ARMOR ANIMAL HEALTH

Professional Services Veterinarian Department

TECHNICAL BULLETIN

BVD DISEASE OVERVIEW - DAIRY

What is BVD?

BVD (Bovine Viral Diarrhea) is a viral disease which can have a high economic impact on farms. BVD is caused by Type 1 or Type 2 BVDV (Bovine Viral Diarrheal Virus). The virus is spread through direct contact with bodily fluids which include: saliva, nasal discharge, urine, feces or semen. It can also be spread by biting insects, inanimate objects, biologic products (colostrum) and other animal species. Since BVD only survives outside the body for a short time, direct contact between animals is the greatest risk for spreading the disease. Cleaning and disinfecting waterers and feeding troughs will help minimize spread as well.

How does it impact the herd?

- Could have **annual loss of $54[1] per cow** where a persistently infected (PI) animal is present
- Reduced milk production
- Decreases immune response to fight off other diseases
- Negative impact on reproduction

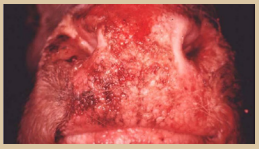
Symptoms of BVD

Symptoms of BVD are varied.

Some cattle may not display any symptoms, while others will be severely affected. The severity of affliction depends on the virus' ability to cause disease.

Symptoms:

- Fever
- Poor appetite
- Diarrhea
- Mucosal ulcers
- Depression
- Decreased milk production
- Excessive nasal secretions
- Eye irritation
- Oral ulcers
- Dehydration



An acute infection (Transient BVD) usually has a low mortality and high infection rate of the herd. Acutely infected cattle usually have a compromised immune system and have been exposed to BVD after birth.

- Most common among young cattle (6-24 months of age)
- Incubation period of 5-7 days after exposure
- Clinical signs start 6-12 days after exposure and last 1-3 days
- Recover quickly
- Visible lesions are rare
- Causes mild respiratory signs

A severe infection usually has a moderate mortality and high infection rate of the herd.

- Clinical signs start 6-12 days after exposure and last 3-7 days
- Animals will have symptoms including: a high fever of >107°F, oral ulcers, irritated eyes, ulcers between claws of the feet, diarrhea, dehydration, hemorrhage and swollen lymph nodes

Be suspicious of BVD if adult cattle have:

- Nonspecific fevers at times of stress
- Decreased fertility
- Increased abortions (>3%/yr)
- DOA's (Do not survive transit or other high stress situations)

For more information contact:
800.255.1181 I info@armorah.com

[1] Impact of BVD on Dairy Herd Profitability, John Vanleewun, Center for Epidemiological Research, Atlantic Veterinary College, UPEI, Canada.

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EFFECT ON CATTLE

Cattle can either be Transiently Infected (TI) or Persistently Infected (PI) animals.

TI (Transiently/Acutely Infected)

- Exposed after birth
- Most clear virus on their own
- Short incubation period
- Shed virus for 4-15 days post infection
- Can have mild-severe symptoms

PI (Persistently Infected)

- Exposed during the first trimester (40-130 days) of fetal development
- Bodies assume the virus as normal so they don't develop an immune response to BVD
- Will have a weakened immune system for life and be more susceptible to other diseases
  - » High risk for developing Mucosal Disease
    - ס Mucosal disease develops when a PI calf is infected with a new (different) strain of BVD
    - ס The calf's immune system attacks all the foreign viral-infected cells, which is usually every cell in its body and leads to severe signs of infection
    - ס Only PI cattle will develop Mucosal Disease and usually do not survive
- Will continually shed the virus for their entire life
- PI calves are the main source of transmission and basis of BVD survival in the cattle industry
- Can appear healthy and normal size or be a poor performing animal

Pregnant Cattle

- BVD will cross the placental barrier and infect a fetus when the cow is exposed to BVD during the first trimester (40-130 days) of pregnancy. The virus can infect the fetus at any time, but only infection in the first 4 months will lead to a PI calf.

PI cows or cows infected with BVD during pregnancy can display:

- Reduced conception rate
- Abortions
- Still births
- Premature births
- Birth defects
- Weak calves
- Stunted growth in calves

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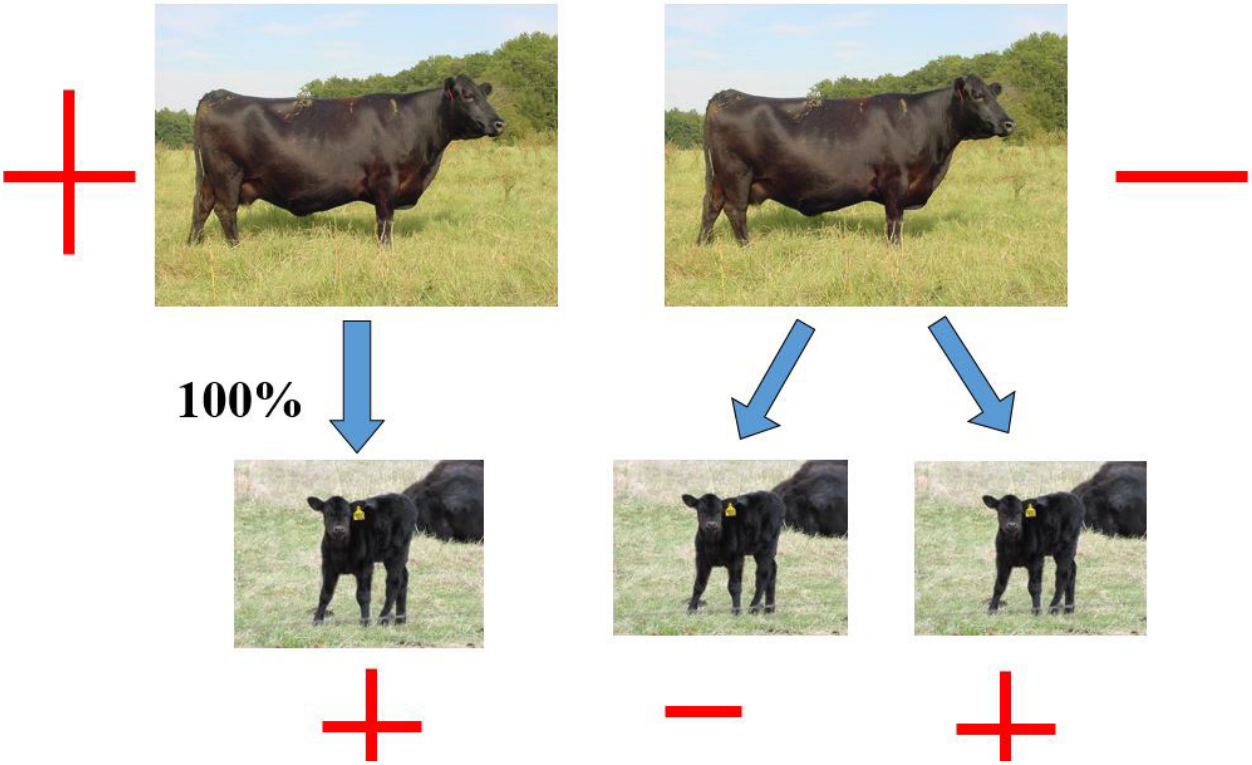
PI CREATION AND TREATMENT

A persistently infected (PI) cow will always give birth to a PI calf. A transiently-infected cow can give birth to a PI calf or a normal, non-PI calf depending when she was exposed to BVDV while she was pregnant.



Treatment

There is **no cure** for BVD-PI cattle; treatment is limited to supportive therapy and control of the disease through management practices on the farm. Non-PI (Transiently Infected) animals should be treated with antibiotics and anti-inflammatories to prevent secondary bacterial pneumonia.

Prevention

- Test all new entries into the herd
- Identify and remove all PI cattle from the herd
  - Cull all PI cattle to slaughter

Vaccination

- Antibodies present in >90% vaccinated cattle
- Killed or modified live vaccines
- Modified live - do not vaccinate during pregnancy or illness
  - Provide quick, strong and long lasting immunity
- Killed - can use during pregnancy
  - Short duration, more frequent vaccination
  - No vaccine shown to completely protect fetus from BVD if cow exposed during pregnancy
- Contain Type 1 and Type 2 BVD

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TESTING STRATEGIES

Testing Methods

» PCR (Polymerase Chain Reaction)
- Usually used to screen large groups
- Looks for the presence of BVD (Bovine Viral Diarrhea) RNA

» ELISA (Enzyme Linked Immunosorbent Assay)
- Usually used to test individual animals
- Looks for the presence of BVD specific antigens (protein)

» Immunohistochemistry
- Run on individual samples
- Looks for the presence of BVD specific antigens (protein)
- Can only be run on formalin-fixed skin biopsy (including ear notches)

Testing Strategies

Bulk Tank

- Use PCR technology
- Recommend to be checked quarterly
  - Follows trend over time assures all cows are represented in a milk string per year
- Samples taken from well agitated tank from first milking
- Can use a preserved sample; no ice pack needed
  - Preserved samples will have a preservation tablet added

Pros
- Good screening tool
- Will detect BVD presence in lactating herd
- Taken from up to 3,500 cows

String Sampling

- Use PCR technology
- Can use a preserved sample; no ice pack needed
  - Preserved samples will have a preservation tablet added
- Include milk from hospital and fresh pens

Pros
- More specific than bulk tank
  - Look at different sub-populations
  - High-producing, first-calf heifers, etc.
- Cost effective

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TESTING STRATEGIES (cont.)

Pooled - Use PCR technology

Pros

- PCR very sensitive and provides rapid detection of BVD
- Can test multiple animals at once, so decreases costs
- Run on ear notches, blood or milk

Individual - Use ELISA method

Pros

- Easy individual test and identify newborn calves, so you can cull PI animals early
- Run on ear notches, blood or milk

BVD PCR positive pool	Need to individually test samples via ELISA
BVD PCR negative pool	No BVD PI animals
ELISA positive individual	BVD PI animal (98% accurate). May retest in 3 weeks.
ELISA negative individual	Not a BVD PI animal

- All positive animals may be retested in 3 weeks to confirm a PI
- PI calves should not be marketed
- Adult PI animals can be sent to slaughter once withholds are met

Testing Plan

New Entries into Herd - If BVD status is unknown, should be tested before comingling.	Calves	Cows
• Purchased open heifers • Purchased springers or cows • Bulls - before breeding	• All born alive have ear notch or blood sample • Ideal to test even bull calves • All calves aborted, still-born or ill	• If calf tested negative, dam is negative • If calf tested positive, dam should be tested • Bulk tank/string sampling to monitor herd - Individual test run if positive • If not previously tested and a cow loses a calf, test cow if calf not tested

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HERD TESTING PROCESS

Individually, a producer can experience an **annual loss of $54[1] per cow** where a persistently infected (PI) animal is present, which makes BVD testing a great return on investment. BVD testing can be a quite simple when process for PI animals. Let us break it down for you:

Testing Milk Herd:
First, you need to determine if you have BVD in your herd. With training, testing can be performed by anyone by taking ear notches, drawing blood from the tail vein or milk samples.

Bulk Tank Test

The easiest way to test is to take a milk sample from your bulk tank and send it to a testing facility. The test will determine if BVD is present in your herd. The test does not determine how many or which animals are infected, but it does tell you if BVD animals are present.

- If the sample is **negative** then your herd is free of BVD at the date of sampling.
- BVD is spread by animal to animal contact, so if your farm purchases new animals, sends heifers to a heifer raiser with at least two clients, or your animals share a fence line with the neighbor's animals you should test frequently for BVD with a bulk tank milk sample.
- If your milk sample is **POSITIVE** you will want to find the positive animal. There a few ways to do this:

Milk Strings

- The milk sample is easiest if the herd has multiple tanks and separate strings can be sampled individually. If the milk sample is **negative,** those cows in that milk string are clean of BVD and no further testing for those cows is needed.
- If **POSITIVE**, milk strings are then tested as individual samples to find the positive(s) animal.

Blood or Ear Notch Individual

- If milk string sampling is not feasible, then you need to sample individual animals either by milk, blood or ear notches.
- These samples are typically grouped in pools of 25 – 28 samples and tested as a group. This is more economical then testing individually. If the sample is **negative,** that BVD pool is considered clean and none of those cows in that pool need further testing. If the pool is **POSITIVE** the lab will individually test the samples to find the positive BVD animal. You do not need to re-collect samples, as the lab already has the individual samples.
- Timing of Testing: You can test all animals in a herd at the same time or spread out testing of animals over time. This may result in a delay of finding positive BVD animals, but also allows cost and labor to be spread out over a period of time. Remember the sooner you find the positive BVD animals, the sooner your herd starts improving.
- Many commercial herds prefer ear notches for sampling because it provides a quick visual to see if the animal has been tested before.

- Lastly, all positive cows' offspring should be tested as BVD PI cows almost always have BVD PI calves.
- Positive BVD calves should be culled.

[1] Impact of BVD on Dairy Herd Profitability, John Vanleewun, Center for Epidemiological Research, Atlantic Veterinary College, UPEI, Canada.

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HERD TESTING PROCESS

Monitoring going forward:

- After all positive BVD animals are identified and removed from the herd, it is highly recommended to start a quarterly **BVD surveillance milk bulk tank sample program** to monitor your BVD status.
- Another alternative test method is to test young calves (see next page). Dams of positive calves should always be tested as BVD calves may come from positive BVD dams or negative BVD dams (if exposed to a BVD PI animal during gestation period).
- Show animals should always be tested. Blood testing is preferred in this case so it doesn't change the appearance of the ear.

Herd Testing Process:

Send a bulk tank sample and run test

If negative, test quarterly

Option 1

If positive, send in comingled sample per pen or string and run test

If positive, send individual samples in, the lab groups samples into pools and runs test per head*
***min. of 20 head**

If positive, each sample will be run individually as a positive sort test

Option 2

If positive, send individual samples in, the lab groups samples into pools and runs test per head*
***min. of 20 head**

If positive, each sample will be run individually as a positive sort test

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CALF TESTING PROCESS

Calf Testing Plan

- All born alive have ear notch or blood sample
- Ideal to test even bull calves
- All calves aborted, stillborn or ill
- Dams of positive calves should always be tested as BVD calves may come from positive BVD dams or negative BVD dams (if exposed to a BVD PI animal during gestation period).

Calf Testing Process:

Blood or Ear Notch Individual

- These samples are typically grouped in pools of 25 – 28 samples and tested as a group. This is more economical then testing individually.
  - If the sample is **NEGATIVE,** that BVD pool is considered clean and none of those calves in that pool need further testing.
  - If the pool is **POSITIVE,** the lab will individually test the samples to find the positive BVD animal. Note: you do not need to re-collect samples, as the lab already has the individual samples.
- Many commercial herds prefer ear notches for sampling because it provides a quick visual to see if the animal has been tested before.

Send in Blood or Ear Notch Samples

↓

The lab groups samples into pools and runs test per head*
***min. of 20 head**

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If positive, each sample will be run individually as a positive sort test

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