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ABSTRACTS

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remaining three diets, all of the urea and some of the cracked corn was removed and replaced with DDGS at 15% (D15), 25% (D25), and 35% (D35) of the diet DM. The diets were balanced to provide similar levels of CP for CON and D15 (13.2 and 13.3% CP, respectively) and a stepwise increase in CP for D25 and D35 (15.4 and 17.6%, respectively). Weights were recorded prior to feeding on d 0 and 105, and every intermediate 28 d. Over the entire trial, DMI was greater ($P < 0.05$) for D25 compared to all other treatments (10.77, 10.94, 11.25, and 10.91 kg/d for CON, D15, D25, and D35, respectively). There were no differences in final weight between treatments, but D35 steers tended to have a higher dressing percent ($P < 0.10$), which resulted in D35 having greater carcass weights ($P < 0.05$; 358.9, 362.8, 359.5, and 375.2 kg for CON, D15, D25, and D35, respectively). No differences were detected between treatments for marbling, backfat, ribeye area, or yield grade. Air samples were collected via wind tunnel at 3 locations per pen over a 3-d period prior to animal introduction and on d 78-80. Hydrogen sulfide levels were greatest ($P < 0.05$) in pens containing cattle consuming the D35 treatment compared pens with cattle consuming the treatments. Odor was analyzed using dynamic, triangular, forcedometry. No differences in odor characteristics were detected between treatments.

Distillers Grains, Hydrogen Sulfide, Odor

423 Factors influencing ammonia emissions from beef cattle feedlots air wind tunnels. D. Sherwood*, G. Erickson, T. Klopfenstein, *et al.*, University of Nebraska.

Ammonia emissions transport N into the air, but the factors that slow down or speed up this transport and actual emission amounts for beef feedlots are not well known. Open chamber wind tunnels were used to measure ammonia emissions from the surface of 12 open feedlot pens during two feeding trials where N mass balance was conducted evaluating diets. No diet effects were observed and will not be presented. The pens were identical between the two trials having the same treatment and number of animals. Ammonia emissions were measured weekly during the last six weeks of each feeding period (March 25 - April 29, 2004 and July 23 - August 27, 2004 from 9 AM to approximately 2 PM) using wind tunnels and a 0.2 M sulfuric acid trap for 30 minutes in each pen. The total volume of the wind tunnel is 0.064 m³ with air flow of 0.024 m³/s. One inch core samples were taken from the feedlot surface at all four corners of the tunnel to be analyzed for pH, N concentration and DM. At the beginning of each 30 minute measurement a surface temperature and soil temperature taken 2 inches below the surface were recorded. N loss averaged 42.5 g/d/steer across the spring and summer collection periods. In the spring period, N loss averaged 28.6 g/d/steer with pen surface samples averaging 3.85% N, 74.7% DM and 19.5° C. In the summer sampling period, N loss averaged 56.5 g/d/steer with pen surface averaging 4.8% N, 78.6% DM and 25.0° C. Combining all sampling periods, N loss was significantly correlated with N concentration on the pen surface ($r = 0.25$, $P < 0.01$), and soil temperature ($r = 0.20$, $P < 0.02$). No correlation was observed between N loss and pH. Ammonia losses were variable but may be related to N in manure and temperature as observed with N mass balance techniques.

Key Words: Ammonia, Cattle Feedlot, Emissions

424 Assessment of strategies to reduce ammonia, methane, and nitrous oxide emissions from gestating and lactating sows. C. Piñero*, G. Montalvo*, and M. Biguerio*, ¹PigCHAMP Pro Europa, S.A., Segovia, Spain, ²Tragsega, S.A., Madrid, Spain, ³Spanish Ministry of Agriculture, Fisheries and Food, Spain.

During the last decade, the approach to environmental issues related to animal production is changing, including concepts such as emissions to soil, water and air and proper use of energy and water. Latest regulations have been developed under this concept such as the Directive 96/61/EC of 24 September 1996 concerning integrated pollution prevention and control in intensive pig and poultry production. The objective of the directive is to achieve a high level of protec-

tion of the environment as a whole. In the EU Reference Document on Best Available Techniques (BAT) for Intensive Rearing of Poultry and Pigs (BREF) several techniques are proposed for emissions abatement. The Spanish Ministry of Agriculture, Fisheries and Food has implemented a three years plan to evaluate the BAT proposed by the European Commission under Spanish conditions. In these studies, two BAT candidates for gestating sows (weekly slurry removal and manure channel reduction) and one for lactating sows (board on: sloped in the pit) were compared with the BREF reference system (monthly slurry removal and underlying deep collection). The concentration of NH₃, CH₄ and N₂O in the air, and the ventilation rates were semi-continuously measured with an Innova 1312 infrared photo-acoustic system (SIR, S.A., Tres Cantos Madrid, Spain). In gestating buildings, frequent slurry removal reduced ($P < 0.001$) the average CH₄ and N₂O emissions by 19% and 83%, respectively. However, the average NH₃ emissions increased by 15% ($P < 0.001$) due to the picks of ammonia concentration in the emptied. Manure channel reduction abated ($P < 0.001$) the average NH₃, CH₄, and N₂O emissions by 49%, 28%, and 68%, respectively. In lactating sows, the implementation of a slope in the pit reduced ($P < 0.001$) the average NH₃, CH₄, and N₂O emissions by 32%, 65%, and 43%, respectively. In conclusion, BAT proposed in the BREF for gestating and lactating sows were shown to be effective under Spanish practical conditions.

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Key Words: Gas Emissions, Sows, Best Available Techniques

424 Improving estimates of enteric methane emissions from cattle Canada. K. Ominski*, D. Boadi, and K. Wittenberg, University of Manitoba Winnipeg, Manitoba, Canada.

Currently, Canadian inventories of methane (CH₄) emissions from enteric fermentation in livestock are estimated using the International Panel on Climate Change (IPCC) Tier-1 methodology (TIM) which calculates CH₄ emissions for each animal category by multiplying the animal population by the average emission factor for a given category (IPCC 1997). This methodology is limited because factors such weight, age, gender, and feeding system are assumed similar within each category. Further, it does not include regional differences in animal genetics or feeding/management strategies. According to IPCC (2000), countries that employ IPCC Tier-2 methodology (T2M), which accounts for the above parameters, can improve emission estimates. The objective of this study was to estimate CH₄ emissions of cattle in Canada using IPCC T2M. Estimates were then compared with IPCC TIM and data from Canadian research studies (CRS). Cattle population data was obtained from Statistics Canada to characterize cattle into eight categories for each province. Information regarding cattle performance and feeding practices were obtained from scientific literature and surveys. Calculated CH₄ emissions for 2001 were 173,030.4 t yr⁻¹ (3.6 Mt CO₂ eq); 763,852.0 t yr⁻¹ (16.0 Mt CO₂ eq) for Canadian dairy and beef cattle, respectively. Tier-1 emission factors (kg CH₄ yr⁻¹) were 6.4 to 25.3% lower than those obtained using T2M. Further, the Tier-2 emission factors were 7.6 to 30% lower than values published by CRS. This study suggests that use of T2M reduces some of the uncertainties associated with TIM, however, a discrepancy exists between these values and those reported by CRS. There is a need to further measure methane emissions in production scenarios characteristic of those used in Canada. In addition, further characterization of the Canadian cattle population, and the associated feeding/management strategies are required, on a regular basis, to account for changes in management practices that occur as a consequence of economic viability.

Key Words: Enteric Emissions, Tier-1 Methodology, Tier-2 Methodology

425 Effects of ractopamine on growth performance and carcass characteristics of feedlot steers differing in biological type. S. L. Gruber*, J. Tatum*, T. E. Engle*, M. A. Mitchell*, S. B. Laudert*, A. L. Schroeder*, and J. Platter*, ¹Colorado State University, Ft. Collins, ²Elanco Animal Health Greenfield, IN.

Effects of ractopamine hydrochloride (RAC) supplementation on growth performance and carcass characteristics of feedlot steers differing in biological