industry, current statistics and economics of organic milk production. A summary of strategies used by organic dairies to adapt to current industry challenges will be discussed including those mentioned above as well as changing herd genetics, putting even more emphasis on cropping and pasture fertility, and exiting the industry. Finally, a brief review of changes to the organic pasture standard currently being proposed and revised by the National Organic Program will be presented.

Key Words: dairy, organic, systems

377 Grass-fed management systems for profitable livestock production. S. K. Duckett* and J. G. Andrae, *Clemson University, Clemson, SC.*

Consumer markets for natural, forage-finished livestock products are expanding in the U.S. As a result of this demand, some livestock producers are electing to finish animals on forages and market products directly to consumers. Agricultural Marketing Service has established a voluntary standard for a grass (forage) fed marketing claim for ruminant livestock. The grass (forage) fed claim standard is that grass (annual and perennial), forbs, browse, forage, or stockpiled forages, and post-harvest crop residue without separated grain shall be at least 99% of the energy source for the lifetime of the ruminant specie, with the exception of milk consumed prior to weaning. Producers can now request a grass fed claim be verified by USDA. Results from our research show that forage-finishing decreases LM lipid content and increases fat-soluble and water-soluble vitamin contents. Forage-finishing also increases concentrations of cis-9 trans-11 CLA, trans-11 vaccenic acid, and all n-3 fatty acids (linolenic acid, EPA, DPA, DHA). One of the greatest challenges facing livestock producers is the consistent supply of high quality forages for finishing. Forage nutritive and fatty acid content are variable among species, variety, harvest time, and growing season. These differences in forage fatty acid content influence meat and milk fatty acids produced in grazing animals. Forage systems that optimize stocking rates and nutritive density and minimize input costs are needed. Evaluation of alternate forages is of considerable interest to fill gaps in perennial forage production and/or promote high rates of gain. Forages we have evaluated for finishing include: alfalfa, chicory, cowpea, pearl millet, non-toxic tall fescue, and bermudagrass. Alternative fertilizers, legumes, and supplements should be evaluated to determine their effects on forage production, animal performance (including parasite load) and product quality.

Key Words: livestock, forage, fatty acid

Animal Behavior and Well-Being: Animal Behavior and Well-Being 1

378 Enriched colony cage for laying hens and the effects on behavioural and physiological parameters. N. J. Cook*[1], J. Feddes[2], D. Korver[2], D. B . Haley[2], and J. S. Church[3], [1]*Alberta Agriculture and Rural Development, Lacombe Research Centre, Lacombe, Alberta, Canada*, [2]*University of Alberta, Edmonton, Alberta, Canada*, [3]*Thompson Rivers University, Kelowna, British Columbia, Canada*.

The benefits to laying hens of colony cages of 40, 20 and 10-birds/cage, and enrichment with perches, nest boxes and scratch pads, were assessed by behavioural and physiological parameters. Non-enriched, "conventional" cages of 5-birds/cage were included for comparison. Laying hens were Brown (n = 360) and White (n = 360) Leghorns over an egg laying period of 65wks. Behavioural and physiological parameters were the % perch use for roosting at 57, 61 and 62 weeks, claw length (n = 288) for use of scratch pads at week 65, and the comparative numbers of eggs laid within nest boxes at 35 and 60 weeks. Feather cover was assessed by infrared thermography of 144 birds at 35 and 60 weeks. Densities and areas of the humerus and femur (n = 60) were assessed by quantitative computer tomography at week 65. Time-integrated adrenocortical activity was assessed by egg yolk and albumin levels of corticosterone in 20% of the eggs from each cage type during weeks 35 and 60. Data were analyzed by mixed models using JMP v6. The majority of eggs (72.6%) were laid in nest boxes. Nest use was highest in Brown hens ($P < 0.03$). Perch use was >80% but was significantly less in the 10-bird cages ($P < 0.0001$) due to a shorter perch length. Claw length was longer in the 5-bird cages compared to enriched cages ($P < 0.0001$). Bone densities and areas were not associated with cage type or enrichment. Densities and areas of the humerus and femur were highest in Brown birds ($P < 0.005$). White birds exhibited better feather cover than Brown ($P < 0.0001$). Feather cover declined from 35 to 60wks for breast and back areas ($P < 0.0001$). Feather losses were highest in 20 and 40-bird cages and lowest in the 5-bird cages. Egg albumin corticosterone was significantly lower at 60wks compared to 35wks ($P < 0.001$). Yolk corticosterone was significantly lower at 60wks in 5-bird cages ($P < 0.05$). The findings indicated a preference for the use of nest boxes, perches and scratch pads. However, the materials and size of the enrichment amenities had implications for feather cover.

Key Words: laying hens, colony cages, environmental enrichment

379 Animal welfare indicators of Holstein bulls ring-castrated at three months of age. S. Marti*[1,2], A. Velarde[2], J. L. de la Torre[1,3], A. Bach[2,4], X. Manteca[1,3], A. Aris[2], A. Serrano[2], and M. Devant[1,3], [1]*Animal Nutrition, Management, and Welfare Group, Barcelona, Spain*, [2]*IRTA, Barcelona, Spain*, [3]*UAB, Barcelona, Spain*, [4]*ICREA, Barcelona, Spain*.

Ring castration at 3 mo of age is an effective and low-time consuming procedure, however it has been questioned from the welfare point of view. Forty-seven bulls (130 ± 3.43 kg BW and 95 ± 1.5 d of age) individually housed were randomly assigned to 2 treatments (control, CTR, n = 23 or castrated, CAS, n = 24) to evaluate the effect of ring castration at 3 mo of age in Holstein bulls on welfare indicators. Castration was performed with local anesthesia (lidocaine 2%, 3 mL in each testis and 2 mL in the scrotum) and analgesia (flunixin meglumine, 3 mg/kg BW) treatment, no local anesthesia and analgesia were used in CTR bulls. Serum cortisol concentration was determined at -120, 0, 30, 60, 90, and 180 min after castration. At days 1, 3, and weekly thereafter during 2 mo serum haptoglobin concentration, rectal temperature, lesions at the castration site, and behavior of 12 CTR and 12 CAS bulls recorded continuously for 24 h, BW and concentrate and straw intake were analyzed. Serum antibody titers against ovoalbumin were determined at 14 and 35 d. At day 49, bulls were i.v. injected with ACTH and serum cortisol concentration at 0, 1, 2, and 4 h thereafter, and serum testosterone concentration were determined. The statistical model included initial BW as a covariate, castration, time, and the interaction between castration and time, as fixed effects, and animal as a random effect. Gain was greater ($P < 0.001$) in CTR than CAS bulls (1.36 vs 1.16 ± 0.038 kg/d, respectively). Area under the curve of serum cortisol at day 0 was smaller ($P <$

0.05) in CAS than in CTR bulls (18 vs 33 ± 5.2 nmol/L/h, respectively) where no local anesthesia and analgesia were used. At 49 d, 100% of CAS bulls had no testes and no serum testosterone was detected. Ring castration performed at 3 mo of age with local anesthesia and analgesia decreases ADG but does not alter other welfare indicators.

Key Words: beef, castration, welfare

380 Pain mitigation at time of castration improves performance and intake in feedlot bull calves. L. A. González*[1], K. S. Schwartzkopf-Genswein[1], E. Fierheller[2], E. Janzen[2], N. A. Caulkett[2], T. A. McAllister[1], D. B. Haley[4], J. M. Stookey[3], and S. Hendrick[3], [1]*Agriculture and Agri-Food Canada*, *Lethbridge, AB, Canada*, [2]*University of Calgary*, *Calgary, AB, Canada*, [3]*University of Saskatchewan*, *Saskatoon, SK, Canada*, [4]*University of Alberta*, *Edmonton, AB, Canada*.

Angus bulls (n = 173; 6 to 8 mo of age; initial BW 301 ± 3 kg) were randomly assigned to 1 of 6 treatments according to a 3 × 2 factorial design to study the effect of castration method and pain medication on performance and feed intake. Castration (Cast) treatments consisted of sham (C), band (B), and surgical (S) castration. Pain medication (Med) treatments consisted of either lactated ringer solutions (NM) or pain mitigation drugs (M). Drugs used were 2% lidocaine with epinephrine injected at 10 mL into each testicle plus 10 mL subcutaneously at the scrotal base, and a subcutaneous injection of flunixin meglumine (2.2 mg/kg BW) in the neck of calves. Bulls NM received the same injections with ringer solutions except no intratesticular injection was given to avoid causing orchitis. All animals were fitted with electronic ear tags to monitor individual feed intake and randomly assigned to 1 of 4 pens within each treatment. Intake and BW were measured weekly from 1 wk before (used as covariates) until 6 wk after castration. Data were analyzed with a mixed-effects regression model considering the fixed effects of covariate, Cast, Med, wk as repeated measure, and all possible interactions. Pen, Pen×Cast×Med, and Pen×Cast×Med×Wk were random effects. Overall ADG was lower in S and B compared to C calves ($P < 0.01$). However, S calves grew slower than both B and C during wk 1 ($P < 0.001$) whereas B calves grew slower than both S and C during wk 3 ($P < 0.05$). Final BW was greater in C than B and S ($P < 0.001$), and in M than NM calves ($P = 0.04$). Calves S ate less DM than C ($P = 0.003$), and NM ate less than M ($P = 0.003$). Pain mitigation using a local anesthetic and a systemic analgesic upon castration improves feed intake and BW compared to non-medicated calves up to 6 wk post castration.

Key Words: beef bulls, castration method, pain medication

381 Feeding behavior and weight gain of dairy calves in the post-weaning period. A. L. Stanton*[1], D. Kelton[1], K. E. Leslie[1], S. J. LeBlanc[1], K, Hester[1], and S. T. Millman[2], [1]*University of Guelph*, *Guelph, Ontario, Canada*, [2]*Iowa State University*, *Ames*.

The objectives were to investigate associations between post weaning weight gain and behavior of dairy heifers. Holstein heifers (n=74) were group housed in a naturally ventilated heifer barn in groups of 4-6 and were 56.6 (±7) days old at weaning. Prior to enrollment, calves were housed individually in outdoor hutches or in a nursery barn. Post-weaning diet consisted of component fed grain and hay. Behavioral data was collected from video-recordings for a subset of calves (n=65) immediately post-weaning (Day 0) from 12pm-7pm and on Days 1, 2, 4 and 6 from 7am to 7pm, using 5 minute instantaneous scan sampling. Calves were recorded as eating (head through bunk and lowered), bunk engaged (head through bunk not lowered) or bunk directed (at bunk but head not through bars). The probability of eating and Day 7 body weights were modeled with random effects of group in the weight model and calf and group in the eating model. Day 7 weight increased with weaning weight, such that a 1.0 kg increase in Day 0 weight increased day 7 weight by 1.09 (± 0.03) kg, $P < 0.001$. On Day 7, nursery raised calves weighed 7.9 (± 2.2) kg more than hutch raised calves ($P<0.01$). Total time eating and pre-weaning housing interacted in this model. For nursery raised calves, a 1% increase in eating time during the first week increased day 7 weight by 3.7kg ($P<0.01$). For hutch raised calves, a 1% increase in eating time increased day 7 weight by 0.23(±0.1) kg ($P<0.01$). This indicates that nursery calves are likely either consuming more feed or absorbing increased nutrients while they are eating. Bunk engaged and bunk directed behavior did not influence day 7 weight. The amount of time spent eating increased over time with calves eating 3.8 (±0.4) percent on Day 0 and 12.8 (±0.7) percent on day 6, ($P<0.001$). These findings suggest that calves became more adept at accessing feed with a longer time in the new environment. Low levels of eating on Day 0 may result from low feeding motivation, perhaps due to weaning stress or novelty associated with a new environment, diet and presentation of feed.

Key Words: growth, feeding behavior, heifers

382 Evaluation of the Pedometry Plus system for the detection of pedometric activity and lying behaviour in dairy cattle. J. H. Higginson*[1], K. E. Leslie[1], S. T. Millman[2], and D. F. Kelton[1], [1]*University of Guelph*, *Guelph, Ontario, Canada*, [2]*Iowa State University*, *Ames*.

The objective of this study was to validate the Pedometry Plus system (SAE Afikim, Israel), which measures pedometric activity as well as lying and standing behaviour. The device provides information regarding the number of steps taken, the duration of lying time, and the number of lying bouts. Sixteen Holstein cows housed individually in maternity stalls were used for the validation in the fall of 2008. In stage one of the trial, eleven cows had a Pedometry Plus tag on one hind leg and a previously validated IceTag (IceRobotics, UK) on the opposite hind leg. Allocation of devices to right or left legs was random. Digital video recordings were made throughout the validation process, with each cow being observed for three days. The duration of lying time and the number of lying bouts were recorded from video analysis. Pearson product-moment correlation between the two devices for the number of steps taken was r=0.73 ($p<0.0001$). This lower correlation was unexpected; however video analysis revealed that during bouts of lying, there was movement of the upper leg while the lower leg was immobile. This could account for differences in pedometric activity recording between the two legs, and hence the two devices. In stage two, five cows were fitted with Pedometry Plus tags and IceTags, with both tags on each hind leg. Correlation between the two devices for the number of steps taken was r=0.82 ($p<0.0001$). Additionally, the number lying bouts and the duration of lying time were highly correlated for all cows, r=0.98 ($p<0.0001$) and r=0.90 ($p<0.0001$), respectively. The Pedometry Plus device appears to be a useful tool for the measurement of activity, including steps taken, number of lying bouts, and duration of lying time in dairy cows. In addition, differences in activity measurements in the initial experiment may in part be attributable to differences in movement of upper and lower legs during bouts of lying, and should be considered in the interpretation of data from pedometers.

Key Words: pedometry, biotelemetry, activity

383 Behavioral and physiological responses to lipopolysaccharide induced clinical mastitis. J. L. Zimov*, N. A. Botheras, and J. S. Hogan, *The Ohio State University*, *Wooster*.

The behavioral and physiological effects of lipopolysaccharide induced mastitis were examined in lactating Holstein cows. Twenty cows were assigned to five blocks of four cows grouped by parity and stage of lactation. Two cows within a block were randomly selected to receive either intramammary infusion of 25 µg of sterile lipopolysaccharide or intramammary infusion of sterile saline. Uninfected mammary quarters were infused three hours post milking. Experimental cows were under continuous video monitoring during the study. Cows receiving the lipopolysaccharide treatment had higher (P≤ .05) mean (± s.e.) peak quarter milk somatic cell counts (6.75± 0.04 vs. 4.57 ± 0.32 log10/ml), rectal temperatures (41.4± 0.2 vs. 38.4 ± 0.2 C), concentrations of milk amyloid (3.4 ± 0.3 vs. 1.4 ± 0.2 µg/ml) and serum cortisol (63.0 ± 6.0 vs. 28.3± 2.9 µg/dl) the first twenty four hours after infusion compared with saline treated cows. Lipopolysaccharide treated cows spent a reduced percentage of the first twenty four hours after challenge eating (16.9 ±0.8 vs. 21.0 ±1.2%), cud chewing (35.8 ± 2.3 vs. 39.8 ± 1.5%), and laying in their stalls (40.7± 4.0 vs. 47.9± 3.4%) compared with saline infused cows. Rumen contractions were reduced in lipopolysaccharide infused cows compared with saline infused cows at sample times corresponding with peak rectal temperatures. Hock to hock distance following intramammary infusion did not differ between lipopolysaccharide and saline treated cows. Results of the current trial suggest that lipopolysaccharide induced mastitis affects both behavioral and physiological responses in lactating dairy cows.

Key Words: behavior, mastitis, lipopolysaccharide

384 A comparison of the effects of two different Korral Kool® systems on dairy cows in a desert environment. X. Ortiz*[1], J. Smith[1], B. Bradford[1], J. Harner[1], and A. Oddy[2], [1]*Kansas State University*, *Manhattan*, [2]*NADA Al-Othman*, *Saudi Arabia*.

An experiment was conducted to investigate the effects of two different Korral Kool® (KK) systems on core body temperature (CBT) of dairy cows. Two different KK systems were tested; a system with 2m diameter, 3 hp fans and spaced at 6m (SMALL), and a system with 2.2m diameter, 5hp fans spaced at 8m (BIG). Forty eight multiparous Holstein cows were randomly assigned to 8 pens (4 BIG, 4 SMALL) and pens were randomly assigned to sequence of treatments (KK were operated for 21 [21h] or 24 [24h] hours per day) in a switchback design. CBT measurements were obtained at 5-minute intervals using data loggers (HOBO U12®) attached to blank continuous intravaginal drug release (CIDR®) devices. The experiment lasted 6 days, with 3 periods of 2 days each. All treatments started at 0600h and KK were turned off at 0300h for the 21h treatment. The data were analyzed using a repeated measures model, with time, treatment, and time by treatment included as fixed effects and cow within pen, day, and pen as random effects. Average ambient temperature was 35°C and average relative humidity was 45%. Significant treatment effects on mean CBT were observed; cows on the SMALL 24h treatment had a lower average CBT (P<0.01) compared to the SMALL 21h treatment (39.22 vs. 39.36°C), and cows on the BIG 24h treatment had a lower average CBT (P<0.01) compared to the BIG 21h treatment (38.95 vs. 39.09°C). The average CBT of cows on the BIG 24h treatment was significantly lower (P<0.01) than the SMALL 21h treatment (38.95 vs. 39.36°C). There was a significant treatment by time interaction (P<0.001), with greatest treatment effects occurring at 0100h; treatment means at this time were 39.05, 39.01, 39.72, and 39.89°C for BIG 24h, BIG 21h, SMALL 24h, and SMALL 21h, respectively. Results demonstrated that at certain parts of the day the BIG system had a better performance compared to the SMALL system. These results showed that CBT can decrease when KK running time is increased from 21h to 24h, regardless the size of the KK cooling system.

Key Words: heat stress, dairy cow, evaporative cooling

385 Effect of feedline soakers complementing Korral Kool systems on lactating dairy cows in a desert environment. X. Ortiz*[1], J. Smith[1], B. Bradford[1], J. Harner[1], and A. Oddy[2], [1]*Kansas State University*, *Manhattan*, [2]*NADA Al-Othman*, *Al Ahsa, Saudi Arabia*.

An experiment was conducted in a dairy in Saudi Arabia to investigate the effects on core body temperature (CBT) of dairy cows when Korral Kools (KK) were complemented with feedline soakers (FS). Twenty multiparous Holstein cows averaging 44 kg/d of milk and 67 days in milk were randomly assigned to 2 pens, which were randomly assigned to treatment sequence in a switchback design. The experiment lasted 4 days, in which the KK were operated for 24 hours while alternately the FS in one of the pens remained off while the FS in the other pen would stay on for 12 h periods. All treatments started at 0600 h and FS were operated from 1200 h to 0000 h with a soaking frequency of 5 min (36 s on and 264 s off). Core body temperature measurements were obtained at 5-minute intervals using data loggers (HOBO U12®) attached to blank continuous intravaginal drug release (CIDR®) devices. CBT data were analyzed with a repeated measures model including fixed effects of time, treatment, and treatment by time interaction and the random effects of day and cow within pen. Average ambient temperature was 35°C and average relative humidity was 33% during this experiment. A significant treatment effect was observed; FS significantly decreased the mean 24-h CBT from 39.16 to 38.99°C (P < 0.04). Treatment by time interaction was also significant (P = 0.02), with greatest treatment effects at 1500 h, when FS reduced CBT from 39.38 to 38.81°C. These results demonstrate that the use of FS complementing the KK cooling systems decreased the CBT of dairy cows.

Key Words: desert environment, Korral Kool, feedline soakers

386 Revised temperature humidity index (THI) for high producing dairy cows. R. B. Zimbleman*, R. P. Rhoads, L. H. Baumgard, and R. J. Collier, *University of Arizona*, *Tucson*.

Current THI underestimates impact of thermal environment on high producing cattle because studies utilized low producing cows (<15 kg/d) constant temperatures and long intervals (2 wks) before estimating milk yield losses. Therefore, eight studies (100 multiparous Holstein cows) were used to determine minimum, maximum, and average THI threshold for milk yield loss for high producing (> 35 kg/d) multiparous dairy cows. In addition 48 lactating multiparous cows were used to evaluate effects of black globe humidity index (BGHI) on these same parameters to apply solar radiation effects to this index. Studies were carried out in climate controlled rooms at the University of Arizona. Physiological measures of heat strain included respiration rate (RR/min), infrared surface temperature (ST, °C), rectal temperature (RT. °C), heart rate (HR/min), and evaporative heat loss (EVHL, g/m2). Respiration rates, ST, RT, EVHL, and HR were collected 2-4 times per day. Data was analyzed using ANOVA and REGRESSION procedures of SAS (SAS, 1999). Milk yields recorded during acclimation periods and prior to environment initiation were included as a covariate in the analyses. All physiological measures of heat stress were linearly increased between

THI values of 60 and 90. Respiration rates increased by 2.0 breaths per minute per increase in THI unit ($P < 0.001$; $r2 = 0.4343$). Milk yield losses became significant when minimum THI on any given day was 65 or greater. Milk yield losses per day were 2.2 kg between a minimum THI of 65 and 73. Furthermore, milk yield losses became significant after 17 hours of exposure to an average THI of 68 and equated to a 2.2 kg per day loss in milk yield. This suggests that cooling of dairy cows producing more than 35 kg milk/d should be initiated at a minimum THI threshold of 65 or above or when average THI is 68 for more than 17 hours. We did not detect any advantage of BGHI index over THI in predicting milk yield losses or physiological responses. This project was supported by National Research Initiative Competitive Grant no. 2006-01724 from the USDA Cooperative State Research, Education, and Extension Service.

Key Words: heat stress, dairy cattle, index

387 Evaluation of the stress response of heifers during transportation. S. M. Behrends*[1], T. B. Schmidt[1], D. H. Keisler[3], J. W. Daily[2], J. O. Buntyn[1], D. J. Sykes[1], L. E. Hulbert[2], K. M. Cooley[1], D. T. Dawson[1], and J. A. Carroll[2], [1]*Mississippi State University, Mississippi State*, [2]*Livestock Issues Research Unit, USDA-ARS, Lubbock*, [3]*University of Missouri, Columbia*.

To evaluate the stress associated with transportation; 22 heifers (326 ± 47 kg) were randomly assigned to a control (Con) or transport (Tran) group. On d 0, 12 h prior to the transportation, heifers were weighed and fitted with an indwelling rectal temperature (RT) probe, jugular catheters and heart rate (HR) monitors. On d 1, all heifers were haltered and tied for 2 h prior to transportation. At the end of the 2 h period all heifers were weighed, controls were returned to their tie stall and transported heifers were loaded on the trailer for transport. The first transport period (FTP) began when Tran heifers were loaded on a trailer with 12 individual stanchions and Con heifers were returned to tie stalls. Blood samples were obtained throughout the 4 h transport period (Con and Tran heifers) at 30-min intervals. After transport, Tran heifers were taken to a new location unloaded and weighed; blood samples were obtained for 2 h post-transport. Simultaneously, Con heifers were weighed and blood samples obtained. Heifers were allowed a rest period for 14 h. After the rest period on d 2, heifers were subjected to a second transport period (STP; same protocol as in FTP). Serum was analyzed for cortisol (CS), insulin-like growth factor-1 (IGF-1), and growth hormone (GH). The FTP resulted in a 6% loss in BW for the Tran heifers as compared to a 2.5% loss for the Con heifers ($P<0.001$). Overall, BW loss was 2% greater ($P>0.02$; FTP and STP combine) for Tran heifers compared to Con heifers. During FTP ($P < 0.001$) and STP ($P < 0.002$) Tran heifers had an elevated RT compared to Con heifers. Prior to- and post-transport (both FTP and STP), CS concentrations did not differ between the treatment group's. Differences ($P < 0.05$) in CS were observed starting 1 h into the FTP and 30 min into the STP. After three h in transit, no difference ($P\geq0.05$) was observed in CS for both the FTP and STP. Results of this study indicate that transportation can be an acutely stressful event, as seen with increased CS concentrations, increased RT and increased BW losses. However, after 3 h, it appears that heifers are able to acclimate to initial stress induced by transportation.

Key Words: cortisol, stress, transportation

388 Use of an automated sampler to assess bovine adrenal hormone response to transportation. N. C. Burdick*[1,2], J. A. Carroll[2], R. D. Randel[3], S. T. Willard[4], R. C. Vann[5], C. C. Chase, Jr.[6], D. A. Neuendorff[3], A. W. Lewis[3], J. W. Dailey[2], L. E. Hulbert[2], L. C. Caldwell[1,3], J. G. Lyons[1], and T. H. Welsh, Jr.[1], [1]*Texas AgriLife Research, Texas A&M System, College Station*, [2]*USDA ARS Livestock Issues Research Unit, Lubbock, TX*, [3]*Texas AgriLife Research, Texas A&M System, Overton*, [4]*Mississippi State University, Mississippi State*, [5]*MAFES, Mississippi State University, Raymond*, [6]*USDA ARS Subtropical Agricultural Research Station, Brooksville, FL*.

Automated blood sampling would aid characterization of acute endocrine responses to transportation procedures. In this study, the IceSampler™ device was programmed to collect blood samples via jugular catheter from the herd's 7 calmest (C; temperament score=0.84±0.03) and 8 most temperamental (T; temperament score=3.37±0.18) 10-month-old Brahman bull calves at 15- and 30-min time intervals relative to transportation. Bulls were fitted with indwelling jugular catheters, rectal thermometer probes, and heart rate monitors and were then transported. Bulls were loaded onto a trailer that contained individual stalls. The trailer remained stationary for 120 min to allow for acclimation. After initiation of transportation at time 0, bulls were transported (390 Km roundtrip) for 480 min at an average speed of 91 Km/h. Plasma concentrations of cortisol, epinephrine (EPI) and norepinephrine (NE) were determined by RIA and by EIA, respectively. Data were analyzed using ANOVA specific for repeated measures. Rectal temperature increased over time (38.3±0.2 and 39.3±0.2°C pre- and post-transport, respectively; $P<0.01$) but was not affected by temperament ($P>0.10$). Heart rate remained steady in C bulls (μ=100.8±26.2 bpm) but varied over time in T bulls (time*temperament $P<0.01$). Cortisol concentration increased ($P<0.01$) in C bulls (18.6±5.5 at time 0 to 44.6±5.7 ng/mL at 15 min) but not T bulls (μ=36.8±3.2 ng/mL) in response to the initiation of transportation at time 0. Concentrations of EPI remained unchanged in C bulls (μ=43.7±15.4 pg/mL) throughout the sampling period but decreased in T bulls (235.7±32.1 and 78.6±54.2 pre- and post-transport, respectively $P<0.05$) whereas NE concentrations were not affected ($P>0.10$) by transportation or temperament (μ=267.19±48.2 and 261.3±49.8 for C and T bulls, respectively). These data suggest that temperament affects the stress response to transportation. The use of remote samplers allows us to detect specific indices of transportation stress, and to discern that although some changes were attributable to handling stress and temperament, the transportation process was not equally stressful within temperament groups.

Key Words: bovine, stress, transportation

Animal Health: Animal Well Being: Tackling the Issue of Cow Longevity

389 New frontiers in mastitis research. S. C. Nickerson*, *University of Georgia, Athens*.

Mastitis or bacterial infection of the mammary gland is the most costly disease of dairy cattle, with estimated economic losses approaching $2 billion each year in the US. Approximately 40 years ago, the 5-point plan for mastitis control was developed, and although modifications have been added to this plan, it has remained the cornerstone for controlling this disease in dairy cows over the past 4 decades. However, as consumers and milk processors demand higher quality products free of adulterants, dairy farmers continue to strive to lower the prevalence