

## Counteract Heat Stress on Broiler Chicks by Adding Anti-Heat Stress Vitamins (Vitamin C and E) with Organic Zinc

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**Abstract :** This study was carried out to elevate the broilers physiological response against heat stress and reduce this impact by adding vitamin C (VC), vitamin E (VE) alone/or with organic zinc (Zn) to chicks' rations. A total of 192, 26-day-old Arbor Acres male chicks were randomly divided into equal 8 groups (4 replicates for each). All experimental groups were treated as follow: Group 2 was served as a heat stress control that reared at 37°C with relative humidity  $53 \pm 8\%$  for 6 hours/day for three successive days/week and fed the basal diet only. Groups 3-8 were heat stressed in a like manner to group 2 and fed basal diet inclusion 200mg VC (group 3), 200mg VE (group 4), 200mg VC+200mg VE (group 5), 200mg VC+30mg Zn (group 6), 200mg VE+30mg Zn (group 7) and 200mg VC+200mg VE+30mg Zn (group 8) /kg feed, while Group 1 was served as a positive control that reared on a neutral temperature (NT) (approximately 21°C) and fed the basal diet only. Respiration rate and rectal temperature were boosted of HS chicks (80.8 breath/min and 41.97°C) compared to NT group (60.12 breath/min and 40.9°C), while, adding VC alone and with VE or Zn resulted in decrease these measurements. Heat stress had a significantly negative effect on chicks body weight gain, feed consumption and feed conversion ratio compared to the NT group, this harmful effect could be overcome by adding VC and VE individually or with Zn. Chicks exposed to heat stress showed slightly increase hemoglobin concentration compared to NT group, while, adding VC, VE individually or with Zn alleviated this effect. Plasma glucose concentration was significantly increased in HS group than the NT group, but adding VC, VE individually or with Zn resulted in a reduction plasma glucose level, which it was still higher than the NT group. Heat stress caused an increase in plasma total lipids and cholesterol concentration compared to the NT group and inclusion VC or VE alone or with Zn was not able to reduce this effect. The increased liver enzymes activities (AST and ALT) that observed in HS group compared to NT group were removed by adding VC and VE individually or with Zn. As well, exposure of broiler chicks to heat stress resulted in a slightly decrease in plasma total antioxidant capacity level (TAC) superoxide dismutase and catalase enzymes activities, while inclusion VC and VE individually or with Zn in chicks rations caused an increased in these measurements. Broiler chicks that exposed to HS revealed a significant increase in heat shock protein (Hsp 70) compared to the NT group, while, adding VC or VE individually or with Zn resulted in a significant decrease in Hsp70 than the HS group and VE alone or with VC had the greatest effect. In conclusion, it could be overcome the harmful and the negative effect of heat stress on broiler chicks' productive performance and physiological status by inclusion VC (200mg) or VE (200mg) individual or in a combination with organic zinc (30 mg) in chicks' rations.

**Keywords :** heat stress, broiler, vitamin C, vitamin E, organic zinc

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