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Dose response effects of some Iranian native essential oils on *in vitro* ruminal methane production

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The aim of the present study was to evaluated effect of some Iranian native essential oils at different doses on *in vitro* ruminal methane production of a high concentrate diet. Experimental diet that used for batch cultures was a mix of concentrate: alfalfa hay (80:20, based on DM) which was ground to pass from 1-mm screen. Approximately, 500 mg of the diet alone (as control) or plus cinnamon (Ci), Oregano (Or), Pistachio hull (PH), Coriander (Cor) and Thyme (Th) essential oils (35, 70, 140 and 280 µl/l of culture fluid) were placed into a 125 ml serum bottles (n=6) containing 50 ml of buffered rumen fluid (ratio of buffer to rumen fluid was 2:1), then bottles were placed in water bath for 24 h at 38.5 °C. Rumen fluid was obtained from three adult ruminally fistulated sheep, before the morning feeding. In the end of incubation gas production of each bottles was recorded and a sample of the gas was collected into a 10 ml evacuated tubes. Methane content of the produced gas was determined using gas chromatography procedure. Data were statistically analyzed using SAS (V. 9/1) and differences between each treatment and control were tested using Dunnett's test ($P<0.05$). The results indicate that all of the essential oils (except Cor) were effective ($P<0.05$) in decrease of methane produced compared with those of the control. Relative to the control increasing concentration of essential oil (except for Cor) resulted to decrease in methane production. Results of the present study concluded that TH, Ci and PH essential oils have a high potential to decrease ruminal methane production.

Tea leaves improve *in vitro* degradability but reduce rumen ammonia from rice straw-based diets

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Green (GTL) and black (BTL) tea leaves are good sources of crude protein (CP) and phenolic compounds including tannins. Therefore, their use as novel additives may be useful to improve the utilization of low quality rice straws (RS) based ruminant diets. Five iso-nitrogenous (152±7.6 g CP & 11±0.13 MJ ME/kg DM) diets were prepared by mixing (% DM basis) 70 concentrate with either 30 RS (control) or 25 RS + 5 GTL (GTL5) or 20 RS + 10 GTL (GTL10) or 25 RS + 5 BTL (BTL5) or 20 RS + 10 BTL (BTL10). An *in vitro* incubation experiment with a 5×5 factorial design, in triplicate, was used to compare these 5 diets at 5 incubation times (0, 6, 24, 48 and 72 h) for their *in vitro* dry matter degradability (IVDMD) and ammonia (NH_3) production using sheep rumen fluid under anaerobic conditions at 39 °C. The statistical comparison showed that the mean IVDMD (g/kg DM) of GTL5 (308.4) and GTL10 (311.8) were significantly higher ($P<0.001$) than the control (275.6) but not BTL5 (278.0) and BTL10 (280.2). Conversely, the mean NH_3 concentration (mg/l) for GTL5 (114.9), GTL10 (100.4) and BTL10 (117.1) were lower ($P<0.001$) than the control (126.3) but not for BTL5 (125.9) which was similar to the control. GTL have the more potential than BTL to improve IVDMD of RS based diets. Moreover, lower NH_3 production for tea leaves-containing diets was likely due to the ability of tea tannins to bind and protect plant proteins from rumen degradation but make these available as by-pass protein for their absorption in small intestine.