Geophysical Research Abstracts
Vol. 14, EGU2012-6630-1, 2012
EGU General Assembly 2012


# Trace gas emissions following deposition of excreta by grazing dairy cows in eastern Canada

P. Rochette (1), D.E. Pelster (1), M.H. Chantigny (1), D.A. Angers (1), C. Liang (2), G. Belanger (1), N. Ziadi (1), E. Charbonneau (3), and D. Pellerin (3)

(1) Agriculture and Agri-Food Canada, Québec City, Canada (david.pelster@agr.gc.ca), (2) Environment Canada, Gatineau, Canada, (3) Dép. de zootechnie, Université Laval, Québec City, Canada

The $N_2O$ emission factor proposed for cattle excreta N by the Tier I IPCC methodology (EF3) is 2% (IPCC, 2006). While $N_2O$ emissions from excreta deposited by grazing animals have been reported in several publications, relatively few estimated EF3 values because measurements did not cover the entire year. This study measured $N_2O$ and $CH_4$ flux and crop dry matter (DM) yield over two years (2009 to 2011) from a clay and a sandy loam soil cultivated with Timothy grass (Phleum pratense L.). A split-plot design was used on each soil type, with different application dates (either spring, summer or autumn application) as main plots and treatment (U-50: urine 50 g N $m^{-2}$, U-100: urine 100 g N $m^{-2}$, dung: 60 g N $m^{-2}$, and control) as the sub-plots. Regardless of application time, annual DM yield increased in all treated plots when compared to the control. Also, DM yields were generally greater when urine as opposed to dung was applied suggesting greater N-availability from the urine application. The $CH_4$ flux from the dung plots increased for only the first two weeks after treatment while the flux from the urine plots was similar to the control plots. Cumulative $N_2O$ emissions on the U-50 and U-100 plots increased linearly with urine N rate on both soils, resulting in nearly identical mean emission factors for both urine rates. The emission factor for the urine was three times greater on the clay (1.02% of applied N on both rates) than on the sandy loam soil (0.26% (U100) and 0.31% (U50) of applied N). Cumulative $N_2O$ emissions from dung plots also differed between soil types; however the impact of soil type on $N_2O$ emissions was opposite to that of urine, with greater losses from the sandy loam (0.15%) compared with the clay soil (0.07%). These results suggest that estimates of soil $N_2O$ emissions by grazing cattle in Eastern Canada obtained using the IPCC default methodology are overestimates of actual values and that these estimates for should include a stratification according to soil type.