

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. Hernandez², E. Zanella³, M. Shimokomaki¹, S. Prudencio-Ferreira¹, E. Youssef¹, H. Ribeiro¹, and J. Reeves², ¹Universidade Estadual de Londrina, Londrina, PR, Brazil, ²Washington State University, Pullman, ³Universidade 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. Millis², ¹Monsanto Company, Animal Science Division, St. Louis, MO, ²University of Tennessee, 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 osteotomy 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 ^{99m}Tc-MDP injections and scans were performed to determine metabolic activity at osteotomy sites. Scans were evaluated for pattern of activity and count densities at the osteotomy 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 osteotomy site, proximal and distal to the osteotomy, 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 ($P < 0.01$). 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 ^{99m}Tc uptake at osteotomy sites over time; that being greater in cST-treated vs. control dogs. BA, BMC and BD of osteotomized radii were greater at all measured sites in the cST-treated dogs. Indices of biomechanical strength indicated that ULF and stiffness of the osteotomized 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. Etienne¹, A. Matthews¹, E. Miles¹, G. Davenport², and J. Matthews¹, ¹University of Kentucky, Lexington, ²The 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-

sible for putative dog PepT1 (dPepT1) activity reported earlier by us (FASEB J. 2001, 15: A829), we generated a full-length cDNA predicted to encode a 708 amino acid-protein from MDCK cells using 5'- and 3'-RACE and RT-PCR methodologies. Dog PepT1 shares 81, 83, and 83% amino acid identity with human, sheep, and pig PepT1, respectively. To characterize the functional activity of dPepT1, non-polarized Opossum Kidney (OK) cells were transiently transfected with pcDNA3.1-dPepT1 or pEGFP-N1-dPepT1 (GFP-PepT1) plasmids and glycylsarcosine (GlySar, 1 mM) uptake measured 48 h after transfection. With both dPepT1 and GFP-dPepT1, H⁺-dependent [³H]GlySar uptake (pmol•mg⁻¹ protein•30 min⁻¹) by transfected OK cells was optimal at pH 5.5 (3.1 times greater (P < .0001) vs pH 7.5) and saturable (K_m = 0.57 ± 0.25 mM). IC₅₀ studies demonstrated that dPepT1 possesses a range of substrate affinities (TrpLeu: 38 μM, carnosine: 1200 μM, cefadroxil: 600 μM). GlySar uptake was similar with dPepT1 and dPepT1-GFP. Western blot analysis demonstrated immunoreactivity of anti-pig PepT1 antibody for dPepT1 (92 kDa) in OK cell homogenates. To develop a cell culture model to study membrane-specific substrate- or hormone-dependent regulation of dPepT1, polarized OK cells were transfected with dPepT1 and GlySar uptake (pmol•well⁻¹•90 sec⁻¹) measured. Apical GlySar uptake was 8 times greater (P < .01) than basolateral. This report uniquely describes the molecular and functional characterization of dog PepT1, and demonstrates that a useful cell model to study membrane trafficking and membrane-specific regulation of PepT1 has been established.

Key Words: Canine, Peptide Transport, GFP-PepT1

W38 Feeding of chicken or soy protein-based diet differentially affects in vivo PepT1 uptake capacity in dogs. B. Zanghi¹, G. Sipe¹, G. Davenport², and J. Matthews¹, ¹University of Kentucky, Lexington, ²The IAMS Company, Lewisburg, OH.

Intestinal Peptide Transporter 1 (PepT1) expression can be upregulated by increasing amounts of dietary casein and certain dipeptides. Previously, we demonstrated that orally bolused [³H]cefadroxil (CEF, 40 μCi, 40 nmol) was a good substrate to detect changes in PepT1 uptake capacity in adult, female, mongrel dogs (JAS, 2004, 82(1): A375). The objective of these experiments were to evaluate the effect of feeding isonitrogenous diets that contained chicken (C) or soy (S) protein sources on PepT1 functional capacity and total tract digestibility. CEF was bolused 4 (Exp. 1) or 14 h (Exp. 2) after feeding and ³H appearance, metabolism, and disappearance in blood, urine, and feces was measured. Exp 1 compared the effect of 18-d feeding of C, S, and S supplemented with carnosine or glycylsarcosine diets on these CEF parameters using a 4 x 4 Latin Square design (n = 4; BW = 21.3 ± 2.5 kg), whereas Exp 2 evaluated 39-d feeding of C versus S diets with a crossover design (n = 3). For Exp 1 and 2, the C diet had a greater (P < 0.05) apparent total tract DM, OM, CP (92 vs 86%), DE, and NDF digestibility versus any S diet. In Exp 1, plasma content (pmol) of CEF from 3.5 or 5.5 h through 12 h after dosing (renal retention capacity) was 19 or 24% greater (P < 0.06) with the C diet than the S diet. In Exp 2, plasma content of CEF was 200 or 89% greater from 0 through 1.5 h or 2.5 h, respectively, after dosing (intestinal uptake capacity) with the S diet than C diet. No treatment effects were observed for CEF metabolism or ³H disappearance from plasma or urine in either experiment. Within a dietary treatment and across experiments, intestinal and renal CEF absorption capacity increases in the post-prandial state of dogs fed a C diet, whereas CEF absorption capacity is about the same in the postprandial and fasting state of dogs fed a S diet. These data indicate that C and S diets differentially affect in vivo PepT1 functional capacity.

Key Words: Canine, Intestine, Cefadroxil

Dairy Foods: Dairy Microbiology and Dairy Processing

W39 Quality characteristics and consumer acceptance of yogurt fortified with date fiber. I. Hashim*, A. Khaul, and H. Afifi, UAE University, Al Ain, United Arab Emirates.

Milk and dairy products do not contain fiber while the by-product produced during date syrup production is a good source of dietary fiber. The objective of this study was to investigate the effects of date fiber (DF) fortification on yogurt quality and sensory properties. Quality characteristics, sensory properties and consumer acceptance of yogurt fortified with DF were evaluated. Yogurt samples were prepared from whole milk using a commercial yogurt formula (2.5% milk solid nonfat, 0.6% stabilizer and commercial yogurt culture). Control yogurt and yogurts containing 1.5, 3, and 4.5% DF as well as 1.5% wheat bran (WF) were prepared. Acidity (1.04) and pH (4.47) of yogurt were influenced by DF fortification (1.08 and 4.61-4.65). Yogurts fortified with DF had firmer texture (hardness 55-57) and darker color [lower L* (75.4-84.8) and higher a* (2.7-4.9)] than control (L = 95.5 and a* = -.8) or WF (L=89.3 and a* = 0.8) yogurts. Hedonic ratings by 32 consumers indicated that yogurt appearance (8.3) and color (8.5) were significantly affected by the addition of DF (6.2-6.5). Yogurt containing up to 3% DF had similar hedonic ratings for sourness, sweetness, firmness and overall acceptance as the control yogurt. Increasing DF to 4.5% decreased sensory ratings and acceptability of yogurt significantly.

Fortifying yogurt with 3% DF produced acceptable yogurt with beneficial health effects.

Acknowledgements: This study was funded by the Research Council at United Arab Emirates University.

Key Words: Yogurt, Date Fiber, Quality and Consumer Acceptance

W40 Effect of milk heat treatment on the growth and viability of *Bifidobacterium animalis* Bb12 during fermentation and storage of yogurt. L. Fachin and W. Viotto*, State University of Campinas - UNICAMP, Faculty of Food Engineering, Department of Food Technology, Campinas, SP, Brazil.

Production of yogurt with *Bifidobacterium* spp. has been attracting much attention in the last years due to health benefits of these microorganisms. However, it is claimed that a minimum level of these bacteria (usually 10⁶ cfu/g of the product) should remain viable at the moment of consumption. Many studies have pointed to the low viable counts of these microorganisms during shelflife. Lactulose is a known prebiotic that is produced by severe heat treatments of the milk. The objective of this work was to evaluate the effect of the heat treatment of 142°C/15 s comparing to the control one, 90°C for 5 minutes, on the growth of *Bifidobacterium animalis* BB 12 during yogurt fermentation and its viability during storage, monitoring textural changes, syneresis and yogurt post-acidification. Heat treatment of 142°C/15 s had no effect on the growth of *Bifidobacterium animalis* Bb12 during yogurt fermentation and on its viability during storage. Yogurt post-acidification also did not change but heat treatment impaired texture, decreasing hardness, gumminess and adhesiveness of the product. Whey separation, however, was slightly improved compared to the control.

Key Words: Heat Treatment, Probiotic, Yogurt

W41 Effect of *Propionibacterium freudenreichii* PS-1 on the growth and viability of *Bifidobacterium animalis* Bb12 during fermentation and storage of yogurt. L. Fachin and W. Viotto*, State University of Campinas - UNICAMP, Faculty of Food Engineering, Department of Food Technology, Campinas, SP, Brazil.

Bifidobacterium spp. is increasingly being incorporated into dairy foods, especially yogurt, due to their health benefits. However, many studies have shown