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Antinutrients Present in Unconventional Fodder Leaves from Bangladesh Alter Rumen Fermentation Characteristics *in Vitro*

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Abstract

Unconventional plants are increasingly recognised as high quality feed resources in tropical countries and as a potential source of compounds that affect rumen fermentation. Often, secondary compounds reduce the nutritional value of the plants but on the other hand may become useful to protect dietary protein from microbial degradation in the rumen and thus increase the protein supply to the ruminant. This study aimed at unravelling the effects of antinutrients on rumen fermentation parameters *in vitro* with special emphasis on protein metabolism.

Fourteen Bangladeshi fodder plants were screened for their contents of nutrients and anti-nutrients and 5 leaf materials were selected for further investigation and extraction of the respective compounds: *Syzygium cumini* for its content in total tannins (TT), *Artocarpus heterophyllus* for condensed tannins (CT), *Acacia nilotica* for hydrolysable tannins (HT), *Sesbania aculeata* for saponins (SAP) and *Eichhornia crassipes* for non-starch polysaccharides (NSP). TT, CT and HT were extracted with acetone and purified with Sephadex LH 20. SAP were extracted with methanol, chloroform and butanol, while NSP were extracted enzymatically. *In vitro* incubations were performed with the Reading Pressure Technique using bovine rumen fluid and a substrate composed of maize silage, barley grain, soybean meal and BSA. Either ground leaves replacing the silage (27 % inclusion) or plant extracts were added. The production of gas and short-chain fatty acids (SCFA) and the kinetics of protein and ammonia concentration were monitored over 12 hours.

All additives decreased gas production, the effect being highest with *S. cumini*, which also caused the strongest decrease in total SCFA production. TT, CT and HT protected protein from degradation by precipitation, with the protein precipitation capacity being highly correlated to the content of TT determined by ferric chloride assay and being highest in *S. cumini*. The concentrations of ammonia and branched SCFA were decreased strongly by TT, but only slightly with CT and HT, and increased with SAP and NSP. Detailed studies on the interactions of the extracted compounds are in progress.

Keywords: antinutrients, *in vitro*, protein degradation, rumen fermentation

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