
BEEF PRODUCTION ON PASTURE AND LUCERNE

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Abstract

In 1971-3 and 1972-4 two successive generations of Friesian male weaners were carried to slaughter on two self-contained farmlets, one all pasture, the other with half its area in pasture and half in lucerne. The pasture farmlet produced slightly less herbage dry matter than the pasture/lucerne farmlet. Average net hot carcass production was 922 and 829 kg/ha/yr respectively. The stocking rate was 4.85 animals/ha with an overlap of two generations from November to February.

Herbage yields and animal intakes were estimated by before and after grazing cuts. The lucerne was grazed at a 40-day rotation in its growing season. To obtain high cattle growth rates, much stalk was left ungrazed, being 15 to 20% of the total dry matter standing before grazing above a height of 3 to 4 cm. Overall conversion efficiency of ingested forage was lower on the lucerne/pasture farmlet than on the pasture farmlet and it was also more variable on the former. With the grazing rotation and pressure adopted in this trial, bloat was no serious problem.

INTRODUCTION

SUMMER FEED SUPPLIES can be a problem when raising beef cattle, particularly dairy beef. Weeda and During (1975) showed how this can be overcome by irrigation. Lucerne, with its well-known summer growth potential, offered another possibility which warranted further study. A great deal of research work has been done with lucerne, but comparatively little is available on its performance under cattle grazing. For this reason a trial was started at the Ruakura Soil Research Station to investigate this aspect.

EXPERIMENTAL

This trial was conducted on an area of sandy loam, sown in Wairau lucerne in spring 1970. It consisted of two treatments, each of 2.06 ha. The first treatment was entirely in pasture, while in the second treatment half the area was in pasture and half in lucerne. The management principles outlined by Weeda and During (1975) also applied in this trial. The Friesian cryptorchid calves at 4.85 animals/ha were brought on to the farm in late

November and for the following 2 months both yearlings and calves were carried.

The aim was to feed the cattle to appetite except for about two months in winter. However this could not always be achieved, particularly in the lucerne/pasture treatment, owing to the different growth pattern of the lucerne. When high levels of feeding became impossible in early summer, calves were given preference and surplus yearlings were slaughtered.

TRIAL MANAGEMENT

Pasture was grazed at about 25-day intervals in spring and summer and the rotation was lengthened in autumn to reach 50 days in winter. Lucerne's need for relatively long spells between grazings is often mentioned (Keoghan, 1967; O'Connor, 1970) and the lucerne in this trial was grazed at about 40-day intervals from mid-September to early June.

In the first winter, when the lucerne was not over-sown with oats, it was not grazed for $3\frac{1}{2}$ months and the cattle had to be carried on their pasture area from early June to mid-September at 9.7 animals/ha.

For the second winter oats were drilled into the lucerne in April and the cattle were held on their pasture area at 9.7 animals/ha during autumn and fed hay. In winter they were rotated on pasture and oats plus residual lucerne.

To allow for the differences in the amount of green herbage available in winter, different amounts of hay were required in the two treatments. In the all-pasture treatment, 20% of the area was cut for hay in both years, while in the lucerne/pasture treatment all its pasture, *i.e.*, 50% of the total area was cut for hay in the first year and 30% of the total area in the second year, because of increased winter feed from the oats.

These oats sown in the second year produced about 2400 kg DM/ha. Hay was made from pasture, because without specialized equipment it is difficult to make good lucerne hay in the northern part of the North Island. The adjustments of the area hayed and the provision of a winter cereal led to virtually identical dry matter intakes per animal in the two treatments in each winter. However, in the first year the yearlings on the lucerne/pasture treatment had to be held at maintenance levels of intake till mid-September, while those on pasture were almost fed to appetite from mid-August onward. Overdrilling of oats into the lucerne avoided this situation in the second year.

The saving of so much pasture for hay had a marked effect on the composition of the diets of calves and yearlings in the lucerne/pasture treatment. Calves had first choice of the pasture in early summer, but even so it accounted for less than half of their intake in late spring and summer. Yearlings were fed almost entirely on lucerne from late October till slaughter. Thus, while half the treatment was in pasture, lucerne was the main diet from September to December inclusive, the four months of the highest cattle growth rate.

RESULTS

HERBAGE PRODUCTION AND UTILIZATION

The average annual yield of lucerne was about 16 000 kg DM/ha compared with a pasture yield of 12 800 kg DM/ha. But, although pasture as measured, was very well utilized, this was not so with lucerne. To achieve high daily intakes of lucerne at the stage of growth at which it was grazed, cattle had to be allowed to leave the coarser stalks uneaten. These stalks, which eventually decayed, represented 16% of the total yield, or 2500 kg DM/ha/yr. In this experiment, which was designed to achieve high cattle growth rates, the somewhat lenient grazing of lucerne resulted in almost identical dry matter intakes -of cattle in both treatments, in spite of higher lucerne yields.

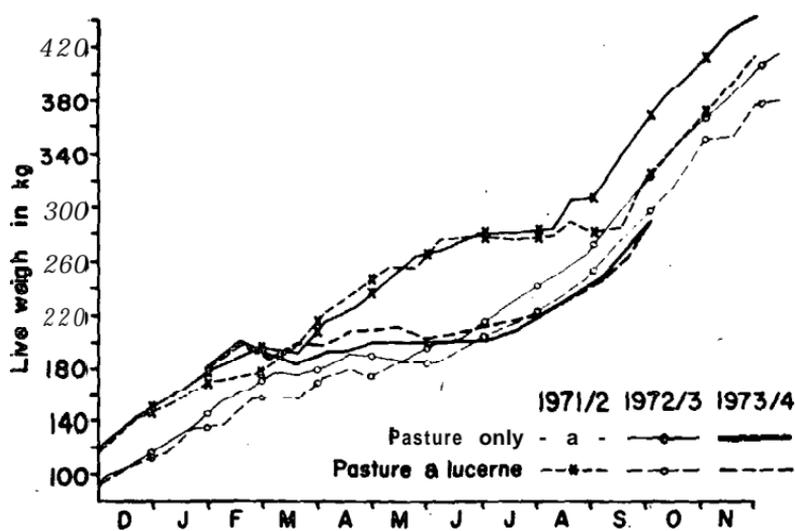


FIG. 1: Cattle liveweights.

LIVEWEIGHT GAINS AND CONVERSION EFFICIENCY

Liveweight gains of the two groups of cattle are shown in Fig. 1. In the first year, good calves were available and liveweight gains of both treatments were similar until mid-August. However, a liveweight difference of some 50 kg developed in the following month. This gap was only slightly narrowed by compensatory growth during spring and early summer and at slaughter carcass weights of the pasture treatment were 20 kg heavier.

In the second year, the calves were much lighter and in poorer condition. Owing to an exceptionally dry autumn that affected not only pasture but also lucerne growth, liveweight gains in autumn were low, but they were compensated for by relatively high growth rates in winter. It must be remembered that stock in the lucerne/pasture treatment had greenfeed oats, and their consumption of hay was only some 50% higher than that of the all-pasture treatment, whereas in the previous year they had some 60% less pasture and over 70% more hay than the pasture treatment. Thus, although the total dry matter intakes were virtually identical for the two treatments in each winter, the quality of the winter feed in the lucerne/pasture treatment was improved in

TABLE 1: SUMMARY OF APPARENT CATTLE INTAKES (kg DM/day), LIVEWEIGHT GAINS (kg/day), AND CONVERSION RATIOS (kg DM/kg LWG)

Period	Pasture		Pasture and Lucerne			
	App. Intake	LWG	Conv. Ratio	App. Intake	LWG	Conv. Ratio
1971-73						
Nov.-Mar.	4.34	0.65	6.7	4.90	0.72	6.8
Mar.-Jun.	4.99	0.96	5.2	5.76	0.96	6.0
Jun.-Aug.	6.72	0.23	29.0	6.54	0.05	131.0
Aug.-Sep.	7.08	1.48	4.8	4.89	0.19	25.7
Sep.-Nov.	10.16	1.45	7.0	9.81	1.75	5.6
Nov.-Feb.	8.8	0.51	17.3	13.49	0.77	17.5
Total period	6.58	0.86	7.7	7.19	0.81	8.9
1972-74						
Nov.-Mar.	5.93	0.85	7.0	4.16	0.68	6.1
Mar.-Jun.	5.00	0.16	32.0	4.69	0.33	14.2
Jun.-Aug.	5.44	0.82	6.6	5.15	0.68	7.6
Aug.-Nov.	11.49	1.55	7.4	9.73	1.44	6.8
Nov.-Feb.	10.47	0.71	14.7	11.02	0.45	24.5
Total period	7.39	0.54	8.8	6.66	0.73	9.1

the second year. Growth rates were fairly similar in winter and early spring, with the lucerne group falling behind in late spring.

In the third year, Angus and Angus-cross weaners were used and the stocking rate was raised to 5.83 animals/ha. The very dry summer and autumn experienced favoured lucerne. From December to March inclusive, the lucerne produced about 6000 kg DM/ha and the pasture 3000 kg. This is reflected in the live-weight gains of the calves, but by mid-August this difference had disappeared.

Apparent cattle intakes and liveweight gains are shown in Table 1, together with conversion ratios, which were derived from these, data. In the first year, conversion ratios were satisfactory in both treatments until winter, when the differences in feed quality, not quantity, were clearly shown. In the second year, the dry autumn reduced the overall conversion efficiency, but appreciably more so on the pasture than on the lucerne/pasture treatments. On the other hand values in winter were excellent on both treatments and remained so during spring. From November to February of both years, conversion of feed by the yearlings was rather inefficient and particularly in the second year on lucerne.

A summary of carcass production and total apparent intakes per animal is shown in Table 2.

TABLE 2: CARCASS PRODUCTION (AVERAGE OF TWO YEARS)

	<i>Pasture</i>	<i>Pasture and Lucerne</i>
Average slaughter date	Jan. 11	Jan. 22
Killing-out percentage	53.7	51.9.
Average hot carcass weight (kg)	241	222
Estimated carcass weight of calf	51	51
Carcass gain/animal	190	171
Carcass gain/ha	922	829
Total apparent intake per animal (kg DM)	2850	2900
Conversion ratio (kg DM/kg carcass gain)	15.0	17.0

DISCUSSION

In preliminary work, preceding the experiment described, satisfactory rates of liveweight gain were obtained on lucerne with a 40-day grazing rotation provided cattle were not forced to eat

the coarse stalks. This result was the basis for the management adopted. Yet it became evident during the trial that the digestibility of lucerne so managed was lower than that of pasture in a 25-day grazing rotation. The killing-out percentage of cattle was about 4% lower with the lucerne animals, indicating greater gut fill and slower passage of feed through the rumen. The dung was much more fibrous, yet intakes as measured by before and after grazing cuts did not differ significantly between the two treatments. Large differences in digestibility are usually reflected in large differences in voluntary intake. In the writers' opinion, the superior conversion ratio of the animals on pasture cannot be entirely explained by the superior feed supply in winter and early spring. In the second year, in spite of the provision of cereal greenfeed and in spite of similar rates of liveweight gain over the critical winter period, differences in carcass weights were the same as in the first year, about 20 kg more in the animals on the all-pasture unit. No doubt more digestible lucerne can be obtained with shorter grazing intervals and more lenient grazing pressure. This is practised by dairy farmers on light pumice soils, but is possible only because of daily drenching for bloat. Fewer problems were experienced with bloat on lucerne than on pasture.

Summer weight gains of the yearlings were rather low (0.6 kg/day) in spite of relatively high intakes of dry matter (12 kg/day) and it seems unlikely that it will be profitable, under local conditions, to provide lucerne simply to retain cattle loag into summer.

Steers are expected to grow even more slowly than cryptorchids at that time of the year, and the low conversion ratio of lucerne to meat in summer suggests that it, and not pasture, should be hayed. This is, of course, common practice, and no technical problem with adequate machinery and in a climate where lucerne is normally grown.

Two minor points emerged from this trial. Cryptorchids and bulls damage lucerne stands more than steers and are not recommended. Secondly, the dung of cattle grazing on lucerne, under the conditions described, tends to be firm and fibrous and difficult for emerging shoots to penetrate, and hence frequent harrowing is required.

Lucerne produces more feed in summer and less in winter than pasture and for this reason is most suitable for a system of beef production where feed requirements in summer are high and those in winter are minimal. It is therefore much more suited for dairy beef production where there is an overlap of generations

in summer and lower stocking rate in winter, than for raising beef from autumn weaners with their high stocking rate in winter and relatively low feed requirements in summer.

The average carcass weight gain of 170 kg over 13 months, achieved with cryptorchids is unlikely to be reached with steers. In the trial situation lucerne does not appear to be worth growing, mainly because pasture yields are high. However, in areas where lucerne produces much more than pasture it may well have an important place in beef production. With a system based mainly on lucerne a carcass production of 600 to 700 kg/ha should be possible, at conversion ratios of 20: 1 or slightly higher. Technically there seem to be few problems and the question of whether cattle should be finished on lucerne becomes one of economics.

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