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标准回肠可消化氨基酸模式下降低饲粮粗蛋白质水平对蛋鸡生产性能、蛋品质及氮平衡的影响

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Effects of Lowering Dietary Protein Level on Performance, Egg Quality and Nitrogen Balance in Laying Hens under Standard Ileal Digestible Amino Acid Pattern

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摘要 本试验旨在研究标准回肠可消化(SID)氨基酸(AA)模式下,降低饲粮粗蛋白质(CP)水平对海兰灰蛋鸡生产性能、蛋品质及氮平衡的影响。选取540只20周龄体重相近且健康的海兰灰蛋鸡,随机分为5个处理,每个处理6个重复,每个重复18只鸡,预试期1周,正试期12周,采食等代谢能(11.82 MJ/kg)、等赖氨酸(Lys,SID Lys为0.831%)、相同AA模式、不同CP水平(18.0%、17.5%、17.0%、16.5%和16.0%)的试验饲粮。结果表明:SID AA模式下,降低饲粮CP水平可极显著降低平均蛋重和CP摄入量($P<0.01$),显著降低鸡蛋浓蛋白高度($P<0.05$),显著降低蛋鸡摄入氮和排出氮($P<0.05$),有提高氮表观利用率的趋势($P=0.05$);数据偏相关分析表明,饲粮中SID AA模式外的精氨酸、苯丙氨酸和亮氨酸水平下降与平均蛋重下降显著相关($P<0.05$),与浓蛋白高度下降无显著相关($P>0.05$)。结果提示,SID AA模式下,降低饲粮CP水平,除影响平均蛋重和浓蛋白高度外,对其他生产性能、蛋品质及血液生化指标影响较小,平均蛋重的下降与低CP饲粮中精氨酸、苯丙氨酸和亮氨酸不足有关;AA平衡的低CP饲粮,可在维持较高生产性能的同时减轻蛋鸡粪氮排出。

关键词: SID AA 产蛋鸡 生产性能 蛋品质 氮平衡

Abstract: This experiment was conducted to evaluate the effects of lower dietary crude protein (CP) level on performance, egg quality and nitrogen balance in laying hens under standard ileal digestible (SID) amino acid (AA) pattern. A total of 540 healthy Hy-Line W36 laying hens aged 20 weeks with similar body weight were randomly allotted to one of five treatments (18.0%, 17.5%, 17.0%, 16.5% and 16.0% of CP) with the metabolizable energy (ME) of 11.82 MJ/kg and SID Lys of 0.831% under the same AA pattern. Each treatment consisted of six replicates with 18 birds per replicate. The results showed as follows: under the SID amino acid pattern, lowering dietary protein level significantly affected average egg weight ($P<0.01$), CP intake ($P<0.01$), albumen height ($P<0.05$) and nitrogen intake and excretion ($P<0.05$), and a trend of improving the nitrogen apparent availability was also shown up ($P=0.05$). Data analyses of Pearson correlation and Pearson partial correlation showed that the declined average egg weight had significant correlation with the reduction of dietary essential amino acids, such as Arg, Phe and Leu beyond SID AA pattern used ($P<0.05$), but declined albumen height had not ($P>0.05$). In conclusion, lowering dietary CP level rarely affects performance, egg quality and blood biochemical indices except for average egg weight and albumen height, and the decrease of average egg weight is related to the deficiency of Arg, Phe and Leu in the diets. Applying SID AA pattern in low protein diets, performance of laying hens maintains well, while nitrogen excretion is significantly declined.

Keywords: SID AA, laying hens, performance, egg quality, nitrogen balance

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