



Tropentag, September 11-13, 2024, hybrid conference

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Evaluation of nutritional composition of tropical forages and relationship between fiber fraction and fiber digestibility

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Abstract

The study aimed at evaluating the nutritional composition of tropical forage legumes (TFL) and the relationship of nutritional composition between fiber fraction and fiber digestibility, and compared it with tropical grasses (TG). Samples of 22 TFL and 11 TG were used. Proximate nutrient and fiber fractions were analyzed. Undigested neutral detergent fiber (uNDF₂₄₀) and potentially digestible neutral detergent fiber (pdNDF) concentrations and its proportion of total ash-corrected neutral detergent fiber (aNDF_{om}) were determined in triplicate in two 240-h *in vitro* incubations using the modified Tilley and Terry technique. Data were analysed using SAS (V9.4, SAS Institute Inc., Cary, NC, USA). Pearson correlations and multiple linear regressions were determined using CORR and GLM procedures, respectively. The TFL had lower aNDF_{om}, acid detergent fiber (ADF), and pdNDF concentrations, but had greater crude protein (CP), lignin, and uNDF₂₄₀ concentrations compared to TG. The CP concentrations ranged from 149 to 251 g kg⁻¹ DM (TFL) and from 43 to 121 g kg⁻¹ DM (TG). The aNDF_{om} concentrations ranged from 219 to 492 g kg⁻¹ DM (TFL) and from 418 to 631 g kg⁻¹ DM (TG). The uNDF₂₄₀ concentrations ranged from 113 to 376 g kg⁻¹ DM (TFL) and from 125 to 308 g kg⁻¹ DM (TG). The pdNDF concentrations ranged from 75 to 216 g kg⁻¹ DM (TFL) and from 107 to 473 g kg⁻¹ DM (TG). Meanwhile, fiber digestibility ranged from 0.197 to 0.563 (TFL) and from 0.403 to 0.791 (TG). In TFL and TG, uNDF₂₄₀ concentration correlated positively with aNDF_{om}, ADF, and lignin concentrations. In TFL, fiber digestibility correlated negatively with aNDF_{om}, ADF, and lignin concentrations. Meanwhile, only ADF and Lignin concentrations correlated negatively with fiber digestibility in TG. According to multiple linear regressions, uNDF₂₄₀ concentration were related to aNDF_{om} and lignin concentrations in TFL ($p < 0.001$) as well as to CP and lignin concentrations in TG ($p < 0.001$). In conclusion, fiber digestibility is related to aNDF_{om} and lignin concentrations in TFL and to CP and lignin concentrations in TG. However, further research with a greater number of samples is needed to better define the relationship between proximate nutrient and fiber concentrations and fiber digestibility.

Keywords: Fiber digestibility, fiber fraction, forage legumes, grasses, ruminant nutrition