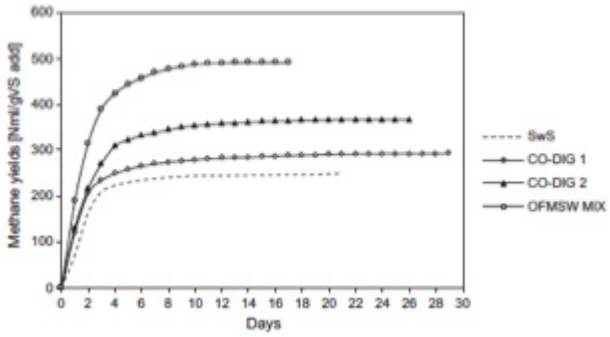
Co-digestion of multiple substrates

Mixing two or more different types of substrates together may improve nutrient balance and lead to a more stable AD process. This is favourable for maximising the gas production and resource utilisation and represents an integral part in the optimisation of a biogas plant. However, not all substrate mixtures have positive effect on the process. The AMPTS II is an excellent batch fermentation test platform for fast evaluation of co-digestion strategy with minimal labour demand.

Example 1

Screening of single or multiple substrate combinations

AMPTS II may be used to simultaneously screen combinations of co-substrates to find the substrate mixture than lead to the highest gas production and fastest degradation (Cabbai et al., 2013; Sahito et al., 2013; Kuusik et al., 2013). For example, anaerobic co-digestion of sewage sludge with food waste or co-digestion of animal manure with energy crops may be one of the most viable solutions to optimise the digesters stability & efficiency in wastewater treatment or biogas plants.

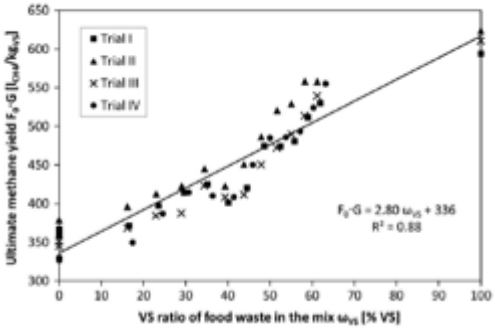


Specific methane production of sewage sludge (SwS), OFMSW and two co-digestion mixtures (CO-DIG 1, CO-DIG 2) (Cabbai et al., 2013).

Example 2

Optimisation of substrate mix for co-digestion

Besides the selection of co-substrates it is important to determine how the co-substrates should be mixed to maximise the gas production and resource utilisation. AMPTS II is an excellent tool in this regard as it allows for parallel evaluation of different co-substrate ratios and concentrations (Koch et al., 2015; Wall et al., 2013; Nartker et al., 2014).



Ultimate methane yields vs. volatile solids (VS) content of food waste in sewage sludge mixture (Koch et al., 2015).

Example 3

Investigation of microbial communities change in co-digestion

In order to improve the overall co-digestion process AMPTS II could also be used for optimising the microbial community structure. An example is the evaluation of the hydrolysis/acidification reaction in a two-phase system that can separate the two groups of microbial communities (Rajagopal et al. 2014).

Another example is the investigation of how the methane potential and methanogenic communities change in a co-digestion process at different temperatures (i.e. mesophilic (37 °C) and thermophilic (55 °C) conditions) (Walter et al., 2015).

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