Rate of stocking, rate of fertiliser in the Chapman Valley

R.J. Parkin

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MORE SHEEP PER ACRE

Rate of Stocking/Rate of Fertiliser in the Chapman Valley

By R. J. PARKIN

THE Chapman Valley embraces a relatively small area of country, following generally the course of the Chapman River. The Chapman Valley proper extends from just north-east of Geraldton to Nanson, Nabawa and Naraling and includes on its fringes, areas of Narra Tarra, Moonyoonooka and areas west of Nabawa towards Northampton.

However, a number of other areas such as Kojareena, Northern Gully and Northampton have extensive areas of soil very similar to the major soils of the Chapman Valley. The soil is variable but essentially it is a brown loam, stony and gritty to sandy in some localities (hills and slopes) to a heavy deep loam in the valleys and along drainage lines.

The characteristic native vegetation is jam, curara (Acacia spp.) and standback (Hakea recurva) with occasional york gum, and river gums along the drainage lines with occasional Casuarina spp.

The stocking rate trial was started in May, 1963, on Chapman Research Station, near Nabawa. The trial included three stocking rates, 2, 3 and 4 wethers per acre at a low rate of super (45 lb. per acre) and three rates of superphosphate at the highest stocking rate (4 sheep per acre). The super rates were 45, 90 and 180 lb. per acre.

Table 1.—Greasy wool weight (lb. per head)

<table>
<thead>
<tr>
<th>Year</th>
<th>Super 45 lb./acre</th>
<th>Super 90 lb./acre</th>
<th>Super 180 lb./acre</th>
<th>Super 180 S/A 112 lb./acre</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2 Sheep/acre</td>
<td>3 Sheep/acre</td>
<td>4 Sheep/acre</td>
<td>4 Sheep/acre</td>
</tr>
<tr>
<td>1964</td>
<td>13.7</td>
<td>14.1</td>
<td>13.5</td>
<td>13.9</td>
</tr>
<tr>
<td>1965</td>
<td>11.3</td>
<td>11.8</td>
<td>10.9</td>
<td>10.4</td>
</tr>
<tr>
<td>1966</td>
<td>11.9</td>
<td>12.4</td>
<td>12.1</td>
<td>11.8</td>
</tr>
<tr>
<td>Total</td>
<td>36.9</td>
<td>38.3</td>
<td>36.5</td>
<td>36.1</td>
</tr>
<tr>
<td>Average</td>
<td>12.3</td>
<td>12.8</td>
<td>12.2</td>
<td>12.0</td>
</tr>
<tr>
<td>Total Wool/ac.</td>
<td>73.8</td>
<td>115.2</td>
<td>145.4</td>
<td>144.0</td>
</tr>
</tbody>
</table>

THE AUTHOR: R. J. Parkin, B.Sc. (Agric.)—Agricultural Adviser, Geraldton.
An additional treatment included 1 cwt. per acre of sulphate of ammonia at the 180 lb. per acre super rate and 4 sheep per acre stocking rate.

The experiment involved 120 Peppin Merino wethers. There were two replications, one situated on the slopes (stony and gritty) and one on the levee soils of the valleys.

On both sites the total superphosphate application is in excess of 1 ton per acre. The trial has run for three years continuously, the sheep being weighed monthly and shorn annually in March-April.

**PROGRESS RESULTS**

**Wool Production**

The animals were selected originally on the basis of 1962 and 1963 greasy wool weights. The combined wool weight of each group was $14.7 \pm 0.1$ lb. per head for two eight-month periods of wool growth. The wool weights for subsequent shearings are shown in Tables 1 and 2.

The trial has been complicated by the need for supplementation on many plots. The only treatment with no hand feeding throughout the trial period is the 3 sheep per acre stocking rate. The total wool production of this group over three years is 115 lb. per acre for an average wool cut of 12.8 lb. per head.

Some useful trends are apparent and becoming more obvious with time.

There is an apparent effect of super on wool cut per head at 4 sheep per acre.

The animals on plots receiving 180 lb. super annually have cut about a pound of greasy wool per head per year more than the average of the animals running on the plots receiving 45 and 90 lb. super per acre. (0.9 lb. in 1964, 1.0 in 1965, 0.8 in 1966).

The addition of sulphate of ammonia has had no effect on wool production. The greasy wool cut per head without sulphate of ammonia was 13.0 lb. average compared with 12.7 lb. with sulphate of ammonia. It may have more effect at a higher stocking rate.

Neither stocking rate nor super rate has had any effect on clean wool yield (see Fig. 1).

The highest wool production per acre has been achieved at the 4 sheep per acre stocking rate. The difference between nitrogen and super rates at the 4 sheep

<table>
<thead>
<tr>
<th>Super Treatment Year</th>
<th>2 Sheep/acre</th>
<th>3 Sheep/acre</th>
<th>4 Sheep/acre</th>
<th>4 Sheep/acre</th>
<th>4 Sheep/acre</th>
<th>4 Sheep/acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Super 45 lb./acre</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1964</td>
<td>9.0</td>
<td>9.7</td>
<td>9.1</td>
<td>9.3</td>
<td>9.9</td>
<td>9.7</td>
</tr>
<tr>
<td>1965</td>
<td>8.7</td>
<td>8.1</td>
<td>7.5</td>
<td>6.9</td>
<td>8.0</td>
<td>7.9</td>
</tr>
<tr>
<td>Total</td>
<td>17.7</td>
<td>17.8</td>
<td>16.8</td>
<td>16.2</td>
<td>17.9</td>
<td>17.6</td>
</tr>
<tr>
<td>Average</td>
<td>8.85</td>
<td>8.9</td>
<td>8.3</td>
<td>8.1</td>
<td>8.95</td>
<td>8.8</td>
</tr>
<tr>
<td>Total wool/acre</td>
<td>35.4</td>
<td>53.4</td>
<td>66.4</td>
<td>64.8</td>
<td>71.6</td>
<td>70.4</td>
</tr>
</tbody>
</table>

Chapman Research Station, near Nabawa, has an annual average rainfall of almost 18 in. The soil is mainly brown loam, deep and heavy in the valleys and gritty and stony on the slopes and hills.

This experiment indicates that a stocking rate of 3 wethers per acre can be safely carried on good subterranean clover pastures in the Chapman Valley. Hand feeding has not been necessary at this stocking rate.

The experiment involved 120 Peppin Merino wethers. There were two replications, one situated on the slopes (stony and gritty) and one on the levee soils of the valleys.

On both sites the total superphosphate application is in excess of 1 ton per acre. The trial has run for three years continuously, the sheep being weighed monthly and shorn annually in March-April.

**Table 2.—Clean wool weights (lb. per head)**

<table>
<thead>
<tr>
<th>Super Treatment Year</th>
<th>2 Sheep/acre</th>
<th>3 Sheep/acre</th>
<th>4 Sheep/acre</th>
<th>4 Sheep/acre</th>
<th>4 Sheep/acre</th>
<th>4 Sheep/acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Super 45 lb./acre</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1964</td>
<td>9.0</td>
<td>9.7</td>
<td>9.1</td>
<td>9.3</td>
<td>9.9</td>
<td>9.7</td>
</tr>
<tr>
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<td>8.1</td>
<td>7.5</td>
<td>6.9</td>
<td>8.0</td>
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</tr>
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<td>71.6</td>
<td>70.4</td>
</tr>
</tbody>
</table>
per acre then becomes an economic consideration. A recent report on this aspect (Ward, 1966) revealed no increase in gross margin of profit per acre from increasing super rate and application of nitrogen.*

Economically, at 4 sheep per acre there has been no advantage in applying more than 45 lb. per acre super annually. However, the benefit of higher phosphate levels could be cumulative and differences in the pastures do seem to be increasing each year. Over a longer period, this may be reflected more strongly in the stock production. Other considerations may also

* Comparative Budgeting of Stocking Rate Trial Results.—Australian Wool Board report by Mark A. Ward.

Fig. 1.—The effect of stocking rate and fertiliser treatment on wool cut per head.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Gross Margin Per Acre. (Wool at 50c Per lb.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 sheep per acre; super 45 lb. per acre</td>
<td>$18.52</td>
</tr>
<tr>
<td>3 sheep per acre; super 45 lb. per acre</td>
<td>$30.51</td>
</tr>
<tr>
<td>4 sheep per acre; super 45 lb. per acre</td>
<td>$36.38</td>
</tr>
<tr>
<td>4 sheep per acre; super 90 lb. per acre</td>
<td>$31.38</td>
</tr>
<tr>
<td>4 sheep per acre; super 180 lb. per acre</td>
<td>$37.96</td>
</tr>
<tr>
<td>4 sheep per acre; super 180 lb. per acre + sulphate of ammonia 112</td>
<td>$24.98</td>
</tr>
</tbody>
</table>

(Gross margin = Wool Revenue—Total Costs)
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favour the higher application. The consistently higher bodyweights at 180 lb. per acre super suggests there could be a lower risk factor in dry years, a higher sales price and hence a lower depreciation.

Liveweight Changes

The pattern of liveweight change of animals in this trial has been very similar to that of animals in other continuous grazing trials in the Geraldton district. A rapid increase in liveweight takes place in winter-spring, reaching a peak around mid December. This peak is more-or-less maintained until February-March. A loss in liveweight then occurs and the rate of this loss is determined by the incidence of rainfall over the period. The opening of the season precipitates very rapid weight loss of short duration followed again by rapid weight gain. These patterns are illustrated in Figures 2 and 3.

Figure 2 shows an almost constant relationship between stocking rates, with the 3 sheep per acre animals being at all times the heaviest group. The difference between stocking rates becomes most noticeable over the period of rapid weight loss in autumn-early winter. At this time, the 4 sheep per acre group (at 45 lb. super per acre) have weighed, depending on the year, 10 to 20 lb. less than the 2 and 3 sheep per acre groups, which have not been significantly different.

Figure 3 shows the effect of super on the liveweight of sheep run at 4 per acre. For the first year no differences between super rates were obvious, but differences developed in subsequent years. At no time have the 45 lb. and 90 lb. super rates been different with regard to sheep liveweight. The sheep running on plots receiving 180 lb. super per acre have weighed much heavier at all times since September 1965, and the difference has been greatest in summer and autumn. At this time, the high-super groups have been up to 10 lb. heavier than the low-super groups.

Supplementary Feeding

The need for supplementation was decided on the basis of sheep liveweight and body condition score.

Feeding started when average body weight fell below 85 lb. and average body
condition score fell below 1.5. The scale of condition scoring used was that developed by CSIRO workers.

In 1965, the only plot requiring supplementation was one replication of 4 sheep per acre at 90 lb. super. This amounted to 42 lb. hay and 18½ lb. oats per head, costing approximately 60c per head.

In 1964, considerable supplementary feeding was needed at 4 sheep an acre and low super rates, indicating the stress on these animals. Very little feeding was required at 4 sheep an acre with higher super rates and there was no need for supplements at 3 sheep an acre.

Pasture Changes

As with liveweight changes, the pastures on the plots are changing and the changes are becoming more obvious with time.

The 2 sheep per acre plots, while having a considerable clover content, are dominated by rank silver grass. The pasture receiving low super and grazed at 4 sheep

### Table 3.—Details of supplementary feeding in 1964

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Rep. I</th>
<th>Rep. II</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Supp. per Head</td>
<td>Cost/Head</td>
</tr>
<tr>
<td>2 sheep per acre—P45</td>
<td>13½ lb. Oats</td>
<td>22c</td>
</tr>
<tr>
<td>3 sheep per acre—P45</td>
<td>14 lb. Hay</td>
<td>46c</td>
</tr>
<tr>
<td>4 sheep per acre—P45</td>
<td>23½ lb. Oats</td>
<td>$1.30c</td>
</tr>
<tr>
<td></td>
<td>49 lb. Hay</td>
<td></td>
</tr>
<tr>
<td>4 sheep per acre—P90</td>
<td>54½ lb. Oats</td>
<td></td>
</tr>
<tr>
<td>4 sheep per acre—P180</td>
<td>14 lb. Hay</td>
<td>46c</td>
</tr>
<tr>
<td>4 sheep per acre—P180 + S/A 112</td>
<td>23½ lb. Oats</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9 lb. Hay</td>
<td>25c</td>
</tr>
<tr>
<td></td>
<td>9½ lb. Oats</td>
<td></td>
</tr>
</tbody>
</table>

Fig. 3.—The effect of superphosphate rate on liveweight of wethers stocked at 4 sheep per acre.
per acre is becoming clearly clover dominant. On one replication of the 4 sheep per acre 45 lb. super per acre the pasture is composed almost entirely of Dwalganup subterranean clover.

Sulphate of ammonia has had the effect of boosting capeweed growth tremendously in winter, and this is temporarily reflected in sheep liveweights. It also promoted doublegee growth. (Doublegees were not much in evidence on any other plots). It has also had a more or less permanent effect on grass with a trend toward grass dominance. The pasture composition on the 4 sheep per acre plots receiving 180 lb. super and 1 cwt. sulphate of ammonia per acre is similar to that of the 2 sheep per acre, super 45 lb. super per acre plots.

SUMMARY

- A stocking rate of 3 wethers per acre can be comfortably carried on established subterranean clover pastures in the Chapman Valley. Supplementary feeding may be necessary in some years if a stocking rate of greater than three wethers is to be supported continuously.

- Wool production per acre has reached a total of 145 lb. over a three-year period at 4 sheep per acre and 45 lb. super per acre. At the safe stocking rate of three sheep per acre and 45 lb. super per acre wool production per acre has totalled 115 lb.

- In this trial, it has been economic to increase the stocking rate to the highest level of 4 wethers per acre but to date, there has been no economic advantage in increasing the rate of superphosphate application.

- High super rates and the use of sulphate of ammonia at high stocking rates (4 sheep per acre) has tended to produce grass dominant pasture similar to the pasture resulting from the low stocking rate (2 sheep per acre).

- At the stocking rates examined, the use of nitrogenous fertiliser on established subclover pasture, has been a waste of time and money.

ACKNOWLEDGEMENTS

Grateful acknowledgment is made of the technical work carried out by the Chapman Research Station Manager (formerly E. R. Fox, and subsequently W. Booth) and his staff, the Sheep and Wool Branch for scouring of wool samples; to A. W. Williams, Regional Veterinary Officer for assistance at various stages of the trial and to Agricultural Adviser L. D. White, for advice and comments.

The finance for this trial was partly provided by Wool Research Trust Funds, which is gratefully acknowledged.
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turns in slightest breeze
• Automatic self-oiling
• Outstanding tail sta­
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