Effects of mannan-oligosaccharide and β-glucan prebiotic on the brain oxidant/antioxidant balance in broilers under natural Egyptian summer conditions

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Abstract:

This study was conducted to investigate the potential effects of mannan-oligosaccharide (MOS) and β-glucan (BG) prebiotic (AGRIMOS®) on the redox homeostasis, histopathology, and microglia count in the brain of heat-stressed broiler chickens. One hundred sixty eight (168) Ross one-day-old broiler chicks were obtained from local hatchery. The experiment was started at 28-day old; where birds were exposed to heat stress and were randomly allotted to four dietary treatments containing 0 (control), 0.5, 2, and 4 g/kg MOS and BG probiotic, respectively, for 14 days. Each treatment consisted of three replicates of 14 birds each (i.e., total birds/treatment count is 42 birds). The results indicated a significant decrease in catalase and superoxide dismutase activities in all MOS and β-glucan prebiotic treated groups. Supplementation with 0.5 g of prebiotic/kg diet resulted in a significant increase in glutathione levels; however, a significant decrease in superoxide radicals was found at dose of 4 g of prebiotic/kg diet. The levels of lipid peroxidation in supplemented groups exhibited a significant decrease at doses of 2 and 4 g of prebiotic/kg diet. Although there were no obvious changes in the histoarchitecture of cerebellar tissues, a significant increase in the number of microglia was evident following administration with 4 g of prebiotic/kg diet. In conclusion, supplementation of MOS and BG may be regarded as promising candidate for alleviating the undesirable effects of heat challenge on the brain of broiler chickens, nevertheless; further studies are warranted to look for other nutritional approaches.

Keywords:

Prebiotic, broiler, heat stress, brain, oxidant/antioxidant, microglia

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