Ammonia - LCFA synergetic co-inhibition effect in manure-based continuous biomethanation process - DTU Orbit (11/01/2019)

In the current study it has been hypothesized that, when organic loading of an anaerobic reactor is increased, the additional cell biomass biosynthesis would capture more ammonia nitrogen and thereby reduce the ammonia toxicity. Therefore, the alleviation of the toxicity of high ammonia levels using lipids (glycerol trioleate-GTO) or carbohydrates (glucose-GLU) as co-substrates in manure-based thermophilic continuous stirred-tank reactors (RGTO and RGLU, respectively) was tested. At 5 g NH4+-N L−1, relative methane production of RGTO and RGLU, was 10.5% and 41% compared to the expected uninhibited production, respectively. At the same time control reactor (RCTL), only fed with manure, reached 32.7% compared to the uninhibited basis production. Therefore, it seems that using lipids to counteract the ammonia effect in CSTR reactors creates an “ammonia–LCFA (long chain fatty acids) synergetic co-inhibition” effect. Moreover, co-digestion with glucose in RGLU was more robust to ammonia toxicity compared to RCTL.

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