

to serve as a reference point for this study. All tissue samples were weighed and sub-sampled for glycogen analysis. Liver glycogen (3.1 mg/g liver or 2.8 mg total) and breast glycogen (2.3 mg/g, 3.7 mg total) were 2 and 1.2 times higher, respectively, in the winter than in the summer ( $P < 0.0001$ ). Only during the winter did hatch time affect glycogen status. Total glycogen levels in liver and breast were 3.4 and 1.3 times higher, respectively, among poult hatched at 648 h than those hatched at 636, 660 or 672 h. Post-hatch holding played a significant role in the recovery of glycogen in breast muscle in winter and in liver glycogen in summer, however total breast glycogen decreased 1.35 fold during the holding period in the summer. These results demonstrate that hatch time and season influence glycogen reserves, possibly affecting early poult survival.

**Key Words:** turkeys, hatch time, glycogen

**118 Incubation temperature and eggshell conductance effects on the intestinal maturation and thyroid function in commercial turkey poult hatching from a first cycle flock.** S. L. Funderburk\*<sup>1</sup>, V. L. Christensen<sup>1</sup>, G. G. Campbell<sup>2</sup>, M. J. Wineland<sup>1</sup>, J. L. Grimes<sup>1</sup>, K. M. Mann<sup>1</sup>, E. R. Neely<sup>1</sup>, D. T. Ort<sup>1</sup>, D. V. Rives<sup>2</sup>, and J. P. McMurtry<sup>3</sup>, <sup>1</sup>North Carolina State University, Raleigh, <sup>2</sup>Prestage Farms, Clinton, North Carolina, <sup>3</sup>USDA-ARS, Beltsville, Maryland.

Eggshell conductance (G) and egg weight (EW) affect poult viability. Poor livability may be related intestinal maturation and thyroid function of the neonate. The objectives of this study were to test if incubator temperature and G determine poult maturity among egg from a young turkey flock. Maturation was assessed by measuring body weight (BW), feed per gain, jejunum maltase (M) and alkaline phosphatase (ALP) activities and thyroid function of commercial turkey poult. Eggs from a first cycle flock (new), mean EW 83.47 g, were weighed, numbered, set and incubated under standard operating procedures in a commercial turkey hatchery. Eggs were incubated under a high temperature profile (HP) and under a low temperature profile (LP). All eggs were reweighed at 25 d and G was calculated. The eggs were then sorted into three groups: high, average, and low G. At hatch poult were identified by G group and incubation profile. Poult from each experimental group was placed in battery brooders and grown for 7d and BW and feed consumption were measured at days 1, 3, 7. At days 1 and 3 posthatching blood and intestinal samples were taken from each G group and incubation profile. Data were analyzed using the GLM procedure of SAS. LP poult showed greater total jejunal M, T4 and BW, but decreased gain than HP poult. High and average G poult showed higher M, BW and gain compared to low G poult. Average G males possessed the highest amount of T3, while the average G females had the lowest amount of T3. Females had a heavier jejunum

relative to body weight than the males as well as a higher feed per gain value. Incubation profile interacted with G to affect poult M, ALP and thyroid activities among poult from a new flock. Thus, as flock age changes incubation profile and G are tools that may be managed to improve poult maturity.

**Key Words:** conductance, maltase, thyroid

**119 Incubation temperature and eggshell conductance effects on intestinal maturation and thyroid function in commercial turkey poult hatching from an induced molted flock.** S. L. Funderburk\*<sup>1</sup>, V. L. Christensen<sup>1</sup>, G. G. Campbell<sup>2,1</sup>, M. J. Wineland<sup>1</sup>, J. L. Grimes<sup>1</sup>, K. M. Mann<sup>1</sup>, E. R. Neely<sup>1</sup>, D. T. Ort<sup>1</sup>, D. V. Rives<sup>2</sup>, and J. P. McMurtry<sup>3</sup>, <sup>1</sup>North Carolina State University, Raleigh, <sup>2</sup>Prestage Farms, Clinton, North Carolina, <sup>3</sup>USDA-ARS, Beltsville, Maryland.

Eggshell conductance (G) and egg weight (EW) affect poult livability. Poor viability may be related to intestinal maturation and thyroid function of the neonate. The objectives of this study were to test if incubator temperature and G determine poult maturity. Maturation was assessed by measuring body weight (BW), feed per gain, jejunal maltase (M), alkaline phosphatase (ALP) and thyroid function of commercial turkey poult. Eggs from an induced molted flock (recycled), mean EW of 92.55 g, were weighed, numbered, set and incubated under standard operating procedures in a commercial turkey hatchery. Eggs were incubated using a high temperature profile (HP) and a low temperature profile (LP). All eggs were reweighed at 25 d and G was calculated. The eggs were then sorted into three groups: high, average, and low G. At hatch poult were identified by G group and incubation profile. Poult from each experimental group were placed in battery brooders and grown for 7 d and BW and feed consumption were measured at days 1, 3, and 7. At days 1 and 3 posthatching blood and intestinal samples were taken from each G group and incubation profile. Data were analyzed using the GLM procedure of SAS. Poult incubated under the HP showed increased jejuna weight, M, ALP and T3:T4 compared to LP poult. High and average G poult showed greater jejuna ALP, BW gain and decreased feed per gain compared to L G poult. Males incubated at HP with high G had higher M than average and low G males at HP. Females incubated at HP with an average and low G had greater M than high G females at HP. The greatest BW can be seen among HP males with average G and HP females with high G. Incubation profile interacted with G to affect M, ALP and thyroid activities among poult from a recycled flock. Thus, incubation profile and G may be managed to improve poult maturity.

**Key Words:** conductance, maltase, thyroid

## Processing, Products, and Food Safety: Processing and Products

**120 Modeling broiler growth with Neural Networks using simulated data.** H. A. Ahmad\*, T. Habtemariam, B. Tameru, D. Nganwa, L. Ayanwale, and G. Beyene, *Tuskegee University, Tuskegee, Alabama.*

Broiler growth modeling is usually done using average body weight data over certain periods of time for specific strain of birds under given management conditions. Such growth curve data are then analyzed for its underlying distribution and for predictions either with mathematical

models, like Gompertz or nonlinear statistical models that fits the data best. Constant selection in genetic pool, nutritional factors and environmental concerns however, make such models limited in their utility due to difficulty in fitting the growth curve across time, bird-strain and other determining variables. Moreover, generating data for every strain of birds under continually changing variables is not a feasible approach. The current model addresses two objectives: using simulation techniques to generate growth data, using published literature, on broilers for different growth periods; and use of artificial intelligence techniques rather mathematical-statistical approaches

for predictions. By breaking down the actual broiler growth data into five-day intervals, with known means and standard deviations, Normal distributions were generated for the broiler growth using @Risk software. These simulated data were then used to recognize data patterns and model growth curve with various Neural Networks, an artificial intelligence technique for prediction modeling, using NeuroShell 2 software. Three Neural Networks, namely BP3 (three layers back propagation, each layer connected to previous layer), BP5 (five layers back propagation, each layer connected previous layer) and Ward (five hidden slabs with various activation functions) were used in this research. These Networks were trained using the broiler growth-simulated data. Once the Networks were sufficiently trained, they were then exposed to the actual growth data that they have not seen before to predict broiler growth over next 50 days. BP3 Neural Network gave the best fitting line with predictions tightly fitting to the actual data points. The  $R^2$ , the coefficient of multiple determinations, was 0.998, a near perfect. The  $R^2$  for BP5 and Ward Neural Networks were 0.967 and 0.973, respectively.

**Key Words:** broiler growth curve, simulation, neural networks

**121 Identifying process variables for a low atmospheric pressure stun/kill system.** J. L. Purswell<sup>\*1</sup>, J. P. Thaxton<sup>2</sup>, and S. L. Branton<sup>1</sup>, <sup>1</sup>USDA-ARS Poultry Research Unit, Mississippi State, Mississippi, <sup>2</sup>Mississippi State University, Mississippi State.

Current systems for pre-slaughter gas stunning/killing of broilers use process gases such as carbon dioxide, argon, or a mixture of these gases with air or oxygen; these systems work by displacing oxygen to induce hypoxia. In this study, mechanical removal of oxygen by reducing air pressure was investigated as an alternative to carbon dioxide or argon based stun systems. Low atmospheric pressure systems could offer advantages in worker safety and operational cost because they operate solely with air. A total of 48 male broilers aged 56 d were subjected to low atmospheric pressure. Six treatments of pressure ranging from 0.70 to 0.20 atm (-228 to -608 mmHg vacuum) were administered with eight replications. Birds were individually placed in a vacuum chamber and exposed for two minutes; behavioral responses such as head shaking, wing flapping, and loss of posture were recorded. The test system was comprised of a 83.3 l cylindrical vacuum tank directly connected to a rotary vane vacuum pump with a flow rate of 16.9 m<sup>3</sup>/h; the vacuum chamber had a translucent acrylic lid for observation. A PC-based data acquisition and control system was used to monitor tank pressure and control pump operation. Tank pressure was measured with a strain-gage based pressure transducer and airflow was controlled with manually actuated ball valves. Behavioral responses observed in birds exposed to atmospheric pressures at 0.60 atm and below were similar to those noted for exposure to other process gases used in controlled atmosphere stunning/killing systems, including head shaking, wing flapping, and loss of posture. The incidence of these behaviors increased with decreasing pressure and all birds exposed to pressures of 0.40 atm and higher fully recovered from exposure to reduced pressure; 75% of birds exposed to 0.30 atm and 100% of birds exposed to 0.20 atm did not recover. Loss of posture was observed in 100% of birds exposed to both 0.30 and 0.20 atm. Thus, the operating range of a low atmospheric stun/kill system is 0.30 to 0.20 atm and further study of pressure level, evacuation rate, and exposure time are warranted to refine the process.

**Key Words:** gas stunning, slaughter

**122 Physiology of low atmospheric pressure as a stunning/killing system in broilers.** J. Thaxton<sup>\*1</sup>, J. Purswell<sup>2</sup>, and S. Branton<sup>2</sup>, <sup>1</sup>Mississippi State University, Mississippi State, <sup>2</sup>USDA/ARS Poultry Research Unit, Mississippi State, Mississippi.

Alternatives to electrical stunning of broilers before slaughter by exsanguination are being studied. Inhalation of inert gases has been proposed as a humane stunning method. High levels of carbon dioxide (CO<sub>2</sub>) with or without argon rendered birds unconscious, as evidenced by suppressed electroencephalograms (EEG), within 20-40 sec after onset of exposure. This method is proposed as an effective and humane method of stunning poultry. The present report is focused on evaluation of low atmospheric pressure as a method of slaughter of poultry. Market aged broilers (59 d) included in several experiments were fitted with electrodes which insured continuous monitoring of both EEG and electrocardiograms (ECG). Birds were placed in an air-tight decompression chamber (volume =83.3L) and pressures of 0.70 to 0.20 atmospheres (-228 to -608 mmHg vacuum) were achieved using a rotary vane vacuum pump with a flow rate of 16.9 m<sup>3</sup>/h. A PC-based data acquisition and control system was used to monitor tank pressure, control pump action, and receive telemeterized EEG and ECG signals. A signal decrease in EEG and ECG to at least 10% of peak signal voltage, and recumbancy once the desired pressure within decompression chamber was reached was determined on each bird. The average times for these events were 32, 35 and 37 sec, respectively. All birds were maintained in the decompression chamber for 2 min. Immediately thereafter they were decapitated and a sample of blood was collected into a clean test tube. Blood clotting time was determined to be approximately 60 sec longer in birds killed by low pressure, as compared to those killed by cervical dislocation.

**Key Words:** electroencephalogram, electrocardiogram, stunning/killing

**123 Impact of age and time of portioning on tenderness of slittered broiler breast fillets.** C. M. Owens<sup>\*</sup>, A. Saha, A. V. S. Perumalla, and J.-F. C. Meullenet, *University of Arkansas, Fayetteville.*

Boneless breast fillets are often portioned into smaller pieces in order to create highly uniform products for foodservice operations and to maximize usage of breast fillets. Larger birds (>3.2 kg) are often used in this deboning market. The purpose of this study was to evaluate the effect of age on tenderness of slittered (horizontally cut) breast meat and the effect of time of portioning on tenderness. Two hundred forty broilers either 6 or 8 week of age (n=120 each) were slaughtered in an in-line system using a two stage chilling system, and carcasses were deboned at either 2 or 4 h postmortem. Boneless breast fillets were then horizontally cut (slittered) at either time of deboning or at 24 h postmortem to evaluate the effect of portioning time on tenderness. Whole and slittered fillets (top piece) were weighed. Tenderness was assessed by cooking slittered fillets to an internal temperature of 76 C and shearing using the MORS method. Whole and slittered fillets from 8 wk old birds were significantly heavier (P<0.05) than fillets (whole and slittered) from 6 wk old birds. The difference between the treatments of the slittered fillets was approximately 40 g. After cooking, the fillet height of the two treatments differed by less 3 mm (19 vs. 16.7 mm). Deboning at 2 h postmortem reduced tenderness compared to deboning at 4 h as indicated by the 2 h fillets having a significantly higher (P<0.05) MORS total energy than the 4 h fillets. Age impacted tenderness as well. The slittered fillets from the 8 wk

broilers had significantly higher ( $P<0.05$ ) MORS total energy (tougher) than the 6 wk broilers. The time of slitting did not further impact tenderness as indicated by no significant differences between total energy values of fillets slitted at time of deboning or at 24 h. The results of this study suggest that age of broilers can impact tenderness of slittered/portioned breast meat. In this study, the deboning process impacted tenderness more than the secondary process of portioning.

**Key Words:** tenderness, portioning, breast meat

**124 Optimizing meat tenderness, juiciness and flavor of marinated broiler breast fillets using varying levels of salt.** A. Saha\*, A. V. S. Perumalla, Y. Lee, J. F. Meullenet, and C. M. Owens, *University of Arkansas, Fayetteville.*

Marination is an increasing popular trend in the meat industry for meat quality enhancement. The purpose of this study was to evaluate and compare the effects different levels of salt in marinated poultry breast meat. A total of 100 broiler carcasses were deboned at 4h postmortem and breast fillets were marinated with one of 4 concentrations of salt: 0.5%, 0.75%, 1%, and 1.25%. All marinated treatments had 0.45% phosphate concentration. A non-marinated control was also included. Sensory evaluations of left fillets for juiciness, tenderness, salt intensity, flavor intensity, and overall impression were obtained on all treatments using hedonic and just about right scales. Instrumental tenderness analysis was conducted on right fillets using MORS method. Using the hedonic scale, there was no significant difference in the marinated products (0.5% to 1.25% salt) for overall impression, flavor, and texture. However according to the JAR scale, as the percentage of salt in the formulation increased (0.5, 0.75, 1.0, 1.25%), the percentage of consumers who considered the product as not salty enough generally decreased. The products with the higher concentrations of salt (1.0 and 1.25%) resulted in high percentages of consumers who considered the product too salty. For juiciness and tenderness, a large percentage (>70%) of the consumers considered 0.5%, 0.75%, and 1.0% treatments to be just about right. Additionally, consumers rated samples with salt concentrations of 1% and above as being too strong for overall flavor. Using instrumental tenderness analysis, salt concentrations above 1.0 % were more tender than other treatments; however, all marinated treatments were significantly more tender than non-marinated controls. These results indicate that differences exist among products marinated with varying concentrations of salt and may impact consumer acceptability of products.

**Key Words:** salt, sensory, marination

**125 Marination properties of air chilled and water chilled broiler breast fillets.** A. V. S. Perumalla\*, A. Saha, Y. Lee, J. F. Meullenet, and C. M. Owens, *University of Arkansas, Fayetteville.*

The purpose of this study was to evaluate the effect of carcass chilling methods on marination properties and tenderness of broiler breast fillets. A total of 90 broilers were slaughtered at 6 wk of age. Carcasses were either water-chilled (2 stage pre-chill/chill system) (WC) or air-chilled (AC), and deboned at 3 hrs postmortem to allow sufficient chilling of the AC carcasses. Fillets were tumble marinated in a 15% solution (0.75% salt and 0.5% phosphate, final concentration) at 24

h postmortem for 30 min. Water uptake of the RTC, drip loss of the boneless fillets, marination pickup and retention, cook loss, muscle pH and total energy of shear (MORS method) were measured. During the chilling process, the WC birds had a significantly higher percentage water uptake in the RTC carcass (4.08%) than the AC birds (-2.12%). Although carcasses had weight changes due to chilling, drip loss of the boneless breasts was not affected by chilling method as indicated by no significant difference in drip loss of fillets. Additionally, the chilling treatments did not affect marination properties; there were no significant differences between treatments in marination pickup, marination retention, or cook loss of fillets. The pH values measured at both 3 h and 24h postmortem were similar in both the treatments. Tenderness was not affected by chilling method as indicated by no significant difference between WC and AC in the MORS total energy of the marinated fillets. In this study, air chilling did not affect marination or tenderness properties of broiler breast fillets, producing similar results as the water chilling method.

**Key Words:** marination, water chilling, air-chilling

**126 Evaluation of smoker oven cooking performance using whole broiler carcasses.** L. J. Bauermeister\*, M. A. Leslie, E. T. Moran Jr., and S. R. McKee, *Auburn University, Auburn, Alabama.*

A research study was conducted to evaluate the cooking performance within a KOCH One-Truck MarketMaster™ Smokehouse. Broilers (R X 708 Males) receiving common feed and management were conventionally processed (n=216) and were randomly divided into two treatments: Fresh kept at refrigeration (4 C) and Frozen kept in a freezer (-10 C) until completely frozen (24 hr). The frozen treatment was then thawed for 48 hr. All carcasses were weighed and drip loss was calculated. The carcasses were brined overnight using a common formulation and repetitively weighed again to measure progression in yield. Birds were randomized among 3 cooking cycles and each cycle had 3 vertical blocks (Top, Middle and Bottom), a left and right block and a front and back block. The oven was evaluated for cooking uniformity by cook-loss, cooked breast yield, skin color of the cooked product and the color of the breast meat. All color was evaluated using a Hunter L\*a\*b\* color system measured with a Minolta Colorimeter standardized to a 'pink' color plate. There were no differences found in the left and right blocks or the front and back blocks. There were differences in cook loss, Skin L\* value and Skin a\* value for the vertical blocks. For cook loss, the trend was Top≤Middle≤Bottom tier indicating that the bottom of the oven was warmer than the top. The Skin L\* values were greatest in the top and middle tiers of the oven which is equivalent to a lighter product. The bottom Tier had the lowest L\* value corresponding to a darker color. For the Skin a\* values, the top and middle tiers had the lower values and bottom tier had the highest value indicating more red color. Between the 3 oven cycles there were differences in cook loss, cooked breast yield, Skin L\*a\*b\* values and Meat L\*a\*b\* values. Variation in product location within the smokehouse for heat, air and smoke distribution can contribute to variation in product quality and lack of uniformity. Blocking to accommodate these differences provides additional dimension to source birds and preceding treatments.

**Key Words:** smoked chicken, product uniformity, cook loss

**127 Cathepsin activity in two commercial broiler chicken strains fed supplementary tryptophan.** M. MacKenzie<sup>\*1</sup>, J. MacIsaac<sup>2</sup>, and B. Rathgeber<sup>3</sup>, <sup>1</sup>University of Alberta, Edmonton, AB, Canada, <sup>2</sup>Atlantic Poultry Research Institute, Truro, NS, Canada, <sup>3</sup>Agriculture & Agri-Food Canada, Truro, NS, Canada.

Reduced protein functionality in breast muscle tissue has been shown to be associated with increased proteolytic degradation of important structural proteins in skeletal muscle. The group of enzymes believed to be responsible for this degradation is the cathepsins. To study this relationship it would be beneficial to have a natural source of variation for activity of these enzymes. A study was conducted to examine the variability of cathepsin activity in both sexes of two strains of commercial broilers. Additionally, dietary tryptophan was administered in attempt to reduce bird stress levels and influence the rate of postmortem proteolytic activity. Two strains of sex-separated broiler chickens were randomly assigned to 16 pens of 38 birds each and fed diets formulated to contain 0g/kg or 6g/kg of tryptophan above commercial levels. Birds were raised to 38 days of age and breast samples from 4 birds per pen were collected at 15 m postmortem and frozen in liquid nitrogen at a commercial slaughter facility. Levels of cathepsins B and L were determined using fluorescent substrates incubated in a microtitre plate reader. Results indicated the two strains differed in cathepsin activity. Strain A had a higher cathepsin B activity than strain B ( $P < 0.001$ ). The opposite effect was observed for cathepsin B + L activity ( $P = 0.022$ ). Dietary tryptophan supplementation increased activity of cathepsin B + L for both strains ( $P = 0.036$ ). However, tryptophan was not consistent in its effect on each sex. Strain A males fed the control diet had a lower level of breast muscle cathepsin L activity than strain B males which was not different when tryptophan was fed. When strain A females consumed excess tryptophan the cathepsin L activity was reduced compared to strain B. These two commercial broiler strains appear to be good candidates for studying the effects of cathepsin activity on postmortem muscle changes. The influence of tryptophan may be a useful tool to augment the utilization of these strains for muscle quality research. Additional studies will focus on the impact of cathepsin activity in relation to protein functionality and poultry meat quality.

**Key Words:** broiler chicken, cathepsin, tryptophan

**128 Apple by-products as poultry feed ingredients.** C. Ronalds<sup>\*1</sup>, H. P. V. Rupasinghe<sup>1</sup>, and B. Rathgeber<sup>2</sup>, <sup>1</sup>Nova Scotia Agricultural College, Truro, NS, Canada, <sup>2</sup>Agriculture & Agri-Food Canada, Truro, NS, Canada.

Each year, industrial processing of apples in Nova Scotia results in the production of over four million kilograms of waste by-product in the form of peels, core, and pomace. Both the cost of disposal and the waste of the valuable antioxidant present in by-products are of concern to the agricultural sector. The objective of this research project is to study the feasibility of developing value-added poultry feed ingredients from apple by-products by evaluating broiler growth response to elevated levels of dietary inclusion. The long term objectives are to investigate the bio-availability of key apple phenolics and their potential inhibition of lipid oxidation of processed breast and thigh meat. A floor trial was conducted involving 608 commercial male broilers. Birds were randomly assigned to one of 16 pens and raised until 25 days of age on standard corn and soybean based starter and

grower diets. The pens were randomly assigned one of four treatment finisher diets with the inclusion of dehydrated apple skin powder at the following levels (0%, 5%, 10%, and 15% (w/w)). These diets were formulated to be isocaloric and isonitrogenous based on results of a broiler digestibility study previously conducted to determine broiler utilization of nutrients from similar apple by-product. The birds in this study were raised from 25 to 36 days of age on treatment diets at which time they were weighed to determine growth performance. Statistical analysis revealed that the inclusion of dehydrated apple skin powder up to 15% of a balanced diet does not significantly ( $p > 0.05$ ) influence the broilers' growth or feed efficiency (FE) (1806g, 2.16 FE) compared to control birds (1839g, 1.96 FE). Future studies will include the evaluation of incorporation of apple phenolics in broiler tissues and the potential development of other feed ingredients rich in apple phenolics.

**Key Words:** broiler chicken, apple phenolics, growth performance

**129 Influence of dietary organic and inorganic chromium supplementation on lipid peroxidation and proteolysis in meat of heat-stressed broiler chicks.** M. Toghyani<sup>\*1</sup>, M. Shivazad<sup>2</sup>, A. Gheisari<sup>3</sup>, A. Khodami<sup>4</sup>, and R. Bahadoran<sup>1</sup>, <sup>1</sup>Islamic Azad University, Khorasgan Branch, Esfahan, Iran, <sup>2</sup>Islamic Azad University, Science and Research Branch, Tehran, Iran, <sup>3</sup>Esfahan Agricultural Research Center, Esfahan, Iran, <sup>4</sup>Islamic Azad University, Khorasgan Branch, Esfahan, Iran.

In this experiment four hundred and twenty five-day-old male broilers (Ross 308) in heat stress condition ( $33 \pm 3^\circ\text{C}$ ) were allocated to seven treatments with four replicates in a completely randomized design. Treatments were supplemented with 0 (control), 500, 1000 or 1500 ppb Cr in the form of chromium nicotinate and chloride as organic and inorganic sources respectively. At 42 days of age three chicks were chosen randomly from each replicate, killed and carcass and abdominal fat pad were removed, weighed and expressed as a percentage of live body weight. During two and six days of refrigerated storage ( $4^\circ\text{C}$ ) malonaldehyde (TBARs) and tyrosine value of breast and thigh meat were measured as indicators of lipid peroxidation (oxidative stability) and proteolysis of meat respectively. Chromium supplementation increased carcass yield and decreased abdominal fat pad ( $P < 0.01$ ). Storage time significantly increased lipid peroxidation and proteolysis of thigh and breast meat ( $P < 0.01$ ). TBARs value (mg malonaldehyde/kg meat) of thigh muscle for each storage time was higher than breast muscle ( $P < 0.01$ ). It was also found that increasing dietary chromium supplementation, especially 1500 ppb Cr, significantly decreased lipid oxidation and TBARs value of thigh and breast muscle for 2 days of storage ( $P < 0.05$ ). On the 6th day of storage, dietary Cr supplement did not significantly decrease lipid peroxidation of breast and thigh muscles ( $P > 0.05$ ). The results of this experiment show that in heat stress conditions, supplemental chromium especially 1500 ppb nicotinate (organic chromium) lead to an increase of carcass yield, a reduction in abdominal fat pad and also improved oxidative stability of thigh and breast meat but had no effect on proteolysis of meat during refrigerated storage.

**Key Words:** broiler, organic and inorganic chromium, lipid peroxidation and proteolysis

**130 The effect of Tasker Blue on aerobic plate counts and *Escherichia coli* counts on fresh broiler chicken carcasses.** S. M. Russell\*, *The University of Georgia, Athens.*

A study was conducted to evaluate the effect of Tasker Blue (sulfuric acid, ammonium sulfate, and copper sulfate) on aerobic plate counts (APC) and *Escherichia coli* (*E. coli*) counts on fresh broiler chicken carcasses. Two 55 gallon drums were filled with scalding water (S), 2 with water from chiller 1 (CH1), 2 with water from chiller 2 (CH2), 2 with water from chiller 3 (CH3), and 2 with tap water (DIP) after 5 h of run-time in a commercial poultry processing facility. One of each of these pairs of drums was used as a control (C) and one was dosed with Tasker Blue (TB) to a pH of 2.0 and copper content of 2.0 ppm, except chiller water was dosed to a pH of 3.2 and a copper content of 2.0 ppm. S, CH1, CH2, CH3, and DIP exposure times for C and TB were 2 min, 17 min, 15 min, 45 min, and 10 s, respectively. Five carcasses each were exposed to C DIP or TB DIP as a post-chill dip. Five carcasses each were exposed to C S or TB S and C DIP or TB DIP. Five carcasses each were exposed to C S, CH1, CH2, CH3 and

DIP or TB S, CH1, CH2, CH3 and DIP. After treatment, the carcasses were allowed to drip for 1 min, individually placed into sterile bags, packed on ice in coolers, transported to the laboratory, and evaluated for APC and *E. coli* counts. Two replicate trials were conducted. Log<sub>10</sub> APC results for DIP were 6.29 and 5.15 for C and 2.13 and 2.48 for TB for Reps 1 and 2, respectively. Log<sub>10</sub> *E. coli* results for DIP were 3.93 and 4.14 for C and 0.34 and 0.91 for TB for Reps 1 and 2, respectively. Log<sub>10</sub> APC results for S and DIP were 4.86 and 4.79 for C and 2.51 and 2.53 for TB for Reps 1 and 2, respectively. Log<sub>10</sub> *E. coli* results for S and DIP were 2.97 and 3.14 for C and 1.77 and 1.67 for TB for Reps 1 and 2, respectively. Log<sub>10</sub> APC results for S, CH1, CH2, CH3, and DIP were 4.73 and 3.62 for C and 0.67 and 0.60 for TB for Reps 1 and 2, respectively. Log<sub>10</sub> *E. coli* results for S, CH1, CH2, CH3, and DIP were 2.63 and 2.71 for C and 0 and 0.20 for TB for Reps 1 and 2, respectively. Tasker Blue, applied at various locations throughout the processing operation, dramatically and significantly ( $P \leq 0.05$ ) lowered APC and *E. coli* on broiler carcasses.

**Key Words:** *E. coli* count, Tasker Blue, chicken