

Eugenol Supplementation in High or Low Concentrate Diets: Effects on Ruminal Fermentation, Protozoa Counts, And In Situ Ruminal Degradation of Soybean Meal, Hay, and Corn Grain In Dairy Cows Fed

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Four ruminally primiparous lactating cows (body weight = 568 kg; days in milk = 67) were used in a 4 x 4 Latin square design (28-d periods) with a 2 x 2 factorial arrangements of treatments to determine the effects of eugenol (EUG) supplementation (0 vs. 50 mg/kg of Dry Matter Intake) and concentrate level (high: H vs. low: L; 65% vs. 35%, Dry Matter basis (DM)) on ruminal fermentation, protozoa counts, and in situ ruminal degradation (16 h incubation) of soybean meal, grass/legume hay, and corn grain. The MIXED procedure of SAS (SAS Inst., Inc., Cary, NC) was used to test the main effects of EUG supplementation, concentrate level, and their interaction. Significance was declared at $P > 0.05$. Average ruminal pH was lower for H than for L (6.04 vs. 6.23) while $\text{NH}_3\text{-N}$ concentration was similar for H and L diets (6.00 mM). Total VFA concentration tended ($P = 0.09$) to increase in cows fed H diets as compared to those fed L diets (134.7 vs. 127.0 mM). Molar proportion of acetate was lower (59.7 vs. 63.7%) and that of propionate was higher (23.3 vs. 19.5%) for H than for L. Proportions of butyrate (13.2%) and branched-chain VFA (2.06%) remained unaffected by concentrate level. Total protozoa numbers were higher for H than for L diet (4.1 vs. 2.6 x 10⁵/mL). Supplementation with EUG had no effect on ruminal pH, concentrations of total volatile fatty acids (VFA) and $\text{NH}_3\text{-N}$, and protozoa numbers. The effect of EUG on VFA profile was only limited to branched-chain VFA proportion, which was higher for cows fed EUG than for those fed diets without EUG (2.19 vs. 1.93%). Ruminal degradation of hay DM was lower (45.1 vs. 53.7%) and that of soybean meal DM tended to be lower (71.1 vs. 76.7%; $P = 0.08$) for H than for L. Ruminal degradation of corn DM was unaffected (68.9%) by the concentrate level. Supplementation with EUG had no effect on ruminal degradation of any of the feed ingredients tested.

Implications: Results from this study show that at the concentration evaluated (50 mg/kg of dietary DM), eugenol supplementation had minor effects on fermentation, protozoa numbers, and feed degradation in the rumen of cows fed high or low concentrate diets.