Effects of Thymol and Carvacrol on Productive Performance, Antioxidant Enzyme Activity and Certain Blood Metabolites in Heat Stressed Broilers

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The present study was carried out to evaluate the effects of thymol and carvacrol supplementation on performance, immune response, antioxidant enzyme activity and blood parameters of heat stressed broilers. Broilers were fed with commercial diet till 25 d of age, then they were allocated to a completely randomized design with a 3 × 2 factorial arrangement with 6 treatments including 3 levels of carvacrol (0, 300 and 500 mg/kg of diet) and 2 levels of thymol (0 and 250 mg/kg of diet) in 4 replicates of 9 birds each. To induce heat stress, diurnal cyclic temperature at 35 °C for 8 h from 09:00 h to 17:00 h, were used from 26 day of age until the end of the experiment. Dietary carvacrol did not affect performance parameters of broilers but feeding 250 mg/kg thymol increased body weight gain and decreased feed conversion ratio by 6 and 4%, respectively (P<0.05). Red and white blood cells, hematocrit and hemoglobin were not influenced by treatments, but heterophile and heterophile to lymphocyte ratio decreased in the birds fed on thymol- and carvacrol- added diets (P<0.05). Carvacrol and thymol supplementation decreased (P<0.05) serum cholesterol level but had no effect on triglyceride, low and high density lipoproteins and glucose. Both thymol and carvacrol elevated (P<0.05) serum glutathione peroxidase activity compared to the control group. Carcass and breast percentage were increased (P<0.05) in the birds received thymol-added diet (P<0.05). No carvacrol and thymol effect were observed on relative weight of internal organs in broilers. It was concluded that dietary thymol at an inclusion rate of 250 mg/kg diet might positively modulate the negative effect of heat stress in broiler chickens through improved feed conversion ratio (FCR), increased water intake and antioxidative potential of blood tissue.

KEY WORDS essential oil, glutathione peroxidase, heterophil, lymphocyte, stress.

INTRODUCTION

High ambient temperature imposes severe stress on birds and leads to important economic losses in poultry industry. The thermo neutral zone for optimum performance has been verified at 18 to 22 °C for growing broilers (Lin et al. 2006). When ambient temperature exceeds thermo neutral temperature, heat stress occurs with detrimental consequences including decreased feed consumption, lower body weight gain (Quinteiro-Filho et al. 2010), immune suppression, lipid peroxidation (Sohail et al. 2011) and increased mortality in broiler chicken. In heat-stressed broilers with decreased feed intake, metabolism energy expenditure increases to drive out extra body heat through evaporation, therefore less energy is used for growth, leading to the retarded weight gain (Lei and Slinger, 1970). In addition, exposure to high ambient temperature modifies certain components of immune system such as T-cell counts, cyto-