Mendel University in Brno

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Use of agricultural products in the transformation of biogas fermentation with non liquid fermentation technology

Current Status

- The need for efficient use of biodegradable waste (BDW) and biomass production of the targeted.
- A widely discussed issue of the use of BDW and handling. This method is suitable for non liquid fermentation.
- Currently, an increasing number of biogas plants using non liquid fermentation technology.
- Laboratory research of non liquid fermentation.

Non liquid fermentation

- Total solids 25% or more,
- Solids 3-4x higher than the biogas stations using liquid substrates,
- Processing and imperfectly separated biowaste.

Laboratory Equipment

- 6 laboratory fermenters
- Volume 0,48 m^3

Laboratory fermenters

Tested substrates

- Cattle manure
- Swine manure
- Grass silage
- Maize silage

Methodics

- Mesophilic conditions (38^{o} C)
- Horizontal retention time (HRT) (28 days)
- Dry matter content 20 - 50%
- Specific gravity of the charge
  600 - 800kg.m^{-3}
- C:N 20-35 : 1

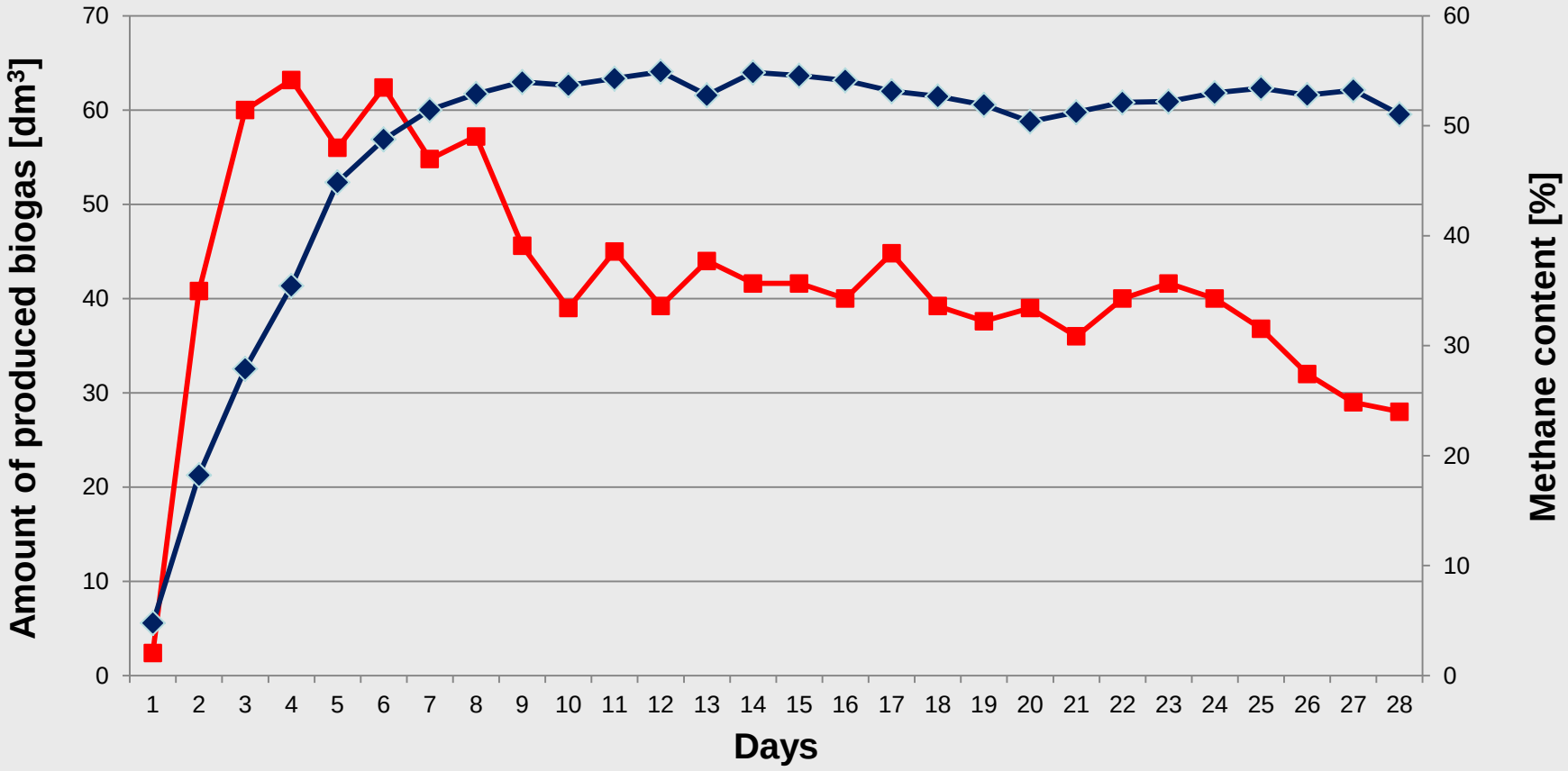
Observed parameters in during process (every day)

- pH,
- Temperature biomass,
- Quality of biogas (CH_4, CO_2, H_2S, O_2),
- Quantity of biogas,
- Pressure in the reactor.

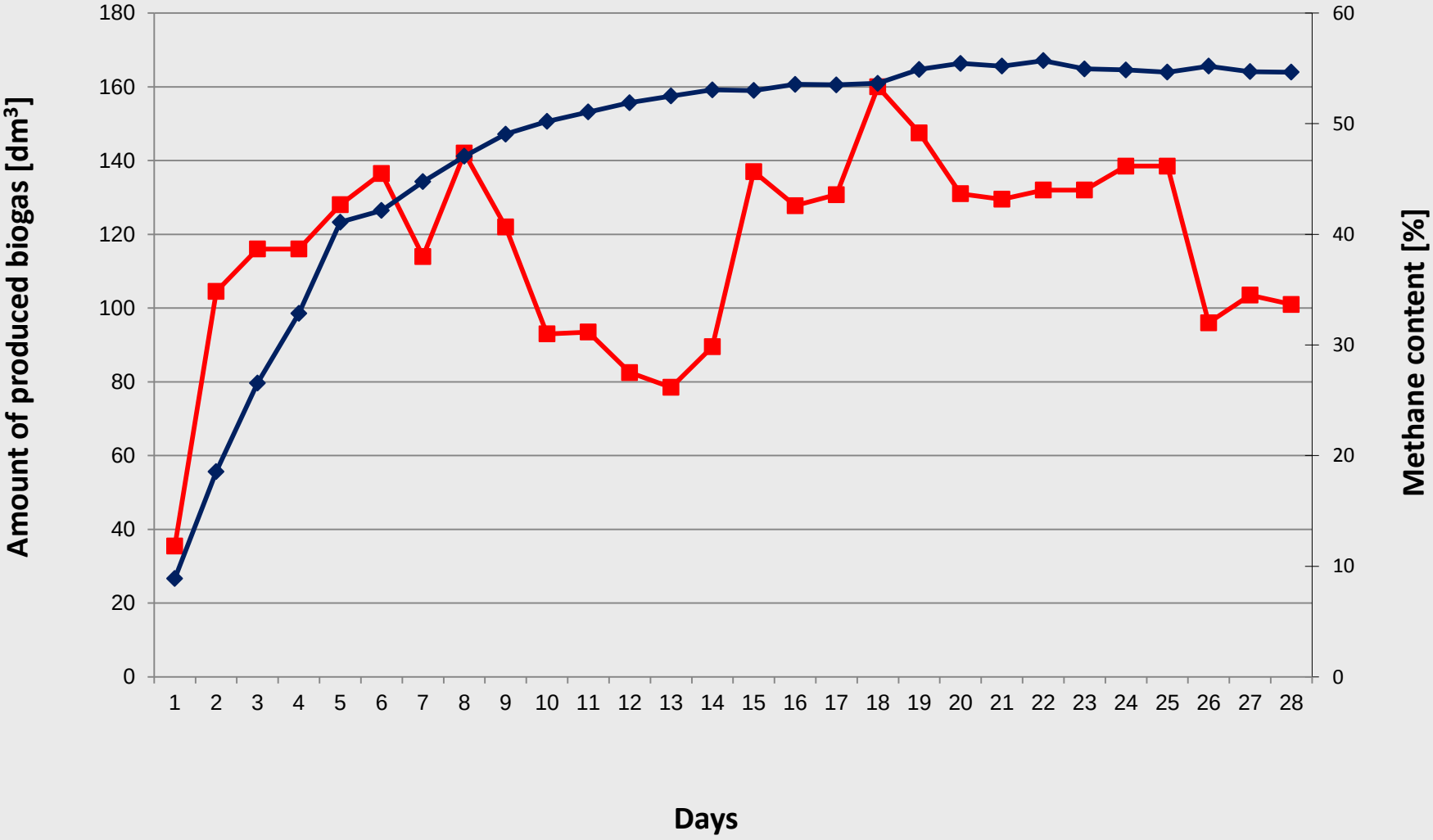
Observed parameters in during process (once a week)

- Dry matter inoculum liquid,
- Volatile fatty acids (ecetic, propionic, butyric, valeric)
- $N\text{-}NH_4$,
- Total nitrogen
- Organic nitrogen

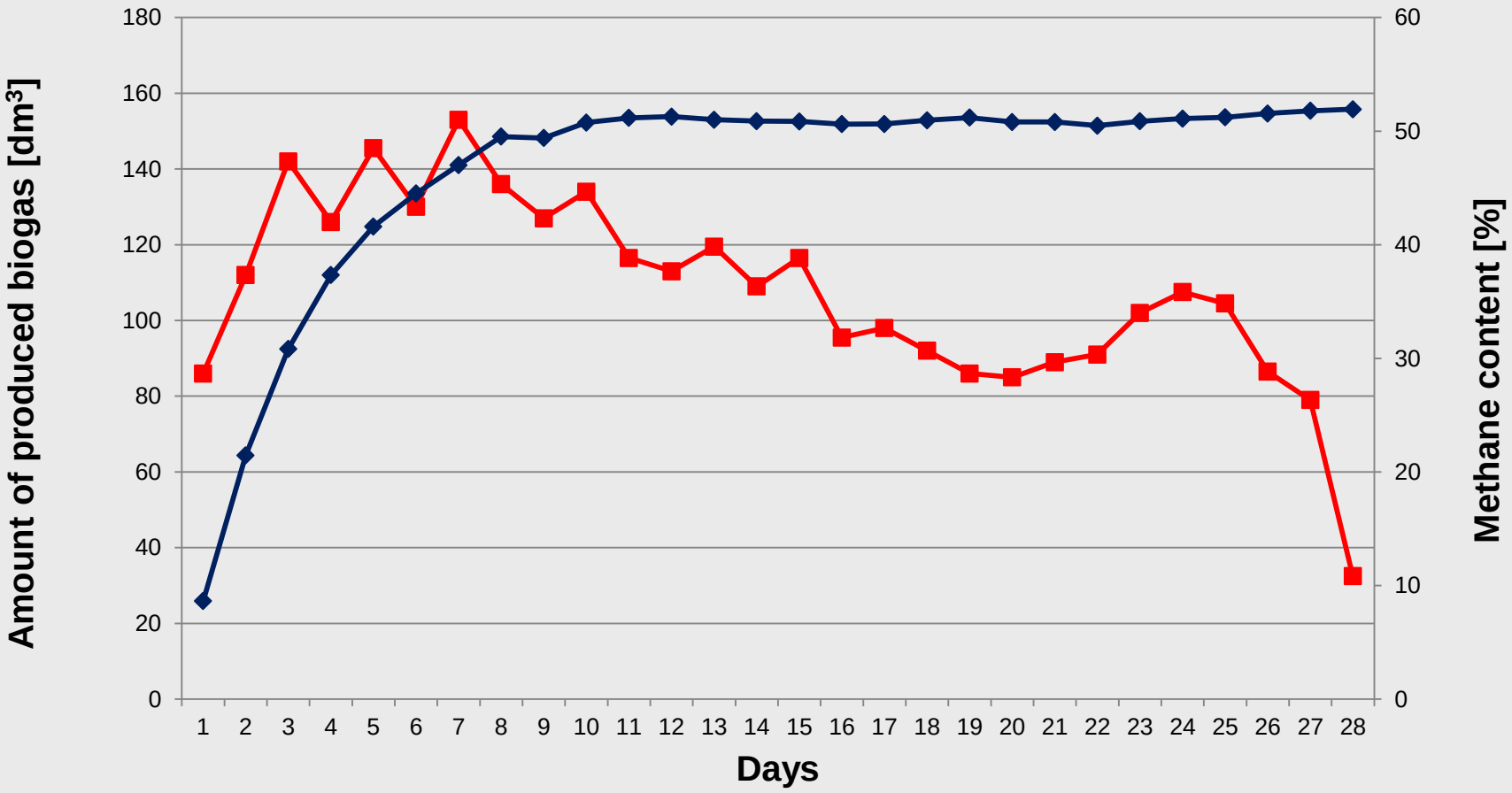
Cattle manure



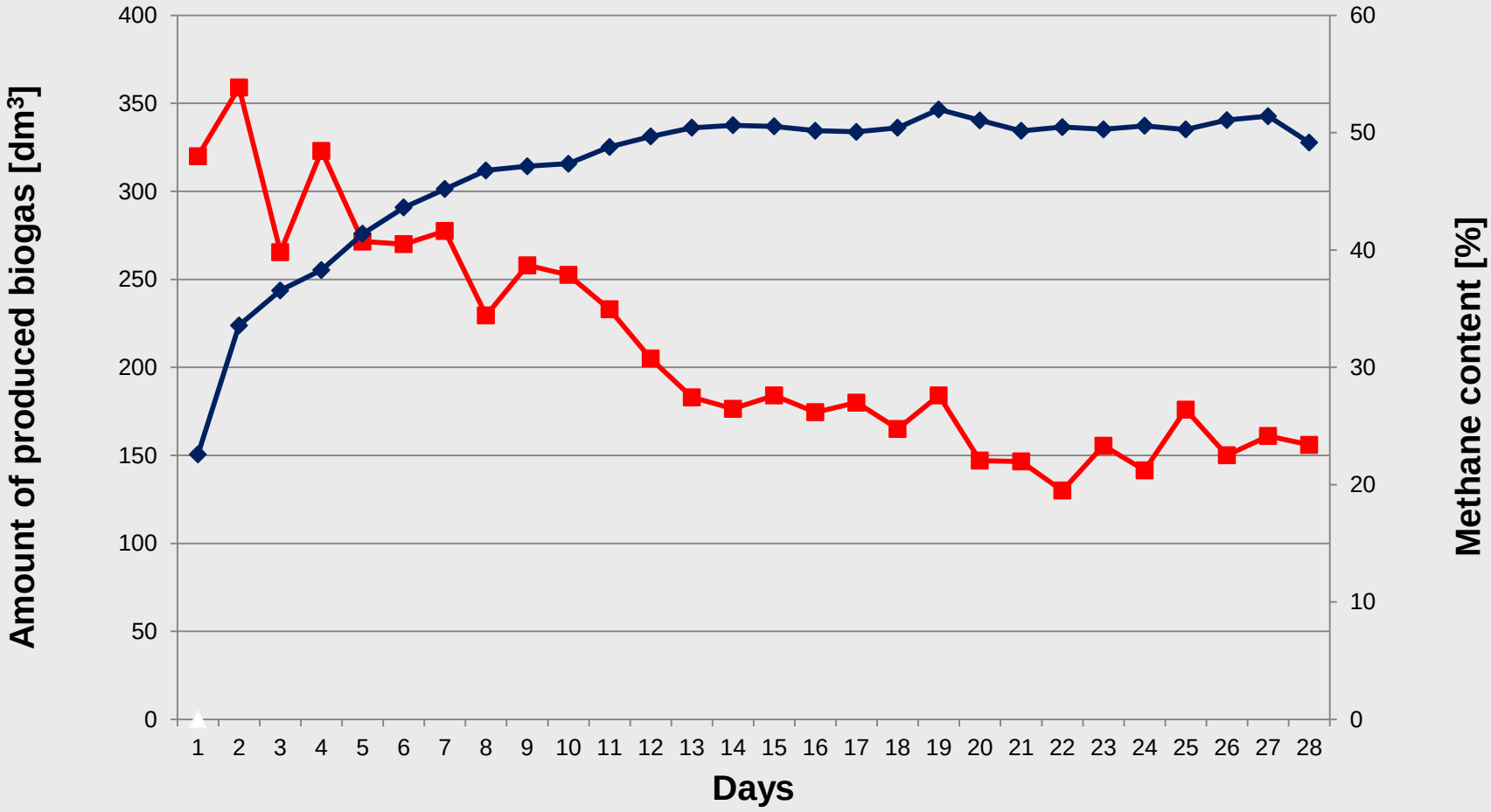
Swine manure



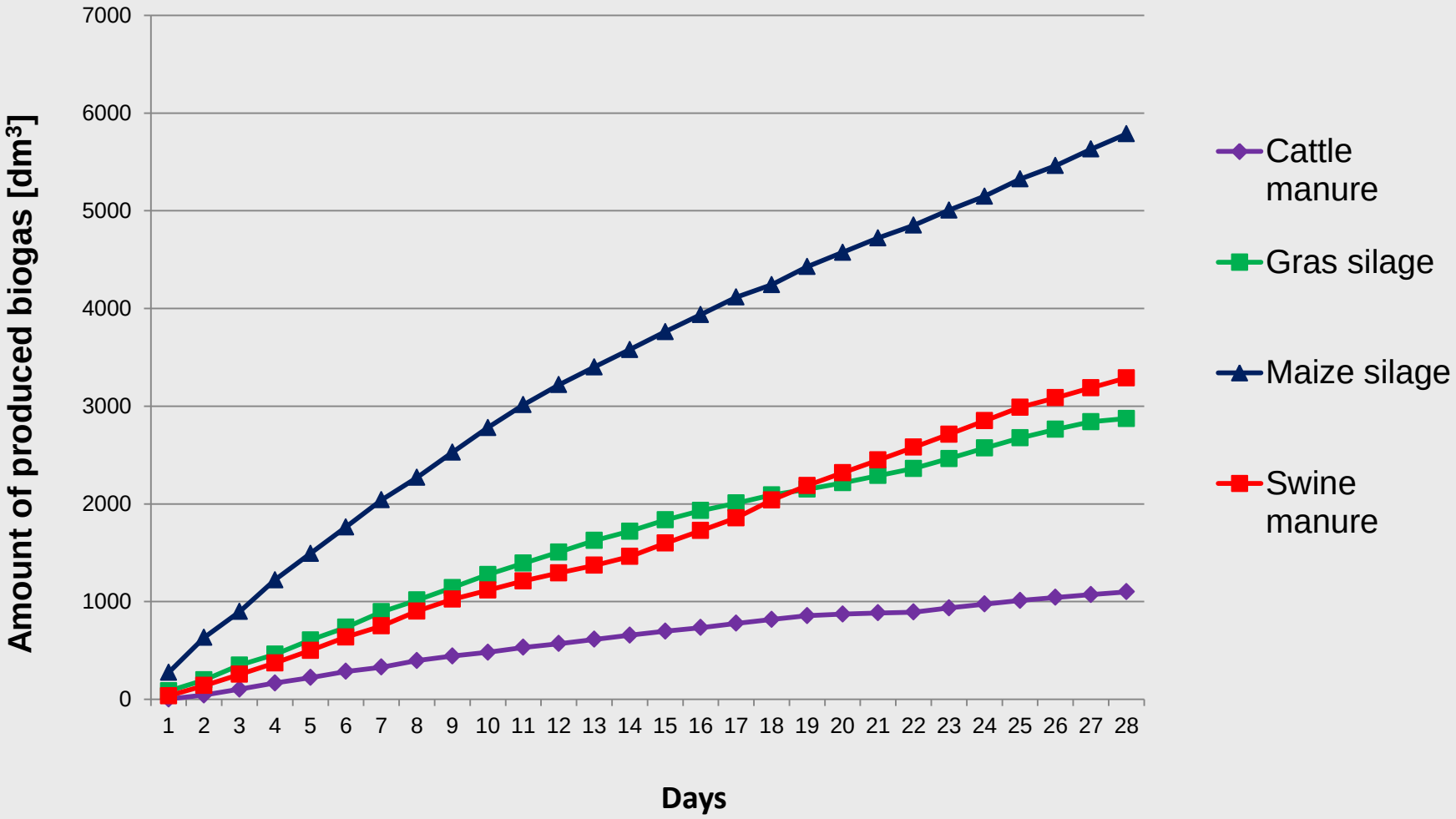
Grass silage



Maize silage



Cumulative production



Conclusion

- The results shows that pH has direct influence on the quality and quantity of produced biogas.
- The level of percolation does not affect the quality of biogas, but on the other hand has a major impact on the amount of biogas produced.
- By degrees of temperature in narrow interval is the quality of biogas not affected, respectively increase of the temperature can improve the amount of developed biogas, this temperature increase is limited to 42°C

Thank you for your attention