

RELATIONSHIPS BETWEEN PASTURE AVAILABILITY, MILK SUPPLY,
LAMB INTAKE AND GROWTH

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Summary

Competition for **herbage** between ewes and their lambs was measured over a wide range of pasture availabilities at one stocking rate during a 33 day period. Sucking lambs had significantly better growth rates than weaned lambs at all levels of pasture availability. The relative contribution of milk and grass to the total intake of the lamb varied with the tiller length of pasture.

At each level of pasture availability, weaned lambs consumed at least twice as much grass as the sucking lambs, but this greater intake of grass did not compensate for the lack of milk resulting from early weaning.

Removal of weaned lambs and the weaning of sucking lambs from pastures of very short tiller length (less than 5 cm) onto pastures of 10 cm or longer would result in an increased lamb growth rate from unsatisfactory low levels to reasonable gains of about 200 g day⁻¹. This gain is approximately 70% of that achieved by sucking lambs grazing with their dams on pastures of similar tiller length. However, the plant pool was rapidly depleted below its initial level when ewes and lambs were grazing together, whereas weaned lambs had little effect on the amount of plant material present in spring. If pastures of greater length than 10 cm are not available for weaning, it is preferable to leave the lamb sucking the ewe, to ensure lamb survival.

I. INTRODUCTION

The quantitative definition of the relationship between the **herbage** available, its effect on milk supply and the growth of the lamb are of importance to the **prime lamb industry**. The intake of digestible energy (DE) is a major determinant of lamb liveweight gain (Joyce and **Rattray** 1970). Also lamb intake and growth in grazing situations are dependent on the amount of plant material present (Arnold 1964; **Allden** and Whittaker 1970).

The results of early weaning experiments are mixed and inconclusive (Watson and Elder 1960; Spedding, Large and Brown 1961; Jagusch et al., 1971). This is most likely due to a confounding of pasture and animal factors in these relatively long term experiments. Also few workers have considered the quantitative importance of the level of pasture quality and availability in relation to competition for feed between ewe and lamb (Langlands 1973). These factors could have a major influence on the outcome of early weaning practices. Competition between **ewes** and their lambs for **herbage** was measured at five levels of pasture availability and at one stocking rate at the Mortlock Experiment Station, Mintaro, South Australia.

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II. MATERIALS AND METHODS

The treatments were:-

<u>Five nominal levels of pasture availability</u>		<u>Three grazing treatments</u>	<u>Two times of grazing</u>
Low	1	1. Weaned lambs	Phase 1
	2		5th October to 21st October
	3	2. Dry ewes	
	4		
High	5	3. Ewes with lambs	Phase 2 22nd October to 6th November

(a) Pastures

Pure swards of Wimmera ryegrass (Lolium rigidum Gaud.) at five levels of pasture availability were prepared as described by Allden and Whittaker (1970). Pasture availability as tiller length (TL, as defined and estimated by Allden and Whittaker, 1970) was measured weekly. The relative rate of change of tiller length was calculated for Phase 1 as the difference between the logarithms of tiller length at day 2 and day 16 divided by the time in days.

(b) Animals

Wether lambs from Dorset Horn rams joined to Border Leicester x Merino ewes were divided into ten groups of four on the basis of weight and age and the groups allocated at random to the weaned or suckling treatments. Half the lambs were weaned at an average age of six weeks, one week before treatments began. These lambs became treatment 1, their ewes became treatment 2 and the remaining lambs with their ewes became treatment 3. A constant stocking rate (80 animals ha^{-1}) was maintained over all availabilities, i.e. flock types (2) and (3) each grazed half the area available to flock (1).

(c) Animal Measurements

Ewes and lambs were weighed, after fasting overnight, at weekly intervals during the experiment. The energy content of liveweight changes during the experimental period was estimated from the relationships of body weight to body energy calculated for lambs by Allden (1970) and for ewes by Hutchinson (1969).

Ewe lambs (either weaned or suckling) from the same mating as the wethers and fistulated at the oesophagus were used six to ten per treatment to obtain dietary pasture samples. Herbage and milk intake of all lambs were estimated over a 4-day and a 1-day period respectively in each phase. The daily intake of milk and grass organic matter by the lambs was estimated by methods similar to those of Langlands (1972), except that the digestibility of the grass consumed by lambs was not reduced by three units. The energy content of ewes milk was taken as 6.5 kJ (1.6 kcal) per gram of fresh milk (Perrin 1958) and the energy content of ryegrass was taken as 19.7 kJ (4.7 kcal) per gram of digestible organic matter (Kellaway 1969).

III. RESULTS

(a) Growth rate and body energy

Suckling lambs had significantly better growth rates and estimated body energy gains (at least 50 g day^{-1} and 1000 kJ day^{-1} , respectively)

than did weaned lambs at all pasture availabilities (Figure 1a). However, lactating ewes lost more weight and body energy than did the dry ewes at low pasture availabilities. Only at high levels of available pasture did lactating ewes show similar liveweight and body energy changes to those of dry ewes (Figures 1 a, b).

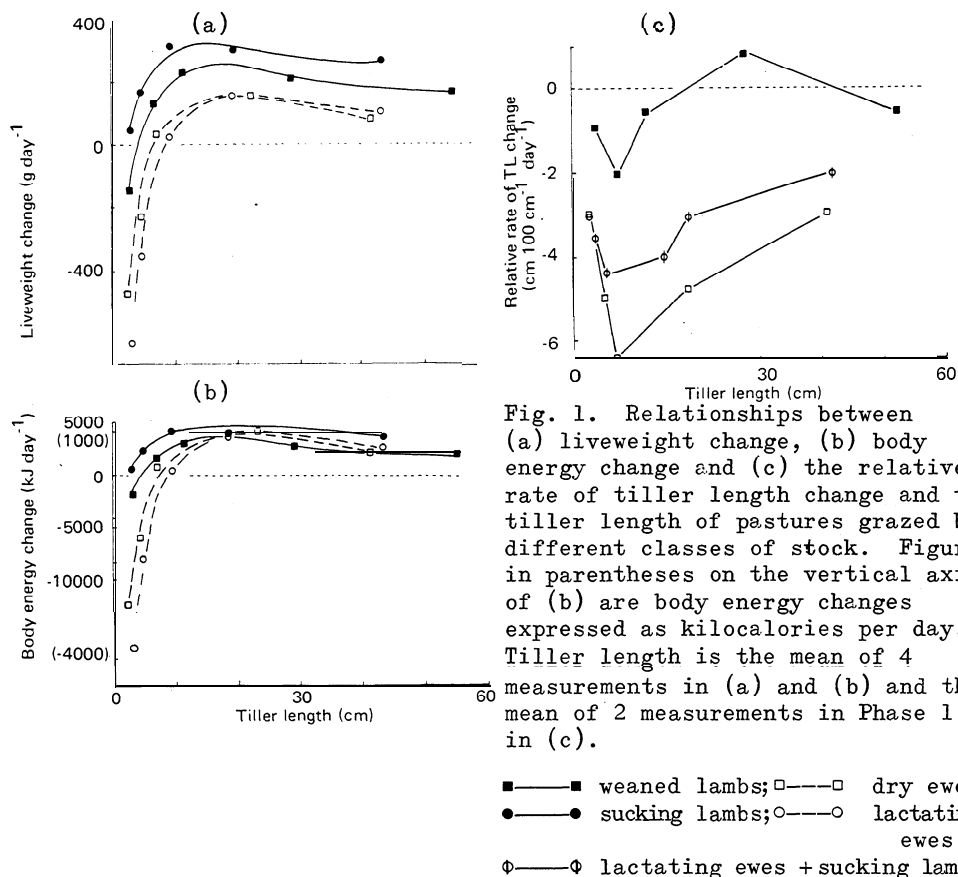


Fig. 1. Relationships between (a) liveweight change, (b) body energy change and (c) the relative rate of tiller length change and the tiller length of pastures grazed by different classes of stock. Figures in parentheses on the vertical axis of (b) are body energy changes expressed as kilocalories per day. Tiller length is the mean of 4 measurements in (a) and (b) and the mean of 2 measurements in Phase 1 in (c).

(b) Pasture changes

The ewes with or without lambs substantially reduced the pasture available, whereas the weaned lambs had little effect (Fig. 1c). The figure also shows that when an area was divided equally between a ewe and her weaned lamb, the grazing pressure of the ewe was greater and of the lamb less than when the ewe - lamb association grazed the whole area together.

(c) Lamb intake

The digestibility of the grass selected by the fistulated lambs was similar at each level of pasture availability irrespective of whether they had been weaned or were suckling (Table 1).

Table 1 shows that at each level of pasture availability weaned lambs consumed twice as much grass as the sucking lambs, but this increase in grass intake did not compensate for the lack of milk resulting from early weaning. Also, although greater liveweight losses were recorded for ewes on short pasture, milk production was equal to that of ewes grazing abundant pasture.

TABLE 1

The digestibility (%) and grass DE intakes of lambs, the milk DE intakes of sucking lambs and the total DE intakes of lambs grazing pastures of different availabilities. All DE intakes are expressed in terms of $\text{kJ kg}^{-1} \text{W}^{0.75} \text{day}^{-1}$.

Variable	Class of lamb									
	Weaned					Sucking				
Availability	1	2	3	4	5	1	2	3	4	5
Tiller Length (cm)	2.9	6.5	11.3	28.7	54.7	3.0	4.7	9.7	18.7	43.4
Digestibility	74.6	80.5	83.3	81.1	75.7	74.6	77.2	81.4	80.4	78.2
Grass DE intake	282	1019	1243	1141	889	141	370	432	726	564
Milk DE intake						448	564	685	486	485
Total DE intake	282	1019	1243	1141	889	588	924	1117	1212	1050

IV. DISCUSSION

The results of this short term study indicate that only under situations of low pasture availability is there any merit in weaning the young lamb, and if any growth advantage is to be obtained the lamb must go onto pastures of higher availability (Figure 1a). In the current study there was no suggestion of any advantage of weaning 8 weeks old lambs when the tiller length of pastures was greater than 10 cm; indeed, there was a loss in lamb growth rate resulting from the separation of ewe and lamb.

Thus, in the ewe - lamb unit the ewe sacrificed her own body tissue at low pasture availability in order to sustain the growth of her lamb. Under such conditions the weight loss of the ewe when separated from her lamb was substantially less than that of the suckling ewe, but her lamb grazing alone grew more slowly than the sucking lamb. The use of body energy to sustain milk production in the short term was an important compensatory mechanism under conditions of adverse nutrition,

The results in Table 1 show that there were no consistent differences in the total DE intakes of the lambs at each level of availability, although the partition of intake between milk and grass energy differed with treatment, but the sucking lambs grew significantly faster than the weaned lambs (Figure 1a). If the higher efficiency of use of milk compared to grass is taken into account the differences between the treatment groups can be eliminated (Jagusch and Mitchell 1971).

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