

# Bovine Viral Diarrhoea (BVD) and Mucosal Disease (MD)

Bovine Viral Diarrhoea is an important infectious disease that is responsible for economic losses in cattle worldwide.

The pathogen is a Pestivirus that is closely related to classical swine fever virus and border disease virus of sheep.

The virus is transmittable via all body fluids.

The most important feature of this virus is its ability to re-assort and change antigenically, allowing it to escape the immune mechanism and subsequently remain active within a flock that appears clinically asymptomatic.

There are two known genotypes of the virus, Type 1 and Type 2:

- Both types can exist as either cytopathogenic (CP) or non-cytopathogenic (NCP) biotypes
- Cytopathogenicity is not an indicator of virulence (pathogenic potency)

## Symptoms

There are several clinical forms that can occur due to infection with BVD:

### Subclinical

- Many animals of a herd that have never shown clinical symptoms have antibodies against the virus.
- Milk drop possible
- Mild fevers
- Usually not recognized in adult animals (unspecific symptoms, animals recover by themselves after a few days)

### Acute BVD

- Animals with the acute form are usually between 6 and 24 month of age
- Incubation period of 5 to 7 days
- Untreatable pneumonia
- Bloody diarrhoea
- Mucosa inflammation and bleeding
- The virus not only damages the mucosa in the mouth, but also the oesophagus and bronchi
- Inflammation in the interdigital space, blue discoloration of the skin on the foot
- Immunosuppression and pneumonia due to secondary bacterial pathogens can occur
- High animal losses of up to approx. 60%

### Hemorrhagic syndrome

The virus can cause a lack of thrombocytes, which can lead to an increased tendency to bleed, e.g. massive skin bleeding from injection sites, insect bites, later also spontaneous

### Reproductive loss

Infertility and embryonic death and abortion. The latter can occur at any stage of gestation

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### **Effects on the unborn calf**

Depending on the stage of pregnancy at which the mother's infection occurs:

- Abortions after infections up to approx. 200 days always possible
- Early pregnancy (up to approx. 40 days): Fruit death and recurrent oestrus
- Approx. 40 - 120 days: If the foetus is exposed to a NCP biotype, a persistent infection can occur which leads to the development of PI animals:

A persistently infected animal will be immunotolerant towards the virus, which means its immune system won't fight the virus and it won't show any symptoms. These animals act as a reservoir and will consistently shed the virus for life. They are assumingly normal at birth, possibly with lower birth weight.

### **PI animals are the main way that BVD is retained within a herd**

- Approx. 100- 150 days: birth of calves with eye and/or brain malformations after normal gestation
- In case of infection after the 120th day, increasing probability of healthy calves being born

### **Mucosal disease**

- Occurs when a persistently infected animal is superinfected with a CP biotype or the NCP biotype mutates to a CP biotype
- Severe, incurable disease with diarrhoea, inflammation or bleeding of the mucous membranes and inflammation in the interdigital space, very often associated with pneumonia

### **Treatment**

The treatment of acute BVD is mostly aimed at preventing serious secondary infections and providing supportive care such as fluids and electrolytes.

The best way of fighting and controlling the disease is by preventing it.

The focus should be on vaccination and on the detection and elimination of PI animals.

### **Vaccination**

Most importantly young animals should be protected as maternal immunity wanes.

Vaccination of cows (prior to breeding season) is conducted to prevent the birth of PI calves and reproductive losses via foetal infection.

Vaccination is particularly useful in farms with a high risk of infection, as it can minimise the economic losses in the event of infection. Herds that have been vaccinated against BVD in the past are recommended to continue vaccination until the control measures are effective. BVD vaccination produces BVD antibodies which cannot be distinguished from BVD antibodies caused by field infections.

### **Diagnosis**

There are two ways of detecting a BVD infection that has occurred:

- Direct detection of virus or its components (antigen):
- The pathogen is still in the animal and there is a definite risk of infection for other animals.



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- Indirect detection of antibodies against the virus produced by the animal: The animal has undergone BVD infection and its immune system has reacted to it. In this case, there can be no statement made whether or not the animal is still shedding the virus.

Antibodies are sometimes detectable in the blood for several years.

The immune system of PI animals is not able to form antibodies against the BVD virus though, so the indirect method would not be successful in detecting persistently infected individuals.

However, as new born calves take up maternal antibodies via the colostrum, BVD antibodies can be detected in the first 2 months of life in PI animals.

Different materials can be used to diagnose BVD:

1. Blood sample: direct and indirect detection
2. Bulk milk sample: direct and indirect detection
3. Ear punches: taken while tagging the calves' ears – only direct detection

### **European method of choice:**

Every calf is directly tested for BVD antigen as soon as the ear tag is being attached. This allows an easy and reliable detection of PI animals in the first days of life and enables the farmer to take action and remove PI animals from the herd before they can pose a major risk of spreading BVD.