848 Ammonia emissions from a commercial feedyard measured using passive samplers and a box model. N. A. Cole*[1], R. W. Todd[1], D. B. Parker[2], M. Rhoades[3], and A. Mason[1], [1]*USDA-ARS, Conservation & Production Research Lab, Bushland, TX,* [2]*USDA-ARS-MARC, Clay Center, NE,* [3]*West Texas A&M University, Canyon.*

Animal feeding operations are a major source of ammonia gas emitted to the atmosphere. Ammonia emissions can potentially affect air quality and sensitive ecosystems, but because measuring ammonia emissions from open lots is difficult, few studies have investigated ammonia losses from beef cattle feedyards. Our objective was to measure ammonia emissions from a 77-ha, 45,000-head beef cattle feedyard on the southern High Plains. Profiles of ammonia concentration, wind speed, and air temperature were measured downwind (5 d in summer) or in the middle (6 d in winter) of the feedyard. In addition, ammonia concentrations were measured at 7 locations downwind (summer) or in the middle (winter) of the yard using a combination of active and passive samplers. Ammonia flux was estimated using a box model. Samples of rations, fresh feces, pen manure, and compost were obtained for chemical analyses (DM, N, P). Dietary N concentrations averaged 2.14% during the summer and 2.51% during the winter. Hourly ammonia-N flux averaged 365 ± 49 mg/m^2 in the summer and 212 ± 92 mg/m^2 in the winter. Ammonia-N emission rates averaged 5,453 ± 741 kg/d in the summer (63% of N intake), and 3,170 ± 1,383 kg/d in the winter (31% of N intake), with an annualized average of 4,311 ± 1,612 kg/d (47% of N intake). Nitrogen volatilization losses, estimated from the changes in the N:P ratio of rations and dry pen manure, averaged 42% of N intake. The annualized emission factor was 15.4 ± 2.2 kg ammonia-N/head fed. Nitrogen volatilization losses from the compost windrows, estimated from changes in the N:P ratio of manure and compost, averaged 3.4 ± 1.4% of N placed in the windrows during winter and 13.3 ± 1.3% in summer. Ammonia-N volatilization losses from the retention pond, estimated using an empirical model, averaged 5.5 ± 4.4 kg/ha daily or 166 ± 130 kg/d. These values agree well with emissions estimated using an inverse dispersion model and demonstrate that the pen surface is the primary source of feedlot ammonia, and that emissions are greater in summer than winter. This research was partially supported by grant #TS2006–06009 from the USDA-CSREES.

Key words: beef cattle, ammonia, emissions

849 Effects of feeding birdsfoot-trefoil on greenhouse gases emissions from fresh and land incorporated dairy manure. Q. Wang*, R. Franco, Y. Zhao, Y. Pan, and F. Mitloehner, *University of California, Davis, Davis.*

Birdsfoot-trefoil, a legume containing condensed tannins, may improve N utilization efficiency and shift urine N to fecal N. This shift might affect greenhouse gas (GHG) emissions because fecal N versus urine N is less utilizable by denitrifying bacteria that produce GHG from manure. The present study investigated the effects of feeding birdsfoot-trefoil (BFT) on GHG emissions from fresh and land-incorporated dairy manure (LIDM). Eighteen lactating Holstein cows were randomly assigned to 1 of the 2 treatments: 1) alfalfa (ALF) based ration, and 2) BFT based ration. Within each treatment, 9 cows were randomly assigned to 3 groups (n = 3). Animals were fed the respective diets for 8 d and then moved into an environmentally controlled chamber for 12 h to allow for GHG monitoring. Blood samples for blood urea N analysis were collected before cows left the chamber. The fresh manure was left on the chamber floor for 12 h to measure GHG emissions with INNOVA 1412 gas analyzer. CO_2, CH_4 and N_2O emissions from the fresh manure of ALF and BFT fed cows are 5.29, 0.05, 0.01 ppm and 4.71, 0.10, 0.01 ppm, respectively. Then the aged manure was collected and incorporated into loamy soil to simulate LIDM. Flux chambers were connected to the INNOVA 1412 gas analyzer to measure GHG emissions from LIDM over a 10 d period. CO_2 and N_2O emissions from the LIDM of ALF and BFT fed cows are 102.70, 0.02 ppm and 78.15, 0.02 ppm, respectively. Blood urea N was lower in BFT versus ALF fed animals ($P < 0.05$). However, GHG emissions were similar between BFT and ALF fed cow manure. In the present study, BFT did not affect the GHG emissions from dairy manure. A follow-up study, will investigate the effects of BFT on N partitioning over time.

Key words: alfalfa, birdsfoot-trefoil, greenhouse gas

850 Prediction of individual methane emission by dairy cattle from milk mid-infrared spectra. A. Vanlierde*[1], C. Delfosse[1], F. Dehareng[1], E. Froidmont[2], H. Soyeurt[3,4], M. Hammida[1], J.-M. Romnee[1], and P. Dardenne[1], [1]*Walloon Agricultural Research Centre, Quality Department, Gembloux, Belgium,* [2]*Walloon Agricultural Research Centre, Department of Production and Sectors, Gembloux, Belgium,* [3]*University of Liège Gembloux Agro-Bio Tech, Animal Science Unit, Gembloux, Belgium,* [4]*National Fund for Scientific Research, Brussels, Belgium.*

Methane produced by ruminants contributes to global warming. Different experiments were conducted on Holstein cows to predict their individual methane production. The objective was to obtain a wide variation in methane emissions to establish predictive equations. For this, the cows were selected according to their stage and number of lactation and received different types of diet known to promote or not the production of methane during rumen fermentation. Individual methane emission was daily measured by a sulfur hexafluoride tracer during a week. In the same time, a sample of individual milk was analyzed by mid-infrared (MIR) spectrometry. The daily methane data was then related to an average of daily milk spectrum (AMS). Five different calculations were used because of the delay between the generation of fermentation products and their use in the milk components. The methane emissions were compared with AMS at d 0, 0.5, 1, 1.5, and 2. Equations were built with partial last square regression and showed that the AMS at d 1.5 gave the best prediction of the CH4 emission with a cross validation R^2 of 0.79. It indicates that there is more than one day between the formation of feed fermentation products and their "detection" in milk analysis. There is also a close correlation between fatty acid (FA) profile and methane emission at d 1.5. However, results show that applying directly the developed methane equation gives a better prediction than the use of correlation between FA and methane. These observations suggest the feasibility of methane prediction from MIR spectra. Now, it is important to increase the reliability of prediction and make a validation to predict continuously the individual methane emissions in small and large scales and also to identify low methane emitted cows.

Key words: methane, mid–infrared, milk

851 Effects of biotechnology on greenhouse gases, volatile organic compounds, and ammonia from feedlot cattle. K. R. Stack-