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## BEEF PRODUCTION ON AN ALL-CROP GRAZING SYSTEM

R. C. STEPHEN and R. C. McDONALD

*Invermay Agricultural Research Centre, Mosgiel*

### INTRODUCTION

Research at Invermay has been concerned with the development of crop-grazing systems as an alternative to pasture as a means of increasing animal production. Two years' results of carrying beef weaners on a 3.2 ha farmlet at a stocking rate of 6.8/ha for 10 to 12 months each year on a 100% crop system are summarized.

### EXPERIMENTAL

Details of the crop systems used in 1976-7 (year 1) and 1977-8 (year 2) are given in Table 1. The systems consisted of medium-stemmed kale for winter grazing rotating with spring-sown Mapua oats for summer grazing (Paddock 1) and autumn-sown oats or ryecorn for spring grazing rotating with either PX610 maize alone or with kale for autumn grazing (Paddock 2). In year 2, 10% of the farmlet area was in lucerne intended for high quality hay production to be fed at times when crop dry matter might be deficient. Lucerne has the added advantage of returning extra nitrogen to the soil.

Based on dry matter (DM) production data derived from several years of agronomic short-term trials at Invermay, the crop rotations were calculated to produce sufficient DM to carry 6.8 weaners/ha (Stephen and McDonald, 1977) and give liveweight gains of 225 kg/animal/year from an initial liveweight of 170 kg. Pasture yielding 12 000 kg DM/ha with an average utilization of 80% can theoretically carry only 3.9 animals/ha with equivalent liveweight gains. Animal DM requirements were based on NRC (1970) tables.

### RESULTS

Average crop yields, degrees of utilization and periods of grazing are shown in Table 1. Two or three different sowing dates per crop were used. Dry matter production in year 1 from both autumn- and spring-sown oats and from maize was less than expected owing to an exceptionally wet and cold spring and summer. In year 2, kale yields were below predicted levels because of a wet summer delaying the sowing date of half the kale by 6

TABLE 1: DM PRODUCTION AND UTILIZATION ON 100% CROP SYSTEM CARRYING 6.8 ANIMALS/HA

<i>Paddock</i>	<i>Crop</i>	<i>Area (ha)</i>	<i>Sowing Date</i>	<i>Period of Grazing</i>	<i>Yield (t/ha)</i>	<i>Utiln. (%)</i>	<i>% Diet as Hay</i>
<i>Year 1:</i>							
1	kale	1.6	Nov.-Jan.	Apr. 22-Sep. 24	13.0	84	16 (O) <sup>1</sup>
2	oats	1.6	Mar.-Apr.	Sep. 25-Nov. 21	5.3	86	11 (O)
1	oats	1.6	Sep.-Oct.	Nov. 22-Jan. 20	3.8	91	46 (M)
2	maize/kale	1.6	Oct.-Dec.	Jan. 21-Feb. 14	1.8	92	28 (M)
<i>Year 2:</i>							
1	kale	1.6	Dec.-Jan.	May 24-Sep. 26	7.8	75	41 (L)
2	ryecorn/oats	1.3	Mar.	Sep. 27-Nov. 24	10.2	67	3 (M)
	lucerne	0.3	—	Nov. 25-Dec. 21	6.0	87	21 (M)
1	oats	1.6	Oct.	Dec. 22-Feb. 6	6.8	71	7 (M)
2	maize	1.3	Nov.-Dec.	Feb. 7-Apr. 25 <sup>2</sup>	12.0 <sup>2</sup>	80 <sup>2</sup>	

<sup>1</sup>O = oaten hay; M = meadow hay; L = lucerne hay.

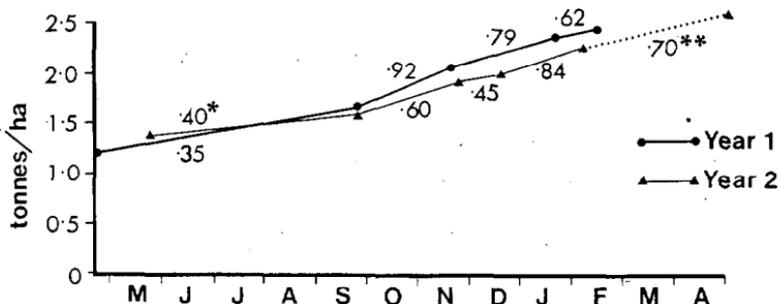
<sup>2</sup>Estimated from McDonald *et al.* (1977).

weeks. Autumn-sown ryecorn and oat yields in year 2 were satisfactory but, because of wet soil conditions which delayed the sowing date, the yields of the spring-sown oats were low at the end of November when the crop was required for grazing; the lucerne was grazed instead at this time to permit further growth of the spring-sown oats. Maize yields in year 2 are estimates based on previous data because this paper was written prior to this crop being grazed.

Utilizations were higher in year 1 than in year 2, especially on the cereals which were less mature and hence lower yielding in the first year. Deficiencies in dry matter were made up with hay which was either produced on the farmlet or was meadow hay bought in (Table 1).

Animal performance in terms of total liveweight production per hectare and average daily liveweight gains (LWG) is shown in Fig. 1. In year 1, animal liveweight increased from 187 to 364 kg in 299 days (= 0.6 kg LWG/animal/day). In year 2, total liveweight was expected to increase from 200 to 385 kg (= 0.55 kg LWG/animal/day) assuming a LWG of 0.7 kg/animal/day on maize based on previous data (McDonald *et al.*, 1977).

LWG was generally highest on oats, especially in year 1, when the oats were low yielding but probably of high quality (Stephen *et al.*, 1977). Gains on maize in year 1 were also good but those on kale in both years were surprisingly low despite its high quality (Drew *et al.*, 1974). Wet and cold winter conditions, possible mineral deficiencies, and anaemia problems may be some of the factors that affected the performance on kale.



\* Daily LWG (kg/a/d) - Top figures for Year 1 and lower for Year 2.

\*\*.....assumed

FIG. 1: Beef liveweight production/ha and daily LWGs.

Assuming a dressing-out percentage of 53%, total carcass gains on these crop systems were 645 and 667 kg/ha in the first and second years, respectively. While these results are promising, much more experimentation is required before this or any other crop system can be recommended for general farm use.

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