PRODUCTION OF ALFALFA (*Medicago sativa* L.) III. SHEEP PRODUCTION[1]

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Resumen

En un ensayo realizado en Canberra, Australia, se midieron los cambios de peso vivo y el crecimiento de lana, en grupos de 3 corderos merinos más 2 corderos cruza cada uno, que pastoreaban parcelas con alfalfa, sembrada a 4 distintos espaciamientos de 15, 30, 45 y 60 cm, y sin alfalfa. El sistema de pastoreo y la carga animal eran los mismos para cada grupo de corderos.

No se detectaron ventajas en la producción animal atribuibles al pastoreo en la alfalfa.

Cambios estacionales en el peso vivo y en el crecimiento de la lana fueron marcadamente diferentes entre los tratamientos con y sin alfalfa, pero sin significancia estadística.

Los corderos cruza ganaron significativamente más peso ($P > 0.05$) que los merinos, tanto en términos absolutos como relativos.

La producción de lana mostró una marcada tendencia estacional, con tasas de crecimiento invernal del 50 por ciento a las obtenidas en primavera y verano.

Introduction

There is evidence that alfalfa pasture increase animal production from young growing ruminants (2, 3, 8, 16). Alfalfa does not necessarily increase the total annual production of herbage but it does increase the total legume content of the diet. An increased legume content invariably increases the amount of pasture eaten by grazing animals and often increases the digestibility of the feed.

Different forage species of the same digestibility may be eaten in quite different amounts. Osbourn *et al.* (14) and Osbourn (13) showed marked differences in voluntary intake with alfalfa > ryegrass > timothy, at a given level of digestibility. Chemical analysis of these forages showed that the "digestible" fraction of alfalfa contained a higher proportion of pepsin-soluble material and lower proportion of digestible fiber than the digestible fraction of timothy, with the levels of ryegrass intermediate between them. Van Soest (18) reported a similar result, that alfalfa contains a higher proportion of cell content and a lower proportion of cell wall constituents than grasses of similar digestibility.

Compared with other species, the digestible fraction of alfalfa could thus occupy less volume X time within the rumen, and consequently animals could eat more of it.

However, under grazing conditions there are other factors affecting intake, called "extrinsic" factors by Raymond (15) and fully explained by Baker (1) and Hodgson (5).

In the work reported in this paper, bodyweight changes and wool growth were measured for a year, on groups of weaners (merino and crossbred) grazing plots with alfalfa at 4 row spacings and no alfalfa, under the same grazing system and the same stocking rate.

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Materials and methods

Details of the experimental design and techniques used have been described before (10). Briefly, the plots (0.043 ha each) were arranged in 2 Latin squares, each 5 x 5 with alfalfa row spacing of 15 cm, 30 çm, 45 cm, 60 cm and no alfalfa as the main treatments.

Ten groups of 3 merinos plus 2 crossbred (3/4 Boder Leicester + 1/4 Merino) wether weaners each were formed by stratified random sampling, so that initial liveweight was similar for all groups. Each group remained on a given row spacing treatment moving from plot to plot at constant intervals of 9, 9, 5, 5 and 7 days grazing. Thus resulting, rotational grazing systems of 5 paddocks for each sequence of plots with the same alfalfa spacing, that is 5 paddocks each of 15 cm, 30 cm, 45 cm, 60 cm and no alfalfa spacings. Two rows of the Latin Squares (blocks), one from each, were grazed simultaneously. An average stocking rate of 23 weaners/ha was the same for each system.

The grazing management described, lasted from February 1969 until March 1970, except during the winter when the grazing time, and therefore spelling time, was doubled. In December 29, 1969 all the animals were replaced by new wether weaners, but the data from those weaners are not included as they only show the effect of new animals allocated to the experiment without pre-experimental treatment.

All weaners were drenched with thiobendazole before they were allocated to different treatments, and the initial mob was drenched 3 more times during 1969. They were weighed on the day of each rotational movement on a portable sheep scale. Wool growth was measured at different intervals by the dye banding technique (4) and wool weight per head, was also recorded for the period February 7, 1969 to January 7, 1970.

The analysis of variance for bodyweight results were calculated considering a randomized complete block design with two split factors (spacing and breed).

Results

1. Bodyweight change

In the analysis of bodyweight date by date only differences between breeds, were consistently significantly different and they resulted from differences at the start of the study (mean initial weight: Merino 20.3 kg; Crossbred 26.6 kg).

The analysis of bodyweight differences between consecutive dates does not show any pattern or significant trend, perhaps due to the shortness of each grazing period from block to block in the rotation. The results presented are considering grazing cycles.

a. Effect of alfalfa spacing

The cumulative increase of bodyweight on each spacing treatment during the experiment are summarized in Figure 1. The only significant differences in liveweight gain per cycle between the different spacing treatments occurred during the first grazing cycle (Fig. 2). At the end of the year the maximum differences of about 4 kg between the different spacing treatments were not significant (Fig. 1).

The relationship between liveweight gain and row spacing changed during the year (Fig. 2). Initially the closest spaced alfalfa sward produced significantly greater gains than no alfalfa, but this trend was reversed in winter then the highest gains were measured on the no alfalfa plots which had most feed at that stress time of the year (10).

b. Effect of breed

Crossbreds grew faster than merino weaners (Fig. 3), the difference in bodyweight increments was not significant at the end of the first cycle but increased gradually throughout the year, finishing at 13.7 kg ($P > 0.05$). The liveweight gains of crossbreds were greater during all periods (Fig. 4).

As the feed supply decreased during winter merinos suffered relatively more than crossbreds on the treatment with lowest feed (15 cm spacing) compared with the best treatment (no alfalfa) (10).

c. Pasture availability animal response relationship

Correlation coefficient for the main components of the pasture in terms of mean dry matter available for each grazing cycle and liveweight change are shown in Figure 5. Alfalfa on the one hand and subterranean clover and grasses on the other were inversely correlated to bodyweight change. No single component had a high correlation between its availability and bodyweight change, but trends were clearly defined. With alfalfa the correlation was positive during late summer-autumn and spring, while during winter the correlation was negative. Subclover and grasses generally had correlations opposite in sign to that of alfalfa.

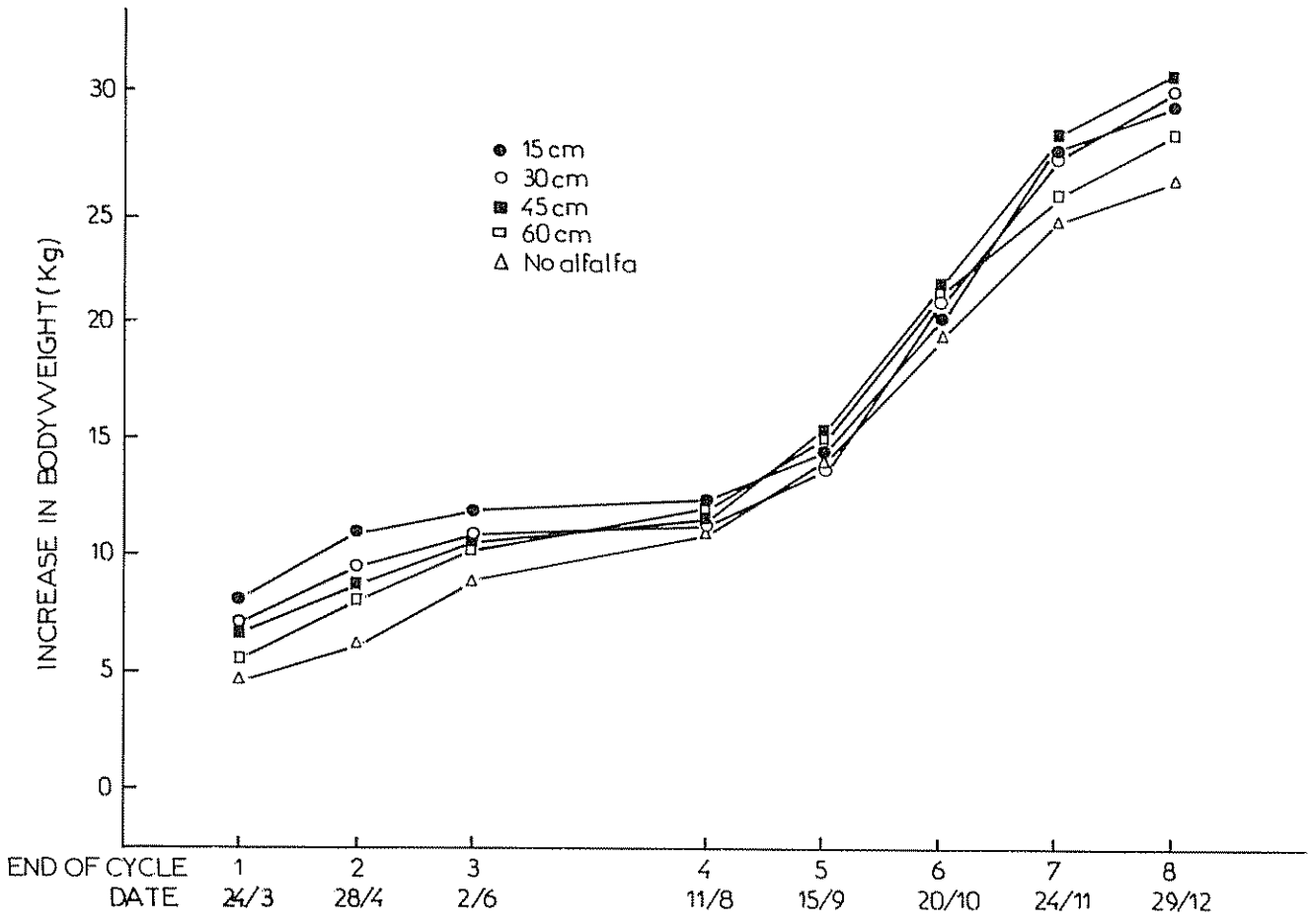

Fig 1. Effect of alfalfa row spacing on cummulative increase in bodyweight over the experimental period

2. Wool production

So that seasonal rate of wool production could be calculated, wool was dyebanded at the midside position on six occassions, the first immediately after shearing in February 7, 1969 and the last in December 29, 1969 four days before shearing.

The main feature of wool growth rate was its decline during winter to about 50 percent of the spring and summer rates (Table 1). A very high value for one merino weaner at 30 cm row spacing in the first period led to a significant treatment effect; in all other periods neither row spacing nor breed had any effect on either wool growth rate or total production.

Discussion

The most noteworthy result was that in terms of total weight gains over the experiment there was no overall advantage from the inclusion of alfalfa in the pasture (Fig. 1); there was a seasonal advantage, spring to autumn, offset by lower growth rates on alfalfa pasture in winter (Fig. 2). In the winter cycle 4, there was a mean bodyweight gain of 2.08 kg on the no alfalfa treatment against 0.42 kg on the densest alfalfa plots, arising from the higher availability of feed where alfalfa was absent (2 500 – 3 000 kg/ha compared with 2 000 kg/ha) (10). These results agreed with those summarized by Thomson in 1977 (17) on the best performance of young ruminants fed alfalfa without restriction, but under grazing conditions there are other factors, like dry matter availability and allowance, which may regulate intake and production (5, 6).

Doubling the length of the grazing cycle in winter was an attempt to achieve a higher dry matter availability production in this period of known food shortage through lengthening the recovery period. The measure was successful in that no weight losses occurred, but may have started too late in the season

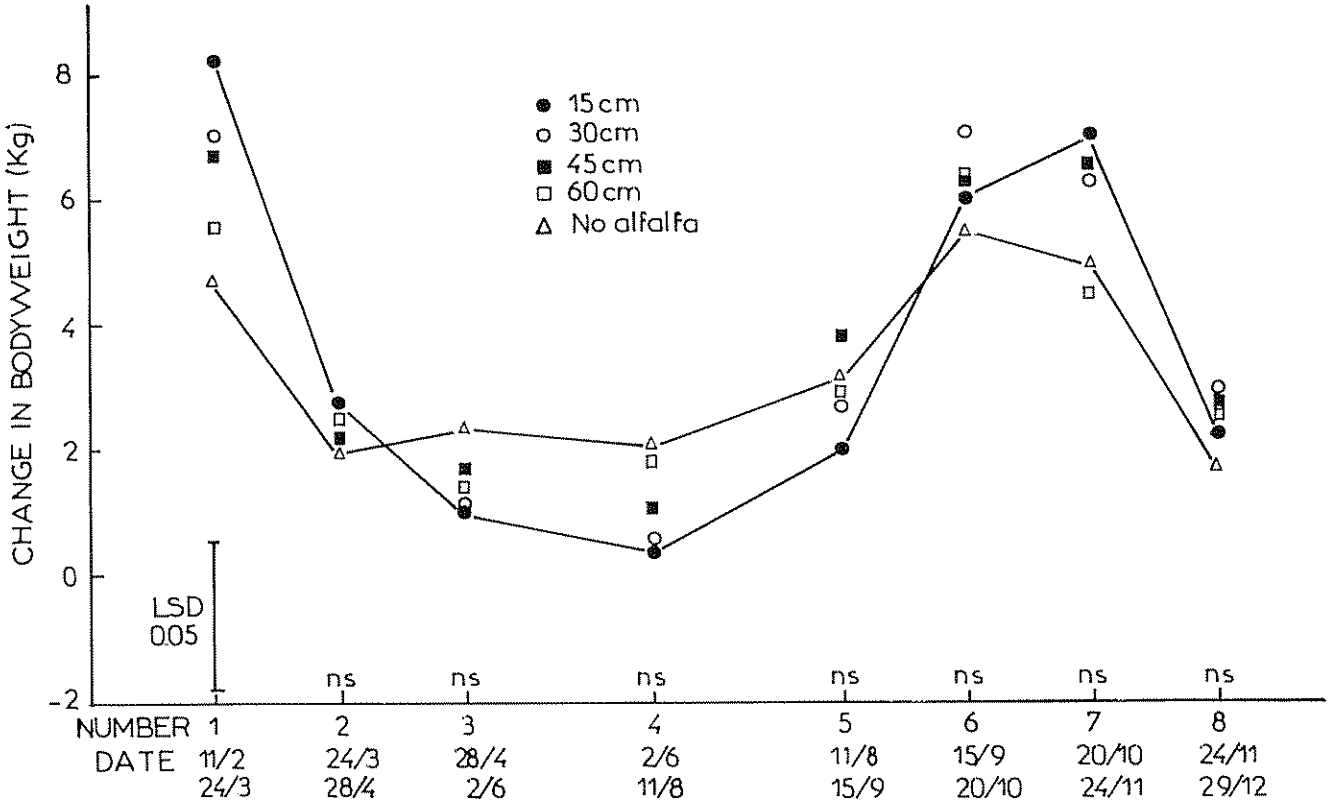

Fig. 2 Effect of alfalfa row spacing on liveweight gain during each grazing cycle.

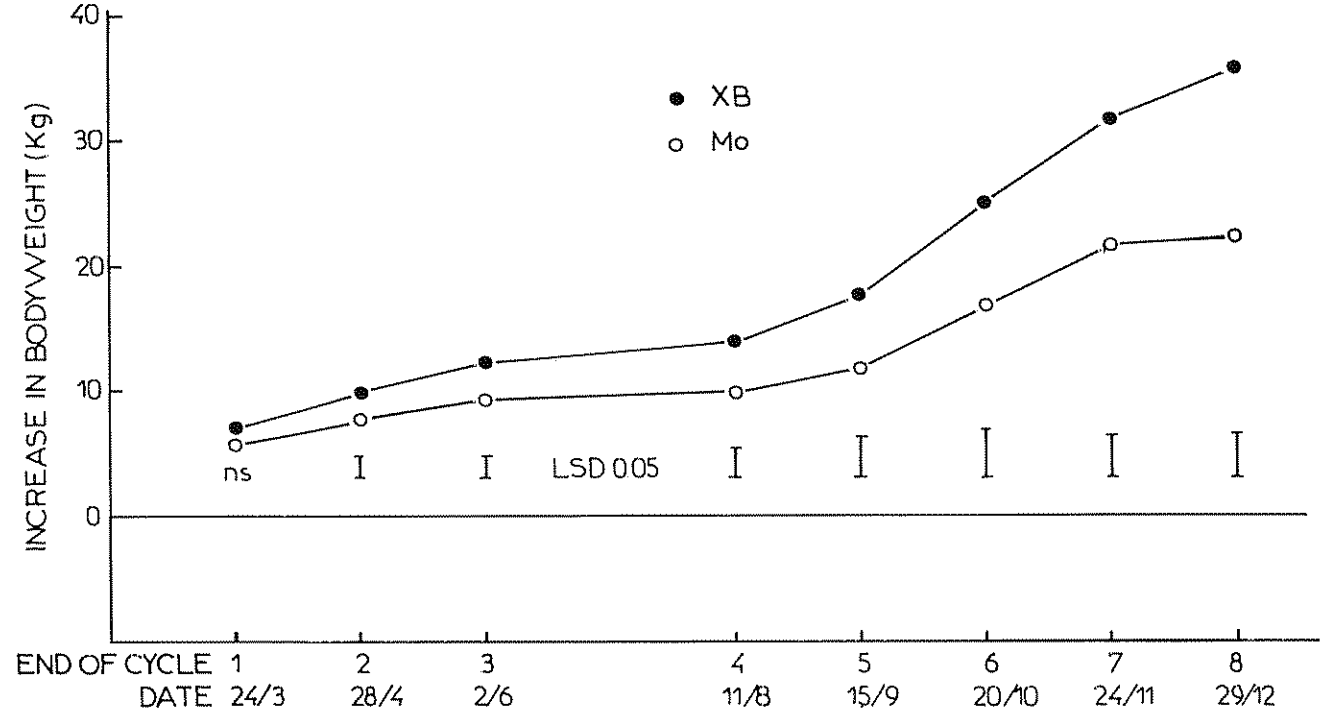

Fig. 3. Influence of breed on cummulative increase in bodyweight over the experimental period.

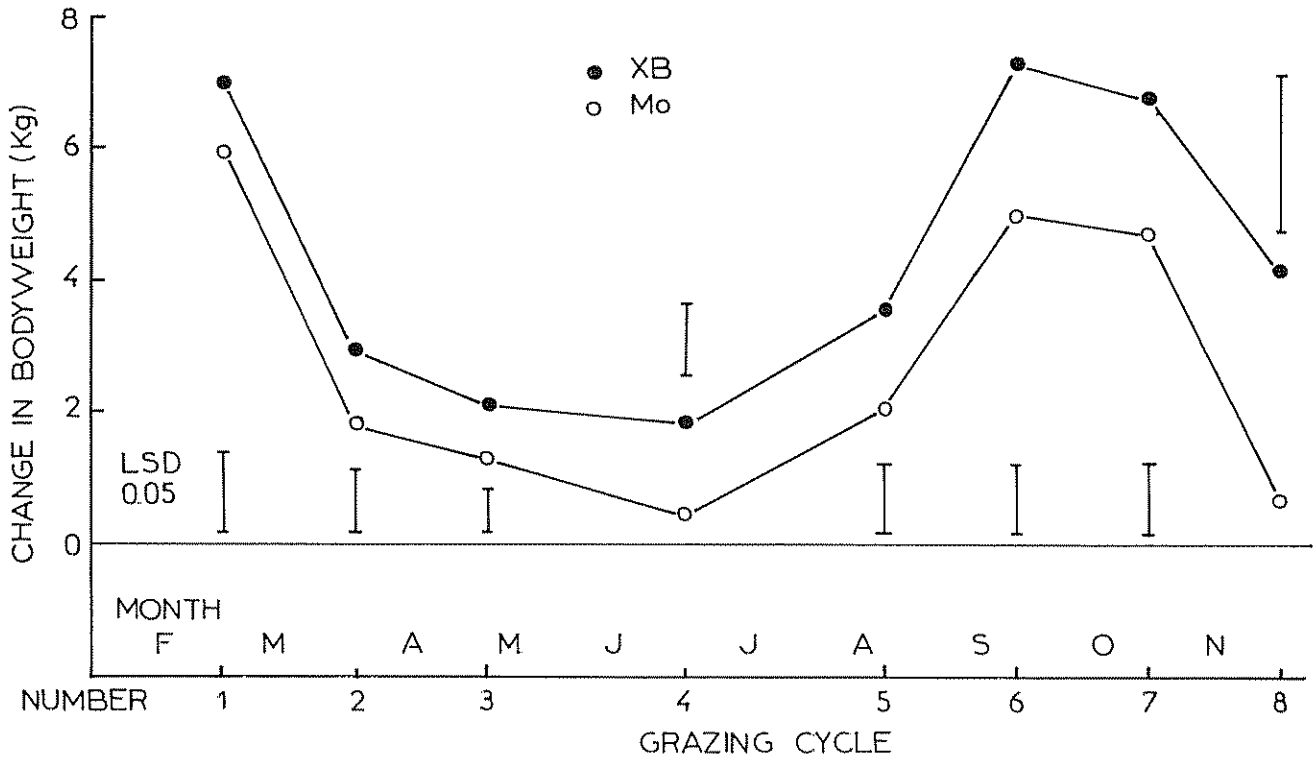

Fig. 4. Influence of breed on liveweight gain during each grazing cycle.

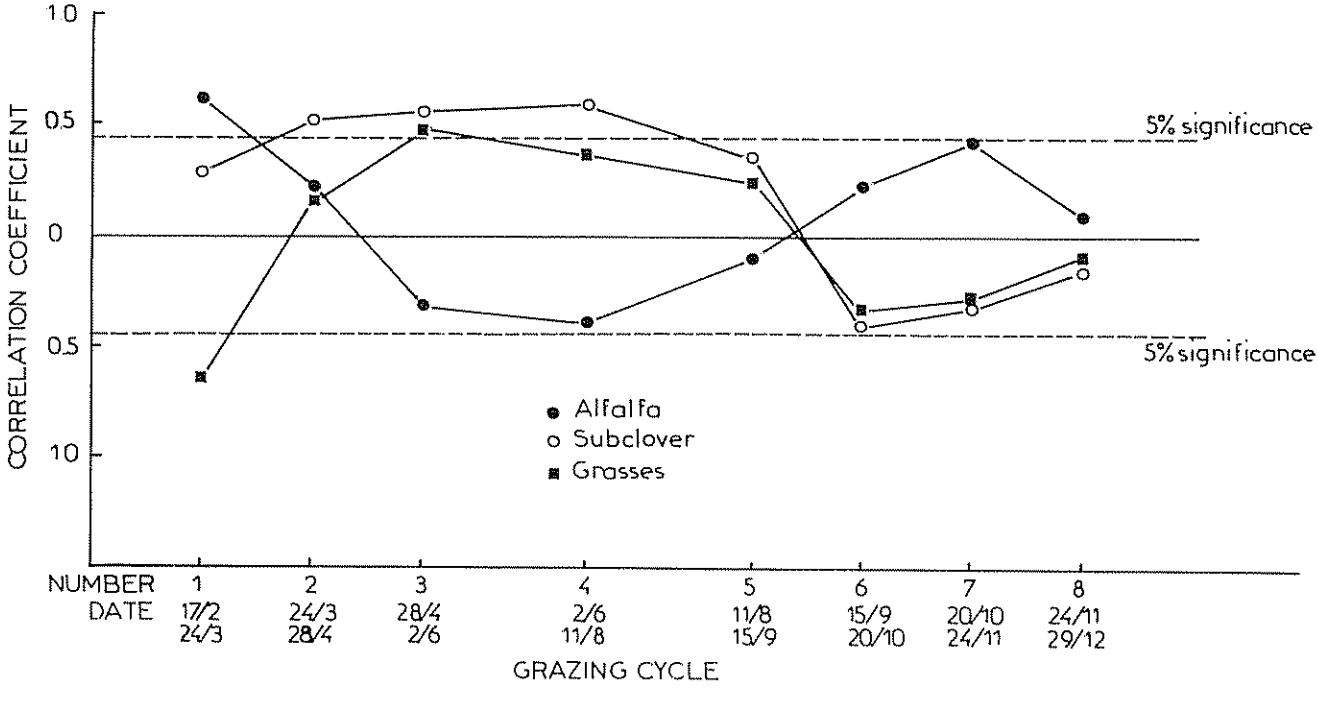

Fig. 5. Correlation coefficients between liveweight gains and availability of the main pasture components during each grazing cycle.

Table 1: Effects of alfalfa row spacing on seasonal wool production.

	WOOL GROWTH gm. head/day										Total Yield kg/head	
	Period 1 7.2.69 24.3.69		Period 2 24.3.69 11.6.69		Period 3 11.6.69 11.8.69		Period 4 11.8.69 20.10.69		Period 5 20.10.69 29.12.69			
Spacing	XB	Mo	XB	Mo	XB	Mo	XB	Mo	XB	Mo	XB	Mo
15 cm	11.6	16.3	11.3	10.7	8.3	5.5	12.2	9.0	15.2	13.3	3.8	3.5
	13.9		11.0		6.9		10.6		14.2		3.7	
30 cm	12.6	22.1	10.9	12.7	6.8	9.4	10.7	12.8	14.0	18.2	3.6	4.7
	17.4		11.8		8.1		11.8		16.1		4.2	
45 cm	14.6	15.2	12.8	12.2	9.4	7.3	14.0	12.2	15.2	15.8	4.3	4.1
	14.9		12.5		8.4		13.1		15.5		4.2	
60 cm	11.4	16.3	11.7	10.9	7.0	6.9	12.0	11.2	13.3	15.8	3.6	3.9
	13.8		11.3		6.9		11.6		14.5		3.8	
No Alf	8.7	14.4	9.5	11.3	8.7	8.3	11.5	12.8	14.5	12.8	3.5	3.8
	11.6		10.4		8.5		12.1		13.6		3.7	
Mean	11.8	16.8	11.2	11.5	8.0	7.5	12.1	11.6	14.5	15.2	3.8	4.0
	14.3		11.4		7.8		11.8		14.8		3.9	
LSD ($P \leq 0.05$)												
Space Means	3.9		2.7		2.3		2.8		5.8		0.8	
Breed Means	3.8		1.5		0.9		1.2		2.4		0.3	
Breed Means Within the same spacing	8.5		3.3		2.0		2.8		5.3		0.7	

XB = 3/4 Border Leicester + 1/4 Merino

Mo = Merino

as in the first plots so treated all treatments suffered a "break" in wool. Its value must be questioned, however, in terms of the adverse effects of prolonged grazing, suggested in a previous paper (11).

Crossbred weaners always grew faster than merinos in both absolute and relative terms: while their initial weight averaged 31 percent more than merinos they ended the year 46 percent heavier. The reason may lie in hybrid vigour, and in the influence of the Border Leicester, selected partly for weight gain. This was perhaps expressed mainly through their ability to eat more, specially in winter when feed was short. In winter they gained 1.86 kg against 0.54 kg by merinos.

Wool production showed marked seasonal trends, with winter growth rates only about half of those measured in summer (Table 1). The peak of production in summer confirmed the forecast by Mc. Farlane (12) that in Canberra's climate the rate of wool production should be highest in summer. The general trends mainly reflected differences in feed supply, the peak production of about 15 g/head/day being com-

mon to no alfalfa and alfalfa plots Although wool production in winter is limited by short daylength and/or low temperature (7), in this study it still responded to the higher availability of feed on the no alfalfa plots.

There was an obvious similarity in seasonal pattern of wool production and liveweight gain, yet crossbreds produced no more wool in winter than merinos which, in terms of wool production, are more efficient producers than crossbreds in periods of food shortage (9).

Because there were no appreciable production differences overall between the different spacing treatments, attempts to combine the benefits of alfalfa during its growing season and no alfalfa during winter by sowing alfalfa at wide row spacings may be of little value. It must be stressed that these results are restricted to the one year of above average rainfall

Summary

Bodyweight changes and wool growth were measured within an experiment conducted at Canberra, Australia, in which groups of 3 merinos plus 2 crossbred weaners each, grazed alfalfa plots sown at 4 different row spacings 15, 30, 45 and 60 cm and zero alfalfa The grazing system and stocking rate imposed were the same to each group of weaners.

No advantages of alfalfa swards versus no alfalfa in overall animal production were detected.

Seasonal liveweight gains and wool growth were markedly, but not significantly, different between alfalfa and no alfalfa swards.

Crossbred weaners gained significantly more weight ($P > 0.05$), both in absolute and relative terms, than merinos.

Wool production showed marked seasonal trend, with winter growth rates only about 50 percent of those measured in spring and summer.

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Notas y comentarios

Curso de Introducción a la Ergonomía

The joint (CIGR/IAAMRH/IUFRO) working group "Promotion of Ergonomics in the Tropics" (P.E.T.) is organizing the 2nd TRAINING COURSE "INTRODUCTION TO ERGONOMICS", specially held for 12 staff members from tropical countries (researchers, teachers and extension officers) in agriculture or forestry who want to incorporate ergonomics into their regular job

The training course will be held from October 22 – November 16, 1984, in Wageningen, The Netherlands.

For information please write to:

Secretary Joint Working Group P.E.T.; F. J. Staudt, Bosbouwtechniek, L. H.; P. O. Box 342; NL–6700 AH Wageningen; The Netherlands."

Revistas nuevas: La Asociación Argentina de la Ciencia del Suelo inició en 1983 la publicación de la revista semestral "Ciencia del Suelo (Vol. 1, Número 1)", incluyendo interesantes artículos sobre física, química, biología, bioquímica, manejo y conservación, fertilidad y fertilizantes, génesis y clasificación, mineralogía y micromofología de suelos. Para suscribirse deberá dirigirse al Ing. R. S. Lanods, Editor de CIENCIA DEL SUELO, calle 532 No. 949 esq. 14 (1900), La Plata, Argentina ($ 12.00).

En el primer semestre de 1984 aparecerá trimestralmente la revista "Investigación y Gerencia". La revista considerará para su publicación artículos sobre temas y problemas de la práctica gerencial y la investigación administrativa, con énfasis en el caso latinoamericano. Las suscripciones deberán hacerse a: Investigación y Gerencia, Apartado 47066, Los Chaguaramos, Caracas 1041–4, Venezuela ($ 8.00).