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Jayanegara, A; Sarwono, KA; Kondo, M; Matsui, H; Ridla, M; Laconi, EB; Nahrowi 2018 Use of 3-nitrooxypropanol as feed additive for mitigating enteric methane emissions from ruminants: a meta-analysis ITALIAN JOURNAL OF ANIMAL SCIENCE, 17(3), 650-656. 10.1080/1828051X.2017.1404945

Background and objective

With regard to 3-NOP, the compound has been experimentally tested to some ruminant species, that is, dairy cows, beef cattle and sheep at various levels, and generally the molecule is able to lower enteric CH₄ emissions. The objective of the present study therefore was to perform a meta-analysis from published experiments on the effect of 3-NOP on methane emissions from ruminants. Other related parameters such as rumen fermentation, nutrient digestibility, blood metabolites, production performance of ruminants and product characteristics were also evaluated in order to comprehensively assess the effect of 3-NOP on ruminants.

Search strategy and selection criteria

A database was developed from studies that reported the use of 3-NOP to mitigate enteric methane emissions originated from ruminants. 1) experiments were performed directly to ruminants (in vivo), not in vitro; 2) methane emissions were directly measured, not estimated by any predictive equations; 3) articles were published in English. Ruminant species included were dairy cows, beef cattle and sheep.

Data and analysis

Meta-analysis of data was performed by using mixed model methodology according to St-Pierre (2001), in which different studies were treated as random effects whereas 3-NOP addition levels in diets of ruminants were treated as fixed effects. Model statistics used were p value, root mean square error (RMSE) and coefficient of determination (R²). The statistical analysis was performed in SAS software version 9.1 (SAS Institute Inc., Cary, NC, USA) by using mixed procedure (PROC MIXED).

Number of papers	Population	Intervention	Comparator	Outcome	Quality score
10	Ruminant	3-nitrooxypropanol	No additive	Metric: 1) CH ₄ /Body weight; 2) CH ₄ /dry matter intake; 3) CH ₄ /milk; 4) CH ₄ /digested organic matter; Effect size: not applicable	37.5

Results

- Increasing level of 3-NOP addition in diets of ruminants decreased enteric CH₄ emissions per unit of BW, CH₄/DMI, CH₄/milk produced or CH₄/DOM (p<.05).
- NULL
- NULL
- NULL
- NULL

Factors influencing effect sizes

- No factors influencing effect sizes to report

Conclusion

The 3-NOP is an effective feed additive to mitigate enteric methane emissions from ruminants.