ANIMAL BEHAVIOR & WELL-BEING II

0802 (W001) Relationship between hair cortisol concentration and previous performance and feeding behavior in holstein bulls fed high-concentrate diets. M. Verdu[*1], A. Bach[2], and M. Devant[3], *[1]IRTA–Dep.t Ruminant Production, Caldes Montbui-Barcelona, Spain, [2]Dep. of Ruminant Production, IRTA, Caldes de Montbui, Spain, [3]IRTA–Dep. of Ruminant Production, Caldes De Montbui, Spain.*

One main hormone produced during stress responses is cortisol. Hair can be used as matrix to measure cortisol levels in beef. Hair specimen could reflect average hormone levels over months and can be used to assess cortisol long-term variations. High cortisol concentrations stimulate breakdown of body tissues to release energy and protein to further support the stress response, and therefore it may impair animal growth. Thus, the hypothesis of the present study was that hair cortisol concentration should be negatively correlated with previous ADG, feed efficiency or feeding behavior parameters. Thirty-seven Holstein bulls (129 ± 2.9 kg BW and 110 ± 2.0 d age) housed in two pens were used to obtain hair samples (1 g) from the forehead by clipping. On d 7, hair was clipped to reflect the new cortisol incorporation in the following hair specimens, which were collected on d 120 and 216 of the study. The relationships between each previous performance and feeding behavior parameters and hair cortisol were evaluated by regression analyses using a fit model procedure of JMP with animal as random effect. Hair cortisol concentration was positively correlated ($P < 0.01$) with ADG ($r = 0.28$), feed efficiency ($r = 0.34$), and coeficient of variation of concentrate intake ($r = 0.36$), whereas hair cortisol concentration was negatively correlated ($P < 0.01$) with average concentrate intake ($r = -0.37$). Hair cortisol concentration tended ($P = 0.10$) to have a negative association with meal size ($r = -0.30$), number of visits ($r = -0.16$), and concentrate eating rate ($r = - 0.21$). In contrast to the hypothesis, the relationship between hair cortisol and ADG and feed efficiency was not negative. Incorporation of cortisol to the hair matrix assumes that blood-borne substances enter the hair through passive diffusion and subsequently become deposited in the hair shaft; however, other possible mechanisms of entry are proposed like the diffusion from sweat or sebum secretions. Probably, hair cortisol concentration needs to be greater to negatively impact ADG and feed efficiency. The negative relationship between meal size and eating rate and hair cortisol concentration may be related with its impact on digestive tract health. In conclusion, weak correlations were obtained between hair cortisol concentration with 3 mo previous data of performance and feeding behavior.

Key Words: bulls, hair cortisol, performance

0803 (W002) Competition in the milk-feeding stage affects post-weaning feeding behavior of pair-housed dairy calves. E. K. Miller-Cushon[*1], R. Bergeron[2], K. E. Leslie[3], G. J. Mason[3], and T. J. DeVries[1], *[1]University of Guelph, Kemptville, ON, Canada, [2]University of Guelph, Alfred, ON, Canada, [3]University of Guelph, ON, Canada.*

This study investigated the effect of competition during the milk-feeding stage on post-weaning feeding behavior and response to a competitive feeding challenge. Twenty Holstein bull calves were pair-housed and provided milk replacer (MR) and grain concentrate ad libitum via either: 1) one teat and feed bucket/pen (competitive feeding: CF) or 2) two teats and feed buckets/pen (non-competitive feeding: NCF). Calves were weaned during wk 7 of life by incrementally diluting the MR. Post-weaning, all pens were managed similarly and offered a complete pelleted diet ad libitum via two feed buckets/pen (non-competitive feeding) in Period 1 (wk 8 and 9) and Period 3 (wk 12 and 13) and one feed bucket/pen (competitive feeding) in Period 2 (wk 10 and 11). Post-weaning feeding times and competitive interactions were recorded 2 d/wk from video. Meal criteria were used to calculate daily meal frequency, meal time, and synchronized meal time (the percentage of meal time when calves within the pen were engaged in simultaneous meals). Data were summarized by week and analyzed in a repeated measures general liner mixed model. Post-weaning, calves raised in CF pens displaced one another more frequently (6.6 vs. 1.5 displacements/d, SE = 1.9, $P = 0.02$) and had fewer overlapping meals than calves raised in NCF pens (34.5 vs. 40.7% of meals, respectively). In Period 1 (non-competitive feeding), calves in previously CF pens had ($P = 0.03$) more frequent meals than calves in previously NCF pens (10.8 vs. 9.8 meals/d, respectively) and tended to have ($P = 0.09$) greater rates of intake (44.3 vs. 38.9 g/min). Likewise in Period 3 (2 buckets/pen), previously CF pens had ($P < 0.04$) more frequent meals (11.3 vs. 9.9 meals/d) and greater rates of intake (87.8 vs. 72.0 g/min). In Period 2 (competitive feeding with 1 bucket/pen), meal frequency and rate of intake were subject to treatment × week interactions ($P < 0.004$), increasing to a greater extent in previously NCF pens compared to previously CF pens. Feeding behavior across treatments was affected by the competitive feeding challenge in Period 2 ($P < 0.04$): feeding time decreased by 18%, meal synchrony decreased by 16%, and displacement frequency increased 1.7x. These results indicate that behavioral responses to pre-weaning competition, such as competitive displacements, degree of feeding synchrony, and rate of intake, may persist once developed.

Key Words: dairy calf, competition, feeding behavior

0804 (W003) Effect of exposure to individual ration components on feed sorting of dairy heifers.

E. K. Miller-Cushon*[1], J. P. Vogel[1,2], and T. J. DeVries[1], [1]*University of Guelph, Kemptville, ON, Canada,* [2]*Dalhousie University, Truro, NS, Canada.*

This study investigated the effect of exposing heifers to individual feed components on extent and pattern of feed sorting on transition to a novel ration. Twelve Holstein heifers (403.3 ± 17.3 d old, weighing 409.8 ± 11.3 kg), consuming a familiar mixed silage-based ration (FMR; 41% corn silage and 59% haylage) ad libitum, were transitioned to a novel total mixed ration (NTMR; 41.6% haylage, 36.5% corn silage, 14.6% high moisture corn, and 7.3% protein supplement, DM basis) according to one of two treatments: direct transition to NTMR (DIR) or exposure to NTMR components individually before receiving NTMR (COM). Heifers were tested in replicates of six and fed individually with automated feed bins. During adaptation (d 1 to 4), all heifers were offered FMR. During transition (d 5 to 12), DIR heifers received NTMR, whereas COM heifers received NTMR components offered separately, in amounts according to NTMR composition (target 15% orts). After transition, all heifers received NTMR (d 13 to 20). Feed intake and feeding time were determined daily. Fresh feed and individual orts were sampled every 2 d for particle size analysis and NDF content. The particle size separator consisted of three screens (18, 9, and 1.18 mm) and a bottom pan resulting in four fractions (long, medium, short, and fine). Sorting activity for each fraction was calculated as actual intake as a percentage of predicted intake. Data were summarized by period and treatment and analyzed in a general linear mixed model. There was no effect of treatment on intake (10.6 kg DM/d, SE = 0.58, $P = 0.46$) or feeding time (172.3 min/d, SE = 4.2, $P = 0.75$) across the study. After transition to NTMR, COM heifers sorted to a greater extent than DIR, sorting against long particles (95.4 vs. 98.9%, SE = 0.5, $P < 0.001$) and for short particles (101.7 vs. 100.6%, SE = 0.4, $P = 0.04$). Heifers fed COM also tended to sort for fine particles more (102.4 vs. 100.7%, SE = 1.0, $P = 0.09$). Differences in sorting resulted in COM heifers tending to have lower NDF intake, as a % of predicted intake (98.9 vs. 100.5%, SE = 0.6, $P = 0.07$). These results suggest that degree of feed sorting in heifers may be influenced by method of transition to a novel ration.

Key Words: dairy heifer, feed sorting, feed presentation

0805 (W004) Relationships of temperament, behavior, and growth of performance tested bulls.

S. A. Lockwood*, H. G. Kattesh, P. D. Krawczel, J. B. Wilkerson, J. D. Rhinehart, D. Kirkpatrick, and A. M. Saxton, *University of Tennessee, Knoxville, TN.*

Flighty cattle can be dangerous to personnel and may threaten the longevity of equipment. The aim of this study was to explore objective criteria for evaluating temperament in bulls while examining relationships between temperament, behavior, and performance. Consigned bulls arrived at the University of Tennessee Bull Testing Station on d -14 ($n = 65$) and were reared into six pens based on age and weight. Bulls (three pens, $n = 30$) were selected to receive dataloggers to measure activity which included: total time lying, total steps taken, number of lying bouts, and lying duration from d 3 to 27 and d 59 to 84 (± 3 d). Pen scores (1, docile to 5, very aggressive) were assigned based on bull reactivity to a human observer on d -1, 27, 55, and 83 (± 3 d). Weight and exit velocity (m/s) were measured along with the time it took the bull to leave the chute once the head gate opened on d 0, 28, 56, and 84 (± 3 d). The average of pen score and exit velocity were used to evaluate overall temperament ratings. A correlation analysis was performed in SAS on temperament, exit velocity, and pen score and their relationship with the behavioral patterns and performance data with moderate and strong correlations of interest ($r > 0.3$, $r < -0.3$). Temperament, exit velocity, time to exit chute, time to cover 1.83 m, and total lying time were repeatable over the testing period ($r = 0.353$ to 0.759, $P < 0.05$) while the order of bulls through the chute showed low repeatability ($r = 0.108$ to 0.307, $P = 0.014$ to 0.394). After d 28, heavier bulls were less active and on d 84, pen score had a negative moderate correlation with bull order through the chute. Based on these data, performance and pen score were better related to behavior than temperament and growth performance.

Key Words: bull, temperament, performance

Table 0805. Relevant correlations between behavior, performance, and temperament

		Day (± 3)	Correlation	*P*-value
Weight	Total Steps	0	0.521	0.003
Exit Velocity	Time to Exit Chute	28	-0.340	0.006
Pen Score	Exit Velocity	28	0.376	0.002
Pen Score	Total Steps	56	0.370	0.044
Weight	Total Lying Time	56	0.302	0.105
Weight	Total Steps	56	-0.438	0.016
Weight	Lying Duration	56	-0.431	0.017
Weight	# Lying Bouts	56	0.531	0.003
Pen Score	Order Through Chute	84	-0.328	0.008
Pen Score	Time to Cover 1.83m	84	-0.343	0.006
Pen Score	Exit Velocity	84	0.343	0.006
Weight	Total Steps	84	-0.330	0.075
Weight	Lying Duration	84	-0.379	0.039
Weight	# Lying Bouts	84	0.513	0.004

0806 (W005) The efficacy of bridging stimuli during acquisition of an operant task and the use of food-based positive reinforcement training on unwanted oral investigative behaviors in horses, *Equus caballus*. M. R. LaFollette*, K. A. Cloonan, and K. W. Walter, *Truman State University, Kirksville, MO.*

This study sought to determine the impact of food-based positive reinforcement training (PRT) on frequency and severity of unwanted oral investigative behaviors (UOIB) in horses. It also investigated the influence of various bridging stimuli (BS) on time and number of reinforcements to behavioral acquisition of an operant task. Eighteen horses were used in a randomized complete block design, where they were split into six blocks by age and assigned to one of three treatments at random. Treatments consisted of mechanically produced BS, human-produced BS, or no BS. A standardized training protocol was used to train each individual to touch a target. Lag time between BS and food delivery was minimal. Before and after training, all horses were evaluated for number and type of UOIB (nose, lips, or teeth on skin, clothes, or treat bag) at 10-sec intervals for 5 min. These UOIB were later given a numerical value based on type and summed to evaluate overall severity. These data were analyzed using PROC MIXED of SAS. Treatment did not influence time to behavioral acquisition (TBA) ($P = 0.7682$) or number of reinforcements ($P = 0.8881$). However, the youngest block had the shortest TBA ($P = 0.0599$) and received the most treats per minute ($P = 0.0207$). Before training, the youngest and oldest blocks tended to have fewer UOIB ($P = 0.0692$) and less overall severity ($P = 0.0653$) UOIB compared to the rest of the blocks. Analysis using a two-tailed *t* test showed that, after training, horses had an average of 4.4 fewer UOIB ($P = 0.0311$) as well as a reduction in overall severity of UOIB ($P = 0.0473$). Our data indicates that use of food-based PRT decreased number and overall UOIB, which suggest that proper delivery of food rewards can allow for successful task acquisition without causing UOIB. The lack of treatment influence on TBA could be due to minimal lag time between BS and presentation of the food reward. Future research evaluating if the presence of a BS with a lag time in food delivery influences TBA is recommended.

Key Words: operant conditioning, food rewards, clicker training

0807 (W006) Towards a better understanding of foraging behavior to boost the expression of conditioned preferences for low-quality foods. F. H. Catanese*[1], R. A. Distel[1], and J. J. Villalba[2], *[1]Universidad Nacional del Sur, Bahia Blanca, Argentina, [2]Utah State University–Agricultural Experiment Station, Logan.*

Our objective was to explore the impact of feeding experiences with a low-quality food (LQF) on sheep foraging behavior when the availability of a high-quality food (HQF) is variable. Twenty-four female 2-y-old Merino sheep were randomly split into two groups; one group consumed oat straw (OS, a LQF) for 20 min and immediately after a ration of soybean meal (CS+), whereas the other group consumed OS but the offer of the meal was delayed 5 h (CS-; i.e., control). After conditioning, pairs of sheep from the same treatment were arranged and their dietary preferences were evaluated (15-min tests) in a U-shaped corridor where they faced a choice at each end of the corridor of OS (ad libitum) and HQF (alfalfa pellets [AP, first trial] or corn grain [CG, second trial] in one of six levels of availability: 2, 4, 8, 12, 24, or 32 g/animal). Data from each level of HQF availability was analyzed separately using a mixed-effects model. During both trials OS intake was almost negligible at high levels of HQF and similar between groups (Table 0807). However, during high levels of restriction in HQF availability, OS intake increased abruptly (e.i., nonlinear relationship) and we observed greater intakes for sheep in CS+ than sheep in CS- (Table 0807). Increasing the quality of the HQF (AP to CG) reduced the likelihood of sheep accepting LQF at lower availabilities (e.g., 8 g of HQF; $P < 0.034$). To boost the benefits of a positive previous experience with LQF, restrictions should be placed on the accessibility and/or quality of the HQF (e.g., restricted foraging time, increased stock rate, etc.); otherwise, previous learning would remain silent or its effects over foraging behavior could be minimal.

Key Words: low-quality food, diet selection, sheep

Table 0807. Oat straw intake by pairs of sheep ($n = 6$) previously exposed to a preference conditioning protocol (CS+) or not (CS-) when tested in a U-shaped corridor with one of different levels of availability of a HQF

Type of HQF	Treatment	Availability of HQF, g					
		2	4	8	12	24	32
Alfalfa pellets	CS-	197.7	141.0	125.7	98.5	4.2	0.2
	CS+	278.2	279.5	239.7	78.6	44.7	4.0
SEM		32.9	23.9	36.6	74.1	20.7	1.7
P-value		0.045	< 0.001	0.027	0.849	0.166	0.104
Corn grain	CS-	267.3	168.7	42.5	30.3	15.3	4.0
	CS+	349.8	252.7	142.6	103.0	43.8	38.3
SEM		18.6	19.0	34.1	45.5	29.9	26.7
P-value		0.009	0.002	0.037	0.259	0.496	0.364

0808 (W007) Effects of bedding frequency on lying behavior of weaned calves. M. Terré*[1] and A. Bach[2], *[1]IRTA, Caldes de Montbui, Spain, [2]Dep. of Ruminant Production, IRTA, Caldes de Montbui, Spain.*

Twenty-eight Holstein male calves (BW: 79 ± 3.1 kg, age: 78 ± 2.5 d) were used to study whether lying behavior of weaned calves would be modified by bedding frequency. All animals were fed the same pellet concentrate and chopped straw, and they were bedded with sawdust, and kept in individual hutches. At the beginning of the study, 15-kg of sawdust were added to each hutch, and during the first 3 d of the study, 3 kg

of sawdust were added to each hutch (this was considered time 0 and used as covariate in the statistical analyis). Afterward, on Day 4, 6 kg of sawdust were added to all hutches, and thereafter half of the animals were bedded every other day (2B), and the other half every 4 d (4B) with 6 kg of sawdust. The study finished on Day 11 (3 d for the basal time plus 2 periods of 4 d each). Animals were weighed on d 1 and 11 of study, and concentrate intake was measured daily. Lying behavior was monitored by placing a data logger in the right hind leg to record movements at 1-min intervals, and bedding samples were obtained daily to determine the moisture content. Data were analyzed with a mixed-effects model with repeated measures considering lying time or concentrate intake of the basal time as a covariate, and calf and period as random effects. Linear correlations were determined between the moisture content of the bedding, lying time and concentrate intake. Moisture content of the bedding was greater ($P < 0.001$) the third and forth day of each experimental period in 4B than in 2B calves (50 vs. 31 ± 4.8% of moisture, respectively). However, neither lying time (1111 vs. 1105 ± 6.1 min for 2B and 4B, respectively) nor DM concentrate intake (2.72 vs. 2.76 ± 0.084 kg/d for 2B and 4B, respectively) or BW differed between both treatments. A slightly negative relationship was observed between moisture content of the bedding and lying time ($r = -0.23$, $P < 0.001$), and also a slightly negative correlation was found between lying time and DM concentrate intake ($r = -0.26$, $P < 0.001$). In conclusion, sawdust bedding at 50% moisture did not change lying behavior, DM concentrate intake, and performance of weaned calves in a short-period study.

Key Words: bedding, lying behavior, weaned calves

0809 (W008) Effect of oral meloxicam on indicators of pain following band castration in beef calves.

S. Marti[*1], M. J. Jelinski[2], L. C. Dorin[2], E. D. Janzen[3], M. E. Olson[4], B. J. Ralston[5], and K. S. Schwartzkopf-Genswein[1], *[1]Agriculture and Agri-Food Canada, Lethbridge, AB, [2]Veterinary Agri-Health Services, Airdrie, AB, Canada, [3]University of Calgary, AB, Canada, [4]Alberta Veterinary Laboratories, Calgary, Canada, [5]Alberta Agriculture and Rural Development, Calgary, Canada.*

The objective of this study was to evaluate if oral meloxicam could mitigate post-procedural indicators of pain associated with band castration in beef calves. One hundred intact Angus bull calves (BW 299 ± 3.3 kg) were randomly assigned to treatments according to a 2 × 2 factorial design assessing castration method (band castration (B) or sham castration (S)) and provision of a pain mitigating agent at the time of castration (1mg/kg of meloxicam oral suspension (15mg/ml) (M) or non-medicated (N) given an oral saline solution) to yield BM, BN, SM, SN treatments (25 calves/group). Behavioral and physiological indicators of pain were assessed over a 9-wk period post-castration. Animal BW (kg) was recorded weekly to calculate ADG and feed intake (kg/d; FI) daily for all animals over the experimental period. A subsample of 48 calves were randomly selected to obtain more detailed measurements on d 0 and weekly until the end of the study including salivary cortisol (ng/mL), blood cell count (CBC), and gait stride length (cm). In addition, 16 calves (4/treatment) were fitted with data loggers to monitor lying and standing duration (min/d) and number of steps (no./d) taken over a 4-d period post-castration. No differences ($P > 0.05$) were observed in lying and standing duration, stride length or number of steps between M and S calves from d 0 to 6. Similarly, M and S calves did not differ ($P > 0.05$) in BW, ADG, FI, or CBC values over the 63 d study. However, a castration × medication × day effect ($P = 0.03$) was observed for ADG with BM calves tending to have a higher ADG ($P = 0.07$) than BN calves on d 7. Salivary cortisol concentrations were greater ($P < 0.05$) in B than S calves from 60 to 120 min following castration but there was no difference ($P > 0.05$) between M and N calves. Overall, meloxicam administered orally at the time of band castration had little effect on indicators of pain post-castration. However, there was some evidence that ADG was improved in M calves on d 7. More study on the timing of drug administration is required to determine optimal circulating levels relative to the time of the procedure when it may have the greatest benefit.

Key Words: pain mitigation, band castration, meloxicam, beef calves

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0810 (W009) Behavior of pigs infected with *Salmonella* and fed diets containing a probiotic or a physiological promoter.

V. F. Buttow Roll[1], E. Barba-Vidal[*2], L. Castillejos[3], X. Manteca[2], and S. Martín-Orúe[2], *[1]Dep. of Animal Science, Faculty of Agronomy Eliseu Maciel, Federal University of Pelotas, Brazil, [2]Animal Nutrition and Welfare Service Dep. of Animal and Food Sciences, Universitat Autònoma de Barcelona, Bellaterra, Spain, [3]Animal Nutrition and Welfare Service, Dep. of Animal and Food Sciences, Universitat Autònoma de Barcelona, Bellaterra, Spain.*

This trial evaluated the effects of a *Bacillus licheniformis* (10^9 CFU/kg of feed; PROPORC; NOREL S.A.) and a physiological promoter based on sodium butyrate (3 kg/t feed; GUSTOR BP70; NOREL S.A.) on the behavior of pigs challenged with *Salmonella* Typhimurium. A total of 72 piglets, weaned at 28 d, were housed in 24 pens and fed three diets: 1) Control diet (CTR), 2) CTR + probiotic (PRO), and 3) CTR + physiological promoter (PHP). After a 1-wk adaptation period, pigs were orally challenged with 10^8 CFU of *Salmonella* Thyphimurium. Behaviors were recorded in the morning and afternoon (0830 to 1030 and 1400 to 1600) for 5 d beginning 2 d before of the challenge (day -2 and -1) and 3 d after the challenge day (Day 2, 3, and 4 post infection, PI). Use of the space (feeder, light, drinker areas), active behaviors (exploration, feeding, drink-

ing, walking, and others) and inactive behaviors (lying ventrally or laterally, and in contact or not with a pen mate) were registered. A repeated measures procedure was used for statistical analysis. No effect of PHP was found. Effects of PRO were observed mostly during the morning. Active behaviors as well as inactive behaviors were higher and lower in pigs fed PRO ($P < 0.008$ and $P < 0.001$, respectively) compared with the other groups. These animals spent less time lying in contact with pen mates ($P = 0.012$), while total time exploring the pen, feeding and other active behaviors, were higher ($P = 0.05$, $P = 0.003$ and $P = 0.03$, respectively). In contrast, the total time lying laterally and ventrally with contact was significantly lower on pigs fed PRO ($P < 0.001$ and $P = 0.008$ compared to CTR and PHP, respectively). Pigs fed the PRO used more the feeding area ($P = 0.02$) and less the lying area ($P < 0.001$). In the afternoon pigs were more active before the challenge than on Day 4 PI ($P < 0.001$). Before inoculation there were significantly fewer pigs lying ventrally in comparison with the d 2 and 4 PI ($P = 0.01$). Positive contacts, exploration, and feeding behaviors were also less frequent on Day 4 PI in comparison with the day before challenge ($P < 0.05$). The use of feeder area decreased ($P = 0.001$) after the challenge. In conclusion the PRO has a positive effect on some behavioral measures, mainly those related to the exploring the pen, feeding and other active behaviors in the morning.

Key Words: probiotics, *Salmonella,* sodium butyrate

0811 (W010) Integrating animal science and human medicine: development of a novel porcine model for calcium oxalate stone formation. B. P. Trojan*[1], S. J. Trojan[2], A. Navetta[1], S. Filleur[1], and T. Nelius[1], *[1]Texas Tech University Health Sciences Center, Lubbock, [2]Texas Tech University, Dep. of Animal and Food Sciences, Lubbock.*

Increased collaboration between animal science Dep.s and medical schools has been highly encouraged in recent years to enhance research funding competiveness. Development of animal models for investigating human health problems has been pivotal for the discovery of treatments for many life-threatening human illnesses. A team of researchers from the Dep. of Animal and Food Sciences at Texas Tech University and the Texas Tech University Health Sciences Center collaborated to develop a porcine model for use in the study and treatment of human calcium oxalate stone formation. Porcine were chosen as the model as they are the most congruent mammal to humans, both anatomically and physiologically, for the study of kidney stone disease. Male, Large White-Chester crossbred pigs ($n = 16$; 19 kg initial BW) were assigned to one of the following seven treatments: 1) 0.8% ethylene glycol administered in drinking water (EG) and 2 µg/kg BW vitamin D dissolved in syrup (Vit. D); 2) EG + 100 mg/kg BW ammonium chloride dissolved in syrup (AC); 3) EG + 5 mg/kg BW gentamicin intramuscularly 3x/wk (GENT); 4) EG + 0.5 mg/kg BW Lasix dissolved in syrup; 5) EG + Vit. D + AC; 6) EG + Vit. D + GENT; and 7) control. Treatments were administered for 28 d; blood was collected and renal panels were obtained on d 0, 14, and 28. Urine was collected on d 0, 14, and 28 and analyzed for pH, Ca, citrate, oxalate, creatinine and P. Renal and bladder ultrasound was conducted intermittently throughout the 28-d period. Animals were euthanized at the end of the study for collection of renal tissue for gross and microscopic analysis of crystal stone formation and inflammation. No crystal deposition was observed in control animals; however, all other treatments developed calcium oxalate stones, confirmed by histopathological analysis of hematoxyin and eosin staining, fluorescent microscopy and stone analysis by infrared spectrum. All treatment combinations examined in this study successfully induced stone formation in pigs. Of the treatment combinations, EG + Vit. D provided the most straightforward model for inducing kidney stone formation and is one that can be employed to study kidney stone disease and mitigation in humans.

Key Words: animal model, animal science, human medicine

0812 (W011) Effects of group size and social rank on welfare and performance of gestating sows in a group-housing system with floor feeding. Y. Li* and L. Wang, *University of Minnesota, West Central Research and Outreach Center, Morris.*

This study was conducted to investigate the interactive effect of group size and social rank on welfare and performance of gestating sows group-housed in pens with floor feeding. Pregnant sows ($n = 152$, parity 1 to 6) were allocated to four large pens (26 sows/pen) and eight small pens (six sows/pen) at 35 d after mating. Both large and small pens provided the same floor space allowance (1.5 m^2/sow). Aggressive interactions among sows during the initial 2 h and during the first meal after mixing were recorded. Rank indices were calculated for each sow based on outcomes of fights, and sows were categorized as high, middle, and low ranking within each pen. Sows were scored for skin lesions at 24 h and 5 wks after mixing. Salivary samples for cortisol analysis were collected from high ranking and low ranking sows during the same periods as assessment of skin lesions. Body weights before mixing, before the subsequent farrowing, and at weaning, litter size and weight at birth and weaning were registered for each sow. Data were analyzed using the PROC MIXED and Glimmix of SAS. There was no interaction of group size and social rank for any variable. Low ranking sows fought less frequently (9.3 vs. 20.7 fights/sow/2h, SE = 3.17; $P < 0.001$) than high ranking sows at mixing, but had similar skin lesions ($P > 0.10$) at 24 h after mixing as high-ranking sows. Low ranking sows sustained more skin lesions ($P = 0.01$) than high-ranking sows at 5 wks after mixing. Low ranking sows and high ranking sows entered gestation pens with similar body weights, but low ranking sows gained less weight (33 vs. 50 kg, SE =

5.6; $P < 0.001$), and had lower weights (250 vs. 268 kg, SE = 5.9; $P < 0.001$) before farrowing than high-ranking sows. There was no difference in cortisol concentration between high- and low-ranking sows. Group size did not affect the number of fights per sow involved, but sows in large pens had more skin lesions ($P < 0.001$) at 24 h and at 5 wks ($P < 0.001$) after mixing than sows in small pens. Neither social rank of the sow nor group size affected litter size or litter weight at birth or at weaning. These results suggest that low ranking sows had poor welfare than high ranking sows in pens with the floor feeding system, as indicated by reduced weight gain and increased skin lesions.

Key Words: group size, social rank, sows

0813 (W012) Grazing and feedlot performance and carcass quality measurements of beef cattle surgically castrated at different stages of maturity with or without analgesia. E. A. Backes*[1], A. C. Brown[1], E. B. Kegley[1], J. T. Richeson[2], H. D. Hughes[2], M. L. Thomas[1], K. Anschutz[1], and J. G. Powell[1], *[1]Dep. of Animal Science, University of Arkansas Division of Agriculture, Fayetteville, [2]Dep. of Agricultural Sciences, West Texas A&M University, Canyon.*

Castration is a common and justifiable management practice used by beef cattle producers; however, it may expose calves to both stress and pain, which may negatively affect animal performance. The objective was to determine the effects of surgical castration at birth or weaning with or without oral analgesic ongrowth performance and carcass quality. This abstract summarizes grazing and feedlot performance, and carcass measurement. Bull calves ($n = 60$) from the University of Arkansas cow/calf unit were allocated randomly near birth to one of four castration methods, consisting of surgical castration near birth or at weaning with or without oral administration of meloicam (1 mg/kg BW). After a 56-d weaning period, calves were transported to West Texas A&M University (WTAMU) for the grazing and feedlot phases. Body weight was determined on arrival and at the end of the grazing phase (start of feedlot phase) and end of the feedlot phase. Calves were allocated to a heavy and low weight group within each treatment on arrival of the feedlot phase. During the 110-d grazing phase, steers were grazed a single group and had access to sorghum × sudan and native pastures consisting of buffalograss (*Buchloedactyloides*) and bluegrama grass (*Boutelouagracilis)*. Throughout the finishing period steers were fed a common feedlot ration. When steers were determined to have reached a suitable degree of finish (1.27 cm backfat), they were harvested at a commercial plant and carcass data were recorded by personnel from the WTAMU Beef Carcass Research Center. Performance and carcass measurements were analyzed using PROC MIXED of SAS, and quality grades were analyzed using Chi-square. Starting (270, 273, 276, and 270 kg, respectively) and ending BW (381, 378, 383, and 374 kg, respectively), ADG, and total gain during the grazing phase did not differ ($P \geq 0.42$) across the four castration treatments. Ending BW (619, 624, 630, and 618 kg, respectively), ADG, total gain during the feedlot phase, and d on feed did not differ ($P \geq 0.50$) between treatments. Carcass weight, fat thickness, color, ribeye area, internal fat, preliminary yield grade, yield grade, and quality grade did not differ ($P \geq 0.17$) across treatments. Therefore, surgical castration performed at either birth or weaning with or without oral analgesia did not affect calf performance during the grazing and feedlot phases and did not affect carcass quality measurements.

Key Words: castration timing, performance, carcass quality

0814 (W013) Evaluation of a disposition scoring system in pen-raised white-tailed deer. K. J. Stutts*, J. L. Lucia, M. J. Anderson, M. M. Beverly, and S. F. Kelley, *Sam Houston State University, Huntsville, TX.*

Pen-raised white-tailed does ($n = 63$) ranging in age from 1.5 yr to 6.5 yr were utilized to evaluate the accuracy of a subjective disposition scoring system for deer by assessing the physiological response to restraint through measurement of serum cortisol concentration. Does were administered annual vaccinations and dewormer while restrained in a drop-floor chute designed for whitetail deer. Following processing and before being released from the chute, blood samples were obtained via jugular venipuncture and serum was harvested to determine cortisol concentration by RIA analysis. Disposition scores ranging from 1 to 5 (1 = docile and 5 = aggressive) were also assigned by independent observers to evaluate deer behavior while restrained in the chute. Pearson correlation coefficients were used to determine the relationship between cortisol concentration and disposition scores, and a one-way ANOVA was utilized to determine if differences existed among mean cortisol concentration for each of the disposition scores. A moderately positive relationship ($r = 0.30$, $P < 0.02$) existed between disposition score and serum cortisol concentration; however, there was no difference in mean cortisol concentration for does receiving a score of 1, 2, 3, or 4 (56.0, 69.7, 69.3, and 54.0 ng/mL, respectively). Does that received a disposition score of 5, indicating the most aggressive behavior while restrained in the chute, had a greater ($P < 0.01$) mean serum cortisol concentration (118.8 ± 13.1 ng/mL) when compared to does receiving a lower numerical disposition score. These results indicate that the disposition scoring system accurately identified does undergoing the greatest physiological stress while restrained in a working chute, but the scoring system requires modification to accurately assess lower levels of stress associated with scores 1 through 4 of the system.

Key Words: deer, stress, disposition

0815 (W014) Objective movement of calf-fed Holstein steers fed in confinement. J. A. Reed[*1], N. May[1], T. McEvers[1], L. A. Walters[1], J. P. Hutcheson[2], and T. E. Lawrence[3], *[1]West Texas A&M University, Canyon, [2]Merck Animal Health, Summit, NJ, [3]West Texas A&M University, Canyon.*

The objective of this study was to determine the impact of zilpaterol hydrochloride (ZH) on movement behavior of calf-fed Holstein steers fed in confinement. The experimental design was a randomized complete block, with a 2 × 11 factorial treatment arrangement of ZH supplementation 0 or 20 d by 11 slaughter dates (254, 282, 310, 338, 366, 394, 422, 450, 478, 506, and 534 d on feed). Steers were fed in 28-d periods; d 1 to 4 included no ZH supplementation, d 5 to 24 included ZH (8.33 mg/kg dietary DM) supplementation, and d 25 to 28 allowed for withdrawal. Animal movement was monitored during each 28 d using IceQube pedometers (IceRobotics, Edinburgh, Scotland, UK), which recorded standing time (mm:ss), lying time (mm:ss), number of steps taken, and number of lying bouts continuously during the 28-d study period. Data collection began at 1200 h on d 1 to remove variation from movement caused by processing the animals at approximately 700 h; data collection ended on d 28 at 2400 h. Data were analyzed as repeated measures using a compound symmetry covariance structure via the GLIMMIX procedure of SAS. Treatment means were generated using the LSMEANS option and separated when significant with the PDIFF option that was adjusted with the Bonferroni correction to reduce the probability of a type-I error $\alpha = 0.05$. Treatment x days on feed interactions occurred ($P < 0.01$) for each outcome variable; they were likely the cause of small sample size per slaughter group and are not likely to be biologically repeatable. No difference ($P > 0.05$) was observed between ZH supplementation treatment groups in the quantity of minutes spent standing (0 d ZH = 565; 20 d ZH = 557), minutes spent lying (0 d ZH = 875; 20 d ZH = 883), or number of steps taken per 24-h day (0 d ZH = 1602; 20 d ZH = 1637). However, the number of lying bouts was different ($P < 0.01$) between treatment groups; cattle supplemented ZH exhibited 10.7 lying bouts, whereas those not supplemented ZH had 11.9 bouts. These results indicate similar objective movement between calf-fed Holstein steers supplemented ZH for 0 or 20 d.

Key Words: zilpaterol hydrochloride, movement, pedometers.

0816 (W015) A competitive and unpredictable feeding environment disrupts feeding and social behavior of pre-partum dairy cows. K. Proudfoot[*1], D. Weary[2], and N. von Keyserlingk[2], *[1]Ohio State University, Columbus, [2]University of British Columbia, Vancouver, Canada.*

Management during the pre-calving period can alter the behavior of dairy cows. The objective was to determine the effect of a competitive and unpredictable feeding environment on feeding and social behavior of pre-partum dairy cows. Sixty-four animals were randomly assigned to treatment ($n = 4$ animals × 8 groups) or control groups ($n = 4$ animals × 8 groups). Each group consisted of three multiparous cows and one primiparous heifer. During a 1-wk baseline period (5 wk before calving) all groups had free access to four Insentec feed bins. From 4 wk before calving until calving, control cows were given ad libitum access to six feed bins. For treatment groups, four non-experimental cows were added to the pen. After 2 wk, treatment groups were moved into a pen with four new cows. Throughout the treatment period morning feeding times were delayed at random 0, 1, or 2 h on alternate days. Cows were excluded if they calved with twins, aborted or calved > 2 wk early. Feeding behavior (intake, feeding time, rate of intake, visits to the feed bins, and intake per visit) and social behavior (total, initiated and received replacements at the feed bins) were collected electronically. Group was considered the experimental unit. Data were analyzed using a mixed model in SAS, including baseline data and parity as covariates, week as a repeated measure (wk 3, 2, and 1 before calving) treatment as the main effect, a week*treatment interaction and group as a random effect. Treatment did not affect feed intake, but decreased time spent feeding (3.9 vs. 4.2 ± 0.1 h/d; $P = 0.003$) and increased feeding rate (82 vs. 63 ± 2 g/min; $P < 0.001$). Treatment groups visited the feeder less often compared to controls (47 vs. 87 ± 3 visits/d; $P < 0.001$), and consumed more feed during each visit (0.39 vs. 0.19 ± 0.01 kgDM/visit; $P < 0.001$). Treatment groups were involved in more competitive replacements at the feeder (30 vs. 22 ± 1 no./d; $P < 0.001$), both initiated (15 vs. 10 ± 1 no./d; $P < 0.001$) and received (15 vs. 12 ± 1 no./d; $P < 0.001$) compared to control cows. In summary, a competitive and unpredictable feeding environment disrupts feeding and social behavior of dairy cows; these effects may be especially problematic for pre-partum cows that are particularly susceptible to disease.

Key Words: close-up, stress, parturition

0817 (W016) Effects of within dyad weight variation on competition, feed intake, and milk production of dairy cows sharing feeding gates. J. R. R. Dórea*[1], A. L. Stanton[2], C. M. Stoffel[2], and L. E. Armentano[2], [1]*University of São Paulo, Piracicaba, Brazil,* [2]*University of Wisconsin–Madison, Madison.*

The goal of this study was to identify the effect of weight variation in cow pairs on animal performance and ingestive behavior under competitive conditions. Twenty-four primiparous and 36 multiparous lactating cows were paired (within parity) to form 30 experimental units (feeding gates). Pairs were fed six diets in five 6 × 6 balanced Latin squares with 21-d periods, using data from the last 5 d. Each pair had access to one gate that allowed one animal to eat at a time, and cows that filched feeds in other gates were excluded during the statistical analysis. Each dyad was categorized based on the difference in weight within dyad. Differences above average (60 kg) were categorized as High. Below average differences in size were categorized as Low. Within cow pair, individual animals were classified by size as either the larger animal in the pair (Large) or the smaller animal in the pair (Small). The effect of size (large/small) and difference (high/low) were tested. For High and Low difference pairs the number of displacement (gate exchange < 1 min) per wk were 55.79 and 90.38 per wk, respectively ($P < 0.05$). An interaction between size and difference was significant for dry matter intake, feeding rate, displacements and milk yield, ($P < 0.05$). In High differences, small cows had greater DMI (% BW) compared to large cows ($P < 0.05$). In Low difference pairs, size did not impact DMI. Milk yield was 4.4 ± 1.1 kg/d lower for Small cows compared to Large cows ($P < 0.05$). For High difference pairs, size was not associated with milk yield ($P > 0.05$). These results suggest that in highly competitive situations, cows close in size have more aggression, poorer welfare, and milk production than animals with a greater difference in weight. This has implications for identifying animals with poor welfare in competitive environments.

Key Words: animal behavior, competition, performance

0818 (W017) Impact of feeding and housing strategy on calf performance and behavior. *S.* H. Ward*, K. Parker, and K. Hart, *Mississippi State University, Starkville.*

Forty-eight Holstein calves were fed either two or three times per day and housed either individually or in pairs (2XI, 2XP, 3XI and 3XP). Calves were randomly assigned to treatments at birth and remained on their treatment until 8 wk of age. At 8 wk of age, calves were moved to a grouped pen and body measures were taken until 10 wk of age. For calves that were on 2XP or 3XP, pairing occurred on d 3 ± 2 d. All calves were fed 3.8L of colostrum within 24 h of birth and then fed whole milk. Calf starter (Startena, Purina Mills, 22% CP) was offered from d 3 and increased by 0.45 kg when less than 0.45 kg was left. DMI and respiration and fecal scores were collected daily. Body weight (BW), hip and wither height, heart girth, and hip width were collected weekly. Play behavior, time spent lying, standing, eating, and drinking were also measured at wk 3, 5, and 7. At wk 8, latency to feed was observed when calves were released into groups. Data were analyzed using the PROC MIXED of SAS (Cary, NC). Separation of means was evaluated with the PDIFF procedure of SAS based on Fisher's F-protected least significant difference test. Significance was declared at $P < 0.05$. There was no effect of treatment on BW or measures or ADG. However, in weeks 6, 9, and 10 calves on 3XP had greater ADG than calves on 2XP (1.15, 1.49, 1.38 vs. 0.72, 0.84, 0.47 kg/d, respectively; $P < 0.05$) and 3XI (1.15, 1.49, 1.38 vs. 0.87, 0.79, 1.19 kg/d, respectively; $P < 0.05$). In wk 6 and 10, 3XP calves had greater ADG than 2XI calves (1.15kg, 1.38kg vs.89kg, 1.06kg respectively). There was no effect of feeding frequency on starter intake, however, calves housed in pairs tended to consume more starter than those housed individually (0.79 kg DM/d vs. 0.84 kg DM/d; $P < 0.07$). Analysis of behavior data indicates no impact of housing type on latency to feed, however, calves fed 3x/day consumed feed within 23.5 min and calves fed 2x/day consumed feed within 37.5 min. Currently, this data demonstrates that, while nutrient values were not different between treatments, both feeding frequency and housing type can impact calf growth and tended to impact intake and latency to feed.

Key Words: dairy calves, housing, feeding behavior

0819 (W018) Communicating farm animal welfare science: Wisconsin dairy producers' attitudes toward and interest in cow welfare. C. Skasa[1], S. Turner[2], and A. L. Stanton*[3], [1]*University of Wisconsin–Eau Claire, Eau Claire,* [2]*University of Wisconsin–Eau Claire, Eau Claire,* [3]*University of Wisconsin-Madison, Madison.*

Farm animal welfare research is gaining momentum in the United States, but few focused assessments of U.S. producer opinions and knowledge about welfare-friendly management practices exist in the literature. By soliciting producer opinions, gaps in producer knowledge and possible strategies to disseminate research-based best practices can be identified. This study of Wisconsin (WI) dairy producers targeted the following: producers' opinions about farm animal welfare and controversial on-farm management practices; their familiarity with farm animal welfare initiatives; and their interest in learning about dairy cattle welfare, including how they currently obtain that information. Surveys were mailed to a computer-generated random sample ($n = 1000$) of WI dairy producers with a response rate of 48.1%. Question topics included impact of management practices on cattle welfare, cattle's ability to experience affective states, familiarity with farm animal welfare initiatives, and accessibility of information about cattle

welfare. Associations between responses and farm size, age, education, and housing type were evaluated with chi-squares test in SAS. Results indicated that farm type, farm size, producer age, and producer education level impacted survey responses. Notably, tie stall farms, smaller farms (1 to 50 head), and producers who identified as university graduates were more likely to disagree with the statement that tail docking is necessary to maintain cow cleanliness ($P < 0.01$). Free stall farms were more likely to agree that milk production is the best indicator of a cow's welfare ($P = 0.05$), as were producers aged 65 and older ($P = 0.02$). Overall, farms that had both free stall and tie stall housing were most familiar with animal welfare initiatives, including extension-sponsored conferences ($P = 0.03$), a university-sponsored welfare-friendly cattle housing guide ($P = 0.01$), and the National Dairy FARM Program ($P < 0.01$). Study results could be used to target welfare education, such as benchmarking information on critical on-farm welfare issues, based on producers' current knowledge and preferred mode of information delivery.

Key Words: welfare, dairy, opinions

0820 (W019) Effect of transportation stress on cytokine gene expression, hematic biometry and blood chemistry in heifers. B. Avila*, J. Kawas, D. Zamora, and H. Fimbres, *Universidad Autónoma de Nuevo León, Escobedo, México.*

Transportation is probably the most stressful event cattle can experience affecting health, performance, meat quality and causing considerable economic losses. The objective of this study was to determine the effect of long-term transport stress on blood chemistry, hematological, and cytokine gene expression measurements. Blood samples from 16 *Bos taurus* x *Bos indicus* heifers from a feedlot located in northeastern México, were obtained by coccygeal venipuncture. Heifers weighed an average of 300 kg. Samples were obtained from eight heifers newly arrived from a 40-h road trip (0 DPA) as they were unloaded and restrained in a hydraulic chute to receive routine weighing and physical check-up, and the other eight heifers were in their 25th day post-arrival (25 DPA). Cytokine gene expression, hematic biometry, and blood chemistry were analyzed. For gene expression, blood samples were stabilized for RNA extraction, and RNA yielded was quantified and standardized. Specific primers were used for the amplification of cytokines TNF-α, IFN-γ, IL-2 and glyceraldehyde 3-phosphate dehydrogenase (GAPDH), the latter used as an internal control gene. Amplified products were analyzed by electrophoresis and quantitative values were calculated for each band using the myImageAnalysis software from Thermo Scientific. Blood chemistry results showed higher concentrations of albumin ($P = 0.013$), amylase ($P = 0.027$), alanine aminotransferase ($P = 0.003$), bilirubin ($P = 0.001$), and cholesterol ($P = 0.013$) in the 0 DPA group. Hematocrit ($P = 0.022$) and hemoglobin ($P = 0.001$) values were lower in heifers at 25 DPA. Cortisol concentration was higher ($P = 0.001$) in the 0 DPA group. On the quantitative gene expression analysis, we observed that the expression of TNF-α was greater ($P = 0.001$) in the 25 DPA group. At the TNF-α amplification two un-specific bands were found, only in the animals of the 0 DPA group. These bands were sequenced, and BLAST analysis suggests that they correspond to bovine lymphotoxin (LT). Literature shows that LT and TNF-α are coded in the same gene, even though, they have different promoters and polyadenylation sites. In conclusion, homeostatic impairment, high stress levels and immunological changes were apparent in recently transported heifers as evidenced by the blood chemistry and hematological measurements, the higher cortisol concentration, the reduction in cytokine TNF-α expression and LT co-expression. Further studies should look into the mechanism that promotes LT expression in animals exposed to transport stress, to probably be used as a biomarker for transport stress.

Key Words: stress, transport, heifers

0821 (W020) Flight speed as predictor of cattle ability to adapt to feedlots. D. R. Soares*[1], J. N. S. G. Cyrillo[2], A. C. Sant'anna[3], T. S. Valente[4], K. S. Schwartzkopf-Genswein[5], and M. J. R. Paranhos da Costa[6], *[1]Bolsista do CNPq– Brasil. Programa de Pós-Graduação em Zootecnia, Faculdade de Ciências Agrárias e Veterinárias, UNESP, Jaboticabal–SP, Brazil, [2]Centro APTA Bovinos de Corte, Instituto de Zootecnia, Sertãozinho-SP, Brazil, [3]Departamento de Zootecnia, Faculdade de Ciências Agrárias e Veterinárias, UNESP, Jaboticabal-SP, Brazil, [4]Programa de Pós-Graduação em Genética e Melhoramento Animal, Faculdade de Ciências Agrárias e Veterinárias, UNESP, Jaboticabal-SP, Brazil, [5]Agriculture and Agri-Food Canada, Lethbridge, AB, [6]Pesquisador CNPq–Departamento de Zootecnia, Faculdade de Ciências Agrárias e Veterinárias, UNESP, Jaboticabal-SP, Brazil.*

The aim of this study was to assess the efficacy of flight speed (FS) as a predictor of cattle ability to adapt to feedlots. Ninety-four animals were studied at the Instituto de Zootecnia research farm in Sertãozinho-SP, Brazil. Cattle were from three herds: 28 Nellore from a Control herd (not genetically selected for maximum post-weaning weights), 26 Nellore from a Selection herd, and 40 Guzerat (animals of both herds were selected based on a maximum differential in yearling weight) were assessed over a 173-d study. Cattle were housed according to their breed (Nellore and Guzerat) in two feedlot pens (68.59 and 105.60 m^2/animal, respectively). Flight speed (FS, m/s) was assessed 1 d after obtaining initial body weight. ADG (kg/d) and bunk attendance (BA, min/d) were used as confirmatory indicators of cattle adaptation to feedlot. ADG was calculated for the entire feeding period (ADGtot; d 1 to

d 169), and also for three feeding phases, defined as initial (ADGin, from d 1 to d 56), intermediate (ADGit, from d 57 to d 113) and the final (ADGfi, from d 114 to d 169). BA was recorded on Days 5, 13, 21, 35, 42, 50, 171, 172, and 173 of the study from 0700 to 1200 h by direct observation using a 10 min interval scan sampling technique. BA was also calculated for the entire feeding period (BAtot, from d 5 to d 173) and for three feeding phases defined as initial (BAin, from d 5 to d 21), intermediate (BAit, d 35 to d 50) and final (BAfin, d 171 to d 173). Regression analysis was used to assess the effect of FS on ADG and BA for the entire feeding period as well as each feeding phase using a model that included the fixed effects of herd and FS as a covariate (linear effect). Flight speed had significant effects on ADGit (ADGit = 0.78- 0.025*FS; R^2 = 0.31; $P < 0.05$), ADGfin (ADGfi = 0.80- 0.016*FS; R^2 = 0.34; $P = 0.08$) and ADGtot (ADGtot = 0.72- 0.015*FS; R^2 = 0.41; $P < 0.05$). No relationship ($P > 0.05$) was observed between FS and BA. The results of this study indicate that FS (assessed within the first d of arrival to the feedlot) has potential to be used as an indicator of cattle ability to adapt to the feedlot, however further studies are needed for a more thorough understanding of this relationship.

Key Words: adaptability, confinement, temperament

0822 (W021) Influence of pen-shade on respiratory rate and panting score in two breed types of growing bull-calves. *A*. Camacho[*1], B. J. Cervantes[2], L. R. Flores[1], J. J. Lomeli[1], J. A. Romo[1], and R. Barajas[1], *[1]FMVZ-Universidad Autónoma de Sinaloa, Culiacan, México, [2]Ganadera los Migueles, S.A. de C.V., Culiacan, México.*

Twenty growing bulls 233 ± 24.9 kg (75% Black Angus blood with remainder of Brahman and Brown Swiss in undetermined proportion, $n = 10$; and Brahman white coated bulls, $n = 10$) were used in an experiment to determine the influence of pen-shade on respiratory rate and panting score in two breed types of growing bull-calves. The experiment was performed during. Bull-calves were blocked by breed type (Angus cross AC type or Brahman BR type) and in groups of five assigned to two category of allotment (pens without shade NS or shaded-pens SH). During 28 alternated days (July and August, 2013), inside of pens air temperature (At), relative humidity (RH), air velocity (Av), and soil temperature (St) were recorded at 0100 and 1400 h, and THI calculated; with a similar schedule respiratory rate (RR) in breaths per min (bpm) and panting score (PS) were visually measured. Animals were fed at 1700 h to minimize the impact of digestive process on heat load during physiological measurements. Data were analyzed by ANOVA and best subset regression. Mean climatic conditions were air temperature 36.4°C (27.6–49.5°C), relative humidity 47.9 (24.7–82.5%), and THI 85.7 (79.1–96.4). RR was higher ($P < 0.01$) for AC than in BR cattle (73.7 vs. 48.7 bpm), and lower ($P < 0.01$) in SH than NS (52.6 vs. 69.8 bpm). Interaction breed x allotments was observed ($P < 0.01$), where BRNS cattle has similar RR than ACSH ($P > 0.10$), mean values were 85.3, 54.3, 62.0, and 43.1 bpm for ACNS, BRNS, ACSH, and BRSH, respectively. PS shown a similar behavior than RR, and its relationship was RR = 33.73 + (24.024 * PS); $r^2 = 0.84$, $P < 0.00001$. General equation for RR = 6.208 + (2.418 At) + (0.1672 St)- (5.043 Shade)- (24.68 Breed type); $r^2 = 0.69$, $P < 0.00001$. And for breed type was AC was RRAC = - 47.3917 + (3.164 At) + (0.2399 St)- (7.169 Shade); $r^2 = 0.72$; $P < 0.00001$; and RRBR = - 17.84 + (1.876 At)- (3.3758 Shade); $r^2 = 0.35$; $P < 0.00001$. Results suggest that panting score could be practical usable in different bred types of cattle, and the benefices of pen-shade helping cattle to cope heat load becomes important in cattle with lower genetic adaptation for confront hot environments.

Key Words: cattle, respiratory rate, pen-shade

0823 (W022) Association among residual feed intake, residual body weight gain, residual intake and body weight gain and temperament of Nellore cattle. C. L. Francisco[*1], A. M. Jorge[2], A. M. Castilhos[1], F. D. Resende[3], J. M. B. Benatti[4], M. B. Silva[1], and R. F. Cooke[5], *[1]Universidade Estadual Paulista–FMVZ, Botucatu, Brazil, [2]Faculdade de Medicina Veterinária e Zootecnia, Universidade Estadual Paulista, Botucatu–SP, Brazil, [3]Agência Paulista de Tecnologia dos Agronegócios–APTA, Colina, Brazil, [4]Universidade Estadual Paulista–FCAV, Jaboticabal, Brazil, [5]Oregon State University–EOARC Burns, Burns.*

A study was conducted to investigate association among residual feed intake (RFI), residual body weight gain (RG), residual intake and body weight gain (RIG) and temperament of Nellore (*Bos indicus*) young bulls ($n = 44$; 387 + 22 kg initial body weight; 22 + 1 mo of age). Animals were evaluated for temperament at feedlot entry (d 0). Individual temperament scores were calculated by averaging steer chute score (5-point scale: 1 = calm, no movement; 5 = violent and continuous efforts) and exit score (calculated by dividing exit velocity results into quintiles; 1 = slowest steers; 5 = fastest steers). Animals were also classified according to temperament type [adequate temperament (ADQ) or excitable temperament (EXC)]. Animals were maintained in individual drylot pens (8 m^2) and individual feed intake was measured during the trial period (d 0 to 109; finishing phase) to determine daily dry matter intake (DMI). Body weights (BW) were measured on d 0 and d 109 to determine the average daily gain (ADG). The DMI and ADG were used to determine the RFI. Residual body weight gain was calculated based on the regression of $BW^{0.75}$ and feed intake. Residual intake and body weight gain was determined from linear combination into RFI and RG. Data were analyzed using PROC MIXED in SAS with fixed effects of temperament; animal was experimental unit.

No differences ($P > 0.05$) were detected for RFI (-0.05 vs. 0.01, for ADQ and EXC steers, respectively; $SE = 0.18$) and RIG (0.04 vs. -0.05, for ADQ and EXC steers, respectively; $SE = 0.20$) between temperament types. However, ADQ steers had greater RG ($P = 0.02$) than EXC steers (0.05 vs. -0.10, for ADQ and EXC steers, respectively; $SE = 0.06$). In conclusion, residual gain is associated with temperament and it is independent of differences in feed intake in Nellore cattle. *Supported by FAPESP#2010/09516–1.*

Key Words: residual feed intake, residual body weight gain, residual intake and body weight gain, temperament.

0824 (W023) Association among peripartum health parameters, cud chewing, and activity.

D. N. Liboreiro[*1], K. S. Machado[1], P. Basso Silva[2], M. M. Filho[1], G. Franco[1], A. E. Barreto[1], M. I. Endres[2], and R. C. Chebel[1], *[1]Dep. Veterinary Population Medicine, University of Minnesota, St. Paul, [2]University of Minnesota, St. Paul.*

Objectives of the current experiment were to evaluate cud chewing and activity of cows with peripartum disorders. Holstein animals (nulliparous = 77, parous = 219) were fitted with cud chewing/activity monitors from −17 to 17 d relative to calving. Blood sampled weekly from 0 to 20 d relative to calving were used for determination of β-hydroxybutyrate (BHB) concentration and incidence of ketosis (BHB > 1400 mmol/L). Blood sampled on d 0, 1, and 2 relative to calving were used for determination of total Ca concentration and incidence of sub-clinical hypocalcemia (Ca < 8.5 mg/dl). Cows were examined for retained placenta (RP) and metritis by study personnel. Data regarding twin calving and stillbirth were recorded. Outcomes measured over time (e.g., rumination and activity) were analyzed by ANOVA for repeated measures using the PROC MIXED. Nulliparous animals spent less time cud chewing than parous animals ($P < 0.01$). There was a tendency for RP to be associated with cud chewing ($P = 0.08$) because from −4 to 10 d relative to calving animals with RP had reduced cud chewing time ($P < 0.01$). Even though there was no association between sub-clinical hypocalcemia and cud chewing time ($P = 0.19$), the interaction between sub-clinical hypocalcemia and days relative to calving was associated with cud chewing time ($P < 0.01$) because on days −16, −13, −11, and 0 relative to calving animals with sub-clinical hypocalcemia had reduced cud chewing time. Concentration of Ca was correlated with cud chewing time ($r = 0.15$; $P = 0.02$). Similarly, ketosis was not associated with cud chewing time ($P = 0.77$) but the interaction between ketosis and days relative to calving was associated with cud chewing time ($P < 0.01$). From 6 to 17 d relative to calving animals with ketosis had reduced cud-chewing time. Concentration of BHB was correlated with cud-chewing time ($r = 0.16$; $P < 0.01$). Nulliparous animals had ($P < 0.01$) greater activity than parous cows. There was a tendency ($P = 0.10$) for animals with stillbirth to have greater activity. There was ($P < 0.01$) an association between RP and activity because from 0 to 11 d relative to calving activity of RP animals was reduced. Although ketosis was not ($P = 0.91$) associated with activity, on d 0 and 1 relative to calving ketotic cows had greater activity and on d 10, 15, 16, and 17 relative to calving ketotic cows had reduced activity. Peripartum disorders are associated with altered cud chewing time and activity in the peripartum period.

Key Words: transition cow, cud chewing, activity

0825 (W024) Animal welfare policies in South Korea.

D. H. Kim[1], J. H. Jeon[2], S. H. Moon[3], M. J. Kim[4], D. M. Ha[1], H. S. Park[5], N. Whitley[5], and S. H. Oh[*5], *[1]Gyeongnam National University of Science and Technology, Jinju, South Korea, [2]National Institute of Animal Science, Suwon, South Korea, [3]Konkuk University, Chungju, South Korea, [4]Seongwoon Livestock Production, Geochang, South Korea, [5]North Carolina A&T State University, Greensboro.*

With the increased global interest in animal welfare, South Korea has implemented laws and policies related to animal production. The goal of this research is to review animal welfare trends in South Korea and introduce the farms that produce livestock with animal welfare in mind. The animal protection laws and policies implemented in South Korea include breeding management, transportation management, slaughter methods, animal welfare, prohibition of animal abuse, and farm regulations. By setting new standards, animal welfare will develop as a leading growth tool in the future livestock industry. In countries with leading livestock industries like the U.S., France, Denmark, and others, certification marks are given to animals produced under strict animal welfare policies to differentiate them from other livestock, and those produced within those certification programs are sold at a relatively higher price. European consumers willingly pay a higher price for products from animals raised under animal welfare certification program guidelines and feel pride in their belief that supporting those products contributes to the good of society. Following these trends, a certification system, which provides legal verification to those farms that comply with the government standard in animal welfare, was stipulated in South Korea. The system went into effect in 2012 with the chicken egg industry. Pigs were included in the system in 2013, and broilers were included in the certification system in 2014. Beginning in 2015, the system will expand annually to include native Korean cattle, beef cattle, dairy cattle, and others.

Key Words: South Korea, animal welfare, policy

0826 (W025) Influence of environmental conditions across day on respiratory rate and panting score of beef cattle in a hot and humidity weather.

A. Camacho*[1], B. J. Cervantes[2], E. X. Murillo[1], M. B. Corona[1], M. A. Osuna[1], and R. Barajas[1], *[1]FMVZ–Universidad Autónoma de Sinaloa, Culiacan, México, [2]Ganadera los Migueles, S.A. de C.V., Culiacan, México.*

Twenty growing bulls 278 ± 11.8 kg (75% Black Angus blood with remainder of Brahman and Brown Swiss in undetermined proportion, $n = 10$; and Brahman white coated bulls, $n = 10$) were used in an experiment to determine the influence of environmental conditions across day on respiratory rate and panting score of beef cattle in a hot and humidity weather. The experiment was performed during August 2013. In groups of five, bulls with same breed were placed in provided or no-shade ground pens (6 × 12 m). During 12 d from 0800 to 1600 h, inside of pens with 1-h intervals, air temperature (At), air relative humidity (RH), air velocity (Av), and soil temperature (St) were measured; one bull in each pen by time and day was randomly selected to respiratory rate (RR) in breaths per min (bpm) and panting score (PS) measurement by direct observation. Data of 12 d were pooled and analyzed by ANOVA. Across experiment, weather conditions were: At 36.30°C (range 25.2 to 53.0), RH 50.30% (range 21.5 to 82.6), Av 3.20 km/h (range 0 to 12), THI 85.93 (range 75 to 98), and St 35.47°C (range 15.7 to 73.9). Mean values of RR and PS were 65.95 ± 1.034 bpm and 1.18 ± 0.037, respectively. At 0800 h RR and PS were 44 bpm and 0.61 with 29.66°C At, 67.86% RH, and 80.35 THI. Mean maximum air temperature (40.65°C), soil temperature (41.10°C), and THI (89.08) were observed at 1300 h, while maximum respiratory rate (72.81 breaths/min) and panting score (1.57) delayed 1 h peaked at 1400 h. Means value of At and THI diminished ($P < 0.05$) at 1500 h; whereas RR, PS were coupled with soil temperature and delayed 2 h more (1700 h) to descend below of climax values ($P < 0.05$). It is concluded that respiratory rate and panting score delays proximately 1 h to reach the highest values after air temperature and THI arrive at its day peak values, and spend around 2 h to decline after air temperature and THI decreases; data suggest that descend of respiratory rate and panting score could be associated with soil temperature.

Key Words: air temperature, cattle, respiratory rate