LIVEWEIGHTS AND WOOL GROWTH OF SHEEP FED VARIOUS AMOUNTS OF CHAFFED ROUGHAGE AND PELLETED LUCERNE

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Summary

Merino ewes were fed, *ad libitum*, a chaff mixture containing 8.0% crude protein or one containing 5.1% crude protein. From nil to seven days each week, lucerne pellets containing 15.8% crude protein were offered *ad libitum* in place of the chaff.

The liveweight of sheep fed the higher quality chaff mixture increased by 0.23 kg per week. Increasing the number of days per week during which lucerne pellets were substituted for this roughage mixture, increased the rate of wool growth and liveweight gain, but did not significantly change the total dry matter intake.

The lower quality roughage mixture did not maintain liveweights. When lucerne was substituted on three or more consecutive days each week, significant increases in wool growth and total feed intake occurred, and liveweights increased.

I. INTRODUCTION

In much of the pastoral area of southern Australia, summer pastures provide only dry roughage. It is often observed that sheep grazing such pastures decrease in liveweight, and as a result decreased wool growth rates are assumed.

Although supplementation of roughage for survival feeding has been studied (Briggs 1958; McInnes and Mangelsdorf 1966), little has been done to study supplementary feeding for production. It is likely that any supplementation for production would be provided most economically by a sown pasture.

In many of the drier areas, particularly central-western New South Wales, lucerne (*Medicago sativa* L.) is the only summer-growing species sown. As the areas of lucerne are usually small in proportion to the areas of natural pasture available, they need to be efficiently utilized, particularly during the summer months. The animal house trial reported here was designed to examine possible means of rationing lucerne to sheep on relatively low quality roughage diets.

II. MATERIALS AND METHODS

The experiment comprised two periods, each of seven weeks. During Period I a mixture of chaffed cereal hay and straw containing 8.0% crude protein in the dry matter was fed. In Period II the roughage was a chaffed mixture of straw and cereal hay with a crude protein content of 5.1%.

In January 1967, 32 three-year old Merino ewes were individually penned and divided into eight groups with similar fleece production records, and a mean bodyweight of 42 kg. During each period, the treatments consisted of offering roughage mixture *ad libitum* on seven to nil days per week. On the days on which

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roughage was not offered, pellets made from good quality lucerne hay were available \textit{ad libitum}. These pellets had a crude protein content of 15.8\% in the dry matter. The sheep in each treatment group remained the same during Periods I and II.

Liveweight change during each period was calculated after actual liveweights were corrected by subtracting the weights of feed eaten and water consumed during the previous 24 h. The dry matter content of feed given and feed refused was determined, and the daily dry matter intake of each sheep was calculated. Wool growth rate of each sheep was measured during the last four weeks of each period on two 100 cm^2 patches, one on each mid-side of the sheep.

Differences between groups in wool growth rate, total dry matter intake, average roughage and lucerne intake per day, and liveweight change were examined by analysis of variance. Analysis of covariance was used to examine the relationship between wool growth rate and lucerne intake.

### III. RESULTS

In both periods wool growth rate increased in proportion to the number of days on which lucerne was offered. There were significant differences \((P<0.05)\) between the weight of wool grown by sheep receiving predominantly lucerne and that grown by those receiving predominantly roughage diets (Table 1). The analysis of covariance showed that the relationship between rate of wool growth and lucerne intake was similar in both periods.

Although there was a tendency during Period I for sheep on predominantly lucerne diets to have a greater average intake per day, there were no significant differences between treatments in either average lucerne intake per day or total feed intake per week. However, most of the groups receiving predominantly roughage

<table>
<thead>
<tr>
<th>Number of days on which lucerne replaced roughage</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>LSD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wool growth rate (g/cm^2/day x 10^5) Period I</td>
<td>61</td>
<td>57</td>
<td>83</td>
<td>89</td>
<td>93</td>
<td>100</td>
<td>102</td>
<td>107</td>
<td>23</td>
</tr>
<tr>
<td>Period II</td>
<td>34</td>
<td>39</td>
<td>65</td>
<td>82</td>
<td>92</td>
<td>114</td>
<td>98</td>
<td>100</td>
<td>27</td>
</tr>
<tr>
<td>Total intake (g/day)* Period I</td>
<td>984</td>
<td>753</td>
<td>1120</td>
<td>1047</td>
<td>965</td>
<td>1090</td>
<td>1204</td>
<td>1270</td>
<td>n.s.</td>
</tr>
<tr>
<td>Period II</td>
<td>311</td>
<td>427</td>
<td>571</td>
<td>801</td>
<td>803</td>
<td>1031</td>
<td>1130</td>
<td>1136</td>
<td>336</td>
</tr>
<tr>
<td>Lucerne intake (g/day)* Period I</td>
<td>984</td>
<td>715</td>
<td>1031</td>
<td>793</td>
<td>710</td>
<td>622</td>
<td>766</td>
<td>302</td>
<td>n.s.</td>
</tr>
<tr>
<td>Period II</td>
<td>311</td>
<td>362</td>
<td>340</td>
<td>378</td>
<td>313</td>
<td>295</td>
<td>319</td>
<td>n.s.</td>
<td>n.s.</td>
</tr>
<tr>
<td>Roughage intake (kg/week) Period I</td>
<td>0.11</td>
<td>0.38</td>
<td>0.44</td>
<td>0.44</td>
<td>0.54</td>
<td>0.70</td>
<td>0.75</td>
<td>0.52</td>
<td>n.s.</td>
</tr>
<tr>
<td>Period II</td>
<td>-0.99</td>
<td>-0.36</td>
<td>-0.23</td>
<td>0.11</td>
<td>0.15</td>
<td>0.45</td>
<td>0.52</td>
<td>0.59</td>
<td>n.s.</td>
</tr>
</tbody>
</table>

* Averaged over number of days during which this feed was offered.

L.S.D. — Least significant difference \((P < 0.05)\).
diets had significantly higher daily intakes of roughage than those receiving predominantly lucerne diets (Table 1).

During Period II there was a significant difference in total feed intake in favour of the sheep receiving predominantly lucerne diets. This was not associated with differences in average lucerne or roughage intake per day, but was directly a result of the number of days during which lucerne was offered.

There were differences in liveweight change in both periods in favour of the treatments receiving a high proportion of lucerne. Sheep liveweights increased on continuous feeding of the higher quality roughage mixture, and further increases were recorded as the number of days lucerne feeding per week increased. Sheep continuously fed the lower quality roughage mixture decreased markedly in liveweight, and it was not until this roughage was replaced by lucerne pellets on three days per week that liveweights were maintained.

IV. DISCUSSION

The results of this experiment indicated that relative to a roughage diet, increases in wool growth were dependent on the quantity of lucerne substituted for the roughage. Although little is known about the effect of variations in roughage and lucerne quality on the productivity of grazing sheep, these results suggest that the efficiency of rationed grazing of lucerne areas would mainly depend upon the quality of roughage available. If the roughage was sufficiently high in quality to maintain sheep bodyweight without supplementation, then the usual practice of maintaining dry adult sheep on the roughage, and using available lucerne to obtain the best possible growth of young animals, seems soundly based.

On the other hand, when the quality of roughage available is such that considerable liveweight loss occurs, rationed grazing of small areas of lucerne would appear to be a valuable management practice. Similar management practices have proved successful with sheep (Lee and Rothwell 1966) and cattle (Norman and Stewart 1967) in the utilization of dry, low quality winter roughage in the northern areas of Australia.

There is an indication from this work that when sheep in pens receive lucerne on three to six days per week, the quality of roughage given during the remainder of the week may have little effect on wool growth rate and only a small effect on the rate of bodyweight increase. This appears to have been partly due to the tendency for roughage intake per day to decrease as the amount of lucerne increased, and as such was similar to other trials in which supplementary feeds have become substitute feeds (Holder 1962).

V. ACKNOWLEDGMENTS

I would like to thank Mr. M. Hunt and Mr. L. Fahey for their technical assistance.

VI. REFERENCES