Inhibition of methane production by the palm oil industrial waste phospholine gum in a mimic enteric fermentation

ABSTRACT

The potential utilization of phospholine gum, a by-product of the palm oil industry was evaluated using waste sewage sludge (WSS) as a substrate as well as a microbial source to mimic methane production by enteric fermentation. Ruminant animals release enteric methane through their digestive process. The enteric methane is one of the greenhouse gasesthat can contribute to global warming and should be prevented. In this study, methane production was remarkably inhibited by adding phospholine gum to WSS, even at a low concentration. Phospholine gum reduced the activity of methanogens and *Lactobacillus* sp. and *Megasphaera* sp. which are known as important ruminal microorganisms were detected as bacterial species induced by the addition of phospholine gum to WSS. Also, the addition of phospholine gum triggered an increase in protein concentrations as well as proteaseactivities and stimulated to produce protease and cellulase by which phospholine gum may be degraded. Furthermore, a significant amount of propionate was produced in the presence of phospholine gum. Thus, phospholine gum inhibits methane production without inhibiting the stages of hydrolysis and acidogenesis/acetogenesis. Finally, methane fermentation using the rumen derived from a goat was also inhibited by phospholine gum. Therefore, these results indicate that the phospholine gum has great potential to inhibit methane production as a feed additive for ruminant animals.

Keyword: Phospholine gum; By-product of palm oil industry; Methane inhibition; Waste sewage sludge; Rumen; Anaerobic digestion