The Effects of Copper on the Efficacy of Phytase, Growth, and Phosphorus Retention in Broiler Chicks

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ABSTRACT Copper is often added to broiler diets at prophylactic concentrations as an antimicrobial despite purported chelation with and reduced utilization of phytin phosphorus. Therefore, male chicks were fed 0, 62.5, 125, 250, or 375 ppm Cu from Cu sulfate in combination with 600 phytase units (FTU)/kg phytase from 9 to 22 d of age (6 cages/diet, 8 birds/cage). Nonphytate phosphorus (NPP) and Ca were formulated to 0.2 and 0.7% of the diet, respectively. Three additional control diets were formulated to contain 0.27, 0.34, and 0.40% NPP, each with 0.7% Ca. Birds fed increasing concentrations of Cu with 600 FTU phytase/kg had linear reductions in performance characteristics ($P \leq 0.05$). Birds fed increasing concentrations of Cu with 600 FTU phytase/kg had linear increases in toe ash percentage ($P \leq 0.027$), but tibia ash percentage was not affected ($P > 0.05$). Birds fed increasing Cu concentrations with 600 FTU phytase/kg had linear reductions in apparent P retention as a percentage of total P ($P \leq 0.0005$). Supplementation with increasing concentrations of Cu to a diet containing 600 FTU phytase/kg resulted in decreases in 21 d BW, BW gain, feed consumption, feed conversion, tibia and toe ash weights, and apparent P retention as a percentage of total P. In this experiment, Cu supplementation did not reduce the efficacy of phytase (i.e., improvement in apparent P retention with phytase supplementation) but did decrease apparent P retention, BW gain, feed consumption, feed conversion, and tibia ash and toe ash weights.

(Key words: broiler, copper, phosphorus, phytase, phytin phosphorus)

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