BORDER EFFECTS ON CATTLE GRAZING PREFERENCE

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ABSTRACT

The objective was to examine the effect of row position on cattle grazing preference. Grazing preference of eight tall fescues [*Festuca arundinacea* (Schreb.)] was evaluated by ocular preference scores at 30 hr (PS30) and 48 hr (PS48). Six rows of a cultivar—numbered consecutively within each plot from left to right—formed one plot. Rows 1&6 were on the outside edges of the plot and rows 3&4 were in the middle. Within a replication, rows 1 and 6 were adjacent to rows 6 and 1 of adjacent plots, respectively. During the first year, row position was not a significant effect. However, in the second year, preference for middle rows was significantly higher than the outer pairs of rows—rows 2&5 and 1&6. This could have been a result of the animals' ability to distinguish preferred cultivars in the middle of the plot because of more distinct olfactory and visual cues. Row position was important in experimental design because of an interaction with animal behaviour.

KEYWORDS

Behaviour, tall fescue, grazing design, grazing method

INTRODUCTION

The design of grazing experiments to determine preference for forages is critical. The layout of plots, and test plants within plots can affect animal behaviour and consequently interpretation of animal preference. This study examines the effect of row position within a plot. We hypothesize that forage in middle rows of a plot would be consumed to a different extent than outer rows, especially rows bordering another tall fescue cultivar. Our hypothesis is based on the idea that grazing animals would receive stronger positive or negative olfactory cues in the middle rows than from edge rows where the olfactory cues would be more mixed with those from the adjacent plot (cultivar).

The objectives were (1) to determine if the position of rows within a plot had an effect on cattle grazing preference, and (2) to determine error of the method.

METHODS

Measurements were taken during May, June, August, and September of 1993 and 1994 when six yearling heifers consecutively grazed three pastures for 48 hr. Each pasture contained three randomized complete blocks with each of the eight tall fescue [*Festuca arundinacea* (Schreb.)] cultivars planted in plots of six rows, 56 cm apart X 6 m long. Six rows of a cultivar (numbered consecutively within each plot from left to right) formed one plot. Rows 1&6 were on the outside edge of the plot and rows 3&4 were in the middle. A relative preference score (PS) for each of the six rows for given cultivars was recorded by four observers at 30 (PS30) and 48 (PS48) hr grazing. A PS from 0 to 10 represented 0 to 100% utilization of available forage, respectively. The procedure used a separate pre-study pasture to train observers and condition heifers to the forage prior to each monitored trial. The stocking rate was designed to remove an average of 50% of the forage in a 48-hr period for optimum sensitivity of preference. Plots were flailed to a common stubble height following each grazing trial. Single degree of freedom contrasts were tested for the comparisons of the following combinations of rows: (1) 1&6 versus 3&4; (2) 2&5 versus 3&4; (3) 3&4 versus 1,2,5,6; and (4) 2&5 versus 3&4.

RESULTS AND DISCUSSION

The row effect was not significant during 1993, but in 1994 all contrasts were significant ($P<0.001$). The center rows (rows 3 and 4) scored a higher preference than rows 2&5 or 1&6 ($P<0.001$) in 1994. Figure 1 shows the means and SE for the PS30 and PS48 scores by year and across four trials per year, three blocks, three reps nested within blocks, and eight cultivars of tall fescue. The outer rows (1 and 6) scored the least utilization in 1994. We interpret the results as the animals' ability to distinguish preferable plants or cultivars by the association of olfactory cues and taste with postingestive consequences from nutrients (i.e. soluble carbohydrates), as discussed by Provenza (1995). The olfactory and visual cues are more distinct in the center rows of the plot than in the outer rows. Thus animals would be better able to decide whether the cultivar was preferred in the center of the plot as compared with the edge of the plot where cues from two adjacent cultivars would be mixed.

The reason for the year effect on the preference scores by row position is not known. Possible explanations are (1) that different animals were used on different years and their individual preference traits were not affected by row position in 1993, (2) that the weather was different and influenced grazing preference or animal behaviour, or (3) other factors affected the preference. Perhaps more wind was present during the 1993 trials that would have mixed the aromas from the cultivars and reduced the animal's ability to distinguish the preferred plants.

In 1994, the variability of PS48 was lower for rows 3&4 than rows 1&6 (Table 1). This may be evidence that cattle could distinctly identify the highly preferred or aversive cultivars in the middle rows but not in the outer rows.

Although the hypothesis was not critically proven and row effect was not significant in 1993, row position is clearly a factor that should be considered in experimental designs to determine ruminant preference for forages. The row design is more practical to seed, maintain, and score than individually randomized plants, but may affect animal behaviour and preference patterns.

REFERENCES

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Table 1
Variability of 48-hr preference scores—means of four observers, N=288—by year and row.

	Coefficient of Variation (%)	
Row / Year	1993	1994
1	39.7	33.7
2	37.9	34.6
3	36.6	31.1
4	38.7	31.1
5	40.8	33.6
6	40.3	32.9
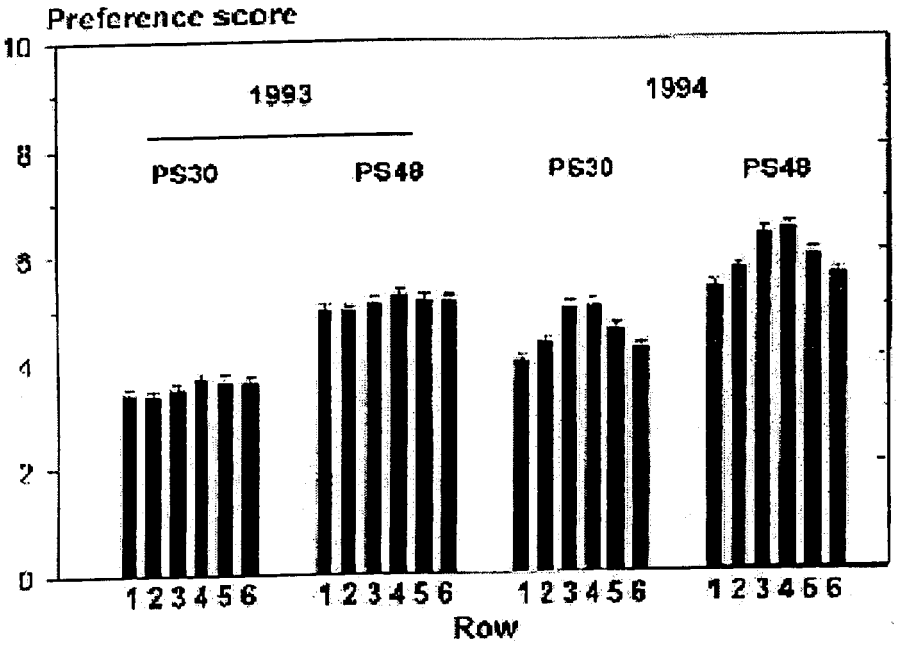
Figure 1
The 30-hr (PS30) and 48-hr (PS48) preference scores as a function of row position.