



## Effect of several saponin containing plant extracts on rumen fermentation in vitro, *Tetrahymena pyriformis* and sheep erythrocytes

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Among the nutritional solutions developed since in-feed antibiotics were banned by the European Union in 2006, extracts from plants with high saponin content have shown the capacity to modulate rumen fermentation. Most previous studies have focused on the effects of *Yucca schidigera* and *Quillaja saponaria*. This study was designed to evaluate i) the effects of extracts obtained from 11 saponin-containing plants and monensin on rumen fermentation patterns in vitro at 417 and 2.0 mg/L, respectively, and ii) the capacity of hemolytic test and inhibition of *Tetrahymena pyriformis* to model the effect of saponin-containing plant extracts on rumen protozoa. Plants belonging to 8 different families were investigated to evaluate a high diversity of saponin compounds. Total gas and methane productions were numerically lower with extract of *Saponaria officinalis* compared to control (-3.0 and -9.0%, respectively). The effect was more pronounced with monensin (-25.5 and -31.7%,  $p < 0.05$ , respectively). Ammonia (NH<sub>3</sub>) and protozoa patterns varied among the extracts during in vitro incubations, e.g. from -22.6% ( $p < 0.05$ ) for *Y. schidigera* extract to -50.7% ( $p < 0.05$ ) for *Primula veris* extract, with respect to the protozoa number. Extracts from *Primula veris*, *Chenopodium quinoa* and *Gypsophila paniculata* mitigated significantly NH<sub>3</sub> production by more than 26% ( $p < 0.05$ ) which, in our experimental conditions, was better than the results obtained with monensin and extracts from *Y. schidigera* and *Q. saponaria*. Statistically significant positive correlations were found between hemolytic capacity and inhibition of *T. pyriformis* (Pearson coefficient = 0.55,  $p < 0.05$ ) and between protozoa number and NH<sub>3</sub> concentration during in vitro rumen incubation (Pearson coefficient = 0.56,  $p < 0.05$ ). Neither hemolytic capacity, nor inhibition of *T. pyriformis*, nor the content in total saponins estimated by gravimetric method was correlated to the inhibition of rumen protozoa. These parameters did not model the effect of extracts from different saponin containing plants on rumen protozoa number. However, the results suggest that by-products containing saponins from food (*C. quinoa*) and horticultural (*G. paniculata*) industries could be investigated as feed additives to improve nitrogen utilization by ruminants.

Résumé en anglais

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