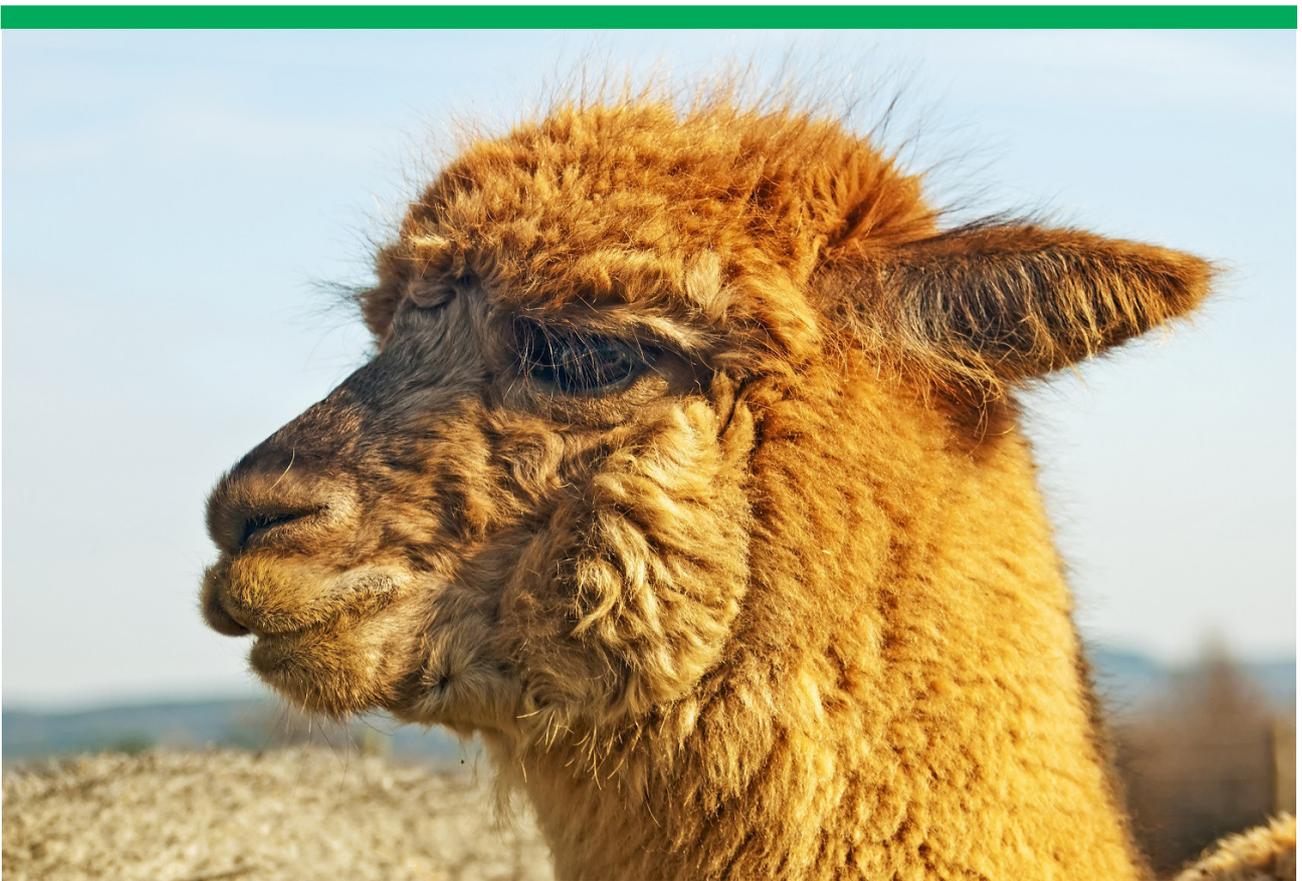


The Surveillance programme for *Psoroptes ovis* in llama (*Lama glama*) and alpaca (*Vicugna pacos*) in Norway in 2019



Veterinærinstituttet
Norwegian Veterinary Institute



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Summary

Skin samples from 294 individual camelids from 75 holdings were examined in the active surveillance programme for *Psoroptes ovis* in 2019. *P. ovis* was detected in one alpaca from one herd. In the passive surveillance programme, 10 necropsied camelids were examined. *P. ovis* was not detected in any of these samples.

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 19th 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 (young alpaca) with otitis externa in an alpaca holding in 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 an additional four holdings; three llama- and one alpaca.

Psoroptic mange is known to be present in llamas and alpacas, but is considered a minor problem because it only causes superficial lesions. However, *Psoroptes* mites in camelids are 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 *P. ovis*.

Materials and methods

The active *P. ovis* surveillance programme was coordinated with the surveillance programme for paratuberculosis in llamas and alpacas. All known camelid holdings were selected for sampling. 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 programme for tuberculosis, were also included in the passive *P. ovis* surveillance programme.

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 2019 was to collect samples from 120 - 140 camelid holdings.

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.

Microscopic examination of the SodiBox cloths under stereomicroscope and 10 x to 100 x 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 pedicel and funnel-shaped suckers on the first and second pair of legs. The mouthparts are pointed (Figure 1).

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.

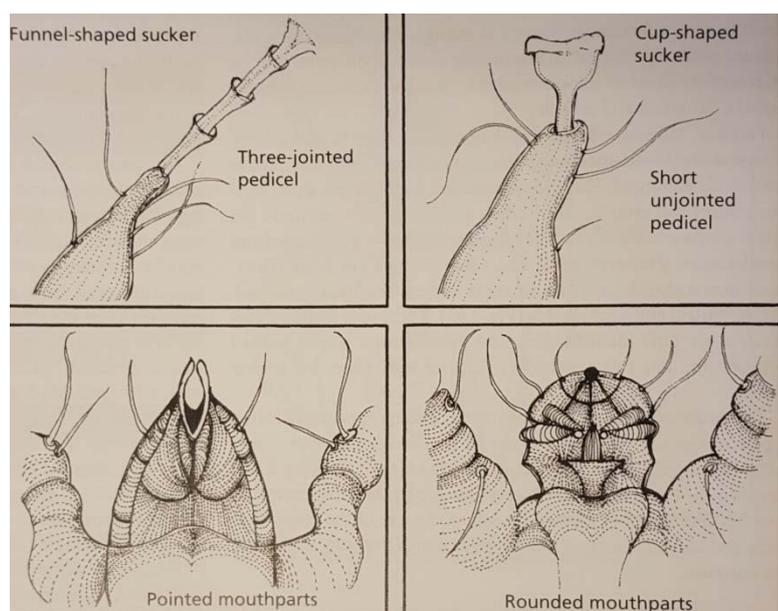


Figure 1. Morphological differences on legs and mouthparts between *Psoroptes* sp. and *Chorioptes* sp. mites (Veterinary Parasitology, 4 ed. Taylor et al .2016. Wiley Blackwell ISBN 978-0-470-67162-7).

Results and Discussion

A total of 333 samples from 80 holdings were received. 294 individual samples from 75 holdings were suitable for examination and included in the active surveillance programme. Thirty-nine samples from seven camelid holdings were rejected. The mean number of individuals examined per holding was 5.5 and 2.8 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 2019.

Holding category	Number of			
	Holdings sampled	Samples examined	Positive holdings	Positive samples
Alpaca	28	155	1	1
Llama	48	132	0	0
Alpaca-Llama hybrid	2	5	0	0
Bactric camel	1	2	0	0
Total	75	294	1	1

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 2019.

Holding category	Number of			
	Holdings sampled	Samples examined	Positive (%) holdings	Positive (%) samples
Alpaca	6	10	0	0
Llama	0	0	0	0
Total	6	10	0	0

Of the holdings included and sampled in the active surveillance programme, *P. ovis* was detected in one llama holdings (1.3%). Of the 10 examined necropsied camelids from 6 different holdings, included in the passive surveillance programme, *P. ovis* was not detected in any of the samples.

The prevalence of positive holdings in 2019 (1.3%, 95% confidence interval 0.36% - 5.0%) is not significantly different from the prevalence in 2018 (1.7%, 95% confidence interval 0.034% - 7.2%) (7).

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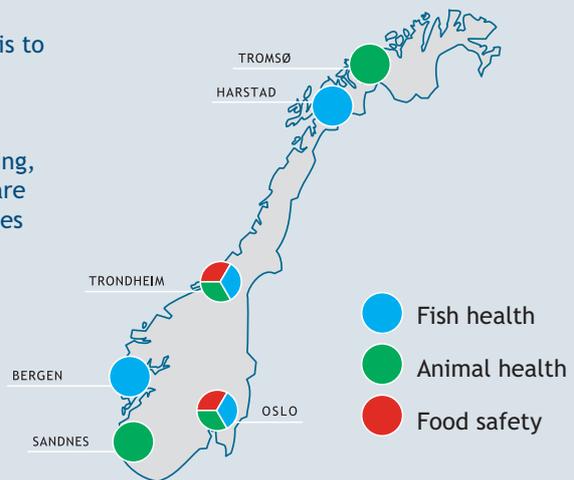
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