



Pasture Type and Site Effects on Annual Nitrous Oxide Emission Rate

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We hypothesized that intensive grazing and reduced stand age increase N_2O emission on Western Canadian pastures. Annual N_2O-N emission rates for ungrazed (exclosed), grazed and urine spot sites in replicated, rotationally grazed, fertilized (100 kg N/ha) old grass (30 yr-old smooth brome grass, quackgrass, Kentucky bluegrass) and meadow brome grass (6 yr-old) pastures were compared from 2003 to 2005 in a randomized block design. Yearling heifers were grazed with the “put and take” method, but average stocking rate for the pasture types was similar. Gas samples were collected weekly using a non-flow through non steady-state method from early April until freeze-up. Urine sites were marked after urination and monitored for an entire year. Annual N_2O-N loss estimates were calculated for each sampling unit by linear interpolation. N_2O-N flux on grazed and urine sites was highly variable. Average annual N_2O-N emission rate for ungrazed and grazed (0.50 vs. 2.04 kg N_2O-N /ha) was similar, but lower than urine sites (5.45 kg N_2O-N /ha); on average old grass was higher than meadow brome grass ($P = 0.05$). When analysed by site old grass had significantly lower, similar and higher average annual N_2O-N emission rates compared to meadow brome grass at ungrazed, grazed and urine sites, respectively. Ungrazed old pastures had lower N_2O-N emission rates than youthful meadow brome grass, but intensive management and urine spot coverage overcame the difference. The information represents sites and not entire pasture areas, however the emission rates for both pasture types on a carbon dioxide equivalent basis was considered relatively high.

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