Annual Report

The Surveillance programme for *Psoroptes ovis* in llama (*Lama glama)* and alpaca (*Vicugna pacos*) in Norway in 2016

Veterinærinstituttet
Norwegian Veterinary Institute

The surveillance programme for *Psoroptes ovis* in llama (*Lama* glama) and alpaca (*Vicugna* pacos) in Norway in 2016

Content

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Summary

Skin samples from 906 individual camelids from 234 holdings were examined in the surveillance programme for *Psoroptes ovis* in Norway 2016. *P. ovis* was detected in three lama holdings and one alpaca holding.

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 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.

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 intension 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. However, holdings that had been sampled continuously in the paratuberculosis programme for the last three years, and holdings with no camelids older than 24 months were excluded from sampling in the programme for 2016.

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 holding to be 420 (6). The aim of the *P. ovis* programme for 2016 was to collect 1000 samples from 120 - 140 camelid holdings. The sampling in the 2016 programme started, for practical reasons, in November 2015.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. Adult *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.

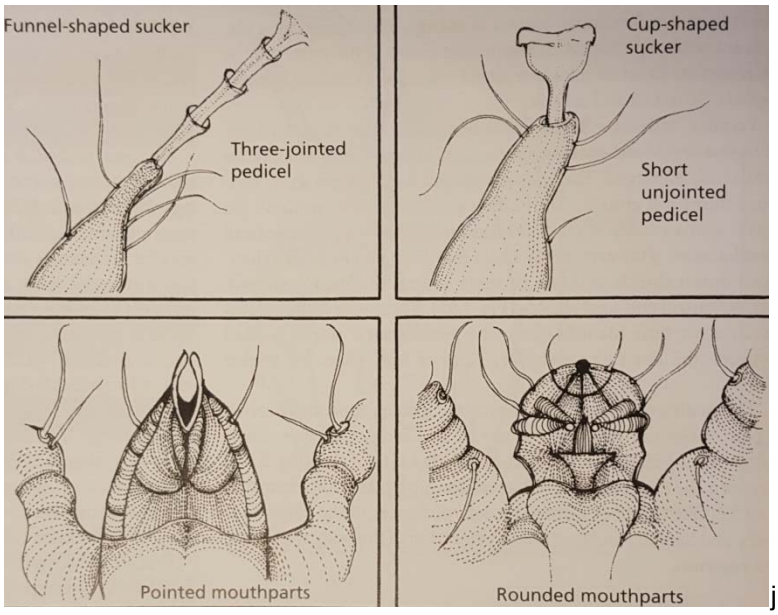

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Figure 1. Morphological differences on legs and mouthparts between *Psoroptes* sp. and *Chorioptes* sp. mites (Veterinary Parasitology, 4 edt. Taylor et al .2016. Whiley Blackwell ISBN 978-0-470-67162-7).

Results and Discussion

A low number of collected samples were rejected, but a total of 906 individual samples suitable for examination representing 234 camelid holdings were included in the project. The distribution of holdings sampled and samples examined, with respect to camelid species, is given in Table 1. The mean number of individuals examined per holding was 6.7 and 2.6 for the alpaca and llama holdings, respectively.

Of the 234 holdings sampled, *P. ovis* was detected in one alpaca (1.4%) and three llama holdings (1.9%), respectively.

Table 1. The number of holdings sampled and samples examined, and the number of positive holdings and samples detected in the surveillance programme for *Psoroptes ovis* in 2016.

Herd category	Number of			
	Holdings sampled	Samples examined	Positive (%) holdings	Positive (%) samples
Alpaca	72	479	1 (1.4)	1 (0.2)
Llama	157	414	3 (1.9)	5 (1,2)
Bactrian camel	1	2	0	0
No information	4	11	0	0
Total	234	906	4 (1.7)	6 (0.7)

The results from the surveillance programme in 2016 showed a low prevalence of llama (1.9%) and alpaca (1.4%) holdings infected with *P. ovis* and a low prevalence of infected individuals on each infected holding.

Since *P. ovis* was detected in an alpaca holding in January 2015 (the index holding), the mite was further demonstrated in samples from altogether four alpaca and six llama holdings during 2015 and 2016. The two consecutive *Psoroptes* positive alpacas in 2015 were found in contact holdings of the index holding. One of the positive alpacas was found at post mortem examination. However, the fourth positive holding, discovered during post mortem examination of a llama, was a zoo with no epidemiological connection to the other positive holdings. In addition to the four new positive holdings detected in the surveillance programme in 2016, three other camelid holdings were found positive in 2016. One of these was found positive at post mortem examination of a llama. The last two were found positive after sampling of contact herds to the former positive holding and to a positive holding in the surveillance programme, respectively.

The number of samples tested in the 11 holdings positive for *P. ovis* in 2015 and 2016 and in 21 contact holdings where *P. ovis* was not detected, are listed in table 2. The number of *P. ovis* examined necropsied llamas and alpacas performed at the Norwegian Veterinary Institute in the same time period is also shown in Table 2.

Table 2. The number of samples tested in 11 holdings positive for *Psoroptis ovis* and 21 contact holdings in 2015 and 2016 distributed on animal species. The number of autopsied camelids and camelids found positive for *P. ovis* is also shown.

Herd category	Number of samples tested in positive holdings	Number of samples tested in contact holdings*	Number of autopsied camelids (positive)
Alpaca	469	233	29 (1)
Llama	16	29	9 (2)
Sheep	95	4	
Goats	14	26	
Rabbits	1	6	
Horse	0	2	
Total	595	300	38 (3)

*****contact holdings where *P. ovis* was not detected.

The results from the post mortem examinations of 9 llamas and 29 alpacas indicate a higher prevalence of infected holdings and infected individuals on infected holdings compared to the findings in the surveillance programme. At necropsy, *P. ovis* was detected in the ear canal of two (22.2%) llamas and one

(3.5%) alpaca. The *Psoroptes* mite was detected in a low number and close to the eardrum in the three camelids found positive at necropsy. When infestation of *P. ovis* is present only near the eardrum, it will not be detected by sampling of live camelids. This might explain the difference in prevalence in the surveillance programme and the post mortem investigations of 38 camelids. However, the impact of low-grade infestations as found in three camelids at necropsy, on the spread of *P. ovis* could be questioned.

It is uncertain how representative the necropsied camelids were for the population of llamas and alpacas in Norway. However, none of them was submitted to the Norwegian Veterinary Institute with suspected infestation with *Psoroptes* mites.

In the positive zoo, *P. ovis* was also detected in a sample from a dwarf goat. No positive sample collected from other hosts has been found.

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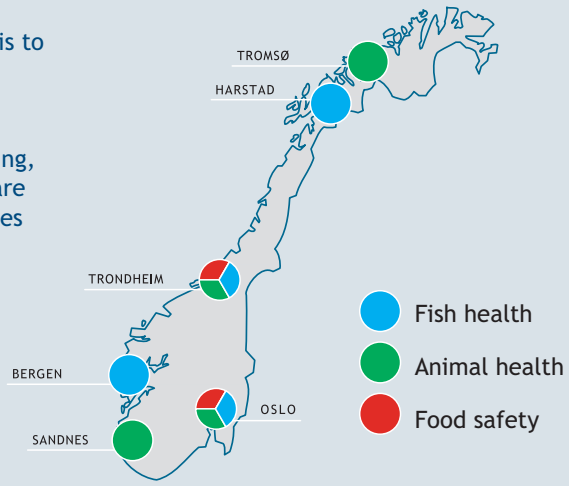

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