ASAS UNDERGRADUATE STUDENT POSTER COMPETITION

0885 (T011) Effects of supplementing Holstein heifers with dietary melatonin during late gestation on serum antioxidant capacity and anti-Müllerian hormone of offspring. B. O. Fleming*, K. E. Brockus, C. G. Hart, and C. O. Lemley, *Mississippi State University, Starkville.*

Previously, our laboratory observed an increase in maternal serum antioxidant capacity during late gestation dietary melatonin supplementation. Therefore, the objective was to examine the effects of supplementing melatonin to dams during late gestation on offspring serum antioxidant capacity and anti-Müllerian hormone concentrations. On d 190 of gestation, heifers (n = 20) were blocked by BW and then randomly assigned to one of two dietary treatments: 1). 20 mg of dietary melatonin per day (MEL) or 2). no melatonin supplementation (CON). Dietary treatments were terminated on d 262 of gestation. MEL heifers received 2 mL of 10 mg/mL melatonin in ethanol while CON heifers received 2 mL of ethanol alone. At birth, calves were separated from their dams and given 3.8L of colostrum. Calves were fed 5.7L of whole milk daily and offered 0.9 kg/d of starter grain. Starter was increased by 0.9 kg/d when orts were 0 kg. Calf (n = 18) total antioxidant capacity was determined in serum on wk 0, 1, 2, 3, and 4 of age. Concentrations of anti-Müllerian hormone were determined in female offspring (n = 15) on wk 4 of age. Data were analyzed using the PROC MIXED of SAS. For repeated measures the model statement contained treatment, age, and their respective interaction. Total antioxidant capacity was not different (P = 0.14) between calves from MEL treated dams vs. calves from CON treated. A main effect of age (P < 0.001) was observed for total antioxidant capacity, which was increased at wk 1 of age vs. 0, 2, 3, and 4. Concentrations of anti-Müllerian hormone tended to be increased (P < 0.10) in heifer calves from MEL treated dams (0.82 ± 0.19 ng/mL) vs. calves from CON treated dams (0.35 ± 0.19 ng/mL). In conclusion, the increase in maternal antioxidant capacity following dietary melatonin supplementation did not affect calf antioxidant capacity of serum during early postnatal development. Interestingly, the tendency for increased heifer calf anti-Müllerian hormone concentrations deserves further investigation into offspring ovarian reserves.

Key Words: anti-Müllerian hormone, antioxidant, melatonin

0886 (T012) Effects of electrostatic particle ionization on hog barn air quality, emissions, and pig growth performance. K. N. Card*[1], J. A. De Jong[1], J. M. DeRouchey[1], P. J. Tomlinson[1], M. J. Baumgartner[2], and Z. Liu[1], *[1]Kansas State University, Manhattan, [2]BEI Ag Solutions, Olivia, MN.*

Electrostatic particle ionization (EPI) systems emit negative ions, which in turn create polarized air particles. These polarized air particles attach to conductive or grounded surfaces in the barn. An experiment was conducted to determine the effects of EPI on hog barn air quality, emissions, and nursery pig growth performance. To make the comparison, the EPI system was installed in two identical nursery barns (200 pigs/barn) at the same location. During five 6-wk periods (6 to 23 kg BW) the EPI system was utilized in a single barn for one complete turn and then rotated to the opposite barn to ensure no barn effects would be present (five replications per treatment). Each barn was equipped with three external exhaust fans, and 12 internal attic air inlets. Pigs were allotted randomly between barns at the beginning of each period and measurements were taken every week for the 6-wk period. Dust particles were collected weekly inside the barn and in exhaust air for determination of particle size and average quantity for the turn. Additional measurements included in-barn air hydrogen sulfide and ammonia as well as ADG and final BW. Overall, there were fewer (P < 0.02) in-barn 0.3, 2.5 and 10.0 µ dust particles when the EPI system was active. The EPI system also reduced (P < 0.03) 0.3, 2.5 and 10.0 µ dust particles/m^3 in exhaust fan air. There were no differences for in-barn air ammonia and hydrogen sulfide concentrations. The EPI system tended to improve (P = 0.09) ADG and final BW. In conclusion, EPI was able to reduce airborne dust concentrations in-barn and in exhaust air and tended to improve growth performance.

Key Words: electrostatic particle ionization, emissions, nursery pig

Table 0886.

Treatment:	Control	EPI	SEM	Probability P <
ADG, g	414	442	12.5	0.09
Final BW, kg	22.60	23.27	2.25	0.06
Inside dust, particles/min				
0.3 µ	687,345	417,797	98,698	0.02
2.5 µ	173,363	77,759	27,236	0.01
10.0 µ	166,980	72,998	30,189	0.01
Exhaust dust, particles/m^3				
0.3 µ	104.37	54.70	16.84	0.03
2.5 µ	18.51	7.52	4.35	0.02
10.0 µ	7.03	2.51	1.57	0.03
Ammonia, ppm	4.02	4.21	1.39	0.86
H2S, ppm	0.81	0.82	0.31	0.89

0887 (T013) Effects of different cooling interventions on stationary livestock trailers at a commercial packing plant.

M. Heiller*[1], L. Edwards-Callaway[2], R. Bailey[3], N. Pudenz[4], M. Klassen[4], M. J. Ritter[5], A. Dezeeuw[4], and P. J. Rincker[6], *[1]Iowa State Univeristy, Ames, [2]JBS, Greely, CO, [3]JBS, Marshalltown, IA, [4]Elanco, Greenfield, IN, [5]Elanco Animal Health, Bondurant, IA, [6]Elanco Animal Health, Dahinda, IL.*

The objective was to determine effects of different cooling interventions on trailer temperature (T), relative humidity (RH), and transport losses over 20 min before unloading. Three treatments included: 1) Control (no water or fans), 2) Fan (20 min in front of a bank of fans), and 3) Shower+Fan (5 min of showering using the internal trailer system followed by 20 min in front of a bank of fans). Data was collected using HOBO data loggers placed inside the trailer on arrival at the packing plant on 150 trailers in blocks where all three treatments were represented with 60 min of each other. Data was summarized at time points 0, 5, 10, 15, and 20 min and was analyzed with PROC MIXED in SAS using block as a random effect. Results on trailer T (Table 0887a) indicate that the Control treatment increased numerically over time, the Fan treatment prevented a rise in T, and the Shower+Fan treatment was the coolest ($P < 0.05$) at all time points. RH inside the trailers was similar ($P > 0.05$) in the Control and Fan treatment, but higher ($P < 0.05$) in the Shower+Fan treatment at all time points (Table 0887b). No differences were determined on the incidence of dead on arrivals ($P = 0.87$) or fatigued animals ($P = .077$). Further investigation of the data revealed an interaction ($P = 0.02$) between treatment and environmental temperature where the temperature differences between treatments become greater at higher environmental temperatures.

Key Words: swine, trailer, cooling, fans

Table 0887a. LSMeans of the difference between trailer and environmental temperatures (°C) during the 20 Min before unloading by treatment

Time Interval	Control	Fan	Shower+ Fan	SEM	*P*-value
0	0.30[a]	0.82[a]	-0.78[b]	0.28	< 0.0001
5	1.04[a]	0.65[a]	-0.86[b]	0.23	< 0.0001
10	1.52[a]	0.43[b]	-0.61[c]	0.20	< 0.0001
15	1.77[a]	0.38[b]	-0.43[c]	0.20	< 0.0001
20	2.11[a]	0.52[b]	-0.25[c]	0.21	< 0.0001

[1]Average environmental placement temperature was 27.53°C
[a,b,c] means within a row lacking common superscripts are different ($P < 0.05$).

Table 0887b. LSMeans of relative humidity (%) by treatment

Time Interval	Control	Fan	Shower+ Fan	SEM	*P*-value
0	56.51[a]	56.27[a]	69.52[b]	2.43	< 0.0001
5	59.15[a]	56.46[a]	64.76[b]	2.58	< 0.0001
10	57.93[a]	57.32[a]	63.23[b]	2.59	0.0006
15	57.63[a]	57.50[a]	62.07[b]	2.65	0.0044
20	57.58[a]	57.43[a]	60.60[b]	2.67	0.0319

[a,b,c] means within a row lacking common superscripts are different ($P < 0.05$).

0888 (T014) Effects of poor maternal nutrition during gestation on gene expression in liver of offspring.

K. K. McFadden*, M. L. Hoffman, K. N. Peck, S. A. Reed, S. A. Zinn, and K. E. Govoni, *Dep. of Animal Science, University of Connecticut, Storrs.*

Poor maternal nutrition during gestation can reduce growth and circulating growth factors secreted by the liver, as well as alter lipid metabolism. However, the mechanisms that lead to these alterations are not well understood. We hypothesized that poor maternal nutrition during gestation would alter expression of key genes involved in lipid metabolism and the somatotropic axis in the liver of offspring. Thirty-six multiparous ewes were individually housed and fed 100, 60, or 140% of NRC requirements beginning at d 31 ± 1.3 of gestation. Lambs were euthanized within 24 h of birth (1 d; $n = 18$) or 3 mo of age ($n = 15$). Lambs from ewes fed 100, 60, or 140% will be referred to as CON, RES, and OVER, respectively. At euthanasia, whole livers were harvested, weighed and tissue samples collected. Total RNA was extracted and gene expression determined by real-time reverse transcriptase (RT)-PCR. Data were analyzed using PROC GLM with significance considered at $P \leq 0.05$ and a tendency at $0.05 < P \leq 0.10$. As previously reported, BW were 13% greater in OVER vs. CON ($P \leq 0.05$). Liver weight was 43% greater in OVER vs. CON ($P = 0.08$) at 1 d when adjusted for BW, but no difference was observed at 3 mo ($P = 0.6$). At 1 d, relative to CON, the expression of sterol-regulatory element binding protein-I (SREBP-I), a regulator of hepatic lipogenesis, was reduced 2.6 ± 0.1 and 3.7 ± 0.1-fold in RES and OVER, respectively ($P < 0.01$). The expression of IGF-I receptor (IGF-IR) was reduced 1.7 ± 0.1 and 2.0 ± 0.2-fold in RES ($P = 0.03$) and OVER ($P = 0.09$), respectively at 1 d relative to CON. Expression of IGFBP-4 was reduced 2.6 ± 0.1 and 1.7 ± 0.1-fold in RES ($P = 0.01$) and OVER ($P = 0.07$), respectively at 1 d relative to CON. Expression of SREBP-I, IGF-IR, and IGFBP-4 were not altered at 3 mo ($P \geq 0.3$). Relative to CON, expression of IGFBP-3 increased 1.7 ± 0.2-fold in OVER ($P = 0.04$) at 3 mo, but was unaltered at d 1 ($P \geq 0.8$). Maternal diet did not affect IGF-I at either time point ($P \geq 0.3$). In conclusion, poor maternal nutrition alters genes involved in lipid metabolism and IGF action, which may contribute to altered growth and increased fat deposition in offspring.

Key Words: liver, sheep, somatotropic axis

0889 (T015) Interleukin-1 β decreases myoblast fusion in vitro. B. E. Sullivan[*1] and S. A. Reed[2], *[1]University of Connecticut, Storr, [2]Dep. of Animal Science, University of Connecticut, Storrs.*

During times of stress, systemic pro-inflammatory cytokine levels are increased, which may prevent optimal growth and development of muscle and/or induce muscle atrophy. Pro-inflammatory cytokines can induce negative responses in muscle by altering the balance of protein synthesis and degradation in established myofibers, or by influencing the proliferation and differentiation of myoblasts. Interleukin-1 β (IL-1β) is a pro-inflammatory cytokine involved in stress and disease responses, but little is known about how IL-1β affects myoblast function. We hypothesized that IL-1β would decrease myoblast proliferation and/or differentiation. To test this hypothesis, C2C12 mouse myoblasts were treated with 0.1 ng/mL or 1.0 ng/mL of IL-1β, or carrier only (control). To determine proliferation rate, myoblasts were plated at $2.6x10^3$ cells/cm^2 and cultured for 48 h in the presence or absence of IL-1β. Cells were pulsed with bromodeoxyuridine (BrdU), fixed, and immunostained. The number of BrdU positive cells was quantified as a percent of total nuclei (identified by Hoescht 33342). To determine if IL-1β affected fusion, myoblasts were plated at $2.0x10^4$ cells/cm^2 in growth media for 48 h, at which time media was changed into differentiation media supplemented with 0.1 ng/mL or 1.0 ng/mL of IL-1β, or carrier only. Cells were immunostained with myosin heavy chain (MyHC) and Hoescht 33342. Fusion index was determined by quantifying the number of nuclei within multinucleated myotubes divided by total nuclei. Finally, to determine the effect of IL-1β on myotube size, myoblasts were cultured for 48 h in growth media and 48 h in differentiation media. Cells were cultured for an additional 48 h in the presence or absence of IL-1β, fixed and immunostained for MyHC. Myotube diameter and fusion index were quantified. All data was analyzed using ANOVA in GraphPad Prism followed by Tukey's test for multiple comparisons. There were no significant effects of IL-1β on proliferation or fiber diameter ($P \geq 0.05$). However, fusion was decreased 13.5% in myoblasts treated with 1.0 ng/mL of IL-1β ($P \leq 0.05$). In conclusion, IL-1β decreases myoblast fusion, but does not affect proliferation or fiber diameter. These results suggest that IL-1β may contribute to poor muscle growth by decreasing fusion of myoblasts into existing myofibers, preventing optimal hypertrophy.

Key Words: cytokine, fusion, IL-1β, myoblasts

0890 (T016) Sperm maturation (capacitation) but not progesterone reduces the abundance of a receptor for oviduct glycans. R. A. Winters[*1], E. Silva[1], and D. J. Miller[2], *[1]University of Illinois at Urbana-Champaign, Urbana, [2]University of Illinois, Urbana.*

As sperm travel through the female reproductive tract they bind to glycan motifs on cells lining the oviduct lumen, forming a sperm reservoir. Near the time of ovulation, sperm are released and travel to the site of fertilization. Our lab has found that a boar sperm protein called lactadherin binds to an oviduct trisaccharide, Lewis^x, to mediate sperm binding to oviduct cells. It has been suggested that sperm release from the oviduct reservoir is partially mediated by an increase in progesterone concentration in the oviductal fluid that would affect sperm capacitation and promote release from oviduct Lewis^x, perhaps by releasing sperm lactadherin. We tested this hypothesis in experiments to define the effect of sperm capacitation and progesterone exposure on sperm lactadherin abundance. Sperm from fertile boars were washed using a Percoll cushion. Treatments consisted of: 1) sperm capacitation for 4 h using mTALP medium containing BSA and sodium bicarbonate, and 2) sperm treatment with increasing concentrations of progesterone (0, 80, 800nM) for 30 min in mTALP. After treatment, sperm protein was extracted using a 0.1% Nonidet P-40 lysis buffer, and samples were submitted to western blot analysis. Experiments were repeated at least twice. Based on western blotting with a lactadherin antibody, two protein bands migrating at 35 kDa and 47 kDa were identified. The greater signal was present at 47 kDa and, based on its migration, it is recognized as lactadherin. The 47 kDa signal (lactadherin) was higher in sperm before capacitation than after capacitation. Based on western blot results, lactadherin concentration was not affected by progesterone treatment; the abundance of the 47 kDa band did not change. In conclusion, two bands were detected by the lactadherin antibody, suggesting the presence of two protein isoforms. Lactadherin abundance on the sperm surface was reduced after sperm capacitation but progesterone did not affect the abundance of lactadherin. The reduction in lactadherin during capacitation may contribute to sperm release from the oviduct. *This project was supported by Agriculture and Food Research Initiative Competitive Grant no. 2011–67015–20099 from the USDA National Institute of Food and Agriculture.*

Key Words: sperm, capacitation, oviduct

0891 (T017) Variations in the expression of triglyceride synthesis genes in pigs provided *Enterobacter cloacae*. S. J. White*[1], J. A. Carroll[2], J. A. Thornton[1], P. R. Broadway[3], J. G. Wilson[1], and J. R. Donaldson[1], *[1]Mississippi State University, Starkville, [2]USDA-ARS, Livestock Issues Research Unit, Lubbock, TX, [3]Texas Tech University, Wolfforth.*

Enteric infections are leading causes of morbidity and mortality among livestock. Weanling pigs are particularly susceptible to infections, primarily due to reduced amounts of adipose tissue. Limited stores of adipose tissue can lead to an insufficient supply of energy during times of nutritional restriction that would be available to mount an effective immune response. Previously, two novel probiotics (*Enterobacter cloacae* JD6301 and JD8715, a genetically altered form that produces extracellular lipids) were found to increase circulating triglycerides in pigs. In this current study, 36 weanling pigs were supplemented with *Enterobacter cloacae* JD6301 or JD8715 for 7 d prior and 3 d afterward relative to an orally inoculated *Salmonella typhimurium* ($1x10^9$ CFU) challenge. To determine if either probiotic altered the production of triglycerides in response to the infection, adipose tissues were collected from four pigs every 24 h in relation to the challenge to evaluate potential differences in lipogenesis. Total RNA was isolated post challenge and analyzed for variations in the expression of genes involved in triglyceride synthesis and compared to control pigs only provided phosphate buffered saline. The data indicate that pigs provided JD8715 had an increase in lipoprotein lipase ($P = 0.027$), and a decrease in the insulin-induced gene 1 ($P = 0.02$), apolipoprotein A1 ($P = 0.04$), and DGAT2 ($P = 0.009$) 1 d post-challenge in comparison to controls. A 16-fold increase ($P = 0.001$) in the insulin-induced gene 1 was also observed on d 3 in pigs provided JD8715 compared to control pigs. Together, these data suggest that providing *Enterobacter cloacae* JD8715 increased the amount of triglycerides available to the pigs, thus potentially improving the availability of energy. Further research is needed to determine how this increase modulates the immune response.

Key Words: pigs, lipids, adipose tissue

0892 (T018) Gene set enrichment analysis of residual feed intake in Hereford cattle. L. D. Kidder*[1], A. Wojtowicz[1], J. F. Taylor[2], C. M. Seabury[3], K. A. Johnson[1], and H. L. Neibergs[1], *[1]Washington State University, Pullman, [2]University of Missouri, Columbia, [3]Texas A&M University, College Station.*

Feed comprises 66 and 77% of the total cost of calf and yearling finishing systems, respectively. Heritabilities for feed intake and feed efficiency (FE, estimated as residual feed intake, or RFI) have ranged from 0.08 to 0.46 in previous studies, highlighting the potential for selection to bring about significant gains in feed efficiency and profitability within the beef industry. The objective of this study was to identify gene pathways significant for FE as measured by RFI through the use of gene set enrichment analysis (GSEA) using single nucleotide polymorphisms (SNPs) as proxies for bovine genes. A population of 847 Hereford cattle (181 purebreds and 666 high-percentage Hereford crossbred animals consisting of 23 females and 824 males ranging in age from 210 to 496 d) from a single ranch were evaluated for a period ranging from 70 to 140 d on feed (DOF). Only 31 animals were fed over 72 d. Average daily gain (ADG), dry matter intake (DMI), initial weight (IW), mid-test metabolic weight (MMWT), and DOF were recorded across the feeding period for each individual. Covariates for the genome wide association study (GWAS) consisted of age, sex, DOF and % Hereford. GWAS was followed by GSEA of SNP data with *Bos taurus* gene sets sourced from GO, KEGG, Panther, Reactome, and Metacyc. Gene sets containing fewer than 10 or greater than 200 SNPs were excluded from the analysis. A total of 19,598 bovine genes were mapped within gene sets, and proxy SNPs were mapped to genes located within 20 kilobase pairs. The null distribution of the GSEA test statistic was approximated using 10,000 random permutations. Genotypes were obtained from the Illumina BovineSNP50 ($N = 361$) and BovineHD ($N = 486$) BeadChips and imputed to 778,000 SNPs using Beagle. The GO pathway GO:0044706 multi-multicellular organism process with 90 genes was significant for RFI with a false discovery rate of 0.061 and a normalized enrichment score of 3.978. There were a total of 51 leading edge genes in GO:0044706. The top 10 genes were: PGR, CORIN, STAT5B, TIMP1, PCSK5, THRB, NR2F2, MMP2, FKBP4, and JUNB. Heritability for RFI was estimated to be 0.49. These results suggest that genetic selection for RFI has potential to dramatically affect the efficiency and, therefore, profitability of beef cattle production.

Key Words: genetics, RFI beef

0893 (T019) pH fluctuations in the hindgut of horses relative to meal feeding. K. M. DeLano*[1], T. L. Douthit[1], A. Reeg[1], N. M. Bello[1], M. E. Gordon[2], and K. Williamson[2], *[1]Kansas State University, Manhattan, [2]Purina Animal Nutrition, LLC, Gray Summit, MO.*

This study assessed changes of pH over time in the equine hindgut relative to meal feeding. Nine quarter horses with cecal cannulae surgically inserted 4 yr before the experiment were utilized. The group was comprised of five geldings and four mares, with ages ranging from 8 to 10 yr old, and body weight between 455 and 590 kg. Horses were housed in heated individual stalls, with ad libitum access to water and white salt blocks. The horses' diet consisted of 1.5% BW prairie grass hay and 0.5% BW concentrate (Omolene 200, Purina Animal Nutrition, LLC, St. Louis, MO), with the concentrate fed in the morning only (0700) and the hay divided into two daily feedings (0700 and 1930). Horses were maintained on this

regimen for three separate 21-d periods. During the last 3 d of each period (d 19 to 21), pH was measured in cecal and fecal samples collected at -1, +1, +4, +8, +12, +16, +20, and +24 h relative to feeding of the concentrate meal. Cecal and fecal pH fluctuations over time were jointly modeled using a general linear mixed model. Hindgut pH dynamics relative to feeding differed between the cecum and the feces ($P < 0.0001$). In the cecum, a decline in pH (approx. 0.363 ± 0.03; lsmean ± SEM) was observed as soon as 4 h after feeding ($P < 0.0001$). Minimum pH values in the cecum were recorded 8 h after feeding, and a return to baseline cecal pH was apparent at 20 to 24 h after feeding. In the feces, a smaller decline was observed (approx. 0.144 ± 0.044) but it did not become apparent until 8 h after feeding ($P = 0.035$). The minimum fecal pH was reached at 12 h after feeding ($P = 0.0055$); by 16 h after feeding, there was no evidence for differences from baseline pH ($P = 1.00$). These results suggest a maximum time lag in pH fluctuations of approximately 4 h between the cecum and the feces. It is necessary to note that more precise lag times could not be quantified with this study design, as measurements were taken every 4 h. Further research is needed to fine-tune predictive ability of fecal pH on cecal pH over time.

Key Words: cecal pH, equine, fecal pH

0894 (T020) Oral supplementation with vitamin E and fertility in young bulls raised in Brazilian midlewest. R. D. Almeida*, L. K. Hatamoto-Zervoudakis, W. A. D. S. Marinho, B. H. Tsuneda, F. A. D. P. D. B. Arguello, J. T. Zervoudakis, M. F. Duarte Junior, P. P. Tsuneda, and T. B. Castaldeli, *Federal University of Mato Grosso, Cuiaba, Brazil.*

The sperm cells are highly susceptible to peroxidative damage, such damage in their sperm membrane occurs due to oxidative stress that is responsible for the reduction in the fertility of sperm. One of the causes of the increase in oxidative stress is increased environmental heat stress and consequent increase in temperature testicular promoting the increase in NADPH oxidase activity and increased availability of transition metals. Dietary deficiencies may also be associated with the decrease in the antioxidant defense mechanisms. Vitamin E is a fat-soluble antioxidant and has the ability to prevent the spread of chain reactions induced by ROS in biological membranes, representing an important defense against oxidative damage caused to the sperm membrane. The objective of this study was to evaluate whether oral supplementation with vitamin E alters bulls fertility and performance of bulls raised in pastures in tropical conditions. We used 16 bulls/Brangus, with a mean of 24 mo and 462.2 kg were randomly divided into two groups: GC = Control group (concentrated supplementation without adding vitamin E), vitamin E group GE = (400UI/animal/day supplemented with vitamin E). The animals were maintained on pasture, and supplemented (4,5 kg/animal) with concentrated feed once a day. During the supplementation period, four samples (days: D0, D30, D60 and D75) were made by electrostimulation. In each collection were evaluated: weight (BW), Diameter (TPER) and Testicular Consistency (TC), Volume (VOL) and Concentration (CONC) of the ejaculate, Motility (MOT) and Vigor (VIG) sperm, Percentage of primary defects (*P*D), Secondary (SD) and Total (TD), Sperm viability (EOS), the Integrity of sperm membrane (HYPO) and Crossomal (POPE). The experiment was conducted in a completely randomized design. Data were analyzed using ANOVA 5%. It was found BW treatment effect ($P = 0.0472$), TPER ($P = 0.0015$), TC ($P = 0.0367$), EVIG ($P = 0.0183$) and a trend effect for SD ($P = 0.0617$). The results obtained in the experimental conditions of this study, it is concluded that oral supplementation with vitamin E, 400UI/day does not altered semen quality, however detracted and testicular characteristics of bulls raised on pasture in tropical conditions.

Key Words: reactive oxygen species, oxidative stress, lipid peroxidation.

0895 (T021) Polymelia in Holstein cattle. K. D. Moss*[1], F. Avila[2], B. M. Marron[3], T. Raudsepp[2], J. Beever[3], M. Neupane[1], S. Parish[1], J. Kiser[1], B. Cantrell[1], and H. L. Neibergs[1], *[1]Washington State University, Pulllman, [2]Texas A&M University, College Station, [3]University of Illinois, Urbana.*

Polymelia is a congenital condition where an animal has more than the normal number of limbs. Previous reports have suggested that polymelia is due to abnormal chromosomal breaks or alternatively due to a mutation found to segregate in Angus cattle. A male Holstein calf was presented to the WSU Veterinary Hospital with scoliosis, a deviated tail, and two additional front legs originating from each scapula. The objective of this study was to determine if polymelia in this Holstein calf was due to the mutation identified in Angus cattle, a gross chromosomal abnormality or potentially another genetic cause. A 10-mL blood sample was taken via the jugular vein for genetic analyses. Five mL of blood was used to prepare a karyotype of the calf to identify chromosomal abnormalities. From the remaining 5 mL of blood, DNA was extracted for genotyping. Genotyping of this Holstein calf for the specific mutation present in Angus cattle was performed using a PCR-RFLP technique. Genotypes were also obtained from the Holstein calf using the Illumina bovine HD BeadChip. A genome wide association study (GWAS) was conducted with the polymelia calf compared with 2800 control Holstein calf samples. The statistical approach used for the GWAS was EMMAX (Efficient Mixed-Model Association expedited) within the SNP & Variation Suite 7 software package (Golden Helix, Bozeman, MT). GWAS data underwent quality control filtering for minor allele frequency (< 1%), SNP call rate (< 95%), and animal call rate (removal of animals with less than 95% of SNPs called). Population stratification was tested

for ($lambda_{GC}$) before GWAS analysis. Loci associated with polymelia were found to be associated when $P < 1x10^{-50}$. The karyotype results showed no evidence of increased levels of chromosomal breaks in the Holstein calf. The PCR-RFLP genotype of the Holstein calf was consistent with a homozygous normal Angus animal. Furthermore, sequencing of the entire coding sequence of the gene mutated in Angus cattle, revealed no additional polymorphisms that might cause the polymelia phenotype. No population stratification was identified ($lambda_{GC}$ = 1.04) in the Holsteins genotyped by the Bovine HD SNP assay. The GWAS association analysis identified three loci associated with polymelia: one locus on BTA13 ($P < 1x10^{-281}$), BTA10 ($P < 2x10^{-110}$) and BTA20 ($P < 2x10^{-52}$). These preliminary results suggest that polymelia may be due to more than one locus and mutations that may cause polymelia are not shared across all breeds.

Key Words: polymelia, genetics, Holstein

0896 (T022) Effect of supplementation of the middle and freezing with vitamin E about the feasibility and quality of frozen bovine semen. R. D. Almeida*, L. K. Hatamoto-Zervoudakis, M. F. C. Filho, J. T. Zervoudakis, P. P. Tsuneda, and T. B. Castaldeli, *Federal University of Mato Grosso, Cuiaba, Brazil.*

The conditions of storing semen induce the formation of free radicals from the oxidation of fatty acids components of the plasma membrane. Those effects are related with the aggression on the plasma membrane and other cellular organelles, caused by oxidative stress, heat shock and formation of intracellular ice crystals. The interception of reactive oxygen species is based in breaking the chain reaction that occurs with free radicals to form oxidation products. This breakdown promoted by certain antioxidants, for example, α-tocopherol (vitamin E), radicals must not result in final products that is, without electrostatic despareado. This work had as purpose to appraise the quality and the feasibility of frozen semen in medium supplemented with vitamin E. Semen collections of 16 bulls Brangus race of reproductive age with proven fertility and healthy were performed. The semen was collected by eletroejaculation method, isolated shock heat, light and previously heated. Immediately after collection each ejaculate obtained was divided into two fractions where each fraction was diluted in one of two treatments being: T1-control (medium without supplementation), T2-medium supplemented with 2.0 mmol/L of vitamin "E". The basic medium used for freezing was tris-yolk sodium citrate, and the methodology used was described by Beconi et al. (1991). The semen was stored in straws of 0.25 and maintained in nitrogen until the time of analysis. For evaluation of sperm viability it was used the method for staining with eosin associated negrosina in thawed semen, cells with membrane lesions present in the nucleus stained by eosin, remaining reddish, the living cells, colorless microscopic reading. In force and motility parameters did not differ between treatments. On sperm viability (eosin/negrosina) had a significant difference between treatments ($P = 0.0031$), where treatment control was superior to treatment with vitamin E, indicating that the inclusion of 2.0 mmol/L was deleterious to sperm viability. More studies should be conducted to find an optimal concentration to ensure a better sperm viability after thawing semen.

Key Words: anti-oxidant, frozen semen

0897 (T023) The effects of cutting height and plant maturity on yield and nutritional value of brome forage. M. A. Woolsoncroft*, S. R. Duncan, A. J. Sexten, and A. K. Sexten, *Kansas State University, Manhattan.*

It is well-known that quality of forage decreases as plants matures. Although some forage quality must be sacrificed to achieve sustainable yields, the purpose of this study is to determine the combination of cutting height and stage of plant maturity that optimizes both quality and forage yield. A brome pasture was divided into 27 plots (3.05 m × 4.57 m) in a completely randomized block design with a 3 × 3 factorial treatment arrangement to determine the effect of cutting height (2.54 cm, 7.62 cm, or 12.7 cm) and plant maturity (boot, bloom, seed) on brome yield and nutritional value. A strip of forage (0.91 m × 3.05 m) was harvested from each plot. One grab sample from each strip was weighed in the field, oven-dried (49°C for 24 to 48 h), reweighed to determine percent dry matter and then calculate plot yield ($kg \cdot ha^{-1}$). A second grab sample from each harvested strip was collected and analyzed for DM, Ash, N, NDF, and ADF. Forage yield was greater ($P < 0.0002$) when brome was cut at 2.54 cm compared to 7.62 cm and 12.7 cm cutting heights. Brome cut at 7.62 cm and 12.7 cm produced similar yields. Cutting height had no effect on any of the nutritional parameters measured. Forage yield was greatest ($P < 0.0001$) for brome that was in the seed stage of maturity, followed by bloom then boot, which produced the lowest forage yield. Dry matter content was greatest ($P = 0.0001$) in the seed stage brome, but lower and similar between bloom and boot stage brome. Ash content was also similar between boot and bloom stage brome with both having a greater ($P = 0.002$) ash content than seed stage brome. Both NDF and ADF increased with plant maturity, with seed and bloom stage brome having a greater ($P = 0.0001$) fiber content than boot stage brome. Crude protein, estimated from N content, was greatest ($P = 0.0001$) in boot, followed by bloom, then seed stage brome, which contained the lowest CP content. Reducing cutting height produced a greater forage yield without negatively impacting nutritional value. More mature brome produced greater yields; however, nutritional value was decreased with increasing maturity. Cutting brome at a reduced cutting height in a younger stage of maturity can lead to better yields without sacrificing nutritional value.

Key Words: brome, plant maturity, cutting height

0898 (T024) Cattle requiring multiple treatments for bovine respiratory disease exhibit decreased capacity to protect against histone cytotoxicity.
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Bovine respiratory disease (BRD) is the leading cause of morbidity and mortality in feedlot cattle. Pneumonia associated with BRD causes significant inflammation and lesions in lung tissue of infected cattle. During acute inflammatory responses, circulating histones increase and contribute to mortality in rodents and humans, yet serum proteins provide protection against histone cytotoxicity in some cases. We hypothesized that cattle experiencing fatal cases of BRD have reduced ability to protect against histone cytotoxicity. Bovine kidney cells (MDBK) were exposed to 0, 50 μg/mL, and 100 μg/mL of histones from calf thymus for 18 h without serum. To assess cell viability, Resazurin was added (0.5%) and cells were incubated for an additional 6 h followed by fluorescent quantification. Because both doses exhibited cytotoxic effects, and work in humans suggests that serum histone levels rise to 50 μg/mL during sepsis, 50 μg/mL was chosen for subsequent studies. At feedlot arrival, serum samples were collected from 37 bull calves, followed by castration and normal feedlot processing procedures. Animals were retrospectively assigned to either Controls (never treated for BRD; CONT; $n = 12$), Recovery (treated once for BRD and recovered; RECOV; $n = 9$), Dead (treated once for BRD and subsequently died; DEAD; $n = 8$), or Chronic (treated four times for BRD; CHRON; $n = 8$). Duplicate wells containing MDBK cells were cultured in 96-well plates as described above except were supplemented with 1% serum from individual animals plus 50 μg/mL histones and duplicate wells with 1% serum alone. Fluorescent values from serum alone were subtracted from values obtained for histone treatment for each animal and analyzed using the GLM procedure of SAS. Results showed that histone treatment reduced cell viability in all groups and treatment group affected serum protective capacity ($P = 0.05$). Serum from CONT, RECOV, and DEAD calves all exhibited a similar ($P > 0.50$) response to histone treatment with values of −591.8 ± 549.9, -1086.9 ± 634.9, and -1193.8 ± 634.9, respectively. However, CHRON calves demonstrated an impaired capacity to protect against histones (-3054.4 ± 673.4) and were reduced ($P < 0.05$) when compared to each of the other groups. Results suggest that calves that require multiple treatments for BRD have reduced ability to protect against cytotoxicity of histones. Understanding the underlying mechanism responsible for protecting against histone cytotoxicity could lead to better identification of animals susceptible to severe cases of BRD.

Key Words: BRD, histones, feedlot, health

0899 (T025) Development of a non-invasive system for monitoring dairy cattle sleep.
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Lack of sleep in dairy cattle may indicate shortcomings in housing, environment, or increased physiological disturbances. Little research has been conducted to assess sleep in production livestock, primarily because of limitations with monitoring abilities. Consequently, biological understanding of the production circumstances and facility options that affect sleep is limited. The objective of this study was to test a non-invasive system using a three-axis accelerometer monitor to measure head position of the cow to classify sleep, and wake behaviors. The duration of the study consisted of two 24-hour periods of observing four Holstein dairy cows in September 2013 at the University of Kentucky Coldstream Dairy. The three-axis accelerometers were attached to a harness on the side of each cow's neck to determine head and body movement. Human observation of the animals noted the times of active behaviors and very low activity, or sleep behaviors. Wake behaviors were classified as standing and alert. Sleep was classified with the behaviors of lying with no movement and eyes closed with head rested on the ground or flank. The radial signal was extracted from the xyz components of the accelerometer to obtain a motion signal independent of direction. Radial signal features were examined for maximizing the performance of detecting sleep behavior using a Fishers linear discriminant analysis (LDA) classifier. This study included a total of 652 min of high activity behaviors and 107 min of sleep behavior recorded from two cows with usable data. Results from a bootstrapping analysis show an agreement between human observation and the LDA classifier of 93.7 ± 0.7% for wake behavior and 92.2 ± 0.8% for sleep behavior, with a 95% confidence interval. This monitor may be used to help understand options for monitoring sleep in research and production settings.

Key Words: behavior, sleep, accelerometer

0900 (T026) Associative effects of feeding varying levels of soyhulls to lambs consuming grass hay.
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Soyhulls are routinely utilized as a supplement to forage based diets in ruminants. Previous studies have focused on low and moderate supplementation rates where soyhulls have generally been effective and economical. Recent grain prices have increased pressure on livestock producers to potentially expand their use of soyhulls in situations where higher levels of performance are desired. The objective of this study was to compare the effect of various levels of soyhull supplementation on nutrient digestibility in lambs fed a basal diet of chopped grass hay. Eight St. Croix

cross wether lambs (39 ± 4 kg) were randomly assigned to four diets using a 4 × 4 replicated Latin square design. All lambs were offered a chopped grass hay free choice and supplemented at 0, 1, 2, or 3% of body weight in soyhulls (DM basis). Each period consisted of a 9-d adjustment period followed by a 5-d collection period. Lambs were housed individually and fitted with total fecal collection bags during the adjustment period of each diet. At the conclusion of each collection period and before proceeding to the next adjustment period, lambs were weighed to adjust supplementation levels. During collection periods, daily feed, refusals and feces weights were recorded and samples retained for analysis. Samples were dried, ground, and analyzed for dry matter (DM), crude protein (CP), ash, neutral detergent fiber (NDF) and acid detergent fiber (ADF). Data were analyzed in SAS using the PROC GLIMMIX procedure with a model including diet and period. Linear, quadratic and cubic treatment effects were evaluated using preplanned contrasts. Daily DM intake increased linearly ($P < .01$) with increasing soyhull supplementation. Dry matter digestibility increased quadratically ($P < .01$) as soyhull supplementation increased (56.6, 63.0, 65.4, and 66.4, respectively). Similarly, both NDF and ADF digestibility exhibited a quadratic response ($P < .01$) as dietary soyhull level increased. However, contrary to DM digestibility, NDF and ADF displayed peak digestibility at the 2% supplementation level. Results would suggest that supplementation of soyhulls above 2% of body weight would provide diminishing benefits as compared to lower levels of supplementation. Depression of NDF and ADF digestibilities at the 3% supplementation level contributed to the reduced DM digestibility improvement. Further research is needed to determine if reduced fiber digestibility was the result of increased rate of passage and reduced ruminal digestion.

Key Words: soyhulls, associative effects, lambs

0901 (T027) Adding post-extraction algal residue (PEAR) to cattle finishing diets reduces the quantity of fecal volatile chemicals often associated with feedlot malodors.

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Efficiencies of finishing cattle in feedlots have resulted in lower production costs and less expensive beef for consumers. But an increase in the size of feedlots, and resulting waste malodors, along with urban sprawl have brought the public and feedlots closer together and given urgency to finding methods to reduce feedlot malodors. Our objective was to feed post-extraction algal residue (PEAR) to steers to reduce the incidence of fecal malodor chemical compounds. Six steers were fed PEAR (1.25 kg/d, as-fed) along with a 90% concentrate and 10% forage diet for 35 d before harvest. One wk prior and 1 wk after the addition of PEAR to the feed, fecal samples were collected from each steer to produce fecal samples with and without PEAR within the same animal. Fecal samples were stored in an enclosed plastic bag immediately after collection (−80°C) until analyses. Each sample was placed in a 760 mL glass jar submerged in a 60°C water bath, and thawed to 25°C. A 75 µm carboxen/polydimethylsiloxane solid phase microextraction (SPME) fiber was then inserted into the jar and collected for 120 min. The SPME was desorbed in a multi-dimensional GC/MS with dual olfactory ports. All eluted chemicals were quantified as total ion counts (TIC) under the curve of each elution peak corresponding to each chemical identified by the MS library. Simple ANOVA was conducted to determine the effect of adding PEAR to the diet of steers on the relative quantity of fecal aroma chemical compounds. The general classification of amine/amide compounds tended ($P = 0.071$) to be reduced when PEAR was added to the feed. The addition of PEAR reduced the quantity of indole (manure/stench), the butyl ester of acetic acid (acid/burnt aroma), and carbon disulfide (rotten eggs) in fecal samples by 92.5, 80.5, and 97.1%, respectively ($P < 0.02$). Additionally, the quantity of the volatile chemicals dimethyl disulfide (garlic/burnt rubber), ethyl vinyl sulfide (sulfurous), and butyric acid (vomit) in the feces were reduced ($P < 0.05$) to undetectable levels with the addition of PEAR in the feed. The addition of PEAR to cattle finishing diets reduced the quantity of volatile chemicals often associated feedlot malodors.

Key Words: algae, beef, odor

0902 (T028) Treatment response to bovine respiratory disease in beef stocker calves was not positively affected when using isoflupredone acetate as ancillary therapy.

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The objective of this study was to evaluate the use of isoflupredone acetate as ancillary therapy in the treatment of bovine respiratory disease in high-risk stocker calves. Crossbred male beef calves ($n = 192$; BW = 221 ± 3.9 kg) were acquired in two blocks from regional auction markets and were transported to the University of Arkansas Stocker and Receiving Cattle Unit. Calves were observed daily for signs of respiratory illness, and antibiotic treatment was administered if calves displayed signs of illness and rectal temperature was ≥ 40°C. Calves ($n = 72$) requiring antibiotic treatment for respiratory illness were assigned randomly to either treatment 1 (injection of florfenicol) or treatment 2 (injection of florfenicol with isoflupredone acetate). Treatments occurred between d 2 and d 14 of the study. Both treatment groups were rechecked 48 h post treatment to determine treatment efficacy. Blood was collected twice (at treatment and recheck) via jugular venipuncture to evaluate complete blood cell count. Body weights were recorded at d 0, 14, 28, and 46 (block 1) or 42 (block 2). No difference was evident between treatment groups for medical treatment cost ($P = 0.54$) or number of calves requiring a second or third antibiotic treatment ($P \geq 0.61$). Upon

recheck, neutrophils were higher and lymphocytes were lower in calves that received isoflupredone acetate ($P \leq 0.04$) compared to calves that received only antibiotic therapy. Consequently, the neutrophil to lymphocyte ratio was greater ($P < 0.01$) in calves that received isoflupredone acetate compared to those that only received antibiotic therapy. No difference existed in overall white blood cell count at recheck ($P = 0.67$) or body temperature at recheck ($P = 0.43$). Calves that received isoflupredone acetate tended to exhibit greater ($P = 0.09$) ADG between d 14 and 28 compared to calves that were treated with only antibiotic therapy, 1.04 kg and 0.77 kg, respectively. Overall ADG for the entire receiving study was similar ($P = 0.88$) for both treatments. Results indicate that treatment of bovine respiratory disease with isoflupredone acetate as ancillary therapy to an antibiotic regimen does not have a positive effect on overall ADG, and it does not reduce medical treatment cost or the number of repeat treatments.

Key Words: bovine respiratory disease, ancillary therapy, isoflupredone acetate

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0903 (T029) The effects of stage of production and implant exposure on feedlot performance, carcass characteristics, and relative mRNA gene expression. K. E. Larrabee*, B. C. Bernhard, C. L. Maxwell, B. K. Wilson, S. Roberts, and C. R. Krehbiel, *Oklahoma State University, Stillwater.*

Black-hided heifers ($n = 187$; 362 kg) were used in a 122-d finishing study to determine the effects of a trenbolone acetate-estradiol implant [Revalor 200 (200 mg of trenbolone acetate and 20 mg of estradiol)] on feedlot performance, carcass characteristics, and relative mRNA gene expression when administered at specific stages of production. Treatments included 1) no implant (CON), 2) implantation on d 0 (EARLY), or 3) implantation on d 56 (LATE). A subset of heifers from each treatment were harvested at d 28 and 84 to collect LM samples that were utilized to measure relative gene expression involving myogenesis and intracellular signaling mechanisms. After d 55, ADG (1.68 vs. 1.31 kg) and G:F (0.172 vs. 0.134) were improved for EARLY vs. non-implanted heifers ($P < 0.05$). From d 56 to 122, ADG improved with implantation and was greatest for LATE ($P < 0.05$), while G:F was only improved by LATE ($P < 0.01$). Overall, implantation improved ADG (1.24 vs. 1.04 kg) and G:F (0.136 vs. 0.114) compared to CON heifers ($P < 0.01$), regardless of timing. Dry matter intake was not affected ($P = 0.41$) by implantation protocol. Implantation increased HCW (340 vs. 320 kg), dressing percentage (65.9 vs. 65%), and LM area (92.3 vs. 85.8 cm^2) vs. non-implanted cattle ($P < 0.05$), regardless of timing. Back-fat, marbling score, and REA/HCW ratio were unaffected by treatment ($P > 0.18$), as well as quality and yield grade distributions ($P > 0.21$). The mRNA expression of myostatin and insulin-like growth factor-1 were not affected by treatment at d 28 ($P > 0.18$). At d 84, myostatin was significantly reduced in heifers that had been implanted compared to CON (5.01 vs. 8.06; $P = 0.02$), regardless of timing. Insulin-like growth factor-1 was not affected by treatment ($P > 0.18$), but mRNA expression levels were decreased at d 84 compared to d 28 (31.8 vs. 50.2; $P < 0.05$). The expression of paired box 7 was increased in EARLY cattle compared to CON cattle at d 28 (0.682 vs. 0.467; $P = 0.05$). Paired box 7 mRNA gene expression of EARLY heifers at d 28 was greater than LATE heifers at d 84 (0.682 vs. 0.371; $P < 0.05$). The results of this study suggest that anabolic growth promotants improve cattle performance and production efficiency without altering carcass quality, independent of exposure time. This study also indicates that stage of production has the greatest effect on relative mRNA gene expression.

Key Words: feedlot and carcass performance, gene expression, implantation

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0904 (T030) The effects of corn silage diets on intestinal morphology in dairy calves. T. J. Pogreba*[1], S. I. Kehoe[1], K. Dill-McFarland[2], and G. Suen[2], *[1]University of Wisconsin–River Falls, River Falls, [2]University of Wisconsin-Madison, Madison.*

A calf's diet in the first few weeks of life is critical for gastrointestinal tract development. Current feed prices are causing producers to experiment with less expensive alternatives. These different feeds may affect the development of the gastrointestinal tract, which can further affect feed efficiency and calf performance. Therefore, evaluating intestinal morphology is an indicator of how well the animal is absorbing nutrients. The objective of the study was to determine the post-weaning effects of calf starter and corn silage fed to pre-weaned dairy calves on jejunal morphology. A total of 45 calves ($n = 15$/trmt) were fed a diet of whole milk with one of the following treatments: 100% calf starter (C), 60% calf starter and 40% corn silage (CC), or 100% corn silage (CS). Nine calves were sacrificed 8 wk after birth. Jejunal samples were collected to compare between the three treatment groups. Samples were preserved in formalin and later phosphate buffered saline until further analysis. Using a cryo-microtome, slices of tissue were made into nine slides per calf and stained with methylene blue. Pictures were taken with a compound light microscope and measured using the ImageJ computer program (NIH, Bethesda, MD). Measurements were recorded including villi length, crypt depth, and villi width. Measurements were averaged per section block and were statistically analyzed using the PROC MIXED in SAS 9.2. Significance was determined at $P < 0.05$ and trends at $P < 0.15$. Least squares means of villi lengths were 97.65, 105.61, and 89.57 µm for treatments C, CC, and CS, respectively ($P = 0.12$). Least squares means of crypt depths were 46.10, 48.58, and 38.69 µm for treatments C, CC, and CS, respectively ($P = 0.03$) and villi diameters were 14.51, 15.38, and 17.17 µm for treatments C, CC, and CS, respectively ($P = 0.69$). Results from the study indicated that the calves fed CS had significantly shorter crypt depths and tended to have shorter villi lengths compared with the other treatments. This may indicate better intestinal development in calves fed either 100% calf starter or a mix of 60% calf starter and 40% corn silage.

Key Words: calves, corn silage, intestine