Baltic Slurry Acidification
Reducing nitrogen loss from agriculture by implementing slurry acidification techniques

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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.

Source: ec.europa.eu/eurostat och HELCOM
How can slurry acidification help?

Ammonia - ammonium balance
\[ \text{NH}_3 + \text{H}_2\text{O} \leftrightarrow \text{NH}_4^+ + \text{OH}^- \]

Acid provides extra Hydrogen ions (H\(^+\))

\[ \text{NH}_3 + \text{H}^+ \leftrightarrow \text{NH}_4^+ \]
Direct effects of acidification on slurry

**NH₃ emissions, kg N ha⁻¹**

Effect of slurry pH on NH₃ 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*

*Karen Peters, DK EPA
ESPC3, 2018-06-11
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

<table>
<thead>
<tr>
<th>Country</th>
<th>Partners</th>
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</thead>
<tbody>
<tr>
<td>SWEDEN</td>
<td>RISE (Formerly JTI), LEAD PARTNER, The Rural Economy and Agricultural Society, Br Goransson AB</td>
</tr>
<tr>
<td>POLAND</td>
<td>Institute of Technology and Life Sciences (ITP), Agricultural Advisory Centre in Brwinow Branch Office in Radom (CDR)</td>
</tr>
<tr>
<td>GERMANY</td>
<td>State Agency for Agriculture, Environment and Rural Areas of the German Federal State Schleswig-Holstein (LLUR), Blunk GmbH</td>
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<tr>
<td>FINLAND</td>
<td>Baltic Sea Action Group (BSAG), Association of ProAgria Centres</td>
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<tr>
<td>ESTONIA</td>
<td>Estonian Crop Research Institute (ECRI)</td>
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<td>LATVIA</td>
<td>Ltd Latvian Rural Advisory and Training Centre (SIA), Union “Farmers’ Parliament” (ZSA), Lauku Agro</td>
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<td>LITHUANIA</td>
<td>Lithuanian Agricultural Advisory Service (LAAS), Animal Science Institute, University of Health Sciences (LUHS), Dotnuvas Experimental Farm</td>
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<td>DENMARK</td>
<td>enAgro Plc</td>
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<td>BELARUS</td>
<td>Scientific &amp; Practical Centre for Agricultural Mechanisation</td>
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<tr>
<td>RUSSIA</td>
<td>Northwest Research Institute of Agricultural Engineering and Electrification, Institute for Engineering and Environmental Problems in Agricultural Production (IEEP)</td>
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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
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
THANK YOU!

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