Screening Escherichia coli, Enterococcus faecalis, and Clostridium perfringens as Indicator Organisms in Evaluating Pathogen-Reducing Capacity in Biogas Plants - DTU Orbit (29/12/2018)

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This study was conducted to identify an indicator organism(s) in evaluating the pathogen-reducing capacity of biogas plants. Fresh cow manure containing 10(4) to 10(5) colony forming unit (CFU) per milliliter of Escherichia coli and Enterococcus faecalis along with an inoculated Clostridium perfringens strain were exposed to 37 A degrees C for 15 days, 55 A degrees C for 48 h, and 70 A degrees C for 24 h. C. perfringens was the most heat-resistant organism followed by E. faecalis, while E. coli was the most heat-sensitive organism. E. coli was reduced below detection limit at all temperatures with log(10) reductions of 4.9 (10 s), 4.37 (40 min), and 2.6 (5 days) at 70 A degrees C, 55 A degrees C, and 37 A degrees C, respectively. Maximum log(10) reductions for E. faecalis were 1.77 at 70 A degrees C (1 day), 1.7 at 55 A degrees C (2 days) and 3.13 at 37 A degrees C (15 days). For C. perfringens, maximum log(10) reduction at 37 A degrees C was 1.35 log(10) units (15 days) compared to less than 1 unit at 55 and 70 A degrees C. Modeling results showed that E. faecalis and C. perfringens had higher amount of heat-resistant fraction than E. coli. Thus, E. faecalis and C. perfringens can be used as indicator organisms to evaluate pathogen-reducing capacity in biogas plants at high temperatures of 55 A degrees C and 70 A degrees C while at 37 A degrees C E. coli could also be included as indicator organism.

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