

## Nitrogen leaching after application of biogas residue

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### background & hypothesis

Increasing number of biogas plants (end of 2010 > 5700) → more residues  
 Fermented slurry → **highly mineralized** → high plant N availability  
 → increased yield? → **increased risk of nitrate leaching?**

**Objectives:** Quantify the N-leaching potential of biogas residues applied to maize compared to animal manure and mineral fertiliser on two different soils.

### material & methods

**Field crop:** Mais (2007, 2008) planted mid April

**N-level:** 0, 120, 240, 360 kg N ha<sup>-1</sup> split to two dressings

**Fertilizer:** Biogas residue; Cattle- and Pig-slurry; mineral fertilizer

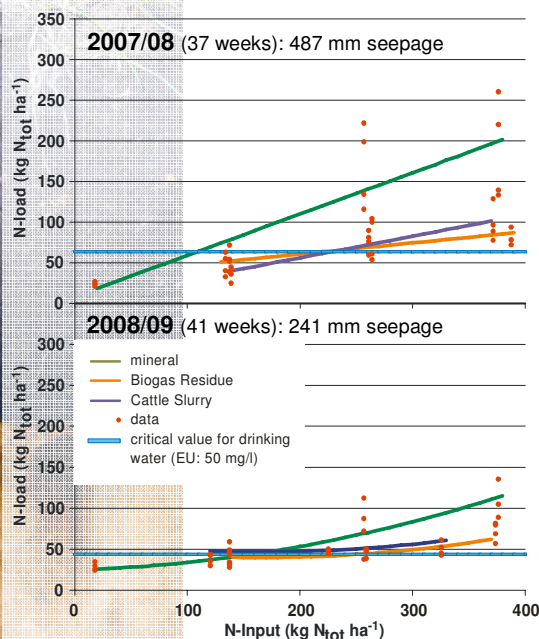
**Soilwater extraction:** April to March 2007 – 2009; suction cups (250 hPa)

**Climate/soil:** Eastern Upland 760 mm loamy sand; Geest 830 mm sandy sand

**Modell:** HUME → soil water potential → drainage · measured NO<sub>3</sub> conc. = N-load

**Statistical analysis:** SAS Proc Mixed, assuming quadratic function with N-input as covariable

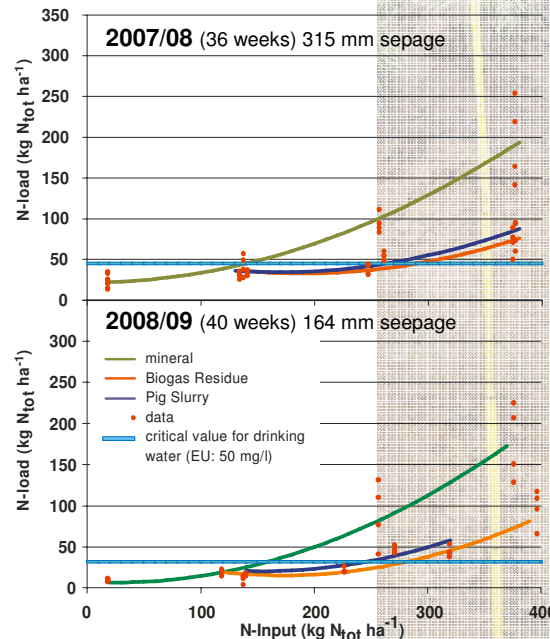
### Geest



### results

- Corresponding to the total N-input, the mineral fertilizer causes significant more nitrate load than the organic.
- Differences between manure and fermented slurry could not be confirmed.
- When using mineral share of N-input used as covariable, fertiliser type and the interaction between fertiliser type and N-input no longer had an effect on N-load, which confirms the hypothesis, that the mineral share of N-input explains most of the variation among the fertiliser types.
- These statements apply for both locations, the sandy Geest and the loamy Eastern Upland (Tab. 1).

### Eastern Upland



Tab.1: Level of significance of means comparisons (slope); adjusted according to Holm (1979)  
 KAS – mineral; PS – pig; CS – cattle; BR – biogas residue

	Eastern Upland				Geest			
	2007/08	2008/09	2007/08	2008/09	2007/08	2008/09	2007/08	2008/09
	N-tot in vs. N-tot out							
min - PS/CS	<.00024	<.00023	0.3230	≥0.3230	≥0.3230	0.0080	≥0.3230	≥0.3230
BR - PS/CS	≥0.3230	≥0.3230	≥0.3230	≥0.3230	≥0.3230	≥0.3230	≥0.3230	≥0.3230
	N-min in vs. N-min out							
BR - min	<.00022	<.00021	≥0.3230	≥0.3230	0.0342	0.0076	≥0.3230	≥0.3230

### conclusions

- Application of biogas residue resulted in N-losses comparable to animal manure.
- Potential N-losses, however, are underestimated since the monitoring periods did not cover complete years.
- Therefore, the N balance will be simulated in a next step to allow N-loss calculations over the whole 2-year period.