THE EFFECT OF HERBAGE YIELD AND ALLOWANCE ON GROWTH AND CARCASS CHARACTERISTICS OF WEANED LAMBS

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SUMMARY

In two experiments conducted in 1976-7 and 1977-8 with ryegrass-white clover pastures yielding 2 to 5 t DM/ha, groups of 10-week-old lambs were offered 2, 4 or 6 kg DM/lamb/day (n = 36/group) over 8 weeks. Herbage allowance, and not pasture yield, digestibility, accessibility to herbage or season, was the major factor affecting growth rate and thereby slaughter weight. Carcass, skin, and perirenal fat weights and eye muscle area differences were directly related to differences in final slaughter weight. Mitscherlich equations ($y = a + br^x$), where y = growth rate and x = herbage allowance, showed that near maximum growth rates of 150 ± 17 g/day were achieved at allowances of 5.0 kg DM/lamb/day. The nature of the response was suggested to be due to both the opportunity for selection and dominance-behavioural structures related to grazing territories. The requirements of the lambs were described by the regression equation: $y = 171 - (195 \times 0.64^x)$.

INTRODUCTION

Forage intakes needed by sheep to support a given performance within a physiological state are well documented (ARC, 1965; NRC, 1975; Jagusch and Coop, 1971; Rattray, 1978). However, sheep do not utilize all the pasture presented to them at each grazing, and in order to aid feed budgeting and pasture management it has become necessary to define optimum herbage allowances for different classes of stock. Work at Ruakura with the ewe at tupping, during mid-pregnancy and at near parturition has shown that performance, in terms of ovulation rate, weight gain, and lamb and wool production, responds in a precise way to increasing herbage allowance (Rattray and Jagusch, 1978; Rattray *et al.*, 1978).

This paper studies the relationship between allowance and production for finishing lambs grazing ryegrass-white clover pastures in early summer.

EXPERIMENTAL

During December-January 1976-7 and 1977-8, six groups of lambs (n = 36/group) were offered herbage allowances of 2, 4

or 6 kg DM ryegrass-white clover per lamb per day (kg DM/lamb/day) from either high (groups 1 to 3) or low (groups 4 to 6) yielding pastures (kg/DM/ha). Herbage allowance was increased by giving lambs access to larger areas, thus keeping grazing intervals (approx. 10 days) constant. Suffolk × Coopworth lambs were used in the first year and Poll Dorset × Coopworth lambs in the second year.

Herbage allowance and yield and pasture disappearance (apparent intake) were measured by a frame-cutting technique with the use of exclosure cages (Jagusch *et al.*, 1978). Pre-grazing pasture samples were analysed for *in vitro* digestibility (Drew 1966), and in the second year the ratio of green to dead material was also determined.

Twenty-four-hour fasted liveweights were measured at the beginning and end of the experiment, and lambs were regularly drenched with anthelmintic plus selenium. At slaughter, carcass, skin and perirenal fat weights, and rib eye area and fat depth at the 12th rib, were measured.

RESULTS

Mean values with their standard errors for the various pasture parameters measured are given in Table 1. Yields of DM were

TABLE 1: PASTURE YIELDS, ALLOWANCE, UTILIZATION, APPARENT INTAKE, AND DIGESTIBILITY IN TWO YEARS WITH SIX GROUPS OF FINISHING LAMBS

Year and Group	*Yield (t DM/ha)*	*Allowance (kg/lamb/day)*	*Utilization (%)*	*Apparent Intake (kg/lamb/day)*	*Digestibility (%)*
1976-7					
1	5.3 (0.2)	1.4 (0.1)	62 (5)	0.9 (0.1)	70 (2)
2	5.4 (0.2)	2.8 (0.1)	47 (3)	1.3 (0.1)	75 (1)
3	5.4 (0.2)	4.3 (0.3)	39 (13)	1.7 (0.6)	74 (2)
4	4.2 (0.1)	1.8 (0.1)	62 (3)	1.1 (0.1)	74 (3)
5	4.0 (0.2)	3.3 (0.3)	40 (5)	1.3 (0.2)	77 (1)
6	4.4 (0.2)	5.8 (0.3)	36 (6)	2.0 (0.2)	75 (2)
1977-8					
1	3.2 (0.2)	1.8 (0.2)	49 (6)	1.0 (0.2)	71 (1)
2	3.3 (0.2)	3.1 (0.5)	42 (3)	1.3 (0.2)	71 (1)
3	3.7 (0.2)	5.5 (0.7)	25 (4)	1.4 (0.3)	70 (2)
4	2.2 (0.2)	1.5 (0.2)	49 (7)	0.7 (0.1)	72 (1)
5	2.6 (0.1)	3.9 (0.4)	39 (6)	1.5 (0.3)	72 (1)
6	2.5 (0.1)	5.7 (0.5)	33 (3)	1.9 (0.2)	71 (1)

Values in parentheses = standard error of the mean.

TABLE 2: WEIGHT GAINS IN TWO YEARS WITH SIX GROUPS OF FINISHING LAMBS

Group	*1976-7* (*g/lamb/day*)	*1977-8* (*g/lamb/day*)
1	60	88
2	110	121
3	143	156
4	77	84
5	147	126
6	164	150
SE (diff.)	5**	7**

particularly high in the 1976-7 season. In spite of this, the ranges of allowances were similar in each year. The proportions of dead material measured in the sward at 2-weekly intervals during 1977-8 were 8, 23, 19 and 28%, respectively. Similar increases at this time of the year have been measured in other experiments (Jagusch *et al.*, 1978). Utilization of the pasture present pre-grazing and apparent intake closely followed herbage allowance and did not relate to either years, pasture yield or digestibility. Similarly, herbage allowance rather than pasture yield or digestibility explained the differences in liveweight gain given in Table 2. This is shown in Fig. 1. The Mitscherlich equation ($y = a + br^x$) fitting the data was calculated as follows:

$$y = 171\ (\pm 17) + (-195\ (\pm 30) \times 0.64\ (\pm 0.11)^x) \quad \ldots (1)$$

where y = liveweight gain (g/lamb/day), x = DM allowance (kg/lamb/day), and the values in parentheses are the standard errors of the estimates. Equation (1) shows that near maximum

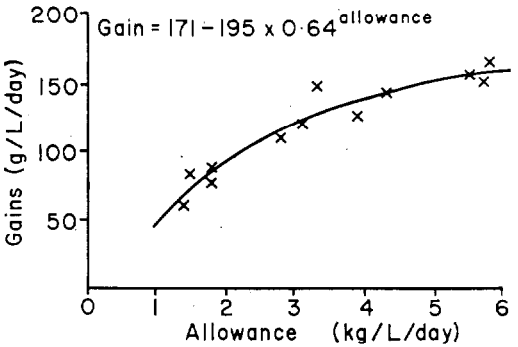

FIG. 1: *Relationship between pasture allowance and liveweight gains.*

TABLE 3: CARCASS, SKIN AND PERIRENAL FAT WEIGHTS, AND EYE MUSCLE AREA AND FAT DEPTH AT 12TH RIB

	Carcass Wt (kg)		*Skin Wt (kg)*		*Kidney Fat (g)*		*Eye Muscle Area (mm^2)*		*Fat Depth (mm)*	
	76/77	*77/78*	*76/77*	*77/78*	*76/77*	*77/78*	*76/77*	*77/78*	*76/77*	*77/78*
High yield	11.6	13.0	2.89	3.22	101	163	1170	1343	0.82	1.80
Low yield	13.1	12.7	3.47	3.20	140	150	1275	1347	1.55	1.64
SE (diff.)	0.3**	0.1*	0.08**	0.06 (n.s.)	8**	9 (n.s.)	23**	24 (n.s.)	0.13**	0.16 (n.s.)
Low allowance	10.2	11.6	2.70	2.98	68	122	1082	1247	0.56	1.25
Medium allowance	12.9	13.1	3.36	3.21	137	157	1251	1358	1.27	1.54
High allowance	14.0	14.0	3.47	3.45	157	191	1334	1430	1.73	2.37
SE (diff.)	0.33**	0.17**	0.10**	0.08**	9**	11**	29**	29**	0.16**	0.20**

gains (150 g/lamb/day) will be achieved at an allowance of DM/lamb/day (Fig. 1).

The slaughter data are summarized in Table 3, where the results are presented for groups given either the high (groups 1, 2 and 3) or low (groups 4, 5 and 6) yielding pastures, and also the low (groups 1 and 4), medium (2 and 5), and high (groups 3 and 6) herbage allowances. The significant effect of pasture yield in 1976-7 is accounted for by the relatively higher allowances given to groups 4, 5 and 6 in that year (Table 1). This resulted in increased body weights at slaughter, and thereby carcass weights, exactly as did increasing herbage allowance (Table 3). Increases in components due to increases in allowance were in proportion to carcass weight.

DISCUSSION

Short leafy pasture is generally considered the best lamb finishing feed. However, our results show that lambs do equally as well over a wide range of pasture yields provided they are given the same allowance. The zone of inaccessibility to herbage below which animals are believed to have difficulty prehending herbage and reduce their intake (Hodgson, 1976) did not appear to be reached in this experiment. Reduced intake and performance as pasture allowance decreased in these trials must therefore relate to the degree of selection the lambs have (Arnold, 1964) and/or dominance-behavioural structures associated with the grazing territories of individual animals or groups of animals (Hunter, 1964). Close grazing was characteristic of all treatments with preference being shown for patches as allowance increased.

These results show that, in feed budgeting, emphasis can be given to herbage allowance, rather than quality and other associated parameters, when lambs are to be finished. However, the relationship may vary with type of pasture, between environments, and between breeds and sexes of lamb.

Lastly, body composition showed a marked dependence on slaughter weight rather than any of the other variables measured.

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