IMPROVING BIOGAS PRODUCTION BY CO-DIGESTION OF CATTLE SLURRY AND FOOD WASTE

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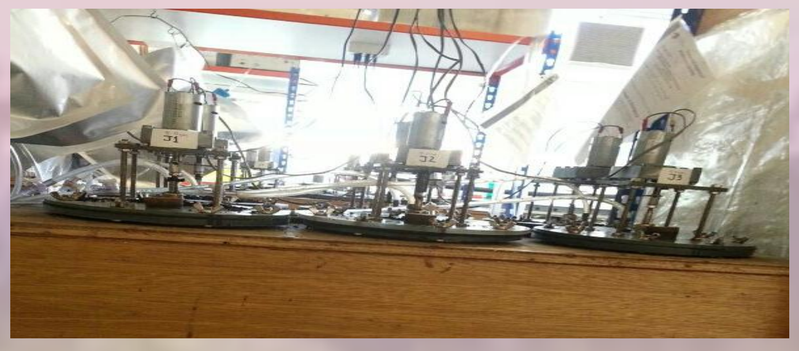
VALORGAS

HIGHLIGHTS

Co-digestion of food waste and cattle slurry showed no synergy in terms of increased specific methane yields, but offered stable digestion and improved volumetric methane production at organic loading rates up to 5 g VS l^{-1} day^{-1} and hydraulic retention times of 20 days.

EXPERIMENTAL SETUP



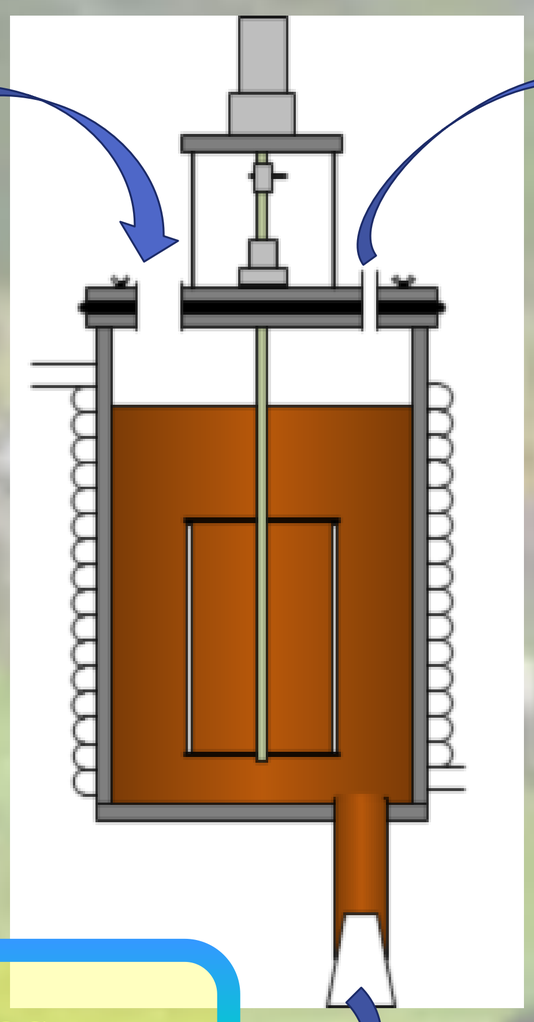
10 CSTRs with 4-litre working volume
Temperature: Mesophilic (35 ± 1 °C)
Test duration: 3.5 HRT (170 days including start-up)

Feedstock

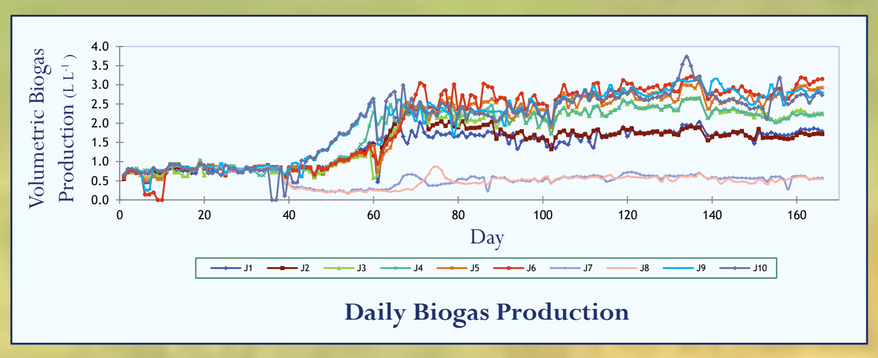
Cattle slurry + Food waste

Ratio 3 : 1 (wet- weight)

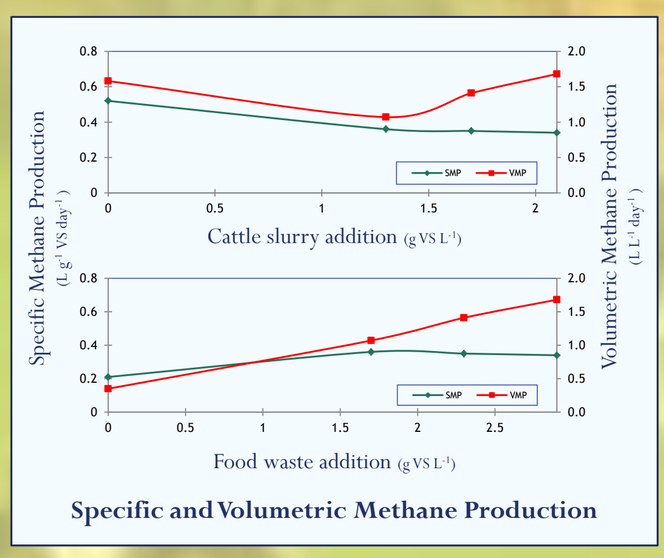
Digester	OLR (g VS l^{-1} day^{-1})			HRT (days)
	CS	FW	Total	
1 & 2	1.3	1.7	3	33
3 & 4	1.7	2.3	4	25
5 & 6	2.1	2.9	5	20
7 & 8	1.7	0.0	1.7	33
9 & 10	0.0	3.0	3	76



Gas production



Daily Biogas Production



Specific and Volumetric Methane Production

Methane content : 60-65%

Average steady state values

Parameter	Unit	Co-digestion			Controls	
		3	4	5	CS	FW
pH	–	7.72	7.65	7.62	7.65	7.92
Ammonia N	mg NH_3-N kg^{-1}	2465	2305	2294	2019	5461
Total alkalinity	mg $CaCO_3$ kg^{-1}	16587	15665	14916	13540	25211
VS destruction	%	61.0	63.5	64.0	42.5	81.5
Total VFA	mg l^{-1}	155	167	221	46	213
IA/PA ratio	–	0.34	0.34	0.33	0.31	0.30

CONCLUSION

Co-digestion offered stability and increased VBP at loading rates from 3-5 g VS l^{-1} day^{-1} at HRT of 20-33 days with little or no reduction in the specific methane yield.

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