Abstract

The purpose of this study was to determine the best model for describing egg production curve in Italian Speckled and wild strains of Japanese quail and, estimation of the genetic correlation between egg production curve parameters and economic traits. For this purpose, the daily records of quail egg production for 4 consecutive generations over the twenty weeks were used for fitting egg production curve. Five nonlinear functions including nonlinear logistic, incomplete gamma (Wood), McMillan, Modification of Wood, and logistic (Nelder) were fitted by R computer program, and the best function was selected based on Bayesian information Criterion (BIC), Akaike Information Criterion (AIC), and Mean Square Error (MSE). After selecting the best model, the production curve parameters for birds was calculated and the genetic correlation between the curve parameters with age and weight of puberty, egg number, total egg production and average egg were estimated. To estimate of the genetic correlation between traits, a two-trait animal model and Gibbs sampling method were used. Based on the goodness of fit criteria, the Modification of Wood and nonlinear logistic (Yang) function was selected as the best model for the wild and Italian Speckled strains, respectively. The peak production time and peak production in ItalianSpeckled was 4 weeks and 6.367 eggs, respectively, and nonlinear logistic (Yang) predicted the peak and peak production time of the fourth week and 6.343 eggs, respectively, that were close to the real value in comparing other functions. The results of multi-trait analysis indicated that heritability for rate of production increases varied from 0.117 to 0.159 in different analyzes, but for the rate of production decreases, the heritability was higher than the rate of production increases (0.274). The heritability of weight of puberty was higher than the age of puberty, the egg number had the highest heritability among the production traits. The highest and lowest genetic correlation was observed between the rate of production decreases and increases (-0.764) and the rate of production increases and weight of puberty (-0.031), respectively. The results of the study indicate that for each specific bird and each strain, a best nonlinear model for this bird is used to describe the egg curve and, the total and average egg weight and age of puberty should be considered into selection target to improve the egg curve parameters.

Key words: Egg production, Age of puberty, Nonlinear logistic, Egg curve parameter.

University of Zabol
Faculty of Agriculture
Department of Animal Scienc

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Superviser
Dr. M. Rokouei
Dr. A. Maghsoudi

Adviser
Dr. Hadi Faraji Arough

By
J.Miri

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