An introduction to slurry acidification techniques to reduce nitrogen loss from agriculture

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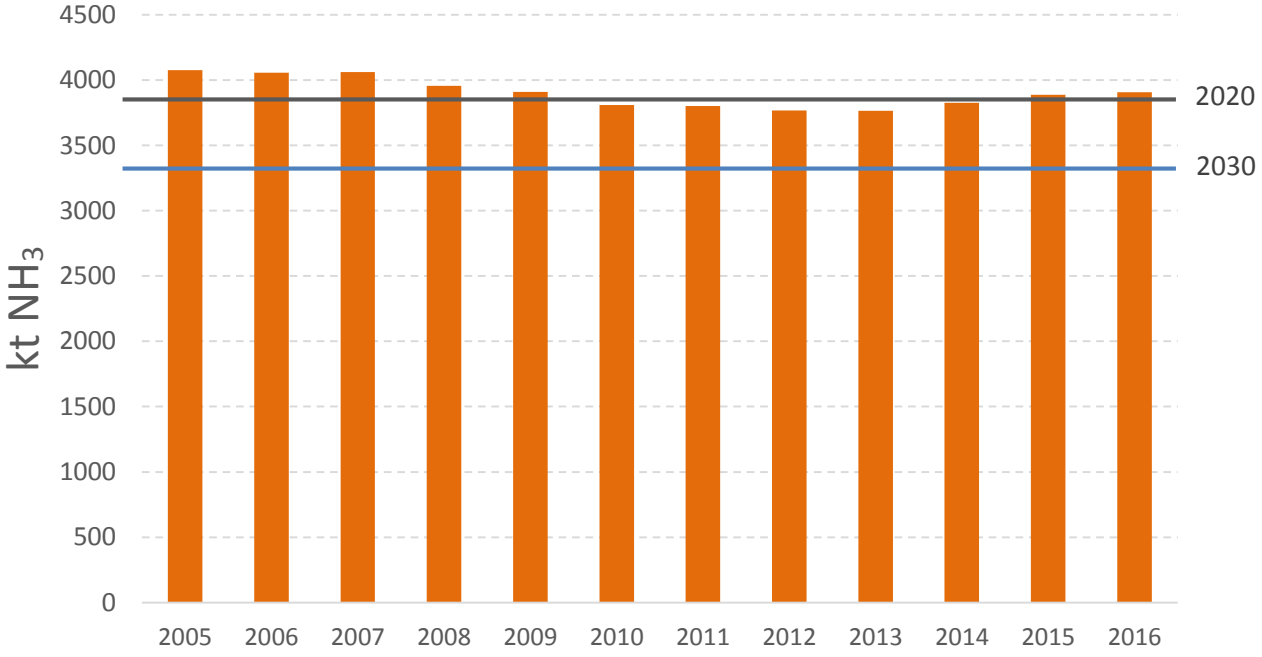
Overview of presentation

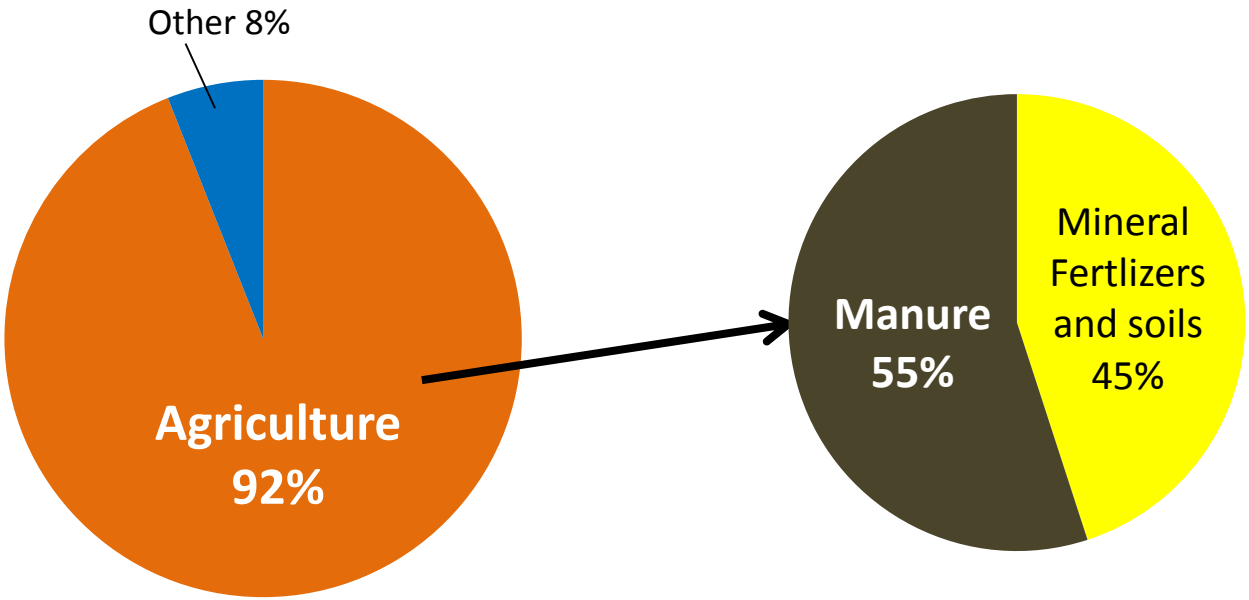
- Background and introduction to acidification of slurry
- Overview of slurry acidification technologies
- Brief introduction to the Baltic Slurry Acidification project

Ammonia emissions from EU Baltic Sea countries



Source: EEA Report 6/2018

Ammonia emissions from EU member states was 3 907 000 t of Nitrogen in 2016

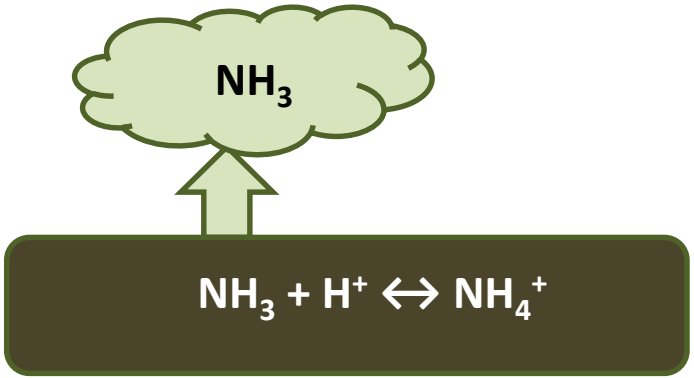


Source: ec.europa.eu/eurostat

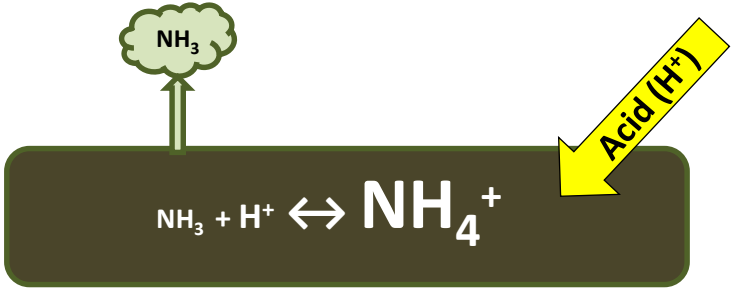
How can acidification help?

Ammonia - ammonium balance

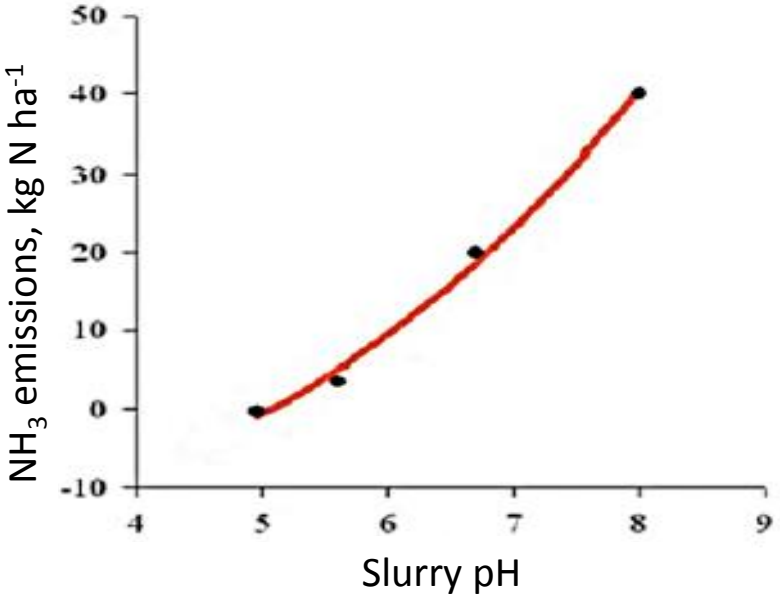
$NH_3 + H_2O \leftrightarrow NH_4^+ + OH^-$



Acid provides extra Hydrogen ions (H^+)



Direct effects of acidification on slurry



(Jarvis and Pain, 1990)

Overview of slurry acidification technologies (SATs)

In-house

In-storage

In-field

Approx. 18% of all slurry acidified in Denmark in 2016*

*Karen Peters, DK EPA

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In-house slurry acidification - JH Agro A/S

Photo: JH Agro

- Approx. 150 installations in DK, 50/50 pig/cattle
- Greatest reduction in emissions
- 50-70% lower emissions
- Improved indoor air quality for pigs and workers
- Reduced CH4 emissions from Slurry Storage
- Completely automatic, no handling acid

- Target pH is 5.5 >> increases use of acid

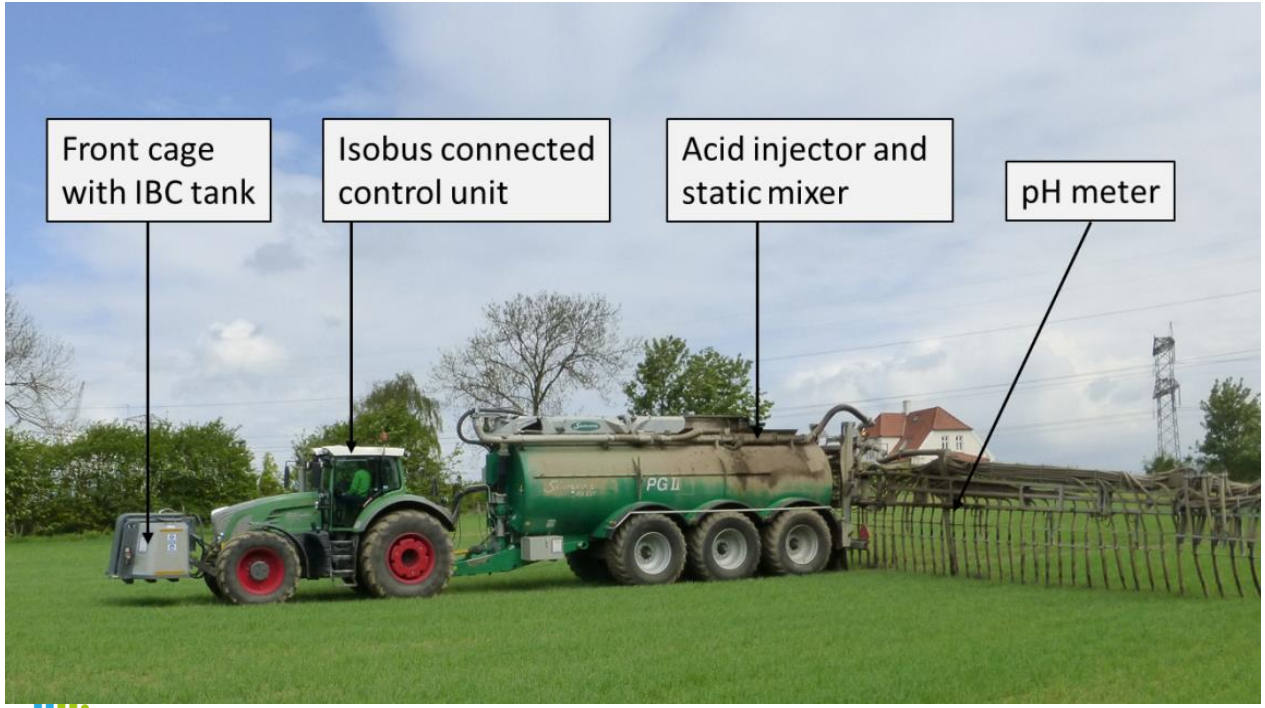
In-storage slurry acidification

Photo: Ørum – Smeden

- Modified slurry mixers
- Used just before spreading slurry on fields. Only reduces emissions during spreading
- Experience needed to avoid excessive foaming

- Target pH is 6.0

In-field slurry acidification



- Acid in front of tractor
- Greatest flexibility (acidify when needed)
- Target pH 6.4
- Requires 4.5 t font lift capacity

Baltic Slurry Acidification

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SAT investments

7 planed, 6 realized (1 partner dropout)

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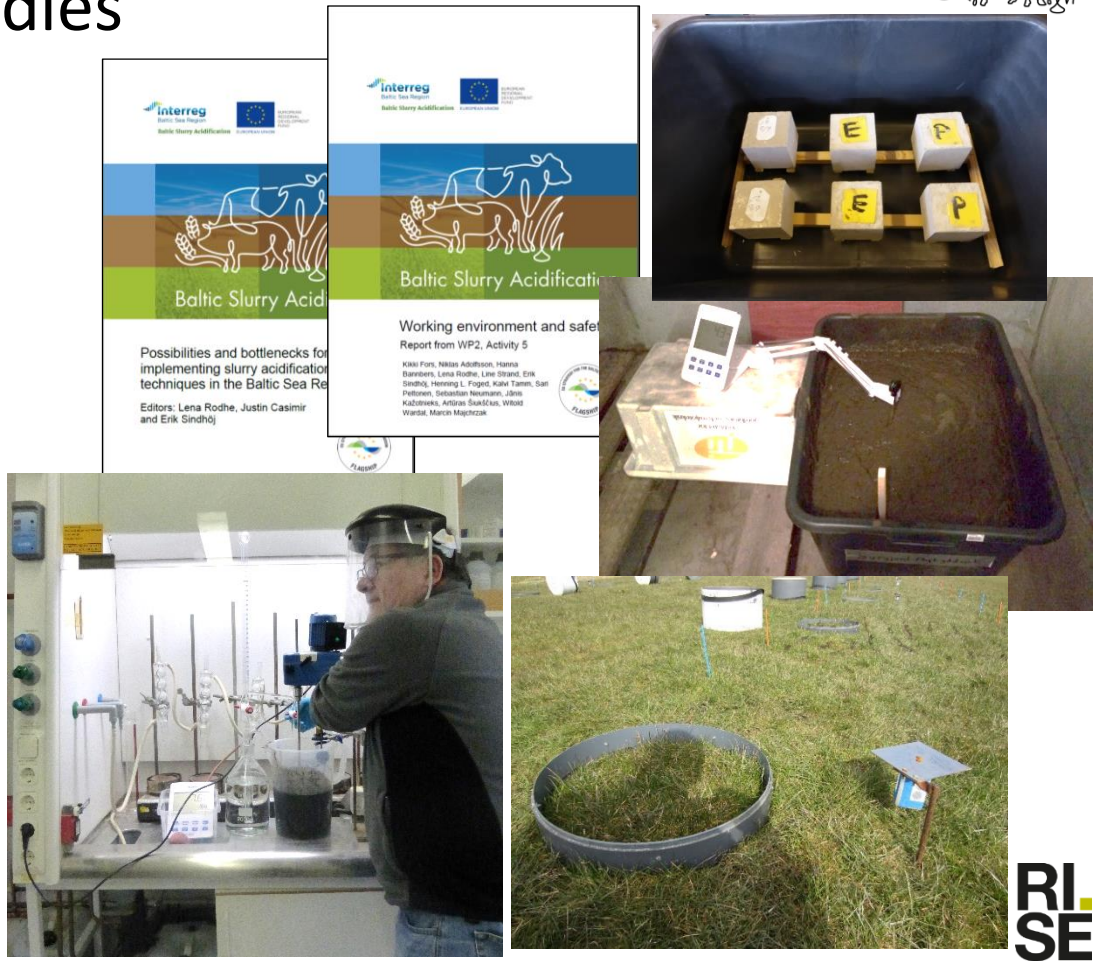
Field trials

- SE 3 yrs
- DE 3 yrs
- EE 2 yrs
- FI 2 yrs
- LV 1 yr
- LT 1 yr
- PL 2 yrs

Technical feasibility studies

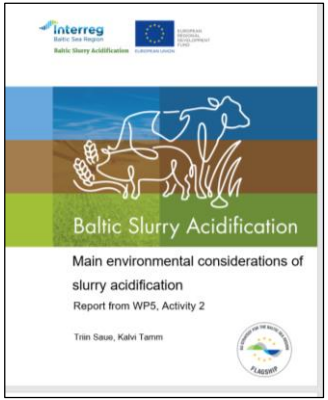
1. Technical bottlenecks for implementation
2. Equipment corrosion
3. Buffer capacity of slurries
4. Effects on soils
5. Working environment and safety
6. Ammonia emissions



Economic and environmental analysis

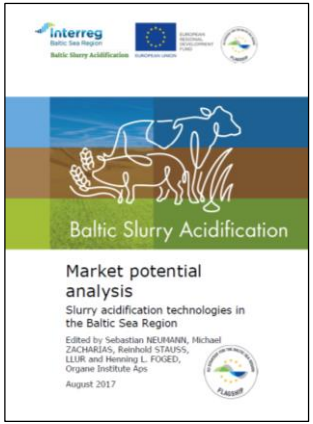
Three studies

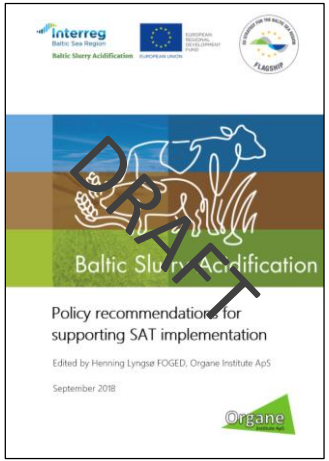
- Main environmental considerations for slurry acidification (Literature reveiw)
- Economic analysis of implementing SATs
- Environmental analsys of implementing SATs



Market and legal analysis and policy recommendations

- Market analysis
- Legislation analysis
- Policy recommendations





Communication

Seminars, workshops, round table discussions

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Thank you!

Questions?

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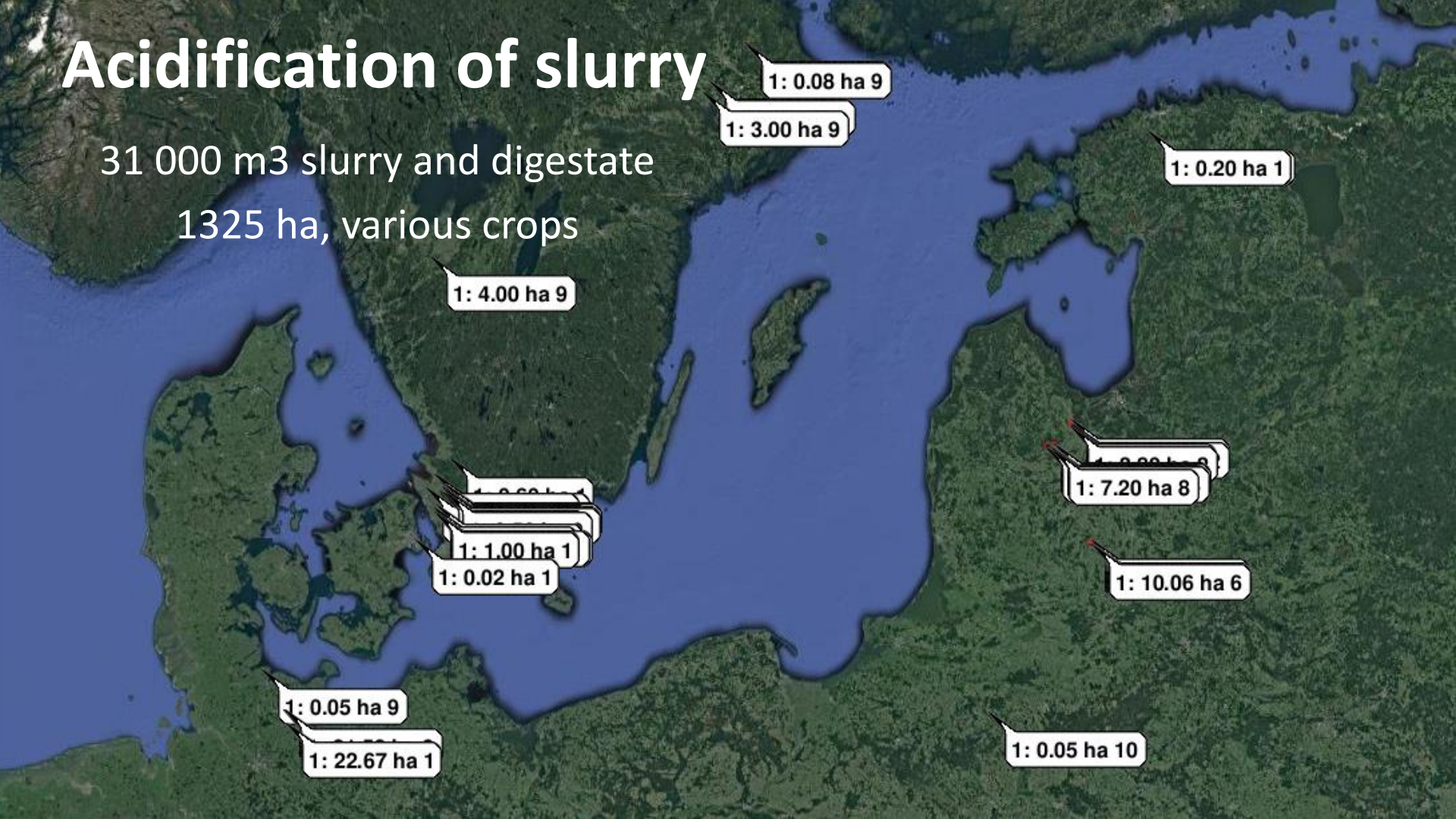
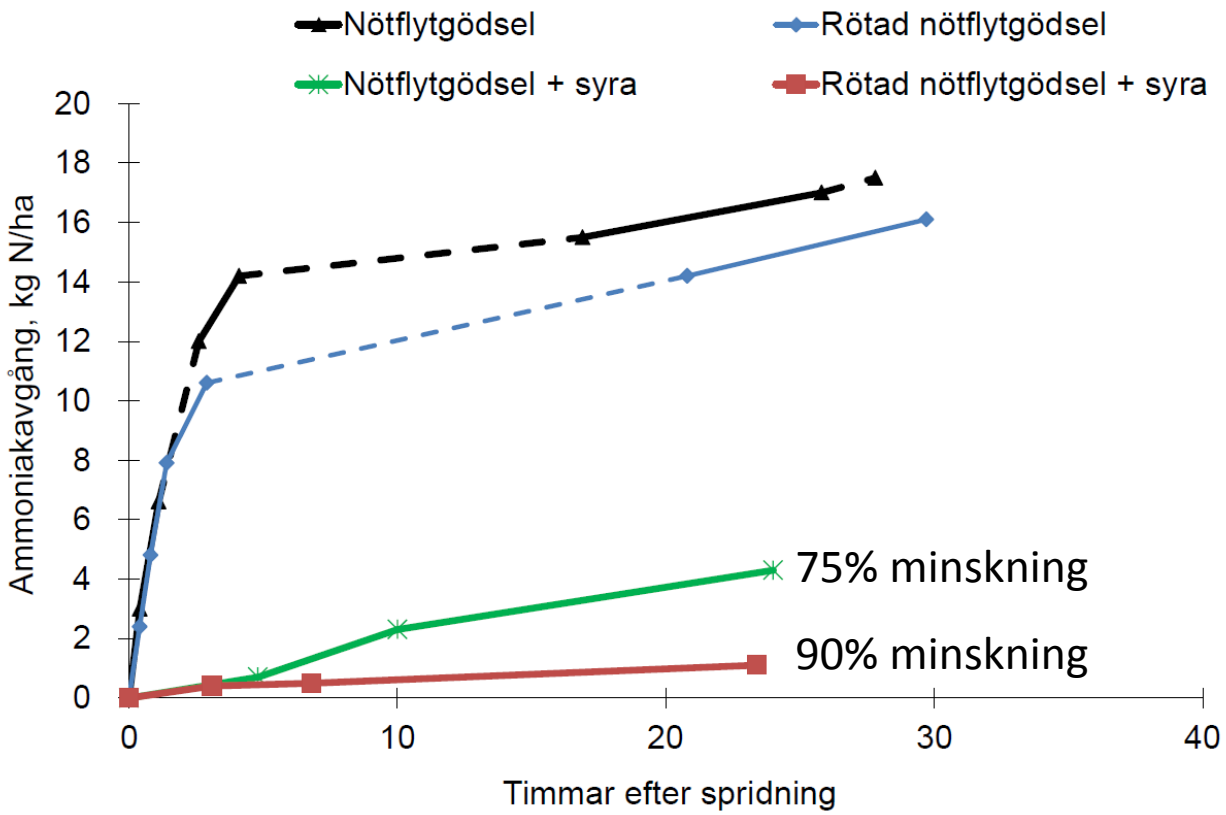
Acidification of slurry

31 000 m3 slurry and digestate

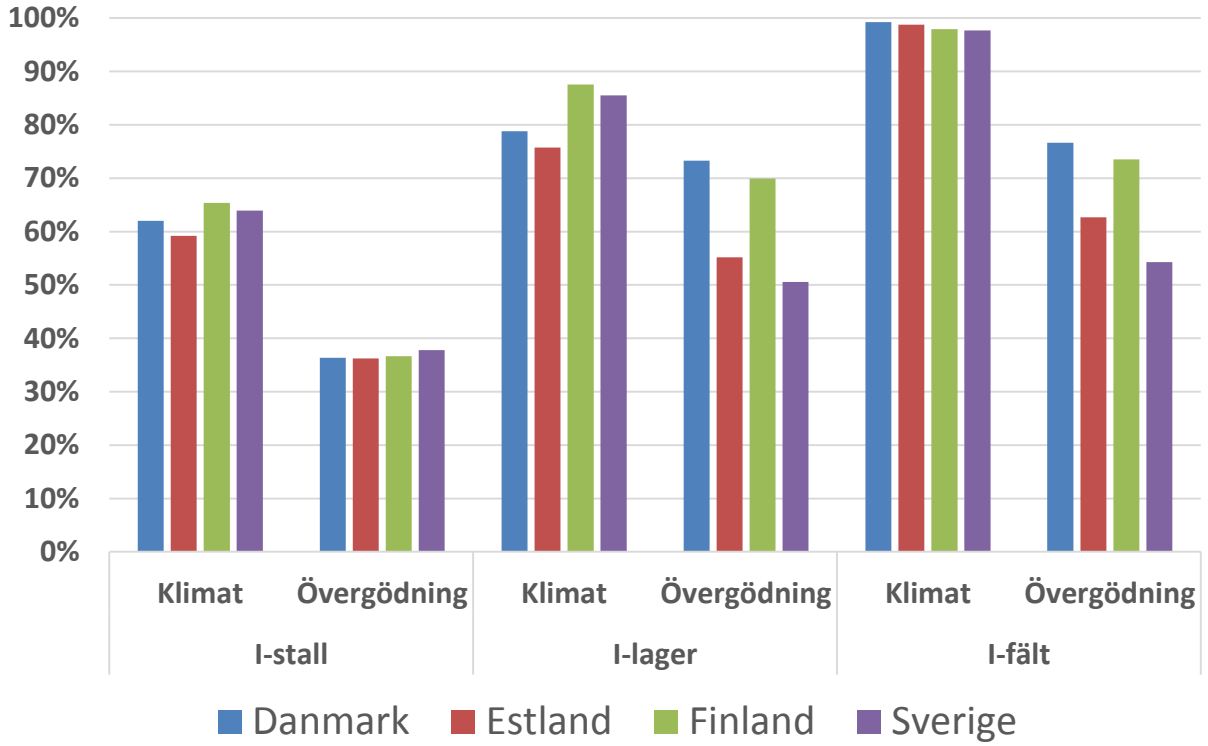
1325 ha, various crops



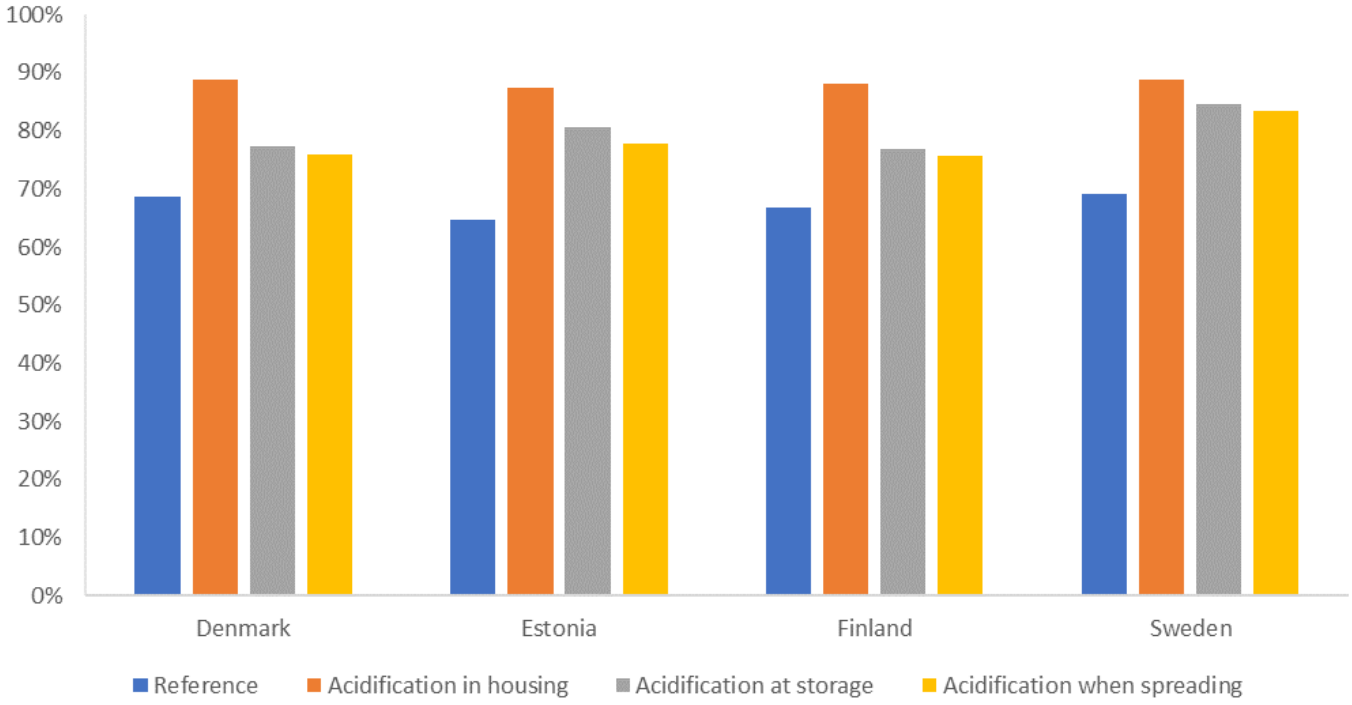
Results of ammonia emissions in Sweden, 2014



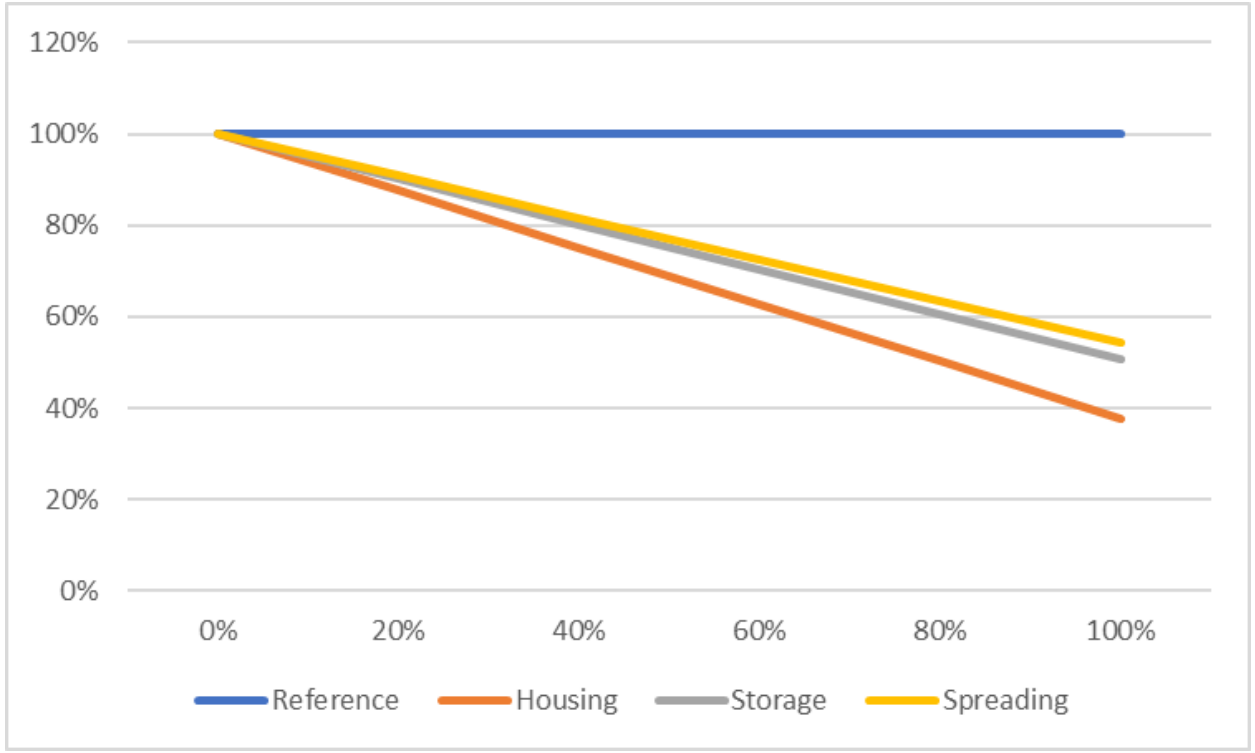
Effects on climate and eutrophication



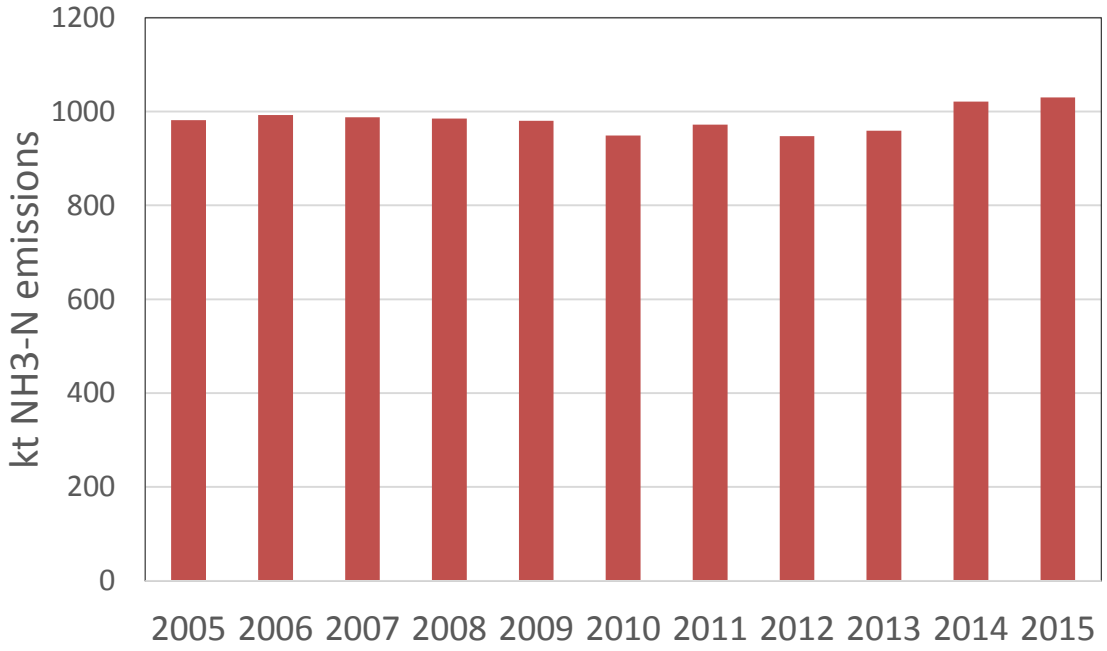
NH4-N remaining after spreading



Reduced eutrophication effects (Sweden)



Ammonia emissions from EU Baltic Sea countries



Source: HELCOM