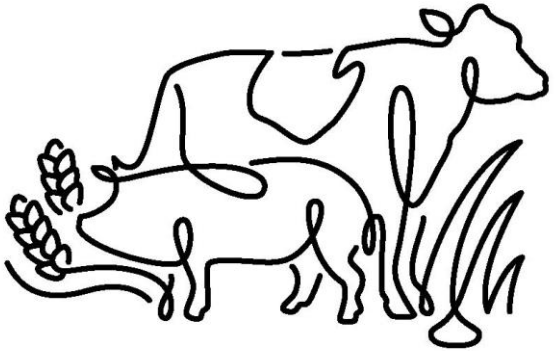
Acidification of animal slurry



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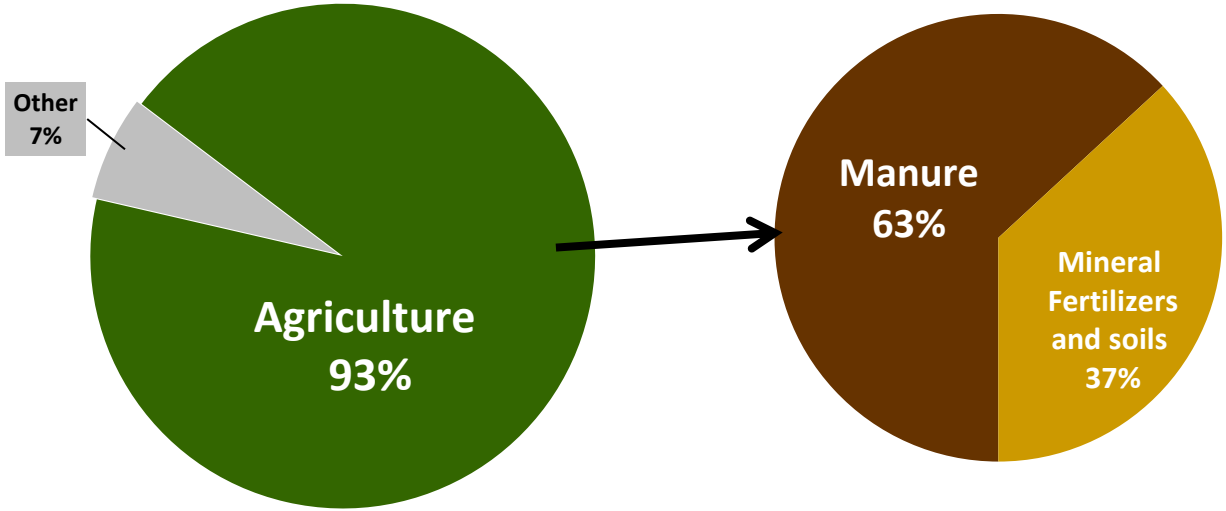
Overview of presentation

- Background and introduction to slurry acidification
- Overview of slurry acidification technologies
- Interreg BSR project “Baltic Slurry Acidification”

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

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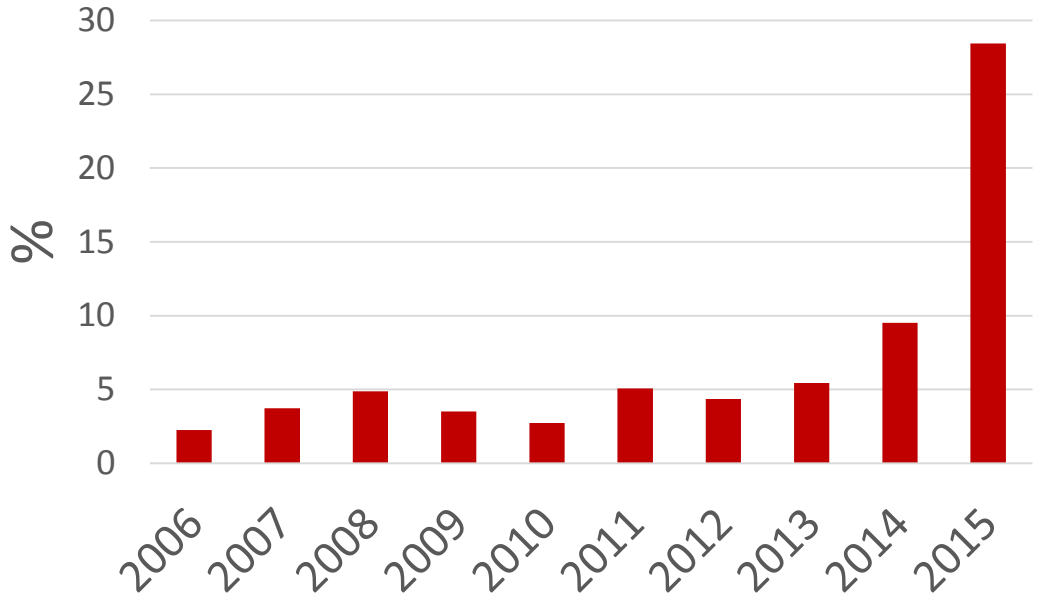
Increase in ammonia emissions relative to 2005 in BSR countries

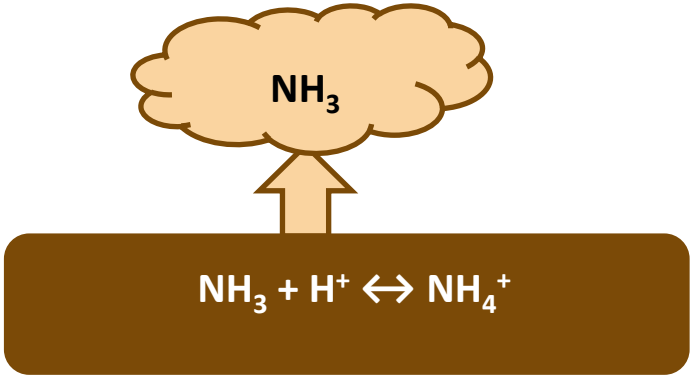


Source: EMEP HELCOM, 2017

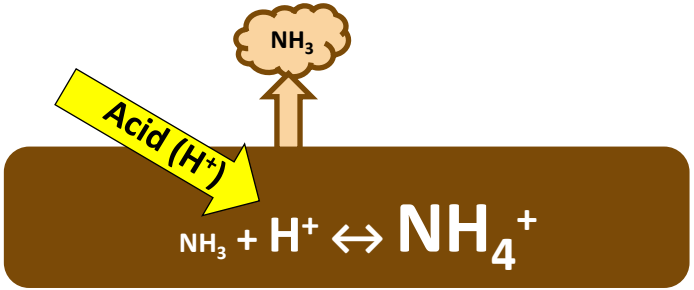
How can slurry acidification help?

Ammonia - ammonium balance

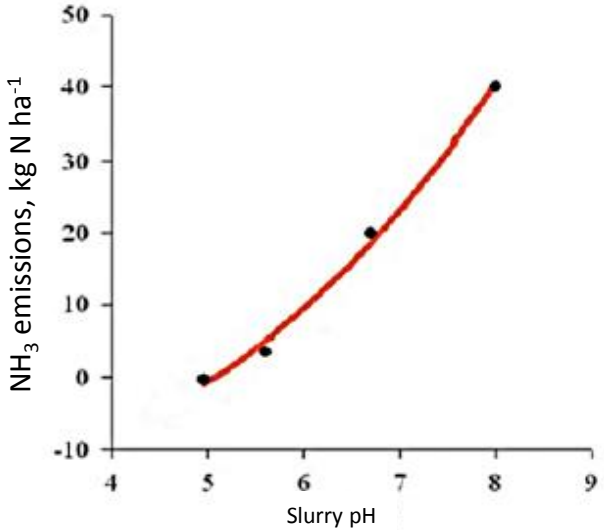
$NH_3 + H_2O \leftrightarrow NH_4^+ + OH^-$



Acid provides extra Hydrogen ions (H^+)

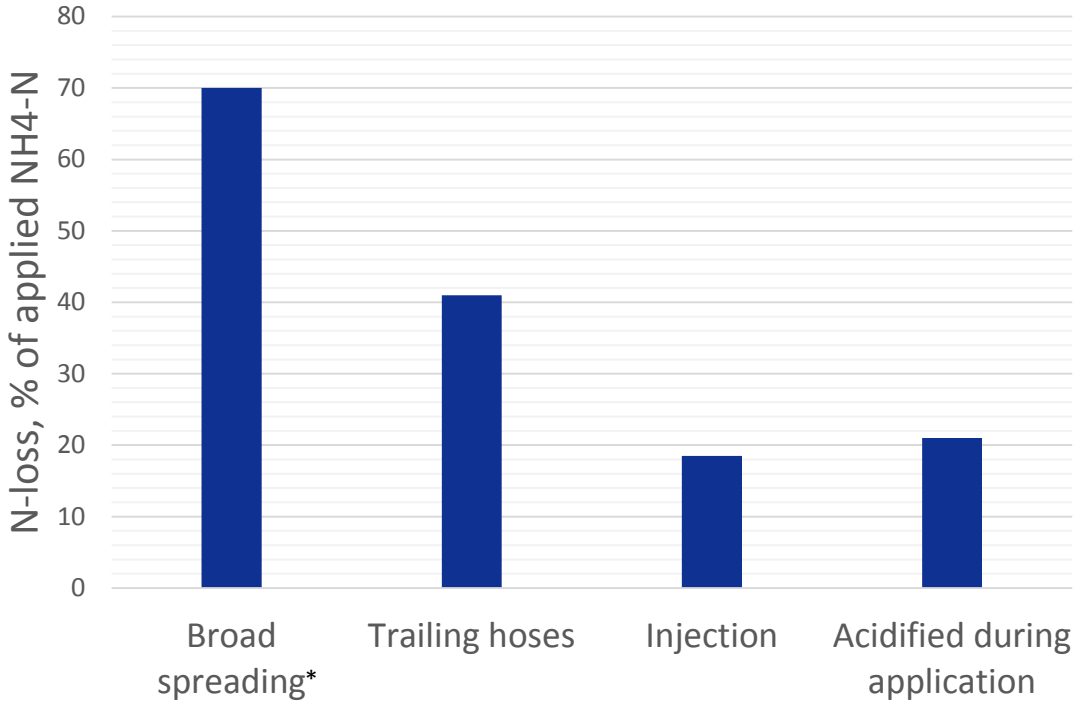


Direct effects of acidification on slurry



Effect of slurry pH on NH_3 volatilization (Jarvis and Pain, 1990)

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

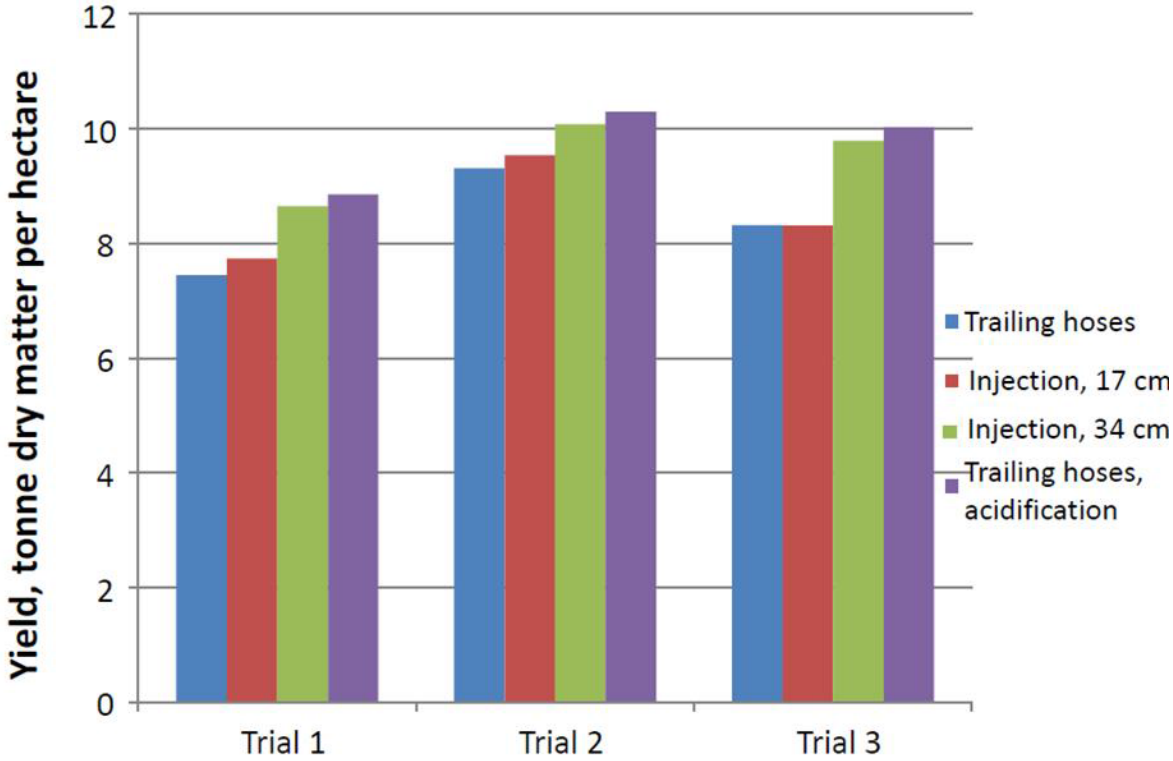


NH4-N = 2 kg/t
Spreading rate 30 t/ha

Applying 60 kg NH4-N/ha

Source: Århus University and SEGES
* Source ALFAM model

Grassland yields from different slurry spreading techniques in Denmark



Source: Birkmose, SEGES, 2013

Overview of slurry acidification techniques

In-house

In-storage

In-field

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In-house slurry acidification - JH Agro A/S

Photo: JH Agro

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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
- Reduced need for mixing Storage before spreading

- Target pH is 5.5 >> increases use of acid

In-storage slurry acidification

Harsø Maskiner A/S

Ørum – Smeden

In-storage slurry acidification

Photos: Torkild Birkmose, SEGES

- Used just before spreading slurry on fields. Only reduces emissions during spreading
- Extra room in storage tank is needed for foaming
- Utrustningen oftast ägs av maskinstationer
- Harsø uses IBC tanks for acid
- Ørum uses tankers

- Target pH is 6.0

In-field slurry acidification

Kyndestoft

Biocover SyreN

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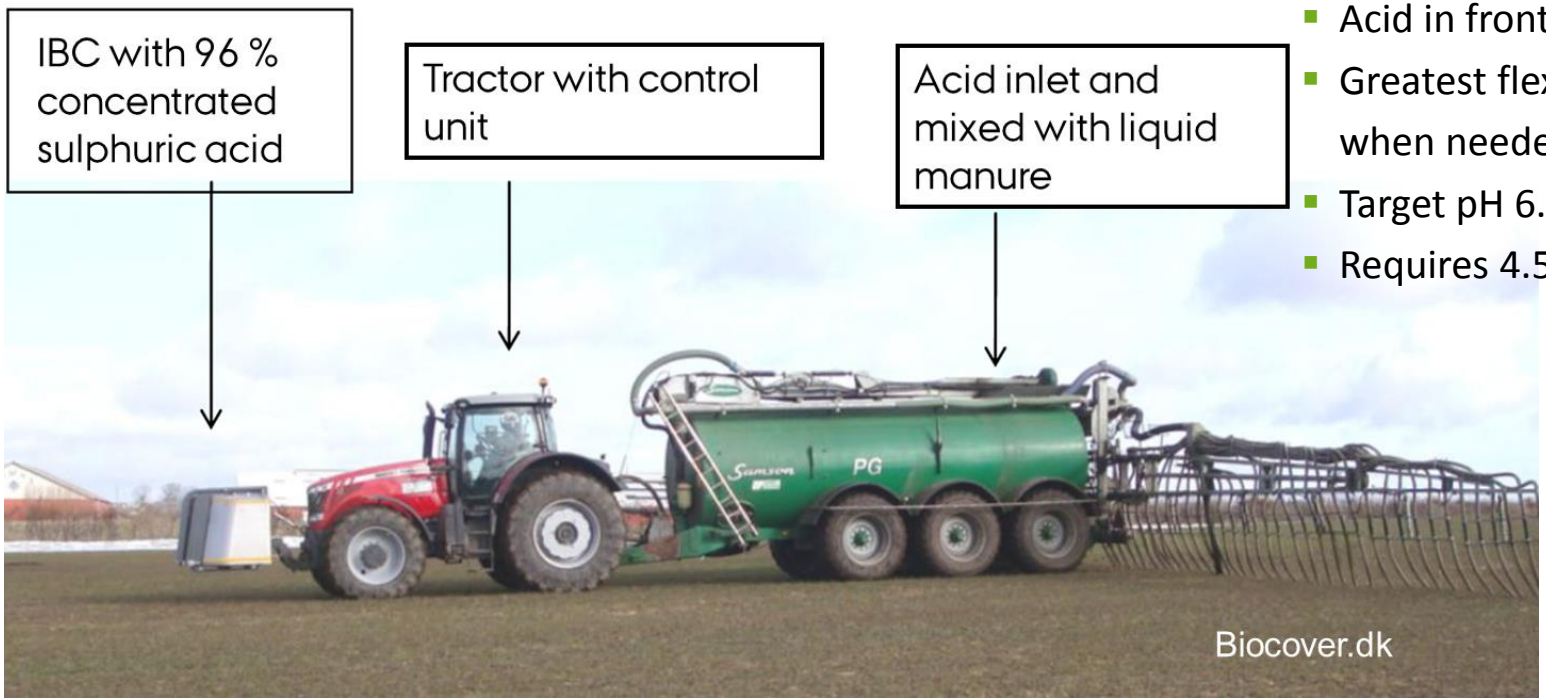
In-field slurry acidification



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

20% of all slurry was acidified in Denmark in 2016

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

Ammonia emissions 2015/2005 were -18%

Source: SEGES, 2015

Baltic Slurry Acidification

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

EU STRATEGY FOR THE BALTIC SEA REGION
FLAGSHIP

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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)

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Main aim of the project

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

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WP2: Technical feasibility studies

Activity 2.1. Possibilities and bottlenecks for Implementing slurry acidification techniques In the Baltic Sea Region

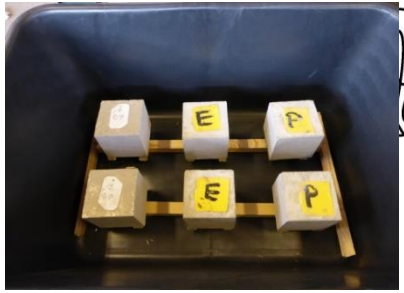
Activity 2.2. Effects on concrete

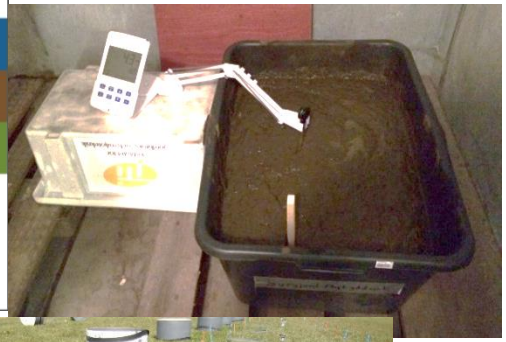
Activity 2.3. Buffer capacity of slurry

Activity 2.4. Effects on Soils

Activity 2.5. Health and safety

Activity 2.6. Ammonia emissions





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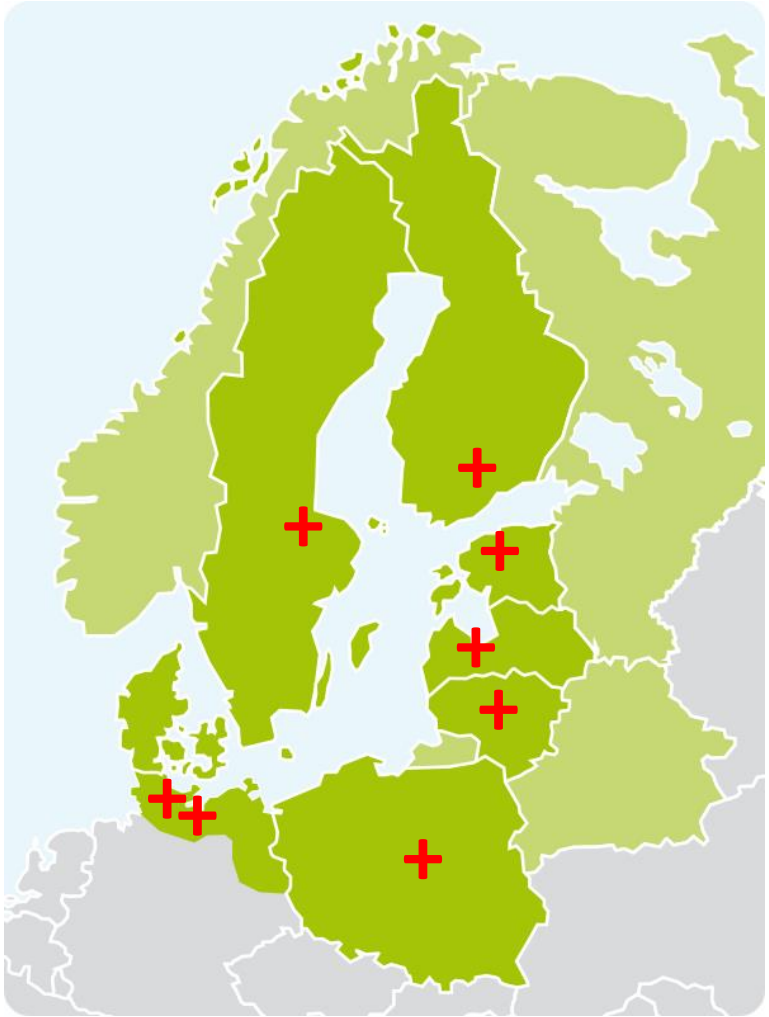
WP3: Investment SATs

In-storage: Poland

WP4 Field trial

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



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WP5: Environmental and economic analysis

WP6: Policy recommendations

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THANK YOU!

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Agrifood and Bioscience

Research Institutes of Sweden