Christian-Albrechts-Universität zu Kiel
Agrar- und Ernährungswissenschaftliche Fakultät

Bundesministerium für Ernährung und Landwirtschaft

„Upcoming Project: GuelleBest“

Mitigation of ammonia and greenhouse gas emission and improving nitrogen use efficiency by innovative slurry and digestate application techniques for growing crops

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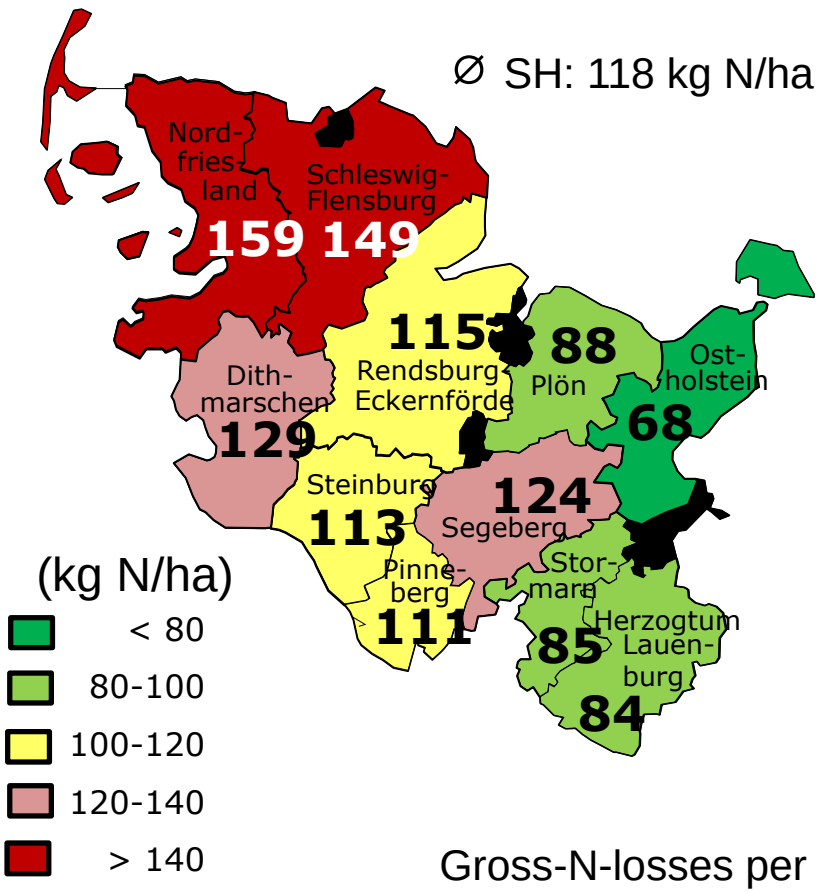
Interreg Baltic Sea Region
EUROPEAN REGIONAL DEVELOPMENT FUND
EUROPEAN UNION
Baltic Slurry Acidification

BSA Stakeholder Meeting, Kiel, 27.09.2018

Background

(Taube et al., 2015)

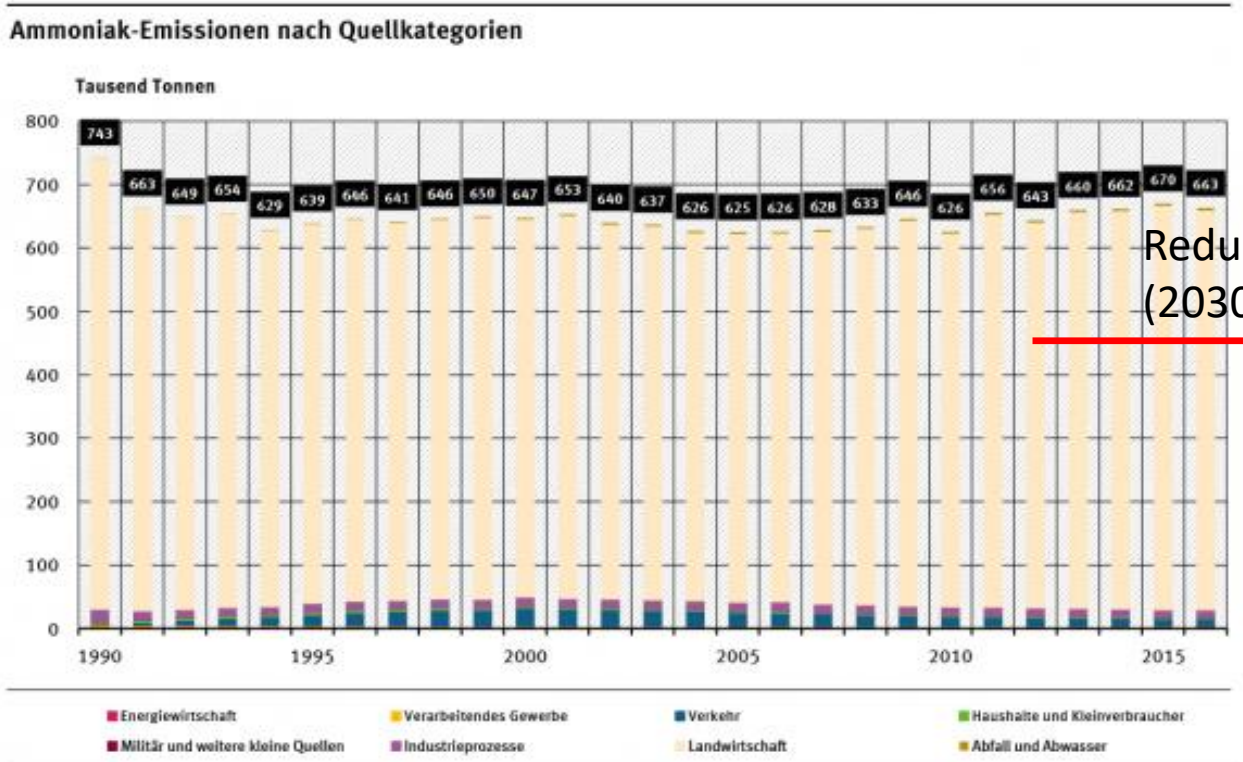


Gross-N-losses per ha UAA in the state of Schleswig-Holstein (Germany)

Currently the losses of nitrogen in agricultural production account > 100 kg/ha UAA, at which 30% could be easily avoided (~ 30.000 tons nitrogen in S-H).

Background

(UBA, 2018)

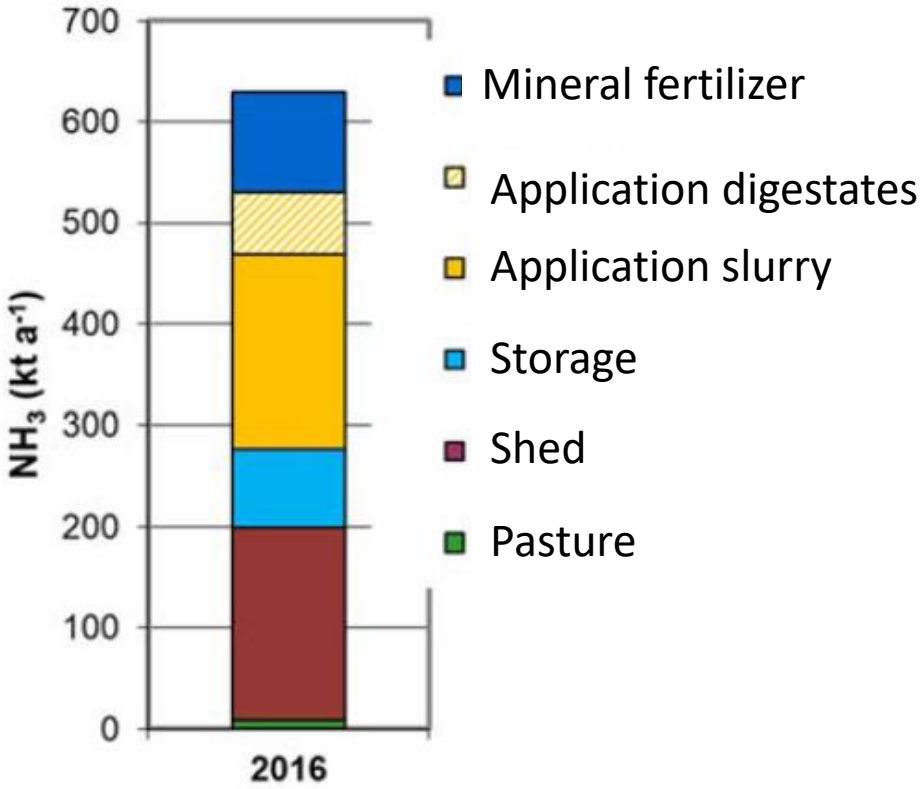


Reduction aim (2030) ca. 440 Gg

- Germany has to decrease the ammonia emissions until 2030 by 29% (NERC-Directive)
- Due to imrovements of the german fertilizer ordinance according to the EU-Nitrate Directive (2018) almost no application of manures after harvest are performable.
- During spring no incorporation possible in winter crops.
- The use of BAT („best availbale techniques“) for slurry application is obligatory by law until 2020 for arabel and 2025 for grassland.

Background

Ammonia emissions from agriculture in Germany



- Slurry application has the highest reduction potential for ammonia emissions in Gemany.

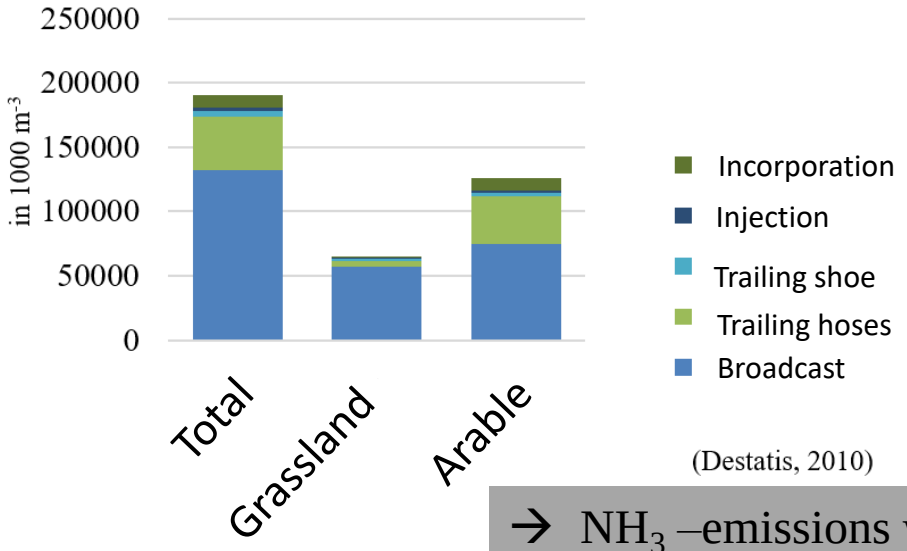
Background

Mitigation strategies:

- Reduction of ammonia emissions during application in standing biomass
- Highest potential for cattle slurry and digestates in Germany

→ The large the substrate surface the larger the ammonia emissions

- **Current application techniques used in Germany:**



(Destatis, 2010)

	Emission reduction compared to broadcast application
Trailing hoses	30%
Trailing shoe	40%
Injection	60%
Broadcast with acidification	55%

(KTBL, 2016a)

→ NH_3 –emissions with broadcast application up to 80% of NH4-N.

GuelleBest

Bundesministerium
für Ernährung
und Landwirtschaft

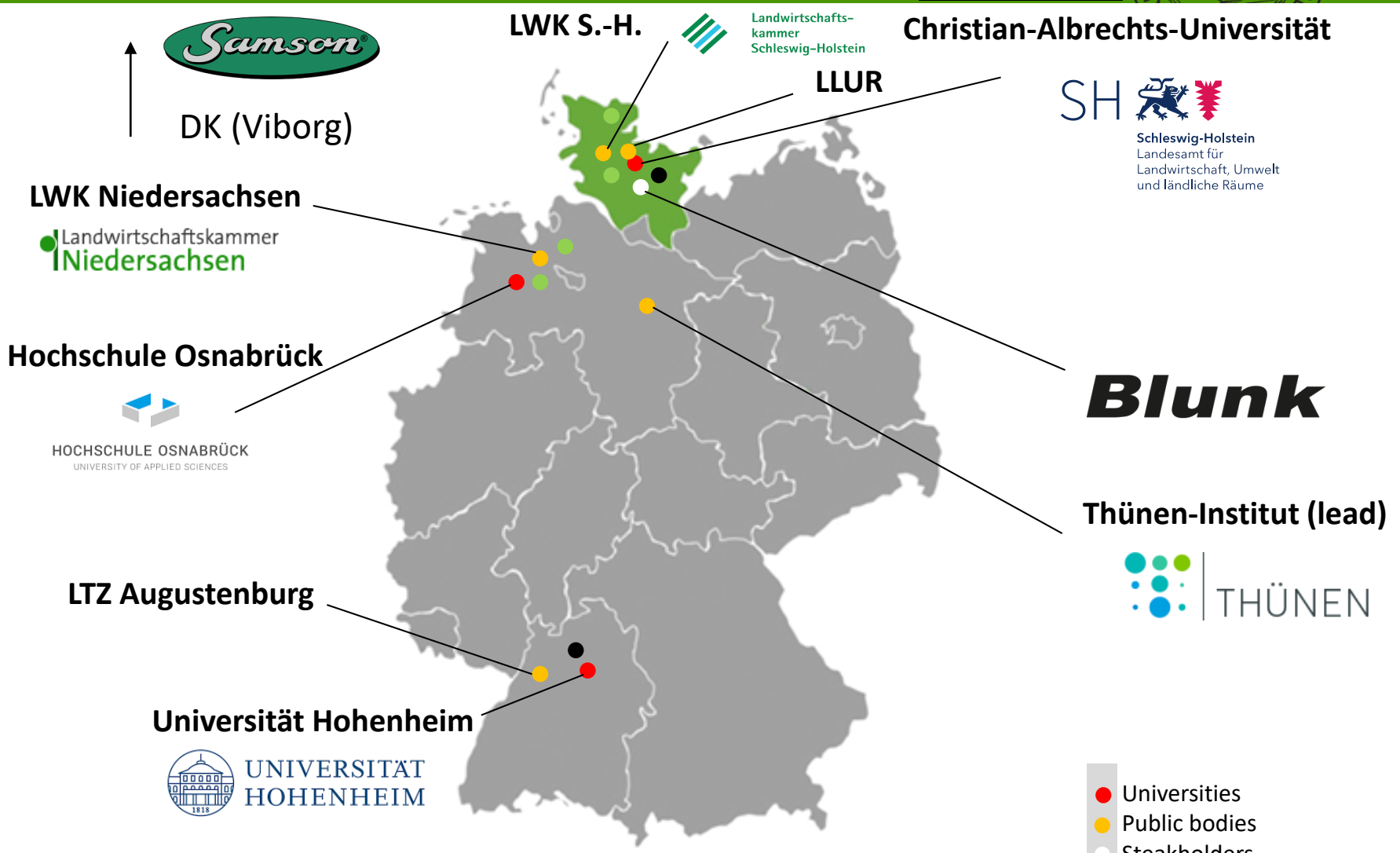
Project Call: Mitigation of ammonia and greenhouse gas emission and improving nitrogen use efficiency by innovative slurry and digestate application techniques for growing crops

Acronym: GuelleBest

Duration: 2019-2021

Funding: ~1.5 Mio €

GuelleBest partners



GuelleBest Work-Packages (WP) (2019-2022)

WP1
Network of co-ordinated field trials to reduce greenhouse gas and ammonia emissions from growing crops

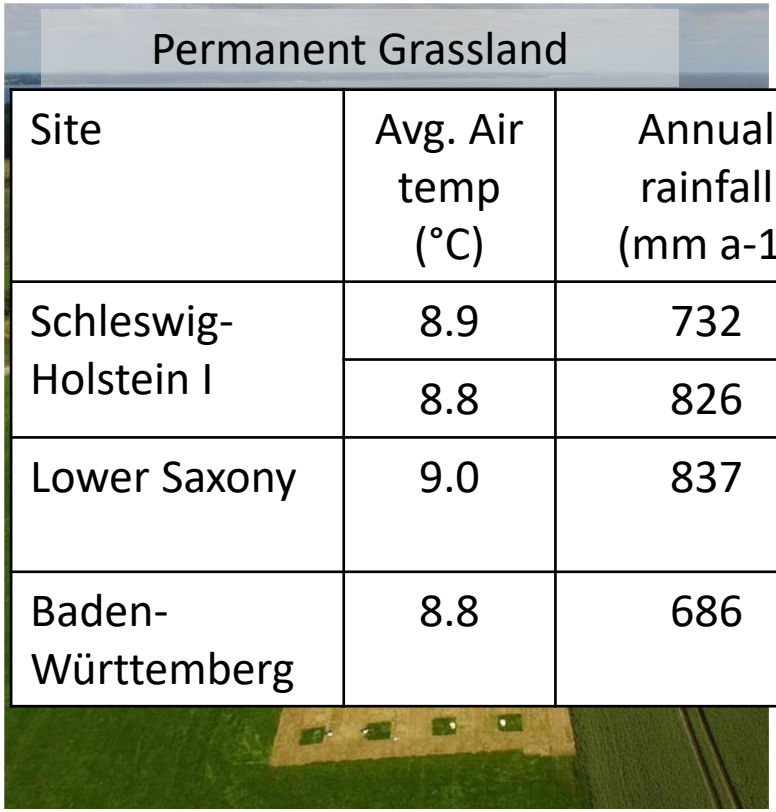
WP2
Assesment of GHG-emissionis

WP3
Economy on farm-scale

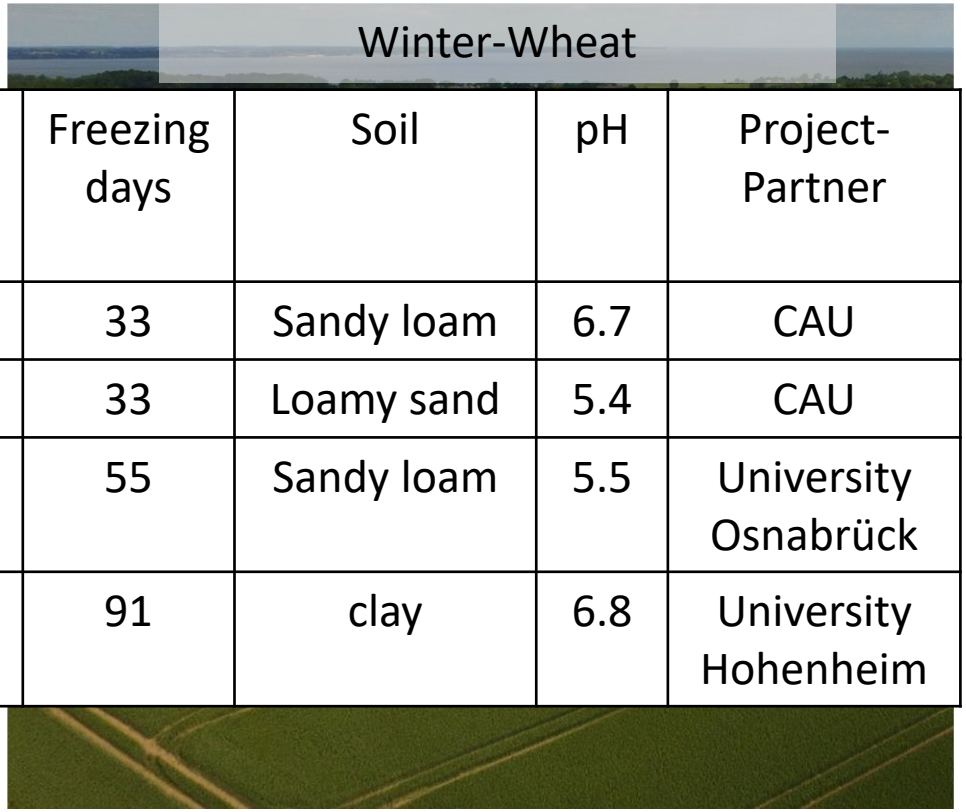
WP4
Prediction of impact on the national inventories

WP5
Joint assessment, transfer of knowledge into practice

GuelleBest field trials (2019-2022)



Permanent Grassland



Winter-Wheat

Site	Avg. Air temp (°C)	Annual rainfall (mm a-1)	Freezing days	Soil	pH	Project-Partner
Schleswig-Holstein I	8.9	732	33	Sandy loam	6.7	CAU
	8.8	826	33	Loamy sand	5.4	CAU
Lower Saxony	9.0	837	55	Sandy loam	5.5	University Osnabrück
Baden-Württemberg	8.8	686	91	clay	6.8	University Hohenheim

GuelleBest field trials (2019-2022)

Treatments and measurements

	Winter Wheat		Grassland
1	Control[1,2,3]	1	Control[1,2,3]
2	Mineral fertilizer - CAN[1,2,3]	2	Mineral fertilizer: CAN[1,2,3]
3	Slurry trailing hoses[1,2,3]	3	Slurry trailing shoe [1,2,3]
4	Slurry acidification trailing hoses[1,2,3]	4	Slurry acidificataion trailing shoes[1,2,3]
5	Slurry injection[1, 2, 3, 4]	5	Slurry injection[1,2,3,]
6	Slurry injection + nitirification inhibitor[1, 2, 3, 4]	6	Slurry injection + nitirification inhibitor[1,2,3,]
7	Digestates trailing hoses[2]		
8	Digestates acidificataion trailing hoses[2]		
9	Digestates injection[12, 4]		
10	Digestates injection + nitirification inhibitor[2, 4]		

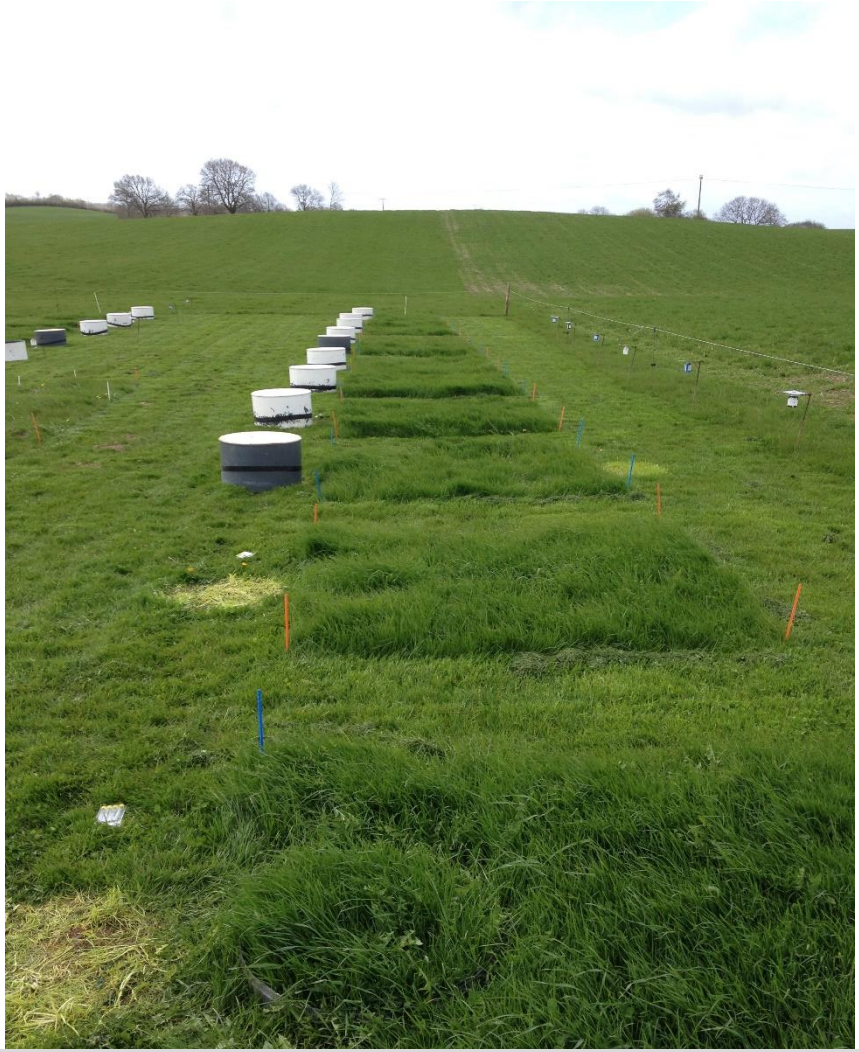
Maximum rate of slurry N: 170 kg applied in two dressings!

[1] NH_3-measurements with the Dräger-Tube-Method
[2] NH_3-measurements with acid traps
[3] N_2O-measurements with the static chamber method
[4] In winter-wheat the first slurry dressing will be performed with injection and the second with trailing hoses

Former techniques will be improved in order to test the different application techniques

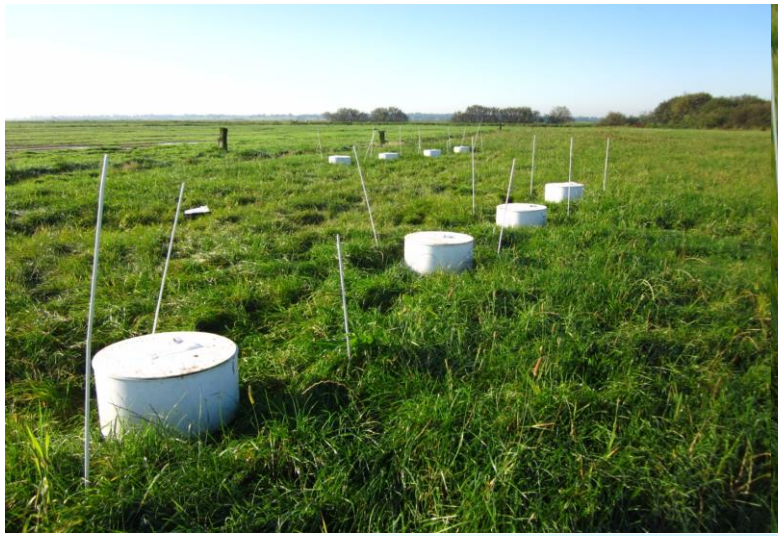
Slurry dressings will be performed with representative techniques to ensure comparibility and up-scaling of results.

Methods



DM-Yield, N-Yield and forage quality will be estimated for each silage cut and winter wheat harvest respectively

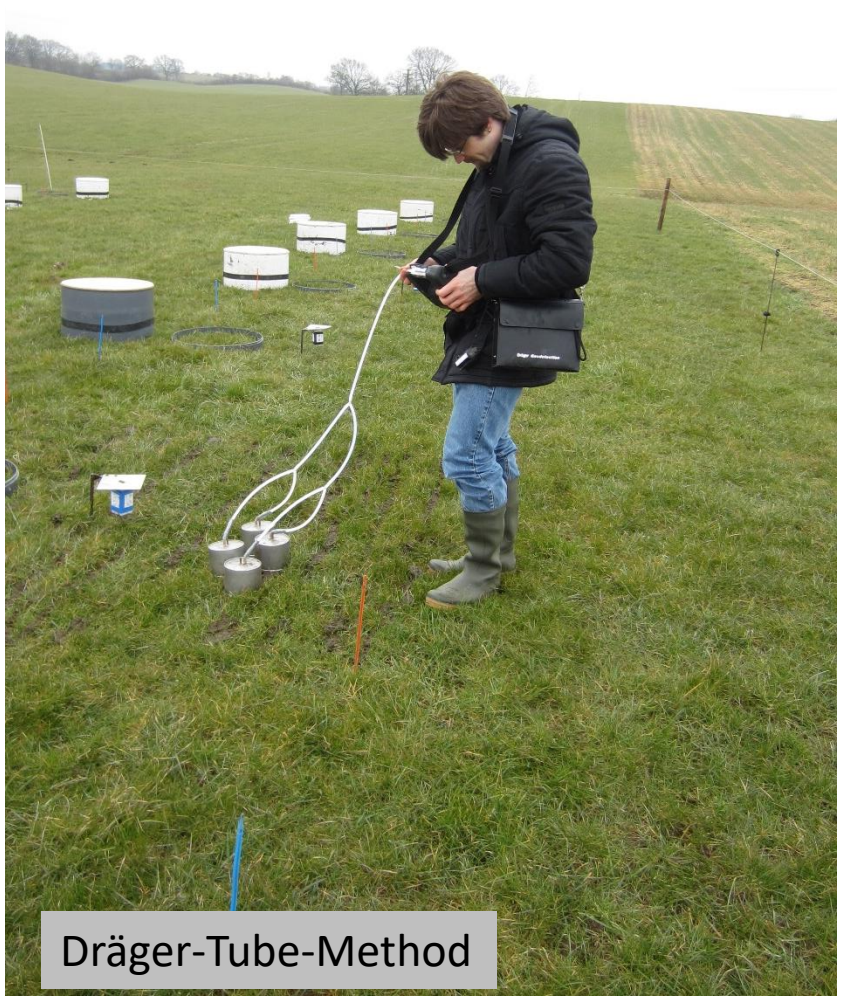
Methods



- Nitrous Oxide will be measured in minimum once a week for 365 days

Methods

- Ammonia measurments will be quantified for >7 days after fertilizer application



Dräger-Tube-Method

Passive-Sampler

Knowledge-transfer

Vielen Dank für ihre Aufmerksamkeit!

HOCHSCHULE OSNABRÜCK
UNIVERSITY OF APPLIED SCIENCES

UNIVERSITÄT HOHENHEIM

Samson

Landwirtschafts-
kammer
Schleswig-Holstein

Bundesministerium
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