

Effects of condensed tannin fractions of different molecular weights from a *Leucaena leucocephala* hybrid on in vitro methane production and rumen fermentation

Abstract

BACKGROUND

Molecular weights (MWs) and their chemical structures are the primary factors determining the influence of condensed tannins (CTs) on animal nutrition and methane (CH₄) production in ruminants. In this study the MWs of five CT fractions from *Leucaena leucocephala* hybrid-Rendang (LLR) were determined and the CT fractions were investigated for their effects on CH₄ production and rumen fermentation.

RESULTS

The number-average molecular weight (M_n) of fraction F1 (1265.8 Da), which was eluted first, was the highest, followed by those of fractions F2 (1028.6 Da), F3 (652.2 Da), F4 (562.2 Da) and F5 (469.6 Da). The total gas (mL g⁻¹ dry matter (DM)) and CH₄ production decreased significantly ($P < 0.05$) with increasing MWs of the CT fractions, but there were no significant ($P > 0.05$) differences between the CT fractions and control on DM degradation. However, the *in vitro* N disappearance decreased significantly ($P < 0.05$) with the inclusion of CT fraction F1 (highest MW) compared with the control and other fractions (F2–F5). The inclusion of CT fraction F1 also significantly decreased ($P < 0.05$) total volatile fatty acid and acetic acid concentrations compared with the control. The acetic/propionic acid ratio was significantly decreased ($P < 0.05$) by fraction F1 but not by the control and other fractions (F2–F5).

CONCLUSION

The CT fractions of different MWs from LLR could affect rumen fermentation and CH₄ production, and the impact was more pronounced for the CT fraction with a higher MW.