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Diet selection of young ruminants in late spring

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ABSTRACT

Sixteen kids, 16 lambs and 16 calves approximately 4 months of age were allocated at random in balanced groups of 4 per species at a common allowance to 4 herbage masses (1800, 3000, 3900 and 5000 kgDM/ha) on a ryegrass white clover sward. A further calf, lamb and kid and a mature goat and ewe, fitted with oesophageal fistulas, grazed continuously with their own species at each herbage mass during the 8 day trial. These fistulated animals were randomly relocated to herbage masses every 2 days so that individuals sampled each herbage mass.

On similar swards the diet of the lamb contained a greater proportion of clover (+0.23) and a smaller proportion of grass (-0.19) and dead material (-0.03) than the calf. The diet of the kid was intermediate between that of the lamb and the calf. The extent of dietary overlap suggests the species are in a major way competitive rather than complementary when grazing intensively managed swards.

While older goats consumed a diet similar in composition to the young goat, older sheep consumed more dead material than lambs, although the proportions concerned were small.

There was no difference in the *in vitro* digestibility of the diet selected by young goats, lambs and calves even though there were differences in botanical composition of the diet selected among the species. The *in vitro* digestibility of the diet selected was not affected by age of animal.

Keywords Diet selection; kid; lamb; calf; goat; ewe; herbage mass; allowance

INTRODUCTION

There is anecdotal evidence that domestic ungulates differ in diet selection from swards. Thus it is often argued that goats preferentially select and indeed require access to herbage of high fibre content. Cattle, on the other hand, are assumed to be incapable of exerting similar selective behaviour to sheep because of their mouth size and prehensile behaviour. Advocates of mixed grazing systems imply, in part at least, that the grazing habits of species tend to be complementary rather than exclusively competitive. We have, however, no objective data for variation in diet selection between species grazing the same sward.

In addition, we are uncertain about the extent of variation in diet selection between animals of differing age within the species (Hodgson, 1982). This is important to establish because the difficulties of oesophageal fistulation favour use of mature animals if these provide samples representative of diet selected by young animals.

This paper examines diet selection characteristics of sheep, goats and kids and the importance, within species, of age.

MATERIALS AND METHODS

Sixteen kids, 16 lambs and 16 calves approximately 4 months of age were allocated at random in groups of 4 per species, balanced on a body-weight basis to one of 4 herbage masses (HM), each animal species

grazing a separate site at each HM for 8 days, thus providing 12 plots. A common pasture allowance for all species (Table 1) was calculated at 3 times the inter-species mean maintenance requirement ($0.5 \text{ MJME/W}^{0.75}$). A further kid, lamb, calf and mature doe and ewe each fitted with an oesophageal fistula grazed with its own species at each of the 4 herbage masses at all times. Thus 20 fistulated animals in total were used in the trial. At 2-day intervals the fistulated animals were randomly reallocated to another of the 4 herbage masses so that over the 8-day measurement period individuals from within species sampled each herbage mass. The lower 2 HM were prepared by intensive on-off grazing with ewe hoggets and the remaining HM with a flail harvester and catcher. A one-year-old Nui ryegrass-white clover sward was used.

Pasture Measurements

Herbage measurements were made the day before grazing commenced, on day 4, and at the completion

TABLE 1 Mean herbage allowances (kgDM/hd) and mean live weight (kg) of lambs, kids and calves used in the trial.

	Lamb	Kid	Calf
Allowance	3.2	2.2	11.3
Live weight	27.6 ± 0.6	16.3 ± 0.5	116.4 ± 2.5

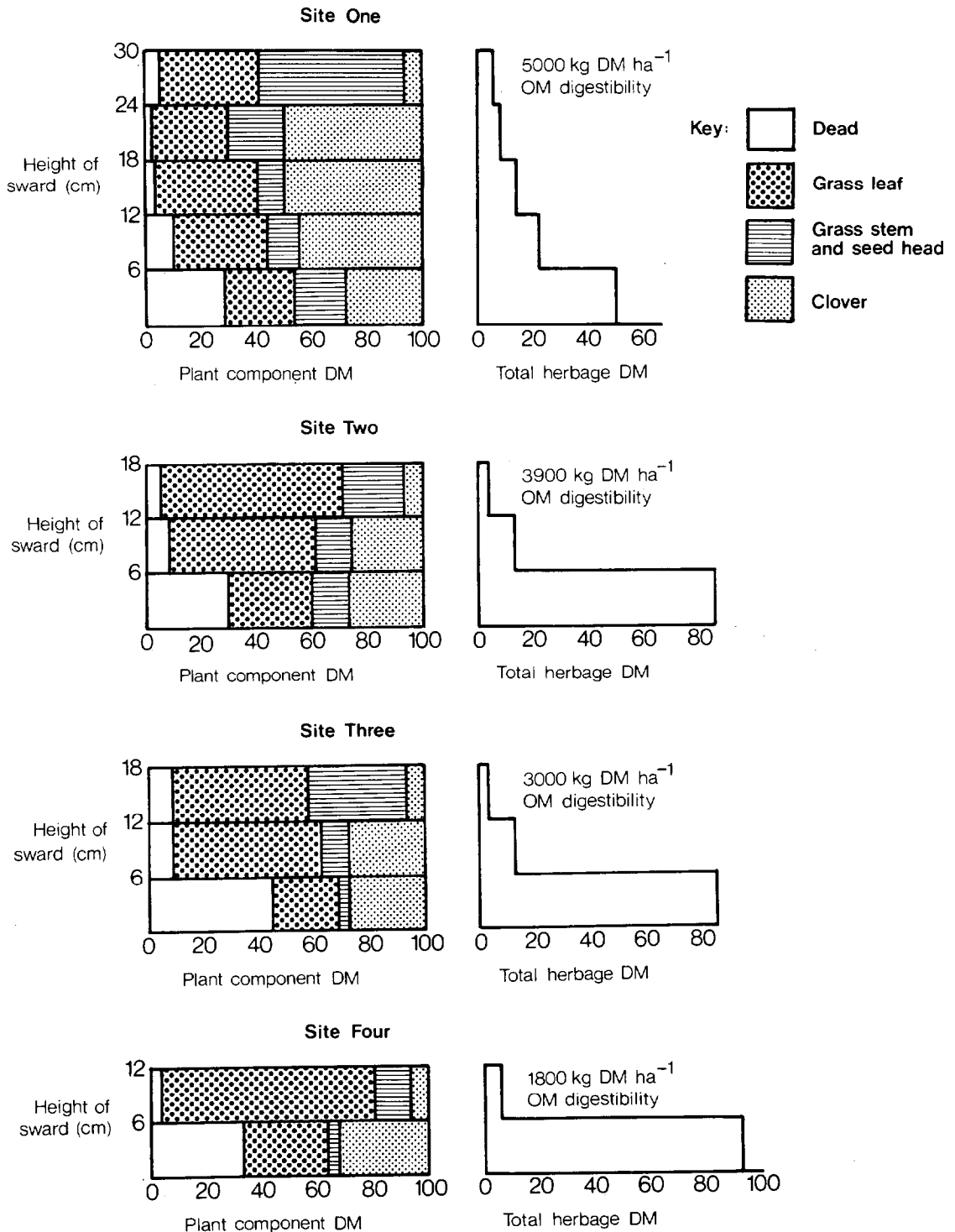


FIG. 1 Proportion of sward component DM and total herbage DM in each horizon of the 4 herbage masses at the start of the trial.

of the trial (day 8). Herbage mass was measured by cutting 3 quadrats (0.2 m²) per plot to ground level with a shearing handpiece and subsequently drying a subsample at 70°C. The remainder of each sample was stored at -20°C for plant composition analysis. The vertical distribution of herbage within the sward canopy was measured by cutting a further 3 quadrats (0.19 m²) per plot in 6 cm layers from the sward surface down to ground level (Milne *et al.*, 1982). Herbage samples were stored at -20°C and subsequently freeze dried before compositional analysis.

Animal Measurements

Extrusa samples were collected daily from each fistulated animal during the early morning grazing period. (0600–0900 h). Any sample with excessive saliva was discarded and a further sample collected during the afternoon grazing. Pasture composition and *in vitro* digestibility were determined on the freeze-dried extrusa.

RESULTS AND DISCUSSION

The sward preparation techniques produced swards of significantly different herbage mass and height. Although pasture composition did not vary greatly the distribution of plant components and the proportion of the total HM in each horizon differed between herbage masses (Fig. 1). Because of the rapid growth of pasture at this time herbage masses were greater than had been projected.

Pasture Composition

Mean values for the composition of the diet selected by animal species are given in Table 2.

TABLE 2 Mean proportion (DM) of sward components and digestibility of OM in oesophageal extrusa from goats, sheep and calves grazing similar ryegrass white clover swards.

	Mean of ungrazed herbage masses	Kid	Goat	Lamb	Sheep	Calf
Grass	0.41	0.64ab	0.79a	0.56b	0.59ab	0.76a
Clover	0.26	0.35ab	0.20b	0.42a	0.36ab	0.19b
Dead matter	0.33	0.01b	0.01b	0.02b	0.05a	0.05a
OM digestibility (%)		81ab	83a	77ab	76b	76b

TABLE 3 Proportion of dead material in oesophageal extrusa DM according to herbage mass (kgDM/ha), animal species and period of sward sampling (d).

Herbage mass		Species		Period	
1800	0.015b	Kid	0.008a	1-2	0.008b
3000	0.014a	Goat	0.009a	3-4	0.016b
3900	0.035ab	Lamb	0.018ab	5-6	0.033ab
5000	0.048a	Sheep	0.051b	7-8	0.056a
		Calf	0.054b		
LSD 0.05	0.024	LSD 0.01	0.039	LSD 0.01	0.034

The diet of lambs contained a greater proportion of clover (+0.23) and a smaller proportion of grass (-0.19) and dead material (-0.03) than that of the calf. Jamieson and Hodgson (1979) also found the diet of calves to contain slightly more dead and less green material than that of lambs when set stocked on an all grass sward. The diet of the kid though intermediate was closer in composition to that of the lamb than that of the calf. The proportion of clover in the diet of the kid was higher (+0.09) than the mean of the ungrazed HM which suggests active selection. Clark *et al.* (1982) reported that mature goats grazing with sheep in gorse-control trials in hill country actively rejected clover. The goats in this trial had few weeds or browse shrubs available to graze but showed no preference for the stalky or dead material in the sward. The results of this trial suggest that the grazing habits of goats, calves and lambs are more competitive than complementary, when grazing intensively managed swards.

Diet selection and *in vitro* digestibility of the diet was not affected by age in the goats and only to a very small extent in the sheep. The ewe consumed a significantly greater proportion (+0.03) of dead material than did the lamb. However, this was not sufficiently large to influence diet digestibility. This result has important implications in pasture intake and selection work. Mature fistulated animals are more robust and, in our experience, both easier to manage and to obtain samples from with reliability. These data do open up the possible use of older mature fistulated animals in diet selection trials but further confirmation is required. Although the effect of age on diet selection in cattle was not studied in this trial Hodgson and Jamieson (1981) found only small differences in diet composition and digestibility.

The proportion of dead material in the diet of all species increased with herbage mass and day of sampling (Table 3). At the higher herbage masses there was a greater amount of dead material in the upper sward profile (Fig. 1). The period of sampling effect was probably due to an increase in the proportion of available leaf being close to dead material as the more accessible leaf was removed. Contrary to expectations the differing herbage masses had no effect on the proportion of grass and clover in the diet. The sheep, goats and calves were apparently able to exhibit the same dietary preferences at all herbage masses.

Digestibility

There was no significant difference between the *in vitro* digestibility of the organic matter (OM) in the diet of the kid, lamb and calf. This result was unexpected in view of the different plant proportions in the diets of the lamb and calf. On a perennial ryegrass sward Jamieson and Hodgson (1979) found lambs selected a more digestible diet than calves, while Langlands and Sanson (1976) reported that sheep also selected a more digestible diet than did cattle. This suggests that the calf must have harvested the youngest leaf of high digestibility in the top sward profiles. As discussed ear-

lier the digestibility of the diet of all species decreased with increasing herbage mass. This follows OM digestibility trends in the total sward (Table 4) and probably reflects the higher proportion of very highly digestible young regrowth material (grass leaf) in the lower herbage masses.

CONCLUSION

In late spring on ryegrass/white clover swards kids, lambs and calves grazing a good quality sward are likely to be in direct competition rather than complementary to each other. Goats do not appear to select a high proportion of dead material and eat clover in proportion to its presence in the sward. Age of goats and sheep did not affect digestibility of the diet selected and had unimportant effects on the plant composition of the diet.

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TABLE 4 Mean values for the OM digestibility (%) of diet selected and of the sward at each herbage mass (kgDM/ha).

	Herbage mass			
	5000	3900	3000	1800
Sward prior to grazing	68	70.5	76.6	69.4
Oesophageal extrusa	74.1 ^A	77.8 ^{AB}	80.6 ^B	81.9 ^B
(P < 0.01) LSD _{Diet} = 5.33				

lier there was no significant effect of age within a species on the digestibility of the diet selected. However, the digestibility of the diet selected by the older goats was significantly higher than that of the sheep or calves which may be partly explained by differences in the proportion of dead material in the diets. The digest-