

Physiological responses of 3 chicken breeds to acute heat stress.

ABSTRACT

Domestic animals have been modified by selecting individuals exhibiting desirable traits and culling the others. To investigate the alterations introduced by domestication and selective breeding in heat stress response, 2 experiments were conducted using Red Jungle Fowl (RJF), village fowl (VF), and commercial broilers (CB). In experiment 1, RJF, VF, and CB of a common chronological age (30 d old) were exposed to $36 \pm 1^\circ\text{C}$ for 3 h. In experiment 2, RJF, VF, and CB of common BW (930 ± 15 g) were subjected to similar procedures as in experiment 1. Heat treatment significantly increased body temperature, heterophil:lymphocyte ratio, and plasma corticosterone concentration in CB but not in VF and RJF. In both experiments and irrespective of stage of heat treatment, RJF showed lower heterophil:lymphocyte ratio, higher plasma corticosterone concentration, and higher heat shock protein 70 expression than VF and CB. It can be concluded that selective breeding for phenotypic traits in the domestication process has resulted in alterations in the physiology of CB and concomitantly the ability to withstand high ambient temperature compared with RJF and VF. In other words, domestication and selective breeding are leading to individuals that are more susceptible to stress rather than resistant. It is also apparent that genetic differences in body size and age per se may not determine breed or strain variations in response to heat stress.

Keyword: Heat stress; Red Jungle Fowl; Village fowl; Broiler chicken; Heat shock protein.