Piyanee Sangsri 2014: Biogas Production from Napier Grass and Rice Straw by Co-Digestion with Cow Dung. Master of Engineering (Environmental Engineering), Major Field: Environmental Engineering, Department of Environmental Engineering. Thesis Advisor: Assistant Professor Suchat Leungprasert, Ph.D. 207 pages.

The objective of this study was to investigate the co-digestion of napier grass and rice straw with cow dung by using ruminal microorganisms from cow and buffalo. The bioreactor working volume was 5 liters and were operated in a single-stage semi-continuous operation by a five day feeding at the rate of 625 ml/5 days, giving rise to the hydraulic retention times of 40 days. The system pH was start up at pH 7.5 and the experiments were performed at 30 ± 1 °C. The results found that napier grass at a cutting interval of 60 days (83.93 % moisture) gave the highest methane yield from co-digestion of napier grass with cow dung (napier grass : cow dung : water = 10 : 10 : 80 % by fresh weight) by using ruminal microorganisms from cow, that was 300 L at STP/kg Chemical Oxygen Demand (COD) degraded (or 371 L at STP/kg Total volatile solids (TVS) degraded and 194 L at STP/kg Total solids (TS) added). The extent of COD degradation was 66.50 % and methane content in biogas was 52 % . As for rice straw (8.08 % moisture) gave the highest methane yield from co-digestion of rice straw with cow dung (rice straw : cow dung : water = 1.75 : 10 : 88.25 % by fresh weight) by using ruminal microorganisms from cow, that was 260 L at STP/kg COD degraded (or 331 L at STP/kg TVS degraded and 168 L at STP/kg TS added). The extent of COD degradation was 52.27 % and methane content in biogas was 44 % . The results show that co-digestion gave higher yield than that of substrate alone for both napier grass and rice straw. By using ruminal microorganisms from cow, napier grass can be a good substrate. On the other hand, rice straw can be a good substrate for using ruminal microorganisms from buffalo. In operating the system for anaerobic digestion and co-digestion of napier grass and rice straw, pH adjustment to be neutral was needed.

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