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Ruminal parameters in cows fed elephantgrass-based diets containing two types of sunflower oil associated with two methods of concentrate feeding

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Changes in pH and concentrations of volatile fatty acids (VFA) and ammonia nitrogen (NNH₃) are important indicators of feed fermentation in the rumen, which may help to better understand possible effects of different diets on animals' performance. Plant oils rich in polyunsaturated fatty acids (FA) have been shown to alter the milk fatty acid composition, but it can also affect rumen metabolism depending on factors such as the degree of FA unsaturation and feeding method. The present study aimed to evaluate the effects of two types of sunflower oil (SO) associated with two methods of concentrate feeding on rumen fermentation parameters in lactating cows fed elephantgrass-based diets. The experimental design was a 4 x 4 Latin Square (LS) with 15 days treatment periods (10 days for diet adaptation and five days for sample collection) in which four rumen fistulated Holstein x Gir lactating cows (79 ± 20 DIM, 16.4 ± 3.1 kg day⁻¹ of milk, 430 ± 38.5 kg BW) were fed the dietary treatments in a 2 x 2 factorial treatment arrangement. The two types of SO differed mainly in their oleic and linoleic acid contents and were classified as high oleic (72.6 and 10.4% of oleic and linoleic acid, respectively) and medium oleic (42.8 and 33.6% of oleic and linoleic acid, respectively). The SO was mixed with other concentrate feeds (ground corn, soybean meal, citrus pulp, minerals and vitamins) at 4.5% of diet DM. The concentrate mix containing high oleic or medium oleic SO was fed either twice a day after morning and afternoon milking or as part of a TMR (65F:30C, on a DM basis). Fresh chopped elephantgrass (70 - 90 days) was used as forage source. Samples of rumen liquid were collected in each LS period at 0, 4, 6, 8, 10, 12, 16 and 24 h after first morning feeding and analyzed for pH and concentrations of VFA (acetic, propionic and butyric) and NNH₃. Data were analyzed as repeated measures using the PROC MIXED of SAS (v. 9.0). The variance matrix was chosen according to Akaike information criteria, with the statistical model including sampling time, cow, LS period, method of feeding and type of SO as sources of variation. Sampling time, type of SO, method of concentrate feeding (and their interactions) and LS period were considered as fixed effects, while cow was the random effect. Differences were considered significant at P<0.05. There was a significant effect of sampling time (P<0.0001) for all rumen fermentation parameters. No significant effects (P>0.05) of SO type or interaction method of feeding x type of SO were observed for any variable. A significant increase (P<0.03) in the concentration of rumen fermentation parameters other than butyrate as well as lower rumen pH was observed in cows fed TMR. These results may be a consequence of higher (P<0.05) DM, CP and NDF intakes in cows fed TMR. It was concluded that the method of concentrate feeding affected the rumen fermentation in cows fed elephant grass-based diets containing high levels of SO inclusion, with TMR resulting in higher concentrations of VFA and lower rumen pH as compared to twice a day feeding.

Keywords: ammonia nitrogen, oleic acid, *Pennisetum purpureum*, plant oil, ruminal pH, volatile fatty acids

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