ANIMAL PRODUCTION ON CROPS VERSUS PASTURE IN THE AUTUMN.
1. WEANED LAMBS

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ABSTRACT

Weaned lambs were grazed on pasture, maize and kale for 59 days from late February to April in 1976 and 1977.

Liveweight gains on maize were higher than those on pasture despite a higher degree of utilisation. Gains on pasture were inconsistent in the two grazing periods in each trial possibly because of the occurrence of "ill-thrift" in the first period of 1976 and the high utilisation in the second period of 1977, both of which gave lower gains than were obtained in the other periods.

The overall gains in both years on higher utilised (63%) kale were similar to pasture but the lower utilised (44%) kale in 1977 gave better lightweight gains than did pasture.

Liveweight gains on kale and pasture were related to the degree of utilisation.

INTRODUCTION

Low growth rates of weaned lambs often occur for varying periods during summer and autumn even though pasture quality and quantity appear adequate (Clarke and Filmer, 1956; Scott *et al.*, 1976). This "ill-thrift" adversely affects lamb fattening and the growth of ewe hoggets. Low liveweights of ewe hoggets at mating mitigate against a satisfactory reproductive performance and this practice is not widely adopted as a consequence (Hight *et al.*, 1973).

The use of crops as an alternative to pasture in the autumn does not appear to have been examined for many years. Early research work (Simpson, 1949; Ewer and Sinclair, 1952), however, concluded that fodder crops such as rape, sweet lupins, chou moellier, turnips and thousand-headed kale gave higher liveweight gains than did pasture. The liveweight gains reported were low; for example, the gains were about 23 g/day on chou moellier of which 81% of the dry matter yield of about 3000 kg/ha was utilised. Duncan (1963) obtained liveweight gains of about 28 g/day on rape. Drew *et al.*, (1974), however, obtained gains of 132 g/day grazing hoggets over winter on medium-stemmed kale of which 92% of the total dry matter yield of 12000 kg/ha was utilised.

The crop yields reported by these earlier workers (Simpson 1949, Ewer and Sinclair 1952, Duncan 1963) tended to be low and liveweight gains in the autumn on potentially higher-yielding crops, such as medium-stemmed kale and greenfeed maize, do not appear to have been investigated. The object of the trials presented here was to compare the growth rates of weaned lambs in the autumn when grazed on kale, maize and pasture and to relate these to the level of dry matter offered and the degree of utilisation.

EXPERIMENTAL

A comparison of lamb liveweight performance on pasture, PX 610 maize and medium-stemmed marrowstem kale was carried out in 1976 and 1977; in the latter year, low (LU) and high (HU) utilisations of kale were also compared (Table 2). The experiments began on February 24, 1976 and on March 1, 1977 and grazing continued for 59 days in both years with 4 replicates of each treatment.

The trials were carried out on a Wingatui silt loam soil and in both years the kale followed 2 previous crops whilst the maize followed pasture. The crops were drilled in 15 cm rows and their cultural details are shown in Table 1. The pasture was a predominantly ryegrass-white clover sward although in 1976 there was a marked clover dominance.

TABLE 1: Crop Production Details

Crop	Year	Sowing Date	Sowing Rate kg/ha	Fertilizer* Applied (kgP/ha)	Weed control (date applied)
Maize	1976	10.11.75	188	22	None
	1977	29.10.76	188	28	Atrazine (21.12.76)
Kale	1976	31.10.75	3.7	13	Semeron (7.1.76)
	1977	11.10.76	3.7	24**	Semeron (8.12.76)

* Superphosphate and reverted superphosphate were applied with maize and kale respectively.

** Sulphate of ammonia at 31 kgN/ha applied on 13.10.76.

Both the crops and the pasture were break-fed and fresh breaks were provided at 7-10 day intervals. Excepting the pasture in 1977 which was sampled only twice 11 and 51 days after the start of the trial, every second crop and pasture break was sampled before and after grazing to determine dry matter yields and percentage utilisation and also, in the 1976 trial only, to provide herbage for N content analysis. In addition, herbage samples were taken about 2 weeks after the start of each experiment for total mineral analyses. At sampling, 8 plots/treatment, each 1.5 m x 0.61 m in size, were cut to 3 cm above

soil level.

Perendale ewe lambs at the rate of 20 per replicate and Romney wether lambs at 15 per replicate (i.e. 80 and 60 lambs/treatment) were used in 1976 and 1977 respectively. All animals were drenched with Nilverm and Selenium before the experiments began and those on pasture were drenched again 3-4 weeks later. The lambs were allowed a period of grazing on their respective crops prior to the start of the experiment.

Lamb liveweights were determined immediately prior to the trials and on days 28 and 59 in 1976, and on days 21 and 59 in 1977. All weighings were made after an overnight fast. On day 1 the average liveweights of the lambs were 24 and 22 kg in 1976 and 1977 respectively.

RESULTS

DM production and utilisation

The areas of pasture, maize and kale eaten in 1976 were approximately 1.6, 0.6 and 0.8 ha respectively. Because of the low yields of maize obtained in that year this crop lasted only 28 days. In 1977, the areas grazed were about 1.1 ha for pasture, 0.8 ha for maize and 0.6 and 0.8 ha for the HU and LU kale groups; the different utilisations of kale were achieved by offering larger breaks in the case of the LU group.

The mean dry matter yields and utilisations for each grazing period and overall for each trial are presented in Table 2.

TABLE 2: Mean dry matter yields (kg/ha) and utilisations/grazing period

Treatment/	1976			1977		
Days	1-28	29-59	Mean	1-21	22-59	Mean
Pasture						
yield	3600	4000	3800	4800	4800	4800
% util	71	67	69	51	83	72
Kale (L.U.)						
yield				11400	13300	12600
% util				39	46	44
Kale (H.U.)						
yield	10000	12100	11100	10800	12900	12000
% util	72	61	66	62	59	60
Maize						
yield	6000*	–		8100	10100	9400
% util	90			77	63	68

* With this maize was also 2000 kg/ha of weeds, of which about 30% was utilised.

In 1976, the dry matter production from kale was considerably higher than that from pasture but the degree of utilisation was similar. In the first period when maize was available its yield was intermediate between the kale and pasture production but utilisation was much higher; associated with the maize was additional dry matter in the form of weeds amounting to 2000 kg/ha of which about 30% was utilised.

Dry matter production in 1977 tended to be slightly higher than in 1976 but kale still gave the highest yields and pasture the lowest with maize yields intermediate. Utilisation of kale was relatively consistent between the 2 grazing periods with approximately a 16% difference overall between the two levels of utilisation. The higher utilisation was only slightly lower than the utilisation of kale in 1976.

Whilst the average utilisation of the pasture was comparable in both years there was a much lower utilisation in the first period of the 1977 trial and a much higher utilisation in the second period. Maize utilisation tended to be lower in the second period in 1977 compared with the first period and both were considerably lower than the utilisation achieved in 1976.

DM mineral composition

The average N contents over the whole period in 1976 were 2.2, 1.8 and 2.4% for pasture, maize and kale respectively and these exceeded minimum requirements (N.R.C. 1975). In 1977 the N content, 2 weeks after the experiment started, was below the minimum required only in the case of the high utilised kale (1.31%).

Most minerals were at adequate levels in the pasture except perhaps for Zn (22ppm) and Mo (0.22ppm). In both years the levels of Na (0.03%), Mo (0.06ppm) and Co (0.06ppm) in maize were less than adequate (N.R.C. 1975), and in 1976 Cu (2.9ppm) and Zn (29ppm) were lower. The S content (0.17ppm) of maize tended to be low in both years as was the P content (0.18% in 1976).

In kale, Cu (2.3ppm) and Mo (0.22ppm) were below minimum requirements (N.R.C. 1975) in both years and in 1977 Zn (27ppm) was lower.

Animal performance

Liveweight gains/day for each grazing period are given in Table 3.

TABLE 3: Mean liveweight gains (g/day) on pasture, kale and maize/grazing period

Treatment/	1976			1977		
Days	1-28	29-59	Mean	1-21	22-59	Mean
Pasture	52 a*	135 a	96 a	90 b	29 c	51 b
LU Kale				81 b	97 a	92 a
HU Kale	63 a	111 b	88 a	29 c	55 b	46 b
Maize	77 a	–		157 a	92 a	115 a
s.e.m.%	13.5	2.4	4.0	14.2	11.2	9.6

* Letters are for LSD comparisons ($P < 0.05$) within columns.

In 1976 growth rates were lower in the first compared with the second period. During the first period, there were no significant differences between treatments due to the relatively high variability although the gains on maize and kale were 48 and 21% higher respectively than those on pasture. During

the second period and overall the gains on pasture were higher or equal to those on kale.

Over the whole period in 1977 the gains on maize and LU kale were similar and both were significantly higher than those on pasture and HU kale. In the first period, however, lamb growth was better on maize compared with similar gains on pasture and LU kale, whilst the HU kale gave much poorer gains. In the second period both maize and LU kale gave the highest gains and pasture the lowest, with HU kale intermediate.

In both years the gains obtained in each treatment differed in each of the periods and the pattern of increase or decrease was inconsistent.

DISCUSSION

In both years the liveweight gains on maize were better than those on pasture. This is a somewhat surprising result particularly in the first period of each trial when pasture production seemed to be adequate and its utilisation was relatively low, whereas the maize appeared to be deficient in respect of some minerals and its percentage utilisation was much higher than that of pasture. It is possible that the mineral deficiencies of maize may have been overcome by ingestion of soil and in 1976 by the consumption of weeds present with the maize.

The poorer performance on pasture and the inconsistency of the gains in the two periods in each trial require some explanation. In 1976 the lower gains in the first period may have been a manifestation of the "ill-thrift" problem, because adequate dry matter was available and the degree of utilisation was similar to that in the second period. In 1977 the low gains obtained in the second period were probably the result of the higher utilisation and therefore the consumption of poorer quality feed. This higher utilisation arose because, in error, the animals were left too long on each break, despite the fact that there was adequate feed available on the remaining area.

The dry matter production/ha of maize in these trials was lower than that from kale as a consequence probably of below average summer temperatures in both seasons. Maize yields might be improved and become more reliable if use is made of the English hybrids which are better adapted to the local cooler climate. In this event maize would have an advantage over kale because of the much higher utilisation that can be obtained using maize while still achieving higher liveweight gains.

As was the case for pasture, there were considerable differences in the gains obtained on HU kale between the two periods in each year and no adequate explanation can be suggested for this. The liveweight gains overall in both years on the HU kale were similar to those on pasture. The animal performance on the LU kale in 1977, however, was better than that on pasture and this illustrates the extent to which the degree of utilisation of kale can influence liveweight gains. The adverse effects on growth rates from increased utilisation of pasture are well known (Thomson and Jagusch, 1976) and occurred in the 1977 trial.

The residue of the crop remaining after a low utilisation of kale by hoggets in the autumn would not be wasted but could be utilised by ewes in the winter when only a maintenance or sub-maintenance diet is required.

ACKNOWLEDGMENTS

Thanks are due to the staff in the Crop Agronomy group, the Botanical Services Laboratory and the Plant Analysis laboratory for the excellent assistance given in these trials.

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