Sustainable **Ma**nure and **Nu**trient management for reduction of nutrient loss in the Baltic Sea Region

Manure Standards

Baltic Slurry Acidification

SuMaNu

Greener Agriculture for Sustainable Seas, Warsaw, 2019-09-26

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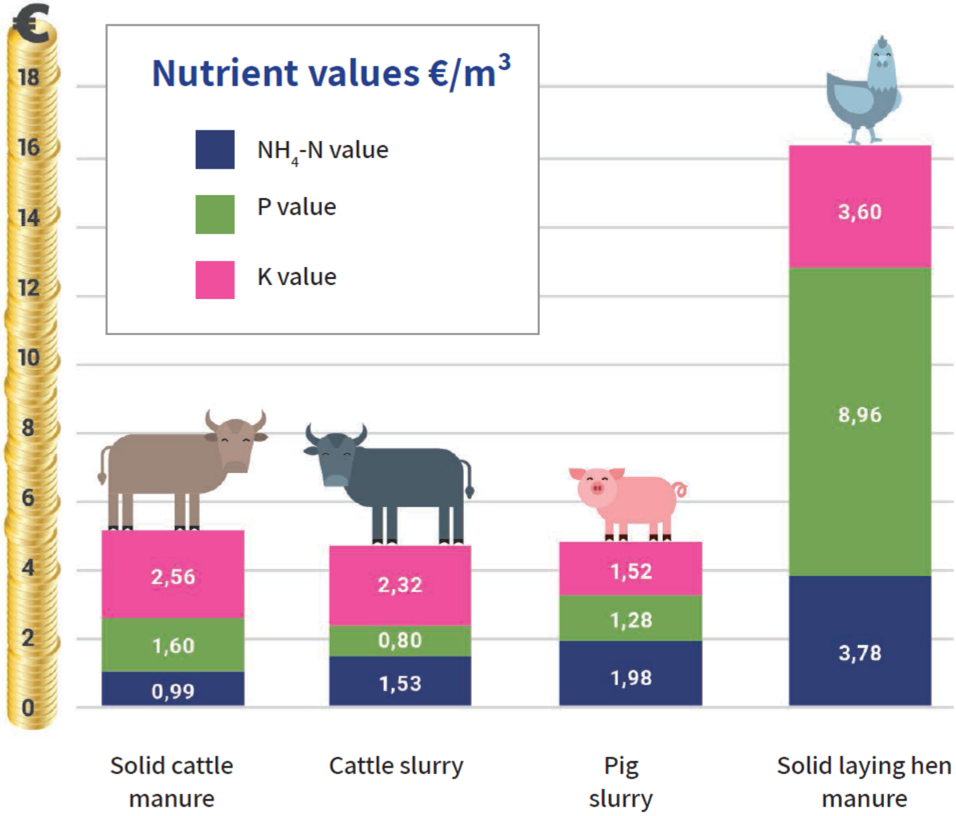
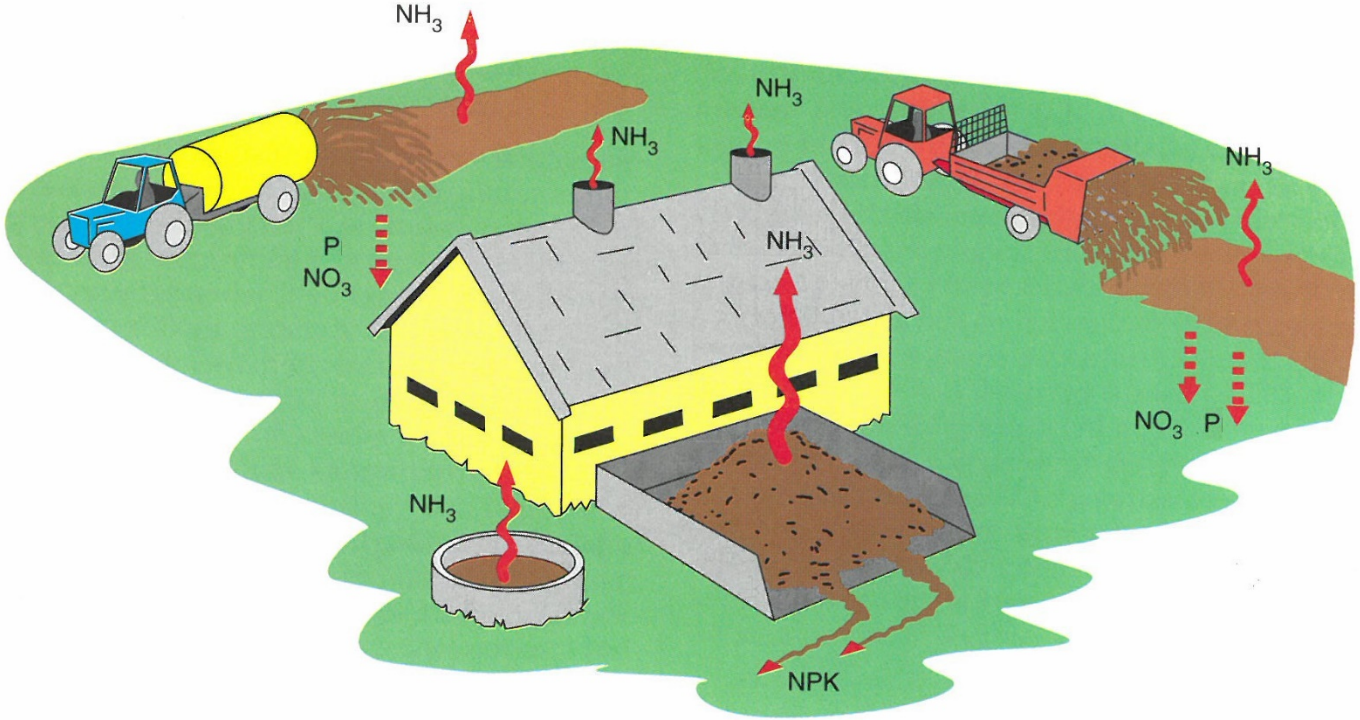
Overview of presentation

- Why should farmers be concerned about manure?
- Path towards increasing circular nutrient cycles
- How can slurry acidification help?

Manure is a resource



Nutrient losses from manure



NH_3 = ammonia
CH_4 = methane
NO_3 = nitrate
P = phosphorus

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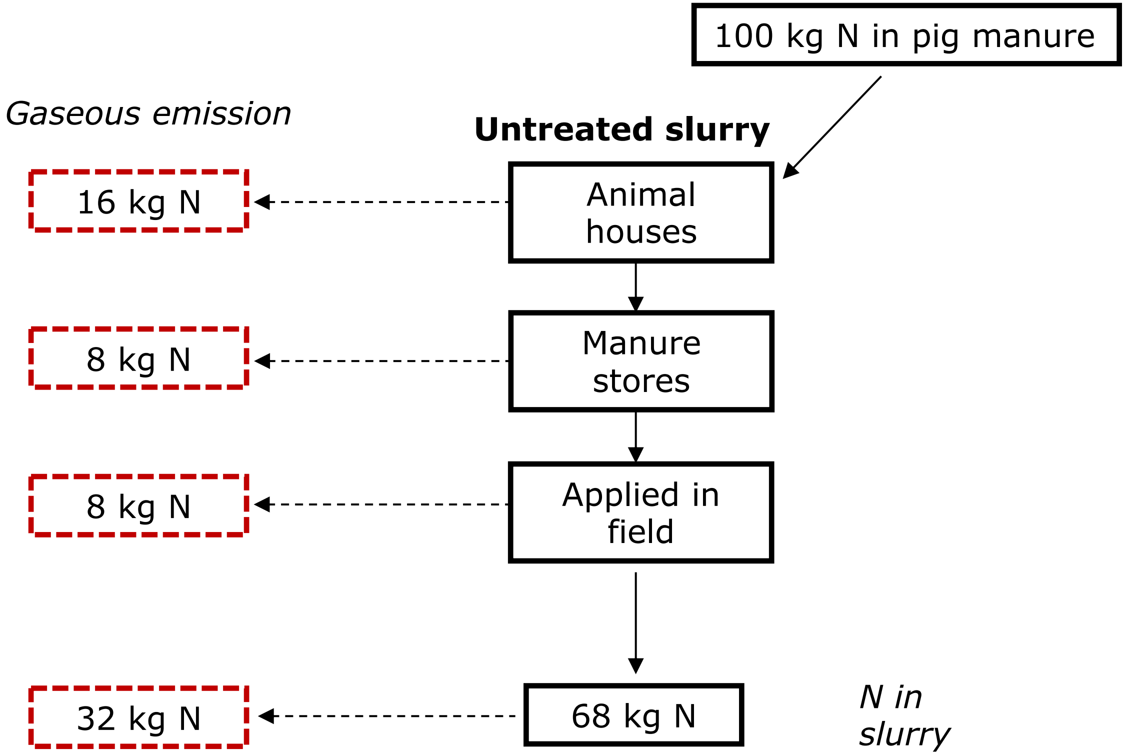
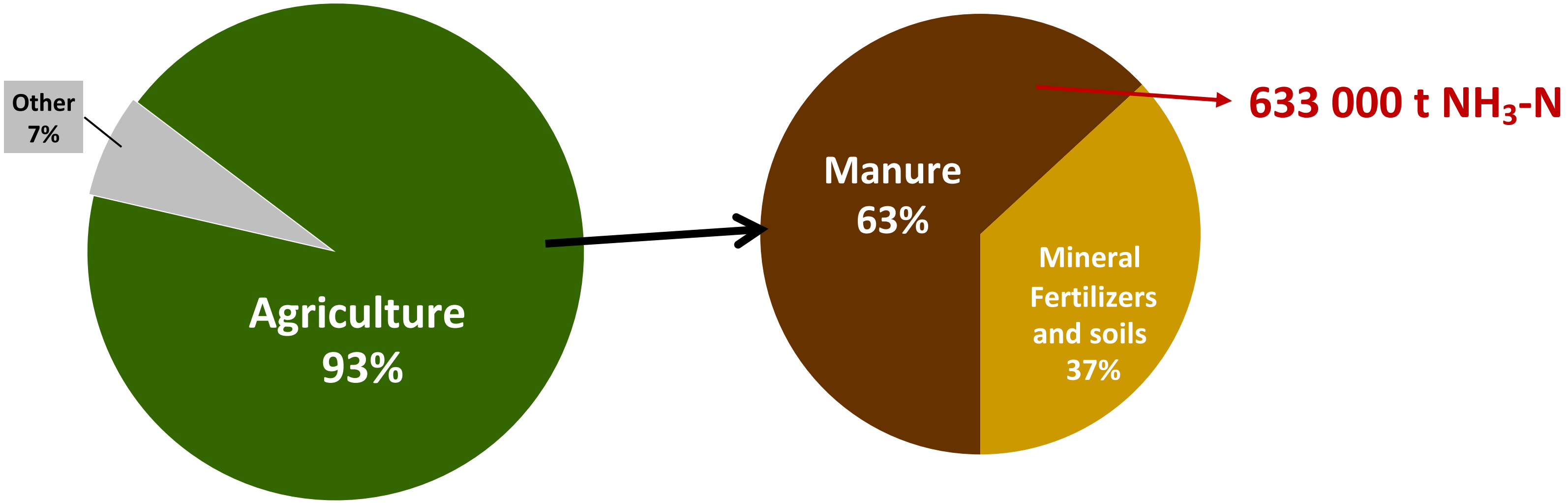
Nitrogen loss from a whole farm perspective (Kai et al. 2008)



Ammonia emissions represent direct loss of Nitrogen.

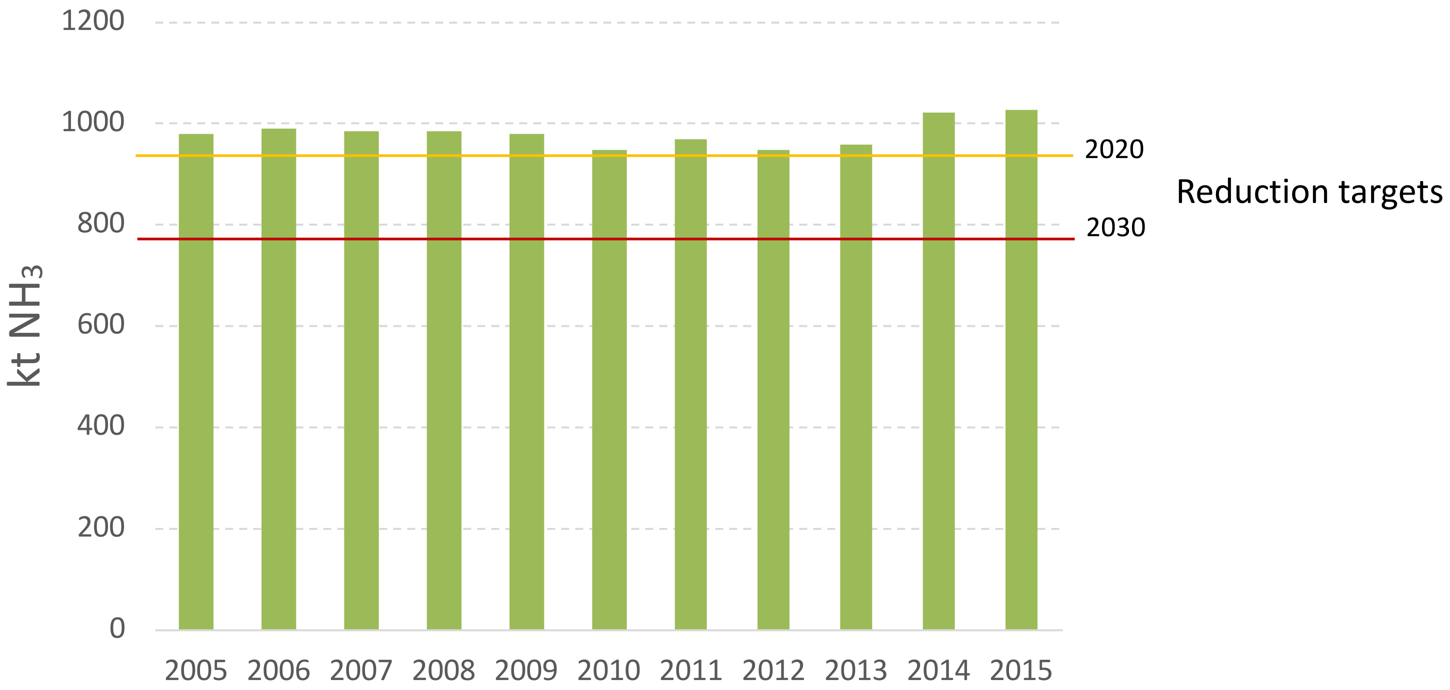
Reducing ammonia emissions from manure results in higher fertilizer value and reduced need for mineral fertilizer.

Ammonia emissions from the EU Baltic Sea Countries was 1 081 000 t of NH_3-Nitrogen in 2016



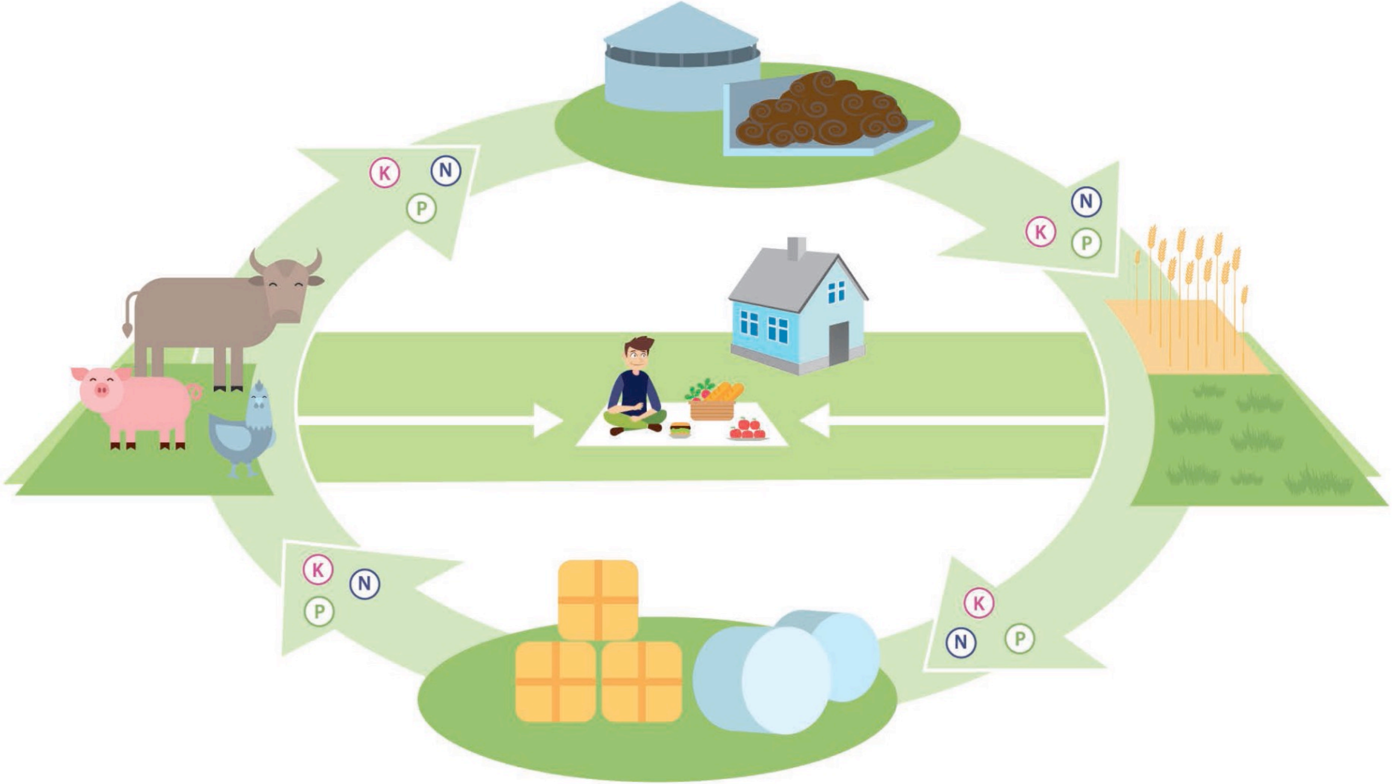
Source: EEA Report 6/2018

Nitrogen loss from ammonia emissions in EU Baltic Sea countries



Source: EMEP Centres Joint Report for HELCOM

Closing the nutrient loop



Farm-level nutrient balances

Nutrients to the farm:

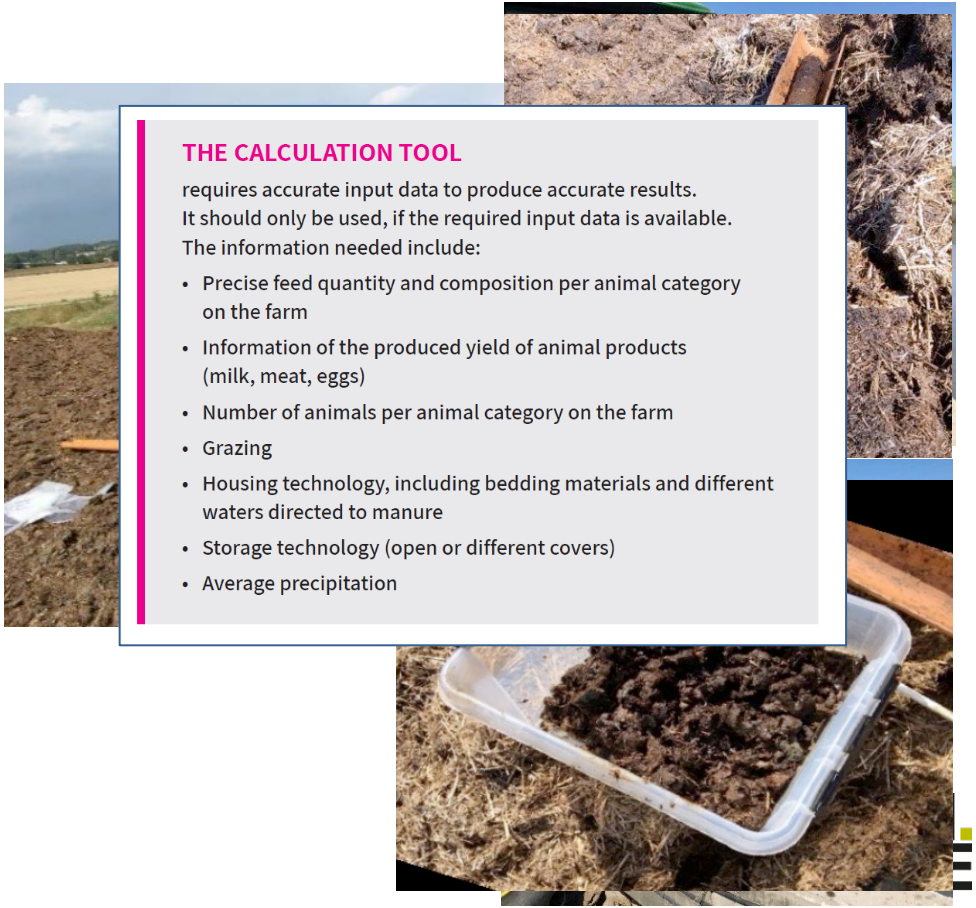
- Fertilizers
- Feed
- New animals
- Seeds
- N fixation
- N downfall

Nutrients off the farm:

- Animal products
- Crops
- Sold animals
- Manure (potentially)

Know what is in the manure

- Manure sampling
- Calculation tools for manure amount and nutrient content
- Updated national standard values



THE CALCULATION TOOL

requires accurate input data to produce accurate results.
It should only be used, if the required input data is available.
The information needed include:

- Precise feed quantity and composition per animal category on the farm
- Information of the produced yield of animal products (milk, meat, eggs)
- Number of animals per animal category on the farm
- Grazing
- Housing technology, including bedding materials and different waters directed to manure
- Storage technology (open or different covers)
- Average precipitation

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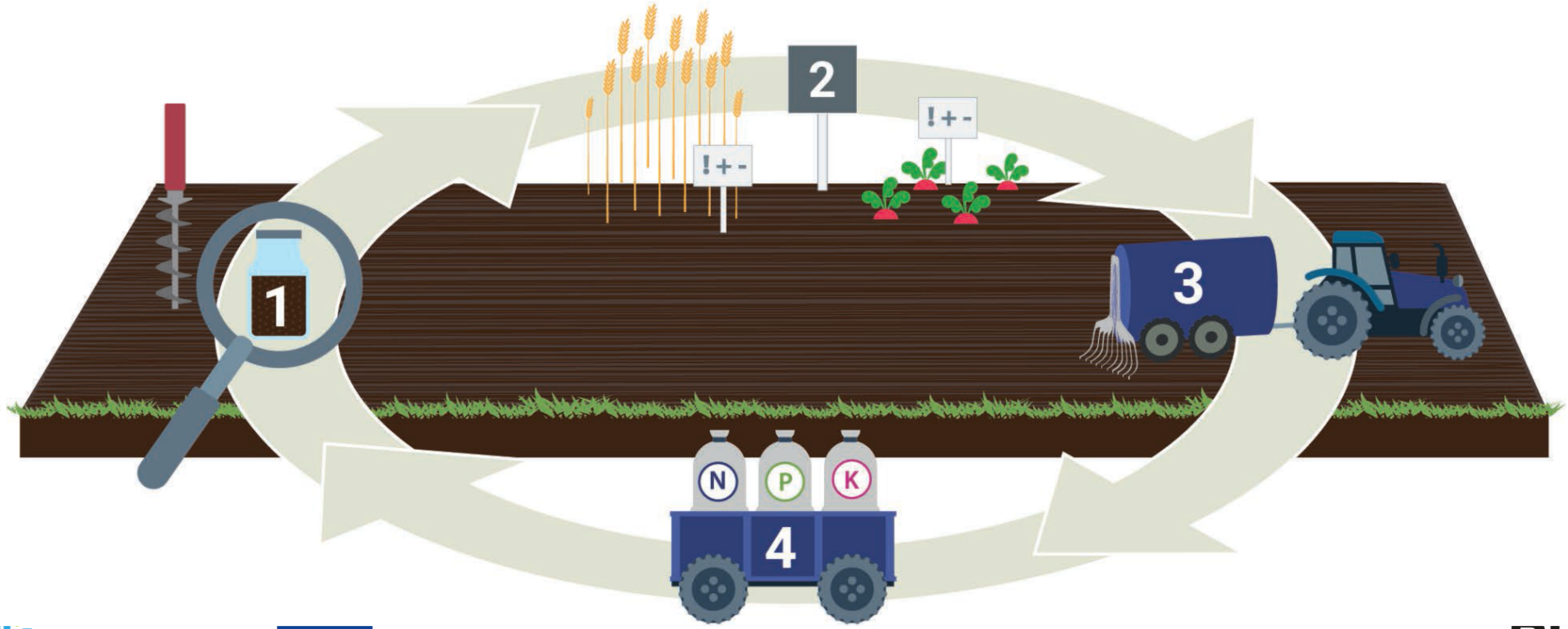
Fertilizer planning

1) Soil analysis 2) Plant needs 3) Get the most of manure 4) complement only if necessary

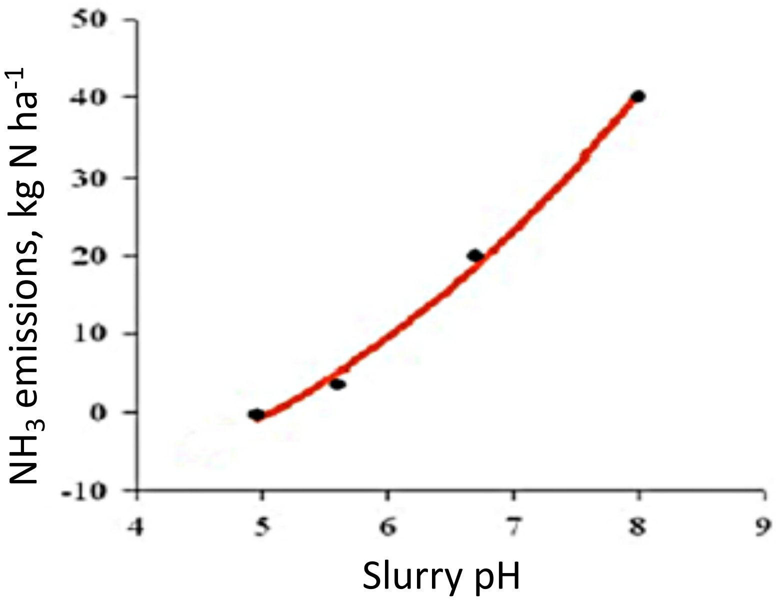


How can acidification help?

Ammonia - ammonium balance

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

Direct effects of acidification on slurry



(Jarvis and Pain, 1990)

Overview of slurry acidification technologies (SATs)

In-house

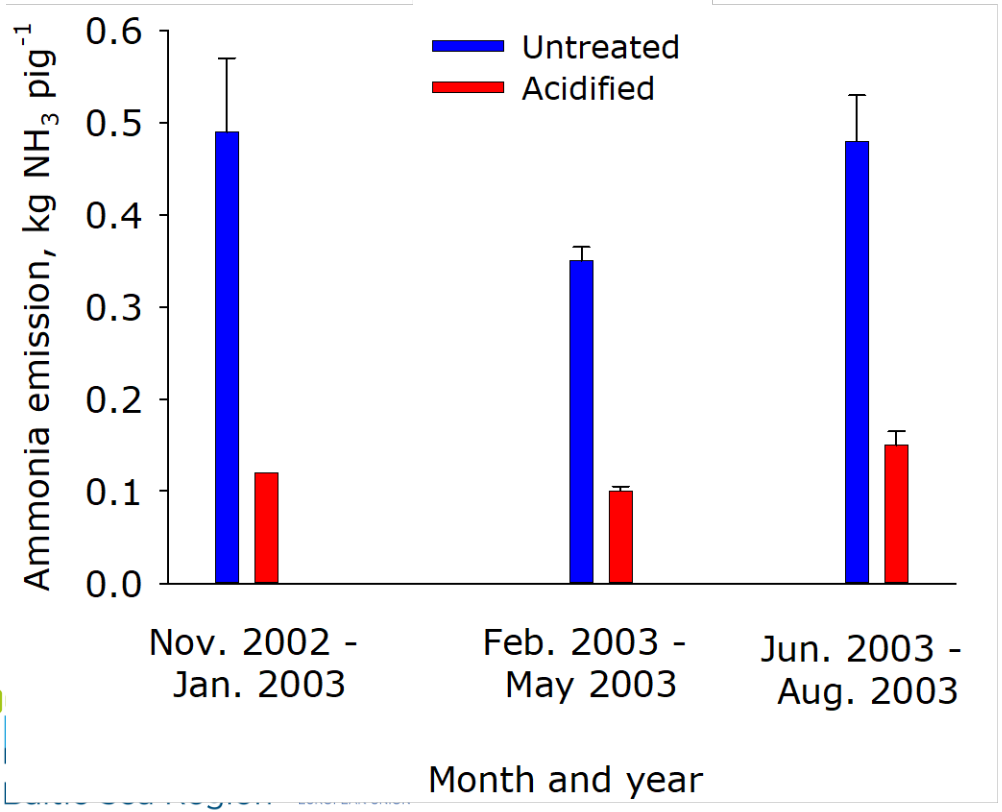
In-storage

In-field

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

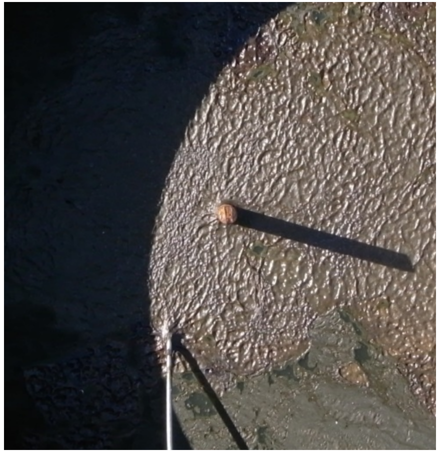
*Karen Peters, DK EPA

Ammonia emissions from pig houses, In-house ammonia reduction 70% (Kai et al. 2008)



Ammonia emission reduction efficiency from outdoor storages

Reduction efficiency, %	Reference
67	Petersen et al. 2014
90	Reguero et al. 2016
90	Al-Kanani et al. 1992
62	Sommer et al. 2017
59	Owusu-Twum et al. 2017



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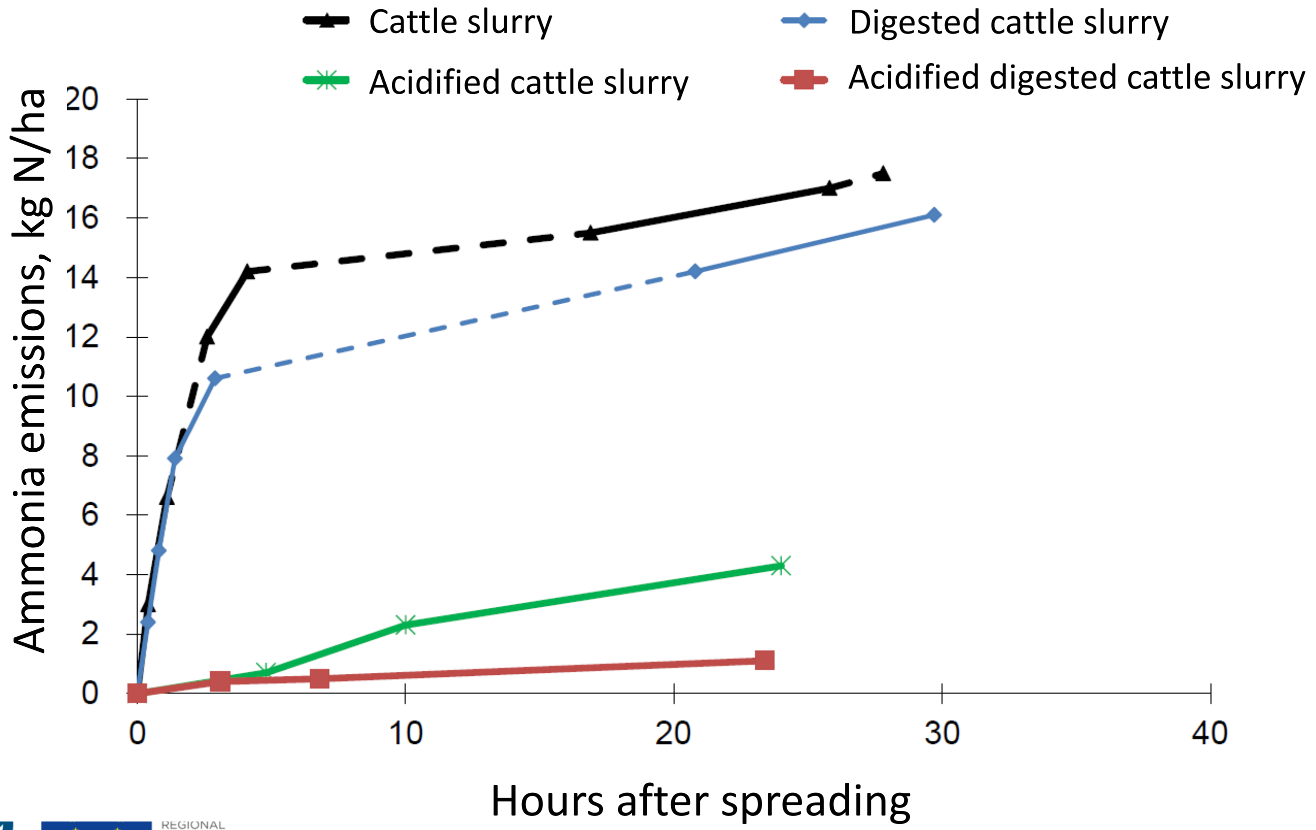
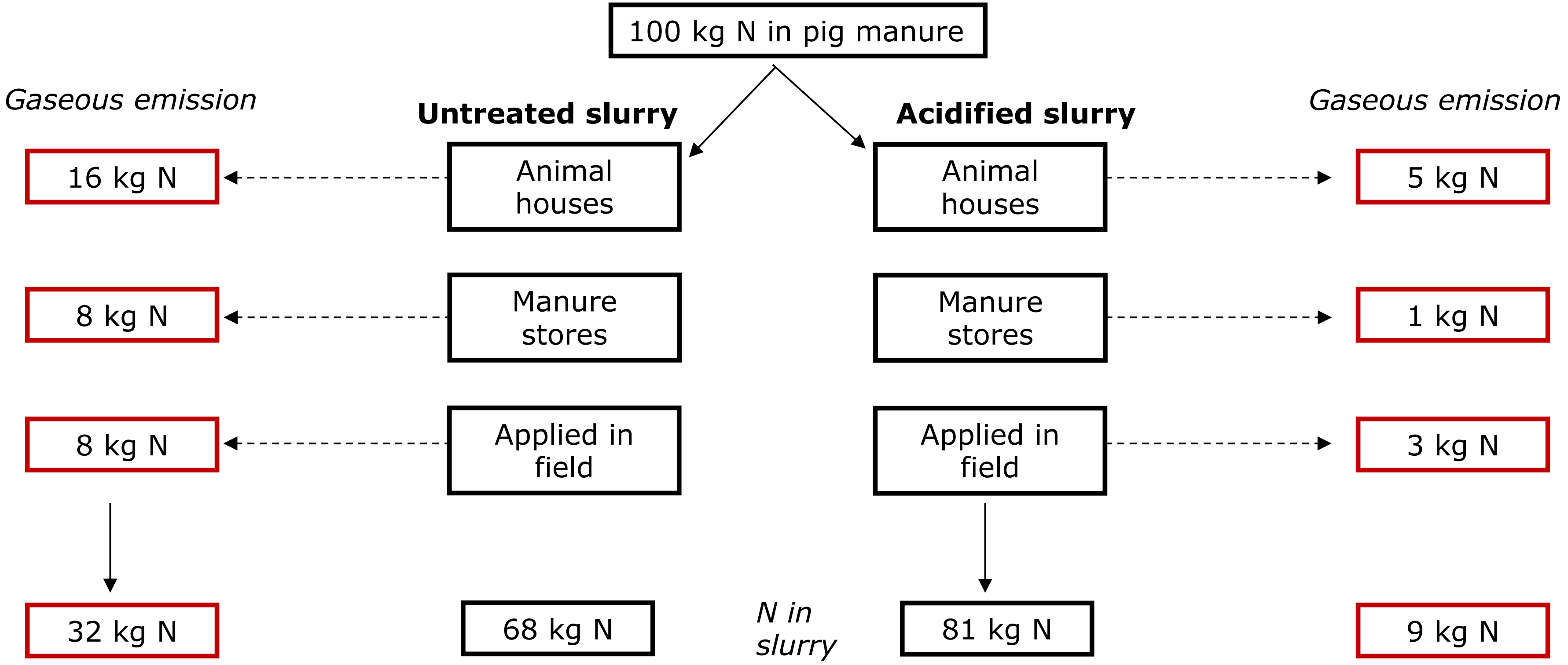
Ammonia emission from field applied slurry and digestate, Rodhe et al, 2014



Nitrogen loss from a whole farm perspective (Kai et al. 2008)



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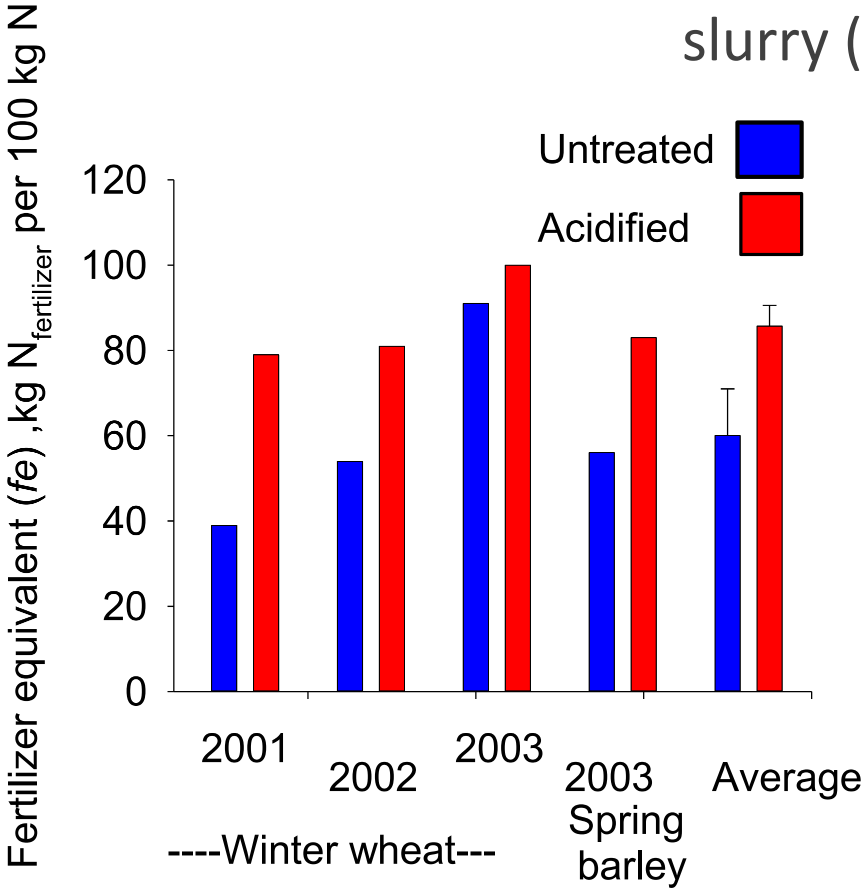
Fertilizer equivalent of in house acidified slurry (Kai et al. 2008)



Investments in slurry acidification technologies

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Slurry acidification in Poland

ITP experimental farm in Biebrza

ITP

Przybkowo pig farm in Poland

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Pilot scale in-storage acidification test facility

ITP experimental farm in Falenty

Field trials

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

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Conclusions/Recommendation

- Farm nutrient (NP) balances and Fertilizer planning based on soils status, crop needs and manure composition for all fields should be standard procedures for all farms
- Farmers need advisory support for accurate planning
- Slurry acidification effectively reduces ammonia emissions and increases manure nutrient use
- Slurry acidification can be implemented on farms in the BSR
- Farmers need support/incentives to implement green technologies

Thank you!

Questions?

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