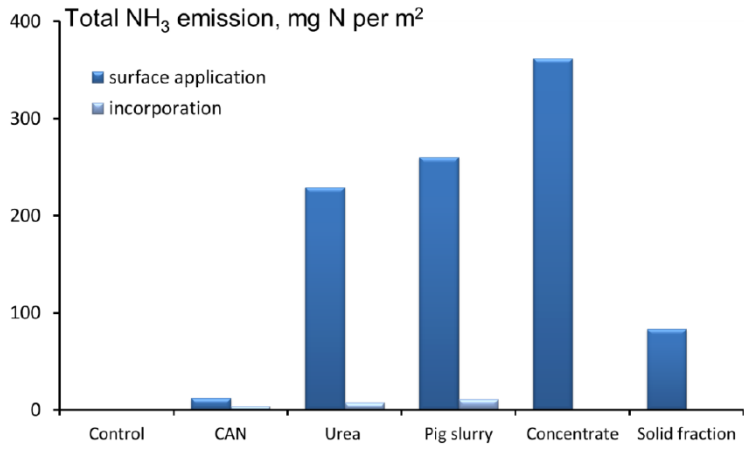
Ammonia emission after application of mineral concentrates

INTERREG IVB

The Biorefine project aims to provide innovative strategies for the recycling of inorganic chemicals from agro- and bio-industry waste streams. The project is financed via Interreg IVB
http://www.biorefine.eu/

Introduction Manure processing can be used to increase nutrient use efficiency of manure. Reverse osmosis of the liquid fraction from separated slurry produces an end-product called mineral concentrate, which has similar properties as a liquid fertilizer. Mineral concentrates have both a high NH_4 content and a high pH, leading to a risk of NH_3 emissions. This risk can be reduced by injection or incorporation into the soil. In incubation studies we compared the NH_3 emissions from mineral concentrate, untreated pig slurry and the solid fraction with the emissions from mineral fertilisers.

Methods Experiments were carried out with arable and grassland soils at 20 °C. NH_3 emission from manures and fertilizers applied with different techniques to sandy soil from an arable field was measured. At 12 times during 28 days, incubation pots were closed during 1 hour and the build-up of NH_3 in the headspace was measured. An experiment with intact grass sod columns from sandy, clay and peat soils was carried out to quantify NH_3 emission from manure and fertilizers at different application techniques and soil types. Pig slurry and concentrate were applied in slits of a few cm depth, mineral N was surface applied. At 8 times during 14 days NH_3 emission was measured.



Total NH_3 emission in 28 days from calcium ammonium nitrate (CAN), urea, untreated pig slurry, mineral concentrate and the solid fraction from separated slurry (averages of four farms) applied to arable sandy soil.

Total N applied was 170 kg N per ha (= 17 g/m^2), emission 0 – 0.4 g/m^2

Results The figure shows that after surface application large differences were found in the amount of NH_3 that was emitted. However, emission from incorporated urea, concentrate and slurry were comparably low as emission from surface applied CAN. In the columns emission from urea was significantly higher than from CAN. Pig slurry gave a significantly larger emission than the solid fraction of separated slurry. Averaged over the three incubation tests, the NH_3 emission from incorporated mineral concentrate was significantly lower than that of incorporated pig slurry. The emission of NH_3 from mineral concentrate incorporated in the soil was low and similar to that of surface applied CAN. The results of N_2O measurement in this experiment are presented in another flyer.

Further reading

G.L. Velthof (2011) Alterra Report 2180. [*link*], G.L. Velthof et al. (2012) Proc. 716, Intern. Fert. Soc., Leek, UK.

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