

Effects of total solid concentration on anaerobic digestion of dairy manure wastewater ⁽¹⁾

Ting-Hsun Hsiao ⁽²⁾ Tein-Ming Su ⁽²⁾ Shui-Tsai Chen ⁽³⁾ Tzong-Faa Shao ⁽⁴⁾
Yu-I Huang ⁽⁵⁾ Mei-Ping Cheng ⁽²⁾ and Shao-Yi Sheen ⁽⁶⁾⁽⁷⁾

Received: Nov. 2, 2015; Accepted: Mar. 21, 2016

Abstract

The dairy manure wastewater of TS concentrations varied from 0.5% (A1), 1% (A2), 2% (A3), 4% (A4) to 8% (A5) were feed to the five anaerobic reactors of 10 L working volume to investigate the effects of total solid (TS) concentrations on anaerobic digestion with 10-d HRT. The COD, BOD, TS and VS concentrations of effluents increased with increase organic loading and the same tendencies were also observed for removal amounts, while the removal efficiencies for A4 and A5 were significantly inferior to the other 3 treatments. The results recommended the operation parameters of A1 and A2 for 10-d HRT anaerobic treatment. The average COD concentrations of influent and effluent were 8,130, 15,100 mg/L and 860, 1,540 mg/L of A1 and A2 treatments separately. The averaged biogas production significantly increased with increase TS concentrations of influents. Among the five treatments, the average daily production of A5 was the highest. Considering the feeding/output efficiency, A3 with results of 208 ml/g TS/d and 260 ml/g VS/d specific biogas production and 133 ml/g TS/d and 167 ml/g VS/d specific methane production is recommended.

Key words: Dairy manure wastewater, Solids, Anaerobic digestion, Biogas.

(1) Contribution No. 2377 from Livestock Research Institute, Council of Agriculture, Executive Yuan.

(2) Livestock Management Division, COA-LRI, Hsinhua, Tainan, Taiwan, R.O.C.

(3) Livestock Technical Service, COA-LRI, Hsinhua, Tainan, Taiwan, R.O.C.

(4) Animal Industry Division, COA-LRI, Hsinhua, Tainan, Taiwan, R.O.C.

(5) Department of Bio-industrial Mechatronics Engineering, National Chung-Hsing University.

(6) Department of Hospitality Management, Southern Taiwan University.

(7) Corresponding author. E-mail: ssheen@mail.stust.edu.tw.