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Metabolism and Nutrition: Amino Acids

186 A road towards the nowadays formulation of dietary protein for poultry. Sergio L. Vieira*[1]; [1]*UFRGS, Zootecnia, Porto Alegre, RS, Brazil.*

The present availability of low-cost synthetic amino acids in the market and the feed formulation towards the expression of optimum animal performance is the result of a long-term evolution. Protein was recognized as a needed nitrogen containing nutrient and first described in 1838. They were then believed as the most important nutrient for maintaining the structure of the body. About a century later, insulin was the first protein to be sequenced, which was a Nobel Prize achievement for the English chemist Dr. Frederik Sanger. The synthesis of the linear chain of amino acid residues, a polypeptide, was understood as a goal to be accomplished by nutritionists because dietary protein had to be degraded to be absorbed. But, at first, this was done by using fish and other animal meals. Then soybean grew as an efficient and comparatively low-cost protein feed ingredient. Feed formulation was going towards the fitting to essential amino acids when synthetic methionine appeared in the market. This was a breakthrough since methionine is first limiting for poultry, then opened opportunities for crystalline lysine as well as other limiting amino acids. Threonine, and then valine, entered commercial feed formulations almost simultaneously as the ideal protein concept was widely accepted as a pathway for an improved use of amino acids by birds. Continuous genetic improvements for broiler growth have been occurring in parallel with the harvest of higher proportions of meat, and then, high amino acid density feeds had to be provided to maximize genetic expressions. The world's population grows and consume more protein daily today than in any other moment. Feedstuffs for poultry have reached a historic high in 2022, which leads to the dilemma of formulation protein for poultry not to maximize performance, but then to optimize it, which presently means feeding lower amino acid density feeds when compared to the recent past.

187 Evaluation of methionine sources on performance and carcass traits of broilers at different dietary sulfur amino acid levels under northern European and middle Eastern conditions. Zeyang Li*[1], Juliano C. de Paula Dorigam[1], Ali Afsar[2], Andreas Lemme[1], Gabriel S. Viana[3], Ehsan Musharbash[4]; [1]*Evonik Operations GmbH, Hanau-Wolfgang, Germany;* [2]*Evonik Iran AG, Teheran, , Iran (the Islamic Republic of);* [3]*Natural Resources Institute Finland (Luke), Jokioinen, Finland;* [4]*Alestesharia Research Farm, Amman, Jordan.*

DL-Methionine (DL-Met, 99%) and liquid DL-2-hydroxy-4-methylthio butanoic acid (methionine hydroxy analogue-free acid, MHA-FA, 88%) are often used in commercial poultry feeds to meet the requirements for Methionine+Cysteine (M+C). However, differences in chemical properties and absorption decrease the relative bioavailability value (RBV) of MHA-FA, which corresponds to 65% of DL-Met for performance . This study aimed to confirm that MHA-FA can be replaced with DL-Met at a weight-to-weight ratio of 100 to 65 under different rearing conditions. In total, 720 (Trial 1: Finland, 5 treatments with 9 replicates and 16 males per replicate, wheat-soybean based feeds) or 2500 (Trial 2: Jordan, 5 treatments with 10 replicates and 25 males and 25 females per replicate, corn-soybean based feeds) day-old Ross 308 broilers chicks (~41 g) were used. In both trials, broilers received a basal diet (BD) formulated to meet the nutritional requirements except for additional Met sources (60-66% of M+C requirements), or BD supplemented with MHA-FA or DL-Met (added at 65% of MHA-FA, w/w), to reach 75% (75MHA-FA, 75DL-Met) or 100% (100MHA-FA, 100DL-Met) of M+C requirements. Broilers were fed *ad libitum* a 3-phase program during day (d) 0-35 (Trial 1) or d 0-32 (Trial 2) under standard housing conditions. Bodyweight (BW), feed intake (FI), daily feed intake (DFI), bodyweight gain (BWG), daily weight gain (DWG) and feed conversion ratio (FCR) were measured in Trials 1 and 2. Carcass (CY) and breast (BY) yields were measured on d 32 in Trial 2. Data was analyzed using one-way ANOVA with GLM procedure of SAS (ver. 9.4). Significances were considered if $P<0.05$ (Tukey test). In Trials 1 and 2, MHA-FA and DL-Met improved ($P<0.01$) FI, DFI, BW, BWG, DWG and FCR compared to BD, without any differences between MHA-FA and DL-Met groups within each M+C level. In trial 1, the 100% M+C groups had higher BW (+4.68%, $P<0.01$), DWG (+4.76%, $P<0.01$) and lower FCR (-4.04%, $P<0.01$) than 75% M+C groups, while DFI did not differ between 75% and 100% M+C levels during d 0-35. In Trial 2, the 100% M+C groups had higher ($P<0.01$) BW (+4.27%) and BWG (+4.34%), and similar FI ($P>0.1$) compared to 75% M+C groups, whilst FCR was only lower (-3.54%, $P<0.01$) in 100MHA-FA vs. 75MHA-FA groups. There was no difference in CY and BY between MHA-FA and DL-Met groups within each M+C level. Breast yield was higher ($P<0.01$) in 100% and 75% M+C vs. BD groups (+16.62%, +8.40%) and in 100% M+C vs. 75% M+C groups (+7.58%), whilst CY was only higher (+3.44%, $P<0.01$) in 100% M+C vs. BD groups. In conclusion, the results confirm that 100 units of MHA-FA can be substituted by 65 units of DL-Met for broilers at the same M+C level, regardless of the regional differences.

188 Effect of high leucine diets supplemented with arginine and valine on growth performance and gut health in broilers challenged with *Eimeria maxima*. Jihwan Lee*[1], Janghan Choi[1], Doyun Goo[2], Hanseo Ko[3], Hanyi Shi[4], Brett Marshall[5], Woo K. Kim[6]; [1]*University of Georgia, Poultry Science, Athens, Georgia, United States;* [2]*University of Georgia, Poultry Science, Athens, Georgia, United States;* [3]*University of Georgia, Poultry Science, Athens, Georgia, United States;* [4]*University of Georgia, Poultry Science Department, Athens, Georgia, United States;* [5]*University of Georgia, Poultry Science, Winterville, Georgia, United States;* [6]*University of Georgia, Athens, Georgia, United States.*

The objective of this study was to investigate the effects of supplementation of arginine and valine on growth performance and gut health in broilers challenged with E. maxima and fed excess leucine diets. A total of 832 fourteen-day-old Cobb 500 male broilers were randomly allocated to a 2×2×4 factorial arrangement with 4 replicate cages of 12 birds per cage. The main factors were two dose of *E.maxima* (EM) either challenged (CC) or non-challenged (NC), two Leu levels of either normal Leu (NL) or high Leu (HL) and amino acid (non-supplemented, 0.5%