

# EFFECT OF SEPARATION AND THERMAL PRE-TREATMENT ON PROCESS STABILITY OF PIG MANURE MONO-DIGESTION

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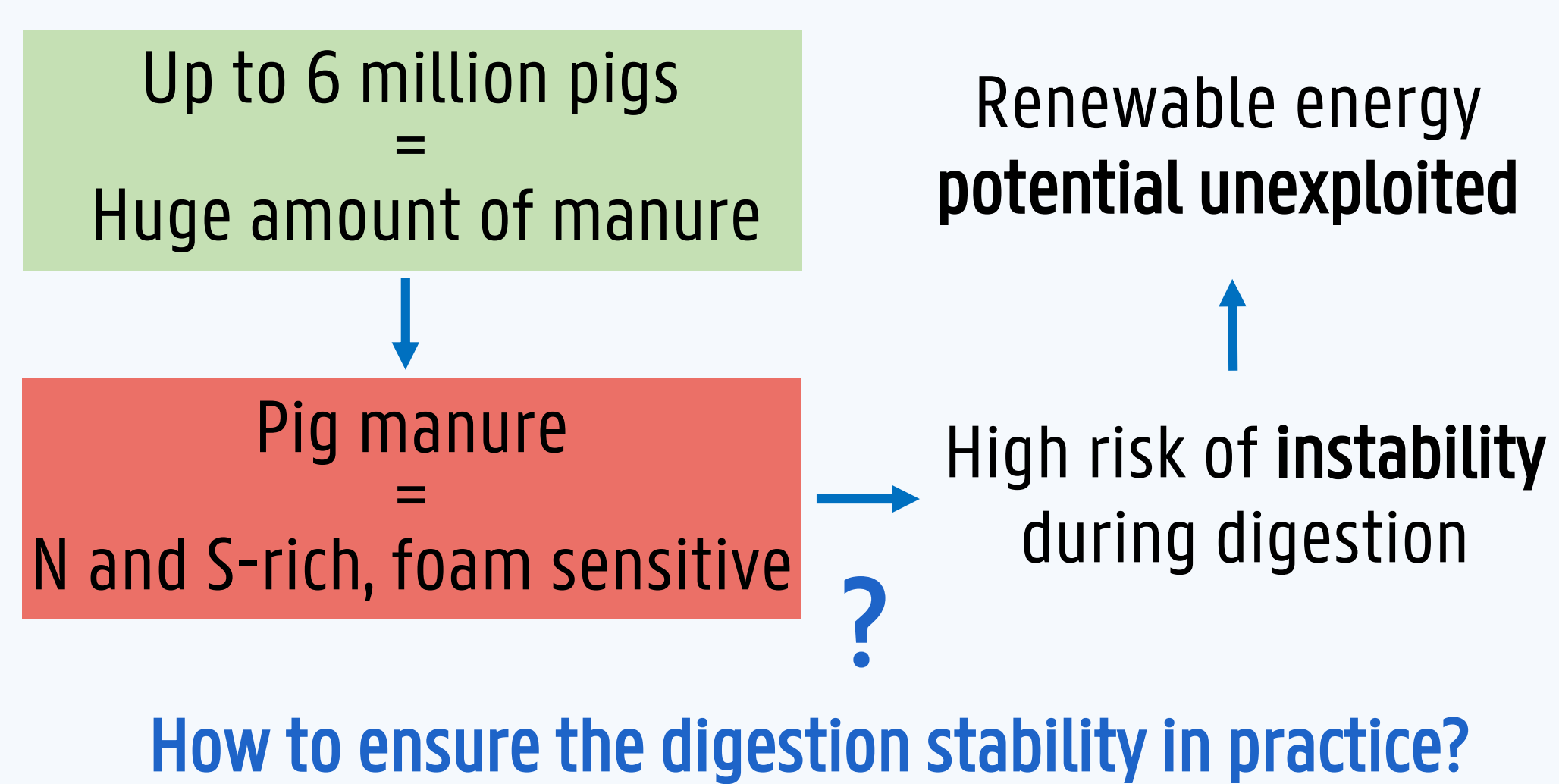
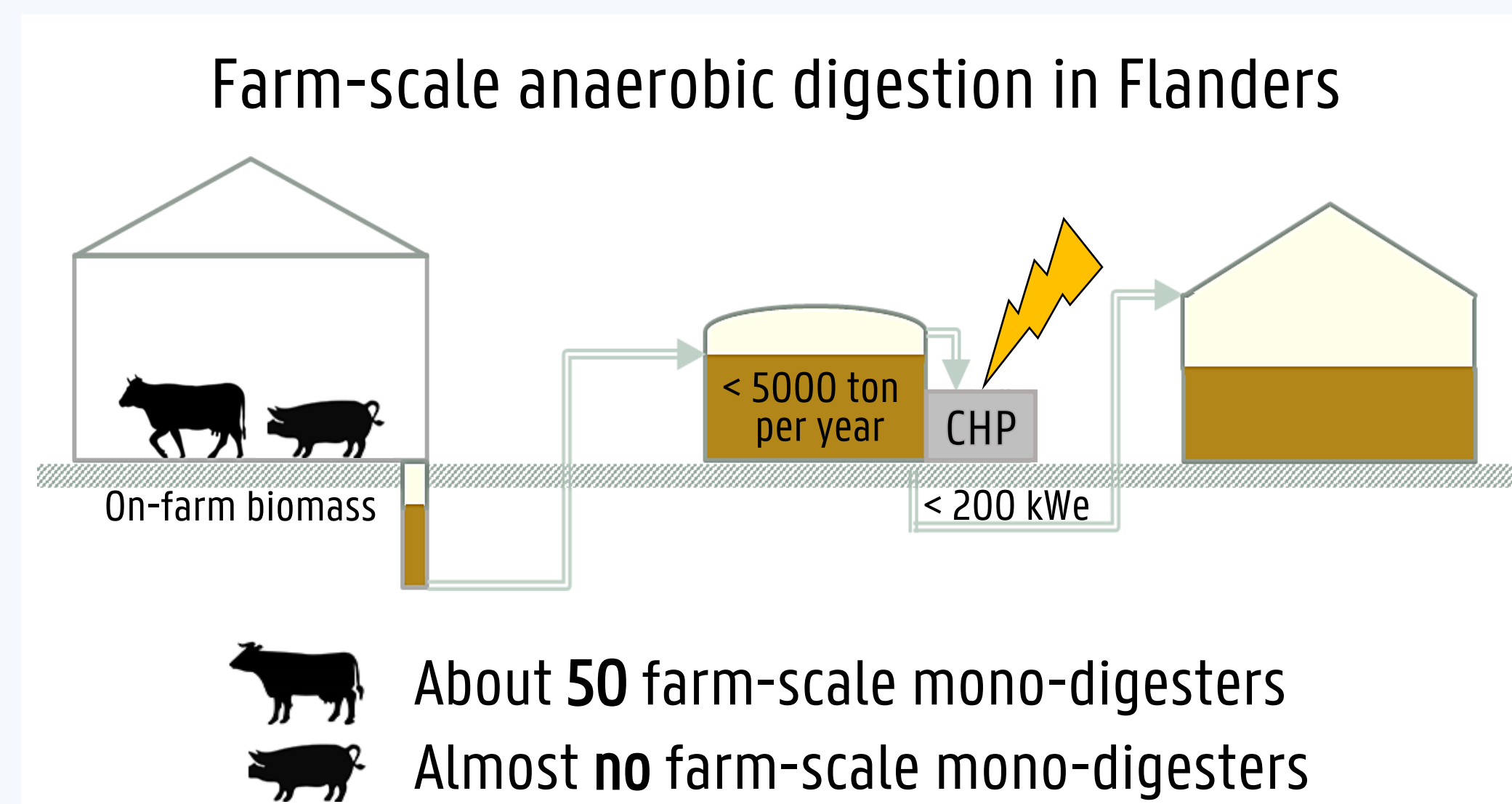
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## Problem statement



## Methods

- Thermal pre-treatment in an oven for one hour at 70 °C
- Separation of fresh pig manure: primary separation by pig housing construction or no separation



### Non-separated

9.3 DM%  
max. 24 L CH<sub>4</sub> kg<sup>-1</sup>

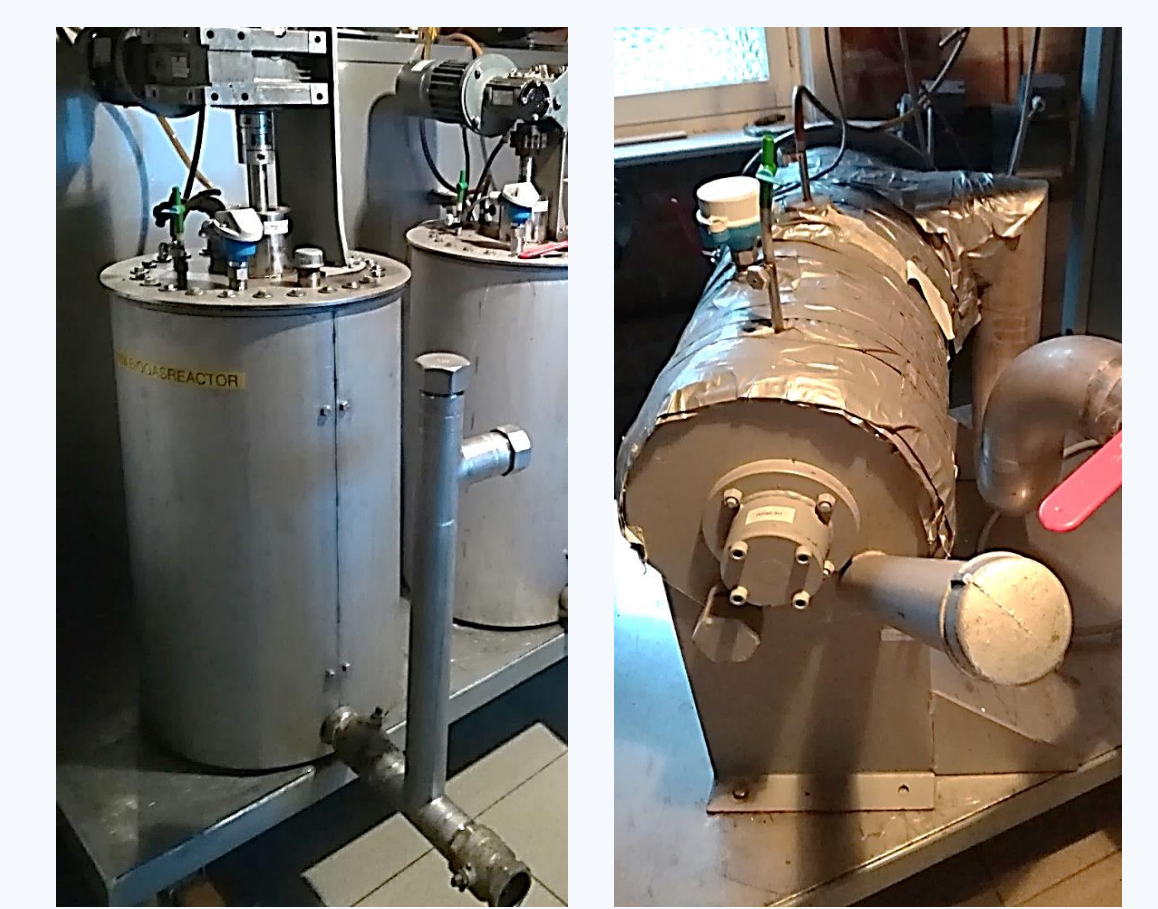


### In-house separated

	Farm A	Farm B
DM%	25 DM%	21 DM%
max. CH <sub>4</sub> production	max. 67 L CH <sub>4</sub> kg <sup>-1</sup>	max. 58 L CH <sub>4</sub> kg <sup>-1</sup>

## Thermophilic pig manure mono-digestion in semi pilot-scale continuous stirred tank reactors (CSTR)

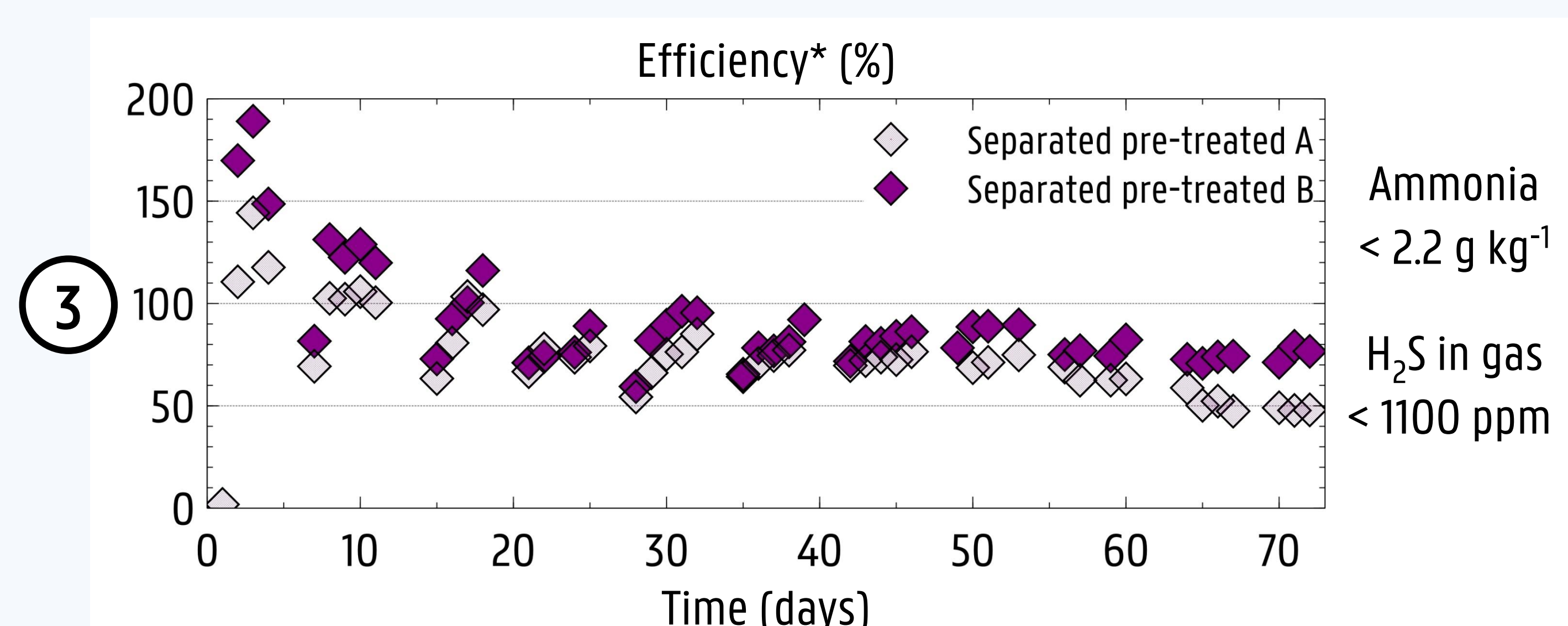
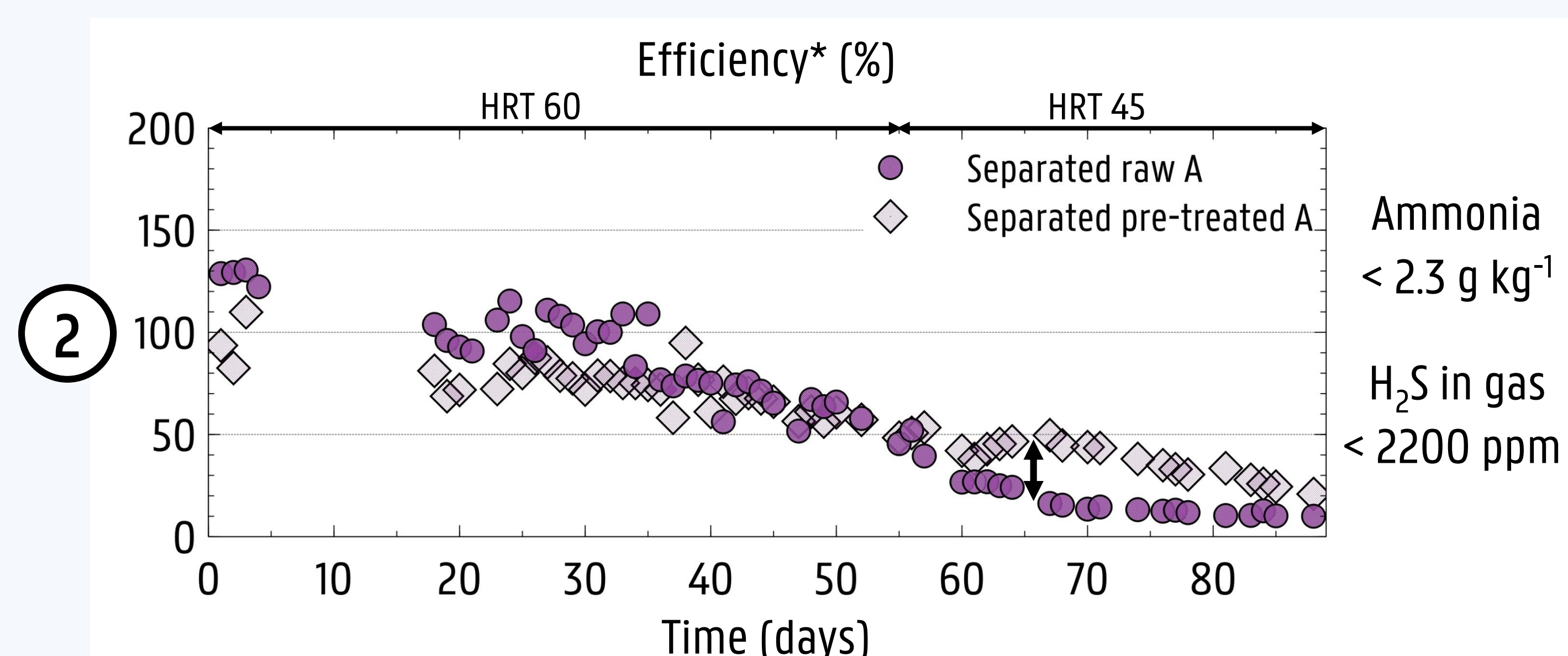
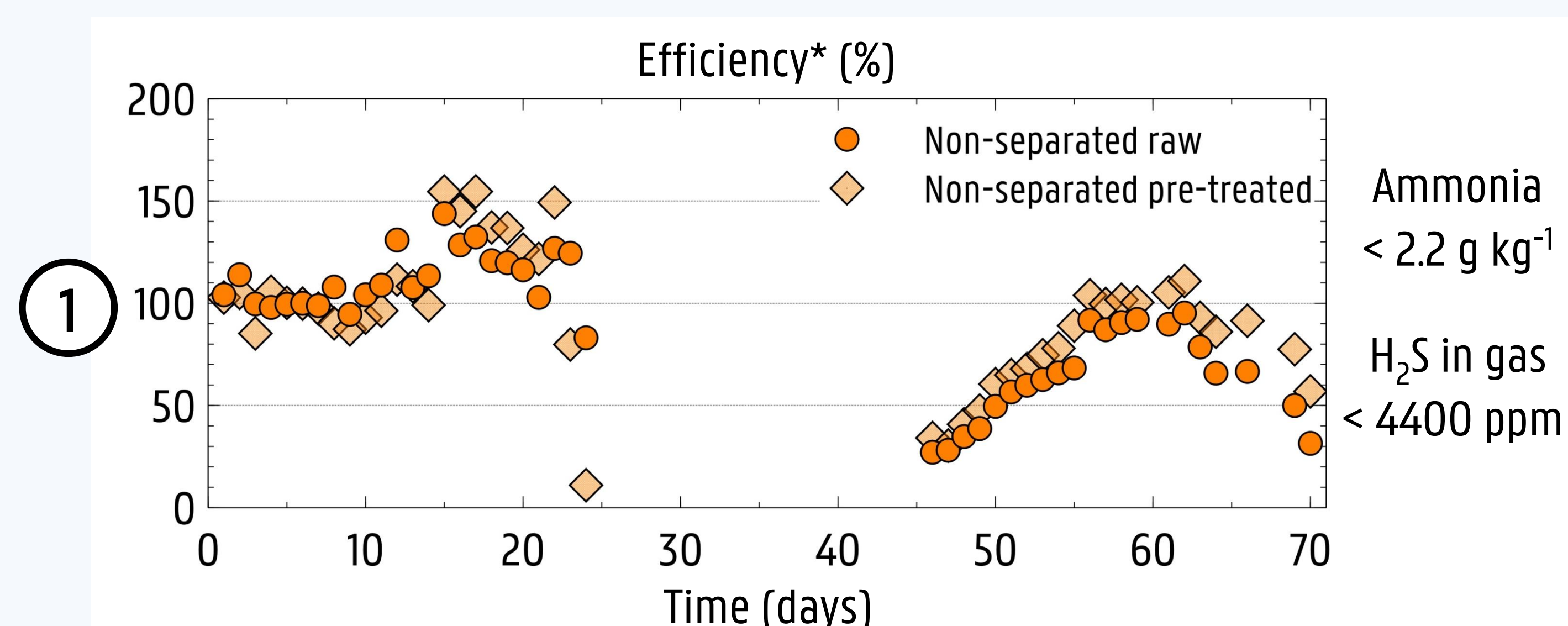
- Non-separated raw (CSTR 1) vs. pre-treated (CSTR 2)  
HRT of 60 days
- Separated raw A (CSTR 3) vs. pre-treated A (CSTR 4)  
HRT of 60 and 45 days
- Separated pre-treated A (CSTR 3) vs. pre-treated B (CSTR 4)  
HRT of 60 days



CSTR 1 & 2

CSTR 3 & 4

## Results



\*Efficiency = actual methane production / theoretical methane potential

## Conclusions & perspectives

- No stable** thermophilic mono-digestion of non-separated, liquid pig manure was reached at an HRT of 60 days due to high levels of **ammonia and sulphuric compounds**.
- Low temperature thermal pre-treatment **did not improve** the digestion stability of non-separated pig manure.
- More research is needed on (partial) inhibitor removal prior to digestion and co-digestion with agro-residues poor in nitrogen.
- Stable** thermophilic mono-digestion of separated pig manure was possible if there was sufficient time for digestion.
- Low temperature thermal pre-treatment **improved** the digestion stability of separated pig manure.
- A cost-benefit analysis on prolonging pre-treatment time and increasing pre-treatment temperature should be conducted.
- The **extent of separation** (in)directly **influenced** digestion stability. The possible existence of an optimal (organic) dry matter range for stable mono-digestion should be investigated.
- An **excess of sulphuric compounds** seemed to be the **main cause** of digestion instability.
- More studies are needed to assess whether thermal pre-treatment is always necessary to achieve stable digestion.

Separation is recommended when aiming at thermophilic mono-digestion of pig manure.  
The extent of separation, the necessity for thermal pre-treatment and the removal of inhibitors requires further research.