

Study of the potential of near-infrared reflectance spectroscopy in the analysis of the tree foliage intake of goats

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Introduction — The aim of this study, one of the first in a series, was to determine whether near-infrared reflectance spectroscopy (NIRS) could be of future use in the analysis of the food intake of goats on Mediterranean wooded rangelands.

Materials and Methods — Fodder and fecal samples were collected from 3 groups of 3 goats, browsing *ad lib* on fresh leafy *Quercus pubescens* branches. The 3 groups were made up of: 3 dried-up animals without supplementation; 3 lactating animals, supplemented with a urea-molasses mixture, in a digestibility cage (Meuret, 1988); and 3 lactating animals compelled to eat a pure *Q pubescens* diet on rangeland, and supplemented with a urea-battey mixture (Waelput, 1988). The separated leaves (no of samples = 100), stems and fruits (no = 50) of *Q pubescens*, the corresponding feces (no = 700), and the leaves of 4 other shrub samples which can be consumed on the same rangeland (*Hedera helix*, *Quercus ilex*, *Pistacia terebinthus* and *Cornus sanguinea*) were dried in a ventilated oven at 60°C until a constant weight was reached, and then ground with a standard hammer-mill (1 mm sieve). These first results concern the analysis of organic matter (OM) and lignin (Li) (Christian, 1971) by wet procedure (WP) and NIRS (PSCO, RCA 6250).

Results and Discussion — The organic matter (OM in % DM) and lignin content (Li

in % OM) obtained from WP are respectively (mean \pm SD) *Q pubescens* leaves (94.3 \pm 0.6; 10.8 \pm 0.8), stems and immature fruit (95.0 \pm 1.2; 23.1 \pm 1.4), other shrub leaves (91.7 \pm 3.8; 10.8 \pm 6.8) and feces (90.5 \pm 1.3; 17.7 \pm 1.1). The correlations (R^2) for calibration equations between WP and NIRS for *Q pubescens* leaves alone are for OM and Li respectively 0.92 and 0.93 (standard error of calibration, SEC = 0.22 and 0.46). As all the forage samples are included in the calibration, the correlation is improved for lignin: R^2 = 0.98 and SEC = 0.81. The calibration of fecal samples shows that it is not necessary to develop 3 separate equations: R^2 = 0.86 and SEC = 0.42. WP values of fecal samples were predicted from NIRS: R^2 = 0.93 and standard error of prediction = 0.29.

The accuracy of the NIRS procedure seems to make it an acceptable method for providing rapid determinations of the quality of available forage and diet on wooded rangeland, although confirmation through further analysis is necessary.

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