INFLUENCE OF GRAZING SYSTEM (WITH OR WITHOUT HAY CONSERVATION) ON WOOL PRODUCTION AND BODYWEIGHT OF WETHERS

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Summary

Wool production and bodyweight change of wethers were compared in two management systems (a) continuous stocking of pasture (C.S.) without hay conservation or supplementary feeding, and (b) discontinuous stocking of pasture (D.S.) with animals removed to a feed lot in autumn and sustained on hay conserved within the system.

The management systems were compared at 12.3, 14.8 and 17.3 sheep/ha but there were also C.S. plots at 7.4 and 9.9 sheep/ha. Wool production and bodyweight change is reported for each of the four years of the experiment (1966 to 1969).

In the three years, 1966 to 1968, management (C.S. or D.S.) had no apparent effect on annual clean wool production, but in 1969 wool production was substantially less on D.S. plots than it was on comparable C.S. plots.

Management (C.S. or D.S.) affected the pattern of bodyweight change, but in each of the first three years there was generally little difference in mean bodyweight in spring between animals on C.S. and D.S. plots at a particular level of stocking. In 1969, mean bodyweight of animals on D S. plots was lower than that on comparable C.S. plots throughout the year.

I. INTRODUCTION

In Victoria, pasture production in spring mostly exceeds animal demands, and pasture conservation is commonly practised in an attempt to reduce within and between year inequalities in pasture supply and requirement. However, in autumn, pastures are usually subjected to grazing "pressure", and according to leaf area index theory (Donald and Black 1958), removal of this pressure could lead to an increase in pasture growth rate and consequently an increase in pasture available for conversion to animal products. The need to supplement pasture or to relieve grazing pressure is most likely at high stocking rates.

There are no published data on wool production and bodyweight responses to deferred grazing with hay feeding in an enclosed system.

Observations were undertaken to compare annual wool production and monthly bodyweight change of wethers in systems with or without hay conservation combined with autumn deferment of grazing and lot feeding. Comparison was made at 12.3, 14.8 and 17.3 sheep/ha during several consecutive years.

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II. MATERIALS AND METHODS

The experiment was conducted 160 km north east of Melbourne at Earlston (mean annual rainfall 500 mm). The pasture, comprised of annual grasses, clovers and *Phalaris tuberosa,* had received molybdenum and 1500 kg superphosphate/ha. Further molybdenum and 126 kg superphosphate/ha were applied annually in the experimental period.

Management comparisons were made between continuous stocking (C.S.) and discontinuous stocking (D.S.). There was a C.S. plot at 7.4, 9.9, 12.3, 14.8 and 17.3 sheep/ha and a D.S. plot at 12.3, 14.8 and 17.3 sheep/ha.

Six wethers, allotted on wool cut per head, were introduced to each plot in October 1965 and 1967. In 1967 and 1969, individual sheep were replaced on some plots, the reasons for replacement being unrelated to management treatment. Neither the animals replaced nor their replacements were included for analyses in the year of replacement.

One quarter (by rotation) of each D.S. plot was enclosed in August and hay made, removed and stored in October or November. The per cent crude protein (Kjeldahl N x 6.25) was determined from a composite sample of hay each year.

When pasture growth commenced each year, sheep were removed from D.S. plots and fed hay for eight weeks in a common feeding yard, using hay conserved from the D.S. plots. The hay was pooled and fed once weekly' at a rate of 0.91 kg/head/day to provide common conditions of feeding and about 5 Starch Equivalents/head/wk.

Monthly bodyweights were recorded direct from pasture from October 1965 to October 1969. Animals were shorn in October and clean fleece calculated by applying the yield percentage to the weight of greasy fleece and belly wool shorn from each sheep.

TABLE 1

Amount of hay* (ton/ha) conserved, utilized and accrued annually for D.S.†
treatments

Hay	Stocking rate, sheep/ha		
	12.3	14.8	17.3
	ton/ha	ton/ha	ton/ha
(a) conserved	1.12	0.96	0.98
(b) utilized	0.63	0.75	0.88
(c) accrued	0.49	0.21	0.10

* Mean of four years (a) conserved 1965 to 1968 (derived from mean of all hay areas in 1965 and actual plot production, 1966 to 1968), (b) utilized 1966 to 1969, (c) accrued 1965 to 1968.

† Deferred stocking treatments.

Mean clean wool production (W kg/ha) was related to stocking rate (R sheep/ha) and a management pseudo-variable D for management treatment (D = 0 for C.S. plots and 1 for D.S. plots) by the following equation,

$$W = a + bR + cR^2 + dD + eRD + fR^2D$$

This equation was fitted to the clean fleece data for each year separately. *Only* those factors with coefficients significant at the 5 per cent level were retained in the final equation.

III. RESULTS

(a) Hay conserved, utilized and accrued

About 1 ton hay/ha was conserved annually on each D.S. plot. After feeding, there was little annual surplus at 17.3 sheep/ha, but at 12.3 sheep/ha a mean 0.5 ton hay/ha accrued each year (Table 1).

The quantity and quality of hay conserved varied considerably between years. The mean amount conserved in 1965 (0.75 ton/ha) was half that in 1966 and the per cent crude protein varied from 8.2 in 1965 to 16.1 in 1966.

(b) Wool production

For each year clean wool production/ha was related linearly to stocking rate. Management treatment (C.S. or D.S.) had no apparent effect on clean wool production in the three years (1966 to 1968) but in 1969 wool production was significantly greater (P<0.05) on C.S. than on comparable D.S. plots (Figure 1).
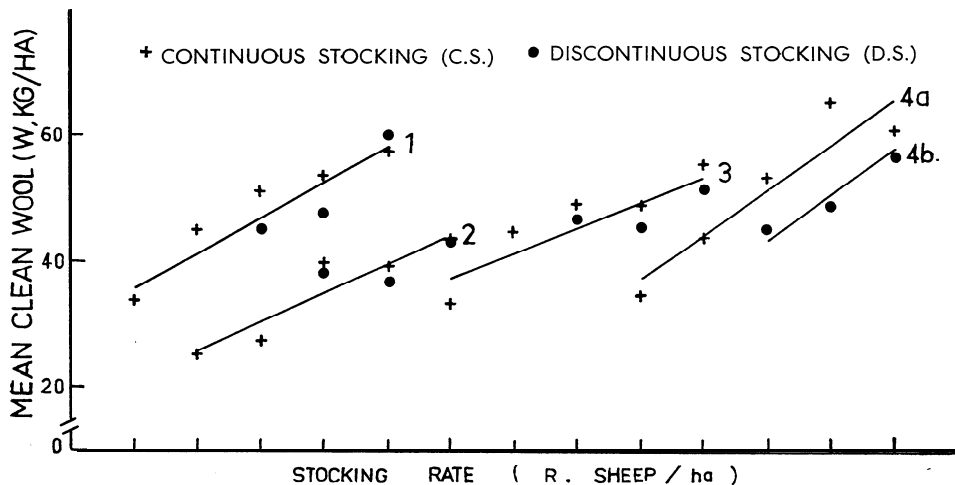
For curves 1, 2, 3, and 4a, R = 7.4, 9.9, 12.3, 14.8, 17.3 sheep/ha:
For curve 4b, R = 12.3, 14.8, 17.3 sheep/ha

1. 1966: w = 18.9 + 2.24R (88.3%) (±0.33)
2. 1967: w = 12.0 + 1.84R (83.2%) (±0.34)
3. 1968: w = 24.9 + 1.65R (81.4%) (±0.32)
4. 1969: w = 15.4 + 2.92R − 8.31D (87.6%) (±0.49) (±3.31)

D, a pseudo variable for management treatment, (D = 0 for CS plots and D = 1 for DS plots).

Fig. 1. — Relationship of mean clean wool production (W kg/ha) to stocking rate and management treatment.

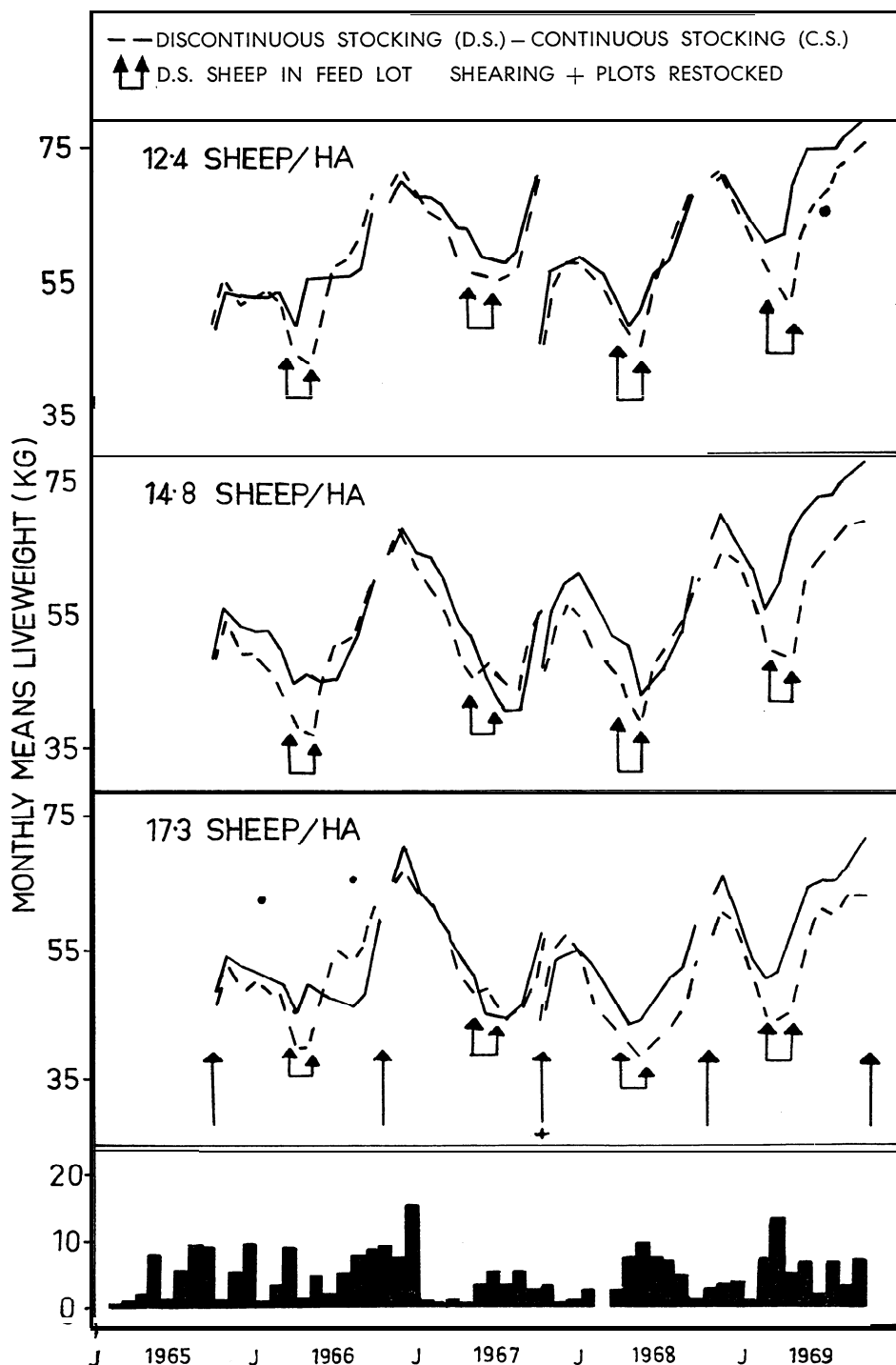Fig. 2. — Change in monthly mean bodyweight at 12.3, 14.8, 17.3 sheep/ha.
Monthly rainfall.

(c) Liveweight relationships
(i) With rainfall and stocking rate

Although annual rainfall varied from 720 mm (1965) to 270 mm (1967), bodyweight was maximal in November or December each year. Sheep continuously depastured had minimal bodyweights in March, April or May except in 1967 when the minimal bodyweight occurred in August. Variation in stocking rate had little effect on the time at which bodyweight was minimal or maximal (Figure 2).

(ii) With management

At commencement of deferment period

By the time deferment commenced each year, bodyweight of animals on D.S. plots had mostly declined to levels lower than those of animals on C.S. plots.

During deferment period

In the feed lot no group of sheep gained weight but the rate of less varied between groups and years. It was greatest for sheep at 12.3/ha but never exceeded 0.74 kg/wk.

In 1969, sheep at pasture gained weight at stocking rates of 12.3, 14.8 and 17.3/ha but in other years they did so at 12.3/ha only. Those at 14.8/ha lost weight, the loss in 1967 and 1968 being much greater than for the comparable sheep in the feed lot. At 17.3 sheep/ha, weight loss at pasture was less than for the comparable sheep in the feed lot, except in 1967.

General

Differences in bodyyweight at each level of stocking between sheep on C.S. and D.S. plots in autumn and winter had largely disappeared by spring each year (1966 to 1968), but in 1969 mean bodyweight of animals on C.S. plots was greater than that on D.S. plots throughout most of the year.

IV. DISCUSSION

Bishop and Kentish (1966) found wool production slightly, but not significantly ($P < 0.05$) greater for animals removed from pasture and lot fed in autumn, than for animals fed a supplement at pasture. In their experiment, hay was introduced from an outside source and sheep stocked at one level only. In this experiment, removal of grazing pressure from pasture in autumn in association with hay conservation and feeding did not result in an increase in wool production in comparison with, continuous stocking of pasture. Indeed, in the fourth and final year of the experiment (1969), wool production and bodyweight were depressed on D.S. plots relatively to C.S. plots. In general, hay conservation adversely affected bodyweight in autumn and the penalty was not overcome by lot feeding. Hay did, however, accumulate on D.S. plots and the amount at 12.3 sheep/ha particularly was of such a magnitude as to require its evaluation as a productive item in any economic interpretation of the experiment.

The data presented indicates that within an enclosed system annual manipulation of the feed supply by conserving hay and lot feeding will increase the costs and may reduce wool production. It suggests (as reflected by lower minimum liveweight) that at very high stocking rates (e.g. 17.3 sheep/ha) there may be a greater risk of starvation in the hay conservation system compared to that in a system of continuous grazing.

V. ACKNOWLEDGMENT

VI. REFERENCES

BISHOP, A. H. and KENTISH, T. D. (1966). *Proc. Aust. Soc. Anim. Prod.* **VII:** 164.

DONALD, C. M., and BLACK, J. N. (1958). *Herb. Abstr. 28:* 1.