Estimation of genetic parameters for total egg production, egg weight, and age at first egg in a laying hens line

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The main aim of breeding programs of laying hens is to do the selection to increase egg production without loss of its quality. The genetic selection of hens has been done based on the genetic parameters of the evaluated traits. The objective of this study was to estimate genetic parameters for total egg production up to 60 weeks of age (PTOTAL), age at first egg (AFE), egg weight at 22 and 28 weeks of age (EW22 and EW28), to choose which traits the genetic selection could be done in order to improve the egg production related-traits. The covariance components and genetic parameters were estimated by the restricted maximum likelihood method using two-trait animal model, which included the fixed effect of generation and the additive genetic and residual random effects. The heritability estimates indicated the existence of additive genetic variability for PTOTAL (0.22), EW22 (0.52), EW28 (0.34), and AFE (0.36) sufficient to result in genetic gains with direct selection on these traits. The estimates of genetic correlation between AFE with EW22, AFE with EW28, and AFE with PTOTAL were 0.11, 0.23, and -0.34, respectively, and for EW22 with EW28, EW22 with PTOTAL, and EW28 with PTOTAL were 0.50, -0.24, 0.09. The use of egg weight on the beginning of egg cycling (EW22) as selection criterion to improve it could produce heavier eggs at peak of egg production (EW28) due to the moderate positive genetic correlation between them. The genetic correlation between PTOTAL with AFE was moderate and negative indicating that the use of PTOTAL for selection would result in higher total egg production and increasing the egg production cycle. It was concluded that the selection to increase egg total production would not result increase in egg weights at the studied ages, but could reduce the age at first egg.