GROWTH OF LAMBS IN A SEMI-ARID REGION AS INFLUENCED BY DISTANCE WALKED TO WATER

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Summary
A feature of pastoral zone grazing systems is the long distances which separate the grazing area from the water supply. This situation was simulated experimentally by separating the food and water by one of three contrasting distances ranging from zero to 4 km. Lactating ewes with lambs at foot were used in the experiment.

Growth rates of lambs and voluntary food and water intake of their dams were measured over a 100 day period.

It was concluded that lambs could survive and grow to satisfactory weaning weights under a management regime involving frequent long walks between food and water, although growth rates were significantly lower in lambs which walked the furthest.

I. INTRODUCTION
Australia’s extensive arid and semi-arid regions support about 30 per cent of the total sheep population. In the Western Division of NSW alone, there are over nine million sheep and the main stock enterprise is Merino sheep breeding. Though the lambing potential is relatively high, the survival rate is poor. The expected average is 50 to 60 per cent of lambs reaching weaning age (Eastoe 1964).

Food and water are sparse and the distances travelled for food and water are much greater than in other regions. Lamb losses are fairly heavy under these conditions (Eastoe 1964).

This paper describes an experiment in which the distance separating food from water was varied from zero to 4 km. Growth rates of lambs were compared over a 100 day period from birth to weaning.

II. METHODS AND MATERIALS
The experiment was carried out at Falkiner Memorial Field Station, 45 km north of Deniliquin, N.S.W., during the spring and summer of 1968-9.

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(a) Animals and management

Twenty-one first cross Dorset Horn x Merino ewes, which had grazed in common since mating with Border Leicester rams, were used in this experiment. Seven pregnant ewes were allocated at random to each of the three treatments just prior to lambing. All ewes had single lambs and there were no lamb deaths.

The experiment started in mid-September and ended in early January when the lambs reached a mean age of 105 days. Ewe bodyweights were recorded at intervals of 14 days. The lambs were weighed shortly after birth, at marking time and at intervals of 14 days thereafter. The ewes were drenched prior to lambing to control internal parasites and the lambs were drenched at age 10 weeks. The lambs were shorn at the completion of the experiment and fleece weights recorded to the nearest 50 g.

(b) Treatments

Three treatments were used to provide a contrast in daily distance travelled. This was achieved by altering the relative placement of food and water supplies. In all treatments, feed was available ad libitum from a self-feeder and water from a trough. In treatment 1, the ewes with their lambs were placed in a small yard. In treatment 2, the sheep were confined to a long narrow laneway which was bare of vegetation (Squires 1970). The feeder was set at 2.2 km from water. In treatment 3, an attempt was made to simulate the field situation where sheep graze progressively further out from water as the season progresses. Accordingly, a laneway was used in which the feeder was moved from a distance of 0.8 km from water to a maximum of 4.0 km from water. The feeder remained at 0.8 km from day 0 to day 30 and the distance was progressively increased, by 0.8 km stages, at 14 day intervals thereafter. Automatic recording units involving mechanical and photographic devices (Squires, Daws and Bawden 1969) were set up in the laneways near the feeder and the water trough and at intermediate sites between them. These records were used to calculate daily distances walked by individually marked ewes and lambs.

(c) Rations

To ensure that sheep walked regularly to water, 15 per cent NaCl was incorporated into the food in commercially pelleted sheep cubes (12 per cent crude protein). The quantities given and rejected were recorded on a weekly basis from day 30 onwards.

Fresh water was supplied via a trough connected to a tank fitted with a “Stephens Type F” water level recorder. Drinking time and volume consumed were automatically recorded on a paper chart from day 30 onwards. Charts were changed weekly.

(d) Statistical procedures

Differences between groups were assessed by calculating the standard error of the difference between means. The standard error of the means is a measure of the within-group variability.
TABLE 1

*Bodyweights and bodyweight trends in ewes (each value is mean of 7 sheep)*

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Bodyweight at day 30*</th>
<th>Final Bodyweight at Day 100</th>
<th>Net Bodyweight Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>49.4 ± 1.8</td>
<td>41.2 ± 2.5</td>
<td>—8.2</td>
</tr>
<tr>
<td>2</td>
<td>55.4 ± 2.0</td>
<td>39.3 ± 1.7</td>
<td>—16.1</td>
</tr>
<tr>
<td>3</td>
<td>50.9 ± 2.7</td>
<td>36.3 ± 1.0</td>
<td>—14.6</td>
</tr>
</tbody>
</table>

* At lamb marking.

III. RESULTS

(a) Ewe performance

At the time of treatment allocation, the mean weight of all ewes was 55.8 ± 1.8 kg. Bodyweights of each group at day 30 (lamb marking), at day 100 and the bodyweight change from day 30 to day 100 are shown in Table 1. The two groups of ewes that walked long distances (treatment 2 and 3) lost more weight than did those in yards.

Fig. 1. — Mean daily distance walked by ewes and lambs at the end of each 14 day period, starting on day 16.
Fig. 2. — Mean food and water intake at the end of each 7 day period (g/head/day).
(b) Distance walked per day

It was observed that at no time did ewes and lambs operate independently in their quest for food or water. Furthermore, day old lambs were seen to walk, in moderate heat (27°C), the 2.2 km from the food trough to the water supply.

Analysis of charts showed that the mean daily distance walked by ewes in treatment 3 showed an initial upward trend which was slightly reversed between 1.6 and 3.2 km, and then increased when the distance between food and water exceeded 3.2 km (Figure 1). No attempt was made to record the short distances travelled by the group in the yard.

(c) Food and Water Intake

The results are summarized in Figure 2. Both food and water intake were significantly (P < 0.01) higher in the yarded group and showed a consistent upward trend.

(d) Lamb growth

There was no significant difference in birth weight of lambs. The mean weight of all male lambs was 4.1 ± 0.4 kg and the females 4.1 ± 0.2 kg. There was no disparity between treatments in sex distribution nor was there any evidence that sex of lambs was a significant factor in performance. Mean growth rate of ewe lambs over the 100 day period was 198 ± 12 g/day and that of the wether lambs 197 ± 14 g/day. Figure 3 shows means growth curves for lambs on respective treatments.

![Graph showing growth curves](image)

Fig. 3. — Mean growth curves for each treatment derived from lamb body weights at birth, day 12, day 30 and at 14 day intervals thereafter.
Although their initial growth rate was inferior, the penned lambs grew faster after day 30 and attained higher bodyweights. Growth rate in treatment 3 was sensitive to increasing distance between food and water. Growth rate to day 30, when the distance was increased to 1.6 km, was high but declined once this distance was exceeded. In treatment 2, where the distance between food and water was constant at 2.2 km, the growth rate of lambs over the 100 day period was 155 g/day which compares with 219 g/day for the non-walking lambs in treatment 1 and 126 g/day for the lambs in treatment 3. Liveweights at the end of the experiment were 28.4 ± 1.1 kg, 24.5 ± 1.6 kg and 23.5 ± 1.2 kg and the mean fleece weights from lambs shorn at the end of the experiment were 1.76 ± 0.08 kg, 1.71 ± 0.16 kg and 1.58 ± 0.13 kg for treatments 1, 2 and 3 respectively.

IV. DISCUSSION

The quality of native pastures in the winter rainfall semi-arid pastoral zone is generally poor in the summer and autumn months and the growth of weaner sheep can be a problem. High weaning weights are considered desirable, especially for spring born lambs. In comparison with previously published growth curves (Davies 1958; Pattie and Williams 1966), the 100 day weights of all groups in the present experiment were satisfactory.

The initial growth rate of all groups of lambs was high, and it is inferred from the work of Wardrop and Coombe (1961) that lambs were entirely dependent on milk for their nutrition at this time. The observations of Hodge (1964) suggest that at about six weeks of age lambs spend approximately half the daylight hours in grazing.

Under field conditions, where some herbage is available at close range, even young lambs would supplement their milk diet by grazing but, in the present experiments, the lambs had access only to a pelleted ration high in salt. No attempt was made to measure their actual intake but the feed intake curves for ewes plus lambs show an increase with time up to day 70. Beyond day 70, the curve for treatment 3 shows a marked decline which can be ascribed to the effects of distance to water. A similar decline in food intake was found for Merino wethers at the same distance (4 km) (Squires 1970).

The results show clearly that lambs can survive and grow to satisfactory weights under a management regime involving frequent long walks between food and water. However, growth rates were significantly lower in the groups which walked the furthest.

V. ACKNOWLEDGMENTS

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VI. REFERENCES