P268  The effects of environmental enrichment devices on feather picking in commercially raised Pekin ducks. S. Colton* and G. S. Fraley, Biology Department & Neuroscience Program, Hope College, Holland, MI.

Similar to other poultry species, Pekin ducks occasionally show feather picking. Self-picking can lead to reduced feather quality and poor overall health of the bird. Although the reasons underlying feather picking are not clear, it appears to occur when the ducks are transitioning between downy feathers and adult plumage. We hypothesized that giving Pekin ducks environmental enrichment devices (EEDs) during this time would decrease feather picking and improve feather quality and duck well-being. The EEDs were red plastic balls, each threaded with 4 zip-ties. The zip ties were either red or white to begin to determine if the ducks have a color preference. The EEDs were placed in barns with 2 pens of ducks, each pen holding 4000–6000 ducks. EEDs were placed in the barn on d 14 of age and remained until processing at around 35 d of age. One half of each barn received the EEDs, the other half was used as control, thus minimizing management differences across barns. A total of 6 barns were used in this study and there were approximately 120 ducks per EED. Upon placement of EEDs, each side of the barn was videotaped for a total of 2 h per day and duck behaviors scored by an individual unaware of treatment groups. In addition, an individual live-scored these behaviors for a one-hour period per pen in each barn. These observation periods occurred twice between d 14–35. The physical characteristics of 100 ducks per pen were scored at ages 7, 21, and 35 d. Results showed a significant ($P < 0.05$) decrease in both self-picking and conspecific-picking (picking at neighboring ducks), and a slight, though not significant, preference for red-colored EEDs over white ones. Although no differences in physical scores were observed at age 7, at d 21 ducks with EEDs showed significantly ($P < 0.05$) improved feather quality and cleanliness scores compared with ducks without EEDs. These results suggest that providing environmental enrichment may minimize feather picking and improve feather quality and, putatively, duck well-being.

Key Words: well-being, aggression, environmental enrichment

P269  Descriptive analyses of the development of gait in Pekin ducks from hatch to market weight. S. Colton*, C. Campbell1, R. Haas1, S. M. Fraley12, and G. S. Fraley1, Biology Department & Neuroscience Program, Hope College, Holland, MI, South Crossing Veterinary Center, Kentwood, MI.

During recent studies it was determined that there exist many different opinions among investigators and within the literature as to the nature of “normal gait” in Pekin ducks. Of particular import was a debate as to what degree of metatarsal adduction (MA, aka “pigeon toed”) impacts a duck’s well being. Thus, we set out to characterize the range of gait patterns of commercially obtained Pekin ducks in an aviary setting. Day old hatchlings (n = 105) were obtained and housed in floor pens under environmental conditions that closely approximate industry standards. Students spent time with the ducks to habituate them to investigators and analytical equipment. Beginning on d 3, weekly footprint analyses were completed by allowing ducks to casually walk down a paper-lined runway after their feet were painted with ink. Semiquantitative analyses revealed that ducks fell into 3 general categories in a normally distributed manner: 1) wide stance (14%; > 1 foot-width between tarsal pads), 2) common stance (73%; < 1 foot-width between tarsal pads), and 3) narrow stance (13%; virtually inline placement of tarsal pads). Although all ducks show MA while casually walking, 9–15% of ducks show excessive MA in one or both feet (>40 degree inward rotation) independent of stance width. Observed percentages persisted regardless of age. Also weekly, beginning with d 1, a subset of ducks across gait categories (n = 10) were weighed and were analyzed for pelvic limb structure and presence of tibial dyschondroplasia (TD). No differences in body weights were observed among gaiters, regardless of degree of MA. Each week, approximately 30% of disected birds showed minimal signs of TD. Although TD may be slightly more prevalent in ducks with excessive MA, TD is also observed in ducks regardless of degree of MA. At this time we conclude that TD may not be a causative factor in the development of excessive MA; and similar to other bipedal species, the presence of MA may not of itself be indicative of lameness or a lack of well being.

Key Words: duck, musculoskeletal, motor control, lameness

P270  Effects of modifying cages with perches on neuroendocrine homeostasis of White Leghorn pullets. F. F. Yan*1, P. Y. Hester1, S. A. Enneking1, and H. W. Cheng2, Purdue University, West Lafayette, IN, United States Department of Agriculture, West Lafayette, IN.

The neuroendocrine system controls animals’ adaptability to their environments by releasing psychotropic compounds such as catecholamines (epinephrine, norepinephrine, and dopamine) and serotonin. Changes of these neuronal compounds have been used as biomarkers of animals’ stress responses associated with their well-being. This study evaluated the welfare of White Leghorn layer pullets housed in conventional cages modified with perches by examining changes in their neuroendocrine homeostasis. A total of 1,064 1-d-old chicks was randomly assigned to 28 cages with or without perches. In each of the 14 cages of the perch group, 2 parallel perches were installed, providing 155 cm2 floor space per pullet originally, and 233 and 310 cm2 after sacrifices at wk 3 and 6, respectively. Two chickens from each cage were sacrificed at 3, 6, and 12 wk post-treatment. Heterophil:lymphocyte (H:L) ratio, and blood concentrations of serotonin, tryptophan, epinephrine, norepinephrine, and dopamine were determined. Data were analyzed using an ANOVA. Compared with controls, pullets with perches had lower blood concentrations of epinephrine ($P < 0.05$) and a trend for decreased blood norepinephrine levels ($P < 0.1$) at 12 wk, but not at 3 and 6 wk of age. Pullets with perches also had a trend toward higher concentrations of plasma dopamine than the controls at 6 wk of age ($P < 0.1$). There were no significant differences in H:L ratio or blood concentrations of serotonin and tryptophan between pullets with perches and controls ($P > 0.05$). These results indicate that perch installation affects catecholamine homeostasis. Pullets provided with perches may

Tuesday, July 10, 2012
POSTER PRESENTATIONS
Behavior and Well-Being
be less stressed as evidenced by decreased blood concentrations of epinephrine and norepinephrine.

Key Words: perch, pullet, catecholamine, serotonin, H:L ratio

P271 Effect of diets differing in color on performance measures and economic factors in broiler chicks. F. Foroudi*, 1 M. Chamani, 2 and M. Naryani, 1 Varamin-Pishva Branch Islamic Azad University, Varamin, Tehran, Iran, 2 Science and Research Branch Islamic Azad University, Tehran, Iran.

The purpose of this experiment was to determine if there is a feed color preference in broiler chicks. We investigated the color preference of chicks offered with artificially colored diets, and on performance measures and carcass quality. Three hundred sixty commercial hybrids of Ross 308 broiler chicks were housed in 28 pullet cages using other treatments whereas blue group had the highest FCR (< 0.05). Furthermore, FCR of red, yellow and brown treatments during higher than control-fed during starter, and entire experiment period (< 0.0001). During photophase, the proportion of chickens that were active changed little with age. In contrast, during scotophase, the proportion of pellets that were active increased up to 10 wk of age after which no further increases were noted to 16 wk of age (time of day x age interaction, P < 0.0001). It is concluded that hens spend considerably more time eating than drinking and that these behaviors are mostly expressed during the time that the lights are on. The relatively high level of activity during night (69 ± 1%) was not due to eating or drinking, but rather to bird disturbances as adjustments were made among pullets in the sharing of space.

Key Words: behavior, pullet, White Leghorn, eating, drinking

P272 The effect of age on the behavior of caged White Leghorn pullets. P. Y. Hester*, S. A. Enneking, M. E. Einstein, and J. P. Garner, 1 Purdue University, W. Lafayette, IN, 2 Stanford University, Stanford, CA.

The objective of the current study was to determine age related changes in feeding, drinking, and activity level during the growing phase of caged pullets. Hy-Line W36 strain chicks were housed in 28 pullet cages using standard management practices relative to stocking density, lighting schedule, and diet. Half of the pullet cages was equipped with perches. Perch effects on behavior are reported in another proceedings. For each cage, a Stealth Cam STC-1540IR automatic digital camera (Cabela’s Inc., Sidney, NE) was used for 24 h to determine drinking activity for 24 h at 2, 4, and 5 wk of age and feeding and activity levels at 2, 4, 5, 6, 8, 10, 12, 14, 15, and 16 wk of age. Two pictures, taken within seconds of one another, were made at 5 min intervals if activity was occurring within the cage. If there were no movements in the cages, then no pictures were taken providing opportunity to assess activity level. Data were subjected to an ANOVA using the mixed model procedure of SAS. When averaged over age, the proportions of pullets drinking, eating, and active during photophase were 2.00 ± 0.06, 14.0 ± 0.2, and 93 ± 1%, respectively, while at night these activities were lower (0.05 ± 0.07, 0.5 ± 0.2, and 69 ± 1%, respectively, P < 0.0001). Drinking activity from 2 to 5 wk of age did not change as the pullets aged (P = 0.49). Unlike dark hours, the % of pullets eating during photophase varied with age with peak activity at 12 wk of age (light by age interaction, P < 0.0001). During photophase, the proportion of chickens that were active changed little with age. In contrast, during scotophase, the proportion of pellets that were active increased up to 10 wk of age after which no further increases were noted to 16 wk of age (time of day x age interaction, P < 0.0001). It is concluded that hens spend considerably more time eating than drinking and that these behaviors are mostly expressed during the time that the lights are on. The relatively high level of activity during night (69 ± 1%) was not due to eating or drinking, but rather to bird disturbances as adjustments were made among pullets in the sharing of space.

Key Words: colored diet, broiler vision, broiler performance

P273 Influence of pre-transport handling and holding time on pre-transport hematological stress indicators and post-transport body condition of ostriches. M. Bejaei*, D. C. Bennett, A. Schaefer, and K. M. Cheng, 1 University of British Columbia, Vancouver, Canada, 2 Agriculture and Agri-Food Canada, Lacombe, Alberta, Canada.

Domesticated ostriches are less tame than chickens and are highly susceptible to stress. Moving birds, separating pen-mates, mixing unfamiliar birds, increasing bird density, transport and feed or water withdrawal are all stress factors that can influence their welfare. The objective of this study is to assess the influence of handling and length of times kept in the holding pen on pre-transport hematology and blood biochemistry of ostriches and post-transport body condition. Twenty-four ostriches (2.5 to 3 yrs old) were kept in 2 visually isolated holding pens with access to feed and water. On the day of shipment, birds were grabbed by the head, hooped and calmed, and walked to the other side of the pen one by one where they were weighed and blood sampled (10 mL blood from wing vein) (approx. Twelve min/bird). After all the birds were sampled, they were shipped to another farm 1100 km away. We used the 12 birds that were kept in the holding pen for the shortest time (<2.5 h) before blood sampling as controls against the 12 birds that were kept for longer than 2.5 h. Blood samples were analyzed to determine the concentrations of serum metabolites and enzymes, and the WBC counts and differentials were determined. Body condition of the birds was scored after arrival. Birds which had more cuts, bruises, injuries, feather loss and swollen wing or leg problems had lower scores. Results show that birds which were held for a longer period in the holding pen (pre-transport) had significantly lower post-transport body condition scores. Birds kept for longer than 2.5 h had significant higher pre-transport plasma sodium and aspartate aminotransferase levels. There were no differences between treatment and control in WBC counts and differentials. We conclude that minimizing the time that birds have to spend in holding pens before loading would lessen the stress of transportation and improve their welfare.

Key Words: ostrich, well-being, pre-transport handling, holding time, hematological stress indicators
The effect of perches on egg production and quality in organic layers. J. Y. Hu*, 1, R. L. Dennis2, and H. W. Cheng2, 1Purdue University, West Lafayette, IN, 2United States Department of Agriculture, West Lafayette, IN.

The housing environment affects animal welfare and productivity. This study examined the effect of perches on egg production and quality of organically reared Bovans Brown hens kept in floor pens. At 19 wk of age, 120 hens were randomly assigned to 12 pens either with or without perches. Each pen (5 ft x 8 ft), provided 5760 in2 of floor space per hen. In the perch group, one square smooth wood perch (2.5 in × 1.5 in × 5 ft) was installed at 8 in above the floor surface. Egg production was recorded weekly. Egg quality determined by egg weight, albumen height, haunt unit, yolk color, egg length, egg width, shell thickness and shell weight was analyzed randomly from 4 eggs per pen daily for 2 consecutive days of wk 4 and 6. Body weight was taken randomly from 2 hens per pen at wk 2 and 8. Data were analyzed using ANOVA. There were no significant differences in hens’ body weight between the treatments at wk 2 (P > 0.05), but at wk 8, body weight was significantly lower in hens with perch compared with hens without perches (P < 0.05). There were no significant differences in the hens’ weekly egg production between the 2 treatments (P > 0.05). However, treatment-related differences in the egg quality were found at wk 6, shell weight (P < 0.05) and shell thickness (P < 0.05) were significantly decreased in hens with perches compared with hens without perches. The eggs from hens with perches also had greater albumen height (P < 0.05) and higher haunt units (P < 0.05). These results indicate that perch installation increases egg quality, but reduces egg weight and egg shell physical characters. The changes of those shell parameters may be related to perching (exercise)-associated modification of calcium metabolism and calcium redistribution between egg shell and skeletal system (bones) during egg formation.

Key Words: perch, organic poultry, hens, egg quality, egg production

Effects of age on behavior, body temperature and liver gene expression in broilers exposed to heat stress. H. S. Yoon*1,2, J. M. Kim1,2, Y. H. Kim1,2, H. S. Chae4, B. S. Park5, and Y. H. Choi1,3, 1Division of Applied Life Sciences (BK21 program), 2Department of Animal Science, 3Institute of Agriculture and Life Sciences, Gyeongsang National University, Jinju, 4National Institute of Animal Science, RDA, 5Department of Animal Biotechnology, Kangwon National University, Chooncheon, Republic of Korea.

This study was conducted to determine the effects of age on behavior, body temperature and liver gene expression in broilers exposed to heat stress. Two groups of Arbor Acres broilers, with difference in age by 2 weeks, were reared up to the age of d 21 and 35 in separate rooms, where room temperature was adjusted to 21 ± 2°C on d 21. After adjustment of density between ages, both ages of birds were housed together in the same room with 10 pens each room and 5 pens each age and then kept for 1 week to adapt to their housing environments. At the end of adaptation period, ambient temperature in one room was gradually increased to 32 ± 2°C over 4 h whereas that in another was maintained without change. Rectal temperature and tonic immobility (TI) in response to heat stress was significantly higher in large body weight broilers (LBW) than in small body weight (SBW). Latency-to-lie (LTL) was decreased greatly in LBW exposed to heat stress, compared with SBW counterpart. Liver mRNA expression of heat shock protein 70, analyzed by quantitative real-time PCR, was decreased more in LBW than in SBW when exposed to heat stress (P < 0.05). The present results show that LBW are more severely affected than SBW (i.e., broilers 2 wk younger than LBW) when exposed to heat stress (Supported by an Agenda grant No. PJ0082412011).

Key Words: broiler, liver, behavior, heat stress, gene expression