Influence of green leaf distribution on diet selection by sheep and the implications for animal performance

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ABSTRACT

Diet selection from 2 swards (ryegrass and prairie grass) vertically stratified into 3 horizons (A, >6 cm, B, 3 to 6 cm, C, 0 to 3 cm) was studied using oesphageally fistulated ewes in summer and autumn.

Green grass leaf (GGL) contributed 68 to 97% of diets, whilst pseudostem and dead material were rejected. Sward and dietary white clover contents were low (0.5 to 4.3% in the sward and 0.1 to 4.9% in the diet) and no selection for this component was evident. Defoliation of white clover appeared to be influenced by the vertical distribution of GGL.

Green material distribution determined the horizons grazed. Sheep grazed horizon C of summer ryegrass pasture, where 95% of GGL was found. In all other swards the surface canopy (>3 cm above ground level) was composed primarily of GGL (>30%), and sheep grazed this horizon. Low apparent intake (21 g DM/kg live weight/d) was associated with the apparent need to penetrate the surface canopy to obtain GGL in summer ryegrass pasture.

Keywords Sheep; green leaf; diet selection; white clover

INTRODUCTION

Grazing sheep have been shown to harvest green leaf in preference to green stem and dead material (Arnold, 1964; Guy, 1979; Clark *et al.*, 1982). There is, however, a lack of information on the influence of sward structure and the vertical distribution of preferred components in the sward on diet selection. This study examined diet selection of sheep grazing dry-land ryegrass/white clover and prairie grass/white clover swards under seasonal conditions (during summer and autumn) which resulted in differences in sward structure.

MATERIALS AND METHODS

Two 0.1 ha areas of the rotational grazing experiment described by Fraser (1982) were used. The interval from previous grazing was 72 and 31 days for both swards in summer and autumn, respectively. Thirteen mixed age Coopworth ewes, 3 of which were fistulated at the oesophagus grazed the swards continuously over a 3-day period in summer and autumn. Oesophageal extrusa samples were collected and sward measurements made as the animals entered the experimental area and daily thereafter over the grazing period. The height above ground level of leaf pseudostem and dead material was measured using a ruler on at least 100 grass plants randomly located by vertical point quadrat. The vertical distribution of sward components within swards was measured daily by cutting 4 quadrats (89 × 22 cm) into 3 horizons, A, >6 cm, B, 3 to 6 cm, C, 0 to 3 cm, 0 cm being ground level. Freeze-dried bolus and fresh herbage samples were dissected into grass (leaf and pseudostem), white clover, weed and dead material. Apparent herbage intake was calculated from total DM disappearance over the grazing period.

RESULTS AND DISCUSSION

Mean values for herbage mass and botanical composition of swards before and after grazing and botanical composition of oesophageal boluses in summer and autumn are presented in Fig. 1.

The high percentage of green grass leaf in the diet of ewes grazing all swards (68 to 97%), reflected animal preference for green leaf relative to that on offer (4 to 82%). Generally, the percentage of weed and pseudostem in swards was low (0.1 to 3.5% and 2.1 to 19.0% respectively) and was largely rejected by the grazing animal (<2.5 and 4.4% in the diet respectively). The percentage of dead material in the

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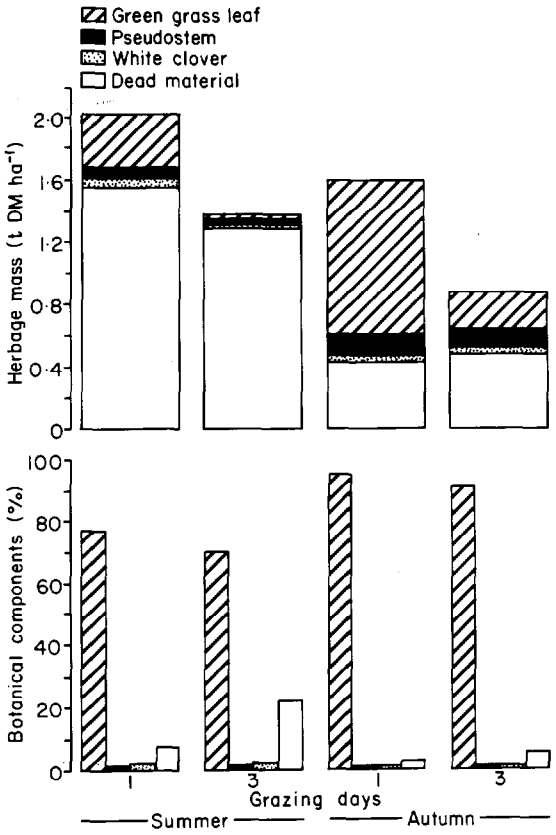

FIG. 1 Herbage mass and botanical composition of swards (upper) and botanical composition of oesophageal boluses (lower) at the start and end of grazing.

diet was low (<24%) relative to that on offer in swards (25 to 94%). Rejection of pseudostem and dead material may be related to a low preference ranking and/or inaccessibility (Clark *et al.*, 1982). The results obtained during summer suggested that animal preference was more important particularly in ryegrass pastures, as pseudostem and leaf components were both found in horizon C and this horizon was heavily grazed by sheep.

White clover was harvested by sheep in proportion to its presence in all swards (0.5 to 4.3% *v* 0.1 to 4.9% for sward and diet respectively). White clover was harvested from horizon C in proportion to its content in that horizon in summer, but at a lower proportion in autumn. Selection for white clover was not evident. This is contrary to the findings of Guy (1979) and Clark *et al.* (1982), who all observed higher proportions of white clover in the diet than on offer. The vertical distribution of white clover relative to the major dietary component (green grass leaf) rather than animal preference may have influenced its consumption by sheep in this study. White clover leaf was in close vertical proximity to green grass leaf in summer and thus was accessible. In autumn, however, much of the grass leaf was located higher in the sward than clover and as a result less grazing occurred in the horizon containing the clover.

Selection for green material appeared to determine the sward horizons preferentially grazed by the sheep. In summer ryegrass pasture, sheep penetrated the surface canopy of predominantly (95%) dead reproductive stem to graze largely in horizon C, where most (95%) of the green leaf was found. In all other swards (in summer and autumn) sheep grazed the surface sward canopy where 30 to 40% of the total grass leaf was found (Fig. 2).

The results appear to indicate that animal preference for green material is an important factor in determining the grazed horizon. The suggestion by Hodgson (1982) and Milne *et al.* (1982) that animals graze indiscriminately at the surface of intensively managed swards appears to apply, in this study, only to those swards where about 30% or more of the green grass leaf was in the surface canopy. In swards of similar herbage mass and surface height (Fig. 2) a striking difference in green grass leaf distribution existed between ryegrass and prairie grass pasture in summer. For prairie grass 36% of the green grass leaf occurred above 3 cm but only 5% in the case of ryegrass.

TABLE 1 Apparent herbage intake (g DM/kg live weight/d) of sheep grazing all swards.

	Summer	Autumn
Ryegrass	21.0	30.0
Prairie grass	39.3	40.7

The effect of this was evident not only in horizons grazed by sheep but also in apparent herbage intake (Table 1). In summer apparent intakes achieved by sheep grazing prairie grass swards was 87% higher than that achieved on ryegrass swards. In autumn, greater GGL distribution above 3 cm for prairie grass (39%) compared with ryegrass (29%) was associated with 36% higher apparent intake.

The difference in green grass leaf distribution between ryegrass and prairie grass pastures therefore clearly seems to have real implications in terms of sheep performance. These data support the view that there is a strong relationship between sward structure and animal performance.

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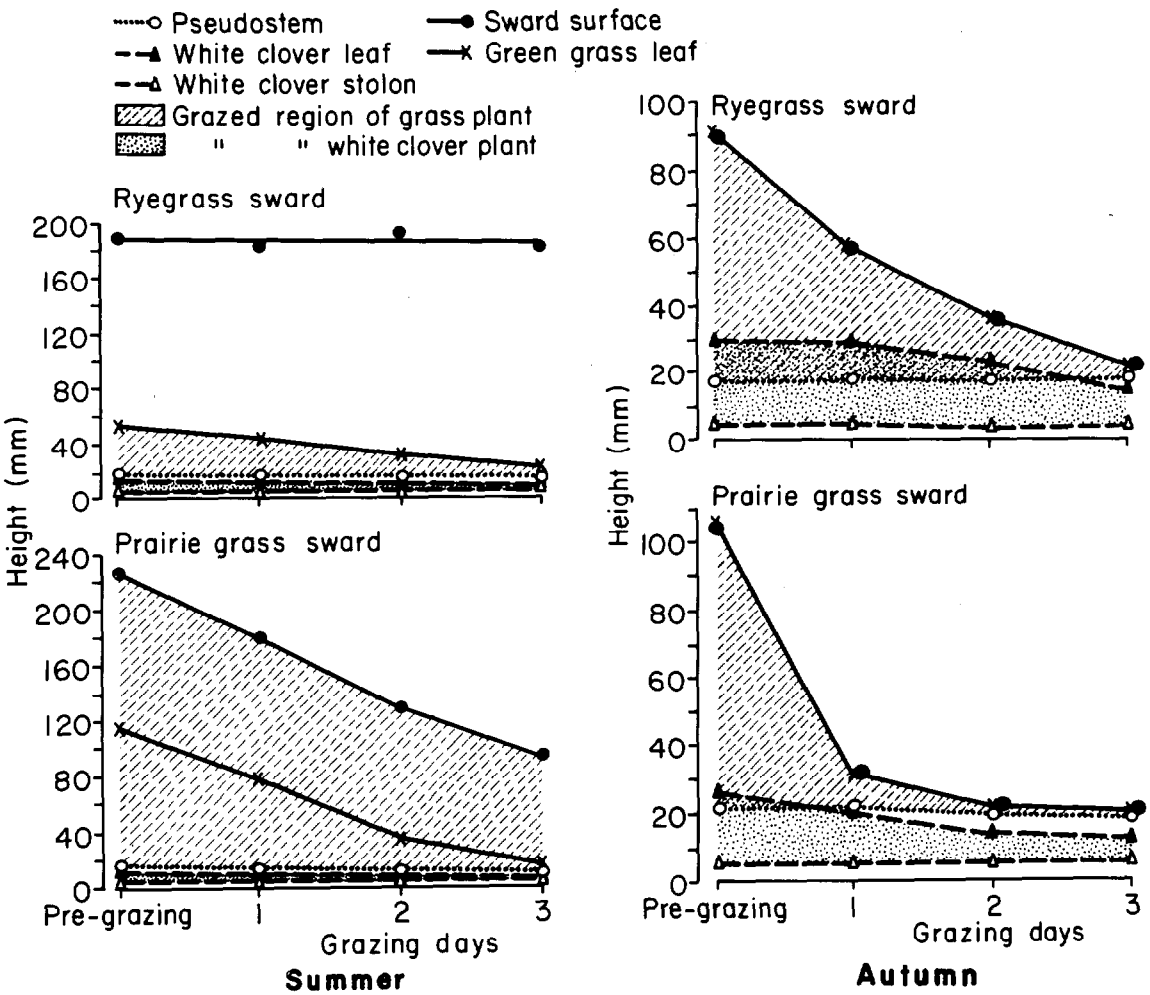

FIG. 2 Height of sward components and grazed horizons in summer and autumn pastures.

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