310 Challenges in using flux chambers to measure ammonia and VOC flux from simulated feedlot pen surfaces and retention ponds. N. A. Cole*[1], R. W. Todd[1], D. B. Parker[2], M. B. Rhoades[2], and E. Caraway[2], [1]*USDA-ARS-CPRL*, *Bushland, TX*, [2]*West Texas A&M University*, *Canyon, TX*.

Few methodologies currently available to estimate ammonia and volatile organic compound (VOC) emissions from livestock operations have been adequately validated for accuracy. Flow-through flux chambers and wind tunnels are sometimes used; however, ammonia and VOC flux from pen or pond surfaces are affected by atmospheric turbulence, atmospheric concentration, and temperature, all of which are altered by a chamber. Two lab-scale studies were conducted to determine the effects of flux chamber air exchange rate (0 to 4 turnovers/minute) on ammonia flux from a simulated retention pond or feedlot pen surface. Buffered ammonium sulfate solutions (pH = 7.6, 8.6, and 9.6) were used as a surrogate ammonia source to simulate a feedlot retention pond. Similar buffer solutions were added to a cellulose media to simulate a feedlot pen surface. With both simulated surfaces, ammonia flux increased with increasing air turnover rate. Flux rates at 4 turnovers/minute were approximately 2x flux rates at 0.5 turnovers/minute and 50% of flux rates from "unaffected" containers placed outside the flux chambers. In a third lab experiment, VOC flux was measured from fresh cattle feces and retention pond effluent using a wind tunnel with air flow rates ranging from 0.5 to 9.7 meters/second (approximately 1 to 32 turnovers/minute). In general, VOC flux doubled for each 2-fold increase in air flow rate. Previous chamber studies have noted a large spatial variability in ammonia flux from pen and lagoon surfaces with CV ranging from 23 to 192%. Based on 11 chamber studies, the number of ammonia flux estimates required to be 95% confident that the estimated mean is within 20% of the true mean (determined as $CV^2/100$) ranges from 5 to 369; with a mean of approximately 75. These findings suggest that flux chambers will not give accurate estimates of ammonia or VOC flux from pen or lagoon surfaces and that large numbers of samples may be required when using chambers for treatment comparisons.

Key Words: Ammonia, VOC, Flux Chamber

311 Odorant production and persistence of generic *E. coli* in manure slurries from cattle fed 0, 20, 40, and 60% wet distillers grains with solubles (WDGS). V. H. Varel*[1], J. E. Wells[1], E. D. Berry[1], M. J. Spiehs[1], D. N. Miller[2], C. L. Ferrell[1], S. D. Shackelford[1], and M. Koohmaraie[1], [1]*USDA-ARS, US Meat Animal Research Center*, *Clay Center, NE*, [2]*USDA-ARS, Agroecosystem Management Unit*, *Lincoln, NE*.

Ethanol production from corn removes starch and concentrates the remaining nutrients including CP and minerals. When WDGS are fed to cattle in place of corn, CP and minerals exceed dietary needs. This may increase N emission, P run-off, and odor production. Crossbred steers (n = 160; 434 kg) were assigned in a completely randomized block design to 9 × 9 m pens with concrete floor (10 animals/pen; 4 pens/trt). Steers were fed a finishing diet that contained either 0, 20, 40, or 60% WDGS on a DM basis, and provided 13.4, 14.6, 18.7 or 22.8% CP, respectively. One kg of manure slurry (14 to 23% DM) was randomly collected across each pen (Aug. 20, Sept. 24, and Oct. 22). Samples were analyzed immediately for odorants, DM, pH, ammonia, L-lactate, and level of generic *E. coli*. After incubation of the samples at 22°C for 2, 4, 7, 10, 14, 21, and 28 d, samples were analyzed for the above parameters plus methane production. Ammonia, reduced sulfur, indole, phenol, isovalerate, isobutyrate and acetate increased ($P < 0.01$) with increasing amounts of WDGS in the diet. Other odorants, skatole, caproate, valerate, butyrate, and propionate were greater ($P < 0.01$) in manure slurries from cattle fed either 20 or 40% WDGS, compared to 0% WDGS. L-lactate was greater ($P < 0.01$) in slurries from cattle fed 0% WDGS (447 μmol/g DM) compared to the other treatment slurries (14-15 μmol/g DM). L-lactate lowered slurry pH (6.3, 7.1, 7.6, and 8.2, respectively, for 0, 20, 40, and 60% WDGS) which inhibited microbial fermentation, generic *E. coli* persistence, and methane production. Because of the favorable pH in the 40 and 60% WDGS slurries, most of the odorant compounds were rapidly converted to methane during a 28 d static incubation. These data indicate feeding WDGS can increase odorants in manure slurries and extend the persistence of generic *E. coli*.

Key Words: Distillers Grains, Feedlot Cattle, Manure Odor

312 Quantification of nutrient excretion and volatile fatty acid production from a swine wean-finish facility. D. M. Sholly*, D. T. Kelly, A. L. Sutton, B. T. Richert, and J. S. Radcliffe, *Purdue University*, *West Lafayette, IN*.

A total of 1,920 pigs were used in a 2 × 2 factorial, wean-finish experiment to determine the effects of diet (control, CTL vs. low nutrient excretion, LNE) and manure pit management (6 mo. deep-pit, DP vs. monthly pull plug, PP) on nutrient excretion and VFA production. Pigs were housed in a 12-room environmental building where quantitative manure collection in 24 pits (2/room) was available. Each room housed 30 barrows and 30 gilts (3 pens each), which were split-sex and phase-fed to meet or exceed the nutrient requirements of pigs (NRC, 1998) at different stages of growth. The CTL and LNE diets were corn-SBM based and had equal Lys:calorie. The LNE diets had reduced CP and P, increased synthetic amino acids, phytase, non-sulfur TM premix and added fat. Regardless of manure storage, manure generation was reduced by 0.39 L/pig/d when pigs were fed the LNE diet vs. the CTL diet (4.05 vs. 4.44 L/pig/d, $P<0.008$). Excretion of total N, P, and K was reduced ($P<0.001$) by 27.5, 42.5, and 20.4%, respectively, from LNE fed pigs. Pigs fed the LNE diet also had a 25.5, 23.8, 32.3, 18.5, 35.8, and 26.7% reduction ($P<0.05$) in acetate, iso-butyrate, butyrate, iso-valerate, valerate, and total VFA production, respectively, compared to CTL fed pigs. Ammonium N production was reduced (16.5 vs. 18.4 g/pig/d, $P<0.002$) with PP manure strategy compared to DP strategy. The PP strategy also reduced total VFA production by 20.5% (26.0 vs. 32.7 mM/pig/d, $P<0.001$) compared to DP strategy. There was no interaction ($P>0.05$) of diet and storage for nutrient or VFA production. In summary, implementing LNE diet formulation or using a monthly pull plug strategy can significantly decrease nutrient excretion and VFA production.

Key Words: Nutrient Excretion, Volatile Fatty Acids, Pigs

ADSA®-ASAS
July 7-11, 2008 - Indianapolis, Indiana

Abstracts

American Dairy Science Association
American Society of Animal Science

July 7–11, 2008
Indianapolis, Indiana
http://adsa.asas.org/meetings/2008/

Journal of Dairy Science, Volume 91, E-Supplement 1
Journal of Animal Science, Volume 86, E-Supplement 2