Response of broiler chickens to dietary Valine:Lysine ratio

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Reducing dietary crude protein (CP) may reduce manure nitrogen, improve health and reduce feeding cost, thereby contributing to improvements in production sustainability. However, in order to maintain broiler performance when fed lower dietary CP, it is mandatory to know which indispensable amino acids become limiting and their requirements. Two thousand two-hundred males Cobb 500 broilers chickens were fed one of five digestible valine to lysine (Val:Lys) levels (0.64, 0.71, 0.77, 0.83 and 0.89) over the growing (14-21 days) and finishing (22-35 days) phases in which growth performance and body composition, using dual-X ray absorptiometry, were measured. These ratios were obtained by adding synthetic valine to a corn, wheat, wheat middling and peanut meal based masterbatch diet low in CP (16%) and blended with a basal diet. The average daily gain (ADG) of broilers in the grower phase was linearly increased with increasing dietary Val:Lys (+ 3% from 0.64 to 0.89; P=0.015), while feed conversion ratio (FCR) decreased (Linear : $P< 0.001$, Quadratic : P=0.05). In the finisher phase, ADG responded (+7% from 0.64 to 0.77) in a quadratic (P<0.01) and cubic relationship (P=0.03), while FCR responded quadratically (P<0.001), with 0.77 digestible Val:Lys leading to the highest ADG and the lowest FCR. The response of body composition measured by DXA scan at the end of the experiment indicates that the impact of dietary Val:Lys on ADG is the result of differential lean tissue deposition. Results of the current experiment demonstrated that digestible Val:Lys positively influences ADG without affecting ADFI, resulting in improved FCR. However, the response of broilers to the Val:Lys ratio was higher during the finishing period in the current experiment, possibly due to suboptimal CP level during the growing phase.