

Development of a New Fermentation Process for Hardly Degradable Rice Straw Agriculture Waste (Advanced Studies on Sustainable Animal Production: Interrelationships among Human, Animal and Environment, 8th International Symposium of Integrated Field Science)

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In order to develop the new and high-efficiency methane fermentation process for hardly degradable rice straw, the co-digestion performance of different amount of rice straw and sewage sludge was investigated. The digestion of rice straw and sewage sludge under the investigated condition resulted in VFA accumulated in the digester. The influences of temperature, moisture content and initial pH value on VFA accumulation in the hydrolysis step of methane fermentation were tested. The results showed that the total VFA concentration was increased with initial pH value, and was decreased with temperature and moisture content. Then the feasibility of rice straw pretreatment with the accumulated VFA from the fermentation process was studied. For the pretreatment process, the increase of acid concentration, pretreatment time and ratio of solid to liquid in some extent increased the lignin reduction and the hydrolysis rate. About 34.19% of lignin was removed and 21.15% of the hydrolysis rate was obtained in commercial reagent pretreatment by 2.5% of acid for 2 h at the ratio of 1:20 (w/v), and 10.7% of weight loss was obtained by pretreatment with drip washing VFA solution. The production of methane gas from rice straw was significantly enhanced as nearly as two times by drip washing VFA solution pretreatment than that of untreated rice straw. This suggested that the accumulated VFA from the rice straw fermentation process can be used as a kind of pretreatment reagent for improving biodegradability and methane production. So a low-cost and high-efficiency methane fermentation process for hardly degradable lignocellulosic materials such as rice straw could be established.