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Microbial community dynamics during the co-digestion of manure and the organic fraction of household waste

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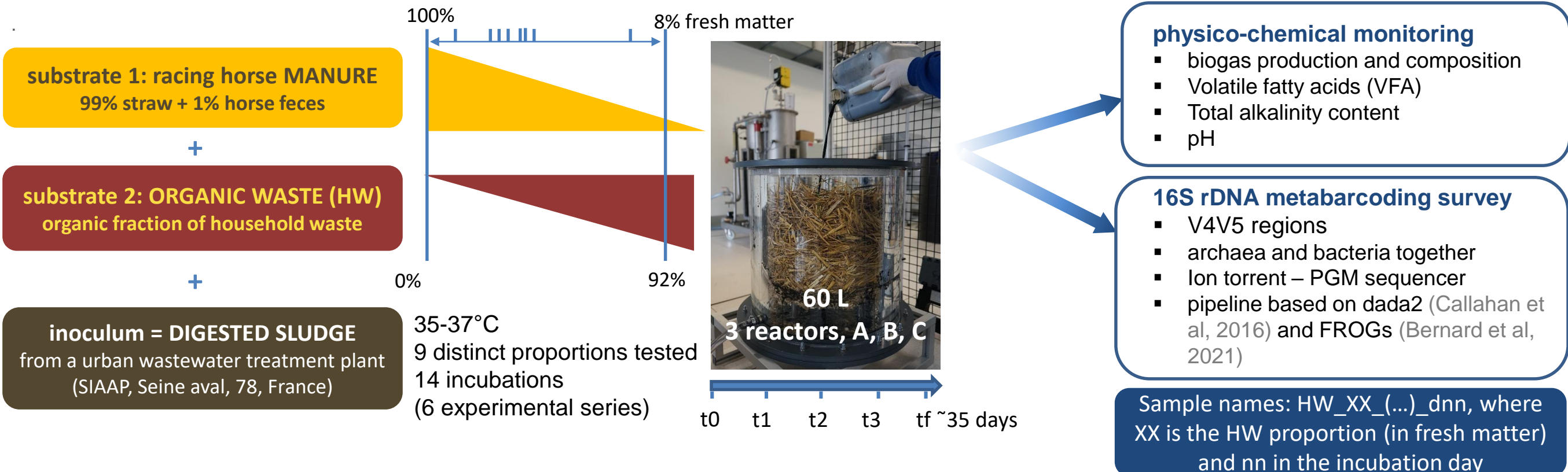
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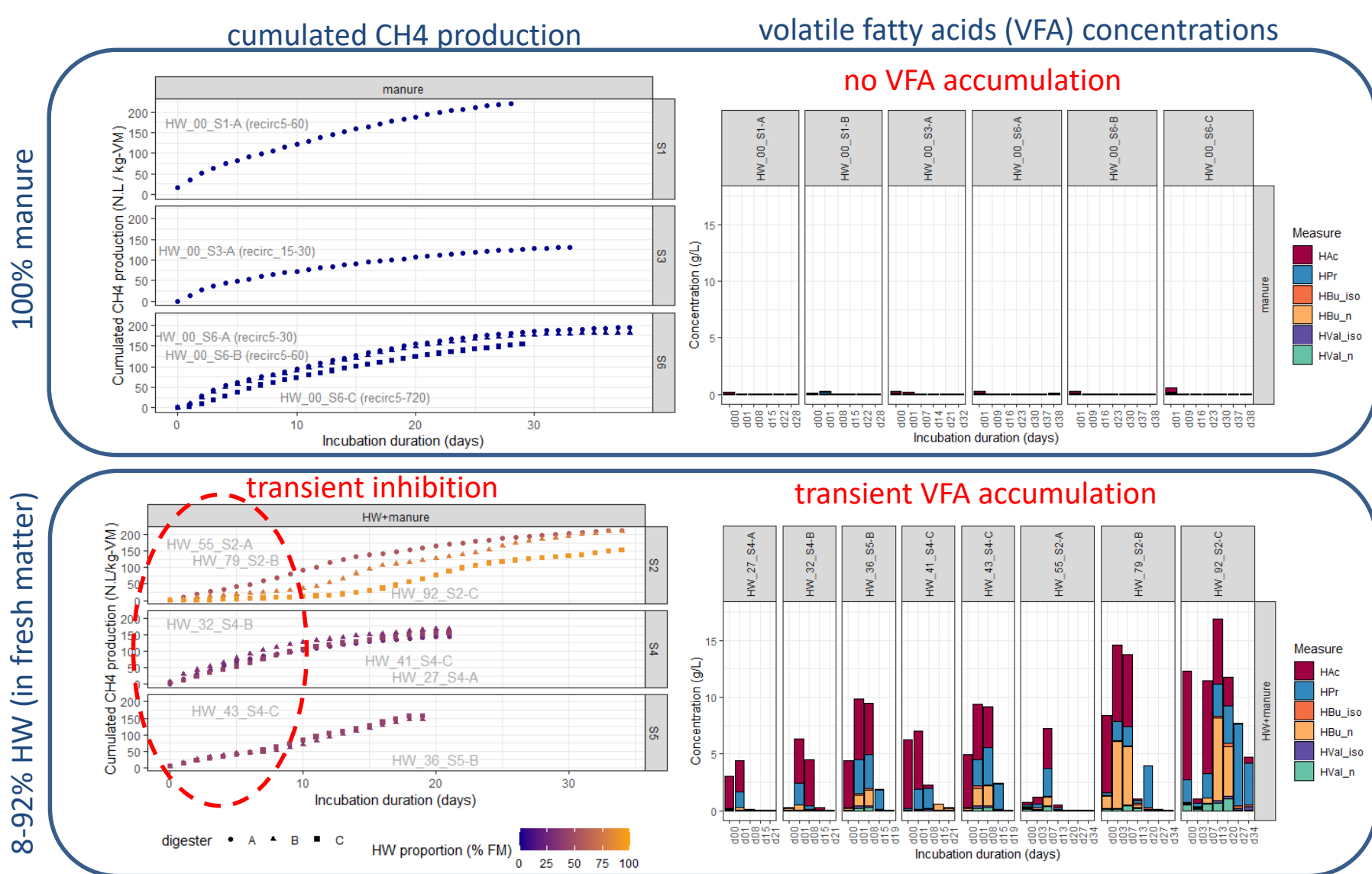
1. Introduction: co-digestion of organic waste is an attractive option for territories but requires optimization

Organic waste co-digestion enables to valorize different types of locally produced waste and to optimize biogas production in digestion plants. However, the operating conditions need to be adapted to the waste stream nature. We studied the dry batch mesophilic co-digestion of **reconstituted racing horse manure** and the **organic fraction of residual household waste (HW)**, in 60 L pilot reactors. We identified optimal proportions of co-substrates and evaluated the effects of their initial proportions on **microbial community** dynamics during **anaerobic digestion (AD)**.

2. Dry batch AD pilots (60 L) were used to assess various proportions of manure and organic waste (HW)



3. Increasing, but transient, acidic inhibition occurs with increasing proportions of organic waste (HW)

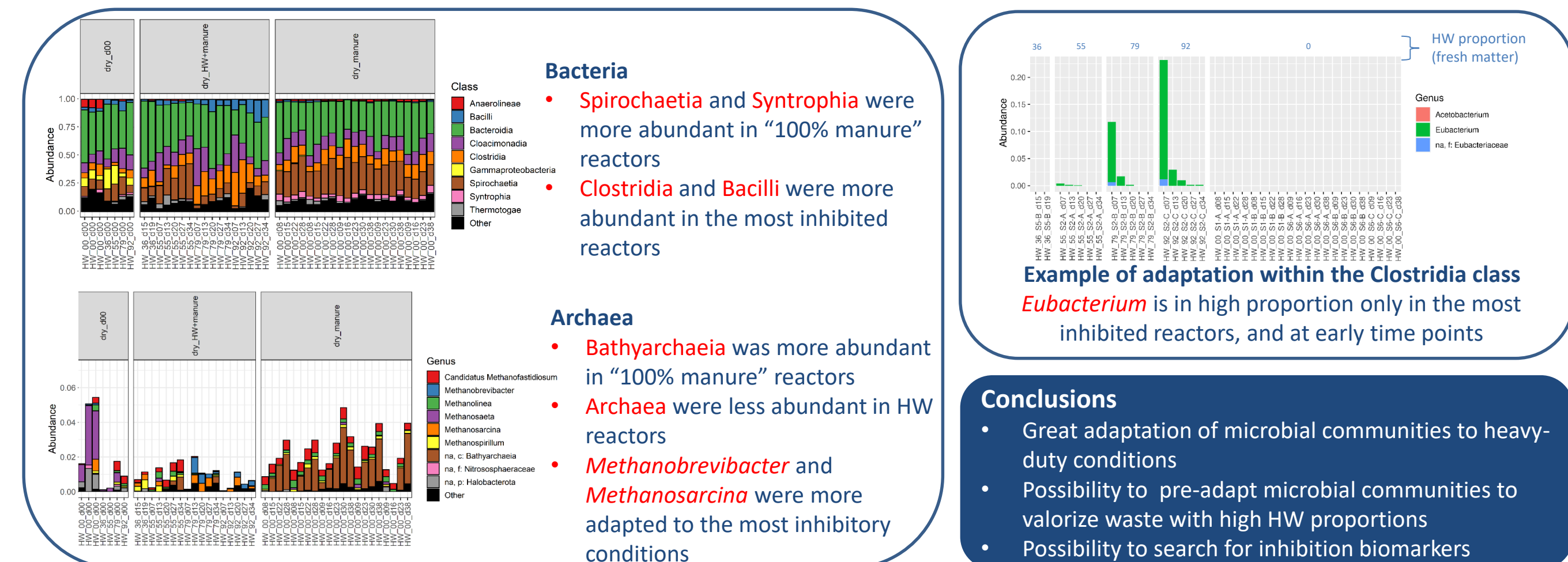


The total cumulated methane volume was overall little affected by the presence of HW. However, a transient acidic inhibition occurred when manure was co-digested with HW, and increased with higher HW proportions. It was caused by VFA accumulation and can be related with the higher degradation rate of HW compared to manure. Indeed, HW must be richer in readily-fermentable compounds compared to the highly lignocellulose-rich manure.

A maximal concentration of 16.9 g(VFA).L⁻¹ was reached in the reactor with the highest HW proportion (92%), at day 13. Acetic and propionic acids (Hac and HPr) were generally the dominant VFAs. However, concentrations in butyric acid (Hbu) increased with higher HW proportions, reaching 7.4 g.L⁻¹ at day 13 in the reactor with 92% of HW.

4. The microbial community composition is greatly influenced by both the use of HW and the acidic inhibition

A selection of 66 samples was analyzed by 16S rDNA metabarcoding (>15 000 sequences per sample).



References

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