Abstract

High feed costs in poultry industry may lead to lower returns. To improve the gains, production cost must be kept minimally. Residual feed intake (RFI) is defined as the difference between observed feed intake and expected feed intake based on estimated maintenance and production requirements. Selection for low RFI is a solution to rising feed costs in poultry production. On the other hand, since poultry were generally exposing to many pathogens and one of the causes of the damages to poultry industry is diseases and losses caused by them, attention to the immune system that protects the body against pathogenic factors is very important. Therefore, having sufficient information regarding the genetic parameters such as heritability and genetic correlations related to the immune system and RFI traits in Japanese quail to provide successful breeding program seems necessary. The purpose of this research was to evaluate the effect of RFI on the immune system response of Japanese quail. In order to do this, the present study, evaluates genetic structure in five successive generations of Japanese quails in Poultry Research Center, University of Zabol. The following traits were evaluated body weight (BW) from 0 to 45 days of age, individual body weight gain from 20 to 25 (BWG20-25), 25-30 (BWG25-30), 30-35 (BWG30-35), 35-40 (BWG35-40), 40-45 (BWG40-45) and from 0 to 45 days of age (BWG0-45), feed intake (FI), feed conversion ratio (FCR), residual feed intake (RFI) from 20 to 45 days of age and humoral immune trait (antibody titers against sheep red blood cells (SRBC) and Newcastle Disease Virus (NDV)). The analyses of Genetic parameters of traits were estimated through single and bivariate animal models via Gibbs sampling method. Data included 7762 records for feed efficiency traits, 5238 records of immune traits and 22681 records for growth traits. Heritability estimates for body weight, body weight gain were 0.2 to 0.23 and 0.02 to 0.23 respectively and also heritability of FI, FCR, RFI were in ranges of 0.04 to 0.11. genetic correlations estimate between BWG20-25 and RFI20-25, BWG25-30 and RFI25-30, BWG30-35 and RFI30-35, BWG35-40 and RFI35-40, BWG40-45 and RFI40-45 were -0.28, 0.33, -0.58, -0.63 and 0.48 respectively. Heritability estimates of total antibody titer (AbT), titer of immunoglobulin Y (IgY), titer of immunoglobulin M (IgM) and titer of immunoglobulin F (IgF) against SRBC were 0.08, 0.14, 0.02 and 0.24, respectively, however, heritability of antibody titer against NDV was lower than estimated of SRBC antigen (h2= 0.05). genetic correlations estimate between total antibody and IgY were positive and high and was 0.92. The negative genetic correlations were related to IgM with RFI and genetic correlations estimates between RFI and other immunoglobulins (IgY, AbT, IgF) and NDV were positive. As a conclusion, selection for IgF due to its heritability (0.24) and negative genetic correlation (-0.23) with RFI, cause improve in RFI and reduce costs, related mainly to feeding and selecting of

animals with phenotyping. On the other hand, due to moderate to high positive genetic correlations (0.34-0.80) were found between IgF and other immunoglobulins, selection of it didn’t lead to decline of humoral immune responses in quail. Hence, we recommend that selection for body weight gain and decrease feed efficiency for improve feed efficiency traits in Japanese quail.

Keywords: Humoral Immune, Antibody Titer, Feed intake, Heritability, Genetic correlation, SRBC.

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Genetic study of the relationship between feed efficiency and immune response in Japanese quail

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