**Titre d’article**: The effects of early age thermal conditioning and vinegar supplementation of drinking water on physiological responses of female and male broiler chickens reared under summer Mediterranean temperatures

**Abstract**

The effects of early age thermal conditioning (ETC), vinegar supplementation (VS) of drinking water, broilers’ gender, and their interactions on respiratory rate, body temperature, and blood parameters (biochemical, hematological, and thyroid hormones) of broiler chickens reared under high ambient temperatures were determined. A total of 1100 1-day-old chicks were divided into four treatments: the Bcontrol^ which were non-conditioned and non-supplemented; Bheat-conditioned^ which were exposed to 38 ± 1 °C for 24 h at 5 days of age; Bvinegar supplemented^ which were given drinking water supplemented with 0.2% of commercial vinegar from 28 to 49 days of age; and Bcombined^ which were both heat conditioned and vinegar supplemented. All groups were exposed to the natural fluctuations of summer ambient temperature (average diurnal ambient temperature of about 30 ± 1 °C and average relative humidity of 58 ± 5%). ETC and broiler gender did not affect the respiratory rate or body temperature of chronic heat-exposed chickens. VS changed the body temperature across time (d35, d42, d49) (linear and quadratic effects, P < 0.05) without changing respiratory rate. Heat-conditioned chickens exhibited lower levels of glycemia (P < 0.0001) and higher hematocrit and red blood cell counts (P < 0.05). Furthermore, the greatest effects of VS, alone or associated with ETC, were the lowering of cholesterol and triglyceride blood concentrations. A significant (P < 0.05) effect of ETC, gender, and ETC×gender on T3:T4 ratio was observed. Finally, some beneficial physiological responses induced by ETC and VS, separately or in association, on chronically heat-stressed chickens were observed. However, the expected cumulative positive responses when the two treatments were combined were not evident.