.
- Sampling is based on a small ear notch placed in a dry tube kept cool or frozen.
- The same tissue sample used for initial PCR screening is the source sample for re-testing to identify individual "reactors" in the pool.
- Mature cows do not need to be sampled and tested unless they have a positive PI calf.
- Individual identification is critical to match all samples with the animal tested and match the calf with its dam.
- A plan should be developed to eliminate PI animals from the herd.
- If an animal tests negative for BVD-PI status, there's no need to ever retest that animal.

- PI surveillance should include the necropsy examination of as many aborted fetuses, stillborns, and pre-weaning deaths as possible.
- PIs that live to be breeding females can horizontally transfer the virus to other animals in the herd – and they will always produce a PI calf.
- Home-raised yearling heifers should be tested prior to breeding for BVD-PI status. If the heifer was tested as a calf and found to be negative there is no need to retest.

## Test New Entries Into the Herd

- Purchased open heifers should be tested before purchase or before commingling with herd.
- Purchased bred heifers or cows with an unknown BVD-PI status should be kept separate from the home herd. Calves from these animals should be screened prior to commingling.
- Bulls should be purchased as BVD-PI free. If not, bulls should be tested prior to the breeding season. A good time to take an ear notch is during breeding soundness exams.

## Calves

- All calves born alive should have an ear notch sample taken prior to bull turn-out. Ear notches can be frozen for up to 30 days, facilitating sampling over an extended period of time.
- All calves aborted, stillborn, or that died before normal sampling time should have an ear notch sample taken and be tested for PI status. Identify those calves and match to the dam if possible.
- All purchased calves for grafting should have an ear notch sample taken.

## Cows

- All open cows should be screened if not sold before breeding.

- Cows that have not calved at the time of sampling calves should be separated. Their calves should be screened.
- All cows that lose a calf and a sample was not obtained from the calf should be screened.
- All recipient females in an embryo transfer program should be screened.

## PI-positive animals

- The PI animal needs to be eliminated from the herd. Remember, once a PI calf, always a PI calf. If not humanely destroyed, the calf should not be marketed.
- PIs that live to be breeding females can transfer the virus to other animals in the herd – and they will always produce a PI calf.

## Ear Notch Sampling Procedure for Pooled PCR Screening

### Materials Needed

- Red top serum tubes (5ml).
- Malt ear notch tool.
- Cardboard shipping container with ice packs and liner.

### Collection Procedure

- Write individual animal ID number on tube or vial.
- Take small ear notch and place in dry tube (do not place in formalin or PBS).
- Rinse ear notch tool in disinfectant after notching and rinse again in clean water prior to taking notch from next animal.
- Maintain collected samples in a cooler with ice packs or in freezer prior to shipment.

- Samples can be frozen right after collection and tested within 30 days.
- Submit samples to lab.

### **Lab Analysis Using API:**

- Technicians “pool” fluid from ear notches (28 samples per pool).
- Examine pools for presence of BVD virus.
- In positive pools, retest individual samples to identify which sample(s) are a contributing virus to the pool.
- Lab reports test results to animal owner within one business day upon receipt of samples.
- Three-four weeks later re-test second submitted ear-notch from suspect animal(s) using Ag-ELISA technique for confirmatory analysis.

For more information please contact: Dr. Bruce Hoffman, Manhattan, MT, DVM, President, Animal Profiling International (API) at (406) 282-7414 (office) or (503) 970-1275 (mobile).

## **Notes:**