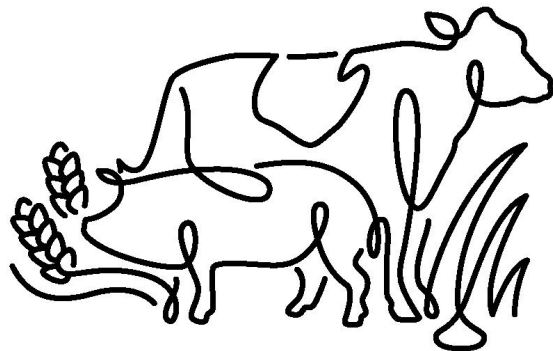


Introduction to slurry acidification

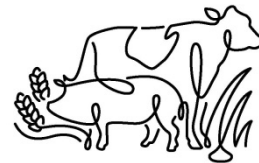


Erik Sindhøj, RISE – Agrifood and Bioscience, erik.sindhoj@ri.se



Overview of presentation

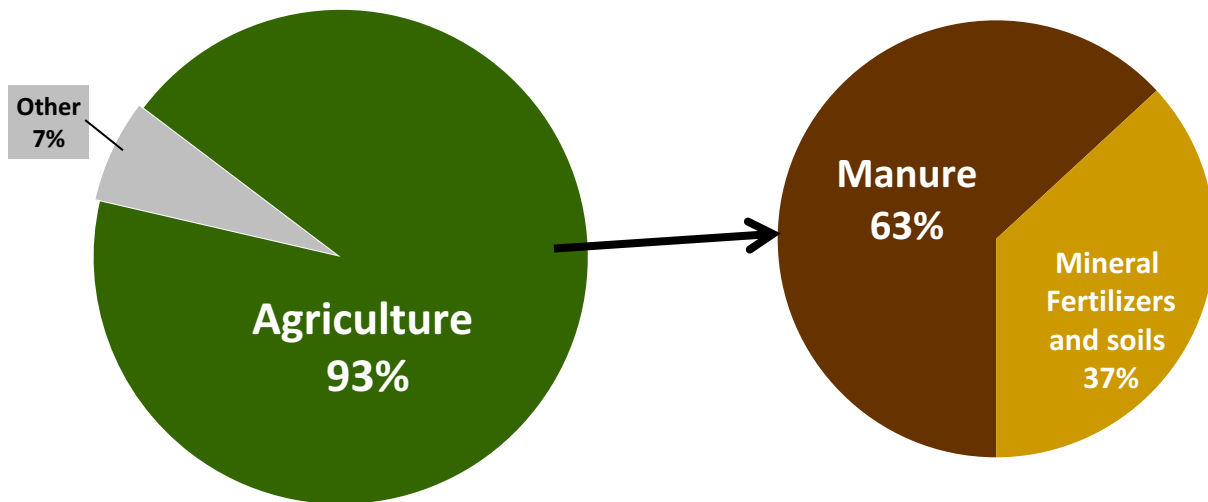
- Why should we acidify slurry?
- How does slurry acidification help?
- Overview of slurry acidification technologies
- EU - Interreg BSR project “Baltic Slurry Acidification”



Why should we acidify slurry



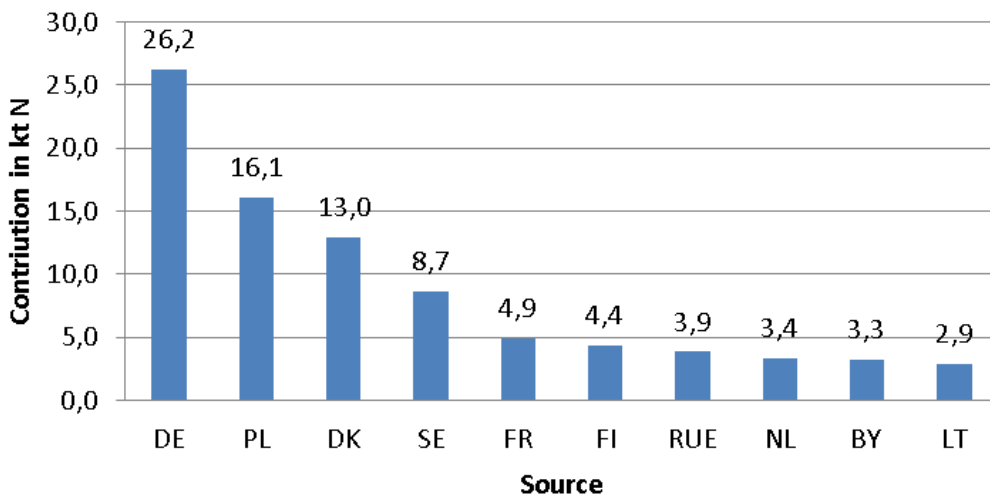
Ammonia emissions from the 8 EU Baltic Sea Countries was
1 227 000 t of Nitrogen in 2014



Source: ec.europa.eu/eurostat och HELCOM

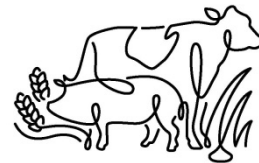


Countries contribution to ammonia deposition on the Baltic Sea



Source: EMEP Centers Joint Report HELCOM, 2013





How can slurry acidification help?



How can slurry acidification help?

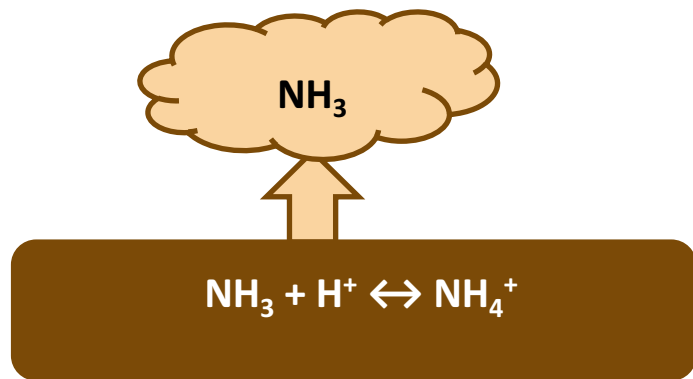
Ammonia - ammonium balance





How can slurry acidification help?

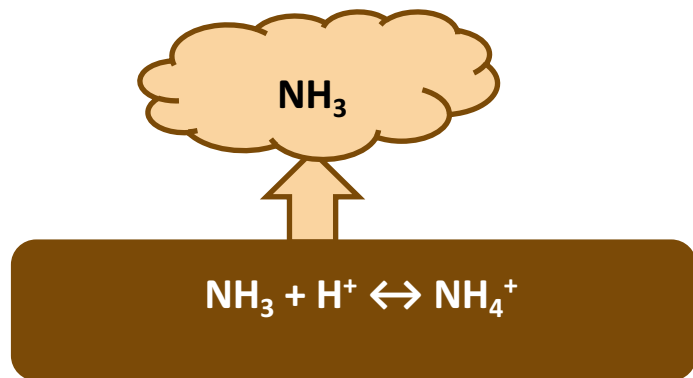
Ammonia - ammonium balance



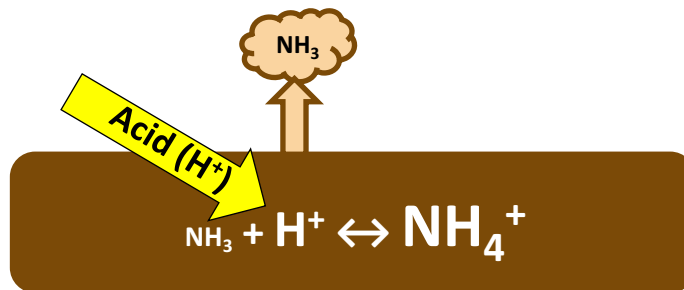


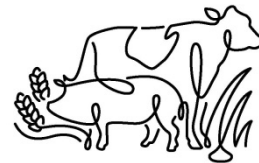
How can slurry acidification help?

Ammonia - ammonium balance

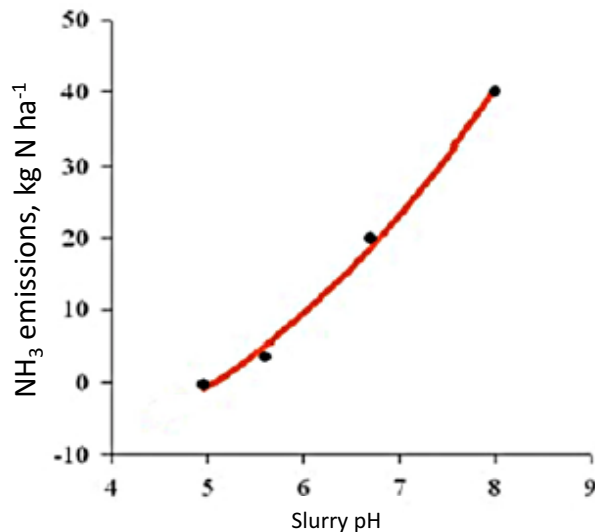


Acid provides extra Hydrogen ions (H^+)

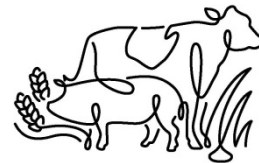




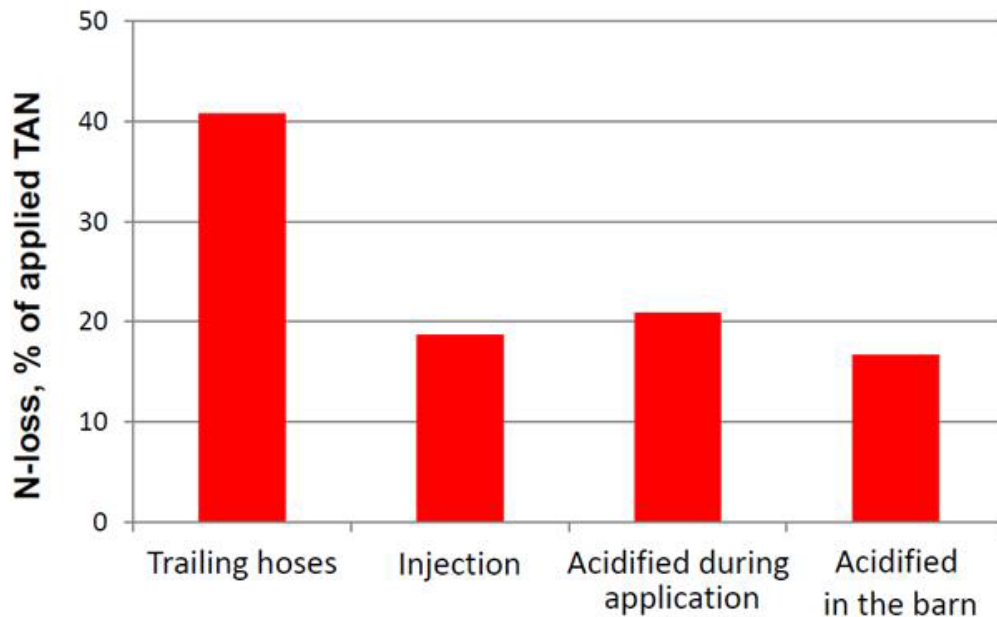
Direct effects of acidification on slurry



Effect of slurry pH on NH₃ volatilization
(Jarvis and Pain, 1990)



Ammonia loss from cattle slurry applied to grass in June in Denmark

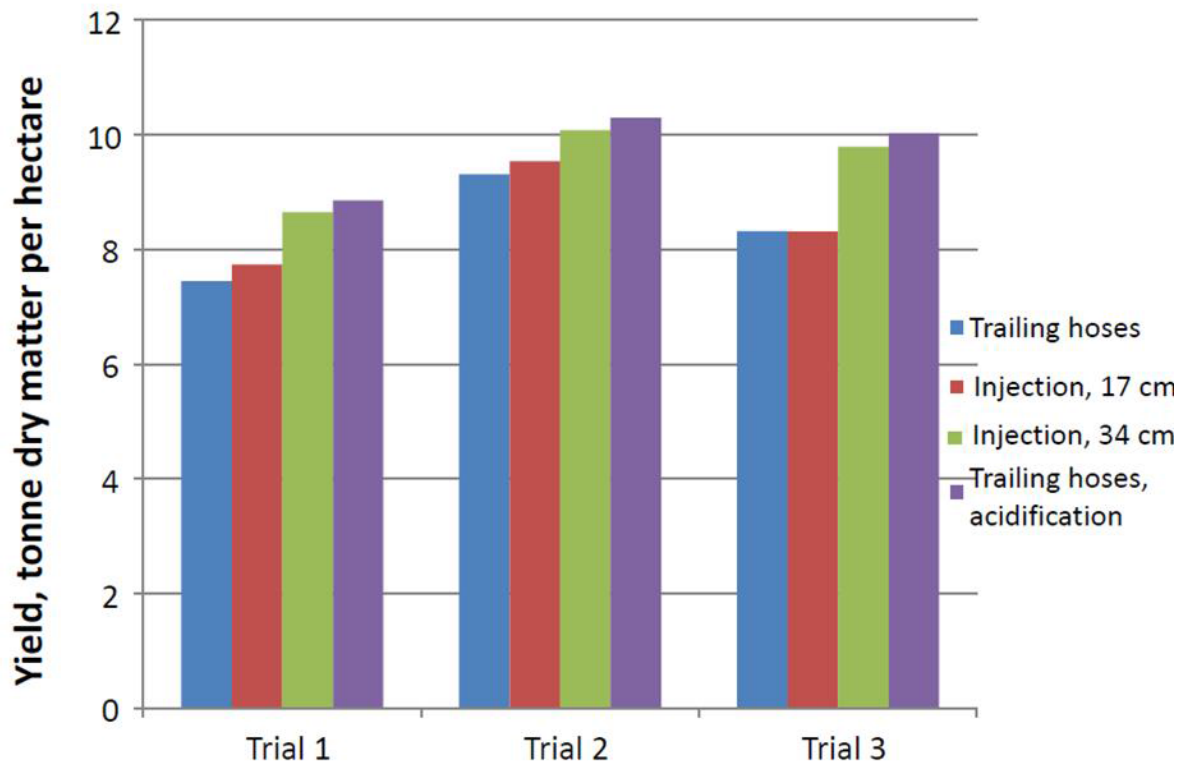


Source: Århus University and SEGES

Riga, 11-12 October, 2017

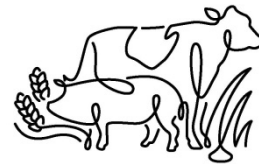


Grassland yields from different slurry spreading techniques in Denmark



Source: Birkmose, SEGES, 2013

Riga, 11-12 October, 2017



Overview of slurry acidification techniques



In-house



In-storage



In-field



In – house SAT - JH Agro A/S



Photo: JH Agro



Riga, 11-12 October, 2017



In – storage SATs

Harsø Maskiner A/S



Ørum – Smeden





In – storage SATs



Photos: Torkild Birkmose, SEGES

Riga, 11-12 October, 2017



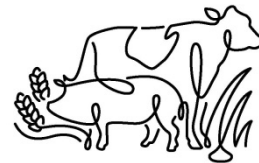
In – field SATs

Biocover SyreN



Kyndestoft





In – field SATs

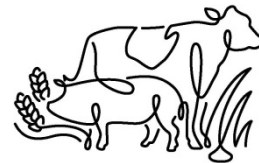
IBC with 96 %
concentrated
sulphuric acid

Tractor with control
unit

Acid inlet and
mixed with liquid
manure



Biocover.dk



Currently in Denmark 20% of all slurry is acidified

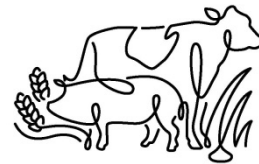
Slurry acidification technology (SAT)	Approximate number of SATs in Denmark, 2016
In-house	140
In-storage	75
In-field	110
Total	325



Baltic Slurry Acidification

Reducing nitrogen loss from livestock production by promoting the use of slurry acidification techniques (SATs) in the Baltic Sea Region





20 partners in 10 countries

SWEDEN

- RISE (Formerly JTI) , LEAD PARTNER
- The Rural Economy and Agricultural Society
- Br Goransson AB

POLAND

- Institute of Technology and Life Sciences (ITP)
- Agricultural Advisory Centre in Brwinow Branch Office in Radom (CDR)

GERMANY

- State Agency for Agriculture, Environment and Rural Areas of the German Federal State Schleswig-Holstein (LLUR)
- Blunk GmbH

FINLAND

- Baltic Sea Action Group (BSAG)
- Association of ProAgria Centres

ESTONIA

- Estonian Crop Research Institute (ECRI)

LATVIA

- Ltd Latvian Rural Advisory and Training Centre (SIA)
- Union "Farmers' Parliament" (ZSA)
- Lauku Agro

LITHUANIA

- Lithuanian Agricultural Advisory Service (LAAS)
- Animal Science Institute, University of Health Sciences (LUHS)
- Dotnuvas Experimental Farm

DENMARK

- enAgro Plc

BELARUS

- Scientific & Practical Centre for Agricultural Mechanisation

RUSSIA

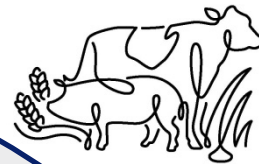
- Northwest Research Institute of Agricultural Engineering and Electrification
- Institute for Engineering and Environmental Problems in Agricultural Production (IEEP)



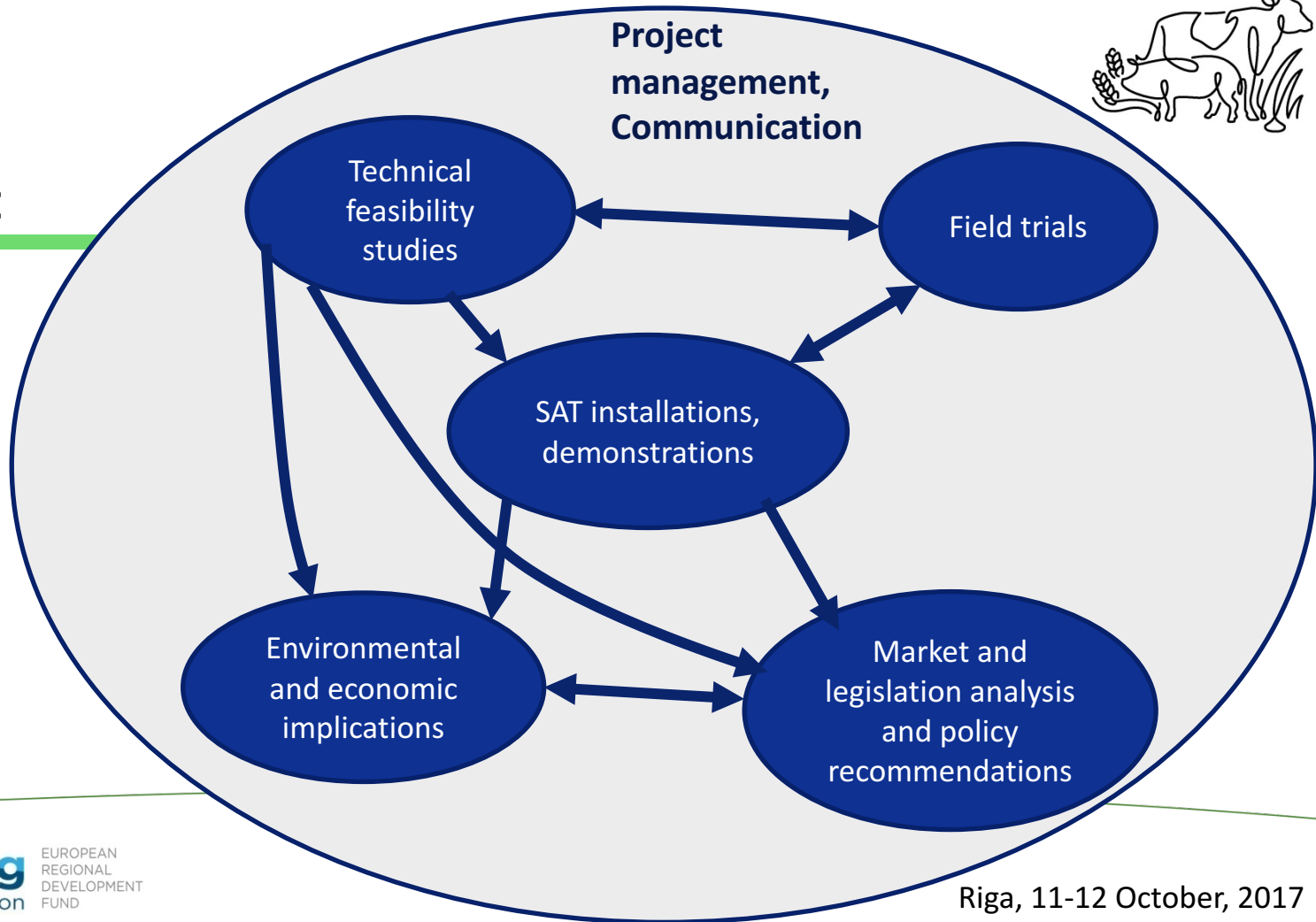
Main aim of the project

Spread the use of slurry acidification to countries around the Baltic Sea





How to meet our aim





How to meet our objective

- **Establish pilot installations** in each country and use them for demonstration and promotion. (WP3)
- **Determine technical and practical bottlenecks for implementation** to help implementation. (WP2)
- **Field research** of the effects of acidification on crop yields in BSR countries. (WP4)
- **Economic and environmental analysis** of implementing SATs on a farm and country level. (WP5)
- **Market and legislation analysis**, including policy recommendations for support schemes. (WP6)