

## Host preference of the sheep scab mite, *Psoroptes ovis*

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### ABSTRACT

Sheep scab mites, *Psoroptes ovis*, collected from a Merino donor sheep, were used to infest Merino and Dorper sheep, and Angora and Boer goats. Mites were placed on the sheep on 1 or 2 occasions and on 5 occasions on the goats. All the animals were examined at regular intervals for the presence of scab lesions and living mites. Both sheep breeds developed lesions, but those on the Merino sheep were always larger than those on the Dorper sheep at the same intervals after infestation. None of the goats developed lesions or showed signs of irritation, or harboured any mites.

**Key words:** Angora goats, Boer goats, Dorper sheep, host preference, Merino sheep, *Psoroptes ovis*, sheep scab.

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The persistence of scab within a region despite the prolonged absence of sheep has led many researchers and stockmen to believe that the sheep scab mite, *Psoroptes ovis*, can survive on other animals. Consequently the transfer of *P. ovis* between host species and the survival of mites on the new hosts are important considerations in the implementation of successful control strategies. It is also possible that the practice of mixed livestock farming may permit hosts other than sheep to act as temporary carriers of the mites<sup>6</sup>. Attempts in Ireland to infest goats by placing them with scab-infested sheep or by depositing mites directly on their skins have failed<sup>6</sup>. In addition pronounced differences in the growth of scab lesions on different breeds of sheep have been reported in Britain<sup>2</sup>. Lesions develop more rapidly on Lowland breeds that have a high density of wool follicles than on Hill breeds with a low follicle density. The mites can also migrate into the ear canals of sheep without causing lesions on the pinnae<sup>1</sup>. In Belgium, *P. ovis* is responsible for severe dermatitis on cattle<sup>4</sup>.

The Dorper sheep is a South African breed derived from crossings between Black-headed Persian and Dorset Horn sheep. It has a short, coarse, hairy, low-density fleece of little commercial value and is farmed mainly for its meat.

Angora goats are farmed extensively in the semi-arid regions of South Africa for the mohair they produce, while Boer goats are an indigenous South African breed farmed for their meat and hardiness. The present study was conducted to compare the suitability of Dorper sheep, and of Angora and Boer goats with that of Merino sheep as hosts for *P. ovis*.

During April 1997, two 10–11 month old healthy Merino and 5 similarly aged Dorper sheep were placed in separate quarantine camps. Mites were collected from a heavily infested Merino donor sheep and each of the experimental sheep was infested with 10 ovigerous female *P. ovis* placed on their withers, followed 1 week later by 22 mites comprising various developmental stages.

Lesion growth was assessed at fortnightly intervals over an 8-week period by placing each sheep on a table and carefully examining its skin surface. When a lesion was found its position was recorded, and its length and width measured. An approximation of the surface area of each lesion was calculated from the product of the 2 measurements and a value for the total surface area covered by lesions on each sheep obtained by tallying the lesion sizes.

The mean lesion size on the Merino sheep increased from 17.1 cm<sup>2</sup> at 2 weeks after infestation to 2615.0 cm<sup>2</sup> at 8 weeks. It increased on the Dorper sheep from 3.10 cm<sup>2</sup> at 2 weeks to 148.7 cm<sup>2</sup> at 8 weeks after infestation. On each of the assessment days the mean total lesion size was significantly greater on Merino sheep

than on Dorper sheep. Although the Dorper sheep showed signs of itching and irritation, these were never as severe as those observed on the Merino sheep.

Towards the end of April 1997, mites were again collected from a Merino donor sheep and 2 Merino sheep as well as 3 Angora goats were infested with 19 ovigerous females, 9 males and 1 attachment pair. A week after the initial infestation the goats were re-infested with 25 ovigerous females, 25 males, 1 attachment pair and 2 eggs and subsequently fortnightly on 3 occasions with the same numbers of mites. Thus each goat received a total of 119 ovigerous females, 109 males, 5 attachment pairs and 8 eggs. The sheep were infested only once and kept in a quarantine camp separate from the goats.

The infested sheep and Angora goats were examined 1 week after initial infestation and subsequently at fortnightly intervals for a period of 9 weeks. The examinations were done with a hand lens and consisted of systematically searching the skin and hair of the goats and sheep for the presence of living mites and lesions. Skin scrapings were made at various sites on the body, as well as on the pinnae and behind the ears of the goats to determine whether any mites were present. The animals were also closely observed for signs of irritation and scratching associated with sheep scab.

One week after infestation a lesion about 1.0 cm<sup>2</sup> in size was detected at the site of mite deposition on both sheep. At the termination of the study after 9 weeks the average total lesion size on the sheep had increased to 3093.0 cm<sup>2</sup>, and both were treated with an endectocide to kill the mites. No mites were detected on the skin or in the hair of the Angora goats at any time during the study and no lesions could be found after extensive examinations. At no stage during the observation period did the Angora goats display any signs of uneasiness, scratching or any other signs that could be related to infestation.

During June 1997, 2 Merino sheep and 2 Boer goats were infested with 15 ovigerous females, 15 males and 1 attachment pair of mites obtained from a Merino donor sheep. A week later the goats were

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re-infested with 25 ovigerous females, 15 males, 1 attachment pair and 2 eggs and subsequently at fortnightly intervals on 3 occasions with the same number of mites. The goats thus each received a total of 115 ovigerous females, 75 males, 5 attachment pairs and 8 eggs. The sheep were infested only once and were kept in a quarantine camp separate from the goats. The same examination procedure was followed with these animals as for the sheep and the Angora goats, but the Boer goats were also closely observed for lesions and clinical signs of sheep scab 3, 6 and 12 months after initial infestation.

One week after infestation a 1.0 cm<sup>2</sup> lesion had developed on each of the sheep and within 3 weeks the average lesion size was 21.0 cm<sup>2</sup>, and numerous active mites and eggs were present. At 9 weeks the average total lesion size was 2300.0 cm<sup>2</sup>, and both sheep were treated to terminate infestation. No mites could be found behind or in the pinnae of the ears and no mites or lesions could be detected on the bodies of the Boer goats 7 days after initial infestation or during the fortnightly examinations thereafter. No irritation or scratching was evident at any time during the observation period. The follow-up examinations at 3, 6 and 12 months after initial infestation revealed no lesions.

None of the goats were killed during or after the assessment period. The infra-orbital fossae and deep external ear canals were thus not examined for *P. ovis*. Examination of the ears was restricted to the pinnae of the live goats.

The rapid lesion growth observed on all the artificially infested Merino sheep indicated that the strain of *P. ovis* used in the 3 experiments was highly pathogenic for

these animals and to a lesser extent for Dorper sheep, on which it nevertheless became established. Repeated infestation of Angora and Boer goats with the same strain of mites produced no lesions or clinical manifestations of scab, nor could any mites be detected. Thus under the conditions prevailing at the time of the experiment, *P. ovis* could not be successfully transmitted from sheep to Angora or Boer goats. This agrees with results obtained in Ireland where *P. ovis* remained on recipient goats for up to a week but were unable to establish themselves or produce disease<sup>6</sup>.

Although various strains of *P. ovis* appear to have become adapted to a specific host, the species is not entirely host-specific. In the USA, sheep scab mites have been transferred to cattle, on which they apparently produced lesions<sup>7</sup>. In addition, *P. ovis* from a bovine has been transferred to a rabbit and then from the rabbit to a sheep on which typical lesions of scab developed<sup>5</sup>. Using British field isolates, however, cross-transmissions of cattle scab mites to sheep or *vice versa* failed<sup>3</sup> and there are indications that the mites have retained their host specificity under field conditions in that country.

The numerous discrepancies reported in the literature on the transfer of *P. ovis* to various hosts clearly indicate that several factors influence the successful establishment of sheep scab mites. These include physiological differences in mite strains, host variables such as appropriate host odour, nutrient and non-nutrient host chemicals and physical factors such as wool or hair density and the immune response of the host. The retarded lesion growth on Dorper sheep in the current experiments may well be due to the high

hair component and low density of their fleece, and the unsuccessful transfer of mites to Angora and Boer goats might in part be attributable to the hairy nature of their pelage.

Even though the present results indicate that *P. ovis* of sheep origin failed to create body lesions on Angora and Boer goats it is possible that mites may migrate to cryptic sites such as the ear canals or infra-orbital fossae of goats, survive there, and then re-infest sheep. Consequently where sheep and goats are herded together and sheep scab is diagnosed both livestock species should be treated as a precautionary measure.

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