

**W15 Gender, age, and hormonal status affect recovery time from general anesthesia in pigs.** D. Wray-Cahen<sup>\*1</sup>, W. Pritchard<sup>1</sup>, A. Ashby<sup>1</sup>, E. Russek-Cohen<sup>1</sup>, J. Vossoughi<sup>2</sup>, and J. Karanian<sup>1</sup>, <sup>1</sup>Food and Drug Administration, Laurel, MD, <sup>2</sup>Biomed Research Foundation, Olney, MD.

Pain awareness during surgery is more prevalent in women than men and may be associated with the more rapid waking from general anesthesia observed in women. The gender, age, and hormonal status of an animal may affect how they respond to anesthesia and the speed at which they awaken from general anesthesia. To determine the effect of gender, hormonal status and age on anesthesia recovery time, we observed seven groups of pigs recovering from general anesthesia for interventional cardiovascular procedures: intact boars (M, n=21), barrows (MX, n=9), intact gilts (F, n=21), ovariectomized (OVX) gilts (FX, n=14), OVX gilts receiving estrogen (ERT, n=10), young gilts (YG, n=12), and young barrows (YB, n=7). Older pigs were all sexually mature and >90kg (X±SEM; 112±1kg). Young immature pigs were <32kg (25±4kg). After induction, a surgical level of general anesthesia (stage 3, plane 2) was maintained by

isoflurane inhalation. Pigs received isoflurane for 188±5 min. Minutes post-anesthesia for responses to stimuli and for motor control parameters to be elicited were recorded. Younger pigs (YG, YB) awoke from anesthesia much quicker than older pigs (P<0.001), getting on their sternum, sitting, and standing >4-times faster. Older gilts (F, FX, ERT) recovered more rapidly than M. Castration, but not OVX, reduced the overall response times. F responded to stimuli (nose pinching, leg pulling) >2.3-times sooner than M (P<0.001). M were slower than other older pigs to get on their sternum (171±17 v 96±7 min; P<0.001), sit (187±16 v 116±7 min; P<0.002), and stand (202±17 v 129±8 min; P<0.02), respectively. These data demonstrate that young pigs awaken from gas anesthesia much more quickly than older pigs and that females (and MX) awake more quickly than M. These results may also have implications for anesthesia rates necessary to maintain a surgical plane of anesthesia. Gender, age, and hormonal status should be taken into account when administering anesthesia to pigs.

**Key Words:** Gender, Anesthesia, Age

## Animal Health III

**W16 Gnathostomosis occurrence in wilds vertebrates in the south of Sinaloa State, Mexico.** E. Torres<sup>\*1</sup>, S. Sánchez<sup>1</sup>, C. De la Cruz<sup>2</sup>, J. J. Portillo<sup>3</sup>, and A. Lafón<sup>4</sup>, <sup>1</sup>EB-Universidad Autónoma de Sinaloa, Culiacan, Sinaloa, Mexico, <sup>2</sup>FCQ-Universidad Autónoma de Sinaloa, Culiacan, Sinaloa, Mexico, <sup>3</sup>FMVZ-Universidad Autónoma de Sinaloa, Culiacan, Sinaloa, Mexico, <sup>4</sup>FZ-Universidad Autónoma de Chihuahua, Chihuahua, Chihuahua, Mexico.

The present study was conducted on the hydrological basins of El Rosario and Escuinapa municipalities, located on the south of Sinaloa State, Mexico. The targets were to identify the hostesses that participate on the biological cycle of *Gnathostoma* spp and establish the probability of occurrence in the hostesses and habitats. A sample of 4469 vertebrates was obtained of a total of 27 species. Of these 15 were for fish, considered secondary hostesses; 1 of reptiles, 9 of birds, who participate as paratenic or accidental hostesses and finally 2 of mammals, considered to be definitive. Third stage larvae recovery and identification was made by the transillumination technique with samples of muscular tissue, been positive 6 species of fish, 1 of reptiles, and 4 of birds, which come from 4 types of habitat. Diagnosis of adult parasites was by stomach and esophagus direct observation finding only one positive mammal species which was *Didelphis virginiana* (Virginia opossum). Results were analyzed by logistical regression, the species with more probability of occurrence (P< 0.05) of *Gnathostoma* were to *Dormitator latifrons* (Pacific fat sleeper) 0.38, *Cichlasoma beani* (Green guapote) 0.23 y *Oreochromis* spp (*Tilapia*) 0.079. Seasonal and permanent ponds presented a bigger proportion of species of infected vertebrates (0.28 and 0.20). According with the obtained results it is concluded that *D. latifrons*, *C. beani* and *Oreochromis* spp were the most important species, so suggested no consumption of raw or not enough cooked meat seasonal them. Left hand, permanent ponds present a higher probability of favoring the presence of *Gnathostoma*, because of the number of secondary hostesses, from where the larvae come to concentrator and disperser hostesses, and the human being; closing the cycle on the definitive hostesses. Is it suggested to continue with the surveys over the hostesses and habitats, also avoiding the consumption of the registered species with high probability of occurrence, given the importance of this parasitosis in Sinaloa State and Mexico.

**Key Words:** Gnathostomosis, Zoonosis, Habitat

**W17 Evaluation of garlic (*allium sativum* L.) anthelmintic properties to control internal parasite populations in adult female Boer goats.** R. A. Franco and M. Worku<sup>\*</sup>, North Carolina A&T State University, Greensboro.

In keeping with organic standards, producers are using natural materials to treat parasites. Diminished health, growth rate and feed conversion have been observed in sheep. There is a need for controlled experiments to support the effec-

tiveness of these materials. Garlic (*allium sativum* L.) is actively antibacterial and may be effective. In order to evaluate a commercial, organically approved garlic product (Gempler's) as a dewormer and to establish dosing rates for goats, twenty female Boer goats weighing ~40 kg were assigned to four groups (0, ½ tsp, 1 tsp, and 2 tsp), of five animals each. A comparison of fecal egg counts (FEC) (for roundworms and coccidia eggs), packed cell volume (PCV), FAMACHA scores, and body weight (BW) in GI parasite infected goats vs untreated animals were evaluated. A general linear model (GLM) analysis was run on all variables using SAS. The results of FEC (roundworms and coccidian eggs), FAMACHA scores, PCV and BW are represented in Table 1. In the correlation analysis, FEC for roundworms had a positive correlation with FAMACHA scores (r = 0.323, P≤0.0015) and a negative correlation with PCV (r = - 0.338, P≤0.0009), but none with any other parameters. FEC for coccidia eggs negative correlation with PCV (r = - 0.207, P≤0.0475). There was no other correlation observed for FEC for this variable. High FEC for roundworm and coccidia eggs were observed when low PCV values were recorded. PCV had a negative correlation with FAMACHA scores indicating anemia (r = - 0.332, P≤0.0009). The organically approved garlic extract did not reduce FEC or alleviate anemia at the concentrations tested.

**Table 1. Data Averages for Treatment Groups and Variables Studied.**

Treatment group	FEC roundworms EGP <sup>ns</sup>	FEC coccidian EPG <sup>ns</sup>	FAMACHA score *	PCV % <sup>ns</sup>	BW Kg. *
Control	2195.6	293.4	2.4 <sup>ac</sup>	21.8	43.6 <sup>a</sup>
Group 2	3870.2	291.2	2.8 <sup>b</sup>	20.2	39.5 <sup>a</sup>
Group 3	1921.0	462.8	2.1 <sup>c</sup>	22.3	51.9 <sup>b</sup>
Group 4	1930.8	482.8	2.4 <sup>ab</sup>	20.5	46.7 <sup>ab</sup>

<sup>ns</sup> = non significant; \* = significant at 5% level of probability.

**Key Words:** Garlic, Parasites, Goats

**W18 Evaluation of FAMACHA<sup>®</sup>, PCV, BW and FEC as diagnostic approaches to evaluate the efficacy of Cydectin<sup>®</sup>(moxidectin) in controlling natural infections of *H. contortus* in adult female South African Boer, Spanish and Boer/Spanish cross goats.** O. Alexander, M. Worku<sup>\*</sup>, G. C. Bernard, and R. A. Franco, North Carolina A&T State University, Greensboro.

*Haemonchus contortus* is a gastrointestinal parasite that causes weight loss, anemia and possible death in livestock. The FAMACHA<sup>®</sup> card is a system in

use by goat and sheep producers to check for the degree of anemia by scoring the color of the ocular membrane, based on a scale from 1 to 5, with 1 exhibiting good health and no need for anthelmintic treatment. The goal of this study was to evaluate the utility of packed cell volume (PCV), bodyweight (BW), fecal egg count (FEC) and the FAMACHA<sup>®</sup>, card to evaluate the efficacy of Cydectin<sup>®</sup> as an anthelmintic treatment against *H. contortus* in goats. Twenty adult female South African Boer, Spanish and Boer/Spanish cross goats weighing ~40 kg were selectively assigned to treatment groups according to their parasite burden. Cydectin<sup>®</sup> was administered to the goats via oral drench at 0.02mg/kg. On days 0, 14, 30, 45 and 60 fecal and blood samples were taken from the goats that were also weighed and scored using FAMACHA<sup>®</sup>. FECs were conducted using a modified version of the McMaster's method. A negative, simple linear correlation with a statistical significance of ( $P \leq 0.001$ ) was observed between PCV and FEC, and a negative correlation between FAMACHA<sup>®</sup> and PCV and between BW and FEC existed, but there were no relationships between other treatments. When administered at the recommended dose, Cydectin<sup>®</sup>(moxidectin) proved to have a 72% anthelmintic efficacy. The FAMACHA<sup>®</sup> was useful in evaluating efficacy and can supplement PCV, BW and FEC in the determination of *H. contortus* burden in goats.

**Key Words:** FAMACHA, Moxidectin, Goats

**W19 Temporal changes in rectal temperature and serum prolactin of weaned brahman-influenced heifers previously grazing endophyte-infected tall fescue pasture.** G. Aiken\*<sup>1</sup> and M. Looper<sup>2</sup>, <sup>1</sup>USDA-ARS, Forage-Animal Production Research Unit, Lexington, KY, <sup>2</sup>Dale Bumpers Small Farms Research Center, Booneville, AR.

Suckling calves maintained on endophyte-infected tall fescue (*Festuca arundinacea* Schreb.) can potentially suffer from fescue toxicosis. Twenty heifers (1/4 to 3/8 *Bos indicus*) were utilized to monitor rectal temperature and serum prolactin concentrations for 8 d post-weaning (Feb. to Oct.) from endophyte-infected tall fescue pastures. Heifers were removed from cows at approximately 0800 h on 19 October at a mean age of  $226 \pm 37$  d and mean 205-d weaning weight of  $220 \pm 42$  kg. During the post-graze weaning period, heifers grazed common bermudagrass [*Cynodon dactylon* (L.) Pers.] and were supplemented 2.3 kg/d per heifer of a commercial weaning ration that contained an antibiotic. Rectal temperatures were recorded, and serum was collected to quantify concentrations of prolactin at approximately 1000 h on the day of weaning (d 0) and on d 1, 2, 3, 6, and 8 post-weaning. Daily ambient temperature during the monitoring period averaged  $19.7 \pm 2.3^\circ\text{C}$ . Rectal temperatures were never critically high ( $> 40.9^\circ\text{C}$ ), but were influenced ( $P < 0.001$ ) by day. Rectal temperatures were higher on days 0, 1, 4, and 6 (mean =  $40.4 \pm 0.4^\circ\text{C}$ ). Rectal temperatures declined below  $39.5^\circ\text{C}$  on day 2, when ambient temperature decreased, and on d 8 to  $39.4 \pm 0.5^\circ\text{C}$ . Concentrations of prolactin averaged  $3.2 \pm 3.7$   $\mu\text{g/ml}$  on d 0 and increased ( $P < 0.001$ ) to  $22.0 \pm 13.5$   $\mu\text{g/ml}$  by d 6. Increases in prolactin over the 8 d post-weaning period indicated there could be a concurrent rapid reduction in circulating ergot alkaloids.

**Key Words:** Fescue Toxicosis, Weaning, Prolactin

**W20 Is male reproduction affected by fescue toxicosis?** P. A. Eichen\*, T. J. Evans, B. C. Wray, L. E. Wax, L. T. King, E. M. Walters, J. K. Critser, G. E. Rottinghaus, and D. E. Spiers, University of Missouri, Columbia.

Fescue toxicosis is known to have a major impact on female reproductive function, but little is known about its effects on male reproduction. A preliminary study was performed to investigate the effects of heat stress (HS;  $31^\circ\text{C}$ ), combined with endophyte toxins and associated decreased feed intake on male reproductive function. Young adult male rats ( $n=48$ ; 65-70 d) were implanted with temperature transmitters to monitor core body temperature. Rats were fed a diet containing endophyte-free (E-) tall fescue seed and maintained at thermoneutrality (TN;  $21^\circ\text{C}$ ) for five days before treatment to record baseline feed intake and growth rates. Rats were assigned to one of three treatments at either TN or HS: E- diet; endophyte-infected tall fescue seed diet (E+), formulated to deliver ~150.5  $\mu\text{g}$  ergovaline/kg BW/d; or E- diet pair-fed to E+ intake

(pair-fed E+). Body weight and feed intake were recorded daily. After 14 days of treatment, rats were euthanized and organ and semen samples collected. Sperm was examined for total and progressive motility and morphology by computer assisted sperm analysis (CASA). Rats fed E+ at TN had an initial decrease in feed intake ( $P < .05$ ), but quickly returned to near pretreatment level. Rats fed E+ during HS had decreased feed intake ( $P < .05$ ) with no recovery. Growth rate was reduced in all treatment groups ( $P < .001$ ) relative to E-, with E+ and pair-fed E+ during HS most having the greatest reduction. The hyperthermia typically associated with E+ during HS was seen, as was the hypothermia found in E+ at TN. Testes weight relative to BW was increased in all treatment groups ( $P < .004$ ) compared to E-, with the largest increase in E+ and pair-fed E+ during HS. All testes appeared morphologically normal with ongoing spermatogenesis. Total sperm motility decreased with HS ( $P < 0.05$ ). Reduced feed intake (i.e., E+ and pair-fed E+ during HS) tended to decrease total sperm motility ( $P < 0.10$ ). Future studies will examine the impact of fescue toxicosis and heat stress on other biomarkers of male fertility in animals of various ages.

**Key Words:** Fescue toxicosis, Heat stress, Male reproduction

**W21 Does Reduced Caloric Intake Contribute to Symptoms Associate With Fescue Toxicosis?** L. E. Wax\*, P. A. Eichen, G. E. Rottinghaus, and D. E. Spiers, University of Missouri, Columbia.

Many problems associated with fescue toxicosis may be linked to reduced caloric intake. A study was performed using pair-fed groups to identify this condition. Male rats ( $n=22$ ; avg. BW160g) were implanted with telemetric temperature transmitters to record core temperature (Tcore). Rats were randomly assigned to treatments containing either endophyte-free (E-) or endophyte-infected tall fescue seed (E+), along with pair-fed groups, {E- pair fed (E- PF), E+ pair fed (E+ PF)} containing only E- seed. Feed intake and body weights were recorded daily. Animals were maintained at thermoneutral conditions (TN;  $21^\circ\text{C}$ ) for seven days, followed by 14 day heat stress (HS;  $31^\circ\text{C}$ ) and a seven day recovery at TN. Blood samples were collected at end of study for serum analysis. E+ rats had an immediate ~8g (50%) decrease in feed intake (FI) upon introduction of E+ diet at TN followed by a partial recovery prior to HS. Feed intake was reduced in all groups during HS. However, E+ rats had the largest reduction, with partial recovery by the end of HS. All groups increased FI when returned to TN, but E+ rats never returned to E- level. Growth rate reflected changes in feed intake with no difference between pair-fed and corresponding treatment groups. Exposure to HS resulted in  $0.7^\circ\text{C}$  increase Tcore of E+ rats above that of E+PF rats ( $P < 0.001$ ). Reduced FI of E+PF rats likely decreased metabolic rate (MR) during HS to reduce Tcore below E+ level to agree with known benefits of dietary restriction during HS. During TN recovery, Tcore of E+PF rats rebounded along with FI. Lower blood glucose level in this group ( $P < 0.001$ ) suggests an increase in metabolism. The E+PF rats exhibited a greater compensatory response during recovery than any other group ( $P < 0.001$ ). Results show that although intake of rats fed an endophyte-infected diet are similar to their pair-fed counterparts under thermoneutral and heat stress conditions, the utilization of the food and corresponding thermoregulatory ability are very different.

**Key Words:** Fescue toxicosis, Heat stress, Feed restriction

**W22 Growth performance of postweaning piglets fed diets containing flaxseed.** S. Durand\*<sup>1,2</sup>, A. Guigère<sup>2</sup>, M. Lessard<sup>2</sup>, and J.-F. Bernier<sup>1</sup>, <sup>1</sup>Université Laval, Québec, Quebec, Canada, <sup>2</sup>Agriculture and Agri-Food Canada, Dairy and Swine Research and Développement Centre, Sherbrooke, Quebec, Canada.

The objectives of this trial were to evaluate the effect of feeding flaxseed on growth performance and frequency of diarrhea in piglets during 4 weeks after weaning. Forty-eight Duroc-Yorkshire-Landrace piglets were weaned at  $21 \pm 7$  d of age and assigned to one of 3 isocaloric and isonitrogenous dietary treatments: control (T0), 3 % flaxseed (T3) and 6 % flaxseed (T6). Piglets were given *ad libitum* access to their respective diets for 28 d. Phase I diet was fed from d 1 to 7 and phase II diet was fed from d 7 to 28. These two diets were formulated to meet or exceed the NRC nutrient requirements. In spite of a simi-

lar initial weight ( $p \geq 0.2$ ), final weight of piglets fed 6 % flaxseed ( $34.1 \pm 1.4$  kg) was significantly lower ( $p \leq 0.05$ ) than those fed T0 ( $37.5 \pm 1.4$  kg) or T3 ( $37.0 \pm 1.1$  kg). Feed conversion was increased during this period ( $p \leq 0.01$ ) for T6 ( $1.58 \pm 0.04$ ) as compared to T0 ( $1.43 \pm 0.03$ ) and T3 ( $1.46 \pm 0.04$ ). The feed conversion ration was rather stable after 5 days. Diarrhea frequency was higher ( $p \leq 0.01$ ) in piglets fed T6 (15.2 %) as compared to T0 (7.1 %) and T3 (8.9 %). Diarrhea was observed mainly the day following feed restriction for weight measurement. In conclusion, diets with 6 % added flaxseed appear to have negative effect to piglet growth at  $49 \pm 7$  d of age.

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**Key Words:** Flaxseed, Growth performance, Piglet

**W23 Characterization of Bacterial Populations in the Gut of Piglets Treated with Probiotics by Using PCR Analysis.** N. Gagnon<sup>\*1</sup>, E. Degagné<sup>3</sup>, G. Talbot<sup>1</sup>, M. Dupuis<sup>1</sup>, P. Ward<sup>2</sup>, D. Roy<sup>2</sup>, T. A. Tompkins<sup>3</sup>, and M. Lessard<sup>1</sup>, <sup>1</sup>Dairy and Swine Research and Development Centre, Agriculture and Agri-Food Canada, Lennoxville, Quebec, Canada, <sup>2</sup>Food Research and Development Centre, Agriculture and Agri-Food Canada, St. Hyacinthe, Quebec, Canada, <sup>3</sup>Institut Rosell-Lallemand Inc, Montreal, Quebec, Canada.

In piglets treated with *Pediococcus acidilactici* (PA) and/or *Saccharomyces cerevisiae boulardii* (SC), PCR amplification assays were developed to characterize gut microflora and to detect PA in the gut, mesenteric lymph nodes (MLN) and liver. Thirty litters were allocated at birth to the following treatments: 1) Control without (C) or 2) with antibiotic (tiamulin) (C+A) added into feed, 3) PA, 4) SC and 5) PA+SC. During lactation, probiotic treatments ( $10^9$  CFU) were given orally three times a week to piglets. After weaning (d 21), probiotics were added into the diet ( $10^9$  CFU/kg). Three piglets per litter were slaughtered at 18 and 24 days of age, respectively (weaning period), or after *E. coli* challenge at 56 days of age. Bacterial DNA from samples was extracted and purified. A set of universal bacterial primers targeting the 16S and 23S rRNA genes was used to amplify the ribosomal intergenic spacer region (RISA) for characterization of gut flora at weaning period. Dendograms, principal components analysis (PCA) and diversity indices were used to compare RISA profiles of piglets. Diversity indices indicated that microbial diversity in the gut was increased ( $P < 0.10$ ) in piglets allocated to C and SC groups compared to those of PA and C+A groups. Comparisons of RISA profiles using dendograms and PCA indicated that variation between fecal samples could not be explained by treatment or time effects. To detect PA in colon feces, MLN and liver of PA-supplemented piglets on days 18, 24 and 56, a specific PCR assay using a set of primers targeting its 16S rRNA gene was set up. The detection limit of this PCR assay was  $10^3$  CFU/g. The results showed a strong signal for fecal samples from PA-supplemented piglets before weaning while it was weak or negative for those obtained after weaning or after challenge. Detection of PA in MLN and liver was performed after incubation in MRS broth for 18 h. After weaning, no PA was detected in both tissues whereas after challenge 13% and 4% of MLN and liver samples were respectively positive. The PCR amplification assays helped to better understand the influence of probiotics on bacterial population in the gut of piglets.

**W24 Probiotics and yeast modulate acute phase response in feedlot steers.** A. Jafari<sup>\*2,1</sup>, V. Emmanuel<sup>1</sup>, K. Beauchemin<sup>3</sup>, J. Leedle<sup>4</sup>, and B. Ametaj<sup>1</sup>, <sup>1</sup>University of Alberta, Edmonton, Alberta, Canada, <sup>2</sup>Isfahan University of Technology, Isfahan, Iran, <sup>3</sup>Agriculture and Agri-Food Canada, Lethbridge, Alberta, Canada, <sup>4</sup>Chr. Hansen, Inc., Milwaukee, WI.

Feeding feedlot steers high proportions of starch is associated with major changes in rumen microflora and metabolism as well as with high occurrence of metabolic diseases such as acidosis and laminitis. Recent research indicates that supplementing cattle with probiotics or yeast improves their health status and performance; however their mechanism of action is not yet understood. The objective of this research was to investigate whether supplementation of *Enterococcus faecium* and *Saccharomyces cerevisiae* (yeast) modulates mediators

of acute phase response in feedlot steers. Eight steers received either the control treatment or *E. faecium* EF212 and yeast in a crossover design with two squares, four steers within each square and two periods. The length of each period was 3 wk, with a 10-d adaptation and an 11-d measurement period. The squares (groups) within the experiment were run concurrently. Body weights of steers in group 1 and 2 were  $484 \pm 58$  kg and  $530 \pm 33$  kg, respectively at the start of the experiment. The experimental diet contained 87% steam-rolled barley, 8% whole crop barley silage and 5% supplement (DM) basis. The bacteria and yeast were blended with calcium carbonate to supply  $6 \times 10^6$  cfu of bacteria per gram ( $6 \times 10^6$  cfu/d) and  $6 \times 10^6$  cfu of yeast per gram ( $6 \times 10^6$  cfu/d) when top-dressed into the diet once daily at the time of feeding (10g/d/steer). Steers fed control diet received only carrier (10g/d/steer). Blood samples were drawn from the jugular vein on d 17 and 21 of each period and serum amyloid A (SAA) and haptoglobin (Hp) were measured by ELISA. Results indicated that oral supplementation of *E. faecium* EF212 and yeast increased plasma concentrations of SAA (325 vs 385  $\mu\text{g/mL}$ ) and Hp (242 vs 431  $\mu\text{g/mL}$ ). Plasma concentrations of SAA and Hp did not change in time (d 17 vs d 21). In conclusion, oral supplementation of *E. faecium* and yeast increased concentration of two crucial acute phase proteins (SAA and Hp) in feedlot steers fed high proportions of grain. Further research is warranted to investigate the mechanism by which feeding of probiotics and yeast modifies immune response in feedlot steers.

**Key Words:** Probiotics, Yeast, Acute Phase Response

**W25 Effects of bacterial direct-fed microbials on mediators of acute phase response in feedlot steers.** D. Emmanuel<sup>\*1</sup>, A. Jafari<sup>2,1</sup>, K. Beauchemin<sup>3</sup>, J. Leedle<sup>4</sup>, and B. Ametaj<sup>1</sup>, <sup>1</sup>University of Alberta, Edmonton, Alberta, Canada, <sup>2</sup>Isfahan University of Technology, Isfahan, Iran, <sup>3</sup>Agriculture and Agri-Food Canada, Lethbridge, Alberta, Canada, <sup>4</sup>Chr. Hansen, Inc., Milwaukee, WI.

The objective of this research was to investigate the effects of oral supplementation of *Enterococcus faecium* on mediators of acute phase response in feedlot steers. Eight steers received either the control treatment or *E. faecium* EF212 in a crossover design with two squares, four steers within each square and two periods. The length of each period was 3 wk, with a 10-d adaptation and an 11-d measurement period. The squares (groups) within the experiment were run concurrently. Body weights of steers in group 1 and 2 were  $484 \pm 58$  kg and  $530 \pm 33$  kg, respectively, at the start of the experiment. The experimental diet contained 87% steam-rolled barley, 8% whole crop barley silage and 5% supplement (DM) basis. The bacteria supplemented were blended with calcium carbonate to supply  $6 \times 10^6$  cfu of bacteria per gram ( $6 \times 10^6$  cfu/d) when top-dressed into the diet once daily at the time of feeding (10g/d/steer). Steers fed control diet received only carrier (10g/d/steer). Blood samples were drawn from the jugular vein on d 17 and 21 of each period and serum amyloid A (SAA) and haptoglobin (Hp) were measured by ELISA. Feedlot steers supplemented with *E. faecium* EF212 had lower concentrations of SAA (351 vs 409  $\mu\text{g/mL}$ ) and Hp (223 vs 272  $\mu\text{g/mL}$ ) in plasma compared to controls; however the difference was not significant. Oral supplementation of *E. faecium* also had no effect on plasma SAA and Hp in time (d 17 vs d 21). Both plasma concentrations of SAA and Hp correlated positively ( $r=0.728$   $P < 0.001$ ,  $r=0.58$   $P < 0.01$ , respectively) with blood pH; however, no significant correlations were found between plasma SAA and Hp and plasma glucose or lactate. Taken together these results indicate that oral supplementation of *E. faecium* had no effect on mediators of acute phase response in feedlot steers.

**Key Words:** Probiotics, Acute Phase Response, Feedlot Steers

**W26 Relationship of prepartum plasma nonesterified fatty acids (NEFA) to periparturient production, health and reproduction of Jersey cows.** G. Higginbotham<sup>\*1</sup>, J. Merriam<sup>2</sup>, E. Nogueira<sup>3</sup>, and J. Santos<sup>3</sup>, <sup>1</sup>University of California Cooperative Extension, Fresno, <sup>2</sup>Ahlem Farms, Hilmar, CA, <sup>3</sup>University of California, Tulare.

Three Jersey dairy herds in California were visited weekly during a 16-wk period and a blood sample and body condition score (BCS) were taken from 830 cows within 21 d of projected calving (actual days prepartum were 1 to 23).

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.

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**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<sup>1</sup>, M. M. Alencar<sup>2</sup>, G. M. Cruz<sup>2</sup>, and D. P. D. Lanna<sup>3,1</sup>, <sup>1</sup>*Animal Growth and Nutrition Lab, ESALQ/USP, Piracicaba, SP, Brazil*, <sup>2</sup>*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 9-10-11<sup>th</sup> 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.

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**Key Words:** Body Composition, Genotypes, Weaning Weight

**W28 The relationship between infrared thermography and residual feed intake in cows.** A. L. Schaefer<sup>1</sup>, J. Basarab<sup>2</sup>, S. Scott<sup>3</sup>, J. Colyn<sup>1</sup>, D. McCartney<sup>1</sup>, J. McKinnon<sup>4</sup>, E. Okine<sup>5</sup>, and A. K. W. Tong<sup>1</sup>, <sup>1</sup>*Agriculture and Agri-Food Canada, Lacombe, Alberta, Canada*, <sup>2</sup>*Alberta Agriculture Food and Rural Development, Lacombe, Alberta, Canada*, <sup>3</sup>*Agriculture and Agri-Food Canada, Brandon, Manitoba, Canada*, <sup>4</sup>*University of Saskatchewan, Saskatoon, Saskatchewan, Canada*, <sup>5</sup>*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<sup>®</sup> 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 fed per 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 in RFI 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<sup>\*</sup>, 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 =  $\beta_1$ \*ADG +  $\beta_2$ \*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