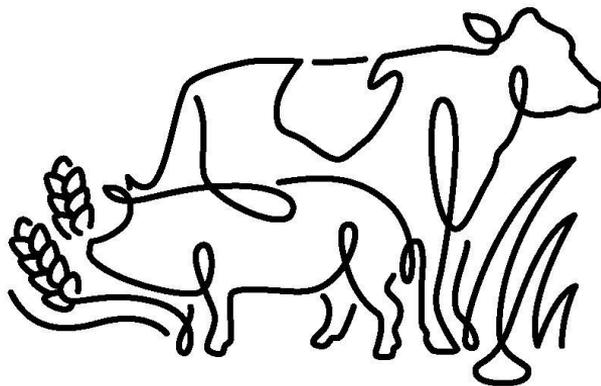


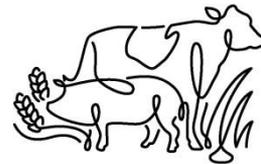
# Baltic Slurry Acidification

## Reducing nitrogen loss from agriculture by implementing slurry acidification techniques



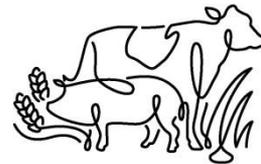
**Erik Sindhoj, PhD**  
Project Coordinator  
RISE – Agrifood and Bioscience  
erik.sindhoj@ri.se



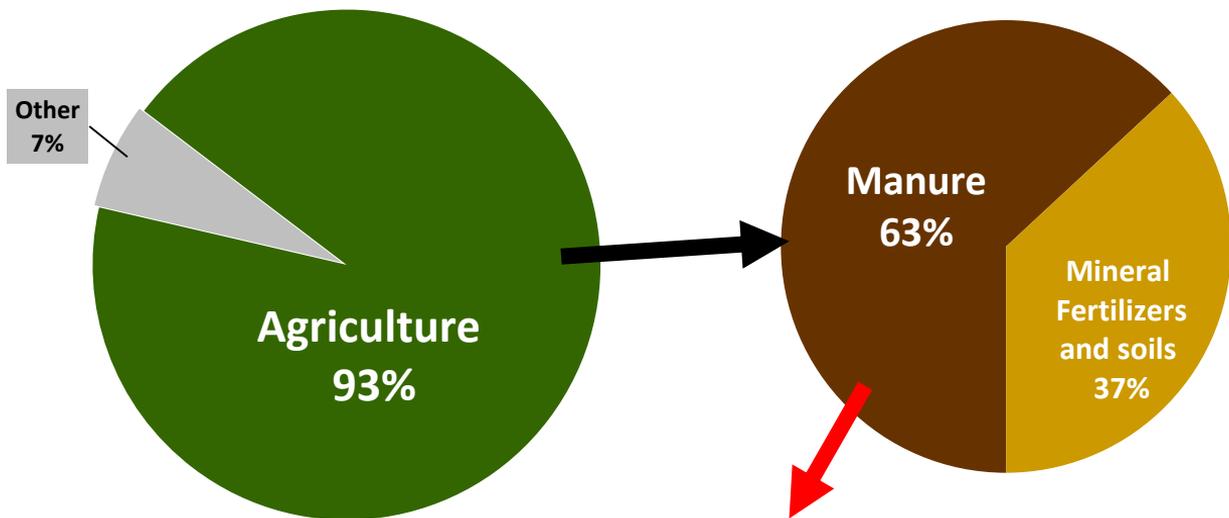


## Overview of presentation

- Background to acidification of slurry, why and how?
- Overview of slurry acidification technologies
- EU - Interreg BSR project “Baltic Slurry Acidification”
- Preliminary conclusions

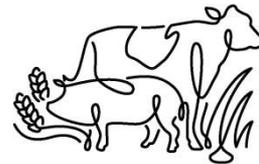


Ammonia emissions from the 8 EU Baltic Sea Countries was  
1 227 000 t of Nitrogen in 2014



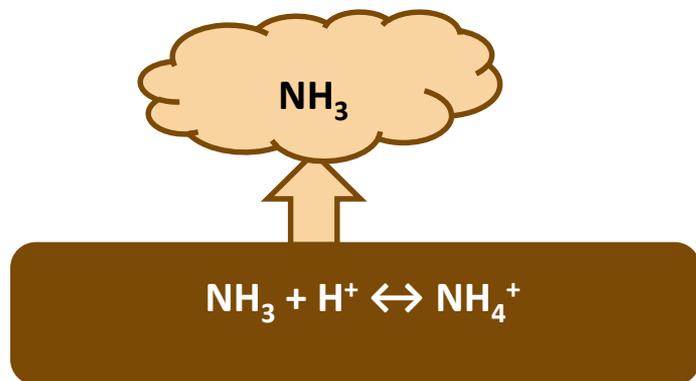
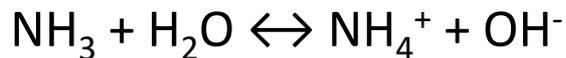
**719 000 t N/yr**

Source: [ec.europa.eu/eurostat](http://ec.europa.eu/eurostat) och HELCOM

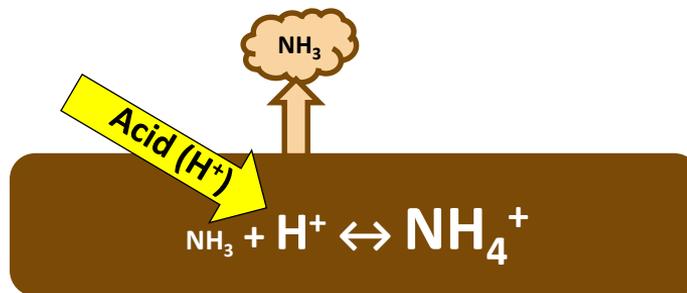


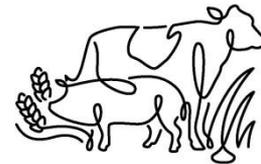
## How can slurry acidification help?

Ammonia - ammonium balance

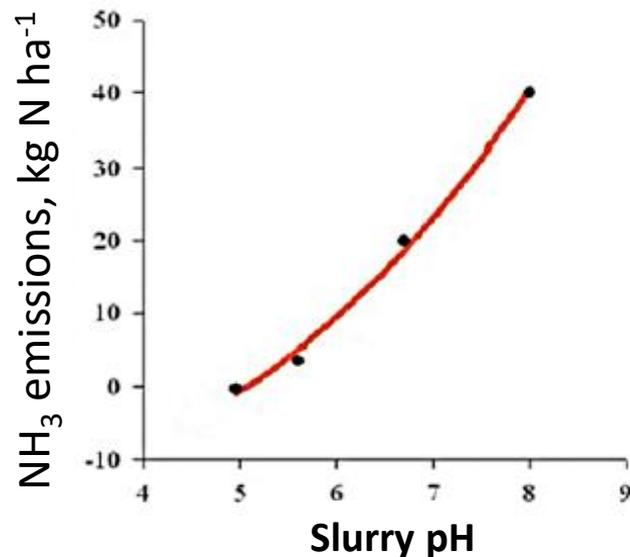


Acid provides extra Hydrogen ions ( $\text{H}^+$ )

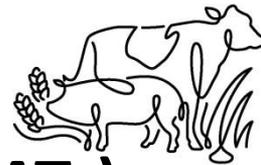




# Direct effects of acidification on slurry



Effect of slurry pH on NH<sub>3</sub> volatilization  
(Jarvis and Pain, 1990)



# Three types of slurry acidification technology (SATs)



In-house

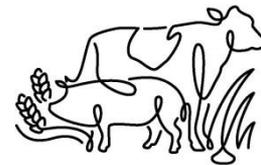


In-storage

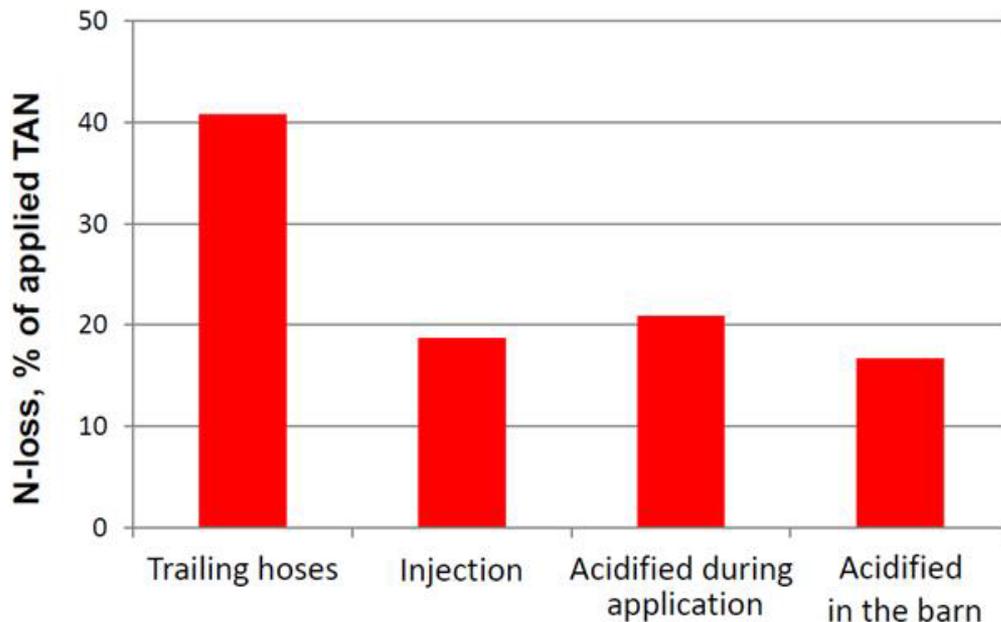


In-field

18% of all slurry acidified in Denmark in 2016\*

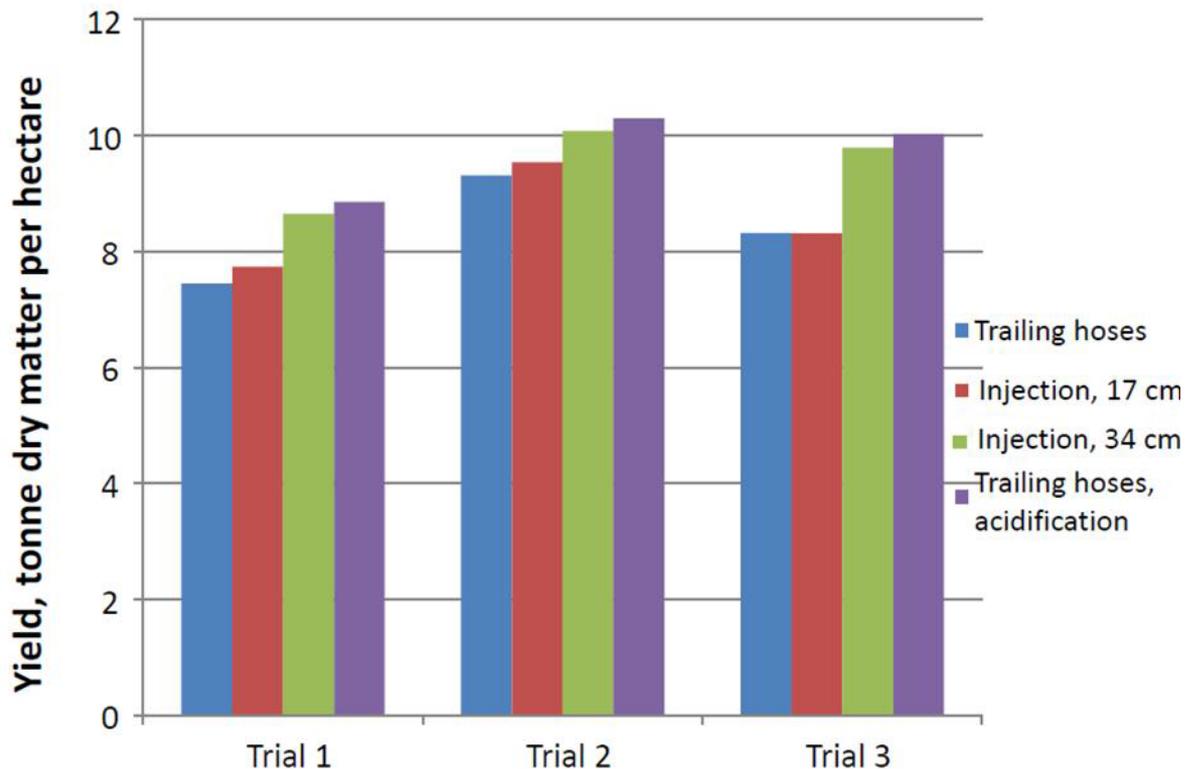
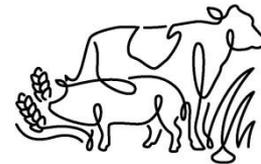


## Ammonia loss from cattle slurry applied to grass in June in Denmark

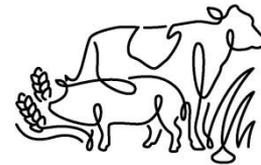


Source: Århus University and SEGES

# Grassland yields from different slurry spreading techniques in Denmark



Source: Birkmose, SEGES, 2013



# Baltic slurry Acidification

To spread the use of slurry acidification to countries around the Baltic Sea

## 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)

# Six demonstration SATs

In-field: Sweden, Germany, Estonia, Lithuania and Latvia

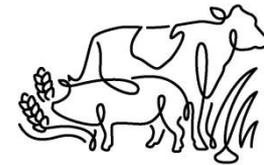


In-storage: Poland



## Field trials

- Field trials in all countries
- Cattle, pig slurry and digestate
- Grasslands, cereals and maize

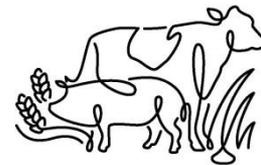


# Feasibility studies

- Possibilities and bottlenecks for Implementing slurry acidification techniques In the Baltic Sea Region
- Effects on equipment
- Buffer capacity of slurry
- Effects on Soils
- Health and safety
- Ammonia emissions



ESPC3, 2018-06-11



## Preliminary conclusions

- Possible to implement SATs in manure handling chains in Baltic Sea countries
- Ammonia emissions are decreased
- Slight increase in yields, dry years no difference
- Some years positive economy, dry years negative economy due to lower yields
- Farmers are interested but skeptical to costs
- Policy support and incentives are needed



**RI  
SE**

[WWW.BALTICSLURRY.EU](http://WWW.BALTICSLURRY.EU)

THANK YOU!

Erik Sindhøj - RISE

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