FARMING PRACTICE
LIVESTOCK FEEDING TECHNIQUES

IMPACT: AIR POLLUTANTS EMISSIONS

Reference 14

Ti, CP; Xia, LL; Chang, SX; Yan, XY 2019 Potential for mitigating global agricultural ammonia emission: A meta-analysis ENVIRONMENTAL POLLUTION, 245, 141-148. 10.1016/j.envpol.2018.10.124

Background and objective

There has been no comprehensive analysis of the effect of management techniques on ammonia (NH_3) emission from both livestock and crop production systems. Effective measures are urgently needed to guide stakeholders and policymakers on minimizing NH_3 emission from agriculture. 1) To evaluate the effect of mitigation options on NH_3 emission from agricultural systems including cropping and livestock production systems, based on individual crop/animal types, through a meta-analysis, and 2) to offer recommendations for future research based on this meta-analysis and literature review. Here, results on the impact of alternative feeding systems on NH_3 emissions are reported.

Search strategy and selection criteria

Peer-reviewed publications from January 1980 to September 2017 that are related to NH_3 emission mitigation measures such as fertilizer application and manure management were extracted from the ISI Web of Knowledge database, China National Knowledge Infrastructure (CNKI) data-base, and Google Scholar by basic and advanced searches. 1) Data from field-, pilot-, and laboratory-scale studies were included; 2) Studies have control treatments to allow assessment of treatment effects, with mean values of NH_3 emission for each treatment available.

Data and analysis

The authors performed a meta-analysis to estimate the mean effect size and the 95% confidence intervals (CIs), then they study the factors associated with higher or lower impact of inhibitors on NH_3 emission (one-way ANOVA and LSD test)

Number of papers	Population	Intervention	Comparator	Outcome	Quality score
172	Livestock production systems	1) Low crude protein (CP) diet; 2) Diet additives (cinnamon extracts, Ferix-3, AlþClear, zeolite, copper silicate nanoparticles, tannin, Zn, maize distillers grains with soluble, gypsum); 3) Yucca extracts; 4) Bacteria (Clostridium butyriucum, Bacillus licheniformis, Bacillus subtilis, Bacillus amyloliquefaciens, Enterococcus faecium); and 5) Acidifiers supplementation	No mitigation strategies	Metric: Ammonia (NH_3) emissions; Effect size: Logarithm of ratio of the considered metrics in the intervention to the considered metrics in the control	68.75

Results

- The application of dietary additives was the most effective option for reducing NH_3 emission (45.5%), followed by crude protein content reduction (42.8%), while the use of dietary acidifier has no significant effect on NH_3 emission (8.6%).
- The reduction in NH_3 emission by mitigation measures through feeding strategy was greater in pig (42.2%) than in poultry (39.7%), while reduction effect on cattle was not significant.
- NULL
- NULL
- NULL

Factors influencing effect sizes

- No factors influencing effect sizes to report

Conclusion

Feeding management with dietary additives and reduction in crude protein content decreased NH_3 emission by 45.5% and 42.8%, respectively, compared with the control. NH_3 emission could be reduced by 62.2% by the use of cover, acidifiers and additives.