

## Control of Bovine Virus Diarrhoea (BVD)

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It is estimated that more than 90% of UK herds have had exposure to bovine virus diarrhoea virus (BVDv). Losses result from reduced fertility, poor production and increased susceptibility to other infections especially in young calves.

In advertising literature, the Scottish Government quotes the annual benefits after eradication of BVD in your herd are likely to be:

Dairy	£15,800
LFA specialist beef	£2,400
LFA cattle & sheep	£1,800
Lowland cattle & sheep	£2,400

(LFA=Less Favoured Areas)

Major financial losses result where infection is introduced into a group of susceptible breeding cattle resulting in poor reproductive performance and the birth of calves with persistent virus infection. While elimination of infection from the herd is optimal, vaccination is highly effective and produces a substantial cost benefits.



***Young calf persistently infected with BVD (right) compared to similarly-aged normal herd mate.***

Strict biosecurity measures and a robust herd health plan are essential to prevent introduction of BVDv into your herd; effective biocontainment measures are essential on those farms with active infection to reduce the costs of BVD and to, eventually, eradicate BVDv from the herd

### Cause

The main transmission route is by direct contact with cattle persistently infected with BVD virus. It needs only one persistently infected animal to be introduced into a susceptible herd to cause very significant financial losses.

### Clinical signs

Cattle exposed to BVD virus may show few clinical signs, producing protective antibodies within three to

four weeks. In some situations, BVD virus infection may temporarily lower immunity to other infectious diseases exacerbating these clinical infections particularly in young calves.

BVD virus infection may temporarily lower immunity to other infectious diseases such as

- Salmonellosis
- Respiratory infections,
- coccidiosis

BVD virus during early pregnancy causes embryonic death and return to oestrus, foetal death/abortion, mummification of the foetus, birth defects of the nervous system and eyes, weak/premature calves, and live persistently-infected calves.



***BVD virus is most important when it infects susceptible breeding cattle during early pregnancy causing foetal death/abortion, and weak/premature calves.***

Infection of the foetus before 110/120 days of pregnancy results in the birth of a live calf but persistently infected (animal carries the virus for life). This is caused by failure of the developing immune system of the foetus to function properly before 110 days. After birth these calves carry the virus for life and act as a potent source of BVDV infection for in-contact susceptible cattle. Virus infection (not necessarily before 110 days), may also lead to various defects of the developing foetus' eyes and brain. These calves may be born blind and lack co-ordination, respectively. These calves should be culled for welfare reasons, as well as being a source of infection.



***Poorly-thriven yearling persistently infected with BVD virus (far left) compared to herd mates.***

**BVD virus during pregnancy may cause:**

- Embryonic death and return to oestrus,
- Foetal death/abortion,
- Mummification of the foetus,
- Birth defects of the nervous system and eyes,
- Weak/premature calves,
- Live persistently-infected calves.



**Birth defects of the nervous system. Note the low head carriage and wide stance. This calf was also very unsteady on its feet.**



**Birth defects of the nervous system. Note the wide stance.**

Virus infection after 150 days gestation usually has little effect with live calves born at full term. Abortion can occur following infection at any stage of pregnancy but this is not common.



**Virus infection after 150 days gestation usually has little effect with live calves born at full term.**

BVD virus can be spread in semen of persistently infected bulls or in bulls experiencing acute BVD with transient virus infection. BVDv will lead to low pregnancy rate due to embryonic death or later foetal death/abortion. Bulls are vigorously tested for BVD before entering AI studs. Testing for BVDv is essential for all purchased bulls prior to their use on farm.



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In older animals acute BVDv infection can reduce milk yield, increase the risk of clinical mastitis and retained foetal membranes, and increase somatic cell counts.

### Mucosal disease

Mucosal disease occurs when persistently infected animals (calves infected before 110 days of pregnancy see above) become superinfected with cytopathic BVD virus. The cytopathic BVD virus usually arises from changes in the BVD virus within the PI animal. Mucosal disease is most commonly seen in 6 to 12 month-old calves, and is usually seen as sudden onset depression, fever and anorexia, with excess salivation. Ulcers appear in the mouth and on the muzzle. There are purulent discharges from the eyes and nostrils. There is profuse diarrhoea with shreds of gut mucosa/blood present during the terminal stages. There is rapid weight loss followed by death within 5-10 days.

### Diagnosis

#### Acute BVD infection:

Paired blood samples 3-4 weeks apart to demonstrate rising antibody levels to this virus.

#### Persistent infection:

PI calves may be clinically normal but commonly present as chronic "ill thriven" or stunted calves due to their susceptibility to bacterial infection such as pneumonia. Testing for virus will identify PI calves. Two virus positive samples taken 3-4 weeks apart will confirm persistent infection, but in the vast majority of cases, particularly in ill-thriven calves one positive test is enough. Virus testing can be done via the blood or, particularly in calves < 12 weeks of age, skin (usually a plug of tissue from the ear). Skin testing is useful in younger calves because detection of the virus is not impaired by the presence of antibodies from the colostrum which may be present in the blood.

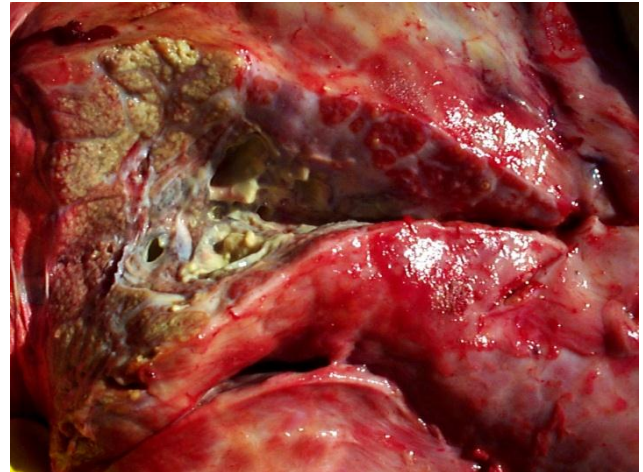


**Fig 5: Poorly grown persistently-infected BVDv calf. This calf has chronic pneumonia and ringworm infection.**

### Treatment

**Acute BVD** – treatment of any concurrent infections if present.

**Persistent infection** - Such cattle have often been treated several times for digestive and respiratory infections. PI animals should be disposed of immediately as they act as a source of BVD infection.



**Fig 6: Chronic pneumonia secondary to persistent BVDv infection (PI calf).**

### General principles of disease control

Biosecurity and biocontainment are terms describing programs for infectious disease control.

**Biosecurity** - reduce/prevent the introduction of new diseases onto an operation from outside sources

**Biocontainment** - reduce/prevent the movement of infectious diseases on the farm once biosecurity has been breached

**Biosecurity** is the first measure to prevent introduction of disease onto your farm; biocontainment measures may limit the financial losses following introduction of disease onto your farm after management errors have allowed disease to enter.

Johne's disease, Bovine Virus Diarrhoea virus (BVDv), salmonellosis, tuberculosis, Leptospirosis, Infectious Bovine Rhinotracheitis (IBR) are some examples of infectious diseases that can be introduced onto your cattle farm and severely affect the financial viability of your beef or dairy cattle enterprise.

**Biosecurity is the first measure to prevent introduction of:**

- Johne's disease,
- Bovine Virus Diarrhoea virus (BVDv),
- Salmonellosis,
- Tuberculosis,
- Leptospirosis,
- Infectious Bovine Rhinotracheitis (IBR)

## Key Principles of Biosecurity

- Keep a closed herd
- If buying in cattle – only purchase from BVDv accredited herds
- If buying in cattle from non BVDv accredited herds blood test and isolate before introducing to herd
- Prevent contact with cattle on neighbouring farms – double perimeter fence

## Key Principles of Biocontainment *which will lead to eradication*

- Screen all animals
- Vaccination – all heifers and cows after screening
- Culling – all PI animals immediately



**Double perimeter fence prevents direct contact with neighbours' cattle**

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Many herds have BVDv present within their cattle where disease/losses are partly controlled by PI calves acting as “natural vaccinators” of the herd. When most adult animals in the herd are immune disease losses are not so obvious to the farmer. However, this situation is not optimum as losses can be catastrophic if naïve breeding females are introduced into the herd.

### Vaccination

Three inactivated BVD vaccines are available in UK. Initial vaccination comprises two doses 3-4 weeks apart before first service followed by booster vaccination at 12 months' intervals. If all breeding females are vaccinated then this will control disease by preventing BVD infection of the developing foetus during pregnancy and production of PI calves.

### BVD eradication

BVD eradication is possible following whole herd blood testing and elimination of all PI carrier animals. If farmers go for eradication then strict herd biosecurity measures must be maintained to prevent re-introduction of virus infection as the herd will soon become naïve and therefore fully susceptible to infection.

### Welfare implications

Cattle with mucosal disease must be euthanased immediately upon diagnosis. Calves born with eye and brain defects, due to virus infection during their development, should also be culled.

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