The surveillance and control programme for maedi in Norway

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None of the investigated flocks were diagnosed with maedi in 2010.

Introduction
Maedi is a progressive viral pneumonia in sheep first described in Iceland in 1939 (1). The disease occurs in several European countries as well as in other continents. The disease visna is caused by the same virus as maedi, but is a neuropathogenic manifestation of the infection (1, 2). Maedi-visna is classified as a list B disease in Norway and is notifiable to the Office International des Epizooties. In Norway, maedi was officially reported for the first time in 1972 (3).

In November 2002 and January 2003, post-mortem examinations of lungs from two diseased sheep from two different farms in Nord-Trøndelag county showed histopathological changes consistent with maedi. During the following investigations more than 15,000 sheep in 300 flocks were serologically examined for maedi-visna infection, and 50 flocks were found to be seropositive (4, 5). The outbreak demonstrated the need for a new, nationwide surveillance and control programme, which was started in November 2003 (4, 6).

An overview of the number of new infected flocks registered each year up to 2010 is given in Figure 1.

Figure 1. The number of new flocks infected with maedi during the period 1972 to 2010. The bars for 2003 - 2005 show both seropositive flocks detected through the investigations after the outbreak in Nord-Trøndelag county and seropositive flocks identified in the programme.
Aim
The aims of the surveillance and control programme for maedi are to document the status for maedi-visna virus infection in sheep in Norway, and to identify infected flocks for disease control.

Materials and methods
During the years 2003-2008, ram circles and their member flocks registered by The Norwegian Sheep and Goat Breeders Association constituted the target population for the programme. In 2009, the programme focused on breeding flocks of other breeds not previously tested. In 2010, 134 flocks from ram circles were initially selected for sampling, however, some more flocks from ram circles sampled for brucellosis testing were also included in the programme. In flocks of less than 30 animals, all animals were sampled. In flocks of 30 to 100, 100 to 200, and more than 200 animals, samples from 30, 35, and 40 animals were analysed, respectively. Rams and a selection of ewes, all more than one year old, were sampled in each flock.

The programme in 2010 was based on serological examination of blood samples from the selected sheep for antibodies against maedi-visna virus with the ELISA from Pourquier (ELISA CAEV/MAEDI-VISNA serum verification kit, Institut Pourquier, Montpellier, France). Samples with inconclusive or seropositive ELISA results would be retested in duplicate with the same ELISA and verified by an agar gel immunodiffusion test (AGIDT, Maeditect, Veterinary Laboratories Agency, Weybridge, UK). CAEV specific agar gel immunodiffusion test would be performed in cases where CAEV could have been the cause of positive reactions in the ELISA. In case of inconclusive results (including single reactors), new blood samples from the animals would be taken one to two months after the first sampling. These samples would be tested in duplicates in both tests (7).

The meat inspectors at the abattoirs still play an important role in the programme by monitoring sheep and especially sheep lungs for detection of suspicious cases consistent with maedi-visna virus infection.

Results
Samples from a total of 188 flocks were analysed in 2010 (Table 1). This is approximately 1.22 % of the total Norwegian sheep flocks.

In 2010, none of the investigated flocks were positive for maedi.

Table 1. The number of flocks and sheep tested in the Norwegian surveillance and control programme for maedi 2003-2010

<table>
<thead>
<tr>
<th>Year</th>
<th>Total no. of sheep flocks*</th>
<th>No. of flocks sampled</th>
<th>No. of animals tested</th>
<th>No. of positive flocks</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>18,400</td>
<td>456**</td>
<td>13,951</td>
<td>1</td>
</tr>
<tr>
<td>2004</td>
<td>17,439</td>
<td>1,230</td>
<td>36,911</td>
<td>1</td>
</tr>
<tr>
<td>2005</td>
<td>16,500</td>
<td>940</td>
<td>29,248</td>
<td>2</td>
</tr>
<tr>
<td>2006</td>
<td>15,800</td>
<td>911</td>
<td>27,846</td>
<td>0</td>
</tr>
<tr>
<td>2007</td>
<td>15,400</td>
<td>1004</td>
<td>29,633</td>
<td>0</td>
</tr>
<tr>
<td>2008</td>
<td>15,059</td>
<td>783</td>
<td>23,235</td>
<td>0</td>
</tr>
<tr>
<td>2009</td>
<td>14,800</td>
<td>417</td>
<td>12,198</td>
<td>0</td>
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<tr>
<td>2010</td>
<td>14,800</td>
<td>188</td>
<td>5,697</td>
<td>0</td>
</tr>
</tbody>
</table>

* Based on data from the register of production subsidies as of 31 July the respective year.
** Sampling period: November 20 to December 31.
**Discussion**

Approximately 90% of the Norwegian sheep flocks in ram circles were screened for antibodies against maedi during 2003 to 2005 and were retested in the programme during 2006 to 2008, and breeding flocks of other sheep breeds than those regulated by The Norwegian Sheep and Goat Breeders Association were selected for sampling in 2009 (8).

Results from the surveillance and control programme for maedi, including data from November 2003 through 2006, showed a preliminary prevalence of less than 0.2% positive flocks. Knowledge about the distribution of the disease so far indicates that it is regionally clustered, and that a more extensive spread of maedi-visna virus has probably been prevented by the restrictions on transfer of sheep across county borders.

**References**


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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