FATTENING BEEF WEANERS ON CROPS. II A PRELIMINARY ASSESSMENT OF CROP AND ANIMAL PERFORMANCE

R. C. Stephen, R. C. McDonald and K. R. Wilson
Invermay Agricultural Research Centre
Ministry of Agriculture and Fisheries
Private Bag, Mosgiel

ABSTRACT

An account is given of the liveweight gains of beef weaners grazed on crops from April 1976 to February 1977 at a stocking rate of 6.8 animals/hectare on a 3.2 ha farmlet. Crop production and utilisation data are also presented.

Liveweight gains of 179 kg/animal were made over the 299 day period (0.6 kg/animal/day). The gains were poorer in the late autumn/winter period compared with those in the following spring and summer. Percentage utilisations of the crops were, with one exception, over 80%.

Whilst kale yields were greater than average, the yields from the oat and maize crops were lower than expected due mainly to adverse climatic conditions.

INTRODUCTION

In Part I of this paper a theoretical evaluation of the profitability of grazing weaners at a stocking rate of 6.8 animals/ha on a 100% crop system was compared with an all grass system carrying 3.9 animals/ha. The evaluation showed a substantially greater profitability on the crop system. The aim of the present trial was to examine in practice the liveweight performance of beef weaners on the crop system outlined in Part I.

MATERIALS AND METHODS

The trial was carried out on a 3.2 ha farmlet consisting of four 0.8 hectare paddocks on a Wingatui silt loam. Half of the area had carried 2 cereal crops previously and the other half followed a single cereal crop. Traditional methods of cultivation were used in preparing the paddocks for sowing.

Details of the crops used and relevant cultural information are given in Table 1. In paddocks 1 and 2 kale alternated with spring-sown oats on the same area and in paddocks 3 and 4 autumn-sown oats alternated with maize/kale as shown schematically in Part I of this paper. The crops were all sown at 15 cm spacing simultaneously with the fertilizer using a Duncan drill.

Assessments of the dry matter available were made periodically during each 'grazing period' from 4 or 6 samples, each 1.5 m x 0.61 m in area, cut to 3 cm above ground level. The residual dry matter after grazing was assessed from similar-sized areas to determine the percentage utilisation and hence the total utilised dry matter/crop/paddock (Table 2).

A stocking rate of 6.8 animals was obtained by grazing 22 Friesian x Hereford beef weaner steers on the 3.2 ha farmlet from April 22, 1976 to February 14, 1977. Individual animal liveweights, after a 24 hour fast, varied from 153-208 kg with a mean of 185 kg at the start of the trial. Drenching with Nilverm and Selenium at standard rates was carried out on May 18.

During grazing, the animals were break-fed using a single wire electric fence in order to control the amount of dry matter available. Break size was dependent on weather and soil conditions and during wet weather the breaks were shifted daily. Animal liveweights were determined periodically after a 24 hour fast (Table 3).

Oat hay made in early December 1975 from a September-sown crop, and theoretically surplus to requirements had the system been run in the previous year (see Table 1, Part I), was fed off in portable hay feeders (Table 2). Because of the low yields obtained from the oat and maize crops it was necessary to supplement the dry matter available with 'bought-in' meadow hay from late October onwards (Table 2).

RESULTS AND DISCUSSION

Crop production and utilisation data for each grazing period are given in Table 2. The yields of the kale crops were slightly higher than predicted (Table 1, Part I) and the percentage utilisation averaged over 80%. Dry matter production from both the autumn- and spring-sown oat crops and particularly so in the case of maize was well below the levels expected (Table 1, Part I) but the percentage utilisations of the crops were high.

The low yields obtained from the cereals can be ascribed to unfavourable climatic conditions (Fig. 1) which occurred during the period under study. Sowing of both the autumn- and spring-sown oat crops were delayed by about 3-4 weeks (c.f. Table 1, Part I) because it was not possible to cultivate the soil as a consequence of wet conditions following rain in February and August respectively. These delays reduced the time available for growth and in part contributed to the low oat yields.

Below average temperatures during growth also contributed to lower production in the oat crops. In the case of autumn-sown oats grown locally little growth occurs during winter and it is not until late August onwards that growth proceeds rapidly in response to more favourable temperatures (Taylor *et al.*, 1976). Adverse climatic conditions are known also to result in lower yields of spring-sown cereals

TABLE 1: Crops used and relevant cultural details

Paddock	Crop	Area Sown (ha)	Sowing Date	Seed Rate (kg/ha)	Fertiliser (kg P/ha)
1 a*	Kale**	0.8	21.11.75	3.7	8.8 RS***
1 b*	Mapua oats	0.8	30. 9.76	129	11.6 S***
a	Kale	0.4	18.12.75	3.7	8.8 RS
2 a	Kale	0.4	15. 1.76	3.7	8.8 RS
b	Mapua oats	0.8	12.10.76	129	11.6 S
a	Mapua oats	0.8	26. 3.76	138	11.6 S
3 b	PX610 Maize	0.5	8.11.76	148	11.9 S
b	Kale	0.3	20.10.76	3.7	7.4 RS
a	Mapua oats	0.8	13. 4.76	138	11.8 S
4 b	PX610 Maize	0.4	1.12.76	175	11.5 S
b	Kale	0.4	22.11.76	3.7	9.4 RS

* a = first half of year b = second half of year.
** Medium-stemmed marrowstem kale.
*** P as reverted superphosphate (RS) or superhposphate (S).

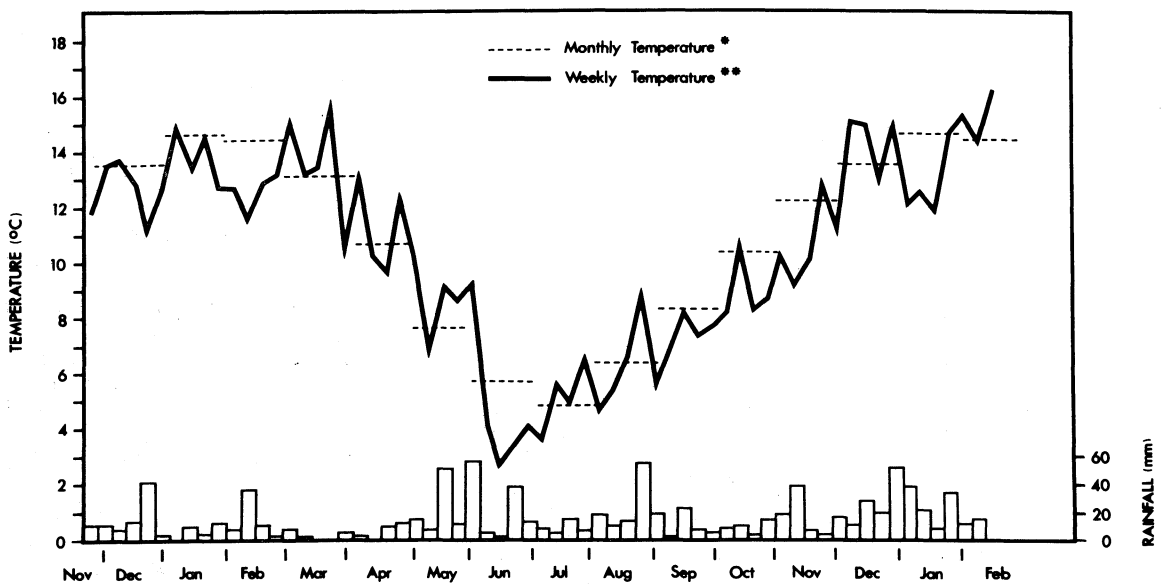

Fig. 1 : AVERAGE WEEKLY AND MONTHLY AIR TEMPERATURES AND WEEKLY RAINFALL .(Nov. 1975 - Feb. 1977)

* N.Z. Meteorological Service , 1973 (30 yr. Avg.)
** Invermay A R.C. Met. Station .

(Stephen *et al.*, 1977). In the present study, with the exception of a short period in August, the mean weekly temperatures from August to the end of November were all much lower than the 30 year mean monthly temperatures and the period had considerable rainfall in addition (Fig. 1).

The maize yields were exceptionally poor as a consequence also of the lower than average air and soil temperatures during growth. From November 8 until the end of the trial on February 14 only about 970 Ontario units were accumulated and this number is about 30% below the minimum requirement of

TABLE 2: Crop production and utilisation and amounts of hay fed/grazing period

Pad No.	Crop	Sowing Date	Grazing Period	Total Crop DM (kg/ha)	% Utilisation		DM Utilised in kg/area grased	
					Crop	Hay	Crop	Hay
1	Kale	21.11.75	Apr. 22 - Jul. 14	13600	87	85	9349	1539
2	Kale	18.12.75	Jul. 15 - Aug. 24	13500	84	85	4536	545
	Kale	15. 1.76	Aug. 25 - Sep. 24	11150	77	85	3434	1202
3	Oats	26. 3.76	Sep. 25 -	4400	90	90	3168	441
4	Oats	13. 4.76	- Nov. 21	6100	82	90	4002	452
1	Oats	30. 9.76	Nov. 22 - Dec. 8	1800	95	95	1368	1175
2	Oats	12.10.76	Dec. 9 - Jan. 20	5900	87	95	4106	3616
3	Maize	8.11.76	Jan. 21 - Jan. 30	1600	90	95	1152	587
	Kale	20.10.76						
4	Maize	1.12.76	Jan. 31 - Feb. 14	2100	95	95	1596	459
	Kale	22.11.76						

Total DM utilised: 10222 crop + 3130 hay = 13352 kg/ha

TABLE 3: Animal liveweight performance and daily intakes per grazing period

Crop	Grazing Period	No. Days	Liveweight (kg)		LWG	Daily Intake (kg DM/animal)		Increase/ Decrease Actual over theoretical intake (%)
			Initial	Final	(kg/day)	Actual	NRC (1970)	
Kale	Apr. 22 - Jul. 14	84	185.00	215.36	0.36	5.59	3.88	+ 44%
Kale	Jul. 15 - Sep. 24	72	215.36	247.40	0.45	6.13	4.66	+ 32%
Oats	Sep. 25 - Nov. 21	58	247.40	301.04	0.92	6.32	7.45	- 18%
Oats	Nov. 22 - Dec. 8	17	301.04	315.00	0.82	6.80	7.61	- 12%
Oats	Dec. 9 - Jan. 20	43	315.00	348.40	0.78	8.16	7.84	+ 4%
Maize/Kale	Jan. 21 - Feb. 14	25	348.40	363.80	0.62	6.90	7.37	- 7%

1380 ± 50 units from sowing to mid silk reported by Bunting and Gunn (1973).

As there was insufficient dry matter available for the animals on the oat and maize crops it was necessary to supplement the feed with hay (Table 2). The supply of maize/kale was exhausted in mid February and the trial was ended then.

The low yields obtained from some crops in this trial as a result of adverse climatic conditions illustrate the danger of predicting crop production from insufficient data. The agronomic trials, on which the crop yield predictions were made, were carried out only over a 2-3 year period, except for the kale yields which were based on 4-5 years experimentation. The shorter period included years with favourable climatic conditions for crop growth. Clearly a much longer period is required before predictions of more accuracy can be made.

Delays in sowing occasioned by the inability to cultivate under wet soil conditions might be overcome by using the no tillage direct-drilling technique. It is possible also that the variety of maize used could be improved by substituting English hybrids known to be better adapted to cooler conditions. There may also be other crops which may be better suited to this system than those used and therefore it seems likely that improvements might be made as a result of further research.

Animal liveweight performance at the various grazing periods is given in Table 3. Liveweight gains were made throughout the whole period though these tended to be poorer in late autumn and winter than in the following spring and summer periods. Over the 299 days grazing liveweight gains of 179 kg/animal were made, equivalent to 0.6 kg LWG/animal/day.

Table 3 shows also the actual daily DM intake/animal and the required DM supply to produce the liveweight gains shown. The actual intakes from April to September were considerably higher than those suggested by the N.R.C. tables although in the earlier period the actual intakes were lower. Over estimations of the dry matter eaten are one source of error but the gross errors that would be involved are considered unlikely. The N.R.C. tables are based on

the use of pasture of uniform digestibility as feed and since digestibilities of the different crops and at different stages during growth are likely to vary this could also account for some of the variation between actual and theoretical intakes. One further possibility that would account for the increased intakes over autumn and winter is the need for extra dry matter to meet additional energy requirements resulting from the severe climatic conditions experienced during this period in the south of the South Island.

Despite the restrictions on feed supply imposed by the low crop yields and its supplementation with a poorer quality material such as hay the liveweight gains achieved in this preliminary trial are considered satisfactory. Had the yields of both oat crops and the maize been closer to average expectations it would have been possible to continue grazing for the full 12 months and the final liveweights/animal would have approximated the target of 425 kg (Part 1) and perhaps exceeded it.

REFERENCES

Bunting, E. S. and Gunn, R. E. 1973. Maize in Britain – a survey of research and breeding. Annual Report, Part IV, Plant Breeding Institute, Cambridge, 32-74.

N.R.C.1970. Nutrient requirements of domestic animals. No. 4. Ruminants. National Academy of Science, Washington D.C.

Stephen, R. C., McDonald, R. C. and Kelson, A. 1977. Comparison of dry matter production from spring-sown cereals sown on different dates. New Zealand Journal of Experimental Agriculture. **5**: 59-62.

Taylor, A.O., McCormick, S.J., Kerr, J.P., Mortlock, C.T., Stephen, R. C. and Wright, D. S. C. 1976. Cool season forage crop production trials. Technical Report No. **4**, Plant Physiology Division, D.S.I.R. 128 pp.