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Biogas production from undiluted chicken manure and maize silage: a study of ammonia inhibition in high solids anaerobic digestion

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Abstract

The feasibility of co-digestion of chicken manure (CM) and maize silage (MS) without water dilution was investigated in 5-L digesters. Specific methane production (SMP) of 0.309 L CH_4 g^{-1} volatile solids (VS) was achieved but only at lower %CM. Above a critical threshold for total ammonia nitrogen (TAN), estimated at 7 g N L^{-1}, VFA accumulated with a characteristic increase in acetic acid followed by its reduction and an increase in propionic acid. During this transition the predominant methanogenic pathway was hydrogenotrophic. Methanogenesis was completely inhibited at TAN of 9 g N L^{-1}. The low digestibility of the mixed feedstock led to a rise in digestate TS and a reduction in SMP over the 297-day experimental period.

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