

## Disease control measures applied in the event of an outbreak

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In case an establishment is suspected of a BVD outbreak, the Danish Veterinary and Food Administration issues official restrictions due to the suspicion of BVDV in the establishment. An ELISA positive bulk milk sample for dairy herds or an ELISA positive blood sample at slaughter from beef cattle establishments is followed up by sampling on individual livestock on farm. In case this initial sampling from individual animals is confirmed positive for BVDV antibodies by the commercially available test kit; Svanovir ®, BVDV-Ab, confirmation format produced by Svanova (Uppsala, Sweden), the competent veterinary authority withdraw the establishments' BVD status as "Free". Removal of bovine animals from the establishment is subsequently prohibited due to official restrictions, and only permitted with prior approval from the competent veterinary authority. Female animals > 1 year can only be moved from the herd if moved for slaughter; animals of susceptible species must not be moved to the establishment; no cattle from the establishment can participate in shows or graze at common pasture; no calvings can take place on pasture; a part or the entire herd must be blood tested or otherwise examined; and mitigation measures to prevent spread and further eradication must be established. The milk processor must collect milk from the infected herd at the end of the route, all persons in contact with the establishment has to be notified about the infection in advance, and a herd specific eradication plan approved by the competent veterinary authority in collaboration with SEGES and the farmer has to be in place within 45 days. The eradication plan must include: Investigation of the risk of introduction, contact herds, test strategy, external and internal biosecurity strategy, removal of PI animals, handling of infected animals, at risk or risk animals. For establishments where animals are at risk of contributing to *in utero* infections, the eradication plan is carried out stepwise. From all other herds, for example veal calf herds, an outbreak investigation is conducted, all PI animals are removed, and the restriction is repealed.

The steps for infected establishments with possible *in utero* infections

### Step 1

Initially, all animals above 8 months of age are tested for BVDV specific antibodies and all animals below 8 months are tested using PCR for detection of BVDV. All antibody negative animals, which are at risk of being PI animals, are subsequently tested for virus, using following PCR diagnostic assays; RT-PCR against BVD type 1 (Rasmussen, 2007) and a Panpesti RT PCR (Hoffmann, 2005), and PI animals are euthanized and

removed for rendering. All analyses for BVDV are conducted at the National Reference Laboratory for BVD (Statens Serum Institut, Copenhagen Denmark) and the antibody ELISA testing is done at laboratories approved by the Danish Veterinary and Food Administration for BVD antibody ELISA.

#### Step 2

Subsequently, an outbreak investigation is conducted. A timeline including the most likely period of BVDV introduction is established. The timeline is based on results from the herd investigation, interview with the farmer and identification of risk factors for introduction. Then, SEGES carries out contact tracing and identify contact herds in risk of having risk animals for BVD or infection with BVDV. All identified herds at risk are closed under the suspicion of infection with BVDV, while the investigation is conducted.

#### Step 3

A herd specific biosecurity and eradication plan is then established in a collaboration with the farmer, herd health veterinary manager and SEGES, and approved by the competent veterinary authority. As part of the plan, a herd specific test strategy for the eradication is described. Generally, all heifers are tested before breeding, and all heifers and cows are retested prior to calving, but more than 180 days after breeding.

All risk factors for spread of BVDV within and between herds are identified and minimised. For example, only necessary visits to the establishment are allowed and must be carried out as the last job during the day and includes change of footwear etc. The internal biosecurity is addressed in the herd specific eradication plan and includes as examples that calving heifers or cows at risk of giving birth to a PI calf must calve isolated from animals pregnant in first and second trimester (0-180 days after breeding), the new-born calf has to stay in isolation until proven negative for BVDV or be euthanized if PI. In case of abortions, risk material have to be removed immediately and sent to further examination for BVDV at the National Reference Laboratory for BVDV.

#### Step 4

After successful eradication of the establishment, the restrictions are repealed, when a representative sample of 6 to 8 months old calves, formerly test negative heifers and cows are tested negative for BVDV antibodies, normally 10 months following the euthanasia of the last PI animal.

#### Step 5

Previously infected herds will remain ELISA-positive on bulk milk in the surveillance programme for a while, because antibodies are still present in cattle with a previous exposure to BVDV. The follow up is therefore reduced to an evaluation of whether the BVDV antibody level is decreasing over time. This procedure is

justifiable, because of the intensity of testing during the eradication programme and the safety period before the Danish Veterinary and Food Administration withdraw the restrictions.

Rasmussen TB, Uttenthal A, Reimann I, Nielsen J, Depner K, Beer M (2007). Virulence, immunogenicity and vaccine properties of a novel chimeric pestivirus. *The Journal of General Virology* 88: 481-486.

Hoffmann, B. et al. 2005. A universal heterologous internal control system for duplex real-time RT-PCR assays used in a detection system for pestiviruses. *Journal of Virological Methods* 136: 200-209.