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Farmers’ and academia’s views”

## Predicting microbial protein synthesis of cattle under tropical conditions

KHATERINE SALAZAR-CUBILLAS<sup>1</sup>, ABEJE ESHETE WASSIE<sup>2</sup>, UTA DICKHÖFER<sup>3</sup>

<sup>1</sup>Christian-Albrechts-Universität zu Kiel, Animal nutrition and feed science, Germany

<sup>2</sup>Ethiopian Environment and Forest Research Institute, Forest Ecologist, Ethiopia

<sup>3</sup>Christian-Albrechts-Universität zu Kiel, Tierernährung und Futtermittelkunde, Germany

### Abstract

This study aims to identify an accurate method for estimating rumen microbial protein synthesis (MCP) by comparing five methods to estimate MCP and three approaches to predict fecal bacterial and endogenous debris nitrogen excretion (BEDN) against measured BEDN. A dataset was compiled (n=95) from three feeding trials conducted with steers and heifers under typical tropical feeding situations. Using the total collection method, fecal samples were collected, and pooled samples were subsequently used to estimate the BEDN excretion.

MCP1 was predicted from urinary purine derivatives excretion. MCP2 was derived from estimates of fermented metabolisable energy and MCP yield. MCP3 was derived from estimates of fermented organic matter and the proportion of concentrate in the diet. MCP4 was derived from metabolisable energy and a constant MCP yield of 10.1 g MCP/MJ. MCP5 was derived from estimates of microbial and feed crude protein determined *in vitro* and rumen undegradable crude protein. BEDN excretion was predicted assuming a MCP proportion of 0.36 (BEDN<sub>1</sub>), 0.15 (BEDN<sub>2</sub>), and 0.11 (BEDN<sub>3</sub>). From the three proportions of MCP that represent BEDN excretion and the five methods used to predict MCP synthesis, 15 predictions of BEDN excretion were derived. Accuracy between measured and predicted BEDN excretion was evaluated using the root mean square error (RMSE expressed as % of the measured BEDN). Differences between MCP methods were evaluated with a Tukey test.

Means of MCP1 and MCP2, MCP3 and MCP4, and MCP3 and MCP5 were the same ( $p > 0.05$ ), while for the remaining comparisons, the means differed ( $p < 0.01$ ). The estimation of BEDN excretion was more accurate when BEDN<sub>2</sub> was combined with MCP3 (RMSE of 45 %) or MCP4 (RMSE of 43 %) than in other combinations (RMSE from 50 to 155 %).

It can be concluded that BEDN<sub>2</sub> predicts measured BEDN more accurately than other approaches. Measured BEDN is predicted more accurately when using MCP3 and MCP4 than MCP1, MCP2, and MCP5. Nonetheless, further research is required to evaluate if these results apply to lactating cows under tropical conditions.

**Keywords:** Cattle, fecal excretion, microbial protein synthesis