

Neonatal feed restriction modulates circulating levels of corticosterone and expression of glucocorticoid receptor and heat shock protein 70 in aged Japanese quail exposed to acute heat stress.

ABSTRACT

This study aimed to determine the effect of neonatal feed restriction on plasma corticosterone concentration (CORT), hippocampal glucocorticoid receptor (GR) expression, and heat shock protein (Hsp) 70 expression in aged male Japanese quail subjected to acute heat stress. Equal numbers of chicks were subjected to either ad libitum feeding (AL) or 60% feed restriction on d 4, 5, and 6 (FR). At 21 (young) and 270 (aged) d of age, birds were exposed to $43 \pm 1^\circ\text{C}$ for 1 h. Blood and hippocampus samples were collected to determine CORT and Hsp 70 and GR expressions before heat stress and following 1 h of heat stress, 1 h of post-heat stress recovery, and 2 h of post-heat stress recovery. With the use of real-time PCR and enzyme immunoassay, we examined the hippocampal expression of GR and Hsp 70 and CORT. The GR expression of the young birds increased following heat stress and remained consistent throughout the period of recovery. Conversely, no significant changes were noted on GR expression of aged birds. Although both young and aged birds had similar CORT before and during heat stress, the latter exhibited greater values following 1 and 2 h of recovery. Within the young group, feeding regimens had no significant effect on Hsp 70 expression. However, neonatal feed restriction improved Hsp 70 expression in aged birds. Neonatal feed restriction, compared with the AL group, resulted in higher CORT on d 21 but the converse was noted on d 270. Neonatal feed restriction appears to set a robust reactive hypothalamo-pituitary-adrenal response allowing the development of adaptive, healthy, and resilient phenotypes in aged quail as measured by a higher hippocampal Hsp 70 expression along with lower CORT.

Keyword: Age; Heat shock protein 70; Heat stress; Quail.