FARMING PRACTICE
MANURE LAND APPLICATION TECHNIQUES

IMPACT: AIR POLLUTANTS EMISSIONS

Reference 1

Emmerling, C; Krein, A; Junk, J 2020 Meta-Analysis of Strategies to Reduce NH3 Emissions from Slurries in European Agriculture and Consequences for Greenhouse Gas Emissions Agronomy 10, 1633 10.3390/agronomy10111633

Background and objective

Research efforts are in place for the abatement of NH3 emissions at the various stages of the manure management chain, namely; the feeding, housing, treatment, storage, and application stages to ensure a whole-farm management model. However, the impact of these mitigation strategies on the emission of other GHGs has not received equal attention. Investigate the consequences of the most effective measures to decrease NH3 emissions from slurries, for the emission of other GHG (swapping effect)

Search strategy and selection criteria

A systematic literature search was conducted on the databases of Scopus, Google scholar, and gray literature, and from the websites of governmental/non-governmental agencies by combining the following keywords: ammonia emission, ammonia abatement, Europe, abatement strategies, integrated assessment, systematic review, meta-analysis, air quality, long-range transboundary air pollution (LRTAP), livestock, livestock management, animal housing, manure treatment, animal diet, Europe, France, Belgium, Germany, Netherlands, Spain, UK, Sweden, Finland. Not specified

Data and analysis

To analyze the combined effect of different measures, taking sample sizes into account, testing for moderators, and obtaining corresponding forest plots, the meta-analytical software OpenMEE was used (http://www.cebm.brown.edu/openmee). A random effect model was used to aggregate the collected data into a meta-analysis, to satisfy the assumption of variance heterogeneity.

Number of papers	Population	Intervention	Comparator	Outcome	Quality score
38	European agricultural systems with slurry fertilisation	Injection, Incorporation, or Band application	No slurry treatment, no storage cover, or band spread application	Metric: NH3 emission; Effect size: Relative difference between treatment and control	50

Results

- The results of the meta-analysis showed a reduction in ammonia emission by −61% (CI −89, −31), when injection was compared to surface application.
- Manure incorporation, with reference to surface application with no incorporation, showed a (non-significant) emission reduction potential for ammonia of −68% (CI −96, +3).
- Band application, relative to surface spreading significantly decreased ammonia emissions (−33; CI −53, −4).
- NULL
- NULL

Factors influencing effect sizes

- No factors influencing effect sizes to report

Conclusion

Different field application techniques (injection, incorporation, band application) were effective to varying degrees for the abatement of ammonia emission, but also resulted in the increased emission of at least one other greenhouse gas.