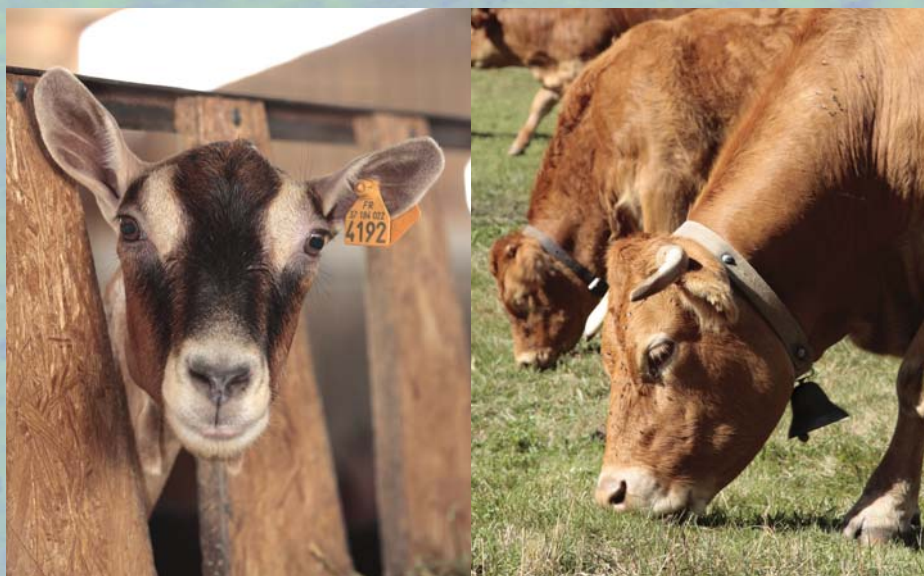


The surveillance and control programme for paratuberculosis in Norway

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Introduction

Mycobacterium avium subsp. *paratuberculosis* was recorded in two new goat herds in 2008.

Paratuberculosis was first diagnosed in cattle and goats in Norway in 1907 and 1934, respectively (1, 2). *Mycobacterium avium* subsp. *paratuberculosis* infection is a notifiable disease (List B) in ruminants in Norway. The control of this disease is enforced by government legislation. Confirmation of infection in cattle most often results in the culling of the herd. Affected herd owners are compensated by the government, which also covers the expenses involved in testing. In sheep and goat herds, government restrictions combined with vaccination are used to control paratuberculosis. Vaccination is performed using an inactivated vaccine (3).

A national surveillance and control programme for paratuberculosis was established in 1996 (4, 5, 6).

Descriptions of occurrence of the disease in Norway, control measures taken up to 1995, and results from the surveillance and control programmes from 1996 to 2001, can be found in the annual report for 2001 (5).

Aim

The aim of the surveillance programme for paratuberculosis is to estimate the prevalence of the infection in the Norwegian population of vaccinated goats. In addition, cattle, goats from unvaccinated herds, and sheep, alpaca and llamas in limited numbers are screened for infection with *M. a. paratuberculosis*.

Materials and methods

Cattle, goats, sheep, llamas and alpaca were examined in the programme in 2008. 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 2007. Sixty herds were randomly selected for sampling. Faecal samples were collected from the five oldest cows in each herd.

Goats

One hundred and twenty herds were randomly selected for sampling. Faecal samples were collected from the ten oldest goats, or from sick goats.

Sheep

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

Llamas and alpaca

Llama and alpaca was introduced as new species to Norway in 1997-98. A few animals have been imported from Sweden and from South America over the last years. Faecal samples from animals over four years of age are collected each year. In addition, organ samples are collected at slaughter and from animals that die when over four years of age.

Herds with restrictions

Infected herds and contact herds are included in the programme.

Passive clinical surveillance

Clinical surveillance has been a part of 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 over four years of age.

Samples

Number and type of samples collected in the programme is given in (Table 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.

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.

Table 1. Number of samples collected for examination for *Mycobacterium avium* subsp. *paratuberculosis* in 2008

		Faecal samples No. of animals	Intestinal samples No. of animals	Total no. of animals	Total no. of herds / flocks
Cattle	Random sample	225	0	225	43
	Suspected or imported cases	0	0	0	0
	Control of infected herds and contact herds	19	2	21	3
Goat	Vaccinated, random sample	700	0	700	70
	Unvaccinated, random sample	302	0	302	30
	Suspected cases	1	3	4	4
	Control of infected herds and contact herds	87	17	104	11
Sheep	Random sample	370	0	370	42
	Control of infected flocks and contact flocks	4	7	11	3
Llama and alpaca		67	2	69	22

Results

All results from bacteriological and histopathological examinations are given in Table 2. *M. a. paratuberculosis* was isolated from 34 samples from goats in 8 different herds and from one sheep. *M. a. paratuberculosis* was detected for the first time in two of the goat herds.

Table 2. Results of histopathological and bacteriological examination of cattle, goats, sheep and llamas in 2008

Species	Type of samples	Bacteriology			Histopathology		
		No. of samples	No. of herds / flocks	No. of pos. samples	No. of samples	No. of herds / flocks	No. of pos. samples
Cattle	Faeces	244	45	0			
	Intestinal samples	2	1	0	2	1	0
Goat	Faeces	1090	108	34			
	Intestinal samples	20	7	0	20	7	0
Sheep	Faeces	374	43	1			
	Intestinal samples	7	2	1	7	2	0
Llama and alpaca	Faeces	67	20	0			
	Intestinal samples	2	2	0	2	2	0

Discussion

Since the surveillance programme for paratuberculosis started in 1996, infection with *M. a. paratuberculosis* has been detected in altogether 9 cattle herds, 6 sheep flocks and in 29 goat herds.

The infection was recorded in two new goat herds in 2008.

As in 2007, the surveillance programme for 2008 gave priority to samples from vaccinated goat herds while cattle and sheep were sampled less. By following this priority over a few years, the prevalence estimate could possibly come closer to the true prevalence in the endemic areas. This could be very useful because the dairy organisation (TINE) and the Norwegian Goat Health Services have started an eradication programme 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 they included herds in areas with paratuberculosis as well.

For the first time since the programme started, clinical disease due to paratuberculosis as a herd problem was registered in Norway in 2007. The herd joined the disease eradication programme in 2004 and terminated vaccination against paratuberculosis. In January 2007, clinical disease was observed in several animals, and the disease was shown to be widespread in the herd. In 2008, one more herd with clinical disease due to paratuberculosis were registered in Norway.

Paratuberculosis is endemic among goats in 6 out of 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 (two cattle herds, six sheep flocks). Importation of live cattle was nearly stopped by 1996 and has since been replaced by importation of semen and embryos. But importation of sheep and goats may together with the presence of infected goat herds represent a risk for spread of the infection to other ruminants.

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