

# Assessment of the potential of different sources of hydrolysable and condensed tannins to manipulate rumen fermentation and methane production *in vitro*

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Tannins added to animal diet may generate positive impact on energy and protein utilization in the rumen. The objective of this study was to examine the impact of different sources and levels of condensed and hydrolyzable tannins on rumen microbial fermentation *in vitro* (24-h batch cultures). Condensed tannin extracts from Acacia (AT; *Acacia mearnsii*; 82% DM) and Quebracho (QT; *Schinopsis balansae*; 90% DM) and hydrolysable tannin extracts from Chestnut (ChT; *Castanea sativa*; 75% DM) and Valonia (VT; *Quercia vallonea*; 71% DM) were used. *In vitro* incubations (repeated 4 times) were conducted in a completely randomized block design using a control (CTL; 0%) and each source of tannin at 2, 5, 10, 15 and 20% of total mixed ration DM. Each treatment was tested in quadruplicate. Differences between treatments and CTL were declared significant at  $P \leq 0.05$  using Dunnett's comparison test. Gas production (GP) was reduced at  $\geq 5\%$  of AT, while at 2% or more, QT produced less gas than CTL. At  $\geq 5\%$  concentration, both AT and QT reduced total volatile fatty acids (VFA) and CH<sub>4</sub> concentrations. No effect was observed on acetate (C<sub>2</sub>) proportion at any level of AT or QT while propionate (C<sub>3</sub>) proportion was slightly increased at  $\geq 10\%$  of AT or QT, resulting in lower C<sub>2</sub>:C<sub>3</sub> ratio. Addition of ChT at  $\geq 5\%$  reduced GP, CH<sub>4</sub> and VFA concentrations compared with CTL. Proportion of C<sub>2</sub> increased when ChT was supplied at  $\geq 10\%$  while no effect of ChT was observed on C<sub>3</sub> proportion or C<sub>2</sub>:C<sub>3</sub> ratio. Supplying VT at  $\geq 2\%$  reduced GP while a level of VT  $\geq 5\%$  was required to decrease CH<sub>4</sub> concentration. Total VFA concentration was reduced only at  $\geq 10\%$  of VT while C<sub>2</sub> proportion was increased at  $\geq 2\%$  VT and no change was noted for C<sub>3</sub> and C<sub>2</sub>:C<sub>3</sub> ratio. Proportions of isovaleric, and valeric and ammonia concentration were decreased at all levels of tannin sources added, indicating reduced mixed protein degradation.

**Implications:** Results from this study suggest that at low concentrations (2–5%), tannins have the potential to reduce CH<sub>4</sub> production and ruminal protein degradation without deleterious effects on fermentation. It is concluded that low concentrations of tannins in the diet of dairy cows may improve energy and protein use efficiency. Further investigation is required to evaluate *in vivo* the potential of using these tannins in dairy cow nutrition.