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Pretreatment of Paper Sludge with Rumen Fluid to Enhance Biogas Production

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A large quantity of paper sludge is generated during papermaking. The paper sludge is difficult to be digested anaerobically due to its high levels of ash and lignin. Here, we investigated whether biogas production from paper sludge could be enhanced by pretreatment with rumen fluid. We also added up to 0.8 mg/ml sodium dodecyl sulfate (SDS) to rumen fluid at pretreatment to improve the efficiency of biogas production. Methane production from paper sludge with 6-h pretreatment was 30 times higher than that without pretreatment. This indicates that pretreatment with rumen fluid can significantly enhance biogas production from paper sludge. Upon the addition of 0.4 and 0.8 mg/ml SDS, the number of ruminal protozoa and the volume of methane production decreased. No differences in chemical oxygen demand and volatile fatty acid concentration were observed upon SDS addition. It is considered that the decrease in the number of fiber-degrading protozoa by SDS addition inhibited the degradation of paper sludge and decreased methane production. From these results, adding SDS during pretreatment using rumen fluid does not seem to have any advantages for the methane fermentation of paper sludge.