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

Chen Sun^{1,2,3}, Weixing Cao^{1,3}, Charles J. Banks², Sonia Heaven², Ronghou Liu^{1,2,3}*

1. Biomass Energy Engineering Research Centre, School of Agriculture and Biology, Shanghai Jiao Tong University, 800 Dongchuan Road, Shanghai 200240, People's Republic of China.

2. Faculty of Engineering and the Environment, University of Southampton, Southampton SO17 1BJ, UK.

3. Key Laboratory of Urban Agriculture (South), Ministry of Agriculture, 800 Dongchuan Road, Shanghai 200240, People's Republic of China.

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 CH₄ 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.

* Corresponding author, Ronghou Liu, Telephone (Fax): 0086 21 34205744. Email address: liurhou@sjtu.edu.cn

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