



Tropentag, September 16-18, 2015, Berlin, Germany

“Management of land use systems for enhanced food security:
conflicts, controversies and resolutions”

Effects of Quebracho Tannin Extract on *in-vitro*-Rumen Fermentation and Chemical Composition of Liquid-Associated Microbes

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Abstract

Condensed tannins bind to proteins, thereby protecting them from rumen degradation and increasing the post-ruminal flow of dietary amino acids. In this study, the effects of a quebracho tannin extract (QTE) on *in-vitro*-rumen fermentation and chemical composition of liquid-associated microbial mass (LAM) were evaluated.

Three experimental substrates were tested:

1) Control: basal diet [in g/kg dry matter (DM): grass silage (335), maize silage (315), extruded rapeseed (160), wheat (92.5), concentrate (92.5), and a mineral premix (4.0)]; 2) QTE15: control + QTE (15 g kg⁻¹ DM); and 3) QTE30: control + QTE (30 g kg⁻¹ DM).

Each substrate was incubated in three runs, with three replicates per run (n=9). Two grams of substrate were incubated in 300 ml of incubation medium (phosphate buffer and rumen fluid, 2:1 ratio) in a water bath at 39°C using an Ankom RF system. After 24 h, total content of the flasks was centrifuged at 500 g (4°C, 10 min) to separate feed particles. The supernatant was decanted and centrifuged at 20.000 g (4°C, 8 min) to separate LAM. This fraction was lyophilized, ground, and analysed for nitrogen, carbon, adenine, and guanine contents. Of the remaining supernatant 5 ml were collected for volatile fatty acids (VFA) and ammonia determination. The data were analysed by a general linear model with QTE level (0, 15, and 30 g kg⁻¹ DM) as main effect and run as block effect. Polynomial contrasts were performed to find linear and quadratic effects.

Addition of QTE linearly decreased total VFA concentrations (mmol/ml), reflecting a lesser substrate degradation. Similarly, QTE linearly decreased the proportion of propionate, indicating an energetically less efficient fermentation. Proportions of valerate, iso-butyrate, and iso-valerate and ammonia concentrations also decreased with QTE addition, indicating a reduced protein degradation. The contents of adenine, guanine, nitrogen, and carbon of LAM were not affected by QTE level.

The QTE addition to ruminant diets may be beneficial in protecting feed protein from rumen degradation, but the rate and extent of carbohydrate degradation might be impaired as well. Chemical composition of microbial matter may be unaffected, but reductions in rumen microbial protein synthesis cannot be excluded.

Keywords: Chemical composition, *in vitro*, microbial fraction, purine bases, Quebracho tannin