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CONSTRUINDO SABERES, FORMANDO PESSOAS E TRANSFORMANDO A PRODUÇÃO ANIMAL

REQUIEREMENT OF METHIONINE+CYSTINE IN DIETS FOR LAYING HENS IN SECOND CYCLE OF PRODUCTION ON EGG QUALITY

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Abstract: Este trabalho teve como objetivo avaliar níveis crescentes de metionina + cistina em dietas para poedeiras em segundo ciclo de produção sobre a qualidade dos ovos. Foram utilizadas 144 poedeiras Hisex White com 84 semanas de idade. O período experimental foi de 105 dias (cinco ciclos de 21 dias). O delineamento experimental foi inteiramente casualizado, com sete tratamentos constituídos por níveis de metionina + cistina (0,45; 0,50; 0,55; 0,60; 0,65 e 0,70%) e quatro repetições de seis aves cada. Nos últimos dois dias de cada período, quatro ovos de cada parcela foram coletados aleatoriamente para avaliação. Os dados coletados foram submetidos à análise de regressão polinomial à 5%. Observou-se nos resultados que a exigência de metionina + cistina para poedeiras no segundo ciclo foi maior que a observada na recomendação para poedeiras no primeiro ciclo, principalmente devido os níveis abaixo da recomendação apresentarem piores resultados na qualidade da casca e altura do albúmen. O nível de 0,65% de metionina + cistina apresentou exigência nutricional adequada para poedeiras no segundo ciclo de produção, obtendo melhores resultados de qualidade de ovos.

Keywords: amino acid, egg shell, poultry, requirement

Introduction

Ensure a good nutrition and feed formulation for laying hens it is essential for large-scale egg production in poultry industry. The use of amino acids in the formulation of these feed is very important for the satisfactory quality and quantity of the final product (Figueiredo Jr, 2014).

The methionine is the first limitant amino acid in diets by corn and soybean for birds, with its synthetic form usually used in diets for increase the quality and reduces the protein content, reducing catabolism and nitrogen excretion, without raising production costs. In practical conditions, diets with methionine deficiency reduces the egg production and egg weight, with increase deposition of fat in the liver of hens (Jordão Filho et al., 2006).

The use of second production cycle for laying hens is large used in poultry industry. The diets formulation for laying hens with methionine + cystine levels that meet the requirements of the birds allows an increase in the crude protein content of albumen, egg production, egg size and egg mass produced, in addition to observing improvement in feed conversion per mass or dozen eggs (Brumano, 2008).

Thus, this study aimed to evaluate increasing levels of methionine + cystine in diets for laying hens in second cycle of production on egg quality.

Material and Methods

This study was conducted in the facilities of Poultry Sector, Department of Animal and Vegetable Production (DPAV), College of Agrarian Sciences (FCA), Federal University of Amazonas (UFAM), south sector of the university campus, Manaus, State of Amazonas, Brazil. The experimental procedures were approved by the local Committee for Ethical Animal Use (CEUA - protocol n. 027/2016) of Federal University of Amazonas, Manaus, AM, Brazil.

144 Hisex White laying hens (84 weeks-of-age) were used. The experimental period was 105 days, divided into five cycles of 21 days. The experimental design

was completely randomized, with seven treatments constituted by increased levels of methionine + cystine (0.45, 0.50, 0.55, 0.60, 0.65 and 0.70%) and four replicates of six birds each.

In the last two days of each period, four eggs from each plot were taken at random to evaluate egg quality. Eggs were weighed on an electronic scale to the nearest 0.01 g. These were placed in wire baskets and immersed in plastic buckets containing different levels of sodium chloride (NaCl), from the lowest to the highest concentration, with density variations from 1.075 to 1.100 g/cm^3, for measure the specific gravity.

For the analysis of albumen and yolk weight, a manual separator of albumen and yolk was used. To calculate albumen and yolk weight, them were placed on a flat glass plate to determine their respective values. For measurement of height, an electronic caliper was used; the values are expressed in millimeters.

The egg shell weight was obtained after them were washed, dried at room temperature for 48 hours and then weighed in grams. Dry shells were used to determine the shell thickness, which were measured using a micrometer in three regions of the shell: basal, meridional and apical. The egg yolk color was evaluated with the ROCHE colorimetric fan with a score of 1 to 15. Haugh unit was performed using the egg weight and albumen height values and the results obtained by the formula UH = 100 x log (H + 7.57 – 1.7 x W0.37), where H = albumen height (mm); and W = egg weight (g).

To determine the shell resistance of eggs, a resistance machine located at the Materials Laboratory of the Superior College of Technology of State of Amazonas University were used. This machine was connected to a computer, generating the power levels (represented in Newton) used for broken the shell.

Data collected were tested by analysis of variance with the GLM procedure of the Statistical Analysis System software and subjected to the polynomial regression analysis at the 5% level of significance.

Results and Discussion

Differences ($p>0.05$) were observed in %shell ($y = -0.053x^2 + 0.06452x + 9.801$; $R^2 = 0.92$), albumen height ($y = 0.0846x + 15.474$; $R^2 = 0.97$), yolk coloration ($y = 0.1029x + 5.66$; $R^2 = 0.93$), shell thickness ($y = -0.1616x^2 + 1.991x + 45.591$; $R^2 = 0.83$) and shell resistance ($-0.9657x^2 + 6.9329x + 27.56$; $R^2 = 0.86$), with better results observed on 0.65% of methionine + cystine for laying hens in second cycle (Table 1).

Table 1. Egg quality of laying hens in second cycle of production fed diets with different levels of methionine + cystine

Variables	Methionine + cystine levels (%)						p-value	Effect	CV, %
	0.45	0.50	0.55	0.60	0.65	0.70			
Egg weight, g	64.24	62.13	64.27	64.50	63.42	63.41	0.24	ns	2.26
Yolk, %	30.21	28.16	27.15	27.96	27.03	28.40	0.76	ns	11.45
Albumen, %	58.51	56.02	58.47	56.88	57.65	57.81	0.38	ns	3.17
Shell, %	9.20	9.41	9.54	9.74	9.59	9.43	0.01	Q	1.99
Yolk height, mm	7.33	7.02	7.00	7.10	7.15	7.23	0.71	ns	6.74
Albumen height, mm	15.53	15.69	15.72	15.80	15.90	15.98	0.05	PL	1.47
Yolk coloration	5.75	5.81	6.03	6.11	6.20	6.22	0.05	PL	4.49
Shell thickness, µm	43.16	43.28	44.07	44.57	45.31	43.66	0.01	Q	1.96
Specific gravity, g/cm^3	1085	1087	1086	1086	1086	1085	0.53	ns	0.14
Haugh unit	81.20	83.26	83.35	83.55	82.47	82.46	0.26	ns	1.78
Shell resistance, N	34.27	35.61	40.30	42.23	35.50	35.16	0.05	Q	7.34

CV - Coefficient of variation. p-value – Coefficient of Probability. PL – Positive Linear Effect. Q – Quadratic Effect. ns – non significant.

In this study, was observed that ideal requirement of methionine + cystine for laying hens in second cycle was higher than observed in recommendation of Rostagno et al. (2017) for laying hens in first cycle, mainly because the levels below of ideal recommendation observed showed worse results in shell quality and albumen height.

Pavan et al. (2005) affirm that the use of protein and dietary amino acids for poultry can provide a supply and balance in the nutritional requirement of these birds, improving their performance at this stage. And from nutritional adjustment of amino acid levels in the diet, the egg quality can be modified aim to reduce the

problems verified at the end of the first production cycle and during the second production cycle, mainly in the shell.

But, Oliveira (1993) also affirm that have a large lack of informations about the ideal levels of amino acids for hens in second cycle, with the requirement tables and commercial manuals do not despoiling very informations about this theme.

Conclusion

In summary, the level of 0.65% of methionine + cystine showed adequate nutritional requirement for laying hens in second cycle of production, obtaining better results of egg quality.

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