



2021 PSA Annual Meeting

**ONLINE**



**ABSTRACT BOOK**

Recent data has indicated that interactions among the branched-chain amino acids, specifically valine and leucine, can negatively influence broiler performance and carcass traits. Therefore, an experiment was conducted to observe the interactive effects between dietary valine and leucine on live performance, carcass traits, and Pectoralis major myopathies of Cobb MV × 500 broilers. A corn/soybean meal basal diet was formulated to contain Val/Lys and Leu/Lys ratios of 72 and 130, respectively, with a digestible lysine level of 1.05%. Graded amounts of feed-grade L-valine and L-leucine were added in order to produce 12 experimental diets consisting of a 4 (Val/Lys: 72, 77, 82, 87) × 3 (Leu/Lys: 130, 150, 170) level factorial design. Diets were fed to eight replicate pens of 21 male broiler chicks. Body weight gain, feed intake, and feed conversion were determined for the 32 to 45 d finisher period. At d 46, four birds per pen were processed for determination of carcass traits and the incidence and severity of woody breast in P. major fillets. All data were analyzed by two-way ANOVA using SAS 9.4. Statistical significance was considered at  $P \leq 0.05$  and means were separated using a repeated t-test, when appropriate. No differences were observed for any live performance or carcass trait variable in response to dietary valine level, leucine level, or their subsequent interaction. Concerning woody breast, a significant interaction ( $P < 0.05$ ) was observed for average score and the distribution of scores 1 and 2. These data indicate that within the valine and leucine levels tested, branched-chain amino acid antagonism did not negatively influence broiler performance and carcass traits. The appearance of an interaction between valine and leucine for woody breast parameters was surprising and the mechanism behind the interaction is currently unknown.

**Key Words:** Valine, Leucine, Branched-chain amino acids, Woody breast, Factorial

**123 Effects of dietary sulfur amino acid supplementation on broiler chickens exposed to acute and chronic heat stress.** Albaraa Sarsour\*<sup>GS</sup>, Mike Persia; *Virginia Tech, Blacksburg, Virginia, United States.*

Non-fatal heat stress (HS) can result in oxidative damage from increased reactive oxygen species. One method for alleviating these chronic effects of HS is the supplementation of sulfur amino acids (SAA) which can be metabolized to produce glutathione, one of the more important antioxidant systems used by poultry. Therefore, the objective of this experiment was to alter dietary SAA content of the diet of broiler chickens exposed to HS from 28 to 35 d to determine the effects on broiler performance, body temperature, intestinal permeability, and oxidative status. Serum concentrations of FITC-Dextran was used to quantify intestinal permeability and oxidative status was determined by reduced glutathione to oxidized glutathione ratio (GSH: GSSG). Four experimental treatments generated from 2 x 2 factorial arrangement of treatments consisting of HS (6 h at 33.3 °C followed by 18 h at 27.8 °C from 28 to 35 d of age) and Thermoneutral (TN: 22.2 °C

continuously from 28 to 35 d) and 2 dietary concentrations of SAA (0.80 and 1.04% digestible SAA that correspond to 100 and 130% of breeder recommendations). Diets fed during HS were formulated to contain 3,200 kcal/kg ME, 19.7% CP, and 1.06% digestible Lys and 0.71% digestible Thr. A total of 648 Ross 708-day-old male chicks were placed in 36 pens with 18 chicks/pen and 9 replicates per treatment. Data were analyzed as a 2 x 2 factorial in JMP 14 ( $P \leq 0.05$ ). Cloacal temperature was increased by 1.7, 1.4 and 1.2 °C with HS at 28, 31, and 35 d, respectively ( $P \leq 0.05$ ). No interaction effects were observed on broiler live performance ( $P \geq 0.05$ ). As expected, HS reduced BWG by 92g and increased FCR by 11 points from 28 to 35 d of age, respectively ( $P \leq 0.05$ ). The additional supplementation of SAA had no effect on live performance ( $P > 0.05$ ). At 28 d of age, there was an interaction where supplementation of SAA to birds exposed to HS was able to reduce the intestinal permeability similar to the TN group ( $P > 0.05$ ). The interaction was lost at 31 d, but HS still increased intestinal permeability ( $P \leq 0.05$ ). By 35 d, broilers were able to restore intestinal function and intestinal permeability was not altered by HS or diet ( $P > 0.05$ ). Additionally, SAA was able to reduce oxidative damage by reducing the GSH:GSSG ratio by 0.41 and 4.91 at 28 ( $P = 0.08$ ) and 35 d ( $P = 0.05$ ). These data suggest that intestinal damage occurs acutely and is possibly maximized within three days, but oxidative damage is more chronic building over the entire 7 d HS period. Increased dietary Met might have some protective effect on these responses to HS although no direct effects on bird performance were reported.

**Key Words:** Sulfur amino acids, Broilers, Heat stress, Intestinal permeability, Oxidative stress

**124 Practical assessment of methionine supplementation regimen for 2 commercial broiler strains on 41 d performance and processing.** Perri A. Purvis\*<sup>UG1</sup>, Andrew Brown<sup>1</sup>, Dalton Dennehy<sup>1</sup>, Kyle Smith<sup>2</sup>, Kelley G. Wamsley<sup>1</sup>; <sup>1</sup>Mississippi State University, Mississippi State, Mississippi, United States, <sup>2</sup>Evonik Corporation, Kennesaw, Georgia, United States.

The current study was conducted with a commercial poultry integrator to help identify potential improvements for their methionine (Met) regimen (MR) utilized for two broiler strains they commonly use (fast growing (FG) vs. high yielding (HY)). Thus, two common sources of synthetic Met supplements were tested: a dry form, DL-Met (DLM), and a liquid form, Met Hydroxy Analogue (MHA). A 2 strain (FG or HY) x 6 MR (1 - 100% MHA to meet HY Breeder Spec for digestible TSAA; 2 - DLM at 65% of MHA used in 1; 3 - MHA at 150% MHA used in 1; 4 - DLM at 65% of MHA used in 3; 5 - MHA at 50% of MHA used in 1; and 6 - DLM at 65% of MHA used in 5) factorial arrangement was employed. All diets were analyzed and within target for DLM and MHA. Day old males (n=2700) were randomly assigned to treatment/pens by location (0.07 m<sup>2</sup>/bird); 9 replicates/treatment. Average BW, BW gain (BWG), feed intake (FI), and FCR were evaluated at d 17,

28, and 40. On d 41, 4 birds/pen (+/- 100 g of average BW/pen) were processed for carcass and breast weights. Data were analyzed using SAS; means were separated using Fisher's LSD where  $P \leq 0.05$ . Strain impacted performance ( $P < 0.05$ ); overall, FG and HY birds finished behind breeder specs by ~2 and 1 d, respectively. Due to the strain x MR interactions being of primary interest and none detected ( $P > 0.05$ ), only the impact of MR will be discussed. Birds fed MR5 had the highest d 17 BW (0.59 kg;  $P = 0.027$ ) but similar to MR 2, 4, and 6; those fed MR3 had the lowest BW (0.56 kg), though similar to MR 1 and 2. Day 0-17 BWG, FI, and FCR were increased when feeding MR 5 ( $P < 0.05$ ); MR4 had intermediate BWG and FI, but also the lowest FCR. Day 28 BW and 0-28 BWG was maximized when feeding MR5 and 6 as compared to MR1-4 ( $P < 0.05$ ). However, MR5 had the highest 0-28 d FCR (1.42), followed by MR6 (intermediate), the lowest FCR was found for MR3 (1.38;  $P = 0.001$ ). Day 40 BW and 0-40 BWG was maximized by feeding MR6 (2.56 kg), however birds fed MR5 were similar for both BW and BWG, and MR2 was similar for BW ( $P < 0.05$ ). For 0-40 d FCR, MR3 had the lowest (1.51), while MR1, 2, and 4 had the next lowest (~1.53;  $P < 0.0001$ ). Birds fed MR6 were intermediate (1.56), and MR5 had the highest FCR (1.57). Carcass weight was maximized by MR6, though similar to MR2; MR1, 3, and 4 had the lowest carcass weight ( $P = 0.001$ ). Total breast weight was maximized by MR4, though MR2 and 3 were similar ( $P = 0.002$ ). Birds fed MR5 had the lowest total breast weight, but similar to MR1, MR6 was intermediate. Data suggests MR6 birds compensated for reduced Met via increased FI and FCR. These data provide nutritionists with insight for MR application to optimize performance and economics and reveal no MR x Strain concerns under these parameters.

**Key Words:** amino acid, broiler, performance, methionine

**125 An investigation into the influence of age on the standardized amino acid digestibility of wheat and sorghum in broilers.** Mukti Barua\*<sup>GS 1</sup>, M. Reza Abdollahi<sup>1</sup>, F. Zaefarian<sup>1</sup>, T.J. Wester<sup>1</sup>, C.K. Girish<sup>2</sup>, Peter V. Chrystal<sup>3</sup>, V. Ravindran<sup>1</sup>; <sup>1</sup>*Monogastric Research Center, School of Agriculture and Environment, Massey University, New Zealand, Palmerston North, Manawatu, New Zealand,* <sup>2</sup>*Nutrition and Care, Animal Nutrition, Evonik (SEA) Pte. Ltd., Jurong Island, West Region, Singapore,* <sup>3</sup>*Baiada Poultry Pty Ltd, Baiada, Pendle Hill 2145, New South Wales, Australia.*

The present study was conducted to determine the standardized ileal digestibility coefficients (SIDC) of nitrogen (N) and amino acids (AA) in wheat and sorghum at six different ages (d 7, 14, 21, 28, 35, and 42) of broilers. Two assay diets were formulated to contain 938 g/kg of each grain as the sole source of AA in the diet. Titanium dioxide (5 g/kg) was added as an indigestible marker. Each assay diet was fed to six replicate cages housing 14 (d 7), 12 (d 14), 10 (d 21), 8 (d 28), 8 (d 35), and 6 (d 42) birds per cage for four days prior to digesta collection from the lower half

of the ileum. The apparent ileal digestibility coefficients (AIDC) were calculated and standardized by using age-appropriate basal ileal endogenous AA losses determined in a previous study by feeding a N-free diet and collecting digesta on d 7, 14, 21, 28, 35, and 42. Data were analyzed by using GLM procedure of SAS with cage means as the experimental unit. Orthogonal polynomial contrasts were performed to determine the linear and quadratic effects of broiler age. In the case of wheat, AIDC of N and all AA increased (linear or quadratic,  $P < 0.05$ - 0.001) with advancing age. No age effect was noticed on the SIDC of N, average of indispensable (IAA) and dispensable AA (DAA), though the average of total AA tended (linear,  $P = 0.09$ ) to be increased by age. In sorghum, the AIDC of N, average of IAA and DAA were unaffected ( $P > 0.05$ ) by age. The AIDC of Met, Trp, Cys, Asp increased linearly ( $P < 0.01$ ) as the birds grew older. However, the SIDC of N, average SIDC of IAA, DAA and total AA were higher at d 7, reduced at d 14 and then plateaued. Among the IAA, the SIDC of Arg, His, Thr and Val decreased (quadratic,  $P < 0.05$  to 0.01) with age. A linear decrease ( $P < 0.05$  to 0.001) was observed in the SIDC of Ile, Leu, Lys, and average of IAA with higher values on d 7. The SIDC of all individual DAA (except for Cys) and the average of DAA decreased with age (linear or quadratic,  $P < 0.05$  to 0.001) with higher values on d 7. Overall, the SIDC of AA increased in wheat and decreased in sorghum with advancing age. The current findings suggest that broiler age influences the AIDC and SIDC of most AA in both wheat and sorghum, and that the age effect may need to be considered in practical feed formulations. The age effect on the AA digestibility in broilers is variable depending on the grain type and specific AA. **Acknowledgement:** We acknowledge the "AgriFutures Australian Chicken Meat Program" for funding the project.

**Key Words:** age, broilers, amino acids, digestibility

**126 Determining amino acid digestibility of soybean meal from different Midwest soybean varieties and growth performance when fed to broilers.** Kara M. Dunmire\*<sup>GS</sup>, Michaela B. Braun, Caitlin E. Evans, Charles R. Stark, Chad B. Paulk; *Grain Science and Industry, Kansas State University, Manhattan, Kansas, United States.*

Two studies were conducted to determine apparent ileal digestibility (AID) of amino acids (AA) and growth performance of broilers fed soybean meal (SBM) from different soybean varieties. Both studies used 1 of 4 soybean sources varying in quality defined by analyzed crude protein (CP) content. Two sources consisted of soybeans from similar regions processed conventionally or experimentally. Other sources included a low quality and high-quality soybean, experimentally solvent extracted at Texas A&M University. Therefore, dietary treatments consisted of a conventionally processed SBM (CSBM; 47% CP) or experimentally processed SBM 42SBM (42% CP), 49SBM (49% CP), or 52SBM (52% CP). In Exp. 1, 240 one-day old