

When compared with low diet, high diet without bST¹ affected expression of 445 genes (168 down and 277 up-regulated) ($p < 0.05$). Genes altered included several hormones, growth factors, receptors and signaling pathway genes involved in mammarygenesis. Ongoing studies focus on verifying changes with Real Time PCR to measure gene expression profile within mammary gland. In conclusion, dietary energy and bST administration alter expression of genes involved in mammarygenesis *First author sponsored by CAPES (Coordination for the Improvement of Higher Education Personnel, Brazil) from may, 2003-april, 2004

Key Words: Mammary Gland Development, Nutrition, Microarray

660 Growth and developmental characteristics of Holstein and Gir (*Bos indicus*) x Holstein bulls and heifers.. S. Schmidt*¹, S. Bowers¹, T. Dickerson¹, K. Graves¹, R. Vann², and S. Willard¹, ¹Mississippi State University, Mississippi State, ²Brown Loam Experiment Station-Mississippi State University, Raymond.

The crossbreeding of Holstein cows with Gir sires has not been evaluated extensively in the southern United States. Gir cattle have a higher milk production potential than many other *Bos indicus* breeds, yet little information exists regarding the growth, development and production performance of Gir x Holstein crossbred dairy cattle. In this study, Holstein cows were bred by artificial insemination (AI) to either Holstein or Gir-sires, which produced Holstein x Holstein (H x H) or Gir x Holstein (G x H) calves. The objective of this study was to compare the growth and morphological differences of H x H and G x H crossbred dairy calves during their first year of life. Body weight, heart girth, hip width, hip height and wither height measurements were obtained from birth to 378 days of age at 28-day intervals. Calves were housed in hutches from birth until 55 to 60 days of age, and thereafter grazed on improved pastures. All growth and development traits were positively correlated with one another ($R=0.72$ to 0.99 ; $P < 0.0001$). A breed x sex interaction ($P < 0.05$) was noted in BW change and average daily gain (ADG). Specifically, G x H bulls ($n=8$; 0.78 kg/d) exhibited a greater ($P < 0.05$) ADG than H x H bulls ($n=12$; 0.73 kg/d), whereas H x H heifers ($n=18$; 0.80 kg/d) exhibited greater a ($P < 0.05$) ADG than G x H heifers ($n=22$; 0.74 kg/d). Wither height (124.9 ± 0.73 cm), hip height (128.9 ± 0.68 cm) and hip width (42.1 ± 0.32 cm) did not differ ($P > 0.10$) relative to sex of calf or breed. Heart girth was greater ($P < 0.05$) in bulls (164.0 ± 1.1 cm) than heifers (157.7 ± 1.2 cm), but was not influenced by breed ($P > 0.10$). In summary, while expected differences were observed between bulls and heifers in some growth characteristics, contrasting differences between G x H and H x H calves were noted only in ADG. Nevertheless, these data indicate that the growth and morphological development of G x H and H x H calves during their first year of life are relatively similar.

Key Words: Gir, Growth, Development

661 Growth of crossbred and purebred calves from birth to an age of 50 days studied by dual energy x-ray absorptiometry (DXA). J. Hampe, S. Nueske, A. M. Scholz*, and M. Foerster, *Experimental Farm, University Munich, Germany.*

Lean tissue (LTGR), fat tissue (FTGR) and bone mineral growth (BMGR) of female ($n=44$) and male ($n=40$) calves was compared among six different breeding types including German Holsteins (GH, $n=14$), German Fleckvieh (FV, $n=17$), GH sire x FV cow, ($n=16$), FV x GH, ($n=20$), GH x GHxFV crossbred (CR, $n=10$), and FV x CR ($n=7$) from day 4 until day 50 of life. Calves underwent three DXA scans under light sedation using a GE LUNAR DPX-IQ scanner with a three week interval. Up to day 15, all calves were fed individually cow milk (47 l) and housed outside in single calf boxes on straw. From day 16, calves were housed in groups on straw in a cold stall. They received age-dependent milk replacer over an automatic feeder (intake: $5.5 - 7.5$ l/d).

PSA - Environment and Management - Broiler Management

663 Impact assessment of feeding high-oil corn to poultry in Brazil. E. Kebreab*¹, J. France¹, R. Phipps², and S. Leeson¹, ¹Department of Animal and Poultry Science, University of Guelph, Guelph, ON, Canada, ²School of AP&D, The University of Reading, Reading, UK.

Agriculture, especially intensive animal production, contributes significantly to environmental pollution. In poultry, only 30 - 40% of nitrogen

In addition, they received ad libitum hay, corn, and on-farm produced concentrate (average intake < 130 g/d). Generally, growth differences among calves originating from GH or FV sires and GH, FV or crossbred cows were small. During the age period 526 days, calves did not gain fat tissue. Alone calves of FV mothers showed in tendency a positive fat deposition, while calves of GH sires starting with a significantly lower body weight (BW) gained significantly more lean tissue than calves with FV sire. No significant differences in tissue growth could be observed during the second period (27-48 days). However, calves of FV sires gained in tendency more lean and fat than calves of GH sires resulting in still heavier calves at day 48. The breed of the sire seems to have a larger effect on early growth of calves than does the mothers breeding line.

	Start BW (kg)	FTGR ¹ (g/d)	LTGR ¹ (g/d)	BMGR ¹ (g/d)	FTGR ² (g/d)	LTGR ² (g/d)	BMGR ² (g/d)	Final BW (kg)
Sire Line								
GH	44±1 ^a	-10±9	365±31 ^a	13±1	16±10	358±44	9±1	59±2 ^a
FV	48±1 ^b	-17±10	282±34 ^b	11±1	23±10	424±48	10±1	64±2 ^b
Mother Line								
GH	46±1	-23±10 ^a	312±33	13±1	35±10	390±46	11±1	61±2
FV	45±1	4±9 ^b	316±32	11±1	15±10	407±45	10±1	62±2
CR	46±2	-21±14 ^{ab}	343±49	13±2	9±15	378±69	8±2	62±2

Significance ($p < .05$) among Least Squares Means is characterized by different superscripts. ¹ = age period: 5 - 26 days; ² = age period: 27 - 48 days

Key Words: Growth, Calves, Dual Energy X-Ray Absorptiometry

662 Portal nutrient flux during pre- and post-weaning growth in dairy calves. J. L. Klotz* and R. N. Heitmann, *Department of Animal Science, The University of Tennessee, Knoxville.*

Dairy calf weaning is associated with increases in ketone levels that exceed measured rates of utilization in adults and present a potential energy loss that may be mitigated by ionophore. To assess effects of weaning and ionophore on net portal-drained viscera (PDV) flux in dairy calves, glucose, acetoacetate (ACAC), BHBA, NEFA, VFA, insulin (INS), and glucagon (GLN) concentrations and PDV fluxes were determined on d 35, 56, 84, and 112 in Jersey bull calves weaned at d 49. From d 3-34 all calves ($n=14$) were fed 454 g/d milk replacer. After sampling on d 35, calves were randomly assigned to a commercial pelleted starter without (C) or with lasalocid (T; 83 mg/kg DM) *ad libitum* plus replacer until d 48. From d 49-112 calves received only C or T *ad libitum*. Calves were equipped with catheters in artery (A), portal (P), and mesenteric veins (V) at wk 3-4. Calf number varied by treatment and sample day due to catheter patency (calves = 3-5). Blood flow was measured by continual infusion of para-aminohippurate into V ($1.5\% @ 0.764$ mL/min) and 6 serial samples taken at 30-min intervals simultaneously from A and P. Portal blood flow increased ($P < 0.05$) with age, but did not differ between C and T. Glucose was released pre-weaning and extracted post-weaning by PDV, but not affected by ionophore. Pre-weaning uptake of NEFA changed to post-weaning release, but this change was delayed to d 84 in T. Flux of ACAC and BHBA in C and T went from pre-weaning uptake to post-weaning PDV release that peaked at d 84, but peak release of ACAC was lower and BHBA tended to be lower in T ($P=0.07, 0.15$). Portal release of VFA increased with age, but was similar to ketones with both butyrate and propionate release lower at d 84 in T ($P < 0.1$). Glucagon was greater in C than T at d 84 ($P < 0.05$). Significant changes in metabolic profile and net PDV flux of transition calves were demonstrated and ionophore appears to moderate alimentary output at a post-weaning period (d 84) where ketone concentrations have potential to exceed whole animal capacity for utilization.

Key Words: Weaning, Ionophore, Portal-Drained Viscera Flux

intake and 18 - 35% of phosphorus intake are converted to edible products. In major poultry exporting countries such as Brazil, reducing nutrient loss to the environment is paramount. The economic and environmental impacts of replacing traditional corn, the main ingredient in poultry rations, with a high-oil corn (HOC) variety were evaluated using specialist least cost ration formulation software based on linear programming principles. Parametric analysis showed that HOC based

rations cost up to \$14/tonne less than traditional corn based ones mainly because less ingredient is used to meet the birds requirements. This is equivalent to an annual savings of up to \$266 million to the Brazilian broiler and broiler-breeder producers. Diets formulated with HOC had a lower crude protein content than with traditional corn, and potentially could reduce annual nitrogen excreted to the environment by 5.3 Mtonnes. HOC provided a better nutrient profile than traditional corn, especially in essential amino acids such as methionine and lysine, which led to meeting amino acid requirements without having to increase the total crude protein content of the diet. The analysis also showed a potential to reduce phosphorus excretion by 842 tonnes/yr if HOC was to replace traditional corn, since the need to supplement rations with inorganic phosphorus sources such as dicalcium phosphate would be much lower. We estimate that 36.6 Mtonnes dicalcium phosphate can be saved annually using HOC in poultry rations in Brazil. The literature suggests replacing traditional corn with HOC does not affect bird metabolism and positive impacts on growth rate have been recorded. Substituting traditional corn with HOC has both economic and environmental benefits for the Brazilian poultry production without compromising efficiency of output.

Key Words: Poultry, High-Oil Corn, Environmental Pollution

664 Electrostatic space charge system for dust reduction and air quality improvement in commercial broiler facilities. C. Ritz*¹, B. Mitchell², B. Fairchild¹, M. Czarick¹, and J. Worley¹, ¹University of Georgia, ²Southeast Poultry Research Laboratory USDA-ARS.

Reducing airborne dust in enclosed animal housing has been shown to result in corresponding reductions in airborne bacteria, ammonia and odor. Technologies that have been shown to be effective for reducing airborne dust in animal areas include misting with an oil spray, water mists, extra ventilation, and electrostatic space charge systems. Increasing pressure from environmental groups to reduce PM-10 and ammonia emissions from animal housing has led to considerable interest by the poultry and swine industries for practical systems to reduce these air pollutants. An electrostatic space charge system (ESCS) was designed to reduce airborne dust and ammonia emissions from a commercial broiler production house. The ESCS for this application was based on patented technology that was developed to reduce airborne dust and pathogens and has proven effective in poultry hatchers and broiler breeder pen trials. In the present study, dust and ammonia were measured at 10-minute intervals over a three-flock period in both a treatment and control house with built-up litter. Results of the study during the months of November through April indicate the ESCS reduced airborne dust by an average of 55%. Dust levels in the treatment house were consistently lower than in the control house. Ammonia levels in the treatment house averaged 8% lower than in the control house with most of the reduction occurring during the evening hours when ammonia levels were highest. No differences in bird activity were observed between treatment and control houses. Successful application of this technology in broiler houses has the potential for improving bird performance and reducing house emissions and caretaker health hazards.

Key Words: Electrostatic, Dust, Broiler

665 In-house composting of litter and poultry carcasses infected with avian influenza. G. W. Malone*¹, S. S. Cloud¹, R. L. Alphin¹, L. E. Carr², and N. L. Tablante², ¹University of Delaware, Newark, ²University of Maryland, College Park.

In February 2004 two Delaware farms were found to be positive for H7N2 avian influenza. The litter and carcasses were composted inside

the houses to minimize potential spread of the virus and to address environmental concerns. Farm A had two 12 by 122 m houses with 12,000 dual-purpose birds ranging from 3 to 26 weeks of age while Farm B had three similar size houses with 74,000 five week old commercial broilers. In each house the carcasses and litter were mixed to form a single windrow 97 m long. These windrows had a 10 cm litter base, 4 m wide, 1.5 m high, and capped with 8 cm of litter or sawdust to cover all carcasses. Windrows were turned inside the house, consolidated and capped with additional sawdust at 14 to 19 days. Although the litter moisture was not ideal for composting, temperatures in these windrows were sustained at 55 C for 10 consecutive days. All houses were heated to 38 C for three consecutive days after forming the windrows and again after turning the piles as an additional measure to inactivate this heat-sensitive virus. Virus isolation samples from the compost and house environment were taken prior to turning and again before compost removal from the house. The compost was removed from the house after one month, stockpiled on the farm, covered and allowed to age for another month. Educational materials were developed and used to train poultry company personnel on in-house composting procedures.

Key Words: Composting, Carcass Disposal, Avian Influenza

666 Spatial Variability of Nutrient Species Within a Poultry House. P. R. Owens*, D. M. Miles, and D. E. Rowe, *Waste Management and Forage Research Unit, USDA-ARS, Mississippi State, MS.*

Large broiler operations must annually collect and analyze litter for nutrient content under the U. S. Environmental Protection Agency's Concentrated Animal Feeding Operation Final Rule. The objective of this study was to determine the variability of nutrient species within a poultry house using geostatistical contour plots. This research was conducted in the summer on a tunnel ventilated poultry house that was 146 m by 12.8 m. Prior to sampling, the litter had twenty-eight flocks of chickens grown on it with decaking between each flock. The house was sampled on a grid at 5 m across the house and 12 m down the house for a total of 36 sampling points. The litter was sampled at day 1 and day 21 to examine litter properties. The pH was determined using 1:5 litter water ratio. The total N was determined by total Kjeldahl nitrogen method (TKN). The ammonium, nitrate and phosphate were extracted with DI water and analyzed using flow injection analysis. The litter samples were also dry ashed and total metals were determined using an ICP. For both sampling dates, the samples weren't random and the data did not follow a normal distribution, however, the data indicated a higher average concentration of TKN and ammonium in the cooling cell end of the house and decreased toward the fan exhaust end of the house. The average nitrate data also yielded higher concentrations at the cool cell end of the house and decreased toward the exhaust end of the house. The data from the geostatistical contour plots illustrated higher TKN and ammonium in the brood end of the house, which corresponded with the lower pH (8.6 vs. 7.5) also in the brood end of the house. The contour plots of the nitrate data illustrated highest concentration near the sidewall of the brood end of the house, which corresponded to the areas with the highest litter moisture. These trends held true with both day 1 and day 21. The water extractable P data did not indicate definite trends within the house during the day 1 and day 21 sampling times. These geostatistical estimates of the nutrient concentrations indicated an anisotropic distribution of the nutrients along the house and illustrated spatial variability of nutrient species within the poultry house.

Key Words: Broiler, Litter, Nutrients

PSA-Nutrition: Feed Additives

667 Egg antibody to phospholipase A₂ increases carcass yield in male broilers. K. D. Roberson*¹, J. L. Kalbfleisch¹, W. Pan¹, R. A. Charbeneau¹, M. E. Cook², and M. Yang², ¹Michigan State University, East Lansing, ²University of Wisconsin-Madison.

Cockerel chicks (Ross X Ross) were procured from a commercial hatchery and placed at day of age into brooding pens which had fresh litter top-dressed on used litter from a previous trial. Dried chicken egg (whole contents) antibody to phospholipase A₂ was added at 0, 0.1, 0.2

or 0.4% of a corn-soybean meal basal diet fed in three phases. Chicks were brooded for 2 wk with 223 chicks/pen and 4 pens/treatment. After brooding, the birds were separated out into 7 pens/treatment with 125 birds/pen and grown to 43 d of age. Body weight and feed consumption were measured for each pen at 14, 28 and 42 d of age. At 43 d of age, 25 birds/treatment (5 pens of 5/pen) were randomly selected for slaughter and weighed live (averaged 3 kg). Hot carcass weight without giblets was determined and small intestinal samples were collected, washed and weighed individually. There were no significant effects on body weight