Surveillance and control programmes for terrestrial and aquatic animals in Norway
Norwegian Veterinary Institute

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# The surveillance and control programmes for paratuberculosis in Norway 2012

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# The surveillance and control programme for paratuberculosis in Norway 2012

*Annette H. Kampen, Tone B. Johansen, Mette Valheim, Attila Tarpai*

*In 2012 Mycobacterium avium subsp. paratuberculosis was recorded in one goat herd in which paratuberculosis previously had been detected in 2002, 2003 and 2005.*

## 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 A national surveillance and control programme for paratuberculosis in cattle was established in 1996 (4, 5). The programme was extended to llamas, 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 and control programmes from the onset of the programme, 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 population.

## Materials and methods

Cattle, goats, sheep, llamas and alpacas were examined in the programme in 2012. 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 Fifty herds were selected for sampling. Faecal samples were collected from the five oldest cows in each herd.

*Goats*

Ninety herds were randomly selected for sampling from areas where paratuberculosis is registered in goat herds and thirty herds were randomly selected from areas where paratuberculosis have not been registered in goat herds. Faecal samples were collected from the ten oldest goats.

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

*Lamas and alpacas*
Llama and alpaca were introduced as new species to Norway in 1997-98. A few animals have been imported over the last years. Faecal samples from five animals over four years of age are collected in each herd each year. 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 over three years of age.

## Samples
Number and type of samples collected in the programme is given in Table 1.

**Table 1.** Number of samples collected for examination for *Mycobacterium avium* subsp. *paratuberculosis* in 2012

| | | Faecal samples No. of animals | Organ samples No. of animals | Total no. of animals | Total no. of herds / flocks |
|---|---|---|---|---|---|
| **Cattle** | Random sample | 265 | - | 265 | 53 |
| | Suspected cases | 7 | - | 7 | 3 |
| **Goat** | Random sample | 926 | | 926 | 95 |
| | Suspected cases | 1 | 3 | 4 | 3 |
| **Sheep** | Random sample | 418 | - | 418 | 41 |
| | Suspected cases | 1 | 1 | 2 | 2 |
| **Llama and** | Random sample | 259 | 5 | 264 | 86 |
| **alpaca** | Suspected cases | 0 | 1 | 1 | 1 |
| **Total** | | 1877 | 10 | 1887 | |

## 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 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 IS*900* by a PCR technique (9) were used to identify the isolates.

## Results

All results from bacteriological and histopatological examinations are given in Table 2. In 2012, *M. avium* subsp. *paratuberculosis* was isolated from 2 goats with clinical signs of paratuberculosis in a goat herd in which *M. avium* subsp. *paratuberculosis* first was detected in 2002.

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).

**Table 2.** Results of histopathological and bacteriological examination of cattle, goats, sheep and llamas in the surveillance programme for paratuberculosis in 2012

| Species | Type of samples | Bacteriology | | | Histopathology | | | Total | |
|---|---|---|---|---|---|---|---|---|---|
| | | Examined | | Positive | Examined | | Positive | Positive | |
| | | Animals | Herds | Animals | Animals | Herds | Animals | Animals | Herds |
| **Cattle** | Faecal | 272 | 56 | 0 | - | - | - | 0 | 0 |
| | Organs | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Goat** | Faecal | 927 | 96 | 0 | - | - | - | 0 | 0 |
| | Organs | 3 | 2 | 2 | 3 | 2 | 1 | 2 | 1 |
| **Sheep** | Faecal | 419 | 42 | 0 | - | - | - | 0 | 0 |
| | Organs | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 |
| **Llama and alpaca** | Faecal | 258 | 84 | 0 | - | - | - | 0 | 0 |
| | Organs | 6 | 3 | 0 | 6 | 3 | 0 | 0 | 0 |
| **Total** | Faecal | 1876 | 276 | 0 | - | - | - | 0 | 0 |
| | Organs | 10 | 6 | 2 | 10 | 6 | 1 | 2 | 1 |

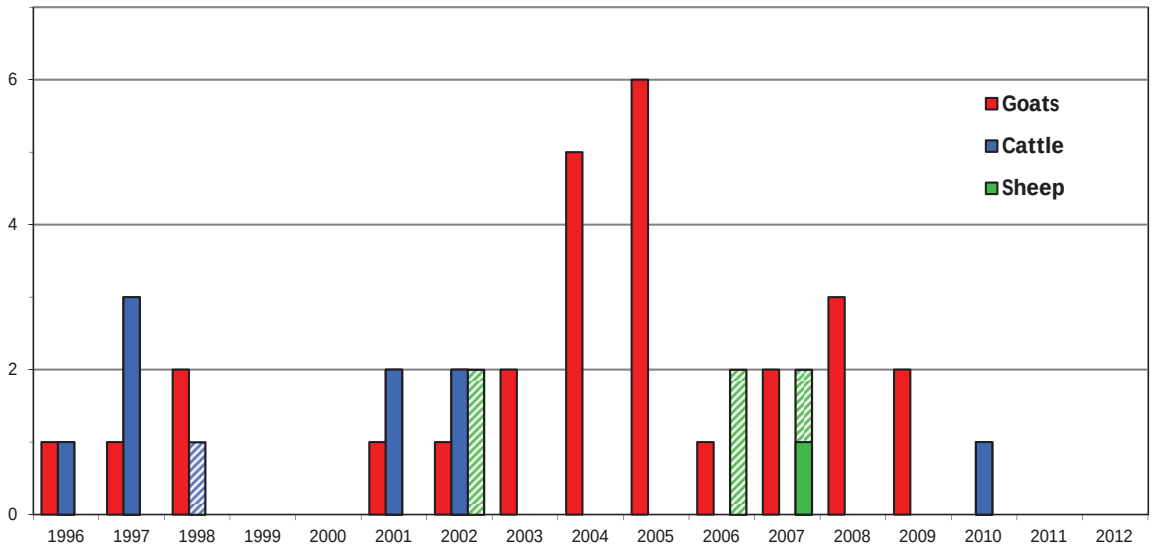


**Figure 1.** The number of new detected goat, sheep and cattle herds since 1996 that have been reported positive for *Mycobacterium avium* subsp. *paratuberculosis* irrespective whether the sample was collected as part of the surveillance programme or not. Cattle herds and sheep flocks where another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

## Discussion

Paratuberculosis is considered to occur among goats in 6 out of the 19 counties in Norway. 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, herds in areas where paratuberculosis had been detected were included. From 2001 to 2012 a total of 515 goat herds had been included in the eradication programme (3).

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.

Although the eradication programme for paratuberculosis in goats is expected to reduce the indigenous source of *M. avium* subsp. *paratuberculosis*, some of these goat herds still represent a risk for spread of the infection to other ruminants. Furthermore, the import of sheep, goats, llamas and alpacas also present a risk for introduction of infected animals into the ruminant population.

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