**METABOLISM AND NUTRITION**

The Effect of Dietary Supplementation with Copper Sulfate or Tribasic Copper Chloride on Broiler Performance, Relative Copper Bioavailability, and Dietary Prooxidant Activity

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**ABSTRACT** Three experiments were conducted to study Cu sulfate and tribasic Cu chloride (TBCC) as sources of supplemental Cu for poultry. In Experiment 1, 252 chicks were fed the basal corn-soybean meal diet (26 ppm Cu) supplemented with either 0, 150, 300, or 450 ppm Cu from Cu sulfate or TBCC for 21 d. Chicks fed 450 ppm Cu from sulfate had lower (P < 0.05) feed intake than those consuming other diets. Feeding supplemental Cu increased (P < 0.0001) liver Cu concentration linearly with increasing dietary Cu regardless of Cu source. The slopes of regression of log10 liver Cu on dietary Cu intake did not differ between sources (P > 0.10). Linear regression over nonzero dietary levels of log10 transformed liver Cu concentration (parts per million of DM) on analyzed total Cu intake (micrograms) resulted in a slope ratio estimate of 106 ± 19 for bioavailability of Cu from TBCC compared to 100 for that in Cu sulfate.

In Experiment 2, a 42-d floor pen study was conducted with 1,260 broiler chicks given the basal corn-soybean meal diet supplemented with 0, 200, 400, or 600 ppm Cu from either feed-grade Cu sulfate or TBCC. Body weight and feed conversion did not differ in birds fed up to 400 ppm Cu from either source. Birds given 600 ppm Cu from either source had lower feed intake, poorer growth, and feed conversion (P < 0.0001). Liver Cu increased (P < 0.0001) linearly with increasing dietary Cu. Based on log10 liver Cu concentration, Cu in TBCC was 112% available compared to 100% for the standard Cu sulfate.

In Experiment 3, Cu sources were added to broiler starter diets at concentrations of 25, 100, and 300 ppm Cu and diets were stored at an elevated temperature to examine the effect of particle size on oxidation. Diets were stored at 37 C for up to 20 d and samples were removed at 4-d intervals. At 300 ppm added Cu, oxidation in TBCC diets was lower (P < 0.0001) than oxidation in diets fortified with coarse Cu sulfate, even though TBCC modal diameter for particle size was almost seven times smaller. Oxidation promotion by Cu sulfate was much greater with fine than in coarse sized particles for all three fortification levels.

(Key words: copper, bioavailability, oxidation, liver, performance, broiler)