Metabolic parameters in young turkeys fed diets with different inclusion levels of copper nanoparticles

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Abstract

The aim of this study was to verify the hypothesis postulating that the supplementation of turkey diets with Cu nanoparticles can lower dietary inclusion levels of Cu without compromising the growth rate and antioxidant status of turkeys. The experiment was carried out on 648 one-day-old Hybrid Converter turkeys divided into 6 groups with 6 replicates per group, in a two-factorial design with 3 dietary inclusion levels of Cu (20, 10 and 2 mg/kg) and 2 dietary sources of Cu - copper sulfate (Cu-SUL) and Cu nanoparticles (Cu-NP). At 42 days of age, blood samples were collected from 2 birds per replicate (12 birds per group), after slaughter livers were collected for analyses. Blood and liver samples were assayed for: Cu, Zn, Ca, P, Mg, GLU, TP, ALB, UREA, TAG, TC, UA, ALT, AST, ALT, GGT, ALP, SOD, GPx, CAT, VIT C, FRAP, GSH+GSSG, LOOH, MDA.

The results of this experiment demonstrate that a decrease in the dietary inclusion levels of Cu from 10 mg/kg to 2 mg/kg does not compromise the growth performance of turkeys, but weakens antioxidant defense mechanisms. A Cu dose of 20 mg/kg induces oxidation reactions and has a much more inhibitory effect on the antioxidant defense system than dietary Cu content of 2 mg/kg. In turkeys, dietary supplementation with Cu-NP has a more beneficial effect on carbohydrate metabolism and antioxidant status compared with Cu-SUL. The results of analyses examining the antioxidant and metabolic status of young turkeys indicate that 10 mg/kg is the optimal dietary inclusion level of Cu.

Key words: nano-copper, turkey, blood, liver, redox status

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