ABSTRACT

Towards the Development of Nutritional Evaluation Methodologies for Tropical Grasses using Non-destructive Chlorophyll Techniques

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Traditional methods used for nutritional evaluation of pasture herbage are laborious, time consuming, expensive and require well equipt laboratory facilities with trained staff to undertake. This study investigated nutritional properties of tropical pastures using traditional laboratory methods and explored the potential of non-destructive chlorophyll techniques as an alternative to laboratory analysis. Chemical composition, *in vitro* organic matter digestibility (IVOMD) and metabolizable energy (ME) of rotationally grazed pastures on commercial cattle farms in Jamaica as influenced by season and harvesting methods were determined. Crude protein (CP), IVOMD and ME were highest in hand-plucked herbage during the intermediate season (May – July). Mathematical models to predict IVOMD from chemical composition showed that IVOMD was best predicted by multivariate models in the dry season (R^2 = 0.86). A trial using inoculum from bovine faeces established that inoculum prepared from 450 g fresh cow faeces (533±23 g/kg) produced comparable IVOMD to rumen fluid inoculum (566±5 g/kg), particularly in the more fibrous substrates.

Two non-detructive chlorophyll devices; Fieldscout CM 1000 NDVI and Yara N-Tester were tested as potential alternative to traditional laboratory methods for nutriotional evaluation of pasture herbage. The Fieldscout CM NDVI 1000 was found to be a usefull, practical and easy-to-use tool for rapid and reliable estimates of pasture CP (R^2 = 0.68 – 0.90) and IVOMD (R^2 = 0.64 – 0.78) in open fields. The Fieldscout CM NDVI 1000 (r^2 = 0.56 – 0.84) and Yara N Tester measurements (r^2 = 0.84 - 0.91) were highly correlated with solvent extractable tissue chlorophyll. Both non-destructive chlorophyll devices also produced reliable estimates of different CP and fibre fractions but poorly predicted *in vitro* ruminal gas production parameters different grass substrates. It was concluded that non-destructive chlorophyll methods can provide quick and accurate predictions of chlorophyll concentrations, CP, NDF and IVOMD but was poor in predicting ADF, lignin, soluble and insoluble CP, CP degradability and *in vitro* ruminal gas production parameters of tropical grasses.

Keywords: Tropical pastures; chemical composition; *in vitro* ruminal organic matter digestibility; Chlorophyll methods; Prediction models.