Veterinærinstituttet
Norwegian Veterinary Institute

Annual Report

The surveillance programme for paratuberculosis in Norway 2019

Comissioned by

Mattilsynet

The surveillance programme for paratuberculosis in Norway 2019

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Summary

In 2019, *Mycobacterium avium* subsp. *paratuberculosis* was not detected in Norway.

Introduction

Paratuberculosis in ruminants is a notifiable disease (List B) in Norway. *Mycobacterium avium* subsp. *paratuberculosis* infection was first diagnosed in cattle and goats in Norway in 1907 and 1934, respectively (1, 2). The control of this disease is enforced by government legislation and includes restrictions on animal movement. In goat herds, government restrictions combined with vaccination have been used to control paratuberculosis. However, in recent years a large proportion of the Norwegian goat herds has undergone a disease eradication programme (3). *Mycobacterium avium* subsp. *paratuberculosis* was detected in sheep for the first time 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 adopted until 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 1996 when 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 2019, cattle, goats, sheep, llamas and alpaca were included in the programme. Faecal samples were collected in farms, and organs were collected at slaughterhouses, by the Norwegian Food Safety Authority.

Active surveillance

Cattle

The target population consisted of all cattle herds delivering milk to dairies during the sampling period and all beef cattle herds receiving state support according to the state register in July 2018. Hundred cattle herds were selected for sampling. Faecal samples from the five oldest animals in each herd were to be collected.

Goats

Seventy herds were selected by a risk-based strategy for sampling from areas where paratuberculosis has previously been detected, while ten goat herds were selected from paratuberculosis free areas. Faecal samples from the ten oldest goats in each herd were to be collected.

Sheep

Thirty sheep flocks from areas where paratuberculosis has been found in goat herds were randomly selected for sampling. Faecal samples from the ten oldest sheep in each flock were to be collected.

Llamas and alpacas

Llama and alpaca were new species introduced to Norway in 1997-98. Since then, several new individuals are imported annually, with many originating from countries where paratuberculosis is endemic. Faecal samples from five animals older than four years of age should be collected in each herd each year. If the

herd has less than five animals, all animals are to be sampled. In addition, a few organ samples are collected at slaughter and from animals that die when older than four years.

Passive clinical surveillance

Clinical surveillance has been part of the programme since 2000. Samples are collected from cattle older than three years that show clinical signs like reduced milk production, weight loss, diarrhoea lasting more than 14 days, and other species on clinical suspicion.

Methods

Faecal and organ samples

Extraction of nucleic acids from faecal samples was performed on a QIAcube using the QIAamp® DNA Mini Kit (Qiagen) or a MagNA Pure 96 using the MagNA Pure 96 DNA and viral NA Large Volum Kit (Roche) before real-time PCR using the ADIAVET ® REALTIME PARATB kit (BioX). This test is based on amplification of the DNA segment IS*900* that is specific for *Mycobacterium avium* subsp. *paratuberculosis*.

In case faecal samples tested positive by PCR, further confirmation would have been performed by culture.

Organ samples were screened for macroscopic pathological changes, and histopathological examination would be performed if lesions were present. In addition, bacteriological confirmatory diagnostic tests would be performed.

Results

In 2019, samples from 475 cattle, 701 goats, 290 sheep, and 668 camelids or their locations were all tested negative for paratuberculosis by PCR. None of the faecal samples in the 2019 surveillance programme were positive by PCR, and thus not cultured.

One organ sample from an alpaca with suspected paratuberculosis was diagnosed with a tumor and thus the suspicion was dismissed after further investigation. None of the other organ samples received in the surveillance programme in 2019 showed macroscopic lesions, thus exempting further histopathological examinations.

Details on type of samples and number of herds/locations are described in Table 1.

Table 1. Number of samples collected for examination for *Mycobacterium avium* subsp. *paratuberculosis* in 2019.

Species	Type of sampling	Number of animals (herds or locations)			
		Faecal	Cadavers/Organs	Total positive	Total analysed
Cattle	Risk-based samples	469 (94)	-	0 (0)	475 (97)
	Suspected cases	6 (3)	0		
Goat	Risk-based samples	701 (86)	-	0 (0)	701 (86)
	Suspected cases	0	0		
Sheep	Random samples	290 (29)	-	0 (0)	290 (29)
	Suspected cases	0	0		
Camelids	Random samples	661 (226)	4 (4)	0 (0)	668 (229)
	Suspected cases	2 (1)	1 (1)		

Since the surveillance programme for paratuberculosis started in 1996, *M. avium* subsp. *paratuberculosis* has been detected in altogether 35 goat herds (some of these also positive before 1996), 11 cattle herds, six sheep flocks, and two alpaca herds (Figure 1). In the figure, only "newly" *M. avium* subsp. *paratuberculosis* detected cases are presented. A herd that has previously been reported as positive for *M. avium* subsp. *paratuberculosis*, can be counted as a herd with new cases again if *M. avium* subsp. *paratuberculosis* is reported in a different ruminant species.

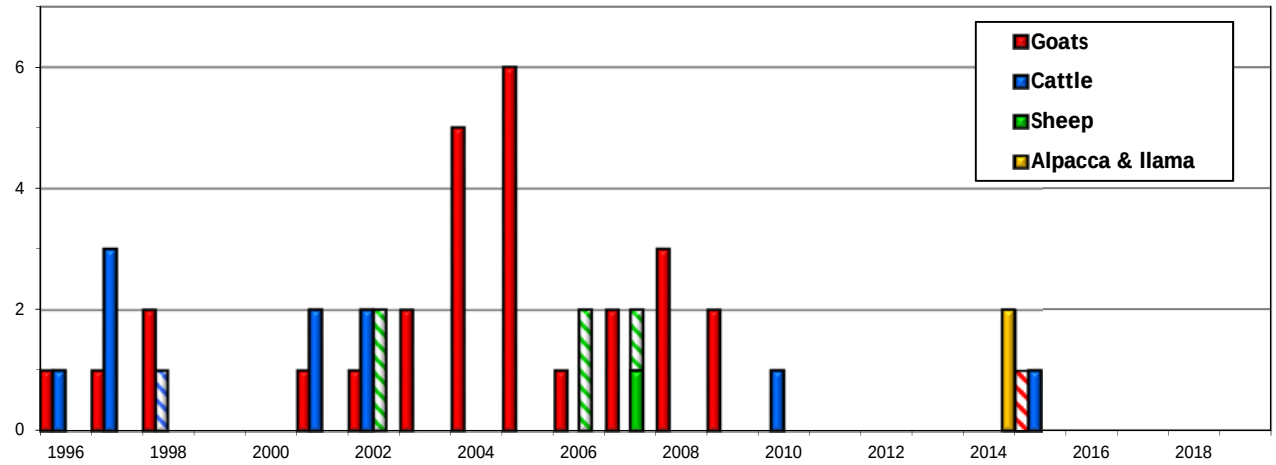

Figure 1. Number of new herds being reported positive for *Mycobacterium avium* subsp. *paratuberculosis* irrespective whether the samples were collected as part of the surveillance programme or not. Striped bars represents herds where another species in the same holding previously was reported positive.

Discussion

Mycobacterium avium subsp. *paratuberculosis* was not detected in Norway in 2019.

Paratuberculosis in goats has previously been detected in five out of the 11 counties in Norway. All the cases among cattle and sheep have been traced to imported animals (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 named "Healthier goats", targeting three infectious diseases that were previously widespread in goats; namely caprine arthritis encephalitis, caseous lymphadenitis and paratuberculosis. In total 612 goat herds were included in the programme from 2001 to 2014 (3).

All goat milk herds in Norway have joined the eradication programme. All known goat herds diagnosed with paratuberculosis have joined the eradication programme or have slaughtered their animals. Hence, Norway is in the unique position in the world of currently having no known cases of paratuberculosis.

Even though the eradication programme has reduced the indigenous source of *M. avium* subsp. *paratuberculosis*, there may still be undetected infected goat herds that pose a risk for new infections to other ruminants in the coming years. Furthermore, imports of cattle, sheep, goats, llamas and alpacas present a risk for new introduction of infected animals into the Norwegian ruminant population.

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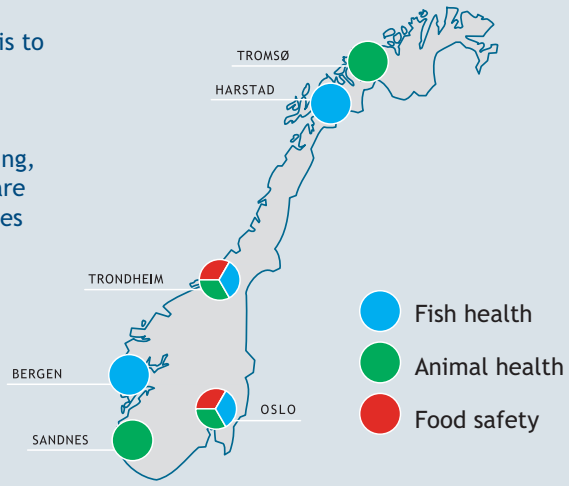

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