Anticiper

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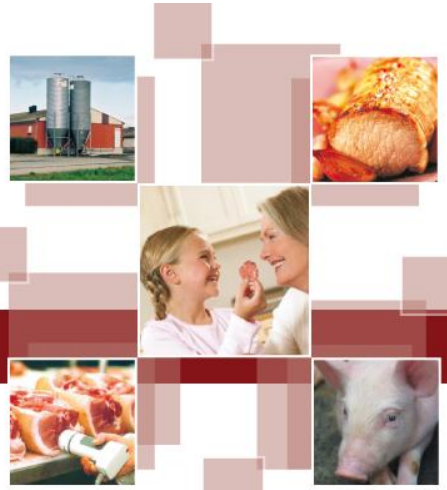

# Gaseous emissions during storage of pig slurry: what lessons for measurements in farms?


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ADEME

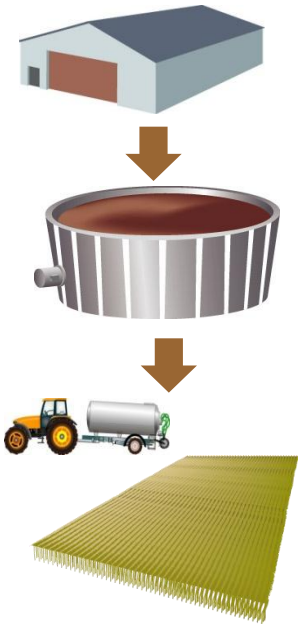
Agence de l'Environnement et de la Maîtrise de l'Energie

# Context

- Necessity to specify French livestock farm emissions



- Increase of the strategic role of the outside storage in the management of pig manures
  - **Reduction of storage time in building : Best Available Techniques (BAT) :** slurry removal, flushing
  - Reduction of the allowed periods of spreading in French regulation



- Difficulty to do gaseous measurements for the storage : climate dependency

# Goals of the study

- Identify possibility to measure gaseous emissions factors in commercial farms ($NH_3$, $N_2O$, $CH_4$, $CO_2$) from stored pig slurry
  - By the use of a dynamic floating tunnel
  - By the use of slurry mass balance deficit

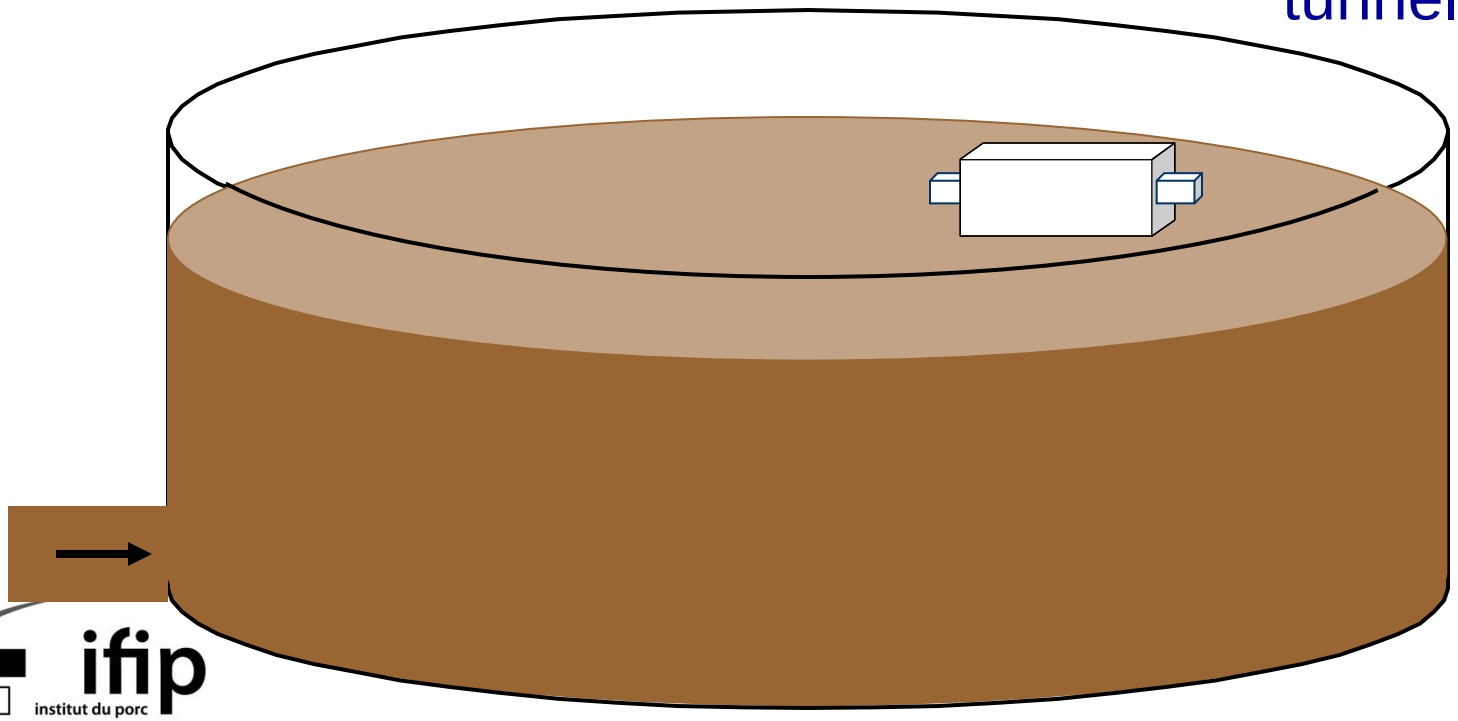
# Storage modalities

**A pit** feeded progressively with fattening pig slurry stored during 5 months for 2 periods :

-Cold période : sept 2010 – feb 2011

-Warm période : march 2011 – sept 2011

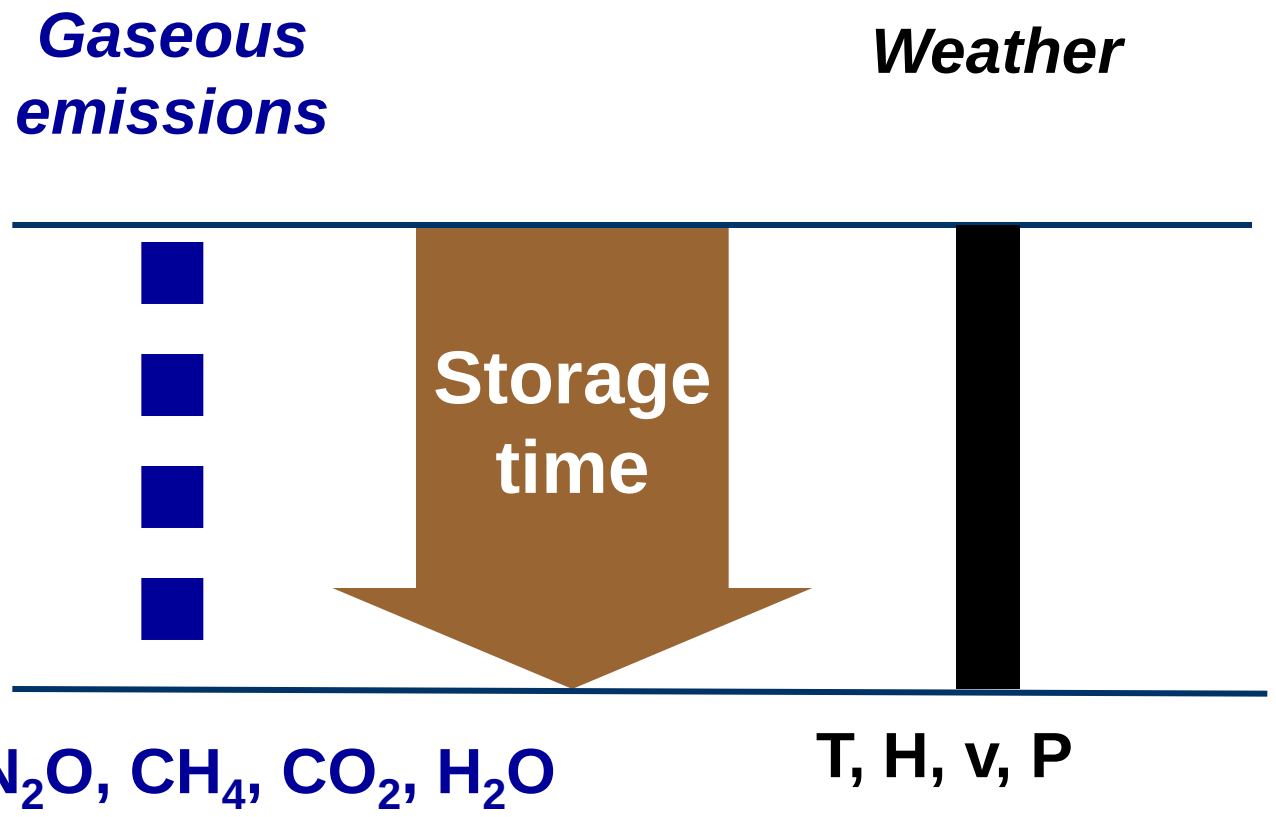
Dynamic floating tunnel



250 m3

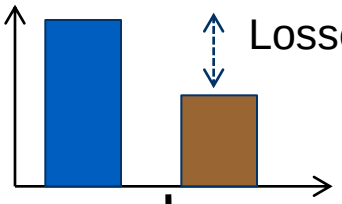
50 m3

# Generic measurements



# Slurry mass balance

## Deficit of N, P, K, C (volume x composition)

**Batches of pig slurry** → 

→ **Final emptying**

***Meth 0 -*** model of N, P, K production (reference)

***Meth 1 -*** Taking in the passing pit

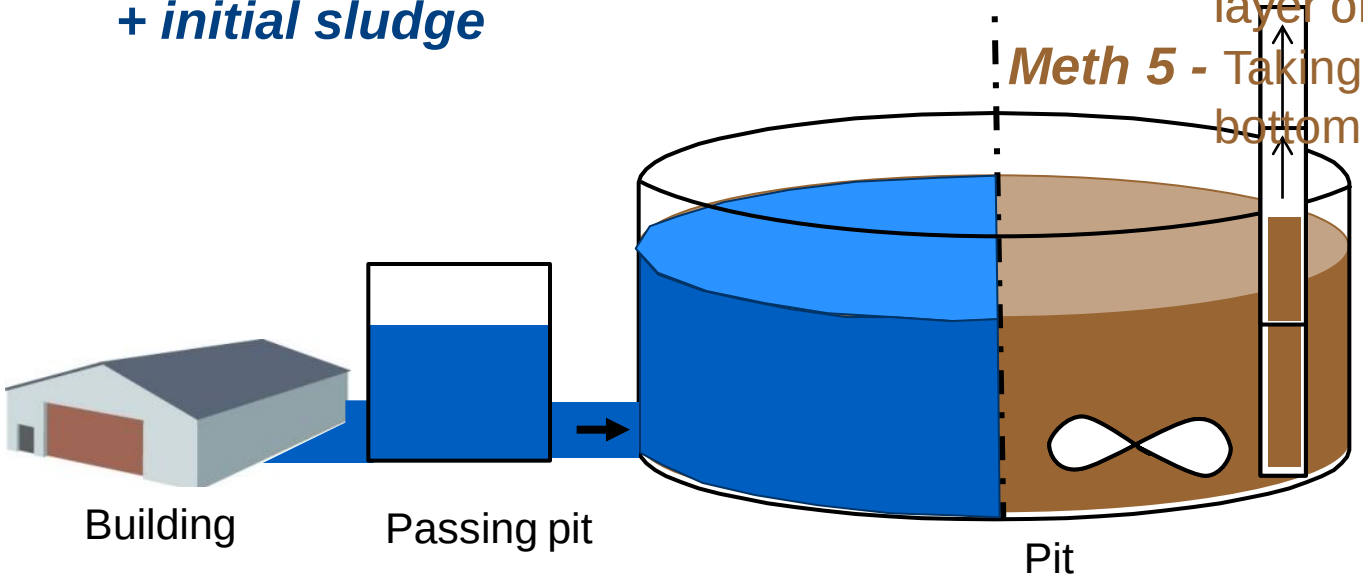
***+ initial sludge***

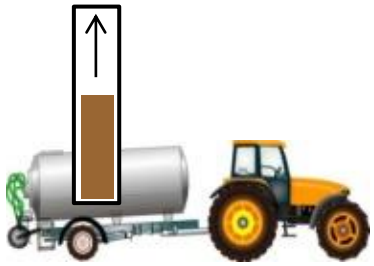
***Meth 2 -*** Core drilling on the all height of non mixed slurrry

***Meth 3 -*** Core drilling on the all height of mixed slurrry

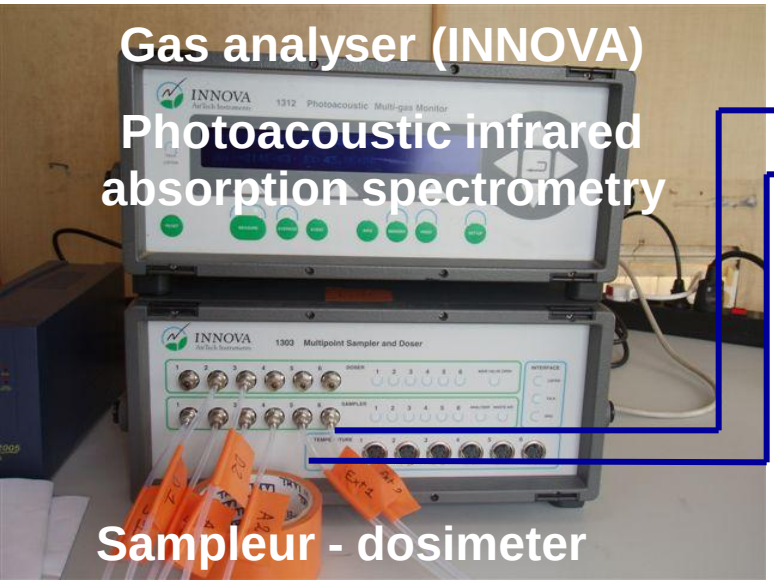
***Meth 4 -*** Taking of the supernatant layer of mixed slurry

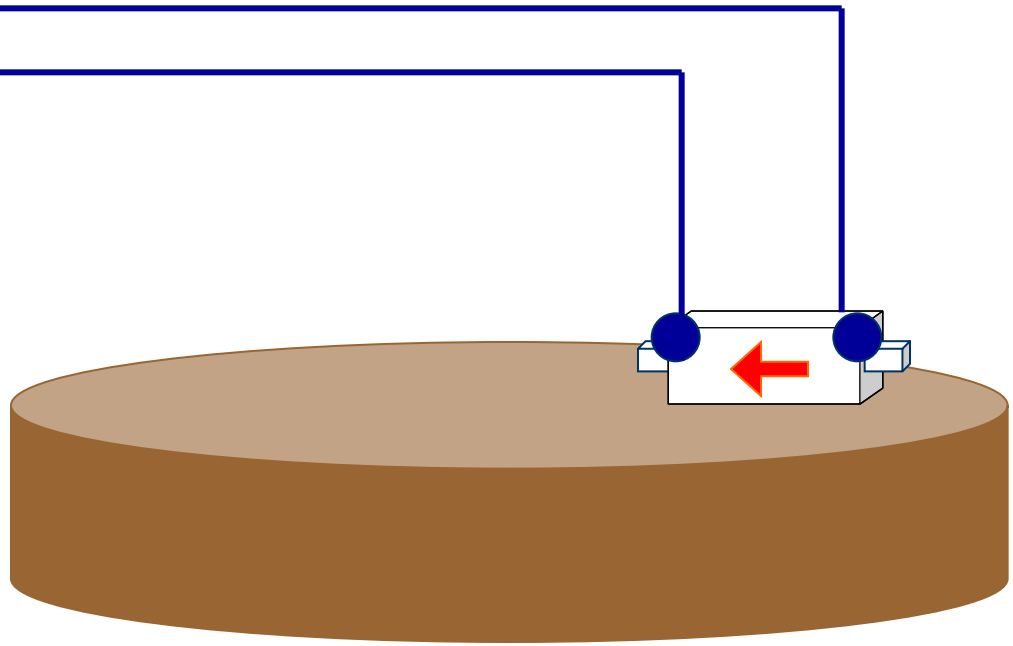
***Meth 5 -*** Taking in the slurry tank + bottom sludge



# Gaseous emissions measurement

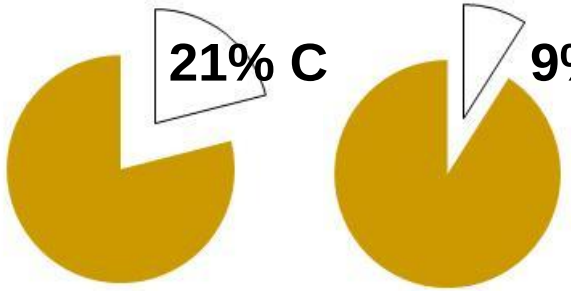


**Δ Concentrations x flow = emissions**

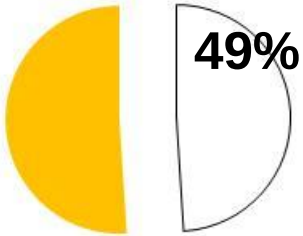
# Slurries mass balances

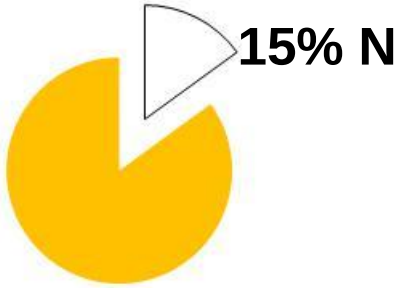
losses

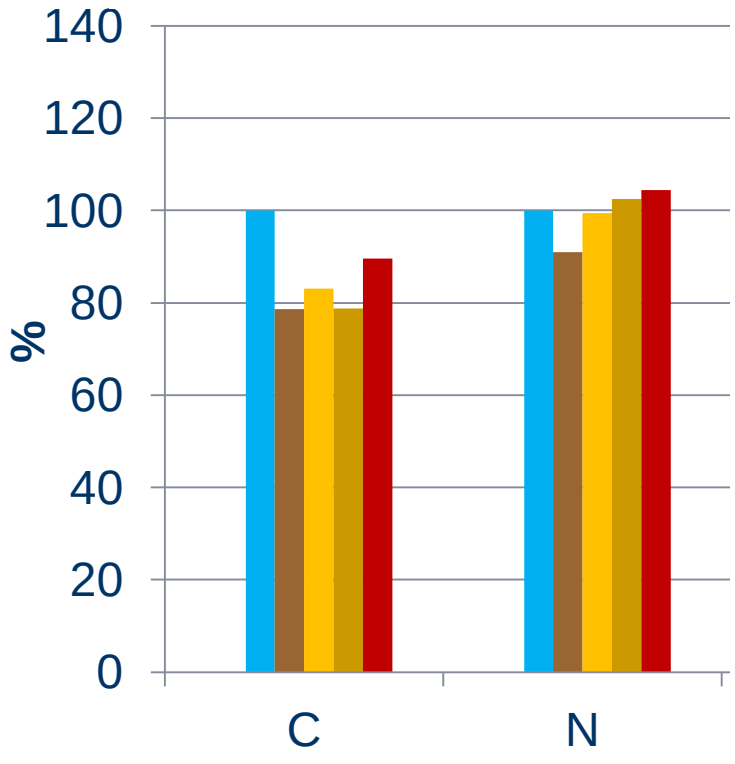


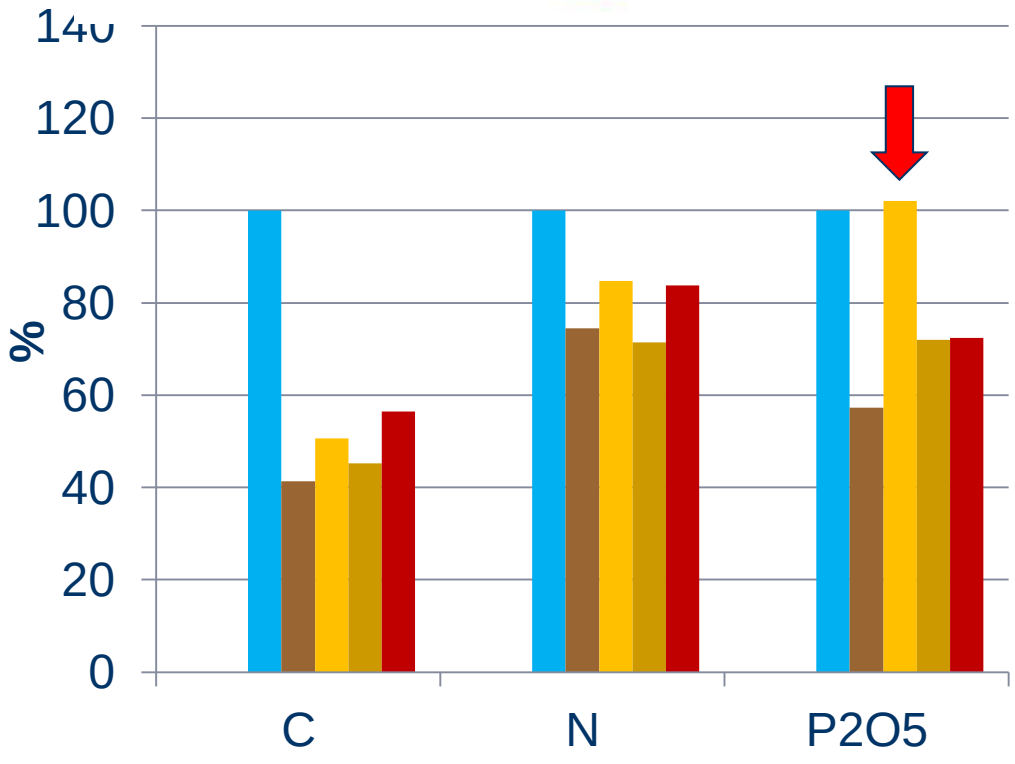






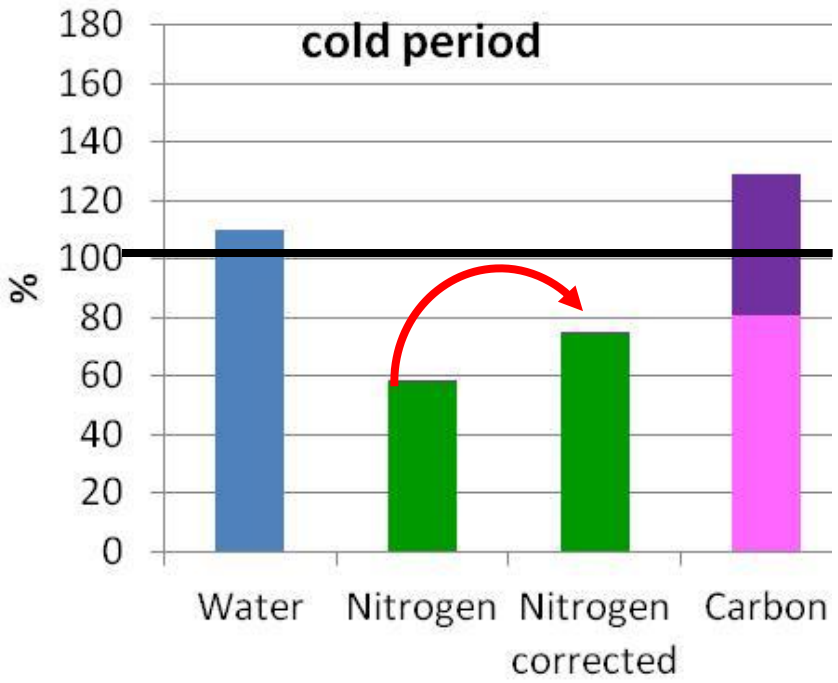




Cold period

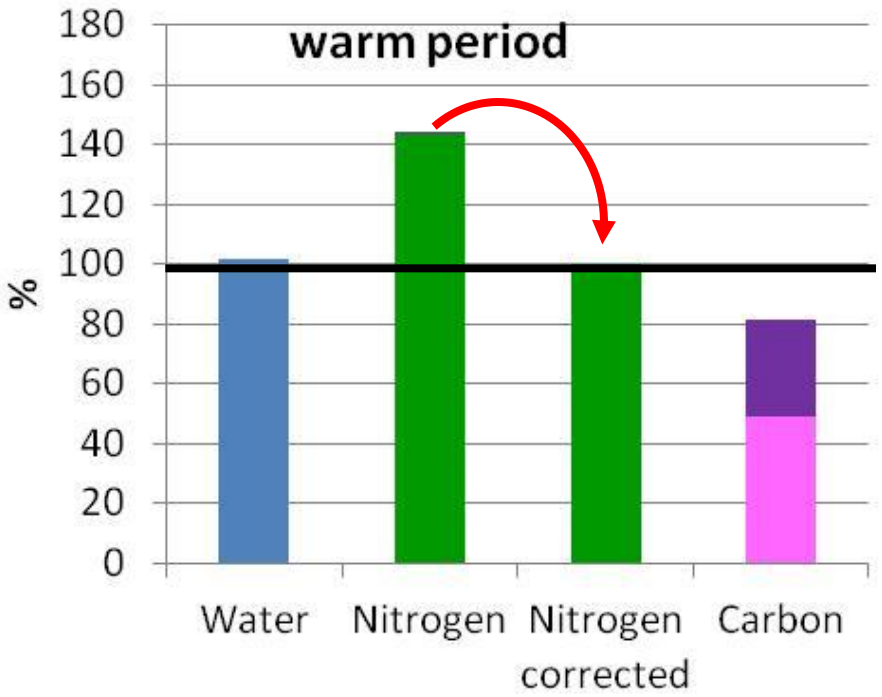
Warm period

# Total gaseous measurements

$V_{tunnel}$ = 0.41 m/s
$V_{slurry\ surface}$ = 0.53 m/s




$V_{tunnel}$ = 0.61 m/s
$V_{slurry\ surface}$ = 0.42 m/s

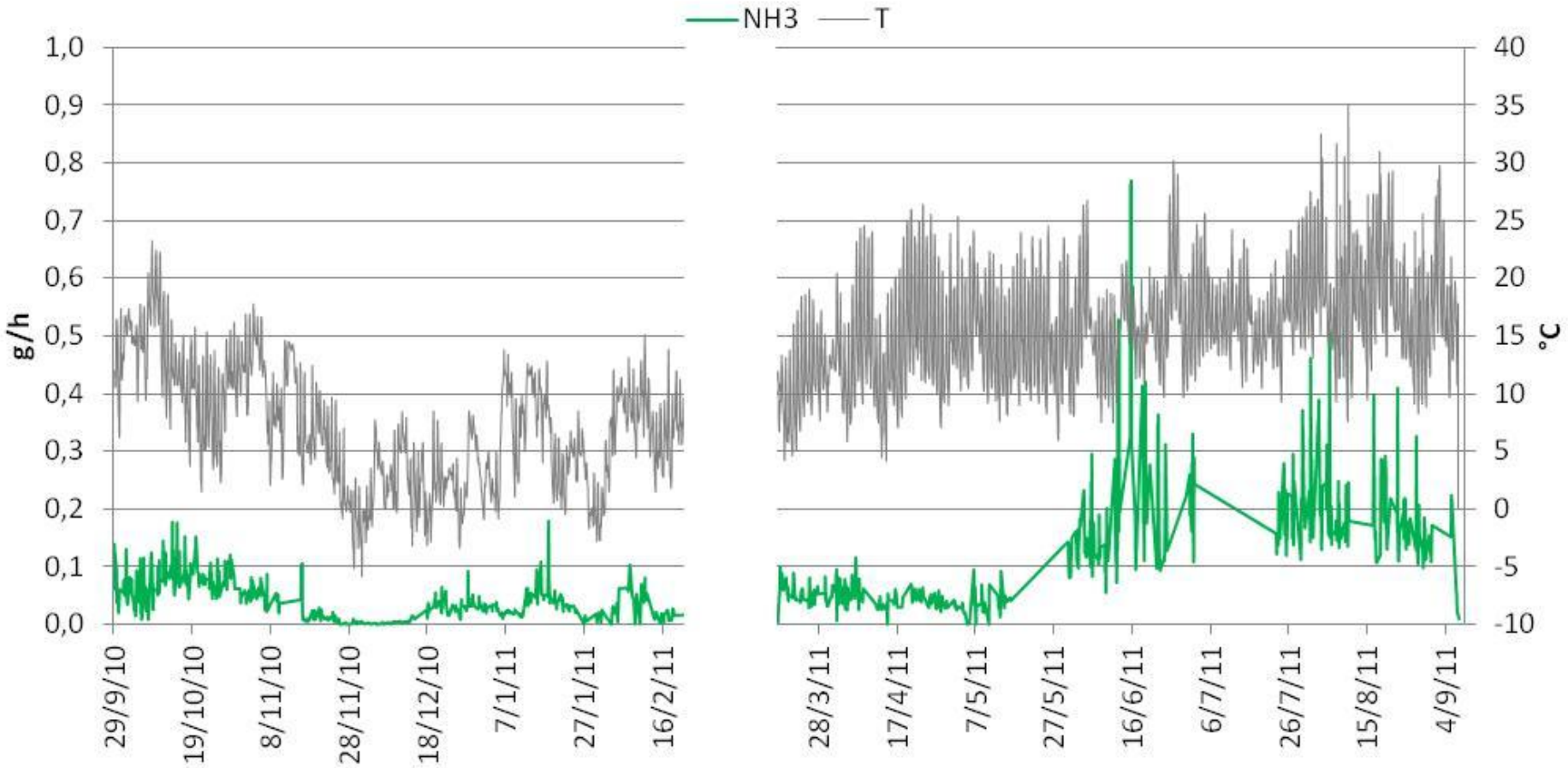



NH3_N
N2O_N
CH4_C
CO2_C

# Conclusion (1)

- **Lessons for an application in commercial conditions**
  - Dynamic floating tunnel seems to be appropriated and could be used for intermittent measurements
  - Slurry mass balance seems difficult to be used in commercial farm to identify the total losses
- **Simplified method using intermittent measurements has to be completed**
  - When doing the measurements ?
  - How many ?
  - How to use them to calculate the emission factors ?

# Conclusion (2)



# Thank you for your attention