

The surveillance programmes for paratuberculosis in Norway 2014

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The surveillance programme for paratuberculosis in Norway 2014

Annette H. Kampen, Tone B. Johansen, Mette Valheim, Petter Hopp

In 2014 Mycobacterium avium subsp. paratuberculosis infection was for the first time recorded in two alpaca herds in Norway. Paratuberculosis was also detected in one goat herd, in which paratuberculosis had previously been diagnosed in 2008.

Introduction

Paratuberculosis was first diagnosed in cattle and goats in Norway in 1907 and 1934, respectively (1, 2). *Mycobacterium avium* subsp. *paratuberculosis* infection in ruminants is a notifiable disease (List B) in Norway. The control of this disease is enforced by government legislation and restrictions on animal movement. In goat herds, government restrictions combined with vaccination have been used to control paratuberculosis, however, the last years a large proportion of the Norwegian goat herds has followed a disease eradication programme to get rid of the infection (3).

A national surveillance programme for paratuberculosis in cattle was established in 1996 (4, 5). The programme was extended to llamas and alpacas, goats and sheep in 2000, 2001 and 2002, respectively (6).

Descriptions of occurrence of the disease in Norway, control measures taken up to 1995, and results from the surveillance programmes from 1996 to 2001, can be found in the annual report for 2001 (5). The number of new infected herds detected since the programme started is given in Figure 1.

Aim

The aim of the surveillance programme for paratuberculosis is to detect and control the infection in the Norwegian ruminant and camelid population.

Materials and methods

Cattle, goats, sheep, llamas and alpaca were examined in the programme in 2014. Faecal samples were collected on the farms by the Norwegian Food Safety Authority, while organ samples were collected at slaughterhouses.

Active surveillance

Cattle

The target population consisted of all cattle herds delivering milk to dairies in the sampling period and all beef cattle herds receiving state support according to records of July 2013. Fifty herds were selected for sampling by a risk-based strategy. Faecal samples were collected from the five oldest cows in each herd.

Goats

Ninety herds were selected by a risk-based strategy for sampling from areas where paratuberculosis is registered in goat herds, and thirty herds were selected from areas where paratuberculosis have not been registered. Faecal samples from the ten oldest goats were collected.

Sheep

Forty flocks from areas where paratuberculosis is registered in goat herds were randomly selected for sampling. Faecal samples from the ten oldest sheep were collected.

Llamas and alpacas

Llama and alpaca were introduced as new species to Norway in 1997-98. Some animals are imported every year, many of which originate in countries where paratuberculosis is endemic. Faecal samples from five animals older than four years of age are collected in each herd each year. In herds with less than five animals should all animals be sampled. In addition, organ samples are collected at slaughter and from animals that die when older than four years.

Passive clinical surveillance

Clinical surveillance has been included in the programme since 2000. For cattle, special emphasis is placed on the collection of samples from animals with reduced milk production, loss of weight, diarrhoea lasting more than 14 days, and animals that are older than three years of age.

Samples

Number and type of samples collected in the programme are given in Table 1.

Table 1. Number of samples collected for examination for *Mycobacterium avium* subsp. *paratuberculosis* in 2014

Species	Type of sampling	Faecal samples No. of animals	Organ samples No. of animals	Total no. of animals	Total no. of herds / flocks
Cattle	Risk-based sample	230	-	230	46
	Suspected cases	24	1	25	3
Goat	Risk-based sample	880	-	880	108
	Suspected cases	0	0	0	0
Sheep	Random sample	415	-	415	42
	Suspected cases	0	0	0	0
Camelides	Random sample	491	6	497	161
	Suspected cases	0	1	1	1

Histopathological examination

Samples from jejunum, ileum, ileocecal valve, and mesenteric lymph nodes were examined histopathologically. The tissue was fixed in 10% neutral-buffered formalin, processed by routine methods and stained with haematoxylin and eosin (HE) and the Ziehl-Neelsen (ZN) method for acid-fast bacteria. Samples showing typical granulomatous lesions with acid-fast bacteria were considered to be positive for paratuberculosis.

Bacteriological examination

The samples were decontaminated with 4% sodium hydroxide and 5% oxalic acid with 0.1% malachite green (7), and inoculated onto selective and non-selective Dubos medium with mycobactin (2 µg/ml) and pyruvate (4 mg/ml) (8). Incubation time was 16 weeks.

Mycobactin dependency, acid-fastness by Ziehl-Neelsen staining, and presence of the insertion segment IS900 by a PCR technique (9) were used to identify the isolates.

Results

All results from bacteriological and histopathological examinations are given in Table 2.

Table 2. Results of histopathological and bacteriological examination of cattle, goats, sheep and llamas in the surveillance programme for paratuberculosis in 2014.

Species	Type of samples	Bacteriology			Histopathology			Total	
		Examined		Positive	Examined		Positive	Positive	
		Animals	Herds	Animals	Animals	Herds	Animals	Animals	Herds
Cattle	Faecal	230	46	0	-	-	-	0	0
	Organs	0	0	0	0	0	0	0	0
Goat	Faecal	880	108	4	-	-	-	4	1
	Organs	0	0	0	0	0	0	0	0
Sheep	Faecal	415	42	0	-	-	-	0	0
	Organs	0	0	0	0	0	0	0	0
Camelides	Faecal	491	160	2	-	-	-	2	2
	Organs	6	3	0	6	3	0	0	0
Total	Faecal	2 015	350	0	-	-	-	6	3
	Organs	6	3	0	6	3	0	0	0

Since the surveillance programme for paratuberculosis started in 1996, infection with *M. avium* subsp. *paratuberculosis* has been found in altogether 10 cattle herds, 6 sheep flocks and in 34 different goat herds of which the bacteria were detected for the first time in 27 of these (Figure 1).

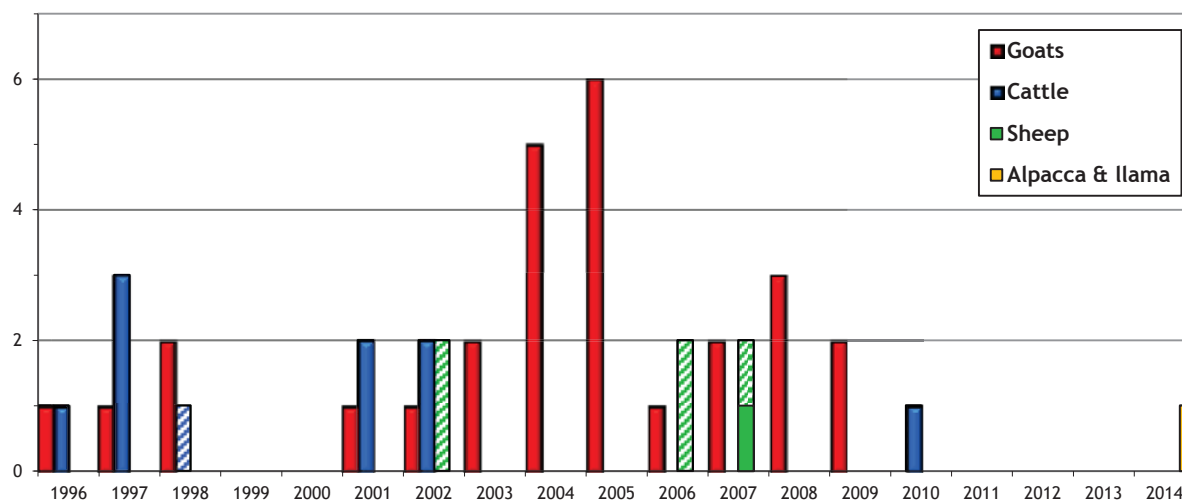


Figure 1. The numbers of new detected goat, sheep and cattle herds since 1996 that have been reported positive for *Mycobacterium avium* subsp. *paratuberculosis* irrespective whether the samples were collected as part of the surveillance programme or not. Cattle herds and sheep flocks where another species at the same holding previously has been reported positive are presented with striped bars.

Discussion

Paratuberculosis has been considered to occur among goats in 6 out of the 19 counties in Norway. All the cases among cattle and sheep can be attributed to one of two reasons; either brought into the country with imported cattle (seven cattle herds, one sheep flock) or contact with infected goats (three cattle herds, five sheep flocks). Importation of live cattle almost ceased by 1996 and has since been replaced by importation of semen and embryos.

Mycobacterium avium subsp. *paratuberculosis* was diagnosed in alpacas in Norway for the first time in two samples from two different herds in the surveillance programme sampled in 2014. The first animal was born in Chile in 2004 and was imported to Norway in 2006. Follow-up investigations in the index herd and contact herds during spring 2015 revealed no further cases of infection in any of the investigated herds. However, the second positive sample came from an animal from one of the first herd's contact herds. The source of the infection was not detected, and whether the alpacas were infected in their countries of origin or by contact with Norwegian ruminants remains unknown.

The dairy organisation (TINE) and the Norwegian Goat Health Services have conducted an eradication programme, "Healthier goats", for three widespread infectious diseases in goats. The programme started in 2001 and concentrated on caprine arthritis encephalitis and caseous lymphadenitis the first years. From 2004, herds in areas where paratuberculosis had been detected were included. From 2001 to 2014 a total of 612 goat herds have been included in the eradication programme (Personal communication Dag Lindheim, Project leader Healthier goats).

All goat milk herds in Norway have joined the eradication programme and either have eradicated or are in the process of eradicating the three diseases. All known goat herds diagnosed with paratuberculosis have joined the eradication programme or have slaughtered their animals. Hence, Norway is in the unique position of having no known cases of paratuberculosis in goat or sheep herds which are not in the process of sanitation. One cattle herd, in which paratuberculosis was diagnosed in 2010, still has restrictions. Although remaining restrictions on goat herds will not be lifted for some years, this is a historical opportunity to eradicate the infection from the entire country.

The eradication programme has reduced the indigenous source of *M. avium* subsp. *paratuberculosis*, but goat herds may still represent a risk for spread of the infection to other ruminants the coming years. Furthermore, the import of sheep, goats, llamas and alpacas presents a risk for introduction of infected animals into the ruminant population.

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