

Reference 3

Torres, RNS; Paschoaloto, JR; Ezequiel, JMB; da Silva, DAV; Almeida, MTC 2021 Meta-analysis of the effects of essential oil as an alternative to monensin in diets for beef cattle THE VETERINARY JOURNAL, 272, 105659. 10.1016/j.tvjl.2021.105659

Background and objective

Additives used to improve feed efficiency of beef cattle on high-grain diets requires products that not only increase animal performance but also provide food safety for consumers. The authors hypothesized that essential oils may replace monensin as an additive in diets for feedlot cattle without any reduction in animal performance. Therefore, to assess the effects of essential oils as an alternative to monensin in diets for beef cattle, studies were systematically reviewed and a meta-analysis was performed.

Search strategy and selection criteria

A comprehensive literature search was conducted using search engines PubMed and Science Direct. Publications were retrieved using following search terms: 'essential oil AND beef cattle', and 'monensin AND essential oil AND beef cattle'. 1) Experiments with beef cattle, and 2) essential oils and monensin treatments should be present in the study.

Data and analysis

The meta-analysis was performed using the R Software Metafor package version 3.4.2. Forest plots were created using Stata software version 16.0. The effect of essential oils as an alternative to monensin in diets for beef cattle were evaluated using random-effect models to examine the weighted means difference between essential oils treatment (diets with essential oils inclusion as an additive) and monensin treatment (diets with monensin as an additive, control treatment). Treatment means were weighted by the inverse of the variance, according to the method proposed by Der-Simonian and Laird (1986) for a random effect model. Between-study heterogeneity (i.e., heterogeneity of the treatment effect) was evaluated using both the chi-square (Q) test of heterogeneity and I² statistics, which measures the percentage of variation due to heterogeneity.

| Number of papers | Population | Intervention | Comparator | Outcome | Quality score |
|------------------|-------------|--------------------------------|------------|---|---------------|
| 10 | Beef cattle | Essential oils supplementation | Monensin | Metric: Methane production per dry matter (g CH ₄ /kg DM); Effect size: Difference of of the considered metrics between intervention and control | 100 |

Results

- The replacement of monensin by essential oils had no effect ($P > 0.05$) on methane emissions (kg CH₄/kg DM) of beef cattle fed high-grain diet.
- NULL
- NULL
- NULL
- NULL

Factors influencing effect sizes

- No factors influencing effect sizes to report

Conclusion

The substitution of monensin for essential oils did not affect methane production.