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Influence of herbage allowance on diet quality in lactating ewes

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ABSTRACT

Diet quality was measured using oesophageally-fistulated lactating Dorset ewes offered herbage allowances of 8 (H), 5 (M) and 2 (L) kg DM/ewe/d. Ewes on all allowances tended to have a similar selection preference for grass and clover; those on H and M allowances consumed proportionately more clover and less dead material than L ewes.

The mean DDM of herbage selected by ewes in H and M groups averaged 0.790 and was 0.734 for L ewes compared with 0.727 for sward samples taken pre-grazing. The ME content of DM consumed by H and M ewes was 7% greater than for L ewes.

It is suggested that the lower digestibility of the diets of L ewes was due to a higher consumption of dead material and plant stalk than in ewes on H and M allowances.

INTRODUCTION

The feed intake of lactating ewes has been shown to increase with herbage allowance (Gibb and Treacher, 1978; Rattray and Jagusch, 1978). There is a lack of information, however, on the influence of herbage allowance on diet selection and quality and consequent effects on the intake of metabolisable energy. In the present experiment oesophageally-fistulated ewes were used to study diet selection and quality at 3 herbage allowances during the first 6 weeks of lactation.

MATERIALS AND METHODS

Animals and Management

Seventy-nine ewes (Poll Dorset and Dorset Horn) were mated to Suffolk rams at a synchronised oestrus (progestagen sponges) and lambed over a 4-day period in late September. Lambs were removed from 21 ewes (MM) about 48 h after lambing; these ewes were machine milked twice daily. Surplus lambs were fostered to remaining ewes with single lambs so all reared twins. Approximately 20 ewes were allocated each to high (H), medium (M and MM) and low (L) herbage allowance groups.

Pasture Measurements

(a) Quantitative

Herbage mass was measured before and after grazing by sward sampling (Geenty and Sykes, 1981) at intervals of 3 days. Ewes were offered herbage allowances of about 8 (H), 5 (M and MM) and 2 (L) kg DM/ewe/d by allocating differential areas each 3 days. Pastures were managed to maintain herbage

mass within the range of 1.8 to 2.8 t DM/ha during the experiment.

(b) Qualitative

Two ewes bagged for total faecal collection and 2 oesophageally-fistulated ewes were included in each group. Extrusa samples were collected from fistulated ewes daily during alternate 3 day periods. The samples were squeezed through muslin cloth immediately following collection to remove saliva (Langlands, 1975) then stored in a freezer. Dissections into botanical components were done on fresh herbage from sward samples and on freeze-dried extrusa material. *In vitro* digestibilities (DDM) were determined using freeze-dried herbage and extrusa and energy content of these and faecal samples determined by bomb calorimetry.

RESULTS AND DISCUSSION

Botanical Composition

Mean values for botanical composition of diets selected and of herbage available before and after grazing during the 6 week period are shown in Fig. 1. The percentage of grass in the diets of ewes in all groups was high (78 to 82%). On average the proportion of clover consumed by H, M and MM ewes (13%) was greater ($P < 0.05$) than that by L ewes (6%). The amount of dead material (17%) in the diets of L ewes was considerably greater ($P < 0.001$) than on the higher allowances (average of 5%). Composition of the sward after grazing showed that ewes and lambs on H, M and L allowances consumed grass and clover in the proportions in

which they were present in the sward, consuming 22%, 41% and 75% of the DM of each component respectively, but MM ewes selected more clover (43%) than grass (26%).

When comparing results in the upper and lower portions of Fig. 1 caution is required since estimates of diet selection were based on animal measurements and composition of the sward on sward samples. Nevertheless the results indicate that grazing ewes and their lambs did not show a selection preference for clover in contrast to previous findings with weaned lambs (Geenty and Sykes, 1981) where a strong selectivity for clover was evident.

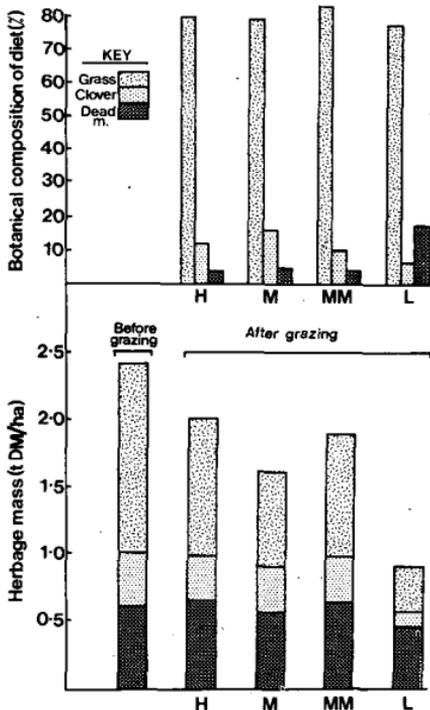


FIG. 1 Mean values for botanical composition of diets (upper) and herbage mass and botanical composition of sward samples taken before and after grazing (lower).

Digestibility and Metabolisability

Changes during the experiment in herbage mass and mean digestibility of diets of ewes and sward samples taken before and after grazing are shown in Fig. 2.

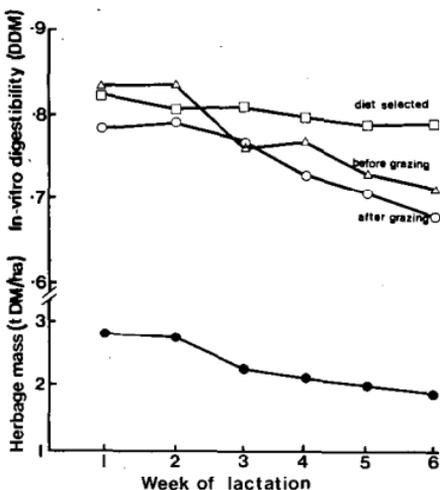


FIG. 2 Mean values each week for digestibility (DDM) of diets selected, sward samples taken before and after grazing and herbage mass (t DM/ha).

The decline in digestibility of sward samples was about 0.1 over the 6 week period compared with a mean decrease of 0.04 in samples from fistulated ewes indicating a compensatory effect due to grazing selection. Mean digestibility values for the experiment (Table 1) show the digestibility of herbage selected by H, M and MM ewes was about 0.07, and by L ewes 0.01, greater than that for sward samples taken before grazing. The apparent selectivity of more highly digestible material by H, M and MM ewes was reflected in greater M/D values (about 11), than for L ewes (10.2). This suggests that ewes on the high and medium allowances had diets with an ME content 7% greater than those on the low allowance.

Botanical Composition and Digestibility

Relationships between botanical composition and digestibility have been examined independently of herbage allowance by regressing digestibility of pre-grazed sward samples (Da, n=52), fistula extrusa samples (Ds, n=24) and post-grazed sward samples (Db, n=52) on botanical components in each. Percentage of grass or clover independently had little influence on digestibility; regression parameters for the 2 combined (i.e. green material) and for dead material are given in Table 2. Higher r^2 values suggest variations in dead material and gave a slightly better indication of variations in digestibility than green. The greater intercept value for green material

TABLE 1 Digestibility of sward samples and diet selected (DDM) and energy content (MJ ME/kg DM) of diets (M/D).

Herbage allowance	Digestibility			M/D
	before grazing	after grazing	diet selected	
H	0.727	0.696	0.796	11.2
M	0.727	0.693	0.778	10.8
MM	0.727	0.704	0.785	10.9
L	0.727	0.636	0.734	10.2

selected compared with sward samples and the relatively smaller regression coefficient for dead material may suggest that ewes were able to select dead material with a higher digestibility than that present before grazing.

In a review on the digestibility of plant parts Hacker and Minson (1981) have suggested that grazing ruminants preferentially select highly digestible leaf and only when grazing pressure is applied does the differential digestibility of plant parts have an influence on diet quality. In the present experiment grazing pressure was sufficient at the low herbage allowance to induce ewes to consume considerably more dead material (and from observation more stalk), than at the higher allowances. The lower nutritive value of dead material and increased lignification of plant stalk probably contributed significantly to the lower digestibility on the low allowance compared with that of the diets of ewes in the other groups. On the other hand, heavier grazing pressure caused by low herbage allowances has been shown to have beneficial effects on ryegrass production (Korte, 1982). Vegetative tiller frequencies (leaf) have increased and reproductive tillers (stalk) decreased, with an associated increase in herbage DM production.

CONCLUSIONS

On a mixed ryegrass-clover sward containing about 25% dead material a low herbage allowance (2 kg

DM/ewe/d) resulted in ewes consuming a diet with substantially more dead and stalky material, a lower digestibility and a 7% lower ME content than ewes on higher allowances (> 5 kg DM/ewe/d). A low herbage allowance during lactation thus not only limits dry matter intake but restricts ewes in their ability to select diets with a high digestibility and ME content. Any depression in animal performance caused by low herbage allowances, however, must be balanced against reduced post-grazing attention or cleaning up required to maintain sward quality for subsequent grazings.

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TABLE 2 Regression parameters for relationships of percentage green material (grass and clover) and dead material (X) with digestibility (DDM) of pre-grazed herbage (Da, n = 52), post-grazed herbage (Db, n = 52) and extrusa (Ds, n = 24) samples (Y).

X	Green material			Dead material		
	Da	Ds	Db	Da	Ds	Db
Y						
a	37.0	49.5	45.2	85.6	79.4	81.6
b	0.49	0.31	0.37	-0.50	-0.30	-0.36
r ²	0.63	0.51	0.55	0.70	0.69	0.54
RSD	3.455	2.104	4.490	3.098	2.933	4.545
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