Surveillance and control programmes for terrestrial and aquatic animals in Norway
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The surveillance and control programme for bovine virus diarrhoea (BVD) in Norway

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Introduction

Bovine virus diarrhoea virus was not detected in any of the herds sampled in 2008.

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.

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

Material and methods

In 2008, 12.5 % of all Norwegian dairy and beef cattle herds were selected for examination.

Testing scheme and laboratory techniques

Bulk milk or pooled blood samples from young stock was tested for antibodies against BVDV, using an indirect enzyme-linked immunosorbent assay (ELISA; Svanova Biotech AB, Uppsala, Sweden) (5). The results were expressed as percent positivity values (PP). Depending on the level of antibodies in bulk milk, dairy herds were divided into four groups (negative, PP$\leq$ 2; low, PP 2-13; moderate, PP 14-29; high, PP>29). Herds with moderate or high levels of antibodies against BVDV in bulk milk were further tested by pooled blood samples from young stock (6).

Identification of persistently infected animals was done by testing blood samples for antibodies from every individual in the herd, testing for the presence of virus in antibody negative individuals, and in animals with weak positive serological results using an antigen-capture ELISA (IDEXX Laboratories, Inc., Westbrook, Maine, USA). Positive reactions in newly infected herds were verified with the polymerase chain reaction (PCR) and sequence analysis.

Results

Bulk milk samples from a total of 1424 dairy herds were tested for antibodies against BVDV in 2008 (Table 1). Weak, moderate or high levels of antibodies against BVDV were detected in bulk milk from 91, 9 and 1 herds, respectively.
Blood samples for serological testing of pooled samples from young stock were submitted from 16 dairy herds (4 %) and 407 (96 %) beef cattle herds, in total 423 different herds (Table 1). One pooled blood sample was seropositive, and individual samples were tested. Of these, one 10 year old cow was seropositive, whereas the other blood samples from yonger stock were both seronegative and negative for virus. It was concluded that the seropositive reaction was a result of an earlier infection. Thirty-four animals from 8 herds were investigated individually in 2008. BVDV was not detected in any of these animals (Table 1).

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 and 2008 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.

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Table 1. Number of Norwegian cattle herds and individual cattle tested for antibodies against BVDV and number of herds and individual cattle positive for BVDV (antibody results not shown).

Year	Bulk milk samples	Pooled milk samples from primiparous cows	Pooled blood samples from young stock	Individual blood samples		No. of virus positive	
	No. of herds[1]	No. of herds[1]	No. of herds[1]	No. of herds	Samples	herds	individual blood samples
1993	26,424	5,031	5,000	NA	46,000[2]	NA	1,300[2]
1994	26,148	3,228	4,107	NA		NA	
1995	25,577	3,191	5,347	NA	36,065	NA	1,180
1996	25,167	1,849	3,163	NA	21,437	NA	685
1997	24,862	1,297	3,292	1,515	16,023	265	525
1998	24,038	1,415	3,407	780	7,091	98	198
1999	23,584	924	3,060	648	7,619	92	224
2000	21,796	100	1,610	423	6,947	72	129
2001	19,910	53	4,198	386	6,287	56	174
2002	18,771	-	2,854	284	3,962	28	43
2003	17,549	-	2,100	149	1,135	9	22
2004	7,365	-	1,351	84	1,017	2	6
2005	7,481	-	1,230	48	356	1	4
2006	14,620	-	997	28	113	0	0
2007	1,575	-	387	8	20	0	0
2008	1,424	**-**	**423**	**8**	**34**	**0**	**0**

[1]One sample from each herd was examined
[2]Approximate numbers
NA=Data not available

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