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Abstract

Digesters fed on food waste (high nitrogen content) were operated successfully over an extended period using sidestream biogas stripping to control total ammonia nitrogen (TAN) below inhibitory concentrations. This is the first time biogas stripping has been used to achieve stable thermophilic operation with undiluted substrate of this type.

Stripping columns operated batch-wise treated the equivalent of 1.7-4.1% of digester contents daily at pH >10 and 70 °C, with no detrimental effect on digestion. TKN removal was 54%, with potential to recover 3.5 kg N tonne⁻¹ substrate. When stripping was stopped in one digester TAN increased, accompanied by rising propionic acid concentrations with progressive instability observed from 2.5 g N L⁻¹. Eventual failure as TAN approached 5 g N L⁻¹ was due to rapid acetic acid accumulation, resulting in a fall in pH to below 6.5. The pattern of VFA accumulation indicated failure of both acetoclastic methanogenesis and acetate oxidation.

Keywords: Anaerobic digestion, ammonia, food waste, biogas stripping, side-stream

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