Ammonia tolerant inocula provide a good base for anaerobic digestion of microalgae in third generation biogas process - DTU Orbit (11/12/2018)

Ammonia tolerant inocula provide a good base for anaerobic digestion of microalgae in third generation biogas process

This study investigated the ability of an ammonia-acclimatized inoculum to digest efficiently protein-rich microalgae for continuous 3rd generation biogas production. Moreover, we investigated whether increased C/N ratio could alleviate ammonia toxicity. The biochemical methane potential (BMP) of five different algae (Chlorella vulgaris)/manure (cattle) mixtures showed that the mixture of 80/20 (on VS basis) resulted in the highest BMP value (431 mL CH$_4$/g VS$^{-1}$), while the BMP of microalgae alone (100/0) was 415 mL CH$_4$/g VS$^{-1}$. Subsequently, anaerobic digestion of those two substrates was tested in continuous stirred tank reactors (CSTR). Despite of the high ammonium levels (3.7-4.2 g NH$_4^+$-N L$^{-1}$), CSTR reactors using ammonia tolerant inoculum resulted in relatively high methane yields (i.e. 77.5% and 84% of the maximum expected, respectively) These results demonstrated that ammonia tolerant inocula could be a promising approach to successfully digest protein-rich microalgae and achieve a 3rd generation biogas production.