

Immunocompetence, Hepatic Heat Shock Protein 70 and Physiological Responses to Feed Restriction and Heat Stress in Two Body Weight Lines of Japanese Quail

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Abstract :

The effect of early heat stress either solely or plus feed restriction on the physiological response, antibody titer and hepatic 70-kDa heat shock protein expression (HSP 70) of two body weight lines (high and low) Japanese quail chicks were investigated. Chicks of each line were divided into three groups; (1) control, (2) exposure to 39±1°C for six hours (h), from 5 to 21 day of age (DOA) on each of three consecutive d/week (HS) and (3) HS concurrent with 70% feed restriction (HSFR). The results showed that quail chicks of either HS or HSFR exhibited significantly higher respiration rate (RR) compared with the control. While, the rectal temperature (RT) was reduced at 21 DOA, in the HSFR group. The plasma concentrations of total protein, globulin, total lipid, cholesterol, triglycerides and glucose were decreased due to HS or HSFR episode. Likewise, the level of both calcium and phosphorus at 21 DOA. However, at 42 DOA, the HS chicks did not significantly differ from the control. The activities of plasma aspartate aminotransferase (AST) and alanine aminotransferase (ALT) were increased ($p < 0.05$) in treated groups (HS and HSFR) at 21 DOA. Either HS or HSFR showed low Newcastle disease antibody titer and a decrease in relative lymphoid organ weights. Unlike the antibody titer, the H/L ratio was increased in the HS chicks. After heat exposure, HSP 70 density of the high body weight line was immediate and pronounced. The combination of heat stress and feed restriction (HSFR) induced even higher response. While in the low body weight line neither the control nor the heat stress treatment showed any response. Chicks of either HS or HSFR had significantly lower live body weight (LBW) and body weight gain (BWG) and poorer feed conversion ratio (FCR) than the control ones. However, during the recovery period (21 to 42 DOA) the HSFR group was the best ($p < 0.01$) for BWG and FCR. The high line body weight chicks showed significantly higher plasma level of total protein, albumin, globulin and cholesterol at 21 and 42 DOA than the low line. Similarly, higher antibody titers against NDV and productive performance traits throughout the experimental period.

Key Word :

Heat stress, feed restriction, physiological, antibody titer, HSP70 and quail