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The surveillance and control programme for bovine spongiform encephalopathy (BSE) in Norway

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All 10,365 samples, originating from 8,552 herds, were tested negative for BSE in 2010.

Introduction

The BSE surveillance programme was initially based on passive surveillance (1998-2000), with active surveillance introduced in May 2000. In the period 1998-2000 the samples were investigated by histopathological examination. From 2001 onwards the samples were examined by an Enzyme-Linked ImmunoSorbent Assay (ELISA) method for detection of resistant prion protein (PrP^{Sc}). In addition, clinically suspected animals were investigated by histopathological examination according to the protocol of the Office International des Epizooties (OIE) (1). The number of samples examined in each category in the period 1998-2010 is presented in Table 1. BSE has never been detected in any of the examined animals.

Aim

The aim of the surveillance programme is to document that the Norwegian cattle population is free from BSE.

Surveillance programme

Programme outline

For 2010 the surveillance programme included examination of the following categories:

- clinically suspected cattle irrespective of age
- all cattle older than 24 months of age, which have died or been culled, but not slaughtered for human consumption (fallen stock)
- all emergency slaughtered cattle older than 24 months
- all cattle older than 24 months, with abnormal findings at ante-mortem examination, rejected for human consumption, or which died at the abattoir or during transport (referred to as ante-mortem animals)
- all slaughtered cattle with unknown age or origin irrespective of age
- all slaughtered imported cattle from any country irrespective of age

Implementation

The farmers were requested to report all cases of clinically suspected cattle irrespective of age, fallen stock older than 24 months and when delivering an imported cattle to slaughter to the Norwegian Food Safety Authority. The brain or head from clinically suspected cattle or a spoon sample from the medulla oblongata from fallen stock, were submitted and analysed at the National Veterinary Institute, Oslo. Inspectors from the Norwegian Food Safety Authority collected the spoon samples of the medulla oblongata from the other categories at the abattoirs and sent them within 24 hours in a cool insulated container to the Norwegian Veterinary Institute in Oslo or Harstad.

Laboratory methods

Clinically suspected animals

The usual protocol followed for the clinically suspected animals is that the whole brain is divided mid-sagittally into equal halves. One half is formalin-fixed and processed according to a standard routine protocol, embedded in paraffin, sectioned at 5 µm and stained with haematoxylin eosin (HE). Immunohistochemical staining for detection of PrP^{Sc} is performed on selected sections using a monoclonal anti-PrP antibody (SAF 84, courtesy of J. Grassi, CEA, France). From the non-fixed half, tissue from the obex area is analysed by ELISA for detection of PrP^{Sc} (TeSeE®, Bio-Rad) as described by the manufacturer.

Table 1. Number of samples from cattle collected for BSE examination by the Norwegian surveillance programme according to categories from 1998-2010

Reason for submission to the laboratory	1998-2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Clinically suspected animals	78	14	2	2	3	1	0	0	0	1	0
Fallen stock		1352	1482	1872	2145	2318	2364	2213	2391	2435	2,788
Emergency slaughtered		7073	7246	7322	9217	8462	8177	7304	8358	8320	7,438
Ante-mortem animals		2612	3562	4102	1355	102	36	48	16	27	11
Imported slaughtered animals	19*	88	39	39	24	10	4	9	5	3	1
Healthy slaughtered animals		2400	9907	10726	10443	10486	10455	10000	9373	9451	127
Total	97	13539	22238	24063	23187	21379	21036	19574	20143	20237	10,365

* All the samples were examined in 2000.

Risk population and routine slaughtered animals

Non-fixed brain tissue from the obex area was analysed by ELISA for detection of PrP^{Sc} (TeSeE®, Bio-Rad) as described by the manufacturer. In cases with positive or inconclusive test results, the remaining half obex was fixed in 10 % neutral buffered formalin, embedded in paraffin, sectioned at 5 µm, and stained with HE. Subsequently, the sections were analysed by immunohistochemical detection of PrP^{Sc} using the same protocol as for specimens from clinical suspects.

Brain samples were evaluated as unsuitable for examination when they were severely autolysed, the dorsal part of the obex area was cut obliquely, the obex was not present, or the medullar anatomy was not recognisable.

Results and discussion

The Norwegian Veterinary Institute received samples from 10,365 cattle. Of these, 144 (1.4%) samples were unsuitable for examination (130 from fallen stock and 14 from emergency slaughter).

For 210 samples (2.0%) the herd of origin was not reported. However, it is important to note that in case of a positive test result from such a herd, the identity could be traced via the carcass number. The remaining 10,155 samples originated from 5,142 dairy cattle herds and 1125 beef cattle herds. The mean number of examined animals per herd was 1.6.

Clinically suspected animals (passive surveillance)

In 2010, one animal was investigated as clinical suspect due to abnormal behaviour and tremor. Improved methods for clinical examination to distinguish between real suspected BSE cases and cases with central nervous disease of other causes has probably resulted in few clinical suspected cases in later years. It is likely that animals with diseases related to the central nervous system have been examined either as fallen stock, emergency slaughtered animals or ante-mortem animals, and thus included in these categories.

Surveillance of slaughtered animals and fallen stock (active surveillance)

The number of samples from fallen stock older than 24 months has increased with 14 % from 2009 to 2010.

This development improves the quality of the programme since fallen stock is an important risk population for the surveillance of BSE.

In 2010 The Norwegian Food Safety Authority decided to exclude healthy slaughtered cattle from the BSE surveillance programme. The argument was that no BSE case has been diagnosed during 10 years with active surveillance and more than 185,000 cattle had been examined for BSE in the same period. According to the OIEs BSE status for member states Norway has a negligible risk.

The geographical distribution of the cattle population and the animals of different categories tested are presented in table 3. There is a relatively good correlation between the collection of samples for fallen stock and emergency slaughtered animals from different regions and the distribution of the cattle population in the regions, but the proportion of sampled animal in the age groups from 30 to 83 months of age is much larger than the corresponding proportion in the population which is requested in this programme.

Table 2. Age distribution of cattle from which samples were received in 2010. There were 641 samples (6.2%) from cattle with unknown age. The age of these cattle are assumed to be distributed like the age distribution of the cattle with known age within each target group.

Age groups (months)	Total population (%)	Fallen stock (%)	Emergency slaughter (%)	Ante mortem animals (%)	Healthy slaughtered animals (%)	Total tested (%)
< 24	56.6	0.7	2.9	0	4.6	2.4
24-29	8.0	12.2	14.8	0	14.1	14.1
30-35	6.6	9.5	8.4	28.6	9.1	8.7
36-47	10.3	16.9	15.7	42.9	13.9	16.0
48-59	6.8	18.6	18.2	0	16.7	18.3
60-71	4.5	17.3	16.3	0	15.7	16.6
72-83	2.9	11.4	10.9	28.6	15.7	11.1
84-95	1.8	5.8	6.1	6.5	6.5	6.0
96-107	1.1	3.3	3.2	2.8	2.8	3.2
108-119	0.5	1.5	1.5	0.0	0.0	1.5
120-131	0.3	1.1	0.9	0.9	0.9	0.9
132-143	0.2	0.5	0.5	0.0	0.0	0.5
144-155	0.1	0.4	0.3	0.0	0.0	0.3
≥ 156	0.2	0.6	0.3	0.0	0.0	0.4
Total number of animals	937,664	2,788	7,438	11	127	10,364*

* One suspected animal not included

Table 3. Regional distribution of Norwegian cattle and the cattle tested for PrP^{Sc} in 2010. There were 120 samples (1.2%) from cattle with unknown region. These samples are assumed to be distributed following the regional distribution of the cattle from known region within each target group.

Region	Total population (%)	Fallen stock (%)	Emergency slaughter (%)	Ante mortem animals (%)	Healthy slaughtered animals (%)	Total (%)
Troms og Finnmark	2.7	2.9	2.6	-	1.7	2.7
Nordland	7.7	4.9	7.0	39.7	8.6	6.4
Trøndelag, Møre og Romsdal	28.7	36.3	33.2	39.7	33.4	34.1
Hordaland og Sogn og Fjordane	9.7	7.1	8.3	-	5.1	8.0
Rogaland og Agder	21.6	26.5	17.5	9.9	18.8	20.0
Buskerud, Vestfold og Telemark	6.6	6.9	5.9	-	6.8	6.2
Oslo, Akershus og Østfold	4.8	5.4	5.3	-	5.1	5.3
Hedmark og Oppland	18.1	10.0	20.0	9.9	19.7	17.2
Total number of animals	937,664	2,788	7,438	11	127	10,364*

* one imported animal not included

Conclusion

It is considered probable that the Norwegian cattle population never has been infected with BSE-agent due to few imports to Norway of cattle and products potentially infected with the BSE-agent, limited use of meat and bone meal in concentrates intended for ruminants, and the use of high temperature and pressure in the domestic production of meat and bone meal (2). This is supported by a recent quantitative risk assessment for BSE in Norway (3) and by the compiled results from the surveillance and control programme for BSE in the years 2001 to 2010 (4) with approximately 195,000 negative samples.

References

1. Anonymous. Bovine spongiforme encephalopathy. In: Manual of Diagnostic Tests and Vaccines for Terrestrial Animals. 5th ed. Paris: Office International des Epizooties; 2004. p. 549-69.
2. Mørk T, Bratberg B, Hopp P, Benestad S, Høgåsen H, Bruheim T. The surveillance and control programme for bovine spongiform encephalopathy (BSE) in Norway. In: Fredriksen B, Mørk T (editors). Surveillance and control programmes for terrestrial and aquatic animals in Norway. Annual report 2001. Oslo: National Veterinary Institute; 2002. p. 55-66.
3. Høgåsen HR, de Koeijer AA. Quantitative risk assessment for bovine spongiform encephalopathy in low- or zero-prevalence countries: the example of Norway. Risk Anal. 2007; 27:1105-17
4. Sviland S, Høgåsen HR, Hopp P, Benestad SL, Eikenæs O, Moldal T. The surveillance and control programme for bovine spongiform encephalopathy (BSE) in Norway. In: Brun E, Jordsmyr HM, Hellberg H, Sviland S, (editors). Surveillance and control programmes for terrestrial and aquatic animals in Norway. Annual report 2009. Oslo: National Veterinary Institute; 2009.

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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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