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THE ASSOCIATION OF FLEECE CHARACTERS AND SUSCEPTIBILITY TO DERMATOPHILOSIS

S.G. GHERARDI*, D.J. HARRIS** and S.W. ROLLS*

SUMMARY

The association of fleece characters with susceptibility to dermatophilosis was studied in two flocks located on the south coast of Western Australia. The characters examined were wax content, suint content, wax to suint ratio, suint pH, yield, fleece wettability, fibre diameter, coefficient of fibre diameter variation, suint direct extract, direct extract pH and electrical conductivity. The results showed that wax to suint ratio was the only fleece character significantly (P < 0.05) different in both flocks for sheep with dermatophilosis as compared to sheep without dermatophilosis (flock 1: 2.0 v 2.7; flock 2: 1.4 v 1.8). These differences were markedly influenced by the wax content (13.5 v 16.6%, P < 0.01) in flock 1 and the suint content (9.7 v 8.18% P < 0.05) in flock 2. Both the electrical conductivity (1.30 v 0.91 siemens/cm, P < 0.01) and suint content of the direct extract (8.2 v 6.4%, P < 0.05) were significantly greater in sheep with dermatophilosis than in sheep without dermatophilosis for flock 1. The remaining fleece characters measured were not significantly different for both flocks.

INTRODUCTION

Dermatophilosis (mycotic dermatitis, lumpy wool) is a skin disease particularly prevalent on young Merino sheep in the medium to high rainfall areas of Western Australia. Examination of 23 affected flocks showed that the mean prevalence of dermatophilosis was 31.3% (range 3.7-62.4%) (Wilkinson 1976). The main economic losses due to the disease result from culling, mortality, loss in fleece and skin values as well as its predisposition of sheep to body strike.

Susceptibility to dermatophilosis can vary between individual sheep both within and between flocks (Gherardi et al. 1983). Lipson (1978) investigated the difference in a range of fleece characters between sheep with or without mycotic dermatitis and suggested that as mycotic dermatitis usually requires climatic conditions similar to that for fleece rot, the predisposing factors in the fleece might possibly be the same. For a group of eight sheep it was found that the wax contents tended to be higher and water uptake lower in the sheep without mycotic dermatitis.

It was the purpose of this study to examine on two commercial flocks in Western Australia the association of a range of fleece characters with susceptibility to dermatophilosis.

MATERIALS AND METHOD

Mid-side fleece samples were collected approximately one month prior to summer shearing from Merino ewe hoggets within two commercial flocks located on the south coast of Western Australia. A total of 40 samples, 17 on sheep with dermatophilosis and 23 without dermatophilosis were collected from flock 1; and 47 samples, 26 on sheep with dermatophilosis and 21 without dermatophilosis from flock 2.

* Department of Agriculture, South Perth, W.A. 6151.
** Government Chemical Laboratories, East Perth, W.A. 6000.

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Prior to conducting any analyses the tips of the fleece samples were removed with scissors to minimise the effects of weathering. A 2-6 g sample of wool was used for wax and suint analyses. The wax and suint were extracted using the technique described by Daly and Carter (1954), with petroleum ether (Shell solvent X222) used as the wax solvent. All results for wax and suint are expressed on a greasy weight basis. The pH of the suint was measured immediately following suint extraction. The fleece wettability was derived by the method described by Lipson (1976).

Average fibre diameter was measured using a projection microscope by the method of the International Wool Textile Organisation (IWTO-8-66). A total of 100 fibres were measured per sample to calculate a value for the coefficient of fibre diameter variation.

The electrical conductivity, suint content and pH were estimated on the solution derived from "direct extraction" of the fleece (Lipson and Hilton 1981). Both the suint and the pH measured on the direct extract will be referred to as the "suint content direct extract" and the "direct extract pH" to differentiate them from the suint content and suint pH as derived by the conventional technique (Daly and Carter 1954).

The results were analysed by analysis of variance for a completely randomised design with two treatments.

RESULTS

Only the mean values of the fleece characters that varied significantly for sheep with or without dermatophilosis in the two flocks are presented in Table 1.

<table>
<thead>
<tr>
<th>Fleece characters</th>
<th>Dermatophilosis</th>
<th>S.E.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>With</td>
<td>Without</td>
</tr>
<tr>
<td>Wax content (%)</td>
<td>13.5</td>
<td>16.6</td>
</tr>
<tr>
<td>Wax to suint ratio</td>
<td>2.0</td>
<td>2.7</td>
</tr>
<tr>
<td>Suint content direct extract (%)</td>
<td>8.2</td>
<td>6.4</td>
</tr>
<tr>
<td>Conductivity (siemens/cm)</td>
<td>1.30</td>
<td>0.91</td>
</tr>
</tbody>
</table>

The sheep with dermatophilosis in flock 1 had a significantly lower wax content ($P < 0.01$) and wax to suint ratio ($P < 0.05$), and a significantly higher electrical conductivity ($P < 0.01$) and suint content direct extract ($P < 0.05$) than sheep without dermatophilosis. The suint content, suint pH, direct extract pH, yield, water uptake, fibre diameter and coefficient of fibre diameter variation were not significantly different.
In flock 2, the sheep with dermatophilosis had a significantly higher suint content \((P < 0.05)\) and a lower wax to suint ratio \((P < 0.05)\) than sheep without dermatophilosis. The remaining fleece characters measured were not significantly different.

DISCUSSION

The results showed that the wax to suint ratio was the only fleece character consistently different between sheep with or without dermatophilosis for the two flocks. This difference between the two groups of sheep was markedly influenced by the wax content within flock 1 and the suint content within flock 2, which suggests that both wax and suint could be involved in similar roles in the development of dermatophilosis as they are for fleece rot; that is, with the wax probably involved in the water proofing of the fibres and the skin, and the suint through its detergent action in emulsifying the wax, thereby removing this barrier (Jackson 1973). The work of Goodrich and Lipson (1978) found that the breakdown of the wax in the fleece is a common factor involved in the development of both dermatophilosis and fleece rot. However, the specific roles of total wax and suint as well as their particular components, in the development of dermatophilosis, require further investigation.

Both the electrical conductivity and the suint content of the direct extract were also found to be significantly different between the two groups within flock 1. The significance of both measurements was consistent with the findings of Lipson and Hilton (1981) who showed that electrical conductivity provides a rapid method of determining the suint content of the direct extract. It was reported that this simplified procedure for suint determination produced no significant difference in the amount of suint recovered in comparison to the conventional technique. Therefore the measurement of electrical conductivity provides a quick and efficient method for screening large numbers of sheep where total suint content is related with susceptibility to dermatophilosis.

While the fleece samples examined from susceptible sheep were taken from a site unaffected by dermatophilosis, they were removed after the occurrence of the disease. There is a possibility that differences in the fleece characters measured were a result of dermatophilosis rather than responsible for its predisposition. Although it was assumed that this did not occur, it should be recognised that this uncertainty exists in retrospective studies of this type.

It would be unwise to draw any general conclusions from the study because of the variation in the importance of the fleece characters within the two flocks. However, it has been shown that some of the fleece characters measured were associated with susceptibility to dermatophilosis and that they should now be examined over a wide range of susceptible flocks.

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REFERENCES


