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**A Thesis Submitted in Partial Fulfillment of the
Requirements for the Degree of Doctor of Philosophy
(Ph.D) in Animal Nutrition**

**Effect of Electrolyte Balance and
Probiotic Addition in Heat Stress
Condition on Growth, Feed Intake,
Nutrients Digestibility and Blood
Parameters in Japanese Quail
(*Coturnix Coturnix Japonica*)**

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Abstract

The present study was performed to investigate the effects of dietary electrolyte balance and probiotic on the performance and carcass characteristics in Japanese quail under heat stress conditions. A total of 672 20-day-old quails were examined in a three-factor factorial experiment in four replications, with 14 birds aged 20 to 41 in each replication. Also, at the age of 37 days, in order to evaluate functional traits, feed intake and weight gain were measured and feed conversion ratio was calculated. Factors included three levels of dietary electrolyte balance (170, 220 and 270 mEq / kg), two levels of probiotics (0 and 100 g / t) and two indoor temperature levels (normal breeding temperature and 34°C). In each experimental group, birds had free access to water and food. The effect of sex was also considered as one of the factors for carcass evaluation. Results showed that probiotic-fed birds at age 20 to 37 had the highest feed intake, while the best feed conversion ratio was obtained without probiotic ($P < 0.05$). During 20 to 37 and 20 to 41 days under heat stress conditions, the best feed conversion ratio and weight gain were related to DEB 270 mEq / kg and no probiotic treatment. Under normal temperature conditions, the best conversion ratio and weight gain coefficients in each time period were related to the diet without probiotics and DEB 170 mEq / kg ($P < 0.05$). Electrolyte balance of 170 mEq / kg increased the ileal digestibility of dry matter and crude protein. Dry matter digestibility and crude protein were not affected by dietary probiotics. Heat stress reduced the ileal digestibility of crude protein but increased the dry matter digestibility. The use of probiotic had a significant effect on the relative weight of the carcass and the relative weight of the heart ($P < 0.05$). Also, within each genus, the highest carcass weight and percentage belonged to probiotic treatments ($P < 0.05$). Interactions between probiotics, temperature and sex in males showed significantly ($P < 0.05$) higher relative weight in carcass traits. The most blood parameters were not affected by the interactions between the main experimental factors. Due to heat stress, the only significant difference was decreasing in RBC in the interactions between the main experimental factors, (excluding probiotics and DEB). Interaction between experimental treatments showed that heat stress was effective on blood parameters, including, increasing in the ratio of heterophils / lymphocytes or decreasing in glucose and uric acid level of blood, in males, and hemoglobin levels in both sexes. These results showed that there is a direct relationship between heat stress temperature and increasing in heterophilic cells in quails exposed to the heat stress. In general, the use of 170 mEq / kg is recommended for electrolyte balance under normal temperature conditions. Probiotics can be used to achieve the best carcass efficiency.

Key word: Japanese Quail, Anion-Cation Balance, Probiotics, Heat Stress, Performance, Immune Responses.