

# The Surveillance programme for *Psoroptes ovis* in llama (*Lama glama*) and alpaca (*Vicugna pacos*) in Norway in 2017



**Veterinærinstituttet**  
Norwegian Veterinary Institute



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### Authors

Tormod Mørk, Inger Sofie Hamnes

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## Summary

Skin samples from 622 individual camelids from 152 holdings were examined in the active surveillance programme for *Psoroptes ovis* in 2017. *P. ovis* was detected in two alpacas. In the passive surveillance programme, 14 necropsied camelids were examined and *P. ovis* detected in samples from two llamas.

## Introduction

Sheep scab is a contagious, highly pruritic disease caused by the mite *Psoroptes ovis* in the family *Psoroptidae*. Affected sheep develop large, yellowish, scaly, crusted lesions, accompanied by damage to the wool and hide. Emaciation and secondary bacterial infections can occur. Sheep scab is an animal welfare concern due to the pain and irritation caused by the mites (1).

*Psoroptes* mites have traditionally been separated into different species based on their host and body site preferences. Mites found on the bodies of sheep, cattle and other ungulates were named *P. ovis*, mites in the ears of sheep and on rabbits were called *P. cuniculi*, mites found on horses were *P. equi* and mites on alpacas and llamas *P. auchenia*. Based on genetic analysis, all *Psoroptes* spp. mites have now been reclassified into a single species, *P. ovis* (2).

The persistence of sheep scab within a region despite a prolonged absence of sheep has led many researchers to believe that variants of *P. ovis* virulent for sheep can survive on other animals (3). There is a concern that *P. ovis* isolated from camelids might act as a reservoir for the infestation of sheep with sheep scab mites (4). *P. ovis* is a notifiable (List A) disease in Norway regardless of animal species.

Sheep scab caused by *P. ovis* was widespread in the sheep population on the west coast of Norway throughout much of the 19<sup>th</sup> century and caused great losses. However, since 1894, sheep scab has never been reported in Norway.

The South American camelids llamas and alpacas were introduced as new species to Norway in 1997 - 98. They have grown in popularity in the last 15 years, and live animals have been imported every year from several countries and continents.

In January 2015, *P. ovis* was detected in a skin sample from a cria with otitis externa in an alpaca holding in Sør Trøndelag County. During 2015, *P. ovis* was detected in samples from alpacas in two contact holdings and finally in samples from a llama and a dwarf goat in a zoo with no epidemiological connection to the other positive holdings. During 2016, *P. ovis* was detected in another four holdings; three lama- and one alpaca holdings.

Psoroptic mange is known to be present in llamas and alpacas, but is considered a minor problem because it only causes superficial lesions. *Psoroptes* mites live on the surface of the skin and in camelids they are particularly associated with ear canal lesions causing otitis externa with pruritus, crusting and alopecia of the ear pinna, and characteristic concentric dry flakes in the ear canal (5).

In November 2015, a national surveillance programme for *P. ovis* in llamas and alpacas was launched and financed by the Norwegian Food Safety Authority (6).

The Norwegian Food Safety Authority was responsible for carrying out the surveillance programme for *P. ovis*. The Norwegian Veterinary Institute was in charge of planning the programme and performing the diagnostic work. Skin samples from the pinnae and external ear canals of individual animals were collected by inspectors from the Food Safety Authority.

## Aim

The objective of the programme is to identify *P. ovis* positive llama and alpaca holdings with the intention to prevent the spread of *Psoroptes* mange to the sheep population.

## Materials and methods

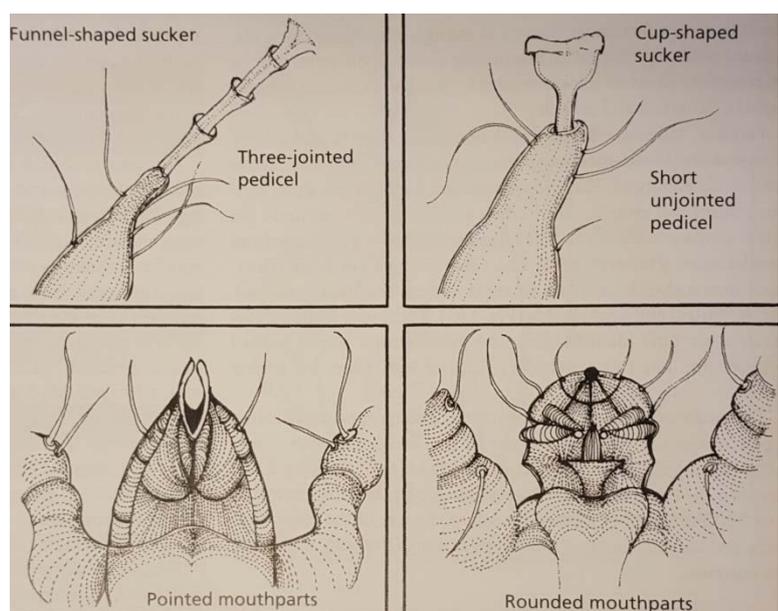
The *P. ovis* surveillance programme was coordinated with the surveillance program for paratuberculosis in llamas and alpacas. All known camelid holdings were selected for sampling in an active surveillance programme. However, holdings that had been sampled continuously in the paratuberculosis programme for the last three years, and holdings with no camelids older than 36 months were excluded from sampling. Additionally, dead or euthanized alpacas and llamas selected for investigations in the surveillance program for tuberculosis, were also included in the *P. ovis* programme (passive surveillance).

The pinnae and external ear canals of each individual camelid were sampled by using SodiBox™ cloths moistened with sterile water. A maximum of ten animals were to be sampled per holding; if possible five adult animals and five yearlings. The samples were submitted to the Norwegian Veterinary Institute in Oslo.

In case of a positive sample, all camelids in the positive holding were clinically examined and sampled/resampled, and the samples were examined as described.

The exact number of llama and alpaca holdings in Norway is unknown. However, in December 2015 the Food Safety Authority estimated the number of holdings to be 420 (6). The aim of the *P. ovis* programme for 2017 was to collect samples from 120 - 140 camelid holdings. Microscopic examination of the SodiBox cloths under stereomicroscope and 10x to 100x magnification was used for the detection of *P. ovis* on the cloths. Any mite found was mounted in glycerol and examined under microscope at 40x to 200x for morphological traits. *P. ovis* mites are identified by the three-segmented pedicle and funnel-shaped suckers on the first and second pair of legs. The mouthparts are pointed (Figure 1).

All samples were analysed at the Norwegian Veterinary Institute in Oslo.



**Figure 1.** Morphological differences on legs and mouthparts between *Psoroptes* sp. and *Chorioptes* sp. mites (Veterinary Parasitology, 4 ed. Taylor et al .2016. Wiley Blackwell ISBN 978-0-470-67162-7).

## Results and Discussion

Twenty-four samples from six camelid holdings were rejected, but 622 individual samples suitable for examination representing 152 camelid holdings were included in the active surveillance programme. The mean number of individuals examined per holding was 5.7 and 3.1 for the alpaca and llama holdings, respectively. The distribution of holdings sampled and samples examined in the active programme, with respect to camelid species, is given in Table 1.

**Table 1.** The number of holdings sampled and samples examined, and the number of positive holdings and samples detected in the active surveillance programme for *Psoroptes ovis* in 2017.

Holding category	Number of			
	Holdings sampled	Samples examined	Positive (%) holdings	Positive (%) samples
Alpaca	58	331	2 (3.4)	2 (0.6)
Llama	93	290	0	0
Alpaca-Llama hybrid	1	1	0	0
Total	152	622	2 (1.4)	2 (0.3)

The distribution of holdings sampled and samples examined in the passive surveillance programme is given in Table 2.

**Table 2.** The number of holdings and individuals examined, and the number of positive holdings and individuals detected in the passive surveillance programme for *Psoroptes ovis* in 2017.

Holding category	Number of			
	Holdings sampled	Samples examined	Positive (%) holdings	Positive (%) samples
Alpaca	10	10	0)	0
Llama	4	4	2 (50.0)	2 (50.0)
Total	14	14	2 (14.3)	2 (14.3)

Of the 152 holdings included and sampled in the active surveillance programme, *P. ovis* was detected in two alpaca holdings (3.4%) and no llama holding, respectively. However, of the 14 examined necropsied camelids from 14 different holdings, included in the passive surveillance programme, *P. ovis* was detected in samples from two llamas (50.0%) and no alpaca.

The results from the post mortem examination programme in 2016 (7) and 2017 indicate a higher prevalence of infected holdings and infected individuals on infected holdings compared to the findings in the active surveillance programme.

The *Psoroptes* mite is usually detected in a low number and close to the eardrum. When infestation of *P. ovis* is present only near the eardrum it will hardly be detected by sampling of live camelids. This might explain the difference in prevalence in the surveillance programme and the post mortem investigations. This seems to be more pronounced for llamas than for alpacas and indicate that sampling the lower part of the ear canal in live llamas is more demanding. However, the impact of low-grade infestations close to the eardrum on the spread of *P. ovis* could be questioned.

In addition to the four positive camelid holdings detected in the surveillance programme in 2017, one more positive holding was found after sampling of a contact holding to a former positive holding. In the positive contact holding, positive samples from altogether four alpacas and llamas were found. Clinical symptoms were reported from one of these positive individuals.

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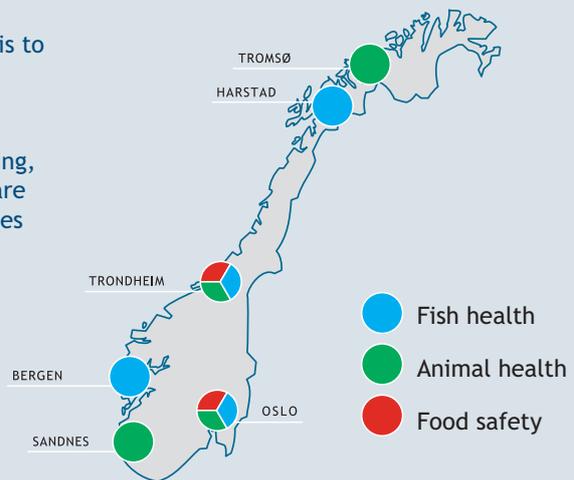
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**Oslo**  
postmottak@vetinst.no

**Trondheim**  
vit@vetinst.no

**Sandnes**  
vis@vetinst.no

**Bergen**  
post.vib@vetinst.no

**Harstad**  
vih@vetinst.no

**Tromsø**  
vitr@vetinst.no

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**Veterinærinstituttet**  
Norwegian Veterinary Institute