

Evaluation of the valine requirement of small-framed first cycle laying hens

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Genetic selection has resulted in laying hens that are producing more eggs while consuming reduced amounts of feed over a laying cycle. As so, it is important to reevaluate the amino acid requirements of these new high performing hens. Valine is an essential amino acid required for protein synthesis, however, research on valine requirement has limited in laying hens. The purpose of this experiment was to evaluate the valine requirement in first cycle laying hens from 41 to 60 weeks of age. In total, 270 Hy-line W36 laying hens were randomly allocated to 6 treatments with 15 replicates of 3 birds for each replicate. Hens were maintained 3 to a cage (72 sq in/bird) in a multi-teared A-frame cage system within an environmentally controlled building. Hens were provided a 16:8 lighting schedule and 70 to 80 °F temperature program. A valine deficient basal diet was formulated with corn and peanut meal with determined valine, lysine and crude protein concentration of 0.515, 0.875, 13.4%, respectively. Synthesized l-valine was supplemented to the basal diet in 0.070% increments, resulting in experimental diets containing 0.515%, 0.585%, 0.655%, 0.725%, 0.795% and 0.865% valine, respectively. Hens were provided a controlled amount of feed daily resulting in approximately 95g/hen/d. Hen-housed egg production (HHEP) and mortality were monitored daily. Eggs were collected on two continuous days each week for Feed Conversion Ratio (FCR) calculations and egg quality analysis. Single-slope broken line, multi-slope broken line and quadratic regression were used to estimate valine requirement based on HHEP, egg weight (EW), egg mass (EM), and feed conversion rate (FCR). Based on HHEP, optimum valine requirement was 591.9, 492.0 and 740.8 mg/hen/d (single-slope broken line regression: $Y=80.23 + 0.12219(X-591.9)$, $R^2=0.83$; multi-slope broken line regression: $Y=-0.607+0.1593X-0.1264(X-492.02)$, $R^2=0.86$; quadratic regression: $Y=-0.00019944X^2+ 0.295507X-28.3124$, $R^2=0.85$).

KEYWORDS

Laying hen; valine; egg production; first cycle