Effect of guanidinoacetic acid supplementation to diets varying in nutrient density on performance of broilers

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The creatine (Cr) and creatine phosphate system plays a critical role in energy homeostasis of cells and guanidinoacetic acid (GAA) is the single precursor of Cr. We hypothesized that dietary GAA would have different effects on performance, depending on the dietary nutrient density (ND). 540 one-day-old male Ross308 broilers were allocated to 9 dietary treatments with 6 replicates (10 birds each) in a 3×3 factorial arrangement with 3 levels of GAA (0, 0.6 and 1.2 g/kg) and 3 levels of ND (2800, 2950 and 3100 kcal ME/kg, and with other nutrients constant relative to ME). One bird per pen was euthanized on d10, 25 and 42 to determine the concentration of energetic metabolites of adenosine phosphate, Cr and creatinine in breast muscle. In the starter and grower period, increasing levels of ND improved BW, ADG, ADFI and FCR, with the exception of ADFI in the starter period. In contrast, GAA supplementation did not change these performance characteristics. All performance indicators responded markedly to increasing ND in the finisher period, whereas the highest GAA level reduced ADFI (155.6 g/d vs. 161.5 g/d) and FCR (1.81 vs. 1.93) as compared to control. No interactive effects were noted for any performance indicator. Inconsistent effects on various energetic metabolites in breast muscle were noticed. Nonetheless, at the end of the experiment, Cr was elevated when feeding GAA at 1.2 g/kg (5455 mg/kg FM vs. 4338 mg/kg FM). To conclude, effects of GAA were independent of ND level in the diet.