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POSTER PRESENTATIONS

Poster Session: Behavior and Well-Being

242P Molting hens using soy hulls: 1. Physiological response through blood metabolites. H. Mazzuco*¹, L. Francison¹, A. Coldebella¹, R. Mores^{2,3}, and V. S. Avila¹, ¹EMBRAPA Suínos & Aves, Concordia, SC, Brazil, ²Universidade do Contestado-UNC, Concordia, SC, Brazil, ³PIBIC/CNPq, Brasília, DF, Brazil.

This study investigated the physiological stress of hens subjected to a conventional (feed removal) and four alternative (non-feed removal) molting programs compared to non-molted hens. Metabolic changes to blood plasma cholesterol, glucose, triglycerides, high-density lipoproteins (HDL) and low-density lipoproteins (LDL) were assessed at 79, 84 and 92 wks of age in a group of Hy-Line W-36 hens (n=216, 12 replicates/treat) induced to molt at 80 wks of age. The treatments consisted of a conventional molt (10 d fasting followed by cracked corn for 8 d and pullet developer diet for 10 d) and alternative molting programs: soy hulls based diet (12% CP, 1455 ME kcal/kg, 1.38% Ca) offered for 14 d followed by cracked corn for 4 d and a pullet developer diet for 10 d, and the other three molt regimens consisted of feeding soy hulls during 4, 8 or 12 d followed by 10, 6 or 2 d, respectively, of a soy hulls-based diet, 4 d of cracked corn and 10 d pullet developer diet. A non-molted control group of birds was fed a laying hen diet during the experimental period. Samples of blood (5 mL) were collected from each hen through the jugular vein and immediately processed using a commercial kit. All data were subjected to ANOVA considering the effects of age, treatment and interactions. Significant treatment x age effects (P<0.001) in triglyceride and HDL concentrations were observed at 84 wks of age. Molted hens showed lower triglyceride levels than control birds regardless of molt regimen. Triglyceride levels averaged 27.58 mg/dL compared to 1562 mg/dL showed by control hens. For HDL concentration, regardless of the molt treatment, birds exhibited higher levels (88.75 mg/dL) compared to control hens (39.33 mg/dL). No differences were observed among treatments regarding the other blood plasma metabolites. Our results showed that similar physiological stress responses are occurring during molt when considering the blood metabolites, triglycerides and HDL.

Key Words: alternative molting, high-density lipoproteins, triglycerides, soy hulls

243P Molting hens using soy hulls: 2. Behavioral responses. R. Mores^{1,2}, V. F. B. Roll³, A. Coldebella⁴, and H. Mazzuco*⁴, ¹Universidade do Contestado, Concordia, SC, Brazil, ²PIBIC/CNPq, Brasília, SC, Brazil, ³Universidade Federal de Pelotas, Pelotas, RS, Brazil, ⁴EMBRAPA Suínos & Aves, Concordia, SC, Brazil.

A study evaluated behavioral changes of laying hens submitted to four non feed removal molts compared with feed removal molting methods and full-fed, control hens. The treatments consisted of a conventional molt (10 d fasting followed by cracked corn for 8 d and a pullet developer

diet for 10 d) and alternative molting programs: soy hulls-based diet (12% CP, 1455 ME kcal/kg, 1.38% Ca) offered for 14 d followed by cracked corn for 4 d and a pullet developer diet for 10 d, and the other three molt regimens consisted of feeding soy hulls during 4, 8 or 12 d followed by 10, 6 or 2 d, respectively, of a soy hulls-based diet, and 4 d of cracked corn plus 10 d pullet developer diet. A non-molted control group of birds was fed a laying hen diet during the experimental period. Molt started when birds were 80 wks-old and video recordings were taken during molt at 80, 81, 82 and 83 wks of age. There were 48 birds/treatment and the behavioral activities were recorded considering 2 cages (4 birds) for 10 min, from 10 to 16h (288 hen observations total), and later scored in 10 s instantaneous behavioral states. The behavior patterns observed were resting, preening, non-aggressive pecking, walk, drink, feeder, head movement (alert) and still. Data were analyzed using logistic regression considering multinomial distribution for the response variables. Aggressive pecking was not observed in this study. Results indicated effect (P<0.0001) of treatment on bird behavior. Regardless of type of molt, birds showed some frustration through activities of resting, preening and non-aggressive pecking compared to control birds (average frequency of 57.4% vs 30.9%, respectively). Age effect was observed (P<0.001) with molted birds showing behavioral patterns that coincided with a decline in frustration activities, and an increase in alertness (still, walk, head movement) and search for food as the molt proceeded until 83 wks of age.

Key Words: alternative molting, behavior, laying hens, soy hulls

244P Molt induction utilizing dietary myceliated grain. W. L. Willis*, O. Isikhuemhen, J. Allen, A. Byers, K. King, and C. Thomas, North Carolina Agricultural and Technical State University, Greensboro.

There is increasing interest in using natural products as dietary components to induce molting in commercial laying hens. This study evaluated the utilization of fungus myceliated grain as a safe and effective alternative for inducing molt, enhancing immunity, reducing *Salmonella* growth and returning to egg production. Laying hens were subjected to one of five treatments (trts): 1) Non-fed (NF); 2) Full-fed (FF); 3) Fungus myceliated meal (FM); 4) 90% fungus myceliated meal + 10% standard layer ration (FM-90) and 5) 90% alfalfa meal + 10% fungus myceliated meal (AF-90). Each treatment condition was replicated nine times during a 9-d molt period. Egg production for trts 1 and 3 ceased completely by d 5; whereas, hens in trts 4 and 5 ceased egg production by d 6. Body weight loss decreased significantly (P<0.05) in trts 1 (57%), 2 (8%), 3 (35%), 4 (37%) and 5 (44%). Ovary weights of hens fed all molting diets decreased significantly from the full-fed control but did not differ significantly (P<0.05) from each other. *Salmonella* population in the crop, ovary and ceca from hens differed significantly (P<0.05)

among treatments. Return to egg production differed between trts with higher production beginning in trt 3 and ending in trt 5. Antibody titers did differ ($P<0.05$) among trts. From these results, fungus myceliated meal appears to be a viable alternative to conventional feed withdrawal and other methods for the successful induction of molt and retention of postmolt performance.

Key Words: molting layers, fungus myceliated grain, *Salmonella*, weight loss

245P Behavioral effects of different alternative molting strategies. R. L. Dennis*¹, R. M. Marchant-Forde², D. C. Lay², M. E. Wilson³, A. G. Fahey⁴, and H. W. Cheng², ¹*Purdue University, Department of Animal Science, West Lafayette, IN*, ²*Livestock Behavior Research Unit, USDA-ARS, West Lafayette, IN*, ³*West Virginia University, Division of Animal and Nutritional Sciences, Davis College, Morgantown, WV*, ⁴*University College Dublin, School of Agriculture, Food Science and Veterinary Medicine, Dublin, Ireland*.

Molting is performed through reduction in light:dark ratio and dietary changes such as low energy diet or complete withdrawal of feed. However, the effects of these practices on bird welfare have not been fully examined. We examined the behavioral effects of four different molting diets. Hens were assigned to one of four molting diets for 28 days: MGA diet (standard layer diet with 4.0 mg/bird/day melengesterol acetate), feed withdrawal (FW; 9 days of feed withdrawal followed by 19 days of standard layer diet), low energy diet (LE; 94% wheat middlings), low sodium diet (LS; 0.05% sodium), or a control diet (C; standard layer diet). Behavioral observations were taken from 18 cages per treatment (2 birds/cage; cage is the experimental unit) on days 2, 11 and 29. On day 2, hens on the FW and LE diets exhibited significantly less feeding behavior compared to C birds ($P<0.05$), FW birds exhibited almost no pecking at the feeder during this time of feed withdrawal. On day 11, after feed was returned to FW birds, these hens spent more time eating than C birds ($P<0.05$). No differences were found in time spent eating on day 29 ($P>0.05$) following the return of layer rations. Birds on FW, LE and LS diets displayed more vigilance behaviors on day 2 than C birds ($P<0.05$), but on day 11 FW birds were less vigilant than C hens ($P<0.05$). Similarly both FW and LE birds exhibited significantly more stereotypic cage pecking than C birds on day 2 ($P<0.05$). For all behaviors measured there was no significant difference between MGA and C birds ($P>0.05$). Observant or vigilance behaviors increase during times of increased social stress, including increased risk of predation and limited food supply. Stereotypic pecking is a maladaptive behavior that may be misdirected foraging behavior, as the birds exhibiting these are eating less during this time period. Increased vigilance and stereotypic behaviors after introduction to novel diets may be interpreted as increased stress in birds receiving FW, LE and LS diets. Birds receiving MGA, however, displayed similar behavioral patterns to C birds, suggesting that MGA may be a less stressful molting strategy.

Key Words: molting, behavior, melengesterol acetate

246P Removed

247P Productivity, health and welfare of 3 strains of laying hens housed in conventional battery and furnished colony cages. M. J. Jendral*¹ and B. M. Rathgeber², ¹*Nova Scotial Agricultural College, Truro, NS, Canada*, ²*Agriculture Agri-Food Canada, Truro, NS, Canada*.

A longitudinal study is being conducted to evaluate the productivity, health and welfare of 3 strains of laying hens (Shaver White (SW), Lohmann Lite (LL), Lohmann Brown (LB)) housed in conventional cages, and furnished colony units, over 2 production cycles. A total of 72 conventional cages (60cm X 50cm) (n=24 per strain) each house 5 hens. Colony cages (240cm X 110cm) (n=12; 4 per strain), which house 40 hens, contain a nestbox (60cm x 55cm), 3 hardwood, semi-circular perches (240cm X 5cm) and a dustbathing facility (60cm x 20cm). Hen performance is being monitored by assessing daily egg production, location of lay (nestbox, cage, dustbath), egg quality (egg and shell weight, specific gravity, albumin height, eggshell breaking force, shell thickness) at 28, 36, 44, 52, 60, 68 and 76 wks, as well as feed consumption and conversion efficiency, and calcium balance at 28, 44 and 76 wks. Hen bone health is being evaluated through palpation for fresh and healed breaks, by x-ray analysis, and by measuring bone density and breaking strength at 36, 57 and 77 wks, and at processing (80 wks). Meat quality will also be assessed at processing. Data are analyzed using GLM for mixed effects, and effects are significant at $P\leq 0.05$. Preliminary findings indicate significantly higher early egg production for LL and LB birds, than SW hens ($P=0.02$). LB hens also produce larger eggs ($P=0.05$). However, no treatment differences in egg production or quality measures have been determined. Treatment or strain differences in bone fractures, as determined through palpation and x-ray analysis, have not been detected. Subsequent findings from

this study will aid in determining the extent to which movement and bone loading opportunity in furnished colony cage systems will impact bone health, egg quality and hen well-being, throughout the production cycle and at end-of-lay, as well as strain suitability to a large group, cage housing system. Consequently, these findings will provide valuable information regarding the economic and welfare implications of housing hens in alternative cage environments.

Key Words: laying hen, conventional cage, furnished cage, productivity, welfare

248P The effect of beak trimming, bird density and the use of perches on productivity of Hy-Line W-98 Single Comb White Leghorn pullets from 1-16 wk of age. E. Navas, A. Gernat*, and G. Murillo, *Escuela Agrícola Panamericana/Zamorano, Tegucigalpa, Honduras.*

Perching is the natural position in which birds sleep and rest, and the presence of perches may improve the health and well-being of pullets housed on the floor, regardless of density. The objective of this study was to determine what effect the presence of perches may have on pullet performance while implementing the practice of beak trimming and varying pullet density. The study consisted of twelve treatment combinations derived from the factorial arrangement of 2 beak trimming methods (trim vs. no trim) x 2 perch treatments (perches vs. no perches) x 3 densities (8, 10 and 12 pullets/m²). The pullets were randomly allocated to the treatments in a randomized complete block design. Body weight, cumulative feed consumption, and pullet uniformity were determined weekly through 16 wk of age. Mortality was recorded daily. Heterophil to lymphocyte ratios (H:L) were measured at 2, 4, 7, 13 and 16 wk of age. Body weights were not significantly different with or without the presences of perches, or among pullets stocked at the three densities. The non-beak trimmed pullets had heavier body weights ($P < 0.05$) as compared to those that were beak trimmed. Feed consumption was not affected by the presence of perches. Pullets that were not beak trimmed and housed at the lowest density (8 birds per square meter) consumed more ($P < 0.05$) feed than the other density treatment combinations. Mortality, pullet uniformity and heterophil to lymphocyte ratios were not affected by any of the treatments. In conclusion, perches had no significant effect on pullet growth parameters when submitted to the practice of beak trimming or placed under various stocking densities.

Key Words: pullets, beak trimming, density, stress, perches

249P Evaluation of different water flow rates of nipple waterers on broiler productivity. A. G. Gernat*¹ and J. L. Grimes², ¹*Escuela Agrícola Panamericana/Zamorano, Tegucigalpa, Honduras*, ²*North Carolina State University, Department of Poultry Science, Raleigh.*

Watering systems utilized in broiler production can impact bird performance. Many companies have increased water flow rates (WFRs) in their nipple waterer (NW) system during brooding above the manufacturers recommended level, then make adjustments in WFRs during the grow period. This has increased moisture and early caking problems in litter. The objective of this study was to determine how birds perform on different WFRs rates during brood and grow periods while observing litter condition. Seven WFR treatments were evaluated for broilers reared from 1-42 d of age: 50 ml/min; 75 ml/min; 100 ml/min; 120 ml/min; 50 ml/min 1-7 d increasing to 75 ml/min 8-42 d; 75 ml/min 1-7 d increasing to 100 ml/min 8-42 d; and 100 ml/min 1-7 d increasing to 120 ml/min 8-42 d. Chicks were identified and randomly allocated in a

randomized complete block design. Body weight (BW), cumulative feed consumption (FC), feed conversion (FCON) (feed: BW), litter moisture (%) and litter moisture under the NW were determined weekly to 42 d. Mortality (MO) was recorded daily. Birds tended to have heavier BW on the higher WFRs (75, 100 and 120 ml/min) in comparison to the lowest WFR (50 ml/min). No differences were observed for FC, FCON or MO. Increased water consumption ($P < 0.01$) was observed as birds aged to 42 d. Birds on treatments with higher WFRs (100 and 120 ml/min) and treatments which were increased to higher WFRs (75-100 ml/min and 100-120 ml/min) consumed greater amounts of water as compared to birds receiving lower WFRs (50 and 75 ml/min). A WFR of 50 ml/min resulted in the lowest litter moisture. The 100 and 120 ml/min WFRs resulted in higher percent litter moisture ($P < 0.01$) under the NW but decreased at the end of the growing period. In conclusion, as birds become heavier, they attempt to consume larger amounts of water benefitting from NW with greater WFRs. As WFRs increase, litter moisture under the NW will initially increase but then decrease as the birds age.

Key Words: broiler, nipples, water flow, litter, water consumption

250P Quality of poultry litter submitted to different temperatures. V. K. Silva, J. D. T. Silva, R. A. Gravena, R. H. Marques, and V. M. B. Moraes*, *São Paulo State University, Jaboticabal, SP, Brazil.*

Fourteen hundred forty day-old male broiler chickens (Cobb-500®) were reared in three different climate chambers up to 42 d, receiving pre-diet (1 to 7 d) added or not added yeast extract (YE) and/or prebiotic (PRE). Each chamber was divided into 16 boxes with 30 kg of shavings/box and 4 replicates with 30 birds per box. All chickens received the same diet from the eighth day. The design was completely randomized in a factorial arrangement 3 x 4, with the factors temperature (high - HT 32°C, control - CT 25°C and low - LT-20°C) and diets (D1- control diet (CD); D2- CD + YE, D3- CD + PRE and D4- CD + YE + PRE). At 42 d samples of poultry litter were collected for analysis of crude protein (CP), dry matter (DM), humidity (H), potential for volatilization of ammonia (PVA) and pH. The poultry litter was removed and weighed to determine the total quantity of residue (TQR). The diets did not influence the variables. The temperatures did not affect the CP and the TQR. MS was higher at CT (79.27), followed by LT (64.16) and HT (59.54). The highest humidity was found at HT (40.46), followed by LT (35.84) and CT (20.73). The greater PVA was observed at HT (23.87) and the less at LT (15.31); however the PVA at CT (16.58) did not differ from the others. The highest pH was found at HT (8.90) and the lowest at CT (8.71), and the pH of the LT (8.83) did not differ from the others. It is concluded that the high temperatures affected the quality of the poultry litter.

Key Words: ammonia, ambient temperature, pre-initial diet, quality of poultry litter

251P Injuries of broilers submitted to different temperatures. V. K. Silva, J. D. T. Silva, and V. M. B. Moraes*, *São Paulo State University, Jaboticabal, SP, Brazil.*

1440 male broiler chickens were raised in three different climate chambers up to 42 days. Each chamber was divided into 16 boxes with 30 kg of shavings/box, and 30 birds per box. The design was completely randomized, with high temperatures (HT-32°C), control (CT-25 °C) and low (LT-20 °C). At 42 days we evaluated the scores of injuries of the hock and foot pad of 10 birds in each replicate. The injuries were evaluated

at 0 - no injuries, 1 - scattered points of inflammation, 2 - little inflammation, 3 - average inflammation, 4 - high inflammation and 5 - very severe injury, and the occurrences were expressed as a percentage. The hock injuries showed score 0 ($P<0.01$) and 1 ($P=0.01$) more often at CT (5.00 and 33.44, respectively) and LT (16.25 and 46.25, respectively) and these scores were less often at HT (0.31 e 15.31, respectively). Score 2 ($P<0.05$) was seen more times at HT (46.25) and less times at LT (25.31). There were no differences between the CT and HT or between CT and LT for this score. The scores 3 ($P<0.05$) and 4 ($P<0.05$) were more often at CT (20.31 and 10.00) and HT (27.19 and 9.37), and less often at LT (9.88 and 1.56). The temperatures had no influence over the score 5 ($P>0.05$). For foot pad injuries more occurrences of score 0 ($P<0.01$) were found at LT (59.15), followed by the AT (32.41) and HT (4.61). The score 1 ($P<0.05$) was observed more often at CT (19.22) and LT (17.30) and less often at HT (9.29). The temperatures had no influence over the score 2 ($P>0.05$). The occurrence of score 3 ($P<0.05$) was more often at HT (27.00) than at LT (13.21). The score 4 ($P<0.01$) occurred more often at HT (26.53) followed by CT (7.73). Score 5 ($P<0.01$) was seen more times at HT (12.91) and less times at CT (1.43). It is concluded that the temperature affected the degree of injury in the hock and foot pad of broilers, since the birds showed less injuries at the cooler temperatures.

Key Words: carcass injuries, quality of poultry litter, temperature

252P Evaluation of stress in female quail fed with passionflower.

J. D. T. Silva, F. H. Hada, R. H. Marques, R. A. Gravena, J. Roccon, V. K. Silva, and V. M. B. Moraes*, *São Paulo State University, Jaboticabal, SP, Brazil.*

This study evaluated the effect of passionflower in the diet on tonic immobility time and injuries against female quails in the reproductive period. A total of 24 female quails and eight male were mated at a ratio of one male for every three females, at 35 days of age, and distributed in completely randomized experimental design for a period of 120 days. The quails were subjected to two treatments (without and with 500 mg of *Passiflora alata*/kg) with four replicates, and housed in cages in a shed for quails. The tonic immobility time, expressed in seconds, and the injuries to the head and body, expressed as a percentage, were evaluated at the end of each production cycle of 14 days, totaling seven tests. For the statistical analysis of the results, we used the GLM procedure of SAS® to assess tonic immobility and Chi-square for the results of injuries. The quails fed with passionflower stayed less time in tonic immobility (10.92 and 24.25, respectively; $P<0.05$) and showed fewer injuries to the head (29.17 and 95.83, respectively, $P<0.01$) and body (12.50 and 54.16, respectively, $P<0.05$) when compared to the quails that did not receive passionflower in the diet. According to the results, we can conclude that the passionflower had the anxiolytic and sedative effect, decreasing the tonic immobility time and the injuries in quails.

Funding: Fapesp and CNPq

Key Words: *Coturnix coturnix japonica*, injuries, *Passiflora alata*, tonic immobility

253P Stress in male quail fed with passionflower.

J. D. T. Silva, F. H. Hada, R. A. Gravena, R. H. Marques, J. Picarelli, V. K. Silva, and V. M. B. Moraes*, *São Paulo State University, Jaboticabal, SP, Brazil.*

This study evaluated the effect of passionflower in the diet on tonic immobility time and injuries against male quails during the reproduc-

ive period. A total of 24 female quails and eight male were mated at a ratio of one male for every three females, at 35 days of age, and were distributed in a completely randomized experimental design for a period of 120 days. The quails were subjected to two treatments (without and with 500 mg of *Passiflora alata*/kg) with four replicates, and were housed in cages in a shed for quails. The tonic immobility time, expressed in seconds, and the injuries to the head and body, expressed as a percentage, were evaluated at the end of each production cycle of 14 days, totaling seven tests. For the statistical analysis of the results we used the GLM procedure of SAS® for tonic immobility, and Chi-square for the results of injuries. The quails fed with passionflower stayed less time in tonic immobility (4.24 and 20.62, respectively; $P<0.05$), and did not show injuries to the head ($P<0.05$) and body ($P<0.05$) when compared to the male quail that did not receive passionflower in the diet. According to the results, we can conclude that the passionflower had an anxiolytic and sedative effect, decreasing the tonic immobility time and the injuries in quails.

Funding: Fapesp and CNPq

Key Words: *Coturnix coturnix japonica*, injuries, *Passiflora alata*, tonic immobility

254P The effects of social and environmental enrichments on leg strength and welfare of tom turkeys. P. A. Weber*, S. Scheideler, and L. Robeson, *University of Nebraska, Lincoln.*

The effects of broiler chick addition on the reduction of early mortality due to starve-outs and the effects of providing environmental enrichment on leg strength of tom turkeys were determined. This experiment was conducted in two phases. Phase one utilized 248 one-day-old turkey poults and 8 three-day old broiler chicks. Four pens of thirty two turkey poults were placed using industry standard procedures for the control groups. Four pens of thirty 1-day-old turkey poults and two 3-day-old broiler chicks were placed together with no human intervention for the treatment groups. Body weights, feed intake and behavioral measurements were collected. Phase two began immediately following phase one. The draft shields and broiler chicks were removed from pens to allow poults to have access to 114 ft² area (3.5 ft²/bird). In four pens, an enrichment containing two adjustable ramps and a platform to perch on was placed in the center of the pen. One feeder was placed above the enrichment and another feeder was placed on the floor opposite an automatic hanging waterer. The remaining four pens remained barren except for two feeders and one automatic waterer. Body weights, feed intake, gait scores, bone quality (tibial dyschondroplasia scores, bone ash, bone tibial length and diameter), carcass yield percent, mortality and behavior measurements were made. No significant treatment differences were observed for feed intake, body weights and mortality during phase I. Behavioral results indicated that with broiler addition, poults spent equal time eating, drinking, active and resting as traditionally raised birds. It could be concluded from these results that broiler addition to a flock of poults could minimize human intervention in the setting process saving time and money for the producers. No significant differences were found in body weights, feed intake, gait scores, bone quality measurements, carcass yield percent, mortality or behavior due to the platform enrichments. Environmental complexity of this magnitude did not increase leg strength in tom turkeys.

Key Words: turkeys, welfare, enrichments