Plasma was analyzed for concentrations of NEFA. Production, reproduction and health data were evaluated in the first 120 d in lactation. Concentrations (uEq/L) of NEFA were divided into quartiles (Q1=31.1 to 94.3; Q2=94.4 to 125.4; Q3=125.7 to 182.3; and Q4=183.4 to 2685.1) and data were analyzed with the effects of NEFA quartile, day prepartum when blood was collected, dairy, parity, and BCS. Data are presented in the following sequence according to NEFA quartile: Q1, Q2, Q3 and Q4. NEFA concentrations increased as calving approached (P<0.01), but they were not influenced (P>0.15) by parity or BCS. Yields (kg/d) of milk (28.1 vs 28.3 vs 27.5 vs 27.4; P=0.21) were not affected by NEFA, but of 3.5% fat-corrected milk (32.4, 32.5, 31.3, and 30.9; P<0.02), milk fat (1.250 vs 1.250 vs 1.196 vs 1.174; P<0.01), and milk true protein (0.979 vs 0.984 vs 0.956 vs 0.944; P=0.08) reduced as NEFA concentrations increased. Reduction in yields of fat and fat-corrected milk were caused by lesser milk fat % (4.52 vs 4.46 vs 4.40 vs 4.30%; P<0.01). Increasing plasma NEFA was not associated with conception rate at first (35.7 vs 38.4 vs 35.2 vs 34.6%; P=0.92) or second AI (25.3 vs 23.4 vs 28.0 vs 28.1%; P=0.83), with the proportion pregnant at 120 d postpartum (65.6 vs 65.8 vs 66.1 vs 61.6%; P=0.89), and with days open for all cows (89.0 vs 89.1 vs 89.5 vs 90.4 d; P=0.98). Incidence of mastitis (15.2%) and d postpartum at the first clinical mastitis case (27.9 d) did not differ (P>0.15) according to NEFA. The proportion of cows leaving the herd (11.2%) and the interval from calving to leaving the herd (109.4 d) were not associated (P>0.15) with NEFA. Increasing plasma NEFA concentrations prepartum reduced milk fat content, which affected yields of fat and fat-corrected milk, but they were not associated with reproduction and health.

Key Words: NEFA, Reproduction, Jersey

Beef Species

W27   Calves energy retention and efficiency to weaning in Nellore, British x Nellore and Continental x Nellore crossbred calves. L. Calegare[1], M. M. Alencar[2], G. M. Cruz[2], and D. P. D. Lanna*[1], [1]*Animal Growth and Nutrition Lab, ESALQ/USP, Piracicaba, SP, Brazil*, [2]*Embrapa, Sao Carlos, SP, Brazil*.

Calf energetic efficiency is the ratio of the empty body energy (EBE) at weaning and metabolizable energy intake (MEI - concentrate plus milk). The objective of this study was to determine EBW composition and energy retained to weaning. Forty cow/calf pairs were randomized in blocks by calving date. Nellore cows were bred to Nellore bulls and crossbred cows (Canchim x Nellore, Angus x Nellore, and Simmental x Nellore) were bred to Canchim (5/8Charolais: 3/8Zebu) bulls. Cows and respective calves; NL, 3/4C, 1/4A, and 1/4S were individually fed a pelleted diet (16% CP, 2.24 Mcal ME, DM basis) from 15 d postpartum to weaning at 180d. The NL calves consumed less ME (P>0.01) than 1/4S, 796±66 vs. 1061±61. The 1/4A and 3/4C calves were intermediate: 938±57, 955±56 Mcal, respectively. Calves were slaughtered at weaning, and body composition estimated by 9-10-11th rib section chemical composition. The energy retained was a difference between EBE at weaning and at birth. EBW of NL calves was lower (P<0.05) at birth and weaning than crossbreds: 29.7±1.9, 149±11 vs. 38.4±1.9, 183±9 (3/4C); 36.4±1.9, 196±9 (1/4A); and 42.5±1.9, 203±10 kg (1/4S). At weaning 1/4A calves had lower water (P<0.05) and higher EBW fat contents (P<0.05; 61.6±0.8, 14.0±0.8, respectively) than 3/4C (64.6±0.8, 10.9±0.8), and 1/4S (64.3±0.8, 11.3±0.9). NL calves had higher EBW water (64.3±0.9%) than 1/4A and intermediate fat content (12.2±0.9%). NL calves deposited 46% and 31% less EBE (P<0.05) than 1/4A and 1/4S: 291.2±33.4 vs. 424.4±29.4 and 381.7±31.2, respectively. The 3/4C calves had intermediate EBE, 341.2±28.5 Mcal. The 1/4A calves were more efficient (P<0.05) than NL, 3/4C, 1/4S: 0.455 vs. 0.372, 0.355, and 0.363±0.03, respectively. British crossbreds were more efficient because of higher growth rate (dilution of maintenance) and higher fat deposition (higher k_g). Nellore deposited 31% less EBE, but was as efficient as 1/4S probably because of lower maintenance requirements.

Key Words: Body Composition, Genotypes, Weaning Weight

W28   The relationship between infrared thermography and residual feed intake in cows. A. L. Schaefer*[1], J. Basarab[2], S. Scott[3], J. Colyn[1], D. McCartney[1], J. McKinnon[4], E. Okine[5], and A. K. W. Tong[1], [1]*Agriculture and Agri-Food Canada, Lacombe, Alberta, Canada*, [2]*Alberta Agriculture Food and Rural Development, Lacombe, Alberta, Canada*, [3]*Agriculture and Agri-Food Canada, Brandon, Manitoba, Canada*, [4]*University of Saskatchewan, Saskatoon, Saskatchewan, Canada*, [5]*University of Alberta, Edmonton, Alberta, Canada*.

The present study examined the relationship between infrared thermographic images collected non invasively and residual feed intake (RFI) in cows. RFI is the difference between actual and expected feed intake based on size and growth over a fixed time. Dorsal thermal scans were collected on 37 mature, crossbred beef cows (mean BW = 750 kg) on three dates approximately one month apart using an Inframetrics 740 or 760 camera. Duplicate thermal scans were used for analysis. A maximum dorsal temperature was used in the thermal calculations. Residual feed intake was monitored on all animals for an 84 day period using an electronic ID and a Growsafe® feed monitoring system. Cows were classed into three categories, namely, those expressing RFI < 1 (more efficient), those with RFI > 1 (less efficient) and those animals with intermediate RFI. Based on least squares analysis with two tailed, unpaired t-tests, cows with RFI < 1 (mean RFI -2.81 kg as fed per day ± 2.06 SD, n=12) displayed significantly lower average dorsal maximum temperatures than cows with RFI values >1 (mean RFI 3.87 kg as fedper day ± 2.86, n=11) (17.9 C ± 1.3 for RFI < 1 vs 19.7 C ± 1.43 for RFI >1 respectively, P< 0.01). Using representative feeding costs for cows, these differences inRFI would equate to greater than $100 per animal per year. The data suggest that the use of infrared thermal scans may display utility in the assessment and ability to fort feed efficiency in cattle.

Key Words: Cattle, Feed Efficiency, Infrared

W29   Correlations between residual feed intake and carcass traits in finishing steers administered different anthelmintic treatments. P. A. Lancaster, B. R. Schilling*, G. E. Carstens, E. G. Brown, T. M. Craig, and D. K. Lunt, *Texas A&M University, College Station*.

Unlike feed:gain ratio (F:G), residual feed intake (RFI) is a measure of feed efficiency that is independent of growth traits. Several studies have reported that RFI is correlated with carcass composition. The objective of this study was to determine if carcass traits will improve the accuracy of predicting DMI used to calculate RFI. Red Angus steers (n = 119; BW 296 ± 34 kg) were assigned to one of three anthelmintic treatments and individually fed a high-grain diet (ME = 2.73 Mcal/kg) for 138 d using Calan feeders. Traits measured were DMI, 28-d BW, as well as 12th rib fat thickness (BF), KPH, marbling score (MS), and REA at harvest. Step-wise regression was used to examine effects of carcass traits in predicting DMI beyond the base model (DMI = β1*ADG + β2*mid-test metabolic BW; MBW). Anthelmintic treatment did not affect (P > 0.25) DMI, ADG, MBW, F:G, or carcass traits, and had negligible effect when included in the base model as a class variable. Inclusion of KPH and BF into an adjusted model (R^2 = 0.66; RMSE = 0.81) resulted in a small improvement over the base model (R^2 = 0.59; RMSE = 0.88). RFI calculated from base and adjusted models were correlated (P < 0.001) with DMI (r = 0.64 and 0.58) and F:G (r = 0.46 and 0.43), but not ADG or MBW. Base model RFI was correlated (P < 0.05) with BF (r = 0.27), KPH (r = 0.32), and MS (r = 0.20), but not REA, whereas, adjusted model RFI was not correlated with carcass traits. Both models revealed that steers with low RFI (< 0.5 SD below the mean) consumed 18-19% less DMI, but had similar ADG and MBW compared to steers with high RFI (> 0.5 SD above the mean). From base model, steers with low RFI had less

(P < 0.01) BF (1.29 vs 1.56 ± 0.06 cm), KPH (3.12 vs 3.58 ± 0.10%) and MS (3.90 vs 4.19 ± 0.07) compared to high RFI steers. Carcass traits did not differ between adjusted model low vs high RFI steers. Although Spearman's rank correlation for base and adjusted model RFI was 0.87, results suggest that inclusion of carcass composition traits in models to estimate RFI may be warranted.

Key Words: Net Feed Efficiency, Regression Models

W30   Evaluation of SafeGuard® (fenbendazole) oral drench in addition to Ivomec® (ivermectin) pour-on vs. Dectomax® (doramectin) injectable alone on parasite load, performance and carcass merit of finishing heifers. C. D. Reinhardt*, J. P. Hutcheson, and W. T. Nichols, *Intervet, Inc., Millsboro, DE.*

Seven hundred fifty-six crossbred yearling heifers were treated with either 1) Safe-Guard (fenbendazole) drench plus Ivomec (ivermectin) Pour-on (SG+IVO) or 2) Dectomax (doramectin) Injectable alone (DMXINJ). Heifers receiving SG+IVO shed 97% fewer (P=.003) worm eggs per sample 35 days after treatment than heifers treated with DMXINJ. With a reduced parasite burden, SG+IVO treated heifers consumed 1.2 lb more feed daily, were 29 and 25 lb heavier at harvest (live and carcass adjusted basis), had .14 and .10 lb higher ADG (live and carcass adjusted basis) and had 16 lb heavier carcasses than DMXINJ treated heifers (P<.10). There were no differences in feed efficiency, yield grade, or carcass quality. Heifers treated with SG+IVO did have a lower percentage of dark cutters (P<.10) than DMXINJ heifers (.5 vs. 2.1%). The combination of Safe-Guard and Ivomec Pour-on increases feed intake, daily gains, and carcass weight in feedlot heifers compared to using Dectomax injectable alone.

Key Words: Fenbendazole, Feedlot, Dewormer

W31   Effects of Revalor®-G in grazing heifer growth performance and subsequent breeding performance. W. T. Nichols*[1], K. Hill[2], J. P. Hutcheson[1], and C. D. Reinhardt[1], [1]*Intervet, Inc., Millsboro, DE, USA,* [2]*Hill Veterinary Svcs., Kaysville, UT, USA.*

One-hundred fifty Angus and Angus cross-bred heifers approximately 12 months of age were used to evaluate the effects of Revalor®-G on grazing heifer growth performance and subsequent breeding parameters. Heifers were assigned to either an implant treatment (R) group (n=75) consisting of Revalor-G (40 mg Trenbolone Acetate and 8 mg Estradiol 17β) or negative control (C) group (n=75) on day 0 by assigning every other heifer through the chute to one of the two treatments. Treatment R heifers received the Revalor-G implant subcutaneously in the right ear according to label directions on day 0. All heifers were individually tagged at processing and individual weights were taken following the implanting and tagging process on d 0. Four two year old Angus bulls were introduced to the herd on d 36. Bulls were subsequently removed 60 days later. Heifers were individually weighed after standing overnight in a dry pen on d 96 to ascertain final weights. All heifers were pregnancy checked by palpation on d 135 and d 148. The initial weights between treatments were significantly (P<.001) different, while the final weights were similar (P>.63). These differences resulted in the R treatment significantly (P<.001) improving ADG and total gain in comparison to the C treatment. There were no differences found between treatments in percent pregnancy (74% and 72% respectively for C and R). However, there was a significant (P<.001) difference in days to conception which favored C. These data indicate that grazing heifer ADG was improved 12% and total gain improved 11% by implanting with Revalor-G. In addition this trial demonstrated that implanting heifers with Revalor-G did not negatively affect conception rate of breeding heifers. However, the use of Revalor-G might increase days to conception in comparison to non-implanted heifers.

Heifer Grazing Performance and Breeding Parameters

Item	Revalor®-G	Control	P-value	SEM
Initial wt, kg	296	302	<.001	0.57
Final wt, kg	358	357	.63	2.04
Gain, kg	62	56	<.001	0.40
ADG, kg	0.65	0.57	<.001	0.018
No. Pregnant[1]	54	56	1.00	
days to Conception	30	24	<.001	0.58

[1]Chi-Square Analysis

Key Words: Anabolic Implants, Grazing, Heifers

W32   Evaluating rapid methods for determination of total conjugated linoleic acid in beef fat. M. E. R. Dugan*[1], D. C. Rolland[1], and J. K. G. Kramer[2], [1]*Agriculture and Agri-Food Canada, Lacombe, Alberta, Canada,* [2]*Agriculture and Agri-Food Canada, Guelph, Ontario, Canada.*

The level of conjugated linoleic acid (CLA) in beef may be of ecomomic value due to its potential health benefits. Levels of CLA in beef can be quite variable between animals even when feeding the same diet, as CLA and CLA precursors are products of the sometimes inconsistent process of bacterial biohydrogenation. Thorough analysis of CLA isomers involves a combination of techniques including GC with a 100 m column combined with silver ion HPLC, and thus is ill suited for rapid sorting of carcasses or tissues of potential economic value. Three simple methods for the measurement of CLA in beef fat using CLA's characteristic absorbance at 233 nm were, therefore, investigated and compared with results obtained by GC. Twenty four beef fat samples ranging continuously in CLA concentration from 0.32 to 1.92% were used for this study. Regressing CLA concentrations determined by GC with those obtained by (1) direct extraction with ethanol (2) after saponification and (3) after direct methylation of beef fat with sodium methoxide (0.5M) followed by measurment of absorbance at 233 nm in ethanol resulted in R^2s of 0.96, 0.93 and 0.98 respectively and significant slopes for all equations (P < 0.01). As a consequence, when comparing differences between predicted and actual results, saponification results tended to be more variable than results obtained after direct methylation (P = 0.10). Direct extraction by ethanol followed by measuring absorbance at 233 nm may thus be the simplest and most viable method for the rapid sorting of beef carcasses with differing CLA contents. It would now, however, be interesting to test the robustness of this methodology during a larger scale industry survey.

Key Words: CLA, Beef, Method

W33   Effect of method and timing of castration on growth performance and morbidity of newly arrived stocker cattle. M. D. Ratcliff*, E. B. Kegley, S. L. Krumpelman, and J. A. Hornsby, *University of Arkansas Division of Agriculture, Fayetteville.*

Method and timing of castration could be one of many factors that impact the performance and health of newly arrived stocker cattle. Two hundred seventy two crossbred male calves (185 bulls, 87 steers; 210 ± 14.7 kg) were purchased and shipped to the Stocker Unit in Savoy, AR in three groups. Upon arrival, calves were weighed, identified, and allowed access to hay and water for 24 h. Bull and steer calves were randomly assigned to pens, and within pens, assigned to one of five treatment groups consisting of: calves that arrived as steers; calves that arrived as bulls and were castrated surgically on d 0 or 14; calves that arrived as bulls and were castrated utilizing a bander on d 0 or 14. The next day, calves were processed and designated bull calves were castrated. On d 14, the remaining bull calves were castrated. Calves were housed in 0.45 ha grass lots and were offered ad libitum hay and a daily grain supplement (1.8 kg as fed basis). Calves were observed for 43, 50, and 52 d for each group received, respectively. For bulls, there was a method × castration day interaction (P < 0.01) for ADG. Bulls surgically castrated on d 0 had the greatest ADG (0.66 kg)

with bulls surgically castrated on d 14 gaining the least (0.50 kg). Steers had a tendency ($P = 0.06$) to have higher total ADG when compared to calves that arrived as bulls. Neither method nor timing of castration affected the number of bulls treated for respiratory disease, the number of antibiotic treatments required/calf, or medication costs/calf ($P \geq 0.54$). However, calves that arrived as steers had a lower percentage of calves that received the first and second round of antibiotic treatments, number of antibiotic treatments required/calf, and medication costs when compared to bulls ($P < 0.04$). This study indicated that method and timing of castration would impact overall growth performance of newly arrived stocker-cattle; however, if calves are castrated prior to arrival, ADG and morbidity could be enhanced.

Key Words: Castration, Stocker Calves, Cattle

W34   Weight and carcass characteristics of nelore, guzerat-nelore and brahman-nelore steers. E. Ribeiro*[1], J. Hernandez[2], E. Zanella[3], M. Shimokomaki[1], S. Prudencio-Ferreira[1], E. Youssef[1], H. Ribeiro[1], and J. Reeves[2], [1]*Universidade Estadual de Londrina, Londrina, PR, Brazil*, [2]*Washington State University, Pullman*, [3]*Universidade de Passo Fundo, Passo Fundo, RS, Brazil*.

This experiment was carried out to evaluate the performance of steers of three genetic groups: 1) Nelore x Nelore (NN), 2) Guzerat x Nelore (GN) and 3)

Brahman x Nelore (BN). Forty-one animals, 24 mo of age at the initiation of the study, were grazed on Brachiaria grass, in the state of Mato Grosso, Brazil. All animals came from the same herd and were raised under the same conditions. They were slaughtered at 3 years of age. At the beginning of the experiment and at slaughter, Brahman-crossed animals were heavier than the animals from the other two groups. Means for body weight for the groups NN, GN and BN, were respectively, 324, 320 and 343 kg (P<0.06) at the beginning of the experiment, and 474, 470 and 499 kg (P<0.02) at slaughter. However, average daily gains were similar among the groups (0.388, 0.386 and 0.409 kg/d, respectively). Brahman (BN) group produced heavier (P<0.05) hot carcasses (253 kg) than the Guzerat (GN) group (238 kg), but they were not different than the straight-bred Nelore (NN) group (242 kg). Percentages of carcass muscle (58.7, 56.5 and 57.3 %), fat (23.1, 25.4 and 25.1 %) and bones (17.9, 17.8 and 17.4 %) were similar among the groups (NN, GN and BN, respectively). Other carcass traits (dressing percentage, ribeye area, fat thickness and marbling) and meat tenderness, measured by a trained panel (5.5, 6.2 and 6.0) or by a texturometer (135, 111 and 134, Newton's force) were, also, similar among the three genetic groups (NN. GN and BN, respectively). Crossing other zebu breeds (Brahman or Guzerat) with Nelore did not improve qualitative characteristics of carcasses and meat; however, crossing with Brahman resulted in heavier animals with heavier carcasses.

Key Words: *Bos indicus*, Crossbreeding, Zebu

Companion Animals: Nutritional and Health Considerations for Companion Animals I

W35   Metabolic & histopathological effects of the somatotropin/insulin-like growth factor axis on bone healing in a canine unstable gap fracture healing model. F. Buonomo*[1] and D. Millis[2], [1]*Monsanto Company, Animal Science Division, St. Louis, MO*, [2]*University of Tennesee, Knoxville*.

The involvement of the somatotropin/IGF-I axis on bone fracture healing was investigated using an unstable gap fracture model in dogs. Beagle dogs (24) were randomly assigned to groups receiving canine somatotropin (cST) at 0, 2, 4 or 6 mg/d for 42d. A 3mm radial ostectomy was then performed on all dogs. Weekly blood samples were obtained preoperatively, and for 12wks post-surgery for cST, IGF-I and osteocalcin (OST) determinations. Radiographs were obtained biweekly to assess the progression of fracture healing. Biweekly [99]mTechnetium-MDP injections and scans were performed to determine metabolic activity at ostectomy sites. Scans were evaluated for pattern of activity and count densities at the ostectomy sites as compared to those of the ipsilateral humerus. Radiographic bone area (BA), bone mineral content (BMC) and bone density (BD) were determined by DEXA at the ostectomy site, proximal and distal to the ostectomy, and the total bone at 12wks post-operative. Bones were then subjected to 3 point bending biomechanical testing, and ultimate load at failure (ULF) and stiffness were determined. Comparisons between trt groups were made using either Student's T test or repeated measures ANOVA as appropriate.

Serum cST, IGF-I and OST increased during healing in cST-treated dogs, but remained unchanged in control dogs (P<.01). CST-treated dogs had more advanced signs of radiographic healing than control dogs; the former nearly reaching clinical union by wk 12, while the latter developed oligotrophic nonunions. All dogs had increased [99]mTc uptake at ostectomy sites over time; that being greater in cST-treated vs. control dogs. BA, BMC and BD of ostectomized radii were greater at all measured sites in the cST-treated dogs. Indices of biomechanical strength indicated that ULF and stiffness of the ostectomized radii were greater at all measured sites in the cST-treated dogs. These results demonstrate that somatotropin-induced increases in serum growth factor levels, such as IGF-I and OST, are associated with improved parameters indicative of advanced bone fracture healing.

Key Words: Somatotropin, IGF-I, Canine

W36   Antioxidants to protect petfood diets enriched in essential fatty acids from autoxidation. T. Tanner* and L. Deffenbaugh, *Kemin Industries, Inc., Des Moines, IA*.

Fat in a petfood diet provides a majority of the gross energy as well as essential dietary fatty acids. Fat is highly susceptible to degradation, especially in a dry petfood diet where exposure to pro-oxidants accelerates autoxidation. Ingestion of oxidized lipids has a negative effect on growth, antioxidants status and some immune functions of dogs (Turek, et al. 2003). The choice of the type and levels of fats is largely determined by nutritional targets for the ratio of ω-3 and ω-6 fatty acids and specific essential fatty acids such eicosapentaenoic acid and docosahexaenoic acid. Animal fats are more stable and less costly than vegetable and marine oils, but do not always provide ideal levels of unsaturated and essential fatty acids. The challenge of stabilizing dry diets, often preferred over wet diets for convenience and cost, is magnified when unsaturated fats and oils are used, greatly increasing the risks of consuming oxidized fats. An experimental petfood diet was used to identify the best antioxidant for a highly unsaturated diet. The diet was composed of corn, poultry meal, rice, soybean meal, vitamins and minerals plus 5% salmon oil applied topically to the extruded core. No liquid animal fat was used. In ambient storage, this diet treated with either ethoxyquin and tocopherols alone experienced severe oxidation within one month. Blends of tocopherols and rosemary extract protected this diet through 3 months ambient storage, maintaining Peroxide Value at <2 meq / kg. Further, accelerated storage suggested that the tocopherol / rosemary extract blends will maintain stability of this highly susceptible diet for >6 months. The addition of ascorbyl palmitate to blends of tocopherols and rosemary extract further improves efficacy in marine oils and diets containing marine oils. The use of tocopherol / rosemary extract blends in such difficult to stabilize diets is finally approaching the target 12 month shelf life target for dry pet foods, which will likely be achievable with further optimization.

Key Words: Essential Fatty Acids, Antioxidants, Autoxidation

W37   Cloning and in vitro characterization of dog PepT1 and development of a polarized cell model to study PepT1 trafficking and regulation. B. Zanghi*[1], N. Etienne[1], A. Matthews[1], E. Miles[1], G. Davenport[2], and J. Matthews[1], [1]*University of Kentucky, Lexington*, [2]*The IAMS Company, Lewisburg, OH*.

Peptide Transporter 1 (PepT1) mediates the H+-dependent absorption of di- and tripeptides in intestinal and renal epithelial cells. To identify the protein respon-