The surveillance programme for bovine virus diarrhoea (BVD) in Norway 2013

Johan Åkerstedt
Madelaine Norström
Tormod Mørk
Surveillance programmes for terrestrial and aquatic animals in Norway

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Project managers at the Norwegian Veterinary Institute:
Ståle Sviland (Terrestrial animals)
Anne-Gerd Gjevre (Aquatic animals)
Mona Torp (Food safety)

Publisher
Norwegian Veterinary Institute
PO Box 750 Sentrum
N-0106 Oslo
Norway

Fax: + 47 23 21 60 95
Tel: + 47 23 21 60 00
E-mail: postmottak@vetinst.no
www.vetinst.no

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Authors:
Johan Åkerstedt, Madelaine Norström, Tormod Mørk

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Bovine virus diarrhoea virus was not detected in any of the herds sampled in 2013.

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 2950 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).

The Norwegian Food Safety Authority was responsible for carrying out the surveillance and control programme for BVD. The Norwegian Veterinary Institute was in charge of planning the programme, collecting the bulk milk samples from the dairies and performing the tests. Blood samples from beef herds were collected by inspectors from the Norwegian Food Safety Authority.

Aim
The aim of the surveillance and control programme for BVD in 2013 was to document freedom from the infection in Norwegian livestock and to contribute to the maintenance of this favourable situation.

Material and methods
Twelve and a half per cent of all Norwegian dairy and beef cattle herds were selected for examination. The target dairy herd population consisted of all herds delivering milk to dairies during the sampling period. The target population of beef herds was all herds delivering cattle to slaughter in 2013. Bulk milk samples from the dairy herds were provided by the dairies, while beef cattle older than 24 months were sampled at slaughterhouses, with a maximum of five animals per herd and day of sampling.

In 2013, bulk milk samples from 1042 randomly selected dairy herds were collected. A total of 4074 individual blood samples from 1167 beef cattle herds were tested in pools. The sampled herds represented 16% of all Norwegian cattle herds (Table 1).

All samples were tested for antibodies against BVDV using a commercial indirect enzyme-linked immunosorbertent assay (ELISA; Boehringer Ingelheim Svanova, Uppsal, Sweden) at the Norwegian 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 (3, 6). In herds with low to high levels of antibodies (classification 1 to 3), individual blood samples from young stock should be collected and tested. Seropositive or inconclusive results from beef cattle herds were followed-up by testing blood samples from young stock. Table 2 shows the numbers of tested herds and individual cattle during the years 1993 to 2013.

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 would be 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.

Table 1. Numbers of dairy herds and beef herds tested within the frame of the Norwegian surveillance and control programme for BVD in 2013

<table>
<thead>
<tr>
<th>Herd category</th>
<th>Total no. of cattle herds*</th>
<th>No. of herds tested</th>
<th>% tested of the total no. of herds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy herds**</td>
<td>9485</td>
<td>1042</td>
<td>11</td>
</tr>
<tr>
<td>Beef herds***</td>
<td>4992</td>
<td>1167</td>
<td>23</td>
</tr>
<tr>
<td>Total</td>
<td>13668</td>
<td>2209</td>
<td>16</td>
</tr>
</tbody>
</table>

* Based on data from the Register of production subsidies as of 31 July 2013.
** Cattle herds delivering milk to dairies.
***Sampling performed at slaughterhouses.

Results

From the 1042 sampled dairy herds in 2013, no bulk milk samples were positive for antibodies against BVDV.

Of the 1167 sampled beef cattle herds, pooled blood samples from two herds were seropositive for BVDV (0.2%). Individual samples representing these pooled herd samples were also seropositive. These two beef cattle herds were followed-up with individual blood samples from young stock which were found seronegative. Table 2 shows the results of the testing during the period from 1993 to 2013.
Table 2. Numbers of 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 blood samples from beef cattle older than 24 months</th>
<th>Pooled milk samples from primiparous</th>
<th>Pooled blood samples from young stock</th>
<th>Individual blood samples</th>
<th>No. of virus positive</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of herds</td>
<td>No. of herds</td>
<td>No. of herds</td>
<td>No. of herds</td>
<td>No. of herds</td>
<td>Samples</td>
</tr>
<tr>
<td>1993</td>
<td>26,424</td>
<td>5,031</td>
<td>5,000</td>
<td>NA</td>
<td>46,000</td>
<td>1,300</td>
</tr>
<tr>
<td>1994</td>
<td>26,148</td>
<td>3,191</td>
<td>3,163</td>
<td>NA</td>
<td>21,437</td>
<td>NA</td>
</tr>
<tr>
<td>1995</td>
<td>25,577</td>
<td>1,849</td>
<td>3,292</td>
<td>1,515</td>
<td>16,023</td>
<td>26</td>
</tr>
<tr>
<td>1996</td>
<td>24,862</td>
<td>1,297</td>
<td>3,407</td>
<td>780</td>
<td>7,091</td>
<td>98</td>
</tr>
<tr>
<td>1997</td>
<td>23,584</td>
<td>924</td>
<td>3,060</td>
<td>648</td>
<td>7,619</td>
<td>92</td>
</tr>
<tr>
<td>1998</td>
<td>21,796</td>
<td>100</td>
<td>1,610</td>
<td>423</td>
<td>6,947</td>
<td>72</td>
</tr>
<tr>
<td>2000</td>
<td>19,910</td>
<td>53</td>
<td>4,198</td>
<td>386</td>
<td>6,287</td>
<td>56</td>
</tr>
<tr>
<td>2001</td>
<td>18,771</td>
<td>1,230</td>
<td>48</td>
<td>356</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>2002</td>
<td>8,356</td>
<td>997</td>
<td>28</td>
<td>113</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2003</td>
<td>9,187</td>
<td>-</td>
<td>8</td>
<td>20</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2004</td>
<td>8,356</td>
<td>-</td>
<td>8</td>
<td>34</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2005</td>
<td>7,481</td>
<td>-</td>
<td>10</td>
<td>31</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2006</td>
<td>14,620</td>
<td>-</td>
<td>47</td>
<td>63</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2007</td>
<td>1,575</td>
<td>-</td>
<td>5</td>
<td>44</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2008</td>
<td>1,190</td>
<td>-</td>
<td>NA</td>
<td>19</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2009</td>
<td>1,190</td>
<td>-</td>
<td>NA</td>
<td>10</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2010</td>
<td>1,190</td>
<td>-</td>
<td>NA</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

1A small number of blood samples collected at slaughterhouses could originate from dairy herds.
2Included beef cattle prior to 2009.
3Approximate numbers

NA=Data not available

Discussion

No herds had restrictions because of BVD at the beginning of 2007. In 2006, bulk milk from all dairy herds and blood samples from 20% of the beef cattle herds were tested. No farm with recent infection was identified. This indicated that the goal of eradicating BVD in Norway was achieved. The results of the surveillance and control programme from 2007 to 2013 confirm this conclusion. No infected farm has been found and no restrictions have been imposed on any farm due to BVD since 2005.

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


6. Niskanen R. Relationship between the levels of antibodies to bovine virus diarrhoea virus in bulk tank milk and the prevalence of cows exposed to the virus. Veterinary Record 1993; 133: 341-4.
The Norwegian Veterinary Institute (NVI) is a nationwide research institute in the fields of animal health, fish health, and food safety. The primary mission of the NVI is to give research-based independent advisory support to ministries and governing authorities. Preparedness, diagnostics, surveillance, reference functions, risk assessments, and advisory and educational functions are the most important areas of operation.

The Norwegian Veterinary Institute has its main laboratory in Oslo, with regional laboratories in Sandnes, Bergen, Trondheim, Harstad og Tromsø, with about 360 employees in total.

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The Norwegian Food Safety Authority (NFSA) is a governmental body whose aim is to ensure through regulations and controls that food and drinking water are as safe and healthy as possible for consumers and to promote plant, fish and animal health and ethical farming of fish and animals. We encourage environmentally friendly production and we also regulate and control cosmetics, veterinary medicines and animal health personnel. The NFSA drafts and provides information on legislation, performs risk-based inspections, monitors food safety, plant, fish and animal health, draws up contingency plans and provides updates on developments in our field of competence.

The NFSA comprises three administrative levels, and has some 1300 employees.

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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