

**656 Influence of maternal breed on meat goat carcass characteristics.** R. Browning, Jr.\*<sup>1</sup>, C. Chisley<sup>2</sup>, O. Phelps<sup>2</sup>, S. H. Kebe<sup>1</sup>, B. Donnelly<sup>1</sup>, M. Byars<sup>1</sup>, and T. Payton<sup>1</sup>, <sup>1</sup>Tennessee State University, Nashville, <sup>2</sup>USDA-Agricultural Marketing Service, Baton Rouge, LA.

Spanish x Boer (n = 16) and Spanish x Kiko (n = 18) wethers (7 mo) and bucklings (5 mo) were harvested under USDA inspection to evaluate the effect of dam breed on carcass traits of crossbred kids. Boer and Kiko dams, respectively, originated from five and seven seedstock farms. Each dam was purebred or fullblood (93.75 to 100%). Traits of interest included live weight and conformation score, carcass grade, carcass weight, dressing percentage, wholesale cut weights, and edible meat yield. Live weight tended to differ (P = 0.08) between Boer (22.96 ± 0.94 kg) and Kiko kids (25.6 ± 1 kg). Hot carcass weight, cold carcass weight, and dressing percentage tended to be greater (P ≤ 0.1) for Kiko than for Boer F1 kids. Kids out of Boer dams had similar (P = 0.29) live conformation scores as their contemporaries out of Kiko dams. Carcass grade scores for Kiko F1 tended to be better (P = 0.08) than those for Boer F1 kids. Paired shoulder and hind leg primal cuts were heavier (P < 0.05) for Kiko (1.66 ± 0.08 kg; 3.05 ± 0.14 kg) compared to Boer (1.41 ± 0.08 kg; 2.59 ± 0.13 kg). Paired foreleg and loin weights for Kiko (2.11 ± 0.1 kg; 1.5 ± 0.09 kg) tended to be heavier (P ≤ 0.10) than for Boer (1.85 ± 0.1 kg; 1.28 ± 0.09 kg). Rib weights were not different (P > 0.2) between breeds of dam. However, when wholesale cut weights were adjusted for carcass weight, only the hind leg tended to be heavier (P = 0.06) for Kiko-cross kids than for Boer-cross kids. Proportional edible meat yields and meat to bone ratios from shoulder, loin, and hind leg were not affected (P > 0.15) by breed of dam. Preliminary results suggest that breed of dam may affect carcass traits from commonly sired crossbred kids.

**Key Words:** Meat Goat, Breeds, Carcass Traits

**657 Size, color, and texture of major muscles from kid goat carcasses.** K. W. McMillin\* and A. P. Brock, *Department of Animal Sciences, Louisiana State University Agricultural Center, Baton Rouge, LA.*

Production of value-added products for ethnic and non-traditional goat meat consumers requires information about the constituent raw materials. Linear dimensions and color of major raw muscles from Boer-Spanish kid goat carcasses and texture after moist and dry cookery were determined in two successive years (n=18 and n=10). After weaning and pasture rearing with 0.11 kg/d of corn, kid goats of average 9 mo age and 25 kg were humanely sacrificed. Carcasses were chilled for 24 h at 4°C before evaluation of carcass conformation (selection 2.6), flank color (A<sup>70</sup>), external fat score (1.0), and kidney, heart, and pelvic fat (1.8%). Dressing percentage averaged 41% and cold carcass weight 10 kg. Individual muscles were manually separated by knife from fat and bone within a 3 d period. Weight, length, and width (ruler), diameter (caliper), and color (reflectance spectroscopy) were recorded for *L. dorsi* (LD), *Semimembranosus* (SM), *Q. femoris* (QF), *B. femoris* (BF), *Triceps* (T), *G. medius* (GM), *Infraspinatus* (I), *Supraspinatus* (S), *Psoas major* (PM), *Semitendinosus* (ST), and *B. brachii* (BB) at the time of separation. Muscles from each carcass side were randomly assigned to moist (water bath at 100°C) or dry (167°C oven) heating to 77°C internal temperature. Muscle weights were LD=SM>QF>BF=T#8805GM>I=S=PM=ST>BB. The differences (P<0.05) in length and diameter between muscles were more variable than the differences in L\*, a\*, and b\* color values between different muscles. Cooking losses were less (P<0.05) for larger than smaller muscles, with shear force greatest (P<0.05) for S and least (P<0.05) for ST, BB, PM, GM, QF, T, LD, and I. Cooking losses (24 to 36%) and shear forces (3.0 to 4.7 kg) for each muscle type did not differ (P>0.05) with type of heating. Time to reach internal temperature was longer with dry than moist heating. Year did not influence linear, color, or shear measurements in muscles of the same type. Characterization of different muscles will assist in identification of muscles suitable for retail goat cuts and for processing into value-added products.

**Key Words:** Goat, Muscle Profile, Color

## ADSA - Growth and Development

**658 Effects of intramammary endotoxin treatment on porcine milk composition, yield, and resultant piglet growth performance.** A. C. W. Kauf\*, D. C. Pighetti, A. L. Magliaro, D. A. Pape, L. C. Griel, Jr., and R. S. Kensing, *Penn State University, University Park.*

Mastitis is a contributing factor to preweaning mortality in pork production. We performed an experiment utilizing an intramammary endotoxin (ET) challenge model (Kensing et al., 1999), to determine the effects of mastitis on milk composition, yield, and resultant piglet growth performance. Following cross-fostering to equalize litter size on approximately d 3 of lactation, 11 parity-one Yorkshire sows were challenged (1.5 µg/gland/kg BW) on days 13 and 20. ET (from *E. coli* O55:B5) was infused into two functional, previously non-infused mammary glands on each experimental day. Milk was collected by manual expression from both control and ET-infused glands before and after ET-challenge up to 60 h post infusion, and analyzed for protein content and composition. Milk yield was estimated by weigh-suckle-weigh procedure, and daily piglet weights were recorded. ET-infusion increased rectal temperatures, which peaked at 1.7 °C above baseline at 5 h (P < 0.01), returning to normal by 24 h. ET-infusion increased milk log TNF-α 87 %, chloride 221 %, total protein 20 %, and albumin 44 %; and decreased β-casein 47 % relative to control samples (P < 0.01). Apparent proteolytic degradation of α<sub>s</sub>-caseins in post-infusion milk samples was dramatic. ET-infusion decreased hourly milk yields 31 % on experimental days (P < 0.01). ET-infusion decreased 24 h weight gains 75 % for piglets nursing ET-infused glands relative to their control littermates during the first 24 h; the difference in 24 h weight gain between groups remained significant through 5 days (P < 0.01). Our data demonstrate significant increases in milk TNF-α, chloride, total protein, and albumin; significant decreases in milk β-casein and yield; and prolonged decreased daily weight gains of suckling piglets. The changes in milk composition are consistent with opening of tight junctions, and the ET-

challenge model is valuable for studying the effects of mastitis in the sow.

**Key Words:** Porcine Mastitis, Milk Yield, Piglet Growth

**659 Effects of diet and bST on gene expression profile of heifer mammary parenchyma.** B. J. Lew\*<sup>1,2</sup>, S. S. Sipkovsky<sup>1</sup>, G. J. M. Rosa<sup>1</sup>, J. S. Liesman<sup>1</sup>, R. P. Radcliff<sup>1</sup>, H. A. Tucker<sup>1</sup>, M. D. S. Oliveira<sup>2</sup>, and M. J. VandeHaar<sup>1</sup>, <sup>1</sup>Michigan State University, East Lansing, <sup>2</sup>UNESP Jaboticabal, São Paulo, Brazil.

Increasing growth rates in prepubertal heifers decreases age at puberty and subsequent milk production. Administration of bST before puberty increases parenchymal tissue and decreases adipose tissue within the udder. Our objective was to examine the effects of a high energy, high protein diet combined with injection of bST on gene expression profile within mammary tissue and identify key genes that mediate mammary development. The mammary tissue used was collected in a previous experiment conducted in 1994 (Radcliff et al., 1997). In the experiment 38, Holstein heifers were randomly assigned to one of four treatments: low or high diet, each with or without bST. RNA from parenchymal tissue of 32 heifers (8/treatment) was extracted, and RNA quality was checked using the Agilent Bioanalyzer. RNA was pooled (2 samples/pool), and the 16-pooled samples were examined using a bovine-specific cDNA microarray (National Bovine Functional Genomics Consortium Library, NBFGC) containing 18,263 uniquely expressed sequence tags (EST). A Loop design was used with cDNA from the 16-pooled samples labeled with Cy3 or Cy5 dyes prior to microarray hybridization. Gene expression data were normalized for dye intensity biases using a robust local regression technique (SAS PROC LOESS). Significance levels of differential gene expression among treatments were assessed using a mixed model approach. Compared with no bST, bST altered expression of 671 genes (368 down and 303 up-regulated) in the high diet (P<0.05) and 365 genes (210 down and 155 up-regulated) in low diet (p<0.05).

When compared with low diet, high diet without bST<sup>1</sup> 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 mammatogenesis. 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 mammatogenesis \*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\*<sup>1</sup>, S. Bowers<sup>1</sup>, T. Dickerson<sup>1</sup>, K. Graves<sup>1</sup>, R. Vann<sup>2</sup>, and S. Willard<sup>1</sup>, <sup>1</sup>Mississippi State University, Mississippi State, <sup>2</sup>Brown 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 ( $124.9 \pm 0.73$  cm), hip height ( $128.9 \pm 0.68$  cm) and hip width ( $42.1 \pm 0.32$  cm) did not differ ( $P > 0.10$ ) relative to sex of calf or breed. Heart girth was greater ( $P < 0.05$ ) in bulls ( $164.0 \pm 1.1$  cm) than heifers ( $157.7 \pm 1.2$  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\*<sup>1</sup>, J. France<sup>1</sup>, R. Phipps<sup>2</sup>, and S. Leeson<sup>1</sup>, <sup>1</sup>Department of Animal and Poultry Science, University of Guelph, Guelph, ON, Canada, <sup>2</sup>School 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 <sup>1</sup> (g/d)	LTGR <sup>1</sup> (g/d)	BMGR <sup>1</sup> (g/d)	FTGR <sup>2</sup> (g/d)	LTGR <sup>2</sup> (g/d)	BMGR <sup>2</sup> (g/d)	Final BW (kg)
Sire Line								
GH	44±1 <sup>a</sup>	-10±9	365±31 <sup>a</sup>	13±1	16±10	358±44	9±1	59±2 <sup>a</sup>
FV	48±1 <sup>b</sup>	-17±10	282±34 <sup>b</sup>	11±1	23±10	424±48	10±1	64±2 <sup>b</sup>
Mother Line								
GH	46±1	-23±10 <sup>a</sup>	312±33	13±1	35±10	390±46	11±1	61±2
FV	45±1	4±9 <sup>b</sup>	316±32	11±1	15±10	407±45	10±1	62±2
CR	46±2	-21±14 <sup>ab</sup>	343±49	13±2	9±15	378±69	8±2	62±2

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