TRANSITION OF MICROBIAL COMMUNITIES DURING THE ADAPTION TO ANEROBIC DIGESTION OF CARROT WASTE

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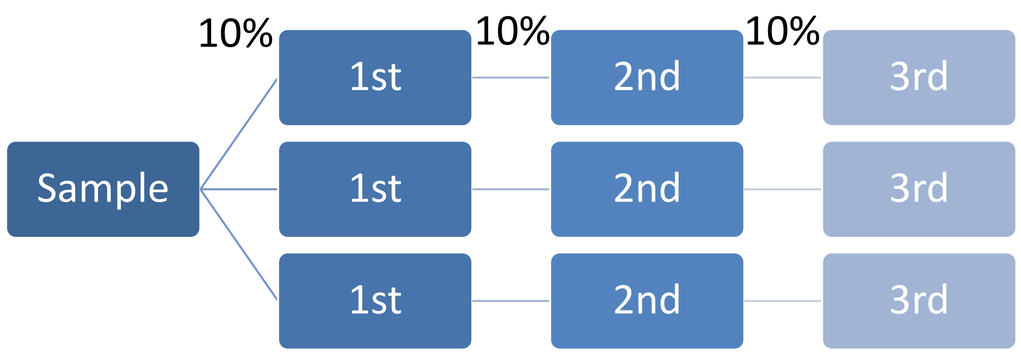
Introduction

Although anaerobic digestion has been studied intensively for greater than 50 years, monitoring and controlling the anaerobic digestion from a biological perspective has not been fully possible. In this study, pyrosequencing was applied to study the acclimatization of microbial communities to a specific substrate such as carrot pomace.

Developing the microbial community

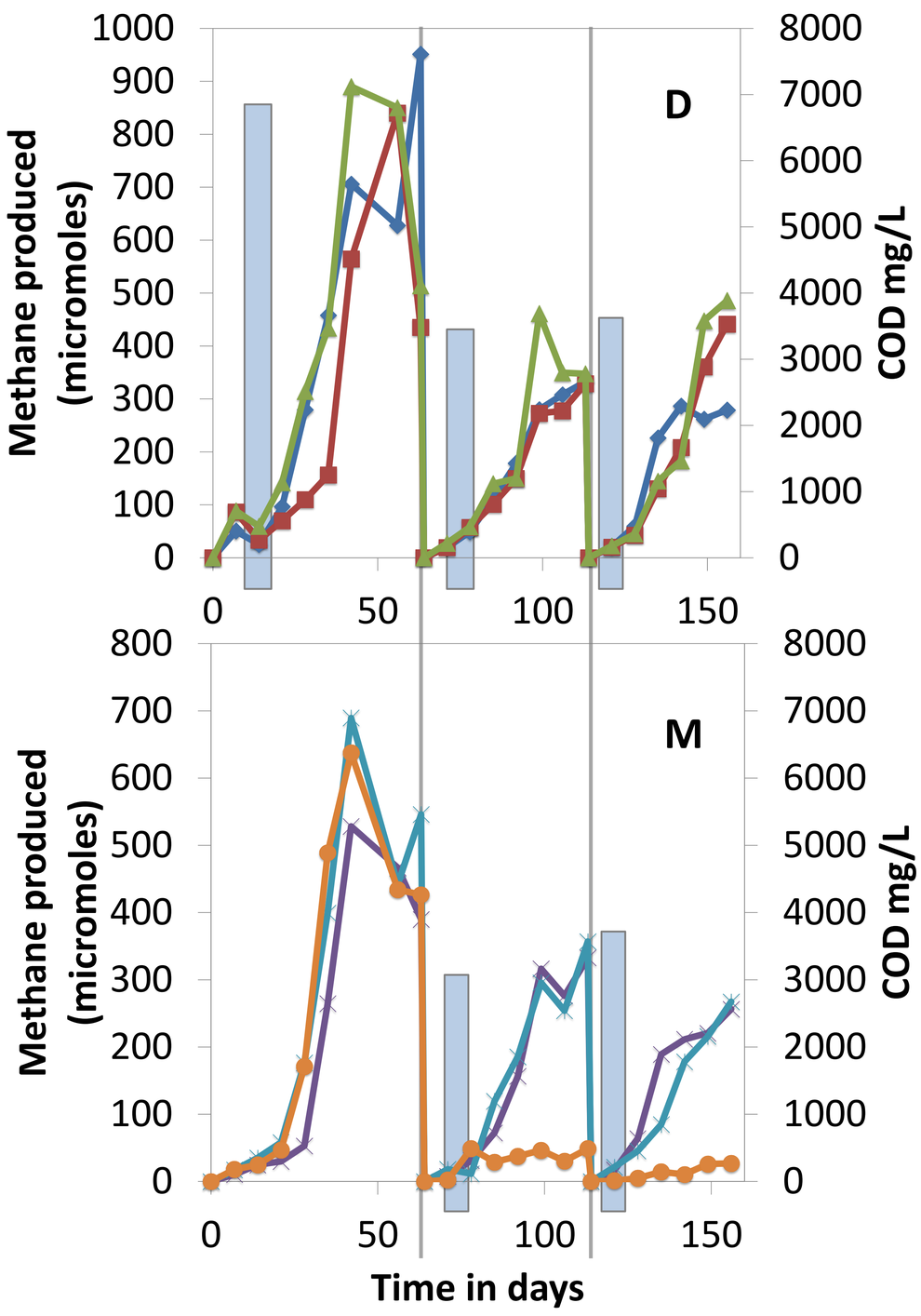
Sample ID	Sample description	pH
D	Rumen fluid from a cow fed with grass and grains	6.3
M	Mixture of two rumen fluids and four sediments	

Three generations of enrichments were carried out and they all consisted of 10% inocula, 1% carrot pomace and a mineral media



Schematics of the enrichments carried out in triplicate. Inoculations for following enrichment were done after methane was detected in the previous.

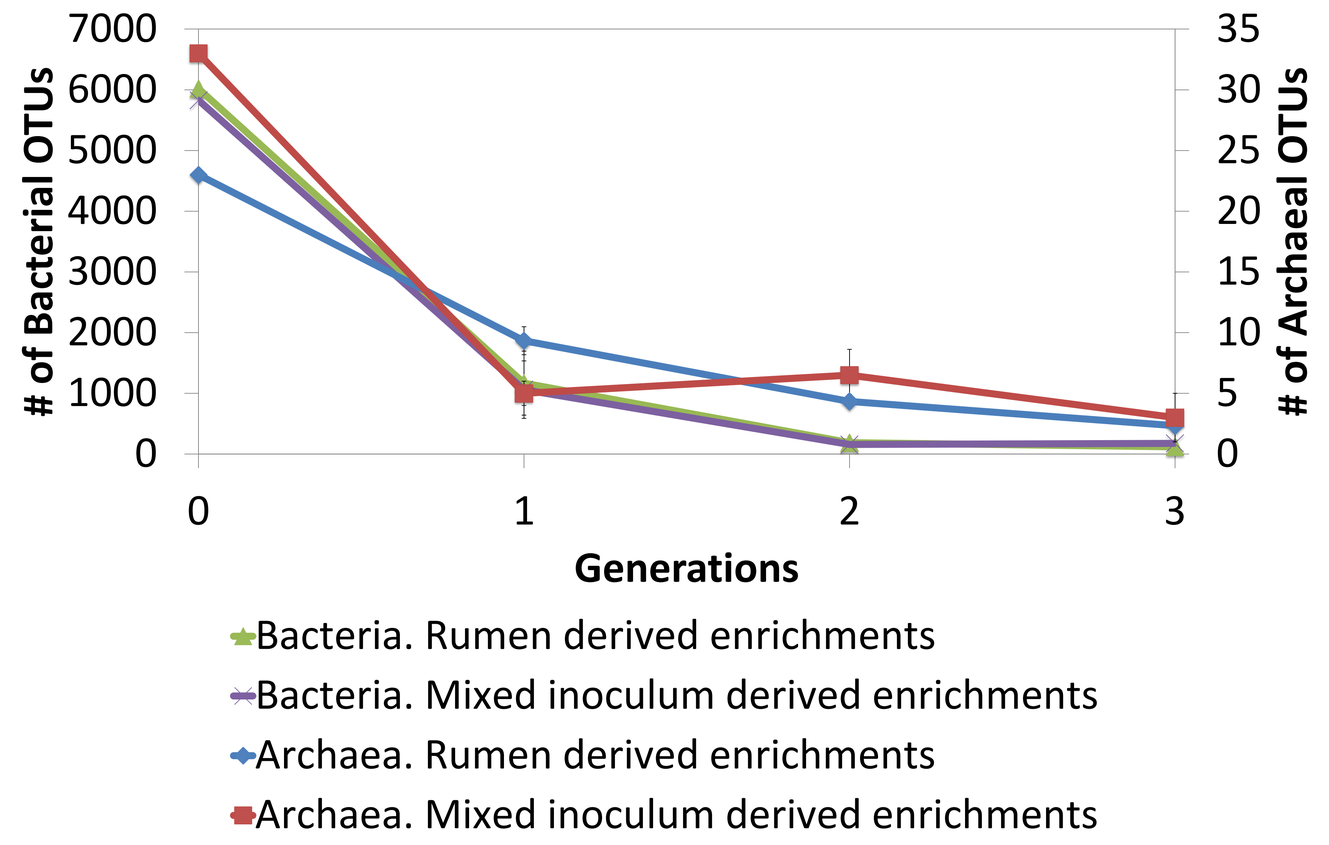
Methane production



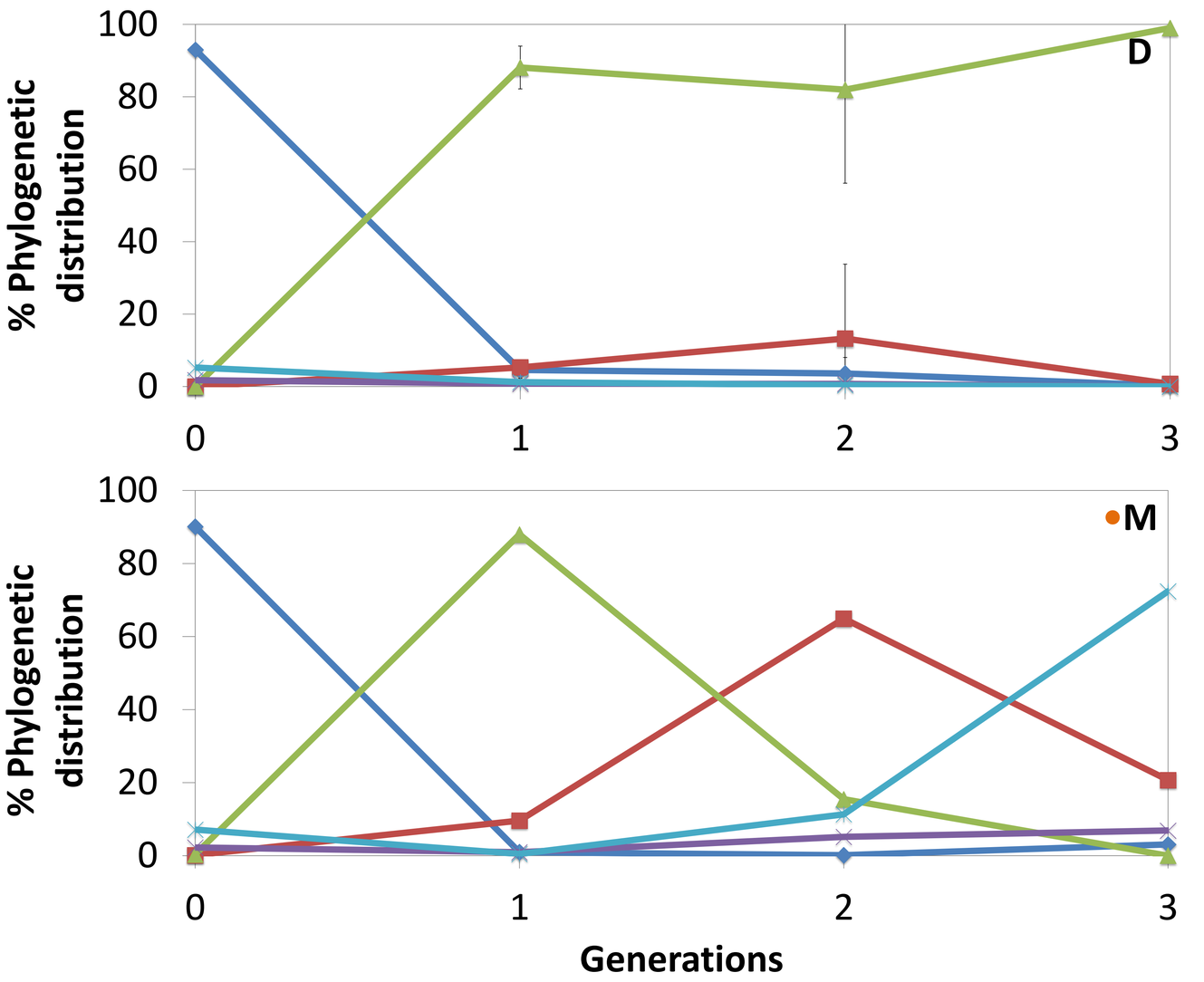
Figures show methane production of the triplicates for the enrichments (D for rumen, M for mixture).

● enrichment with low methane. * Bars represent initial COD and grey lines represent time at which re-inoculation occurred

Trends during adaption by microbial community



Phylogenetic distribution of archaeal community



Figures show the average distribution of the five major phylogenetic groups for the rumen fluid enrichments (D) and the mixed-inoculum enrichment with low methane (●M).

* Major bacterial groups remaining after enrichment were *Bacilli* (31% - 45.3%), *Porphyromonadaceae* (12.1% - 24.8%) and *Spirochaetes* (12.5% - 18.5%)

Conclusions

- Communities adapted to changes in their environment while maintaining methane production as a function.
- Diversity was greatly reduced when acclimatizing to anaerobic digestion.
- Bacterial and archaeal populations exhibit different tendencies: Die out, fluctuate, become diluted and become enriched.
- A reactor failure involves community shifts.

Acknowledgements

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