DIET SELECTION BY SHEEP GRAZING PASTURES WITH DIFFERING WATER-SOLUBLE CARBOHYDRATE CONTENTS

T.A. CIAVARELLA¹, R.J. SIMPSON¹, H. DOVE¹ and B.J. LEURY²

¹CSIRO Division of Plant Industry, GPO Box 1600, Canberra, ACT 2601
²Department of Agriculture and Resource Management, The University of Melbourne, Parkville, Vic 3052

There are many factors which might influence what grazing animals select in their diet. The importance of these factors, and their effect on the choice of diet by the animal are the subject of much research effort. Many of the factors (e.g. smell, taste, texture, palatability, digestibility) are closely linked, and it is difficult to alter one factor in isolation, especially in the field. These features or sensations may reflect differences in more definable aspects of feed quality, such as the concentrations of protein, carbohydrate, lignin, or other contents. There is some indication that animals prefer diets of higher water-soluble carbohydrate (WSC) concentration (Bland and Dent 1964; Michell 1973; Simpson and Dove 1994) and that there is a positive relation between intake and WSC content at constant digestibility (Michell 1973). Our work aimed to create two grass pastures differing only in WSC, and to test the hypothesis that sheep have a preference for pasture of higher WSC and select for it in the field.

A 4.8 m x 15 m area of phalaris pasture was divided into 1.2 x 15 m strips. Areas of low (shaded) and control WSC concentration were created by covering alternate strips with foil-backed fibreglass insulation for approximately 40 hours (beginning at 1600 hours on 2 October 1996) to reduce the WSC concentration of shaded strips (mean ± s.e. 61.6 ± 2.3 mg/gDM) relative to control strips (126.1 ± 2.4 mg/gDM). The total nitrogen concentration, in vitro digestibility and neutral detergent fibre content of the pasture were not significantly altered by the shading treatment. Using a hand-held boom spray, two synthetic alkanes, n-octacosane (C₂₈) and dotriacontane (C₃₂), were sprayed on to the shaded and control strips, respectively, as markers. A second area, 4.8 x 15 m, was prepared identically except that the shaded and control strips were sprayed with C₃₂ and C₂₈ respectively.

The two areas were each grazed by five sheep for about nine hours, beginning at 0900 hours on 4 October 1996. Samples of faeces were collected from each sheep at 1800 hours, and then each morning and afternoon for the next five days. Preference by sheep for one pasture over the other (expressed as control pasture/shaded pasture) was determined from the ratio of the areas under faecal C₂₈ and C₃₂ excretion curves (Table 1). A C₂₈:C₃₂ ratio of 1:1 (taking into account any differences in the concentration of each alkane applied to the pasture, and the recovery of each in the faeces) would imply that sheep exhibited no preference for either pasture treatment.

Table 1. The preference by sheep for control pasture over shaded pasture (expressed as the ratio of the faecal concentrations of the different alkane markers applied to each pasture) when sheep were allowed to select freely from either pasture. The bracketed value is the mean ± s.e.

<table>
<thead>
<tr>
<th>Preference ratio for each of ten sheep</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.1</td>
</tr>
</tbody>
</table>

The ratios of the concentrations of the two alkane markers in the faeces of the sheep indicate that the animals were quickly able to differentiate between the two pastures which apparently differed only in WSC concentration. Their preference for the control pasture, which had the higher WSC concentration, resulted in active selection of that pasture by the sheep.

Advice from R.W. Mayes on the application of alkanes to pastures is gratefully acknowledged.