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Digestible valine:digestible lysine ratio in diets for brown laying hens from 42 to 54 weeks of age

Guilherme R. Lelis[1], Luiz F.T. Albino[1], Arele A. Calderano[1], Claudson O. Brito*[2], Fernando C. Tavernari[3], Rosana Cardoso Maia[1]
* Universidade Federal de Sergipe; Rua Marechal Rondon, S/N; Aracajú; Sergipe - Brasil
[1]Universidade Federal de Viçosa; [2]Universidade Federal de Sergipe; [3]Embrapa
* claudson@ufs.br

Valine may be considered as potential limiting amino acids to laying hens, after methionine, lysine, tryptophan and threonine. Thus, the appropriate level of valine in the diets is important when they are formulated using the ideal protein concept. However, few studies have been conducted with the objective to determine the requirement of digestible valine and especially its ideal ratio with the digestible lysine in diets for brown laying hens. The objective with this study was to estimate the ideal digestible valine:digestible lysine ratio in diets for brown laying hens of 42 to 54 weeks of age. We used 270 Dekalb Brown hens at 42 weeks of age distributed in a completely randomized design with five treatments, nine replicates and six birds per experimental unit. To ensure that all consumed lysine was metabolized by birds and to prevent the excess of this nutrient, the digestible lysine level in the diets was sub-optimal (0.660%). The digestible valine levels in the experimental diets were 0.555, 0.581, 0.607, 0.634 and 0.660%, providing digestible valine:digestible lysine ratios of 84, 88, 92, 96 and 100%, respectively. Diets were formulated to satisfy the nutritional requirements of birds in accordance with the recommendations of Rostagno et al. (2011), except for valine and lysine. The digestible valine:digestible lysine ratios in the diets were obtained by supplementation of L-valine (98.5%) replacing starch. The ideal digestible valine:digestible lysine ratio was estimated through the studied of performance and egg quality characteristics using analysis of variance, regression analysis and Linear Response Plateau (LRP). Was also calculated 95% of the quadratic and quadratic with plateau for the variables that showed a significant quadratic effect. For this study we used the program SAEG (Sistema para Análises Estatísticas e Genéticas). There was linear effect of digestible valine:digestible lysine ratio on feed intake. Quadratic effect was observed in response to digestible valine:digestible lysine ratios for egg production, egg mass, feed conversion per egg dozen and feed conversion per egg mass. For each one of these parameters, the average of the digestible valine:digestible lysine ratio estimated by different statistical models applied were 92.12, 93.20, 91.50 and 93.57%, respectively. The digestible valine:digestible lysine ratios estimated in this study were lower than that observed by Bregendahl et al. (2008) (102%) that used brown laying hens from 28 to 34 weeks of age. However these values were near the recommended ratio by Rostagno et al. (2011). Egg weight, internal egg quality and weight gain were not affected by digestible valine:digestible lysine ratios. The ideal digestible valine:digestible lysine ratio in diets for brown laying hens of 42 to 54 weeks of age recommended is 92%.

Keywords: amino acid, bird, egg, ideal protein