

Multivariate Evaluation of the Relationships Between Egg and Chick Traits in Denizli, Gerze and Sultan Native Chicken Genotypes

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Abstract

This study aimed to evaluate the relationships between egg morphometric traits, incubation characteristics and chick quality parameters in Denizli, Gerze and Sultan native chicken genotypes using univariate and multivariate statistical approaches. A total of 410 eggs obtained from Denizli, Gerze and Sultan native chicken genotypes were used in the study. Egg weight, egg width, egg length, shape index, transfer egg weight and weight loss were determined. After hatching, hatch time, chick weight, chick yield, activity score, navel score, chick score and chick length were measured. One-way analysis of variance (ANOVA) and Tukey's multiple comparison test were applied to determine differences among genotypes. Principal component analysis (PCA), correlation heatmap analyses and linear discriminant analysis (LDA) were performed to evaluate multivariate relationships among traits. Significant differences were detected among Denizli, Gerze and Sultan genotypes for most egg and chick traits ($P < 0.05$). Denizli chickens exhibited higher egg weight, transfer egg weight, chick weight, chick yield and chick length values compared to the other genotypes. Sultan chickens showed lower growth-related parameters but higher activity scores. Correlation analyses revealed strong positive relationships among egg weight, transfer egg weight, chick weight and chick length. PCA results demonstrated a clear phenotypic separation of the Sultan genotype from Denizli and Gerze chickens. In the combined linear discriminant analysis based on egg and chick traits, the overall classification accuracy was determined as 73.5%. The findings demonstrated strong relationships between egg morphometric characteristics and chick quality parameters in Denizli, Gerze and Sultan native chicken genotypes. Multivariate analyses revealed clear phenotypic differentiation among genotypes and highlighted the importance of maternal egg characteristics on embryonic development and post-hatch chick performance.

Keywords: Native Chicken, Denizli, Gerze, Sultan, Egg Quality, Chick Quality

