The surveillance and control programme for bovine virus diarrhoea (BVD) in Norway

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**Bovine virus diarrhoea virus was not detected in any of the herds sampled in 2009.**

**Introduction**

Bovine virus diarrhoea (BVD) is caused by bovine virus diarrhoea virus (BVDV) in the genus pestivirus. The virus is the cause of mucosal disease and hemorrhagic syndrome, but the economically most important manifestations of disease are related to infection in pregnant animals, resulting in embryonic death, abortion and congenital defects. Persistently infected calves may be born and serve as the main reservoir of infection to other animals (1). Bovine virus diarrhoea is a notifiable disease in Norway.

An eradication programme, financed by the authorities and the industry, started December 1992 (2). During the programme period, the number of herds with restrictions decreased from 2,950 in 1994 to none at the end of 2006. Details of the programme and a discussion of factors important for its success are given in the annual report for 2006 (3). Since 2007, the aim of the programme has been surveillance and control (4).

**Aim**

The aim of the surveillance and control programme for BVD is to document freedom from the infection in Norwegian livestock and to contribute to the maintenance of this favourable situation.

**Materials and methods**

In 2009, 12.5% of all Norwegian dairy and beef cattle herds were selected for examination. Bulk milk samples from the dairy herds were provided by the dairies, and individual blood samples were collected from cattle older than 24 months in the beef herds.

The target dairy herd population consisted of all herds delivering milk to dairies during the sampling period. In 2009, bulk milk samples from 1,315 randomly sampled dairy herds were collected. The group of beef herds to be sampled was based on a register of all beef herds receiving governmental support according to recordings of July 2008. A total of 5,048 individual blood samples from 435 beef cattle herds were stored in pools with a maximum of ten samples in each pool. The sampled herds represented 11.0% of the Norwegian cattle herds (Table 1).

All samples were tested for antibodies against BVDV using a commercial indirect enzyme-linked immunosorbent assay (ELISA; Svanova Biotech AB, Uppsala, Sweden) at the National Veterinary Institute in Sandnes (5). In case of positive or inconclusive results in pooled blood samples, the individual samples were tested.

Depending on the level of antibodies in bulk milk, dairy herds were divided into four groups (6). In herds with moderate or high levels of antibodies, individual blood samples from young stock were collected, pooled, and tested as pooled samples. Seropositive or inconclusive results from beef cattle herds could also be followed-up by testing samples from young stock. Table 2 shows numbers of tested herds and individual cattle during the years 1993 to 2009.

In case of seropositive young stock, identification of persistently infected animals would be done by testing blood samples for antibodies from every individual in the relevant herd. Animals with weak positive or negative serological results were tested for the presence of virus using an antigen-capture ELISA (IDEXX Laboratories, Inc., Westbrook, Maine, USA). Positive reactions in newly infected herds would be verified with the polymerase chain reaction (PCR) and sequence analysis.

**Results**

From the 1,315 sampled dairy herds, bulk milk samples from 1,267 herds were negative for antibodies against BVDV in 2009. One herd had high levels of antibodies and 44 herds had low levels of antibodies against BVDV in bulk milk (3.42%). Results from three herds were excluded from the study, due to poor quality samples that gave unspecific reactions in the ELISA.

Of the 435 sampled beef cattle herds, pooled blood samples from eleven herds were seropositive for BVDV (2.53%). Individual samples representing the positive pooled samples were tested. In one herd, five of the individually tested cows gave inconclusive results, whereas seropositive animals were found in the ten other
seropositive herds. In eight of these ten herds, older cows (> 4 yrs) were found seropositive, whereas younger cows were seronegative, suggesting that positive reactions in these herds were results of earlier infections.

Individual blood samples for serological testing of young stock were submitted from ten herds, including the remaining two beef cattle herds with positive individual cow samples; the cattle herd with inconclusive results from individual testing; the one dairy herd with high levels of antibodies in bulk milk as well as from six other beef cattle herds. No seropositive animals were found.

Thirty-one animals from seven herds were additionally investigated for BVDV. Infected animals were not detected (Table 2).

**Discussion**

No herds had restrictions because of BVD at the beginning of 2007. Testing of bulk milk from all dairy herds and a 20% representative sample of all beef cattle herds during 2006 with no findings of new infected herds, indicated that the goal of eradicating BVD in Norway could be considered achieved. The results of the surveillance and control programme for 2007 to 2009 confirm this conclusion. No new infected farms were found and no restrictions were imposed on any farm due to BVD.

Although Norwegian livestock is currently free from the disease, import of infected animals and unknown wildlife reservoirs may pose a continuous threat to the present status. For the rapid detection of a potential reintroduction and consecutive control of spreading, a surveillance system has to make efficient use of the competence and awareness existing among farmers and local veterinarians.

**References**


**Table 2.** Numbers of Norwegian cattle herds and individual cattle tested for antibodies against BVDV, and numbers of herds and individual cattle positive for BVDV (antibody results not shown).

<table>
<thead>
<tr>
<th>Year</th>
<th>Bulk milk samples</th>
<th>Pooled milk samples from primiparous cows</th>
<th>Pooled blood samples</th>
<th>Individual blood samples</th>
<th>No. of virus positive</th>
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<tbody>
<tr>
<td></td>
<td>No. of herds</td>
<td>No. of herds</td>
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<td>No. of herds</td>
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¹Before 2009, one pooled sample from young stock was examined.
²From 2009, beef cattle older than 24 months were sampled (n=435). In case of seropositive or inconclusive results from beef cattle older than 24 months or bulk milk, additional samples from young stock were collected (n=10).
³Approximate numbers
NA=Data not available


Bovine virus diarrhoea virus was not detected in any of the herds sampled in 2009. Photo: Colourbox
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The NFSA advises and reports to the Ministry of Agriculture and Food, the Ministry of Fisheries and Coastal Affairs and the Ministry of Health and Care Services.

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