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Department of Agriculture, Western Australia

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MORE BUTTERFAT PER ACRE
AT DENMARK RESEARCH STATION

By The Dairy Division

STOCKING rates on dairy farms are generally too low and can be substantially increased, but unfortunately there is no satisfactory measurement to indicate the potential of a particular pasture or environment.

In a trial carried out on Denmark Research Station in 1966-67, to obtain information on carrying capacity of a dryland kikuyu-subterranean clover pasture, 10 adult dry cows were comfortably carried for 12 months on 10 acres—a stocking rate of one beast per acre. Taking into account unused hay conserved during this period, a stocking rate of at least one beast to 0.8 acres was considered possible. From this it was estimated that a carrying capacity of one milking cow to 1.6 acres was possible.*

To test this conclusion, it was decided to carry a number of cows in milk on a prescribed acreage and progressively increase their numbers until a point of maximum butterfat per acre was reached. This trial began in 1967.

The trial

Four acres of similar pasture was added to the original 10 acres and eight milking cows were carried on the 14 acres. Seven cows in milk were introduced in September 1967 and one was replaced in February, 1968, by two in-calf heifers. The animals continued to graze the area until February, 1969—a period of 18 months.

The 14 acres were subdivided into seven paddocks of two acres each and were rotationally grazed with two days of grazing followed by 12 days spelling on each paddock. During spring, hay was cut from a number of paddocks and grazing periods were increased and spelling periods decreased.

Fertiliser

Each year superphosphate was applied in March at 2 cwt. per acre and in August at 1 cwt. per acre. Muriate of potash was applied in March each year at 1 cwt. per acre on paddocks cut for hay in the previous spring and 35 lb. per acre on remaining paddocks.

Conservation

The spring of 1967 was very dry and hay yields were low, but in 1968 conditions were excellent and good yields were obtained. Details were:

1967: Four paddocks were cut after intervals from closing of 8, 8, 6 and 4 weeks, to yield a total of 105 cwt., or 13 cwt. per acre.

1968: Five paddocks were cut after intervals from closing of 9, 8, 8, 8, and 5 weeks. The total yield of hay was 380 cwt., or 38 cwt. per acre.

Animals

Seven pure-bred Guernseys (five in milk and two in-calf heifers) were introduced in September 1967 and one cow not in-calf was replaced in February 1968 with two in-calf heifers. All animals were selected to calve in April/May 1968.

Seasonal conditions

The dry spring of 1967 seriously reduced hay yields and this was followed by summer rain which encouraged growth of kikuyu. In autumn, 1968, early light rains gave a false start to the season, and when rains occurred in April they were accompanied by cold, wet conditions which continued until September, so that winter pasture growth was poor. Growing conditions were excellent in spring, 1968, but were followed by a very dry summer with some exceptionally high temperatures.

Supplementary feeding

The 105 cwt. of hay conserved on the trial area in 1967 was rationed during 1968 as follows:

- March 18-31—5 lb. per head per day.
- April—10 lb. per head per day.
- May-July—12½-15 lb. per head per day.
- August—5 lb. per head per day.

Available pasture

Pasture cuts were taken an inch above ground level, and yield and botanical composition were measured in September and December, 1967 and in March, May, July, September and December, 1968.

Animal Liveweight and Production

The cattle were weighed at 28-day intervals, except in January. Butterfat production was obtained from monthly Herd Recording data.

Results

Animal liveweights

Graph 1 shows the average liveweight trends of all animals. Calving dates and the period during which hay was fed are also indicated.

Noteworthy features are the gain in weight in spring and summer, the pre-calving fall in weight and the subsequent loss of weight in winter after calving.

Butterfat production

Five of the cows were in late stages of lactation when animals were introduced into the trial area in September, 1967. Lactations were completed between October and January. Production during that period was 10,425 lb. of milk and 518 lb. of butterfat. The new lactations began in March, 1968 and results are shown in Table 1, together with production in previous lactations, 1965 to 1967.
Graph 1.—Liveweight trends of experimental animals

Table 1.—Production of cows in 1968 and previous lactations

<table>
<thead>
<tr>
<th>Cow No.</th>
<th>Age</th>
<th>Days of lactation</th>
<th>Butterfat—lb. per lactation</th>
<th>Milk—lb. per lactation</th>
</tr>
</thead>
<tbody>
<tr>
<td>876</td>
<td>M</td>
<td>300</td>
<td>443</td>
<td>357</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>300</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>240</td>
<td></td>
<td></td>
</tr>
<tr>
<td>121</td>
<td>J2</td>
<td>330</td>
<td>437</td>
<td>389</td>
</tr>
<tr>
<td></td>
<td>S3</td>
<td>300</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S4</td>
<td>240</td>
<td></td>
<td></td>
</tr>
<tr>
<td>163</td>
<td>S2</td>
<td>300</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S3</td>
<td>270</td>
<td></td>
<td></td>
</tr>
<tr>
<td>187</td>
<td>J2</td>
<td>300</td>
<td>332</td>
<td>285</td>
</tr>
<tr>
<td></td>
<td>J3</td>
<td>300</td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Heifers 1st Calf</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>227</td>
<td>J2</td>
<td>300</td>
<td>239</td>
<td>191</td>
</tr>
<tr>
<td>237</td>
<td>J2</td>
<td>270</td>
<td>219</td>
<td>174</td>
</tr>
<tr>
<td>242</td>
<td>J2</td>
<td>240</td>
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<td>174</td>
</tr>
<tr>
<td>239</td>
<td>J2</td>
<td>270</td>
<td>219</td>
<td>174</td>
</tr>
</tbody>
</table>

Total production for the year (March to February) from eight cows was 41,130 lb. of milk and 1,865 lb. of butterfat, produced from 14 acres. This is equivalent to 2,938 lb. of milk and 133 lb. of butterfat per acre. The fall in production in 1968 as compared with previous lactations is obvious.

**Pasture**

Pasture yields of dry matter per acre are given in Table 2.

Table 2.—Available dry matter-cwt. per acre

<table>
<thead>
<tr>
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<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>2.96</td>
<td>6.91</td>
<td>4.20</td>
<td>4.07</td>
<td>3.15</td>
<td>3.38</td>
<td>5.83</td>
</tr>
<tr>
<td>C</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>OG</td>
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</tbody>
</table>

Graph 2 shows the contribution of clover and “other grasses” in winter and spring and of kikuyu in summer and autumn.

**Discussion**

No attempt was made to measure total pasture yields but pasture available was measured at strategic periods. Feed available at the end of the summer appears to have been adequate since cows were gaining weight. The yield in May, 1968, was no greater than in March, indicating the poor seasonal conditions in autumn, 1968. At this time animals were calving and requirements were much greater. The pasture was inadequate and there was substantial loss in body weight which was not overcome because reserves of meadow hay were small.

Dry matter yields in September reflect the low level of winter production; cows continued to lose condition. Spring growth was rapid and ultimately five paddocks (total area 10 acres) were conserved as hay. Even though stocking pressure was greatly increased on the remaining two paddocks dry matter yields were relatively
high, with cows gaining weight in the last months of lactation. The total hay yield at the end of 1968 was 380 cwt. more than adequate for likely requirements for the next 12 months, whereas the hay reserve at the end of 1967 was insufficient at only 105 cwt.

The botanical composition of the pasture has improved as a result of more intense grazing during the two-year period.

The seasonal contribution of clover, kikuyu and other grasses is apparent in Graph 2. Kikuyu was productive in autumn-early winter; clover and other grasses made maximum contributions in winter and spring and provided the meadow hay. Kikuyu became dominant at the end of spring and during the summer.

Comparison with previous lactations in Table 1 shows how seriously the production per cow fell in 1968 for the four adult cows. The serious fall in body weight before calving and then after calving when cows should be producing at a maximum level is also apparent. Clearly the 13 cwt. per cow of meadow hay available was not sufficient to meet requirements. Such conditions are normal on many dairy farms in the district, and on these farms production per cow is at similar levels. Under such conditions of management, production per cow is greatly reduced and consequently production per acre is relatively low.

Production per acre for the 1968-69 lactation (March 1968-February 1969 inclusive) was 133 lb. of butterfat per acre and this is more than double the figure achieved throughout the district.

The large reserve of meadow hay cut in the spring of 1968 is more than the normal annual requirement of eight cows, and consequently higher stocking rates are possible with adequate hay for supplementary feeding in the pre and post calving period. When this is fed much greater production per cow is anticipated and similarly much greater production per acre.

Conclusions

Eight milking cows were carried for 18 months on 14 acres with a production of 133 lb. of butterfat per acre. The per cow production was greatly reduced due to a shortage of fodder conserved in the year preceding the trial. Maximum utilisation of pasture has not yet been obtained and higher stocking rates are needed to utilise this pasture more fully. During 1969-70 the number of cows is increased to 9 on 14 acres—one milking cow to 1.55 acres.

Acknowledgments

The work reported in this article has been carried out largely under the direction of Mr. F. E. Ryan, in consultation with the Chief of the Division of Dairying. The field work at Denmark Research Station was supervised by the Manager, Mr. N. Macintyre.
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Railway freight rebate.
Early season spreading concession.

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NO ROAD TO FARM HEAP FROM SIDING OR WORKS

ROAD MILEAGE TO FARM HEAP FROM SIDING OR WORKS

First 15 miles
Over 15—20
20—25

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20—25

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$0.75

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Month
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per acre
per acre
per acre

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$3.75 per ton
$4.25 per ton

December
$3.50
$4.00
$4.50

January
$3.75
$4.25
$4.75

Feb.—April
$4.00
$4.50
$5.00

ADD $0.50 per ton when spreading from farmer's own heap.

AERIAL minimum order 30 tons

Month
Over 200 lb.
130—200 lb.
90—130 lb.

per acre
per acre
per acre

Oct.—Nov.
$6.50 per ton
$7.00 per ton
$7.50 per ton

December
$6.75
$7.25
$7.75

January
$7.00
$7.50
$8.00

February
$7.25
$7.75
$8.25

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