

WSU VETERINARY TEACHING HOSPITAL  
Camelid Medicine & Surgery

## Bovine Viral Diarrhea Virus in Camelids

### 1. 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. As with most viral infections, there is a wide range of clinical signs from inapparent infections to diarrhea, respiratory tract infections, hemorrhage, abortions, congenital defects, and death.



[Printable BVD  
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#### *Acute Infection*

Bovine viral diarrhea refers to a mild disease caused by a BVD virus infection in immunocompetent cattle. In general, animals develop acute BVD 10-12 days after infection. Since BVDV infects white blood cells, whole blood (buffy coat) is the sample of choice for isolation of BVDV from clinically ill animals.

#### *Persistent Infection*

BVDV can lead to a persistent infection in a calf if it is infected during a certain time in gestation. If infected prior to complete development of the fetal immune system, the virus will not be recognized as a foreign pathogen. After birth, the calf will shed the virus and infect other animals in the herd. Sometimes these calves look sick but they can also look perfectly healthy thereby making it impossible to visually identify these animals.

## • **2. Why is BVDV important to my alpacas or llamas?**

This question cannot be completely answered at this time. There is much research that needs to be performed to fully understand the implications of BVDV in alpacas and llamas.

Research has shown that llamas and alpacas can be infected with the virus and develop clinical signs. There have also been reports of suspected persistent infections in crias. In cattle, persistent infected calves are the primary source of spreading the infection to other animals. It is not known if persistently infected crias are the primary source of herd infection in camelids, but it is suspected. Alpacas and llamas are sent all over North America and lapses in biosecurity could permit a persistent infected cria to infect other animals and herds.

## **3. What are some concerns among veterinarians and researchers regarding BVDV in alpacas and llamas?**

A few current questions among veterinarians and scientists requiring investigation: Are there true persistent infections or longer transient infections than seen in cattle? How accurately do the bovine-based tests diagnose infections in camelids? Is there a new pestivirus specific to camelids or a mutation of the BVD virus that appears to “prefer” camelids?

## **4. What are some possible clinical signs seen in alpacas and llamas?**

Typical signs that a client may see include fever, oral ulcers, anorexia, diarrhea, abortion, ill-thrift, and congenital defects.

## **5. How is BVDV transmitted?**

The most efficient method of BVDV transmission in camelids is not known. Transmission in cattle has been primarily by ingestion or inhalation of the virus. The virus can be found in all body fluids (respiratory and oral secretions, urine, milk, and semen) and feces. Transplacental (cow to fetus) transmission also occurs. Transmission is assumed to be similar in other susceptible species including alpacas and llamas.

## **6. What species can transmit BVDV?**

Virus can potentially spread between domestic ruminants (cattle, sheep, goats), camelids, and wildlife (deer, elk, etc).

## 7. Is there a vaccine available for alpacas and llamas?

Currently there is no BVDV vaccine licensed for use in camelids. There are several vaccines available for use in cattle. The vaccines do not prevent infection but reduce the clinical disease effects. At this time, it is not recommended to vaccinate camelids until more is understood about the virus. Unwarranted vaccination can interfere with diagnostic testing and identifying truly infected animals.

## 8. Can BVDV infections be prevented?

No, BVDV infections cannot be prevented but they can be reduced. Maintaining a closed herd, implementing strict biosecurity protocols for all incoming animals (recommended not just for reducing BVDV infections), and periodic screening of open herds can reduce the occurrence.

## 9. What diagnostic techniques are currently recommended for alpacas and llamas?

### *Types of Tests Available*

- Polymerase chain reaction (PCR) – nucleic acid detection, very sensitive. Will detect persistent as well as acute (transient) infections. Diagnostic method of choice because of excellent sensitivity.
- Antigen-enzyme-linked immunosorbent assay (Ag-ELISA) – antigen detection; validation of this test has not been established in camelids but is being evaluated.
- Serology (serum neutralization) – antibody detection, a single test indicates exposure, but not active infection. Testing acute and convalescent samples and showing a 4-fold increase in titer indicates active infection. False negatives may occur if sample taken soon after an infection (prior to development of an immune response), or in animals < 3 months of age when maternal, colostrum derived, antibodies interfere with the test.
- Skin biopsy with immunohistochemistry (IHC) – antigen detection; results are not conclusive in camelids.
- Virus isolation – Detects live virus in blood and tissues. May be required for virus typing.

### *Testing Strategies:*

**Acute Infection:** BVDV acute infection can be diagnosed by virus isolation, polymerase chain

reaction (PCR) or serology. Virus detection must be done in the first 3-10 days after infection. A whole blood sample is the best sample for BVDV detection by PCR or virus isolation. Paired acute and convalescent samples collected 3-4 weeks apart are required to identify four fold increase in serum antibody titers following recovery from clinical illness.

***Persistent Infection:*** Definitive diagnosis of persistent infection in camelids cannot be based upon testing done at a single time point. Detection of BVDV persistent infection requires showing virus is present in a particular animal over time (the infection persists). Although the BVDV antigen ELISA test done at a single time point is used to detect BVDV persistent infection in cattle, whether or not similar interpretation of the test in camelids is accurate is not known. Therefore, persistent infections in camelids should be determined by detecting virus (by PCR or virus isolation) in sequential samples collected 3-4 weeks apart.

Tests recommended by the Washington Animal Disease Diagnostic Laboratory (WADDL) and Washington State University Veterinary Teaching Hospital (WSU-VTH) for testing alpacas and llamas.

### **Who to contact for more information?**

Contact WADDL (509) 335-9696 for testing questions.

Contact WSU-VTH Agriculture Animal Department, Ms. Sallie Bayly, RVT [shenson@vetmed.wsu.edu](mailto:shenson@vetmed.wsu.edu) (509-335-0711) to contact a veterinarian regarding management questions.

WADDL and WSU-VTH veterinarians who can assist you:

- [Dr. Jim Evermann](#) (WADDL)
- [Dr. Andy Allen](#)
- [Dr. George Barrington](#)
- [Dr. Stacey Byers](#)
- [Dr. Steve Parish](#)
- [Dr. Ahmed Tibary](#)

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