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The Potential Use of Some Plant-Wax Compounds as Faecal
Markers to Measure the Botanical Composition of Herbivore
Diets

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ABSTRACT

The Potential Use of Some Plant-Wax Compounds as Faecal Markers to Measure the Botanical Composition of Herbivore Diets

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Few methods exist for quantitatively estimating the diet composition of free-ranging herbivores. This thesis examined whether long-chain fatty alcohols or long-chain fatty acids, and possibly other compounds, could be used along with n-alkanes to allow reliable diet composition estimates to be made in herbivores consuming complex diets. The method of analysis of these compounds, their recovery in faeces and levels in plants have been investigated. The original n-alkane method of Mayes *et al.* (1986) was modified to allow separate hydrocarbon (n-alkanes, n-alkenes and branched-chain alkanes), alcohol (free+esterified) and acid (free+esterified) fractions to be obtained from a single sample. Tests on the reproducibility of the analytical method showed that these compounds can be measured to the similar levels of precision in both feed and faeces samples. The results of an experiment involved twelve sheep in metabolism crates offered four different mixtures from *Agrostis capillaris*, *Betula pendula*, *Calluna vulgaris* and *Vaccinium myrtillus* showed high, though incomplete, faecal recoveries for both alcohols (C₂₀-C₃₀) and acids (C₂₀-C₃₂). Seventy nine different plant species from different countries were analysed (using the developed method) to investigate the variability of alcohols and acids within-and between-species. The results of the PCA showed that the patterns of concentrations of these compounds differ greatly between different species but differences within-species were very small. A validation experiment, with 12 sheep housed in metabolism crates and fed four different mixtures of three plant species, was conducted. Levels of these markers, estimated in samples of individual plant species and the faeces from animals that consumed mixtures of these species, were used to calculate the dietary proportions of each species in mixtures.

It is concluded that, long-chain fatty alcohols have great potential to estimate composition of complex diets. However, the estimation from long-chain fatty acids was less good.