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Campylobacter spp. in biogas plants before and after anaerobic digestion of livestock manure

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In the context of developing renewable energies, on-farm anaerobic digestion is a sustainable technology for converting livestock manure to biogas and by product degradation. This digestate is usually spread on agricultural land as a fertilizer.

In France, most of biogas plants operate at mesophilic conditions (35-40°C).

Aim

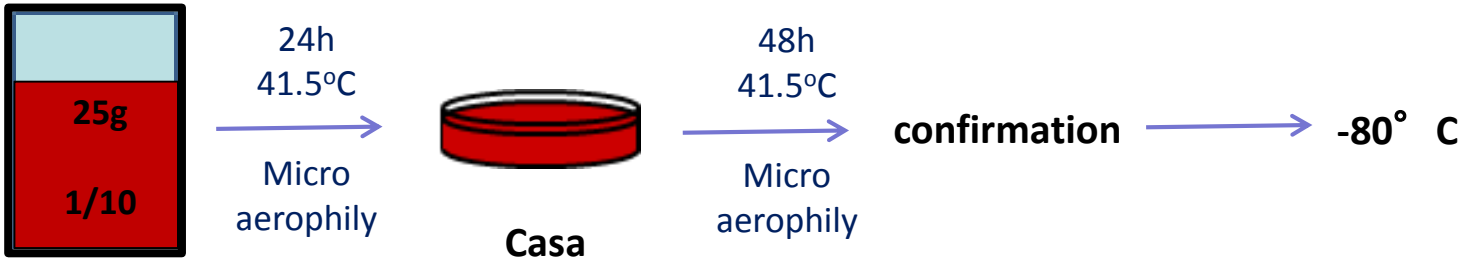
Detection and enumeration of thermotolerant *Campylobacter* spp.

in 3 Biogas plants, before and after digestion, on a 6 month period

MATERIAL & METHODS

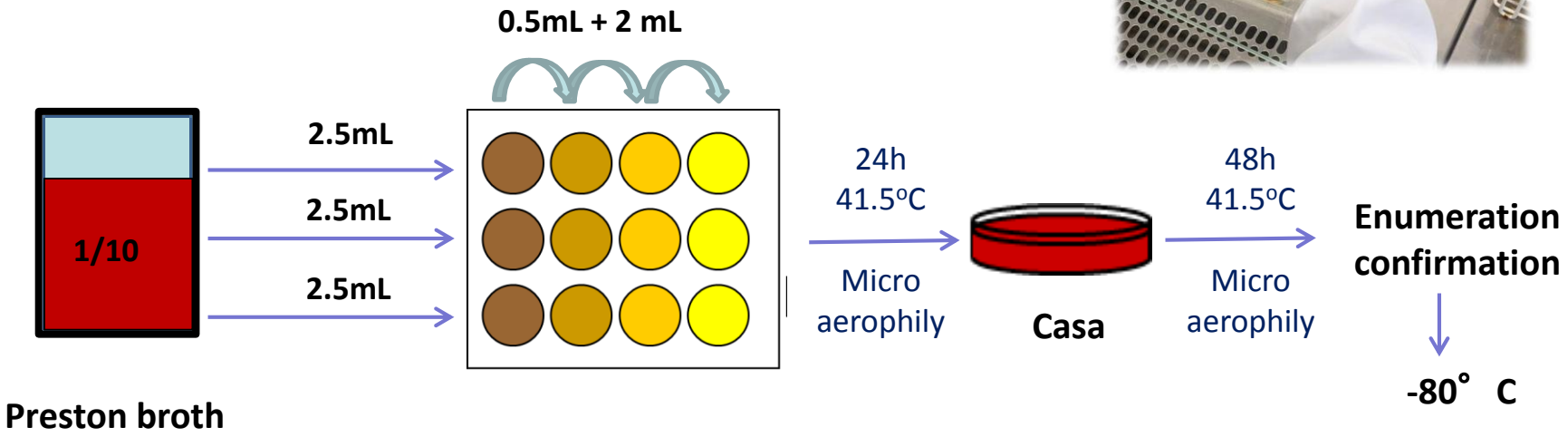
Sampling: 3 replicates manure and raw digestate collected in the 3 biogas plants at each of the 4 visits over 6 months

Detection: *Campylobacter* detected after enrichment in Preston broth



MATERIAL & METHODS

Enumeration: use of the most probable number method (MPN).
The number of bacteria/g was determined by MPN calculator with interval confidence at 95%.



RESULTS

Biogas plants (BP)	Manure	T °C	ID	Thermotolerant *Campylobacter* spp.			
				Manure		Raw digestate	
				Detection: *n positive / 4 x 3 replicates*	Enumeration MPN/g ww	Detection: *n positive / 4 x 3 replicates*	Enumeration MPN/g ww
BP1	**Swine**	**39-41**	*C. coli*	**12+**/12	**344**	**3+**/12	**2.6**
BP2	**Bovine / Poultry**	**38**	*C. jejuni*	**9+**/12	**387**	**0+**/12	-
BP3	**Swine**	**27**	*C. coli*	**12+**/12	**407**	**6+**/12	**14.5**
Total / mean				**33+**/36	**379**	**9+**/36	**8.5**

- *Sp.* in accordance with animal manure : *C. coli*/pig and *C. jejuni* /bovine
- *Campylobacter spp.* present in almost all manures (33 / 36)
- *Campylobacter spp.* present in 9 raw digestates (BP1 & 3)
- Enumeration significantly different (manures vs. raw digestates)

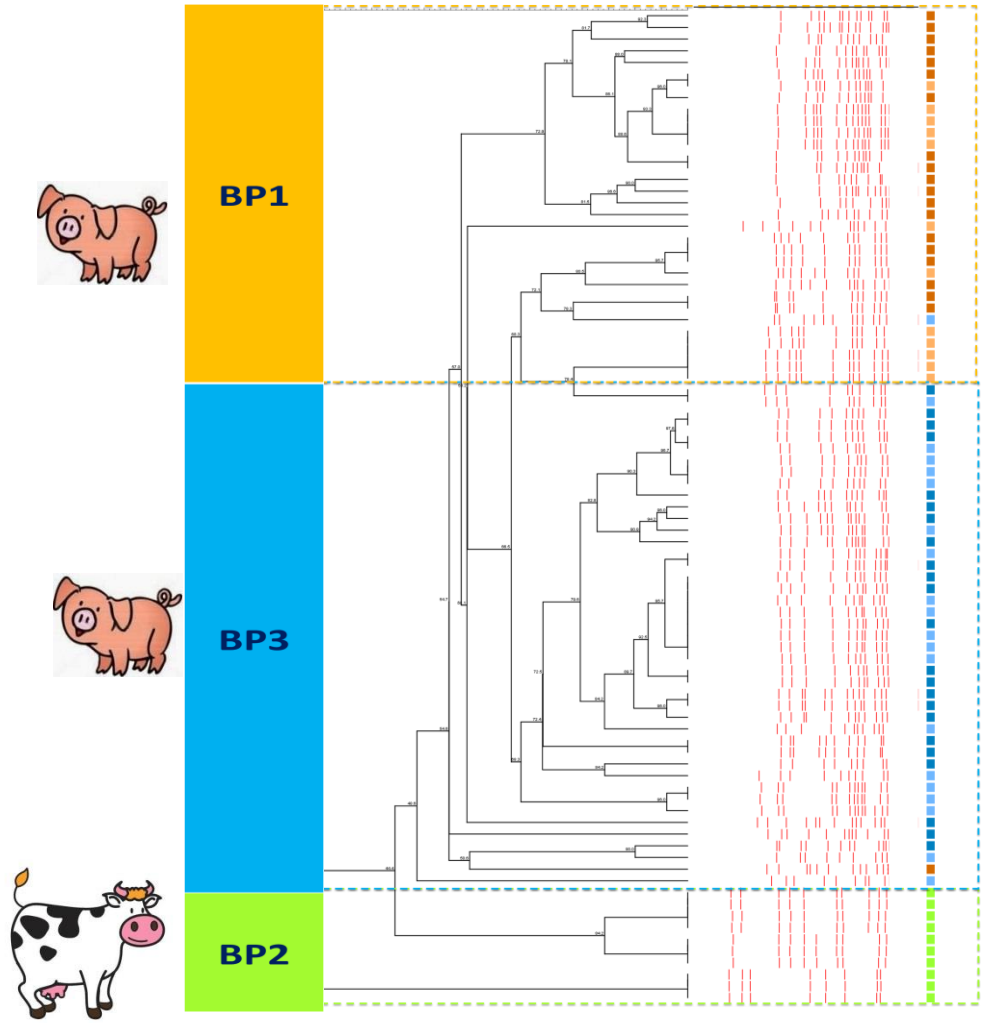
RESULTS

96 isolates
(84 *C. coli* and 12 *C. jejuni*)

RFLP-PFGE ↓ KpnI

49 profiles
(46 *C. coli* and 3 *C. jejuni)*

- ***C. coli* isolates showed a much higher diversity than *C. jejuni***
- **Isolates clustered according to the BP they originated from.**



CONCLUSION

These preliminary results showed that :

- **thermotolerant *Campylobacter* spp. were susceptible to mesophilic anaerobic digestion**
- ***C. jejuni* seemed to be more sensitive than *C. coli***

This treatment of livestock manure can be effective in reducing the presence of this pathogen.

…to be continued…

CONCLUSION

We wish to thank :

- **Ademe for the financial support**

- **the farmers for their kind participation**

Thank you