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# BEEF PRODUCTION FROM LUCERNE

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## SUMMARY

Either lucerne or lucerne/prairie grass swards were grazed by yearling cattle at three grazing intensities. The type of sward had no significant effect on animal performance. Increasing the grazing intensity significantly decreased animal performance as animals consumed less herbage of a lower nutritive value. Results are presented for the mineral composition of the herbage eaten by animals at the three grazing intensities.

## INTRODUCTION

Despite increasing recognition of the agronomic advantages of lucerne as a suitable pasture species for the pumice soils of central North Island, relatively little attention has been given to the performance of livestock grazing this species. Joyce and Brunswick (1975) studied cattle fed chopped green lucerne on a group-feeding *ad libitum* basis. Liveweight gains were satisfactory over the late spring-early summer period (approximately 0.9 kg LWG/day) but liveweights were virtually static over the late summer-early autumn period.

The objectives of the experiment described in this paper were:

- (1) To determine intake-growth rate responses of cattle under different grazing intensities.
- (2) To measure the relative performance of cattle grazing either lucerne or lucerne/prairie grass swards.
- (3) To attempt to elucidate the problem of low summer growth rates of cattle grazing lucerne.

## EXPERIMENTAL

The basic layout of the experiment was 3 grazing intensities on 2 pasture types with 10 Angus steers per treatment.

Six hectares (15 paddocks) were sown solely in lucerne (*Medicago sativa* var. Wairau) and 6 ha (15 paddocks) in lucerne undersown with 28 kg/ha of prairie grass (*Bromus catharticus*, 'Grasslands Matua'). Each paddock was subdivided by electric

fencing in the ratio of 4:3:2, which resulted in low, medium and high grazing intensities when grazed by 10 steers per treatment.

From the 80 yearling steers available, 7 groups of 10 animals were selected on a liveweight and condition basis. One group was slaughtered at the commencement of the experiment for information on carcass weight. The remaining 6 groups were allocated to the three grazing intensities on each of the two pasture types. All animals were rotationally grazed with each paddock in turn being grazed at the same time by the three groups of cattle. The average duration of grazing of any one paddock was 3 days. The medium grazing intensity group was used as the criterion for deciding when to shift animals from the paddock.

After each paddock had been grazed by the cattle, sheep were used to graze the remaining stubble to a uniform height. The trial covered the 179-day period September 26, 1975 to March 24, 1976.

All groups had *ad libitum* access to trace element fortified salt licks and Pluronic L64 added to the water trough.

Estimates of digestible organic matter (DOM) intake and percentage herbage utilization were calculated on a group basis from measurements of the herbage present per unit area taken immediately pre- and post-grazing of each paddock. *In vitro* digestibility (IVD) and mineral levels were determined on samples from both the feed on offer at each paddock at the commencement of grazing and the residue remaining after grazing.

Consumed herbage digestibility (CHD) was calculated as:

$$\text{CHD} = \frac{\text{DOM I}}{\text{OM I}} =$$

$$\frac{(\text{DM}_b \times \% \text{OM}_b \times \% \text{IVD}_b) - (\text{DM}_a \times \% \text{OM}_a \times \% \text{IVD}_a)}{(\text{DM}_b \times \% \text{OM}_b) - (\text{DM}_a \times \% \text{OM}_a)}$$

where b and a refer to measurements of the before- and after-grazing situation.

DM = herbage dry matter per unit area.

#### RESULTS AND DISCUSSION

Although prairie grass represented on average 31% (range 11-82%) of the dry matter composition of the mixed sward, there were no significant differences in either liveweight or carcass-weight gains of cattle grazing lucerne or lucerne/prairie

grass swards (Tables 1 and 2). There were, however, highly significant effects of grazing intensity on liveweight and carcass-weight gains ( $P < 0.001$ ). Cattle grazed at the lowest intensity gained weight 19% and 52% faster than at the medium and highest intensities, respectively.

The average herbage dry matter available at each grazing was 2866 kg/ha with no significant differences occurring between either pasture types or grazing intensities.

The mean dry matter utilization of the lucerne and lucerne/prairie grass swards was 78% (Table 3) with slightly higher DOM intakes being measured on the mixed sward. As the grazing intensity was increased from low to high, the average percentage dry matter utilization for a single grazing increased from 66 to 90%. This was associated with a 27% decrease in DOM intake. Observed DOM intakes were only 94% of that predicted from animal performance (Joyce *et al.*, 1975).

TABLE 1: LIVEWEIGHT GAIN (kg/day)

	H	Grazing Intensity		Mean
		M	L	
Lucerne	0.67	0.81	0.97	0.81
Lucerne + Prairie grass	0.64	0.85	1.01	0.83
Mean	0.65	0.83	0.99	

TABLE 2: CARCASS WEIGHT (kg)

	H	Grazing Intensity		Mean
		M	L	
Lucerne	150.3	168.5	191.2	170.0
Lucerne + Prairie grass	149.6	178.2	197.6	175.1
Mean	149.9	173.4	194.4	

TABLE 3: FEED INTAKE

	% Feed Utilized	Intake (kg DOM/day)	
		Observed	Predicted
Lucerne	77.9	4.12	4.48
Lucerne + Prairie grass	78.0	4.26	4.43
H	90.1	3.58	3.85
M	77.9	4.09	4.46
L	65.9	4.91	5.07

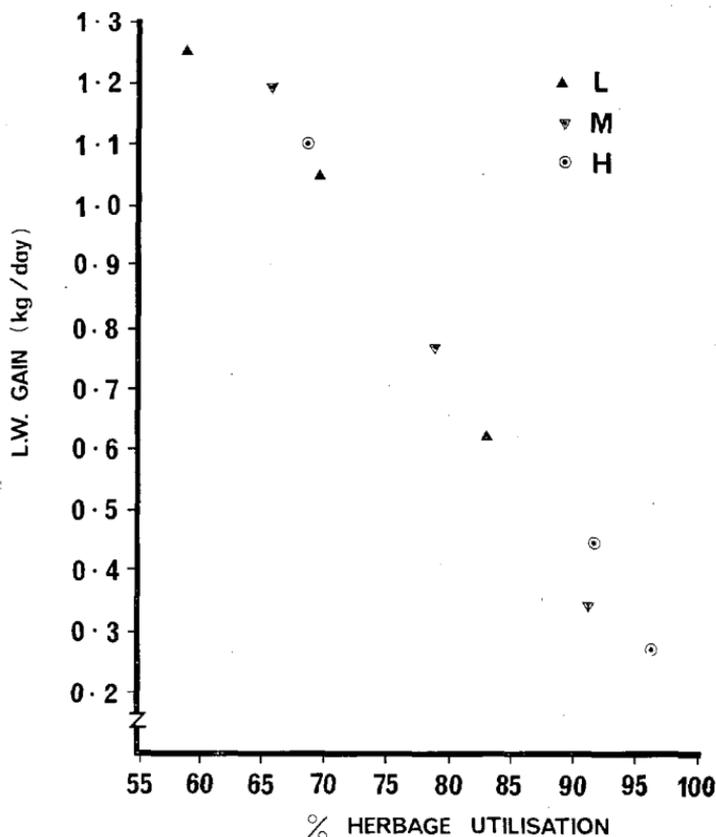


FIG. 1: Effect of degree of herbage utilization on liveweight gain for each of three periods (0-72, 73-130 and 131-179 days).

Figure 1 indicates that the degree of herbage utilization was negatively associated with liveweight gain. Grazing intensities for all treatments tended to increase as the trial progressed and this resulted in decreased rates of liveweight gain, especially in the latter third of the trial. Whether liveweight gain would be faster at lower degrees of utilization than those in the trial is not clear.

At all grazing intensities animals apparently consumed herbage of a higher *in vitro* digestibility and crude protein content than measured in the whole plant. Whereas decreasing the grazing pressure increased dry matter intake by 8 and 25% for medium and low intensities, respectively, compared with the high intensity *in vitro* digestibility of the herbage consumed was only increased

TABLE 4: COMPOSITION OF HERBAGE CONSUMED (% DM)

	Available	Consumed		
		H	M	L
% <i>In Vitro</i> ....	65.5	67.2	71.0	73.7
% Crude protein ....	21.7	22.1	24.7	26.2
% Ca ....	1.06	1.03	1.13	1.14
% Mg ....	0.15	0.16	0.17	0.18
% Na ....	0.018	0.017	0.016	0.021
% K ....	3.46	3.46	3.69	3.82
% P ....	0.26	0.26	0.30	0.32

by 6 and 10%, respectively, indicating that the major effect on liveweight gain by decreasing grazing pressure was by increased dry matter intake rather than by increasing the nutritive value of the consumed forage.

As grazing pressure was relaxed, the mineral level of the diet tended to increase for most elements (Table 4). The magnitude of this effect was generally small.

## REFERENCES

- Joyce, J. P.; Brunswick, L. C. F., 1975. *Proc. N.Z. Soc. Anim. Prod.*, 35: 152.
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