

THE GROWTH OF MERINO LAMBS GRAZING FOUR TEMPERATE GRASSES

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Summary

The bodyweights of lambs grazing pure swards of either phalaris, tall fescue, cocksfoot or perennial ryegrass at two stocking rates were measured in two years. Although lambs grazing cocksfoot had lower annual bodyweight gains than those grazing the other three species, this difference was small compared to the large seasonal differences in growth of lambs grazing each species. Lambs grazing phalaris had poor summer growth and those grazing cocksfoot poor autumn and winter growth. The growth of lambs grazing perennial ryegrass was intermediate while lambs grazing tall fescue had satisfactory growth rates during the whole trial.

I. INTRODUCTION

A number of comparisons of the productivity of sheep grazing perennial grasses have been made where the amount of herbage available was not limiting (McLean et al. 1965; Gallagher, Watkin and Grimes, 1966) and where the species have been stocked for periods of much less than a year (Biddiscombe 1964). A few studies have used a sufficiently high stocking rate to test the ability of different species to meet the quantitative nutritional demands of sheep grazing year long (Hutchings, Neal-Smith and Seton 1963; Axelsen and Morley 1968).

The trial reported in this paper compares the growth of lambs grazing four pure swards of temperate perennial grasses throughout the year on the Northern tablelands of New South Wales. The results are part of a wider study in which both pasture and animal parameters are measured.

II. MATERIALS AND METHODS

The experiment was located at the C.S.I.R.O. Pastoral Research Laboratory, Armidale (Lat. 30° 31' S, altitude 1070 m, mean annual rainfall 750 mm). The region has a cool temperate climate and rainfall has a summer incidence (65 per cent) and high variability both within and between years. Data for rainfall and evaporation from a free water surface (E_s) were available for the experimental period.

Four perennial grasses *Phalaris tuberosa* (cv. Australian Commercial), *Festuca arundinacea* Schreb. (tall fescue cv. Oregon), *Lolium perenne* L. (perennial ryegrass cv. Kangaroo Valley) and *Dactylis glomerata* L. (cocksfoot cv. Akaroa) were sown

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in May 1966 in a total of 32 plots each of 0.154 ha using a randomized block design of two blocks x four species x two stocking rates x two internal replications per block. In year 1 (1967/68), one internal replicate was used as a conservation treatment. This treatment was not applied in year 2 (1968/69) and the results will not be presented in this paper. Thus year 1 consisted of two replicates and year 2 of four replicates of each species-stockings rate treatment.

At sowing and each April thereafter, superphosphate and potassium were applied to all plots. For the duration of the trial, 69 kg nitrogen per ha was applied each three months. The plots were stocked with wethers at high and low stocking rates from February to October 1967 prior to the experimental animals being placed on the plots.-

In year 1, the plots were set stocked with Merino ewes and lambs when the average age of lambs was ten days. Equal numbers of wether and ewe lambs were allocated to each plot. The lambs were weaned at eight weeks of age by placing udder covers on the ewes. The wether lambs were removed at 5 months of age and the adult ewes and ewe lambs remained on the plots for the experimental period of 11 months. The low stocking rate was 13 ewes plus lambs and the high 26 ewes plus lambs per ha.

In year 2, the same plots were set stocked with weaned Merino lambs at an average age of eight weeks at stocking rates of 26 and 39 lambs per ha. Equal numbers of ewe and wether lambs were allocated to each plot and these lambs remained on the plots for 11.5 months.

The lambs were vaccinated against enter-toxaemia, treated with cobalt bullets, dosed with 'Mansonil'* to minimize infection by tapeworms and routinely dosed with thiabendazole to minimize the effects of worm parasites.

Bodyweights of lambs were measured at approximately three weekly intervals and, in both years, the data were adjusted for differences between plots in initial bodyweight. An analysis of variance on plot means was used to analyse the bodyweights at the beginning and end of each season indicated in Figure 1. Because of the discontinued treatments at the high stocking rate in year 1, the bodyweight data from the low stocking rate were analysed separately. The seasons in this study are defined by the dates of weighing which are closest to the beginning and end of the calendar seasons and thus they differ slightly in length. Chi-square analysis was used for the mortality data.

III. RESULTS

Annual rainfalls for the period October to September and the coefficients of variation of monthly totals were as follows:—

	Annual (mm)	Monthly C of V (%)
1967/68	789	99
1968/69	872	53

The seasonal distributions of rainfall and evaporation are given in Figure 1 along with lamb bodyweights and mortalities due to nutritional. stress.

In year 1, there were no significant differences between bodyweights of lambs grazing the different species at either stocking rate. In year 2, at the end of summer, lambs grazing cocksfoot were significantly heavier ($P < 0.05$ and, at the end of winter, significantly lighter ($P < 0.05$) than those grazing the other three species.

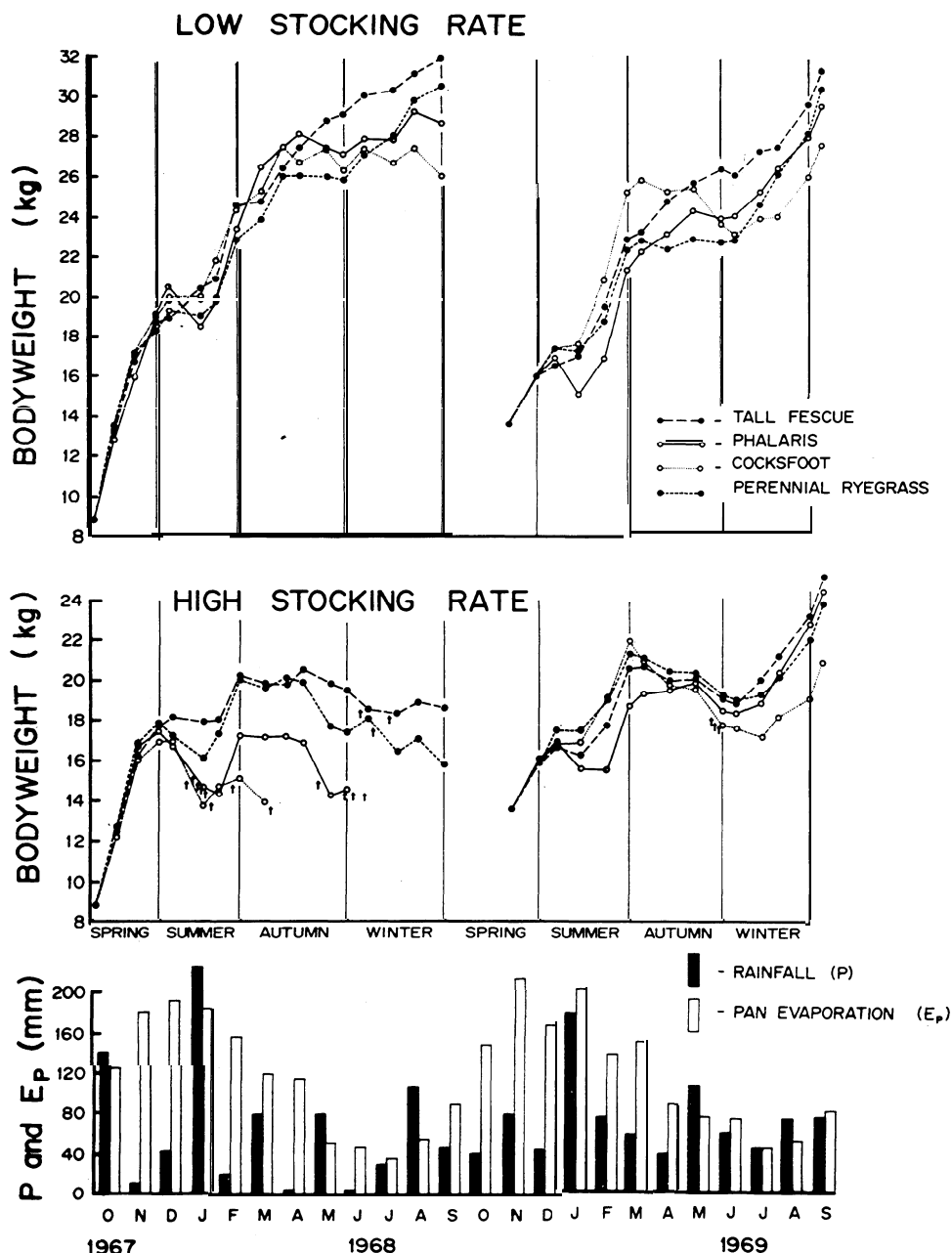


Fig. 1.—Bodyweight change and mortality (†) of lambs grazing four perennial grasses, together with rainfall and evaporation from a free water surface (E_p).

Lambs on the low stocking rate plots were significantly heavier ($P < 0.05$) than lambs on the high stocking rate plots, except at the beginning of summer. There were no significant interactions.

In year 1 at the high stocking rate, there was significantly higher mortality among lambs grazing phalaris than among lambs grazing any of the other species.

The mortalities for each species were: phalaris, 100 per cent; cocksfoot, 50 per cent; tall fescue, 25 per cent; perennial ryegrass, 12.5 per cent. In year 2, mortalities only occurred on cocksfoot where three of the 24 lambs died, which was not statistically significant. There were no mortalities at the low stocking rate in either year.

Seasonal growth rates of lambs are reported in Table 1. In year 1 at the low stocking rate, the growth rates of lambs in spring were significantly ($P < 0.05$) higher than those in the other seasons. In year 2 at both stocking rates, there were significant differences in growth of lambs ($P < 0.05$) between each of the four seasons and the interaction species \times season was significant ($P < 0.05$). This interaction was mainly attributable to the high growth rate of lambs grazing cocksfoot in summer and the low growth rate of these lambs in the autumn.

IV. DISCUSSION

Lambs grazing cocksfoot had lower annual bodyweight gains than those grazing the other three species. However, this difference was relatively small compared to the large seasonal differences in growth of lambs grazing each species. Lambs grazing tall fescue had satisfactory growth rates during the whole of the trial, while the growth rates of lambs grazing phalaris and cocksfoot varied widely from season to season. Growth rates of lambs grazing perennial ryegrass were intermediate. The bodyweight gain of lambs grazing cocksfoot was generally higher in the summer than that of lambs grazing any of the other species but the autumn and winter lamb growth rates were the lowest. Lambs grazing phalaris on the other hand generally had the lowest growth rate in the summer but had satisfactory autumn and winter growth rates. At high stocking intensities, these differences would largely reflect different growth rhythms for the species although seasonal differences in either digestibility or net energy of herbage may be important.

Based on cutting trials, Hilder (1963a, 1963b) reported high yields, particularly in summer, and an extended growing season from two tall fescue cultivars

TABLE 1

Seasonal growth rates (g/day) of lambs grazing pure swards of four species of perennial grasses

	1967/68				1968/69		
	Spring	Summer	Autumn	Winter	Summer	Autumn	Winter
LOW STOCKING							
RATE							
Tall fescue	+161	+75	+44	+29	+ 78	+39	+39
Phalaris	+168	+54	+35	+18	+ 57	+29	+48
Cocksfoot	+167	+67	+20	— 4	+100	—17	+28
Perennial ryegrass	+155	+58	+28	+50	+ 71	+ 5	+65
HIGH STOCKING							
RATE							
Tall fescue	+145	+33	— 7	— 9	+ 56	—18	+48
Phalaris	+145	— 2	—25		+ 31	— 2	+51
Cocksfoot	+133	—23			+ 65	—45	+14
Perennial ryegrass	+148	+28	—24	—17	+ 57	—24	+31

tested at Armidale. With supporting animal data from the present trial, it appears that tall fescue is a valuable species for the Northern Tablelands of New South Wales. The persistence of tall fescue under intensive grazing is inferior to that of phalaris (Hutchinson 1970) and this may be a limitation.

Phalaris with either white or subterranean clover has proved to be an extremely useful species when grazed by sheep in other trials (Hutchings, Neal-Smith and Seton 1963; Robinson and Simpson 1966; Axelsen and Morley 1968). However, when grown with nitrogen but without a legume, it contributes little to the growth of young sheep during the summer. The mortalities experienced during year 1 provide further evidence of this deficiency which is not a feature of tall fescue or perennial ryegrass.

Although there were no significant differences in bodyweight gain of lambs grazing different species in year 1, the trends are similar to those of year 2. Annual rainfalls for both years were above the mean of 750 mm but the high variability of monthly rainfalls recorded in year 1 (Figure 1) resulted in a number of dry periods in summer, autumn and winter which were accompanied by large differences in animal production between species at the high stocking rate.

Pasture data which have been collected on availability, growth rate, digestibility and basal area may help explain some of the differences in growth of lambs. Further work is aimed at relating pasture availability and intake of different species to growth of lambs.

V. ACKNOWLEDGMENTS

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