FARMING PRACTICE
LIVESTOCK FEEDING TECHNIQUES

IMPACT: GHG EMISSIONS

Reference 1

Darabighane, B; Mandavi, A; Aghjehgheshlagh, FM; Navidshad, B; Yousefi, MH; Lee, MRF 2021 The effects of dietary saponins on ruminal methane production and fermentation parameters in sheep: A meta analysis IRANIAN JOURNAL OF APPLIED ANIMAL SCIENCE, 11(1), 15-21. not available

Background and objective

It has been proposed that saponin-rich plants can be used to reduce methane (CH_4) emissions from ruminant livestock, although the reported results are variable in terms of efficacy. Investigate the literature to determine if saponins can contribute to reducing CH_4 production and its further effects on other rumen fermentation parameters in sheep.

Search strategy and selection criteria

Literature searches were conducted through databases of ISI Web of Knowledge and Google Scholar for a period covering January 1990 through to March 2019. The keywords used to search relevant studies included: methane, saponin, and sheep. Several thousand hits were collected from Google Scholar and then the results were saved in order of relevance. After identifying the last relevant record, at least 100 records were saved and then the screening of papers stopped. To identify and collect further relevant papers, the references of the selected papers were evaluated using inter-library links or author correspondence with the aim of finding papers not available in the searched databases. 1) Papers should contain experiments on sheep with a control group and a group that received saponin; 2) Studies should measure methane production in vivo while removing studies that measured this in vitro or estimated methane production using equations. Studies conducted in vivo to examine the effects of saponin on methane emission and production parameters in other animals were excluded.

Data and analysis

Statistical analysis was performed using STATA v.13 and effect size for CH_4 production, CH_4/DMI (DMI=dry matter index), and rumen fermentation parameters were calculated in the form of Hedges' g at a 95% confidence interval. The effect size is based on the mean difference between treatment and control groups divided by pooled standard deviation and adjusted for bias with small sample sizes. Effect sizes are ranked as small, medium and large at 0.2, 0.5, and 0.8. In this meta-analysis, authors also calculated the effect size of the mean difference for CH_4 production and CH_4/DMI. A random-effects model was used where actual effects may vary from one experiment to another, which covers an experiment variable (actual heterogeneity) as well as sampling error. Forest plots, as a common plot in meta-analyses, were used to present CH_4 production and CH_4/DMI. The forest plot was represented with Hedges'g at a 95% confidence interval using a random model.

Number of papers	Population	Intervention	Comparator	Outcome	Quality score
Not reported	Sheep	Saponins supplementation	No saponin supplementation	Metric: 1) Methane (CH_4) production, 2) CH_4/Dry matter intake (DMI); Effect size: Hedge g (standardized difference) comparing the considered metrics between intervention and control	87.5

Results

- The effect size calculated based on a random model for CH_4 and CH_4/DMI shows a decrease for CH_4 (P=0.062) and CH_4/DMI (P=0.001).
- Effect size reported as mean difference indicates that using saponin-rich sources reduced CH_4 production by 1.246 g/day and CH_4/DMI by 0.849 g/kg. No heterogeneity was observed for CH_4 production (P=0.142) nor CH_4/DMI (P=0.155) with the Egger test indicating the presence of publication bias for CH_4.
- NULL
- NULL
- NULL

Factors influencing effect sizes

- No factors influencing effect sizes to report

Conclusion

The results indicate that CH_4 production tends to decrease (but not significantly) and CH_4/DMI is significantly reduced through supplementation of saponin-rich sources in sheep.