IMPACT: AIR POLLUTANTS EMISSIONS

Reference 2

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	Deep placement; Incorporation; Injection; Irrigation; Band spreading; Fertilisation using digestate; Fertilisation using liquid separated phase	No measure	Metric: NH3 emission; Effect size: Logarithm of ratio of the considered metrics in the intervention to the considered metrics in the control	68.75

Results

- Mitigation measures such as deep placement, incorporation, injection, and irrigation could significantly reduce ammonia emissions by 98.7, 53.2, 67.5, and 73.6%, respectively, compared with the control. Band application showed no effect.
- Overall, the average reduction of land application strategies was 60.7%, with 95% CIs ranging from 53.5 to 66.6%.
- Land application of anaerobic digestates or liquid fractions showed no effects on ammonia emissions.
- NULL
- NULL

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. Manure aeration and turning showed no significant effect. Mitigation measures such as deep placement, incorporation, injection, and irrigation could significantly reduce ammonia emissions. Band spreading, digestion and solid-liquid separation shoed no significant effect.