EFFECT OF HYDROLYSABLE TANNINS' METABOLITES ON FEED FERMENTATION, GAS PRODUCTION AND RUMINAL ECOSYSTEM USING A LONG-TERM IN VITRO RUMEN FERMENTATION APPROACH (RUSITEC)

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Livestock production is currently facing the growing demand for animal-source food and the need to reduce the impact on the environment. Ruminants are among the largest contributors to greenhouse gas (GHG) emissions, in particular methane (CH4). Different strategies to lower greenhouse gas (GHG) emissions in ruminants are being investigated, and one of them relies on the dietary tannin supplementation. The dietary supplementation with tannins in ruminants can affect the rumen microbial community and thus the enteric fermentation, leading to reduced methane emissions. Following a previous *in vitro* screening, we investigated the effect of two hydrolysable tannin metabolites, named ellagic acid (EA) and gallic acid (GA), in a long-term in vitro rumen fermentation approach. EA and GA were supplemented to a control diet (CTR: ryegrass hay and barley concentrate (7.5:2.5), 10 g DM/day) in an 8-fermenter rumen simulation technique (Rusitec), running for 10 days. Three experimental conditions were investigated: i) EA 75 mg/g DM, ii) GA 75 mg/g DM, iii) EA 75 mg/g DM + GA 75 mg/g DM. The measurements were performed in the last 5 days of the experimental period. Total gas production was not significantly altered over the last 5 days, whereas daily
methane (CH4) production was significantly decreased by EA (-45%) and EA+GA (-60%), compared to control. CH4 production per unit of dietary organic matter (OM) and short-chain fatty acids (SCFA) was also reduced by EA (-48% and -32%) and EA+GA (-65% and -58%), and less by GA (-19% and -22%). Ammonia formation was significantly reduced by EA (-46%), GA (-19%) and EA+GA (-86%). Total SCFA production was decreased by EA and EA+GA (-26%, -16%), but not by GA. Similarly, EA and EA+GA, but not GA, reduced rumen degradability of OM, crude fibre (CF) and crude protein (CP). All the treatments increased the bacterial count and decreased the protozoal count (except for GA). Furthermore, EA and EA+GA modulated the relative abundance of selected fibrolytic and cellulolytic rumen bacterial taxa. The results showed that both EA and GA decreased average daily CH4 production and ammonia formation, with EA being most effective than GA for almost all the parameters observed. Nevertheless, GA showed a lower impairing effect on the degradability of nutrients in rumen and on SCFA production. Further research on the dynamics of rumen microbiota and the metabolism of hydrolysable tannins in rumen will strengthen the outcome of this study.

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