Ammonia emissions from dairy cows grazing an annual temperate pasture with or without energetic supplementation

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Ammonia (NH₃) emissions from animal excretions has been a concern in grazing dairy systems, and is dependent of the proportion of total urinary and fecal nitrogen (N) lost as NH₃. The aim of this study was to assess NH₃ emissions from excreta of dairy cows grazing an annual temperate pasture (A. strigosa Schum + L. multiflorum Lam.) exclusively or receiving energetic supplementation. Treatments were grazing without supplementation, grazing + 4.2 kg DM corn silage and grazing + 3.2 kg DM ground corn. Supplements were calculated in order to provide the same amount of metabolisable energy. Feces and urine were sampled from four cows of each treatment during one day, at 7:30 and 16:30 h. One hundred and thirty g of feces and 80 mL of urine from each treatment plus a control without excreta were assigned into the pasture area, considering a randomized complete block design with three replications. The NH₃ was captured by a semi-open chamber (10 cm diameter) containing a foam strip soaked with a solution of H₂SO₄ 1M + 2% glycerin. The foam strips were replaced 2, 4, 7, 10, 13, 17, 21 and 25 days after distribution of excreta into the pasture, and ammonium concentration was performed by steam distillation. The amount of N recovered was multiplied by a factor of 1.74 calculated from the N-NH₃ recovery (1/0.63) of this technic. The fraction of excreta N volatilized as NH₃ was calculated by the ratio between the N volatilized from excreta corrected to the volatilization from the control. The fraction of urinary N lost as NH₃ was similar between treatments, averaging 19.2%, but the fraction of fecal N lost as NH₃ decreased from 4.6% in no supplemented cows to 2.4 and 0.6% in animals supplemented with corn silage and corn ground, respectively. Total excreta (urine + feces) NH₃-N emissions factors were similar between treatments, averaging 22%. Supplementing dairy cows grazing an annual temperate pasture with corn silage or corn ground may mitigate NH₃ emissions factors from feces but not from urine or total excreta. The amount of N excreted by these animals will be considered to obtain the real amounts of NH₃-N emissions in each treatment.

Keywords: A. strigosa Schum, corn silage, corn ground, L. multiflorum Lam

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