

## Effects of Copper Oxide Nanoparticles on the Growth Performance, Antioxidant Enzymes Activity and Gut Morphology of Broiler Chickens

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**Abstract :** This research was carried out to investigate the effects of copper oxide nanoparticles (nano-CuO) on performance and gut morphology of broiler chickens. A total of 240 one-day-old male chickens (Ross-308) were randomly divided in a completely randomized design, the inclusion of 4 groups of 60 birds with 4 replicates and 15 birds in each. Experimental diets were as follow: T1 control (basal diets, without nano-CuO but contain 9.1 mg Cu/kg from CuO), T2, T3, and T4 basal diet supplementation with 30, 60, and 90 mg nano-CuO/kg, respectively. Feed intake (FI) and gain weight as weekly recorded and on d 21 feed conversion ratio (FCR) were calculated. Furthermore, at the end of the trial (21 d), four birds per treatment (one bird/replicate) randomly selected and after removed blood samples, they slaughtered and then to the analysis of gut morphological. A segment (10 cm) from the middle part of duodenum and jejunum was removed and put in the formalin 10% (pH = 7). The results revealed that nano-CuO had significantly increased body weight ( $P = 0.029$ , but feed intake ( $P = 0.017$ ), and feed conversion ratio ( $P = 0.031$ ) decreased in the birds that fed 90 mg nano-CuO when compared to control and the other groups. Total antioxidant capacity ( $P = 0.041$ ), superoxide dismutase ( $P = 0.036$ ), and glutathione peroxidase ( $P = 0.048$ ) were more in the birds fed diet inclusion of 60 and 90 mg nano-CuO (T4) than other treatments. The lowest malonaldehyde (MDA) level was observed in T3 ( $P = 0.23$ ) and T4 ( $P = 0.028$ ) decreased ( $P = 0.17$ ). The villi height and villi height to crypt depth (VH/CD ratio) numerically increased ( $P = 0.09$ ) in the bird fed 90 mg nano-CuO in comparison with other treatments. According to present results, it could be concluded that dietary nano-CuO improved performance parameters and antioxidant status of broiler chickens during starter period. As well, the optimum improvement observed in the birds fed diet inclusion of 90 mg nano-CuO/kg.

**Keywords :** antioxidant, broilers, copper, performance, nanoparticles

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