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Pengaruh Jenis Biostarter Alami dan Komersial Terhadap Produksi Biogas dalam Anaerobic Digestion = The Effect of Natural and Commercial Biostarters Type on Biogas Production in Anaerobic Digestion

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Abstrak

Flora mikroorganisme merupakan salah satu aspek penting dalam optimalisasi proses berlangsungnya anaerobic digestion. Biostarter merupakan bahan penyedia flora mikroorganisme pendegradasi yang berperan dalam proses penguraian limbah organik. Tujuan penelitian ini yaitu untuk menganalisis pengaruh jenis inokulum dengan penggunaan biostarter berupa kotoran sapi, rumen sapi, EM4, OrgaDec, PROMI terhadap kinerja proses dan hasil penyisihan Total Solids (TS), Volatile Solids (VS), Chemical Oxygen Demand (COD), dan produksi volume biogas. Penelitian dilakukan dengan metode Biochemical Methane Potential (BMP) yang dilakukan selama 48 hari menggunakan substrat berupa sampah organik dari UPS Universitas Indonesia dan inokulum dengan enam variasi sampel yaitu kotoran sapi, rumen sapi, EM4 dan molase, EM4 dan zat pengaya, OrgaDec dan zat pengaya, serta PROMI dan zat pengaya. Dimana inokulum sebelumnya melalui proses aklimatisasi dengan laju beban organik sebesar 10 kg-VS/m3-hari dan diikuti dengan proses degasifikasi. Hasil penelitian menunjukkan bahwa 5 gram substrat berupa sampah makanan dari UPS Universitas Indonesia dapat dikonversi menjadi biogas dengan volume 4,37 mL/48 hari (menggunakan EM4 dan Molase); 6,91 mL/48 hari (menggunakan rumen sapi); 7,24 mL/16 hari (menggunakan PROMI dan Zat Pengaya); 14,39 mL/16 hari (menggunakan OrgaDec dan Zat Pengaya); 22.37 mL/48 hari (menggunakan EM4 dan Zat Pengaya); serta 261.25 mL/48 hari (menggunakan Kotoran Sapi). Hasil uji analisis statistik menggunakan One Way ANOVA menunjukkan bahwa perbedaan penggunaan inokulum mepengaruhi nilai persentase TS Reduction dan VS Reduction ($p < 0,05$), dimana inokulum berupa campuran biostarter PROMI dan zat pengaya memiliki nilai persentase reduksi TS dan VS terbesar. Di samping itu, hasil uji statistik dengan menggunakan Independent T-Test menunjukkan bahwa biostarter komersial dalam inokulum dapat meningkatkan persentase TS Reduction ($p < 0,05$) dengan menggunakan anaerobic digestion metode BMP.

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Microbial flora is one of significant aspects in optimization of the anaerobic digestion process. Biostarter is material that provides microbial flora which has role in organic waste degradation. The aim of this study was to find out and analyze the effect of inoculum type with the use of biostarter such as cow manure, cow rumen, EM4, OrgaDec, PROMI on process performance and removal of Total Solids (TS), Volatile Solids (VS), Chemical Oxygen Demand (COD), and production of biogas volume. This study conducted with Biochemical Methane Potential (BMP) method for 48 days using organic waste from Unit Pengolahan Sampah Universitas Indonesia as substrate and inoculum with six sample variations—such as cow manure; cow rumen; EM4 and molasses; EM4 and enrichment ingredients; OrgaDec and enrichment ingredients; PROMI and enrichment ingredients, which those inoculums were previously acclimated (with organic loading rate in the amount of 10 kg-VS/m3-day) and were followed with degassing process. The results of this study showed that 5 grams of substrate, namely food waste from Unit Pengolahan Sampah Universitas

Indonesia can be converted into biogas with a volume of 4,37 mL/48 days (using EM4 and molasses); 6,91 mL/48 days (using cow rumen); 7,24 mL/16 days (using PROMI and enrichment ingredients); 14,39 mL/16 days (using OrgaDec and enrichment ingredients); 22,37 mL/48 days (using EM4 and enrichment ingredients); and 261,25 mL/48 days (using cow manure). The results of statistical analysis using One Way ANOVA showed that the difference in the use of inoculums influenced the value of the percentage of TS Reduction and VS Reduction ($p < 0,05$), where the inoculum in the form of a mixture of PROMI biostarter and enrichment ingredients had the highest TS and VS reduction percentage values. In addition, the results of statistical test using the Independent T-Test showed that commercial biostarter in the inoculum can increase the percentage of TS Reduction ($p < 0.05$) by anaerobic digestion with BMP method.<i/>