The Effect of Level of Stocking on Two Posture Types Upon Wool Production and Quality

by

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SUMMARY

Sown pasture stocked at 4 and 6 sheep/acre maintained higher mean liveweights and produced more wool per head and per acre than did annual pasture stocked at these levels. At a stocking level of 2 sheep/acre there were no marked differences between sown and annual pasture. Seasonal changes in productivity are presented which account for the differences between the pasture types. Quality differences due to stocking level were not reflected in the average price per pound estimates.

INTRODUCTION

The usual sown pastures of south-east Australia are superior in dry matter productivity to natural vegetation. However, maximum utilization of these improved pastures for wool production is rarely achieved. In June 1958 at the Dickson Experiment Station, Canberra, an experiment was commenced in which the principal aims were to measure seasonal variation in the efficiency of wool growth and liveweight gain of sheep set stocked on two pasture types at three stocking levels.

EXPERIMENTAL PROCEDURES

Each of two blocks of pasture, one sown to Phalaris tuberosa-Trifolium subterraneum and the other consisting of subterranean clover with volunteer annual grasses, were subdivided into three 3-acre plots. Stocking levels of 2, 4 and 6 six-tooth Medium Peppin Merino wethers per acre were established on the two pasture types. The pastures were sampled at 2-monthly intervals to determine the amount and botanical composition of available material. The sheep were continuously grazed on their respective plots with no supplementary feeding at any time. All animals were weighed weekly. 56% of the 72 sheep on the trial were harnessed for total faecal collections twice weekly. Estimation of Dry Matter intake was made using local regression relationships between Total Faecal Nitrogen and intake derived from digestibility trials. From 35 sheep tattooed mid-side areas were cut every 6 weeks. Wool from these areas when analysed gave a measure of seasonal changes in both the quantity and quality of wool produced.

RESULTS OF FIRST YEAR

Liveweight:

The G/acre stocking rate treatments started later than the 2 and 4/acre rates so that liveweight changes are not strictly comparable. Sheep at 2/acre gained weight earlier in spring and began to decline in weight earlier in summer than did sheep at 4/acre (Figure 1). Sheep at 4/acre had this same delayed liveweight change relationship to sheep at 6/acre. There was very little difference in actual liveweight between sheep grazing at 2 and 4/acre on the

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sown pasture but on the annual pasture sheep at 4/acre had a considerably lower liveweight than those at 2/acre throughout most of the year. At the 6 sheep/acre stocking rates the average liveweights on the sown pasture were always better than on the annual pasture.

Liveweights off shears were 108, 112 and 106 lb. compared to 112, 111 and 99 lb. for sown and annual pastures at 2, 4 and 6 sheep/acre rates respectively.

Faecal DM output:

On abundant green pasture the mean levels of Faecal Dry Matter (DM) Output were very similar for all treatments. In periods of either shortage of green feed or of dry pasture, faecal output was higher on the higher stocking levels, until actual feed intake was considerably restricted when faecal output declined (Figure 1). (Intake data to be published elsewhere).

Faecal nitrogen content:

There was a higher nitrogen content in faeces from the lower stocking levels in winter and early spring, but in late spring and early summer this trend was reversed (Figure 1). Highest peak spring faecal N contents were obtained on the G/acre stocking level.

Total wool production and quality:

For the 10 months when the three stocking levels were operating mean greasy wool production per head declined by 1.05 lb. on the sown pasture as stocking rate increased from 2 to 6 sheep/acre (Table I). On the annual pasture the decline was 2.28 lb/head. Production per acre increased by 39.2 lb/acre on the sown pasture and by 33.3 lb/acre on the annual pasture.

There were no significant differences in percentages of clean wool between any treatments. The percentage of fleeces showing above average handle declined with increased stocking level and the better handle fleeces were produced from the annual pastures. A greater percentage of fleeces from the annual pastures showed trade tenderness. While there was very little difference in total staple length from sown pastures, staple length of fleeces from the annual pastures decreased as stocking rate increased. Mean fibre diameter was greater on the sown pastures. On Series 15 prices* price/lb differed little for fleeces between treatments. There was a greater return/acre from sown than from annual pastures.

Seasonal changes in wool production and quality:

Seasonal variations in both clean wool produced, staple length and fibre diameter, were greater on the annual pastures particularly on the two higher stocking levels. (Figure 2). In the period studied as much clean wool was produced in autumn and early winter as had been produced in spring. This was associated with extremely good pasture growth during early autumn.

*See appendix.
SEASONAL CHANGES IN BODYWEIGHT, FAECAL DM OUTPUT, & FAECAL NITROGEN CONTENT

Figure 1.

LIVEWEIGHT

FAECAL DM OUTPUT

FAECAL N CONTENT

SOWN PASTURE

ANNUAL PASTURE
# TABLE I.
The Effect of Stocking Level on Two Pasture Types on Wool Production: Summary of 1958-59 Results.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Greasy Wool lb./acre</th>
<th>Wool lb./head</th>
<th>% Clean Wool</th>
<th>% Fleeces Having Above Average Handle</th>
<th>% Fleeces Showing Trade Tender</th>
<th>Total Staple Length (mm)</th>
<th>Mean Fibre Diam. (microns)</th>
<th>Average Price/lb. (pence)</th>
<th>Return £/acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sown Pasture:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2/acre</td>
<td>22.7</td>
<td>11.37</td>
<td>71.5</td>
<td>67</td>
<td>0</td>
<td>101.5</td>
<td>21.1</td>
<td>84.95</td>
<td>9.67</td>
</tr>
<tr>
<td>4/acre</td>
<td>42.2</td>
<td>10.56</td>
<td>69.3</td>
<td>50</td>
<td>0</td>
<td>96.5</td>
<td>21.7</td>
<td>81.73</td>
<td>14.37</td>
</tr>
<tr>
<td>6/acre</td>
<td>61.9</td>
<td>10.32</td>
<td>69.8</td>
<td>34</td>
<td>31</td>
<td>100.0</td>
<td>21.4</td>
<td>81.61</td>
<td>20.05</td>
</tr>
<tr>
<td>Annual Pasture:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2/acre</td>
<td>23.5</td>
<td>11.74</td>
<td>68.9</td>
<td>100</td>
<td>32</td>
<td>102.0</td>
<td>20.4</td>
<td>79.43</td>
<td>8.88</td>
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<tr>
<td>4/acre</td>
<td>38.2</td>
<td>9.54</td>
<td>69.6</td>
<td>84</td>
<td>50</td>
<td>95.8</td>
<td>20.2</td>
<td>81.03</td>
<td>12.89</td>
</tr>
<tr>
<td>6/acre</td>
<td>56.8</td>
<td>9.46</td>
<td>69.4</td>
<td>55</td>
<td>50</td>
<td>79.5</td>
<td>19.8</td>
<td>80.50</td>
<td>19.05</td>
</tr>
</tbody>
</table>
SEASONAL CHANGES IN WOOL PRODUCTION & QUALITY

Figure 2.
Animals selected at random were midside sampled. There were unequal numbers from treatments. This inequality of numbers arose from the later starting of the two G/acre treatments and the strictly limited numbers of samples that can be made in one day. The numbers midside sampled and harnessed for faecal collections are shown in the table below.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Number of Sheep</th>
<th>Number Midside Sampled</th>
<th>Number Harnessed for Faecal Collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sown Pasture Z/acre</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Annual Pasture Z/acre</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>4</td>
<td>10</td>
</tr>
</tbody>
</table>

“Series 15 prices” represents the mean price paid at Sydney for the 15th sale in the 1959-60 selling period. These values are based essentially on the average prices for a wide range of wool types classified precisely by the Australian Wool Bureau. This fortnightly market average is regarded as the authentic prevailing value for Australian wools at any one period.

DISCUSSION

P. G. Schinckel (N.S.W.) observed that the data on seasonal variation in wool growth agreed with other data. The extent of this variation may be expressed as a ratio, rate of wool growth in the lowest period to that at the highest period. This ratio varied in different areas from 1:3 in Western Australia to 1:5 in New Zealand. The seasons of maximum and minimum production differ in different areas but the ratios are relatively constant in spite of different pasture and stocking rates. Most observations suggest that mean fleece weight could be lifted by 60 to 100% if sheep continuously produced at their maximum rate in any pasture management complex.

R. J. Moir (W.A.) reported similar results for the minimum-maximum wool growth ratio. He had also found that 80% of the variance in monthly wool growth was related to changes in fibre diameter.

Dr. D. E. Tribe (Vic.) suggested that the results of such experiments should be expressed in net rather than gross returns since there was evidence that net returns decrease with increase in stocking rate and may not compensate for the risks involved in the high stocking rates.

Answer.—No economic study of net returns was possible. However, costs per sheep would probably not increase appreciably with density under these conditions. There was no supplementary feeding and no increase, in worm burden. A drought reserve, necessary when 6 sheep per acre are carried, would be a small cost compared with the increased returns.