

THE BOTANICAL ANALYSIS OF SHEEP DIET — A COMPARISON OF THREE METHODS OF SHEEP DIET DETERMINATION AND THE FIELD APPLICATION OF FAECAL CUTICLE ANALYSIS

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Three methods of sheep diet determination were compared at Brooksdale Station during one time of the year under conditions of declining herbage availability.

Improved methods for establishing and maintaining oesophageal fistulae in free-ranging sheep were developed, as were techniques for preparing and analysing the botanical content of oesophageal extrusa and faecal cuticle. The specialized application of visual determinations of defoliation by grazing was also studied.

Dietary analysis was incorporated with observational studies of the distribution and grazing behaviour of experimental animals grazing semi-improved short-tussock grasslands typical of the sub-humid sector of Central Canterbury mid-altitude hill and high country.

Concurrently with this major study, improved methods of faecal cuticle preparation and analysis were used at Coopers Creek for determinations of sheep diet on improved hill pasture of different aspect throughout the pasture growing season.

A significant similarity between results obtained from the analysis of oesophageal extrusa and from faecal cuticle analysis was thought to suggest that a large proportion of the loss of cuticular detail of reputable palatable species supporting extremely fragile cuticle (e.g., *Anthoxanthum odoratum* and *Trifolium repens*) previously attributed to rumen digestion was the result of damage incurred by previously employed methods of preparing material for analysis. Consequently, it was concluded that improved methods of preparing faecal cuticle for microhistological

analysis may, in future, be used to derive quantitative dry weight assessment of dietary intake.

It was observed that the diurnal grazing behaviour and distribution of experimental animals within a grazing block containing a range of physiographic units followed closely the incidence and storage of solar radiation.

Total herbage availability, species availability, and the availability of plant parts were shown to be major constraints on dietary selection in tussock grassland sites, especially those dominated by a majority of rank low-quality herbage. Results of both studies suggested that gregarious behaviour led to uneven utilization and complex changes in herbage availability, any analysis of which was thought to require a confident quantitative assessment of botanical composition of samples (preferably with some attention to partition of species components into leaf and stem as well as live and dead material).

Of the more readily available species at the Brooksdale site, *T. repens* was the only more abundant species for which animals displayed a consistent and marked preference at both lower and higher grazing pressure, irrespective of the method of analysis. The two other major constituents of the sward, *Agrostis tenuis* and *A. odoratum*, appeared to be grazed relative to their abundance as determined by total species dry matter yield. The stem of *A. tenuis* appeared to be eaten, while that of *A. odoratum* was avoided, suggesting that any dietary comparison at total plant level may underestimate the relative palatability of particular plant components. The utilization of *Notodanthonia* species did not approach the level of its availability ranking until grazing pressure was increased, suggesting initial negative selection.

It was evident that at lower grazing pressure there was a highly significant similarity between rankings resulting from all techniques employed at the Brooksdale site. With increasing grazing pressure the similarity between results of point analysis and ring analysis remained significant, as did the similarity between oesophageal extrusa and faecal cuticle analysis.

At Coopers Creek little seasonal change or variation between aspect in the ranked order of species occurrence was evident. Four major grasses (*A. tenuis*, *A. odoratum*, *Notodanthonia* and *Cynosurus cristatus*) and a composite group of legumes, principally *T. repens*, contributed approximately 75% of the cuticular material identified, and, as at the Brooksdale site, leaf cuticle dominated over stem cuticle. Diet selection was more evident under conditions of increasing or high herbage availability.