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Ruben Teixeira Franco, Rémy Bayard, Pierre Buffière

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How to preserve the energy potential of organic residues during storage?

Focus on anaerobic digestion

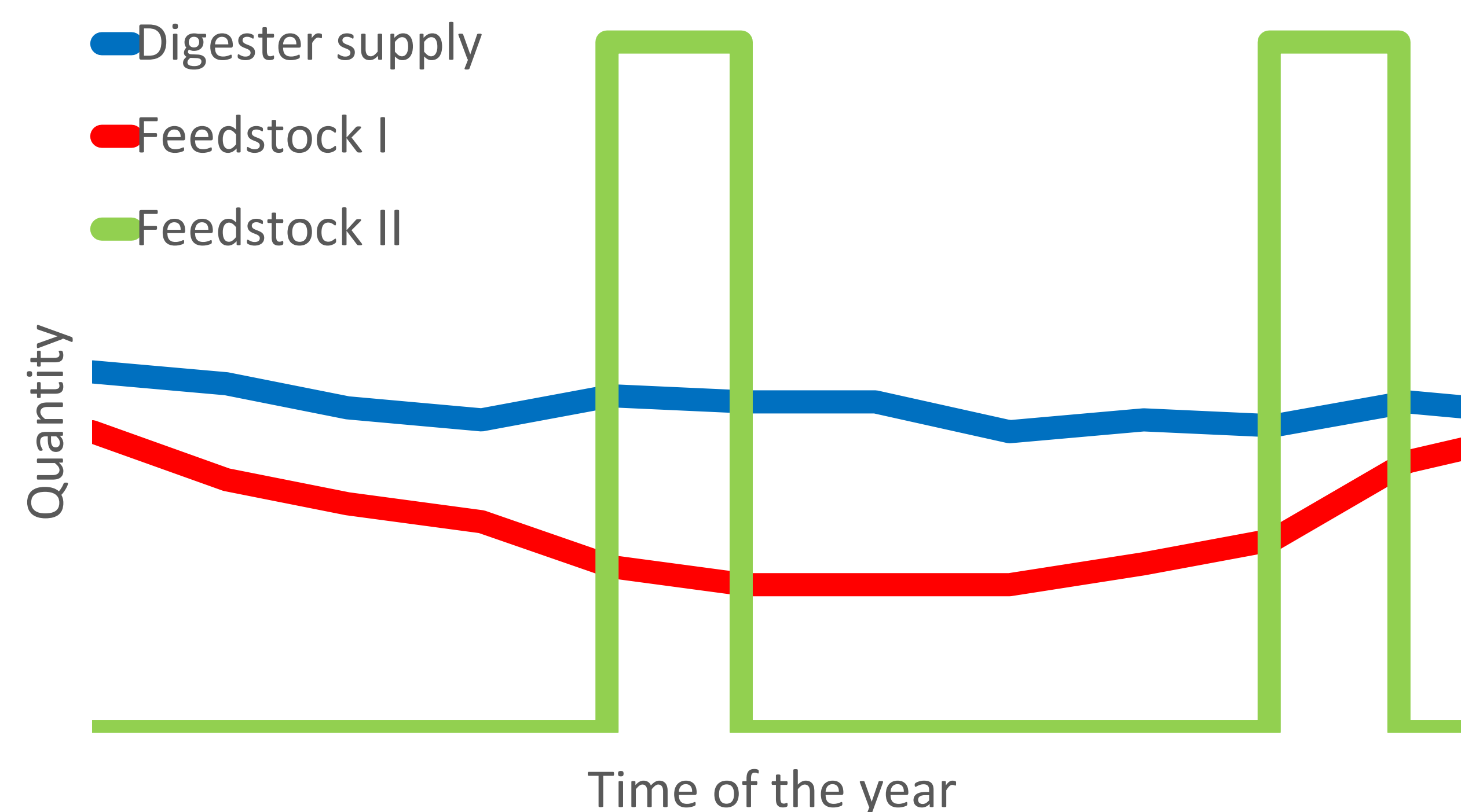
Ruben Teixeira Franco; Rémy Bayard; Pierre Buffière
Université de Lyon, INSA Lyon, DEEP Laboratory

PURPOSE

In order to enable a continuous supply of biogas plants throughout the year, seasonal feedstock needs to be preserved and in most cases for extended periods.

However, several doubts still persist about the good management practices for part of the organic residues used for anaerobic digestion, since this subject has received limited attention so far.

This work brings together a compilation of short and long-term storage assays at laboratory scale for two different types of catch crops and cattle manure.



RAW MATERIALS

Raw materials were collected on an agricultural site in the Rhône-Alpes region of France (Gaec Béreyziat, Les Teppes, 01340 Béréziat, France):

- **Catch crop 1:** triticale, peas, vicia and fodder radish
- **Catch crop 2:** sunflower, sorghum, peas, vicia and trifolium
- **Cattle manure** - annual production in France: 87Mt (~28MWh)

Catch crop 1



Catch crop 2



Cattle manure



EXPERIMENTAL APPROACH

Phase 1: Long-term storage (3-4 months)

- Comparison between the impact of **ensiling** and **open-air** storage techniques on pH and energy preservation
- Batch tests – 3,5L
- **Feedstocks:** Catch crop 1; Catch crop 2; Cattle manure



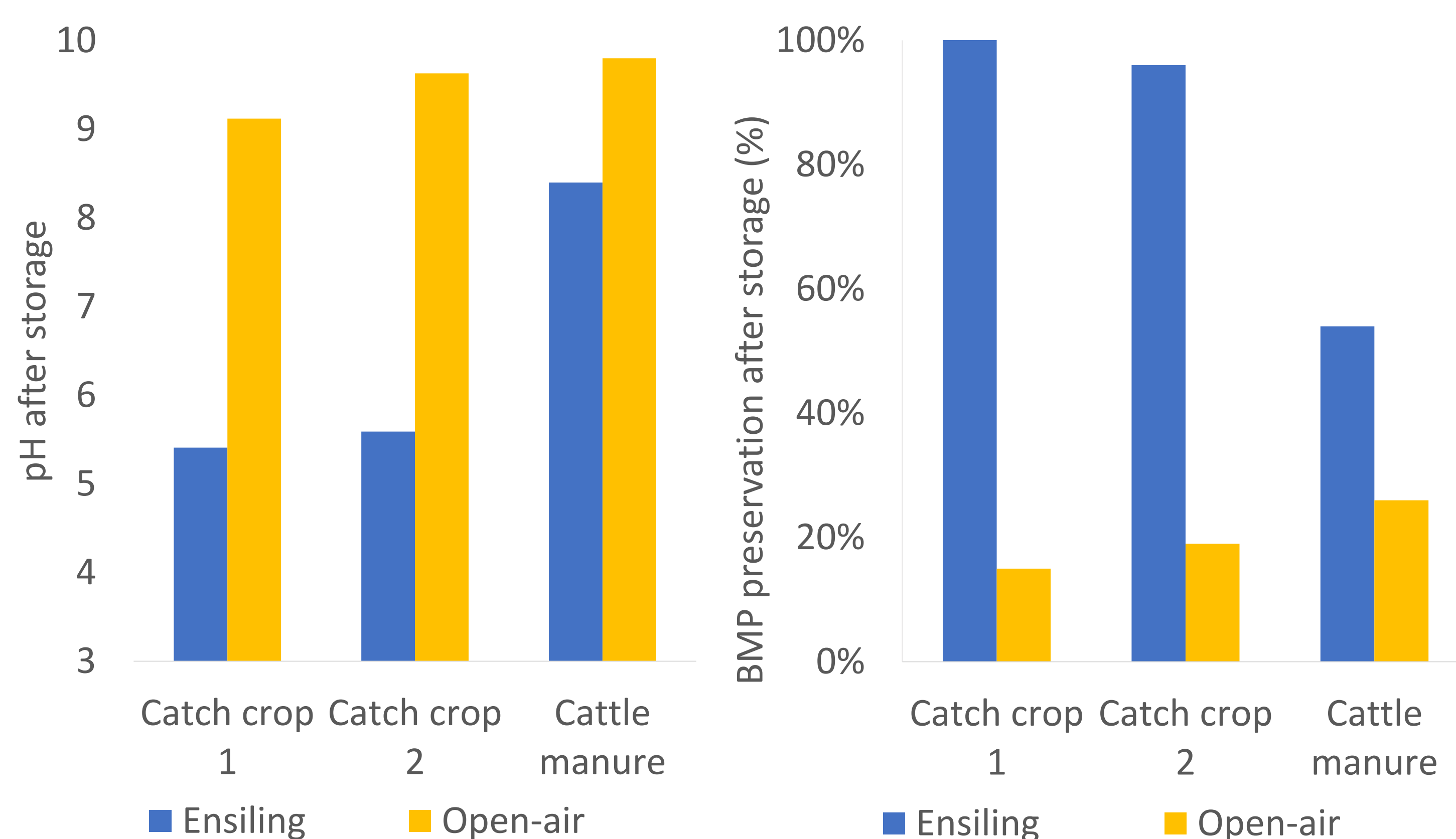
Phase 2: Short-term storage (15 days max.)

- Effects of **co-ensiling** on the pH of **cattle manure**
- Batch tests – 0,5L
- Co-substrates: Formic acid; Glucose; Rapeseed oil

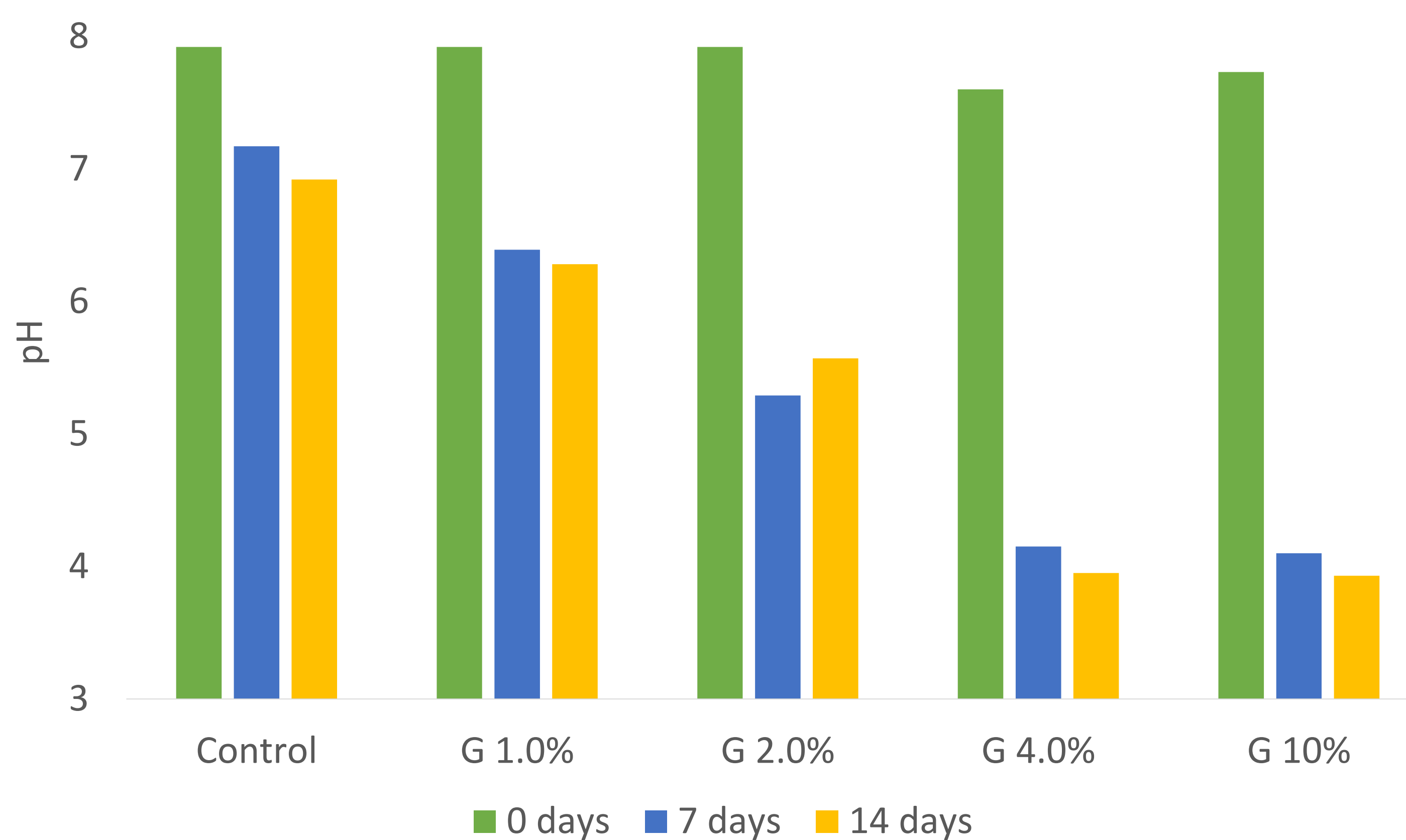


RESULTS

Phase 1: Effects of storage method on pH / BMP after at least 3 months



Phase 2: Impact of glucose addition on pH of cattle manure co-ensiling



CONCLUSIONS

- Energy losses during storage of these organic wastes can be limited through ensiling.
- Even though, ensiling of single-handedly cattle manure leads to important biomass degradation.
- Co-ensiling with a substrate containing high concentration of available water-soluble carbohydrates appears to be the most resourceful method to optimize storage of cattle manure.

➔ **These outcomes will have a major impact on economics of agricultural biogas plants**

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Contact

Ruben TEIXEIRA FRANCO
DEEP Laboratory, Univ. Lyon - INSA Lyon (France)
Email: ruben.teixeirafanco@insa-lyon.fr
Tel: +33(0) 4 72 43 63 61