

OXIDATIVE AND ETHOLOGICAL INDICATORS IN HENS WITH VITAMIN C AND ZINC SUPPLEMENTATION DURING A HOT PERIOD

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Abstract

Nutritional supplements, such as vitamin C and zinc, are used as an option for reducing heat and oxidative stress and improving behavior of poultry during a hot season. There is a probable connection between several oxidative indicators and ethological parameters in hens under thermal stress conditions. The aim of the present study was to determine the fluctuations of corticosterone and malondialdehyde (MDA) concentrations and explain the behavioral changes in 400 DeKalb Brown laying hens in semi-open rearing system during a hot period following a dietary supplementation with 250 mg/kg of vitamin C and 35 mg/kg of zinc oxide.

Four hundred hens were divided into two groups - control and experimental, n=200. The experimental group was fed a supplement of 250 mg/kg of vitamin C and 35 mg/kg of zinc oxide. Poultry behavior was recorded during thermoneutral and hot summer periods with a video camera and ethogrammes. Blood corticosterone levels were assayed by means of commercial enzyme-linked immunosorbent assay (ELISA) kit and MDA concentrations were determined spectrophotometrically at a wavelength of 532 nm during the indicated periods. The statistical analysis processing of the results was performed by means of ANOVA using the GraphPad InStat 3.06 software at a level of significance $P < 0.05$.

During a hot (32.6 °C) period, after 7-months treatment with vitamin C and zinc - supplements, significantly lower concentrations of corticosterone ($P < 0.001$) and MDA ($P < 0.01$) were found in experimental hens versus controls. A high correlation between a hormone corticosterone and malondialdehyde was found in all study groups during the thermoneutral and hot periods, $r \geq 0.8$, $P < 0.01$. At the same time, a significantly higher number of egg laying ($P < 0.01$), feather cleaning ($P < 0.01$), dust bathing ($P < 0.01$), mating ($P < 0.05$) hens and less aggressive hens ($P < 0.05$) were observed in the experimental group versus the control one.

During the hot summer period, a vitamin C and Zn- combination had a positive effect on the reduction of corticosterone levels and MDA and on hens' behavior, due to the stress and antioxidant reducing action of both components.

Key words: Heat stress, Hens, Corticosterone, Malondialdehyde, Vitamin C, Zn.