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## Effects of Increasing Levels of Quebracho Tannin Supplementation on Nutrient Digestibilities in Heifers

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### Abstract

Condensed tannins are known to bind to polymers such as cellulose, hamper the adhesion of rumen microbes to feed particles, and reduce the activity of microbial enzymes. This may strongly decrease fibre digestibility and hence, feed and energy intakes of animals offered diets rich in cell wall constituents. The objective was therefore to investigate to which extent different levels of Quebracho tannin extract (QTE) reduce apparent total tract digestibilities of dry matter (DM), organic matter (OM), neutral (NDF), and acid detergent fibre (ADF) in heifers.

The study comprised five experimental periods (9d adaption + 6d feces collection). Six ruminally cannulated heifers ( $491 \pm 35$  kg bodyweight) were offered a basal diet consisting of  $2.6 \text{ kg d}^{-1}$  of grass hay,  $2.6 \text{ kg d}^{-1}$  of concentrate feed, and  $60 \text{ g d}^{-1}$  of a mineral premix in two equal meals. While in the first period, no QTE was administered (control), all animals simultaneously received 1, 2, 4, or 6% QTE of their daily DM intake during the following four periods. For this, half of the daily QTE dosage was diluted in 1 l of warm water and infused intra-rationally during each feeding. Fecal excretions were quantified and feed and feces samples analysed for DM, OM, NDF, and ADF contents.

DM and OM digestibilities linearly decreased from 0.750 (SD 0.018) and 0.776 (SD 0.015) without QTE supplementation to 0.714 (SD 0.012;  $R^2=0.49$ ) and 0.749 (SD 0.012;  $R^2=0.46$ ) at a dietary concentration of 6% QTE, respectively. The decrease in nutrient digestibilities was most pronounced for NDF and ADF with  $-0.023$  (SE 0.004) per 1% of QTE for both parameters ( $R^2=0.52$ ;  $R^2=0.54$ ). Thus, compared to the control (0.718, SD 0.024; 0.623, SD 0.039), NDF and ADF digestibilities were only 0.590 (SD 0.075) and 0.493 (SD 0.058) at 6% QTE, respectively.

Moderate to high concentrations of condensed tannins strongly reduce total tract digestibilities of the fibrous fractions in ruminant diets which may negatively impact their feed and energy intakes. Together with the direct inhibition of rumen microbes, the lower availability of rumen fermentable substrate may furthermore reduce microbial protein synthesis and therefore amino acid supply to the animals.

**Keywords:** Fibre digestibility, quebracho, ruminant, tannins