

## Continuous anaerobic digestion of swine manure: ADM1-based modelling and effect of addition of swine manure fibers pretreated with aqueous ammonia soaking - DTU Orbit (08/11/2017)

### Continuous anaerobic digestion of swine manure: ADM1-based modelling and effect of addition of swine manure fibers pretreated with aqueous ammonia soaking

Anaerobic digestion of manure fibers presents challenges due to their low biodegradability. Aqueous ammonia soaking (AAS) has been tested as a simple method to disrupt the lignocellulose and increase the methane yield of manure fibers. In the present study, mesophilic anaerobic digestion of AAS pretreated manure fibers was performed in CSTR-type digesters, fed with swine manure and/or a mixture of swine manure and AAS pretreated manure fibers (at a total solids based ratio of 0.52 manure per 0.48 fibers). Two different simulations were performed. In the first place, the Anaerobic Digestion Model 1 (ADM1) was fitted to a manure-fed, CSTR-type digester and validated by simulating the performance of a second reactor digesting manure. It was shown that disintegration and hydrolysis of the solid matter of manure was such a slow process that the organic particulate matter did not significantly contribute to the methane production. In the second place, ADM1 was used to describe biogas production from the codigestion of manure and AAS pretreated manure fibers. The model predictions regarding biogas production and methane content were in good agreement with the experimental data. It was shown that, AAS treatment significantly increased the disintegration and hydrolysis rate of the carbohydrate compounds of the fibers. The effect of the addition of AAS treated fibers on the kinetics of the conversion of other key compounds such as volatile fatty acids was negligible.

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