World Academy of Science, Engineering and Technology
International Journal of Animal and Veterinary Sciences
Vol:10, No:12, 2016

Effects of Vegetable Oils Supplementation on in Vitro Rumen Fermentation and Methane Production in Buffaloes

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Abstract : Methane emitted from ruminant livestock not only reduces the efficiency of feed energy utilization but also contributes to global warming. Vegetable oils, a source of poly unsaturated fatty acids, have potential to reduce methane production and increase conjugated linoleic acid in the rumen. However, characteristics of oils, level of inclusion and composition of basal diet influences their efficacy. Therefore, this study was aimed to investigate the effects of sunflower (SFL) and cottonseed (CSL) oils on methanogenesis, volatile fatty acids composition and feed fermentation pattern by in vitro gas production (IVGP) test. Four concentrations (0, 0.1, 0.2 and 0.4ml /30ml buffered rumen fluid) of each oil were used. Fresh rumen fluid was collected before morning feeding from two rumen cannulated buffalo steers fed a mixed ration. In vitro incubation was carried out with sorghum hay (200 ± 5 mg) as substrate in 100 ml calibrated glass syringes following standard IVGP protocol. After 24h incubation, gas production was recorded by displacement of piston. Methane in the gas phase and volatile fatty acids in the fermentation medium were estimated by gas chromatography. Addition of oils resulted in increase ($p<0.05$) in total gas production and decrease ($p<0.05$) in methane production, irrespective of type and concentration. Although the increase in gas production was similar, methane production (ml/g DM) and its concentration (%) in head space gas was lower ($p< 0.01$) in CSL than in SFL at corresponding doses. Linear decrease ($p<0.001$) in degradability of DM was evident with increasing doses of oils (0.2ml onwards). However, these effects were more pronounced with SFL. Acetate production tended to decrease but propionate and butyrate production increased ($p<0.05$) with addition of oils, irrespective of type and doses. The ratio of acetate to propionate was reduced ($p<0.01$) with addition of oils but no difference between the oils was noted. It is concluded that both the oils can reduce methane production. However, feed degradability was also affected with higher doses. Cotton seed oil in small dose (0.1ml/30 ml buffered rumen fluid) exerted greater inhibitory effects on methane production without impeding dry matter degradability. Further in vivo studies need to be carried out for their practical application in animal ration.

Keywords : buffalo, methanogenesis, rumen fermentation, vegetable oils
Conference Title : ICAVS 2016 : International Conference on Animal and Veterinary Sciences
Conference Location : Sydney, Australia
Conference Dates : December 15-16, 2016