EFFECTS OF STRIP (RATION) GRAZING ON PASTURE AVAILABILITY AND SHEEP LIVEWEIGHTS DURING WINTER

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SUMMARY

An experiment investigated the effects of set stocking (SS) or strip (ration) grazing (SG) on the availability of autumn deferred annual pastures and on liveweights of Merino wethers (age 2.54.5 years) stocked at 20ka. The objective of the SG system was to graze to a residual pasture mass of 400 kg DM/ha with 2 to 4 day shifts, giving an estimated intake of about 0.8 kg DM/sheep.day which would maintain liveweight during the season of pasture growth. There was more pasture available(about 300 kg DM/ha in year 1 and 500 kg DM/ha in year 2) through winter under SG. SG sheep generally maintained liveweight. The SS wethers gained (3-6 kg) weight in the first month of the experiment, maintained weight through winter due to limited pasture availability and with supplementary feed in year 1, and gained (16 to 18 kg) weight rapidly in spring. SG offers the potential for carrying above average stocking rates through the winter feed gap without the need to give supplements.
Keywords: strip grazing, pasture availability, winter.

INTRODUCTION

Total pasture production from continuously stocked annual pastures is generally reduced at high stocking rates (Dunlop et *al.* 1984; Thorn et *al.* 1988), although exceptions occur where pasture growth rates in autumn and winter are high and when favourable conditions prolong growth late in the season (Brown 1977). The reduced growth rates result from low plant density and leaf area index (Donald 195 1), caused by over grazing early in the season.

In the Great Southern Region of Western Australia, average stocking rates per hectare in winter for set stocked sheep are less than 10 DSE, with carrying capacity being limited by winter pasture availability and growth rate. It may be possible to alleviate the winter feed gap by using strategic grazing tactics. Possibilities include autumn deferment (removal of stock through the break of season), which has advantages in late break years (Rossiter 1958) and systems of rationing pasture to stock. Strip grazing has been used to improve pasture utilization in dairy production and to ration pasture to sheep grazing perennial pastures (Nicol 1987). This paper presents preliminary results from an experiment designed to compare the effects of continuous set stocking (SS) and strip (ration) grazing (SG) on annual pastures at Kojonup, W.A.

MATERIALS AND METHODS

The experiment was conducted over 2 years (1989 and 1990) at 'Yannawah' about 25 km south-west of Kojonup (30°59'S., 117°6'E.) using 2.5 – 4.5 year old Merino wethers. There were 2 management treatments, SS and SG, from early winter to late spring. Both treatments were replicated 4 times in a block design. The 4 ha plots were stocked at 20 wetherska after an autumn deferment period. The SG treatment ceased when the sheep needed access to trough water as pastures dried off. After this individual plots were grazed until dry pasture residues were < 1000 kg DM/ha.

Pastures

The experimental site had been in pasture for 10 years, and in 1988 the pasture was capeweed dominant. Pasture composition assessed visually without calibration at the end of the autumn deferment was clover 15%, grasses 30% and weeds 55% in 1989, compared with clover 20%, grasses 50% and weeds 30% in 1990. There were no significant differences between treatments.

In 1989, the site was sown with 10 kg/ha Wimmera ryegrass seed. The plots were reseeded in 1990 with 6 kg/ha Wimmera ryegrass, 7 kg/ha subterranean clover and 3 kg/ha balansa clover seed to reduce differences generated during 1989. Plots were fertilised with superphosphate (9.1% P; 10.5% S) at 300 and 250 kg/ha in 1989 and 1990, respectively. Urea was applied at 50 kg/ha during winter in 1989.

Sheep were introduced to the plots on 8 June, 1989 and 7 May, 1990, when green pasture mass exceeded 400 and 750 kg DM/ha, respectively. On SG plots they were confined to an area within the plot which had the greatest amount of feed on offer (FOO). The area, "break", made available to the

sheep was calculated as: number of animals (80) *x* intake (0.8 kg DM/sheep.day) *x* days divided by pregrazing FOO – post-grazing FOO (400 kg DM/ha).

The period of grazing of each 'break' was 2 to 4 days during the growing season until 31 October, 1989 and 8 November, 1990, after which SG was discontinued. The intake of 0.8 kg DM/day of green pasture was estimated to be sufficient for maintenance of wethers weighing 50 kg, while the residual pasture mass (400 kg DM/ha) was decided from previous farmer experience. Where excess pasture (areas with >3500 kg DM/ha) occurred on SG plots it was removed by grazing with large flocks of sheep to simulate mowing for silage.

FOO assessments were made at about 3 weekly intervals by visual estimation (30 observations SS plots and 50 observations SG plots by 2 or 3 independent operators) calibrated from 15 to 20 quadrat cuts. Quadrats were cut at ground level using a scalpel. In addition, the pre and post grazing FOO values in "breaks" and areas where excess pasture was removed were assessed.

Sheep

Australian Merino Society wethers aged 2.5, 3.5 and 4.5 years old were used. In 1990, the oldest sheep were replaced with a new group of 2.5 year old wethers. All sheep were drenched and vaccinated according to normal farm practices, and were weighed periodically before the experiment commenced. They were stratified on the basis of liveweight within ages and allocated to plots. The same 10 sheep in the middle of the liveweight range for each age group were weighed and condition scored at regular intervals during the experiment. The SG sheep were generally, but not always, weighed at the end of a grazing period, when gut fill would be low.

In 1989, sheep on the SS plots were supplemented with about 250 g/sheep.day oats between 21 July and 27 August, due to very low pasture availability (< 400 kg DM/ha). No supplements were given during the growing season (when pastures were green and growing) to SG sheep in either year or to SS wethers in 1990. Faecal grab samples were taken from 10 of the weighed sheep on each plot at regular intervals through the experimental period and indicated low levels of internal parasites.

Statistics

Within years, treatment means were compared by analysis of variance. For pasture, comparisons have been made for FOO actually available at each assessment and when excess DM removed to simulate conservation as silage had been added to FOO for SG plots. For sheep, liveweight and condition scores were compared at the commencement of grazing, 28 days later, in August and at the conclusion of SG for the 2.5 year old wethers only, as the older groups had different starting liveweights in 1990.

RESULTS

There were no differences in FOO at the start of grazing in either year (Fig. 1). The amount of FOO on SG plots was greater ($P < 0.05$) than on SS plots by 8 September, 1989 and by 22 June, 1990. In November in both years there was no difference in FOO between SS and SG (1580 v. 2500 kg DM/ha, s.e.d. = *352.9* and 1820 v. 1820 kg DM/ha, s.e.d. = 145.8 in 1989 and 1990, respectively). No excess pasture was available from SS plots. Some excess feed was removed from one SG plot in July 1990, with pasture removed from all SG plots in both springs. When excess feed removed was included in November, differences were significant (1989, 1580 v. 3280 kg DM/ha, s.e.d. = 238.1, $P < 0.01$; 1990, 1820 v. 4030 kg DM/ha, s.e.d. = 665.3, $P < 0.05$).

Liveweights, including wool, and condition scores of 2.5 year old wethers were similar at the start of grazing. No significant differences in liveweight or condition score were detected after 1 month of grazing or in August in 1989 (Table 1). In 1990, SS sheep were heavier ($P < 0.05$) 4 weeks after grazing commenced, but were similar in liveweight to SG animals in August. SS sheep were of higher ($P < 0.05$) condition score through winter in 1990. At the conclusion of SG in spring in both years, SS sheep were of greater ($P < 0.01$) liveweight and condition score.

DISCUSSION

The experiment showed that in comparison with SS, SG resulted in additional pasture in August, the start of the spring growth period. We believe that this additional pasture in August was due to a lower consumption of autumn deferred pasture during the first month of grazing. This is consistent with the increase in liveweight of SS wethers during the first 4 weeks of grazing. The high initial pasture consumption under SS necessitated supplementary feeding in winter, 1989, to allow the pastures to persist. It is also possible that more pasture was grown in winter under SG. Annual pastures have the potential to grow at maximal rates around a leaf area index of 4, which for subterranean clover based pasture is at a pasture mass of about 1400 kg DM/ha (Cocks 1974). Throughout winter SS pastures had

Table 1. Liveweight (including wool, kg) and condition score of 2.5year-old wethers managed by set stocking (SS) or strip grazing (SG) during the *growing* season

Date	Liveweight			Condition score		
	SS	SG	s.e.d.	SS	SG	s.e.d.
			1989			
6 June	49.4	50.4	0.50	2.5	2.4	0.09
5 July	55.0	52.1	1.86	2.8	2.7	0.12
1 August	54.1	52.0	1.32	2.7	2.7	0.09
25 October	70.3	59.0	0.73	3.6	2.8	0.14
			1990			
7 May	41.4	41.2	0.35	2.4	2.3	0.15
7 June	43.9	38.1	1.53	2.8	2.2	0.15
16 August	45.2	41.3	1.46	2.6	2.1	0.03
8 November	63.3	41.4	1.01	3.8	2.0	0.10

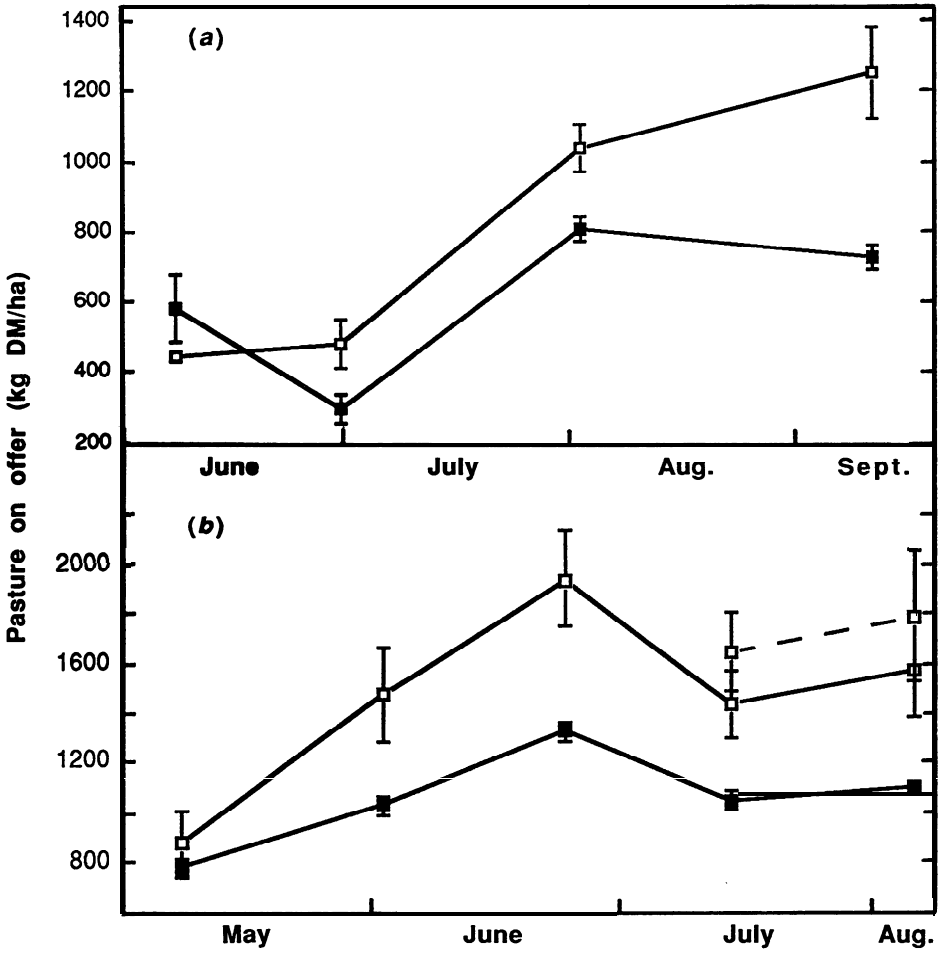

Fig 1. Pasture on offer under set stocking (■) and strip grazing (□) at Kojonup in (a) 1989 and (b) 1990. The dotted line for strip grazing in 1990 represents estimates of pasture on offer if excess feed had not been removed.

FOO values less than this, indicating suboptimal growth rates. In comparison, while FOO was about 400 kg DM/ha immediately after grazing in SG pastures, a large area of the plots had FOO values in excess of 1400 kg DM/ha as on average it took 29 – 57 days and over 70 days to rotate around the plots in 1989 and 1990, respectively.

While care is needed in interpreting the liveweight data, as there would be differences in gut fill and wool weights between SS and SG sheep, the results indicate that it is possible to ration annual pastures to sheep to maintain liveweight through the pasture growing season. This practice would also reduce seasonal variation in wool growth rates and fibre diameter. The SS data indicate that it may also be possible to maintain sheep liveweights under continuous stocking where FOO is between 750 – 1000 kg DM/ha. These values are somewhat higher than other estimates (Smith *et al.* 1972, 1973; Thorn and Perry 1987), which may be due to differences in pasture species present or to differences in techniques used to estimate and calibrate FOO.

It is apparent that strip grazing of sheep enabled high stocking rates to be carried through winter without supplementary feeding. However, the consequences of tactical use of strip grazing for growth rate and persistence of annual pastures is poorly understood and warrants further investigation.

ACKNOWLEDGMENTS

The considerable inputs and assistance of the Young families, the skills of Messrs N. Mamey, T. Plaisted, D. Mead and G. Mathews and support from the Southern Districts Sheep Research Council, Gallagher RSM Pty Ltd and CSBP and Farmers Ltd are acknowledged.

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