

#### Københavns Universitet

### GHG emissions from slurry and digestates during storage and after field application

Baral, Khagendra Raj; Nguyen, Quan Van; Petersen, Søren O.; Bruun, Sander

Publication date: 2014

Document version Publisher's PDF, also known as Version of record

Citation for published version (APA):
Baral, K. R., Nguyen, Q. V., Petersen, S. O., & Bruun, S. (2014). GHG emissions from slurry and digestates during storage and after field application. Poster session presented at Energy and Environment for the Future, Copenhagen, Denmark.

Download date: 16. nov.. 2019

# GHG emissions from slurry and digestates during storage and after field application

Khagendra Raj Baral<sup>1</sup>, Quan Van Nguyen<sup>2</sup>, Søren O. Petersen<sup>1</sup> and Sander Bruun<sup>2</sup>

<sup>1</sup>Department of Agroecology, Aarhus University

<sup>2</sup>Department of Plant and Environmental Sciences, University of Copenhagen

E-mail: khagendra.baral@agro.au.dk

### Introduction

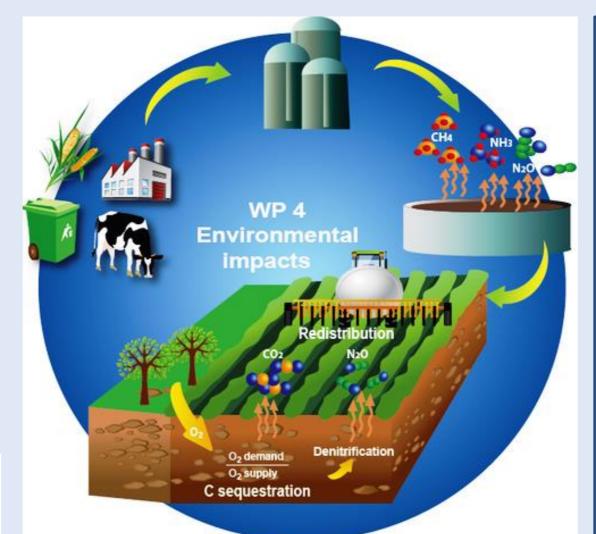
Biogas is produced from liquid manure (slurry) and other biomasses. To a great extent the digestates are recycled to agricultural lands as a valuable fertilizer. The amount and composition of residual volatile solids (VS) is an important control of GHG emissions during storage and after field application.

## Hypotheses

H<sub>1</sub>:Methane emissions during storage can be predicted from VS characteristics and temperature.

H<sub>2</sub>:Nitrous oxide emissions from soil can be predicted from VS characteristics, N content, and soil water potential.



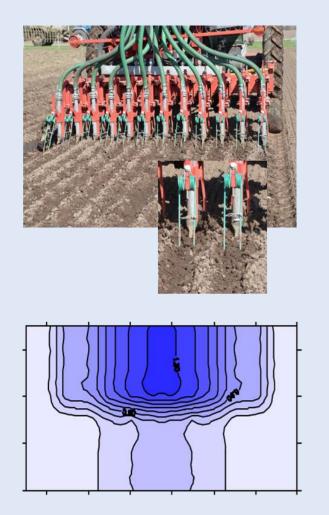


# Approaches

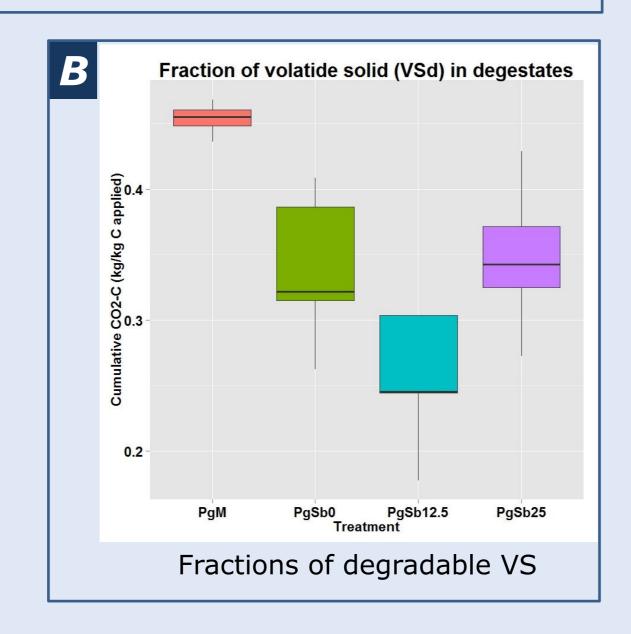
- Methane emissions during storage (A) will be predicted using existing model<sup>1</sup> with new parameters for temperature effect.
- Determination of degradable VS from respiration data was evaluated (B).
- Short-term N<sub>2</sub>O emissions after field application (C) were estimated using an existing model<sup>1</sup>.
- Carbon and nitrogen dynamics in slurry/digestate environments will be studied using O<sub>2</sub> optodes (D).

Store	8	7	6	5	4	3	2	1
Treatment	Maabj	FW+Cs	Cs	Ps	FW+Cs	Cs	Maabj	Ps
Slurry volume (m3)	4	1.3+2.7	4	4	1.3+2.7	4	4	4

Maabj, Maabjerg digested, FW, fredericia waste water; Cs, Cattle slurry; Ps, pig slurry;



Redistribution in soil will depend on both digestate and soil properties



# Total N2O-N emission at -0.015 Mpa water potential 0.8 0.6 (Pub) N-OZU 0.2 PgM PgSb0 PgSb12.5 Treatment PgSb25

### **Treatments**

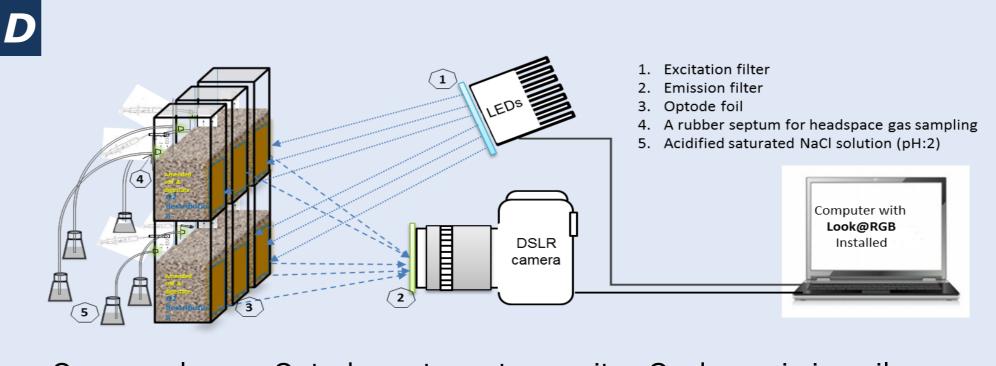
- PgM=untreated pig slurry
- Sb=sugarbeet root pulp

### Digestates:

• PgSb0 0% Sb

• PgSb12.5 12.5% Sb

• PgSb25 25% Sb



Oxygen plannar Optode systems to monitor O<sub>2</sub> dynamic in soils

### Reference

<sup>1</sup>Sommer, S.G., Petersen, S.O., Møller, H.B., 2004. Algorithms for calculating methane and nitrous oxide emissions from manure management. Nutrient Cycling in Agroecosystems 69, 143-154.

# **Conclusions**

- Degradable VS can be estimated from respiratory response.
- The model for N<sub>2</sub>O emissions is sensitive to VS composition.





