

linked to energy expenditure will help elucidate the physiological basis for variations in energetic efficiency.

Key Words: Endocrines/Genes, Energy Metabolism, Ruminants

57 Cellular energy expenditure and the importance of uncoupling. M-E. Harper*¹, A. Antoniou¹, V. Bezaire¹, and S. Monemdjou¹, ¹*University of Ottawa.*

Just as total body energy expenditure in animals can be classified into that which supports resting energy metabolism, work, growth, etc., cellular energy expenditure can similarly be classified. Our overall objective is to examine the metabolic origins of cellular energy expenditure, differentiating between metabolic states where cells are at relative rest, and where cellular energy expenditure is high. In most situations when energy expenditure is high, mitochondrial ATP production (oxidative phosphorylation) is coupled and efficient. Uncoupling refers to the dissociation of the oxidation of energy substrates, such as fatty acids, from the synthesis of ATP by mitochondria. Uncoupling can occur during

states of high energy expenditure or during states of metabolic rest. In brown adipocytes, uncoupling protein 1 (UCP1) activity can cause very high rates of energy expenditure for the purpose of thermogenesis (heat production). UCP1 is found exclusively in brown adipocytes. While uncoupling also occurs in other cells of the body, it is of greatest importance during periods of relative metabolic rest. The latter form of uncoupling is referred to as mitochondrial proton leak, and accounts for roughly one quarter of the resting metabolic rate of the rat. The mechanisms of mitochondrial proton leak are not well understood. The recently identified uncoupling proteins may play some role, but may also have some other physiological functions. Our recent findings from transgenic mice with altered expression of UCPs will be reviewed. Proton leak activity scales roughly in proportion with metabolic rate in mammals of different body size, and is related to thyroid hormone status. Proposed functions for mitochondrial uncoupling include thermogenesis, control of oxidative phosphorylation efficiency and protection from reactive oxygen species. Support: NSERC of Canada.

Key Words: thermogenesis, proton leak, uncoupling

Meat Science in an International Marketplace

58 Global meat research initiatives. R.B. Sleeth*¹, ¹*Consultant.*

The International Congress of Meat Science and Technology (ICoMST) is a very extraordinary and dynamic organization. A brief review will highlight the history, structure, and function to enable participants to better understand and appreciate its uniqueness as a scientific entity. It is imperative that we foster worldwide cooperation in meat science and technology research to be better informed and to minimize duplication. Within the USA, scientists access the Current Research Information System (CRIS) to determine the status of ongoing research. One purpose of the ICoMST is to provide a global forum for discussing research concepts and accomplishments but proceedings are not available for the majority of the scientific community. The presentation will briefly highlight related meat research programs from several countries which hopefully will provide the impetus to develop an implementation plan to foster greater worldwide exchange of meat science and technology.

59 U.S. Pork Products in the International Marketplace. J.W. Cravens*, *National Pork Producers Council, Des Moines, Iowa.*

In 2000, the United States exported 1.25 billion pounds of pork and pork variety meats, worth 1.316 billion dollars, an increase of 213 percent by volume and 224 percent in value since 1991. Exports now represent 6.8 percent of domestic production. According to the USDA Foreign Agriculture Service, pork represented 41 percent of global meat protein consumption in 1999. Global pork trade is projected to continue increasing as global populations and per capita incomes increase and trade barriers fall.

Although the United States is one of the world's lowest cost producers of pork, to maintain rapid growth in exports, the United States industry must continue to supply safe, high quality pork that meets the needs of varied customers around the globe. The demands of the export market can vary significantly from those of the U.S. market. The United States exported pork or pork variety meats to 85 different countries in 2000.

Frequently the demand for various pork cuts or byproducts are unique to these individual markets. And just as frequently, unique requirements or standards exist in areas such as processing, carcass fabrication, labeling, food safety, sanitation and hygiene. This presentation will look at the demands of the export market for U.S. Pork and explore a number of these issues. It will contrast the specifications and customer requirements in the domestic market with those of the export market in an attempt to present both the opportunities that exist for increasing exports and the barriers that must be overcome. It will also explore some of the advantages our competitors have over the U.S. industry.

Key Words: Pork, Exports, Trade, Variety meats, Offals

60 Poultry products and processing in the international marketplace. S.F. Bilgili*¹, ¹*Auburn University.*

Globally, consumption of poultry meat products has increased dramatically during the last decade. As a result, production of young meat chickens (broilers), turkeys and other poultry (spent layers, ducks, geese, guinea-fowl, pheasants, ratites, etc.) continues to grow and expand in many parts of the world. Nutritional profile, taste, versatility, convenience, availability and relative value are the major reasons why consumers prefer poultry meat products. Adoption of new production and processing systems and technologies, and development of new and novel products have enabled the poultry industry to continually innovate and respond to market demands. Although poultry products vary greatly in many countries, ranging from live poultry markets to consumer packaged, ready-to-eat entrees, there has been a clear trend of diversification in the marketplace. The most obvious change has been the steady shift in product forms, from a primarily "homogenous, generic commodity" to a "well differentiated, name-branded, value-added" products. Value-adding by cut-up and further-processing not only meets the changing needs of the consumers, but also improves the net returns and profitability. Given this trend, the future challenge in product development will be preservation and/or incorporation of unique cuisine and preferences of diverse cultures.

ASAS/ADSA Animal Behavior and Well Being

61 Effect of genetic selection for loin-eye area on belly-nosing and plasma cortisol in weanling Landrace pigs. S. Torrey*¹, E. Pajor¹, S. Weaver², D. Kuhlers³, and T. Stewart¹, ¹*Purdue University*, ²*USDA-ARS Livestock Behavior Research Unit*, ³*Auburn University.*

Two genetic lines of Landrace gilts, selected for differences in loin-eye area, were studied for behavioral and physiological differences during Segregated Early Weaning (SEW). The select line, selected for increased loin-eye area (n = 30), differed from the contemporary random control line (n = 32) by 10.6 cm². The gilts were weaned at an average age of 15 d and transported from Auburn University to Purdue University. Litters were blocked by farrowing date to minimize age differences and trans-

ported on two dates, 2 wk apart. Litters were videotaped continuously while in nursery to record frequency of belly-nosing. Individual blood samples were collected in late afternoon 9, 20 and 30 d after arrival into the SEW facility to measure plasma cortisol levels. Frequency of belly-nosing was examined on d 2, 3 and 4 post-weaning using scan sampling. Significant differences in frequency of belly-nosing were seen only on d 4 between the two lines (select 2.43 ± 0.44% of time; control 0.61 ± 0.43% of time; p < .02). This is in agreement with previous literature that found differences in belly-nosing occurring several days after weaning. Blood samples were assayed for cortisol levels using GammaCoat RIA. Cortisol concentrations in the select pigs (29.34 ± 3.12 ng/ml) were significantly higher (p < .02) than in the control pigs (23.11 ± 3.00 ng/mL). Previous results showed that the select pigs spent more time active and

had higher whole blood serotonin levels than control pigs. Our results suggest that a genetic relationship exists for lean pigs with an increased loin-eye area and a pig's ability to handle the stress of weaning. As weaning is a stressful event in a pig's life, this decreased ability to handle the stress related to weaning may have negative implications on the welfare of pigs selected for lean growth.

Key Words: belly-nosing, cortisol, genetics

62 Savaging in gilts and second parity sows: a study of seven commercial farms. M.J. Harris^{*1,2,3}, Y. Li¹, and H.W. Gonyou¹, ¹*Prairie Swine Centre Inc., Saskatoon, Saskatchewan, Canada*, ²*University of Saskatchewan, Saskatoon, Saskatchewan, Canada*, ³*Present address: Purdue University, West Lafayette, Indiana, USA*.

Savaging of piglets by their mothers is a harmful and costly behavior, the extent and causes of which are largely unknown. A study was conducted to investigate the incidence and correlates of savaging behavior on seven new 600- or 2400-sow units (n = 4 and 3, respectively) during their first two farrowing cycles. Females were subject to a light (continuous or intermittent light) and sound (newborn piglet vocalizations or no vocalizations) treatment before and during farrowing. Behavior records were collected for the first farrowing of 6625 gilts (first farrowing cycle) and 2175 gilts and 5232 sows (second cycle). The incidence of savaging and number of piglets killed or injured by it were recorded.

During the first farrowing cycle 331 gilts (5.3%) displayed some piglet-directed aggression, and of these, 201 (2.9%) fatally savaged one or more of their young; 392 piglets (.6%) were killed by savaging and a further 114 (.14%) were non-fatally injured. Savaging levels were similar for the gilts in the second farrowing cycle, while the problems were reduced to approximately half among the sows. During the second parity, females that had savaged as gilts were more likely to behave aggressively again (14%) than those that had not (<1%; p<0.05). There was considerable variation among farms in reported incidence of savaging and numbers of piglets affected. During the first farrowing cycle, percentages of gilts killing one or more of their offspring ranged from .8% to 5.8%, and percentages of piglets killed by savaging ranged from .1%-1.1%.

During the first farrowing cycle, continuous light resulted in a reduction in the proportion of piglets fatally savaged (.47 vs. .77%; p<0.05) and reduced total reported mortality (.62 vs. .74 piglets/litter; p<0.05) compared to intermittent light. Gilts farrowing in crates in the center of rooms receiving the vocalization playback fatally savaged more piglets (.12 piglets/litter) than did those in the front (.05 piglets/litter) or back (.07 piglets/litter; p<0.05). We theorize that increased illumination allowed gilts to better see approaching piglets, reducing their fear response. The sound treatment may have disturbed the gilts, and thus extraneous sounds should be minimized during farrowing.

Key Words: Pig, Savaging, Mortality

63 Behavior of outdoor sows 72 h after parturition: relation to piglet mortality. A. K. Johnson^{*1}, J. L. Morrow², J. W. Dailey², and J. J. McGlone¹, ¹*Pork Industry Institute, Texas Tech University, Lubbock, TX, 79409-2141*, ²*USDA-ARS, TTU, Lubbock, TX, 79409-2141*.

The majority of piglet deaths occur in the first 72 h after parturition, with the main cause attributed to crushing by the sow. The objectives of this study were to determine 1) time spent outside the farrowing hut by the sow and 2) sow behavior one hour prior to the piglet death in relation to piglet mortality. Records were used to identify PIC USA sows that crushed (CR) N=10 or did not crush (NC) N=10 piglets and for these sows the time spent inside and outside the hut was determined. Records from 10 of these sows (N=5 CR and N=5 NC) were used for further behavioral analysis. Sows were housed in an English style-farrowing hut with chopped wheat straw bedding and a metal fender. Multiparous sows were fed a completely balanced milo-soy diet once daily. Behavioral data were collected by time-lapse video using 2.5 frames/s. Nine behaviors were collected: walk, stand, sit, lateral lying, sternum lying, lying while rooting, stand while rooting, nurse and outside of the farrowing hut. Sows did not differ in the amount of time spent outside the farrowing hut (P > .05) over the first two days. On day three, CR spent less (P < .01) time than NC outside of the hut (20.2 4.7 vs. 40.4 4.8 min/d) and showed an increased (P < .01) time lying on their sternum (9.7 3.1 vs. 0.7 3.1 min/h). Before crushing a piglet, 78 % of the CR were lying on their side and 56 % moved from lying on their sternum to

lying on their side. Only 11 % of NC showed these sequences of behavior with 67 % nursing, then remaining on their side. In conclusion, CR sows spent more time inside the farrowing hut on day three and spent more time lying on their sternum. The behavioral sequence associated with crushing piglets was a shift in lying postures rather than transitions from sitting or standing to lying down.

Key Words: Piglet, Behavior, Mortality

64 The lying behavior of pigs; a basic study. E.D. Ekkel¹, H.A.M. Spoolder², and B. Hulsege³, ¹*Wageningen University, Wageningen, The Netherlands*, ²*Research Institute for Animal Husbandry, Lelystad, The Netherlands*, ³*ID-Lelystad, Lelystad, The Netherlands*.

An experiment was carried out in which the lying behavior of pigs was studied. It is well known that pigs housed in groups prefer to lie down together for many hours per day, but little is known about their lying posture and the total space they occupy. Moreover, the extent to which pigs tend to huddle was studied, since this affects their total space occupation. Information about these lying characteristics is necessary in order to be able to assess the space requirements for pigs, e.g. in the event (inter)national authorities pass legislation on minimum space requirements for pigs. The study included two replicates of 8 groups. Each group consisted of 8 pigs. Pigs were housed at thermoneutral conditions in 8 m² pens. Two types of flooring were studied: pens with 60 % solid sloped floor and 40 % slatted floor and pens with 60 % solid arched floor and 40 % slatted floor. Lights were on from 0630 until 1830. Feed and water were available ad libitum. Behavior of the pigs was recorded for 48 h on video at approximate 30, 50, 80 and 100 kg live weight. General activity (lying, sitting, standing), lying posture (sternum, half-sternum, lateral recumbent) and percentage of space-sharing (as a consequence of huddling behavior) were scored by 20 min scan-sampling. The results confirmed that pigs lie down for a great part of the day. During the behavioral period, on average > 80 % of the pigs lie down. There were no differences (P > .05) between replicates or floor types. The weight category did affect the lying behavior of the pigs (P = .027): the percentage of pigs that lie down, increased with weight. During the night (1840 to 0620), the fully lateral recumbent lying posture was predominant and unaffected (P > .05) by floor type. A significant interaction was found between replicate and weight category. The percentage of space that is shared with other pigs was on average 33.7, 28.1, 28.3 and 31.0 for 30, 50, 80 and 100 kg pigs respectively. Average space occupation for these weight categories when lying was 0.30, 0.46, 0.64, 0.76 m² per pig. In conclusion, pigs lie down for most of the time and the fully lateral recumbent position is predominant. Regulations for minimum space requirements for pigs should take this into account.

Key Words: Pigs, Lying Behavior, Space requirements

65 Effects of transportation and relocation on plasma glucose, triglyceride and cortisol concentrations in Brahman and Hereford steers. R. Browning, Jr., T. Payton, N. Whittingham, and C. Bradley, *Tennessee State University*.

In Exp 1, Hereford (n = 7) and Brahman (n = 7) steers were hauled round trip (344 km, 243 min) or maintained in holding pens on the farm in a crossover design to assess physiological responses to transportation. Steers were bled on afternoons 6 and 3 d before treatment, immediately after treatment, and 1, 3, and 6 d after treatment. Plasma was harvested to determine glucose, triglyceride and cortisol concentrations. No breed × treatment × day interactions were evident. Treatment × day interaction affected (P < 0.05) all three blood constituents. Glucose, triglyceride and cortisol concentrations immediately after transportation (81 ± 2 mg/dL, 52.4 ± 0.8 mg/dL, and 174 ± 14 ng/mL) differed (P < 0.01) from concentrations at 3 d before (57, 57 and 72) and 1 d after transportation (59, 55 and 61) and compared to non-transported steers (62, 56 and 92). In Exp 2, Hereford (n = 7) and Brahman (n = 7) steers were hauled one-way (55 km, 40 min) to a new farm or hauled round trip an equal distance in a crossover design to assess physiological responses to relocation. Relocated steers were maintained at the new farm for 6 d. Steers were bled on afternoons 6 and 3 d before transit, immediately after transit, and 1, 3, and 6 d after transit. Plasma was harvested to determine glucose, triglyceride and cortisol concentrations. No breed × treatment × day or treatment × day interactions were evident that would have indicated an influence of relocation. Day affected (P < 0.01) all three blood constituents. Glucose, triglyceride

and cortisol concentrations immediately after transportation (88 ± 2 mg/dL, 43.9 ± 0.4 mg/dL and 407 ± 15 ng/mL) were higher ($P < 0.01$) compared to 3 d before (65, 47.0 and 94) and 1 d after transportation (66, 45.4 and 126). Results indicate that plasma glucose and cortisol increased, whereas triglyceride concentrations were reduced in response to transportation in steers. However, the responses were transient and not influenced by breed or relocation.

Key Words: Cattle Breeds, Transportation, Stress

66 Shade effects on performance, carcass traits, and behavior of heat-stressed feedlot cattle. F. M. Mithlner*, M. L. Galyean, and J. J. McGlone, *Texas Tech University*.

In earlier studies on heat stress in feedlot cattle, we found that the use of water (sprinkling or misting) was largely ineffective, but shade minimized some negative effects of heat stress. Past studies were conducted in concrete floored pens under experimental feedlot conditions. To determine whether shade also improves performance, physiology, and carcass traits under conditions similar to those in commercial feedlots, we used a total of 168 heifers in 12 dirt-floored pens. Six pens were shaded (SHADE) with a tin-roofed shade construction (4 m height), allowing for 2.04 m² shade per heifer and six pens served as the unshaded control (CONT). The performance variables that were measured or calculated were DMI, BW, ADG, feed:gain (F:G), and dietary concentrations of NEm, and NEg. Carcass measurements were yield grade, kidney, pelvic, and heart fat, longissimus muscle area, hot carcass weight, quality grade, liver abscess rate, and incidence of dark cutters. The respiration rates of the heifers were measured, as well as the behaviors of feeding, drinking, walking, standing, lying, agonistic, and bulling. Heifers in SHADE compared with CONT had higher DMI (9.80 vs 9.52 ± 0.05 kg/d, $P < 0.01$), ADG (1.74 vs 1.64 ± 0.03 kg/d, $P < 0.05$), and final BW (565.47 vs 554.15 ± 2.97 kg, $P < 0.05$). The F:G, and NEm and NEg concentrations did not differ between treatments. Carcass traits were similar between treatments, but more carcasses of heifers in SHADE graded Choice, (55.84 vs 36.23% , $P < 0.01$) and the incidence of dark cutters (8.33 vs. 19.05% , $P < 0.05$) was decreased in carcasses from SHADE heifers. Respiration rates were decreased among SHADE compared with CONT heifers (73.8 vs 105.3 ± 1.2 breaths/min, $P < 0.01$). Most behaviors were not different between treatments, but cattle in SHADE showed less agonistic behavior than CONT heifers (0.34 vs $1.40 \pm 0.33\%$, $P < 0.05$). During heat, shade improves well-being of feedlot cattle and the profitability of the operation in West Texas.

Key Words: Feedlot Cattle, Heat Stress, Shade

67 Behavioral and adrenal response of cows tail docked with a rubber ring with or without local anesthesia. D. S. Schreiner* and P. L. Ruegg, *University of Wisconsin, Madison*.

The practice of tail docking dairy cattle is controversial. Dairy farmers justify tail docking by claiming it improves cleanliness and reduces mastitis. Behavioral and physiological effects of tail docking are unknown. The objective of this study was to determine the behavioral and hormonal affects of tail docking with rubber rings in dairy cattle. Twenty-four pregnant Holstein heifers 20-25 months of age were randomly assigned to four treatment groups: control, rubber ring docked, control plus epidural, or rubber ring docked plus epidural. Docked animals were banded three to four inches below the vulva. Blood samples were obtained -45, -15, 0, 15, 30, 60, 90, 120, 180, 240, 360 and 720 minutes from treatment for cortisol analysis. Blood samples were obtained at -45 minutes and 7, 14 and 21 days for complete blood count (CBC). Animals were observed -60, -45, -30, -15, -1 before treatment and every 5 min. for the first hour, every 15 min. for hours 2-4 and every 30 min. for hours 5-12 after treatment. Additional behavioral observations were taken three times daily for weeks 1 and 2, twice daily for weeks 3 and 4, and once daily for weeks 5 and 6. Animals were observed for the following behaviors: eat, ruminate, standing, walking, tail shake, vocalization, foot stomping, grinding teeth, posture, restlessness, and tail tucking. There were no significant differences in cortisol levels between treatment groups ($P = .49$). CBC results remained in normal ranges for all animals during all time periods. There were no significant differences in the proportions of behaviors observed between treatment groups ($P > .14$). Tail shaking was observed more frequently for both docked and control animals before and after treatment as compared to other time periods ($P < .01$). The application of rubber rings and the process of

tail atrophy did not significantly affect observed patterns of behavior or selected physiologic variables during the period of this study.

Key Words: Behavior, Docking, Stress

68 Development of a bovine lameness index that correlates visual lameness scores to measurable limb movement variables - a pilot study. P. G. Rajkondawar*¹, N. Neerchal¹, M. A. Varner², B. Erez², A. M. Lefcourt³, R. M. Dyer⁴, and U. Tasch¹, ¹UMBC, ²UM, ³Biomedical Engineer, ⁴Univ of Delaware.

Lameness in dairy herds has been reported to be a critical economic factor and a vital animal-welfare issue for the dairy industry around the world. Various lameness evaluation schemes that assess the severity of the ailment have been suggested. These schemes are based on visual observations of individual cattle. A lameness scoring scale that focuses on the shape of the cattle's back in posture and gait has been proposed. This scheme is easy to implement under field conditions, however it is observer dependent and non-quantitative in nature.

In an effort to objectively characterize the status of hoof and leg ailments, a system that measures various limb movement characteristics was developed. This system can be used to measure multiple variables representative of limb movements, including: (a) peak value of ground reaction force (GRF) of individual limbs, (b) integral of GRF with respect to time, (c) stance time, (d) average GRF, (e) step size, (f) integral of the Fourier transformation of the GRF signature with respect to frequency, and (g) the integral with respect to frequency of the Fourier transform of the GRF signature multiplied by the frequency. To allow comparisons among different cows, variables were normalized with respect to body weight. The objective of this study was to examine the relationship between a visual scoring scale and the 7 listed limb movement variables. The visual lameness score and all movement variables were measured for 23 mature Holstein cows.

Logistic regression and discriminant analyses (LOGISTIC, STEPDISC procedures in SAS) indicate that visual lameness scoring scale can be captured by the average GRF values ($p < 0.05$) of individual limbs. The model predicts probabilities that a cow is sound, mildly lame, and lame. An estimated lameness index is derived as the weighted sum of these probabilities. In this pilot study, the results of the visual scoring scale and the new lameness index matched for lame cows. However the visual scores and lameness index of 6 out of 16 mildly lame and sound cases exhibited discrepancies. Future studies will compare visual scores, limb movement variables, and clinical lameness diagnoses of individual limbs to enhance objective measures of dairy cow lameness.

Key Words: Lameness, Dairy Cattle, Limb Movement Variables

69 Utilization of a small animal model of fescue toxicosis to evaluate the potential benefit of *Ascophyllum nodosum*. P. A. Eichen*¹, D. E. Spiers¹, G. Rottinghaus¹, and D. P. Colling², ¹University of Missouri, Columbia, MO, ²Land O'Lakes Farm-land Feed, Kansas City, MO.

Cattle grazing endophyte-infected tall fescue (EIF) during summer months display symptoms of fescue toxicosis that include hyperthermia, decreased feed intake and growth, and death in extreme cases. An economical rat model of fescue toxicosis shows changes in internal body temperature, feed intake and weight gain that are similar to those seen in cattle fed EIF. Adding seaweed extract (*Ascophyllum nodosum*; SWE) to the diet may reduce stress associated with EIF consumption during summer heat. An initial study was performed to determine a level of SWE (range of 0 to 2% of diet) that might reduce symptoms of fescue toxicosis in male rats ($n=36$) fed control or EIF diets ($90\mu\text{g}$ ergovaline/kg BW). Telemetric temperature transmitters (Mini Mitter, Bend, OR) were implanted into one of the 3 rats from each of the 12 treatment groups to measure core body temperature (Tc). Rats were housed at 21°C for 5 days and then heat-challenged (HC) at 31°C for 21 days. Rats fed diets containing more than 0.25% SWE tended to have a lower Tc during initial HC at about 3 days. A second, shorter study was conducted to verify the thermal-relief effect of SWE, using control and EIF diets from Study 1, and SWE (0 or 1% of diet). Rats fed EIF diet with 1% SWE exhibited lower Tc ($P < .0001$) during HC. In both studies, EIF-fed rats had a larger decrease in feed intake ($P < .0001$ and $.0007$) and a smaller gain in body weight ($P < .0001$) than control rats. Decreased blood levels of cholesterol ($P < .002$ and $.03$), alkaline phosphatase ($P < .0001$ and $.009$) and amylase ($P < .002$ and $.01$), together with reduced liver weight ($P < .0001$), were seen in EIF-fed rats in both

studies, with no effect of SWE treatment. Although SWE, at 1% of diet, is effective in reducing the hyperthermia associated with fescue toxicosis, it does not appear to reverse other known disorders associated with fescue toxicosis.

Key Words: Fescue toxicosis, Heat stress, Seaweed

70 Use of *Ascophyllum nodosum* to reduce problems associated with fescue toxicosis in cattle during heat challenge. M. J. Leonard*¹, D. E. Spiers¹, G. Rottinghaus¹, and D. P. Colling², ¹University of Missouri, Columbia, MO, ²Land O'Lakes Farmland Feed, Kansas City, MO.

Cattle grazing endophyte-infected tall fescue (EIF) during summer months are at increased risk of heat-related stress. Previous studies have reported that cattle grazed on EIF pastures sprayed with seaweed extract (*Ascophyllum nodosum*) (SWE) exhibit reduced internal temperature compared to cattle grazing EIF pastures without the SWE. The objective of this study was to determine if supplemental SWE would reduce symptoms of fescue toxicosis in cattle. Twelve Angus x Simmental steers (238+/-10 kg) were randomly divided into 3 treatment groups consisting of 0, 0.5, or 1% SWE. Steers were housed in environmental chambers with a feedlot starter diet and water *ad libitum*. Air temperature and percent relative humidity (%RH) were recorded continuously. Steers were exposed to thermoneutral conditions (19°C, 50% RH, days 1-5 and 27-31) and heat challenge (HC) (26-33°C, 50% RH, days 6-26) during the trial. EIF seed and SWE were fed daily in the diet at a concentration that would ensure 10µg ergovaline/kg BW/day and the appropriate SWE dose. Rectal temperature, respiration rate, and skin temperatures were recorded three times daily to monitor thermal status. Feed intake was recorded daily. Blood was drawn prior to treatment and weekly thereafter for analysis of blood constituents. Feed intakes were reduced during HC for all treatments; however, this reduction was greater for 1% SWE steers (P <0.05). Rectal temperature for 1% SWE was also lower than the other treatments (P <0.05). Respiration rates and skin temperatures were similar for both 0.5 and 1% SWE groups, however, respiration rates for 1% SWE steers were lower than 0% SWE (P <0.05). Blood levels of total and free triiodothyronine and total thyroxine were lower in 1% SWE steers after removal from heat challenge (P < 0.05). Addition of 1% SWE reduced heat-related stress in steers. Further studies are needed to determine the effect of SWE on metabolic function during long-term heat challenge.

Key Words: Fescue toxicosis, Heat stress, Cattle

71 Effects of an intermittent altrenogest regimen on behavioral, hormonal, and testicular parameters of three-year-old stallions. H.A. Vartorella*¹, H.A. Brady¹, A.D. Herring¹, S.D. Prien¹, N.L. Heninger¹, and A.L. Neumann¹, ¹Texas Tech University, Dept. of Animal Science and Food Technology.

Overly sexual/aggressive stallions within the performance horse industry create a hazardous working environment and several training challenges. To suppress these behaviors without surgical castration, oral altrenogest (Regu-Mate[®], Intervet, Millbro, DE) is being administered to stallions by trainers in an off-label application. Previous research has studied the use of altrenogest in continuous application. The objective of this study was to evaluate the testicular, hormonal, and behavioral capacity of three-year-old stallions receiving a short term, repetitive dosage of oral altrenogest. Nine, three-year-old Quarter Horse stallions were initially blocked by sire, and then randomly designated to two groups, treatment (n=5) and control (n=4). The treatment group received an oral daily 0.088 mg/kg BW dose of Regu-Mate[®] for 10 d, followed by 10 d of recuperation (no treatment). This process was repeated three times over 60 d, followed by a recovery period of 36 d. All animals went through interval evaluations for steroid hormones, physical condition, testicular parameters, and sexual/aggressive behavior (including Flehmen response, biting/chewing, sniffing/licking, erection of penis, dropping of penis, and vocalizations). The altrenogest dosages had no significant effects on body weight or condition scores. Of the testicular parameters analyzed, scrotal width, testis composition, and gross testicular parameters were unaffected, although a significant decrease (P<0.05) was found in the mean number of spermatids. No differences

were observed between treatment groups for either estrogen or testosterone concentrations. However, there was a significant time by treatment interaction for estrogen levels (P<0.05). No significant differences were seen for any of the sexual/aggressive behavioral parameters analyzed based on frequency, latency, or duration, at any point of the study. Nevertheless, several areas assessed in this study showed large variations between individual stallions. Further research of altrenogest in the stallions is needed to determine a practical dosage amount and sequence to produce a manageable animal, which takes age and fertility effects in consideration.

Key Words: Stallion, Altrenogest, Behavior

72 Social structure and behavior of laying hens in large groups. R. Freire*, F. Short, and C.J. Nicol, Bristol University, Bristol, United Kingdom.

There has been a recent trend in Europe towards large group systems for the commercial housing of laying hens. The aim of this study was to obtain information about the spatial interaction and social cohesion of birds in large groups. A group of 1000 birds was housed in a perchery pen providing littered areas, individual nest boxes and a central frame of perches. Eighty birds were tagged with transponders that emitted a unique identification number each time they walked near antennae placed at 16 locations at each of 4 heights. Over a four-month recording period, approximately 85% of the tagged birds restricted their movement to particular areas (i.e. within a home range, chi-squared P<0.001). We tested the possibility that birds that occupy the area under the perches (i.e. the slats) for long periods of time are in poor health and retreat to this location as a means of avoiding social encounters. Increased use of the slats was significantly related to reduced weight (third order polynomial fitted line, F_{1,67}=6.6, P<0.0001) and poorer back feather condition (ANOVA, F_{1,67}=4.2, P<0.05). However, latency to move away from a group of birds and distance reached was not significantly correlated to time spent on the slats (multiple regression, P>0.1). In conclusion, the health and condition of a few individuals that become restricted to unfavorable areas may be compromised in large group systems.

Key Words: Social, Behavior, Hens

73 Survey of auction and slaughter horses. K. McGee¹, J. L. Lanier¹, and T. Grandin*¹, ¹Colorado State University.

Surveys of 10 non-cataloged auctions (n=1,473) and at 3 slaughter plants (n=1,348) were used to characterize the types of horses typically found. Informal interviews with industry people were conducted to gain an insight into why certain types of horses are more prevalent in auctions than in slaughter plants. Soundness of horses was based on guidelines in the U.S. Pony Club Guide to Conformation, Movement and Soundness, and foot condition and body condition was scored with a four-point and five-point scale, respectively. Interviews indicated that horses are typically not sold to a slaughter plant if there is potential for that horse to continue as a riding or working horse. Usable horses have a greater economic value at an auction than at a slaughter plant. The frequency for types of horses seen at slaughter and auction plants, respectively was riding horses 63% and 68%, mules, donkeys, ponies and miniatures 2% and 18%, racehorses 4% and 1%, feedlot horses fed for slaughter 9% and 0%, draft horses 7% and 2%, male horses (stallions, gelding, and colts) 50% and 57%, sound riding or working horses 13% and 47%, gray horses (70-90% have melanosis tumors) 10% and 10%, and horses with an official Bureau of Land Management freeze brand were 2% of the slaughter horses and less than 1% of all auction horses. Body condition for slaughter and auction horses, respectively was emaciated 3% and 2%, thin 27% and 20%, good 59% and 67%, and fat or obese 11% and 11%. Slaughter plant horses had substantially poorer foot condition than the auction horses. Neglected hooves that had damage of the coronary band were 10% of the slaughter horses versus 2% of the auction horses. Moderately neglected hooves accounted for 54% and 26%, acceptable hooves for 31% and 54% of slaughter and auction horses, respectively. More horses sold at auctions were sound usable riding/working horses than those sold to the slaughter plants. Slaughter plants in the United States assist in maintaining a level of horse welfare by preventing old and (or) unsound working/riding horses from being neglected.

Key Words: Equine, Welfare, Slaughter