

Reference 10

Ti, CP; Xia, LL; Chang, SX; Yan, XY 2019 Potential for mitigating global agricultural ammonia emission: A meta-analysis Environ. Pollut. 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 NH₃ emission from both livestock and crop production systems. Effective measures are urgently needed to guide stakeholders and policymakers on minimizing NH₃ emission from agriculture. 1) to evaluate the effect of mitigation options on NH₃ 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.

Search strategy and selection criteria

Peer-reviewed publications from January 1980 to September 2017 that are related to NH₃ 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. Database compilation followed the following criteria: data from field-, pilot-, and laboratory-scale studies were included, and studies have control treatments to allow assessment of treatment effects, with mean values of NH₃ 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 NH₃ emission (one-way ANOVA and LSD test)

Number of papers	Population	Intervention	Comparator	Outcome	Quality score
172	European agricultural systems with slurry fertilisation	Manure aeration, manure turning, anaerobic digestion, solid-liquid separation	No measure	Metric: NH ₃ emission; Effect size: Logarithm of ratio of the considered metrics in the intervention to the considered metrics in the control	68.75

Results

- Manure aeration and turning increased NH₃ emission by manure storage strategies (2.3 and 108%, respectively), while not significant different compared with the control.
- Overall, the average reduction of land application strategies was 60.7%, with 95% CIs ranging from 53.5 to 66.6%.

Factors influencing effect sizes

- Livestock type : Among selected animals, greater reductions through abatement measures were achieved in cattle and poultry than in pig. The effect of land application strategies on reducing NH₃ emission also varied significantly with animal type, with the highest for poultry (74.3%) and the lowest for cattle (58.9%).

Conclusion

Manure aeration and turning showed no significant effect on NH₃ emissions. Anerobic digestion and solid-liquid separation showed no significant effect.