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Ti, CP; Xia, LL; Chang, SX; Yan, XY 2019 Potential for mitigating global agricultural ammonia emission: A meta-analysis Environ. Pollut. 245, 141–148
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Background and objective

There has been no comprehensive analysis of the effect of management techniques on ammonia emission from both livestock and crop production systems. Effective measures are urgently needed to guide stakeholders and policymakers on minimizing ammonia emission from agriculture. 1) to evaluate the effect of mitigation options on ammonia 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	"covering the manure", "application of acidifiers", "manure additives", "manure aeration", "manure turning"	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

- Techniques such as covering the manure, the application of acidifiers and additives, could significantly reduce ammonia emission by 92.5 and 29.3%.

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 ammonia emission also varied significantly with animal type, with the highest for poultry (74.3%) and the lowest for cattle (58.9%).

Conclusion

Techniques such as covering the manure, the application of acidifiers and additives, could significantly reduce ammonia emission.