Effect of ascorbic acid or increasing metabolizable energy level with or without supplementation of some essential amino acids on productive and physiological traits of slow-growing chicks exposed to chronic heat stress

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Abstract

Four hundred and twenty, 21-day-old slow-growing chicks were divided randomly into seven treatments, each containing five replicates. Each replicate was kept in a 1 · 1-m floor pen. One treatment was kept under thermo-neutral conditions in a semi-open house and fed a corn–soybean meal diet (positive control). The other six groups were kept under chronic heat stress (CHS) at 38 °C and 60% RH for 4 h from 12:00 to 16:00 pm for three successive days per week. Chicks in CHS treatments were fed a corn-soybean meal diet without (negative control) or with increasing metabolizable energy (ME) level by oil supplementation alone, or also with increasing some essential amino acids (EAA) such as methionine (Met), methionine and lysine (Met+Lys) or methionine, lysine and arginine (Met+Lys+Arg) or supplemented with 250 mg of ascorbic acid (AA)/kg. CHS impaired (p < 0.05) growth performance, increased plasma triglycerides
and total serum Ca while decreasing (p < 0.05) plasma glucose and total serum protein. Meanwhile 250 mg AA/kg diet or an increasing ME without or with some EAA partially alleviated (p < 0.0001) the negative effect of CHS on growth while increasing (p < 0.05) feed intake and improving (p < 0.05) feed:gain ratio (F:G) and crude protein (CP) digestibility (p < 0.05). AA or increasing ME with or without EAA increased (p < 0.05) percentage dressing, liver and giblets to those of the positive control. AA or increasing ME with or without EAA partially alleviated the negative effect of CHS on blood pH, packed cell volume (PCV), haemoglobin (Hgb), total serum protein and total Ca, plasma glucose and triglyceride, rectal temperature and respiration rate. Increasing ME level improved chickens’ tolerance to CHS without a significant difference from those supplemented with AA. However, increasing Met, Lys and Arg concentration did not improve performance over that recorded with increasing ME level alone. Under CHS, 250 mg AA/kg diet or increasing ME level by addition of 3% vegetable oil could be an useful approach to improve productive and physiological traits of slow-growing chicks, which may be applicable also to fast-growing one.

Keywords
ascorbic acid, energy, amino acids, heat stress, productive and physiological traits.


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