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INTENSIVE WINTERING OF BEEF STEERS IN NORTHLAND

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SUMMARY

A fertilizer × stocking rate trial showed, over the three winter-spring periods of 1976-8, that nitrogen increased liveweight gain (LWG)/head and LWG/ha of steers and reduced hay requirements. LWG/head decreased with increasing stocking rate. LWG/ha increased with stocking rate to reach a maximum and then decreased. Nitrogen increased the range of stocking rates at which the maximum LWG/ha occurred, from 6.2–7.4/ha to 6.8–8.0/ha.

INTRODUCTION

Farming systems should, ideally, be adapted to the climate in which they function (Brougham, 1973). In Northland, with relatively mild winters and pasture growth that continues throughout the year, the potential exists for farmers to use the winter as a productive, rather than a maintenance, season. In an earlier study at Otaroa, D. R. Hopkins (1971, unpublished data) showed that weaner steers could be run at a relatively high stocking rate (4.9/ha) and gain weight over the winter.

Increasing the stocking rate generally results in a decrease in the rate of LWG/head (Holmes, 1974). In Northland nitrogen is a limiting factor to pasture growth over the winter-spring period (During, 1972; O'Connor and Cumberland, 1973; Field and Ball, 1978), with large pasture responses of 3 400 to 4 000 kg DM/ha being obtained in a trial near Kaikohe where 245 kg N/ha were applied over the autumn-spring period (K. W. Steele, unpublished data).

The objectives of the present trial were to grow weaner steers to a liveweight of 250 kg/head for sale as stores by the end of October, and to study the effects of nitrogen fertilizer use and stocking rate on the achievement of this aim.

EXPERIMENTAL

The Punakitere trial area is 10 km west of Kaikohe, on a free-draining basaltic soil, Ruatangata friable clay. The area consists of 32 paddocks, each 0.4 ha. On the basis of annual dry matter production, eight farmlets each of four paddocks were formed and each randomly allocated to a treatment in 1976. Each farmlet remained under the same treatment for three years.

At the start of the trial period, in late April-early May of each year, 96 nine-month-old Angus weaner steers were selected from a larger group and randomly allocated to eight treatment groups (Table 1).

TABLE 1: OUTLINE OF TREATMENTS

Stocking Rate (steers/ha)	*Number of Animals per Group*	
	No Nitrogen	*Nitrogen*
6.2	10	
6.8	11	11
7.4	12	12
8.0	13	13
8.6		14

Prior to coming on to the trial area, the animals were drenched, with repeat doses being administered as required. Exoparasites were also controlled. The steers were weighed at the end of each rotation.

The steers were grazed on a 40-day rotation from the start of each trial period. During the rotation, 125 kg/ha of urea (46% N) was applied to each N paddock immediately after the animals had moved to the next paddock. The 40-day rotation was selected as previous results (During, 1972; O'Connor and Cumberland, 1973) showed that this interval gave the most efficient use of applied N. This practice continued for three rotations, giving a total of 172.5 kg N/ha.

The 40-day rotation was repeated once more after nitrogen application ceased, and then shortened to 24 or 32 days to prevent deterioration of the sward during the spring. In 1977 the measurement period of the first rotation was reduced 16 days by a technical problem.

The level to which pastures were grazed was adjusted throughout the trial to prevent overgrazing. Hay was fed whenever pasture dry matter on offer fell below a maintenance level of 1.5% of liveweight on a daily basis, to bring the ration up to that level. The pasture was break-fed in two-day shifts, with no back fence being used.

RESULTS

In late October-early November of each year, the trial results were assessed in terms of liveweight gain (LWG)/head and LWG/ha (Table 2). The trial period in 1977 was 11 days shorter than in the other years. In all years, there were highly significant increases in LWG/head and LWG/ha from nitrogen use, and significant reductions in LWG/head with increasing stocking rate. While production varied between years, there was a general trend for LWG/ha to increase with stocking rate to a maximum, and then decline with any further increase in stocking rate. The stocking rate at which maximum LWG/ha occurred was generally higher in the N than in the no-N treatment groups.

TABLE 2: MEAN LIVEWEIGHT GAINS PER HEAD AND PER HECTARE (kg)

Stocking Rate	*1976*				*1977*				*1978*			
	per head		*per ha*		*per head*		*per ha*		*per head*		*per ha*	
(*steers/ha*)	*–N*	*+N*	*–N*	*+N*	*–N*	*+N*	*–N*	*+N*	*–N*	*+N*	*–N*	*+N*
6.2	95		590		150		920		110		673	
6.8	105	115	730	770	135	155	919	1040	105	130	700	900
7.4	90	120	660	900	130	145	963	1074	100	115	740	850
8.0	80	110	610	860	120	145	931	1150	85	95	680	750
8.6		90		780		120		1061		85		750
Mean SE (diff)	8		60		5		45		7		55	
Stocking rate	**		n.s.		**		n.s.		**		*	
Nitrogen	***		***		***		***		***		***	
Initial liveweight	187 ± 8				183 ± 8				189 ± 10			
Duration of grazing (d)	183				172				183			

The use of nitrogen resulted in 25 to 55% less supplementary feed being used. The mean figures for total annual hay requirements per head for the three years of the trial were 185 and 115 kg for no-N and N, respectively.

DISCUSSION

The target weight of 250 kg/head in October was selected because a ready market exists in Northland at that time for store animals in good condition. These animals are sold to farmers on winter-wet country or to areas further south.

In all years, the target mean liveweight of 250 kg/head in October was achieved. As the aim was to produce store not finished animals, treatment effects can be assessed in terms of LWG/ha.

Nitrogen fertilizer was more effective than stocking rate in increasing LWG/ha. This increase was achieved in two ways. At a constant stocking rate, nitrogen use increased LWG/head and thereby LWG/ha. Additionally, the differences in LWG/head between the no-N and N treatment groups meant that a given LWG/head could be achieved at a higher stocking rate in the N than in the no-N situation. This also contributed to increases in LWG/ha owing to the use of nitrogen.

The relationship between these two effects varied between years, owing to variation in the nitrogen response. This variation makes it difficult to predict the optimum stocking rates to use both with and without nitrogen, a problem frequently encountered in trials of this nature (Holmes, 1974). However, the pattern of responses conforms with previously observed effects, with the greater relative responses to nitrogen occurring in the years of lower production (Browne and Walshe, 1968; During, 1972), and decreasing individual performance with increasing stocking rates (Joyce, 1970; Everitt, 1973; Holmes, 1974).

Under similar conditions and stocking rates to those described here, it is probable that increases in LWG/head resulting from nitrogen use would contribute more to overall increases in LWG/ha than any accompanying increase in stocking rate. In order to maximize the increase in LWG/ha resulting from the use of nitrogen, stocking rates should therefore be increased only slightly. The trial results suggest that, without nitrogen, the optimum stocking rate for maximizing LWG/ha lies between 6.2 and 7.4 steers/ha, while with nitrogen the optimum lies between 6.8 and 8.0 steers/ha.

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