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Food selection and habitat use in the red deer (*Cervus elaphus* L.)

by H.E. van de Veen.

ABSTRACT

This thesis deals with the causal factors underlying seasonal shifts in patterns of food selection in the red deer.

From field evidence and rumen content analysis it was concluded that diet composition varied greatly through the seasons. Fresh grass was important in all seasons when available, but in spring the tender leaves of deciduous trees were preferred over grass. Thereafter increased intake of leaves can supplement low-preference, maturing grass. Where deciduous trees were absent or overbrowsed shoots of Heather and bark of Scots pine were taken as daytime maintenance food in summer. In winter needles of Scots pine and dwarfshrubs formed the staple food; Heather being clearly preferred over Bilberry and Cowberry.

The established relative preferences were compared with the corresponding N-contents, the share of cell wall contents and the levels of digestible and undigestible cell wall components as well as with short term digestibility as determined by an *in vitro* fermentation technique. It was evident that red deer try to compensate for declining forage quality levels by changing their diet.

Concerning low preference forages the share of cell wall contents and particularly the total levels of undigestible cell wall components were indicative, but such data were less predictive with regard to high preferences. For high preference forages short term digestibility was closely related to relative preference.

With a tame animal nine feeding trials were conducted spaced over a full annual cycle. These trials were based on semi-natural, hand-picked diets. The results yielded highly significant negative correlations between total levels of undigestible cell wall components and digestibility of dry matter and N. It was also found that high rations of tannin-rich forages induced a marked reduction of N-digestibility.

Extrapolation of these findings to natural diets showed that summer diets were twice as digestible as winter diets. Because intake of summer diets could be shown to be also twice as high as the intake of winter diets a fourfold difference between net summer and winter intake was evident. Concentrated daytime feeding in thickets and game reserves as a consequence of extreme wariness was associated with feeding on second choice forages resulting in diets of markedly reduced digestibility.

Substitution of data on gross chemical composition in natural diets from various environmental conditions showed that red deer tend to select diets containing ca 50% cell contents. Because the cell content fraction is more digestible than the cell wall fraction it was concluded that in the red deer focussing on short term digestibility must be more important than the potential for the - slow - fermentation of fibres.

The results of this study stress that for the understanding of food selection in ruminants apart from dietary digestibility also knowledge of ruminal turnover speed is indispensable whereas carrying capacity is greatly dependent on the various factors which determine habitat use.