

The surveillance programmes for paratuberculosis in Norway 2015



Surveillance programmes for terrestrial and aquatic animals in Norway

Annual report 2015

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The surveillance programme for paratuberculosis in Norway 2015

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

In 2015, Mycobacterium avium subsp. paratuberculosis was detected in one cattle herd and one goat herd being neighbours. The goat herd had paratuberculosis in sheep in 2007.

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). *Mycobacterium avium* subsp. *paratuberculosis* was detected in sheep for the first time in Norway in 2002 and in alpaca in 2014 (4).

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

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 (6). 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

In 2015, cattle, goats, sheep, llamas and alpaca were included in the programme. Faecal samples were collected in farms by the Norwegian Food Safety Authority, while organs 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 2014. Fifty dairy herds were selected for sampling by a risk-based strategy and fifty beef cattle herds were randomly selected. 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 has been found 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. New animals are imported every year, and many of the animals 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 all animals should 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, weight loss, diarrhoea lasting more than 14 days, and animals that are older than three years of age.

Methods

Faecal samples - PCR

Faecal samples were investigated using a PCR technique. DNA extraction from faecal samples was performed on QIAcube using the QIAamp® DNA Mini Kit (Qiagen).

All samples were tested by real-time PCR using the ADIAVET® REALTIME PARATB kit (bioMérieux). This test is based on gene amplification of the DNA segment IS900, which is specific for *Mycobacterium avium* subsp. *paratuberculosis*.

Faecal samples and organ samples - Bacteriological examination

Faecal samples positive by PCR and organ samples were analysed by culture. These 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.

Organ samples - 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.

Results

A total of 290 cattle, 874 goats, 392 sheep, and 662 camelids were examined. One animal in a cattle herd, and two animals in a goat herd, were positive. The goat herd had paratuberculosis in sheep in 2007. For details on type of samples and number of herds, see Table 1. In addition, faecal samples from five cattle and organ samples from four cattle were submitted to the laboratory but rejected due to inadequate quality.

Table 1. Number of samples collected for examination for *Mycobacterium avium* subsp. *paratuberculosis* in 2015.

Species	Type of sampling	No. of animals (herds) analysed	Positive animals (herds)	Positive animals (herds) - total	Analysed animals (herds) - total
Cattle	Risk-based - faecal samples	289 (59)	0 (0)	1 (1)	290 (60)
	Suspected cases - organs	1 (1)	1 (1)		
Goat	Risk-based - faecal samples	872 (102)	1 (1)	2 (1)	874 (103)
	Suspected cases - organs	2 (2)*	1** (1)		
Sheep	Random - faecal samples	390 (38)	0 (0)	0 (0)	392 (40)
	Suspected cases - organs	2 (2)*	0 (0)		
Camelides	Random - faecal samples	661 (236)	0 (0)	0 (0)	662 (237)
	Suspected cases - organs	1 (1)	0 (0)		

* Only one of the two investigated by PCR.

** Positive by histopathology only.

Since the surveillance programme for paratuberculosis started in 1996, *M. avium* subsp. *paratuberculosis* has been found in altogether 35 goat herds (some of these also positive before 1996), 11 cattle herds, 6 sheep flocks, and 2 alpaca herds (Figure 1). In the figure, only “new” herds, including herds with findings in “new animal species” in herds where another animal species previously was found positive, are indicated.

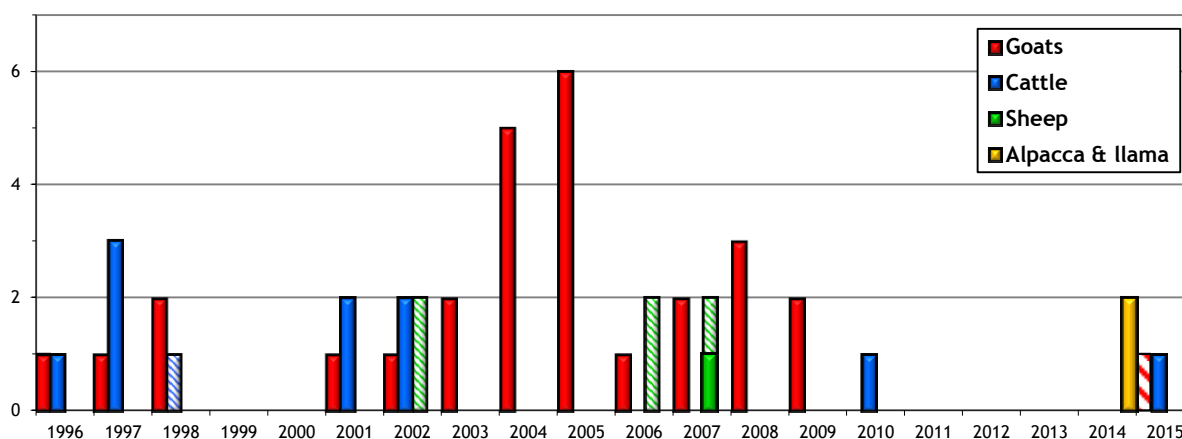


Figure 1. The numbers of new herds that have been reported positive for *Mycobacterium avium* subsp. *paratuberculosis* irrespective whether the samples were collected as part of the surveillance programme or not. The striped bars represents herds where another species in the same holding previously has been reported positive.

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 is limited and largely replaced by importation of semen and embryos.

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, paratuberculosis was included in the eradication programme and herds in areas where paratuberculosis had been detected were included, in total 612 goat herds from 2001 to 2014 (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.

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 cattle, sheep, goats, llamas and alpacas presents a risk for introduction of infected animals into the ruminant population.

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