Genetic variability of body performance and carcass parts in a broiler strain

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The increasing global demand for low-cost and healthy animal protein has been the focus of animal breeding programs which aim to select commercial broiler strains for carcass quality. In this work, we assess the genetic variability of body performance and carcass parts in a broiler strain. We used records of 1,400 animals of a broiler strain to estimate genetic parameters. This strain was developed by Embrapa Swine and Poultry, a research facility located in Concórdia, SC, Brazil. Selection of animals was based primarily on body weight measured at 42 days of age (BW42). We evaluated the BW42, weight gain from 35 to 41 days of age (WG3541), feed conversion ratio (FCR), abdominal fat content (AFC) and skins weight (SW). Least squares method was used in order to verify the significant effect ($p < 0.05$) of sex (2 levels) and hatch (5 levels) for all traits. Variance components were estimated by Restricted Maximum Likelihood under a multi-trait animal model using the WOMBAT software. The model included the random additive genetic and residual effects and fixed effect of sex-hatch group (10 levels). The heritability estimates and respective standard errors obtained for BW42, WG3541, FCR, AFC, and SW were 0.42 ± 0.08, 0.14 ± 0.04, 0.11 ± 0.04, 0.41 ± 0.08, and 0.32 ± 0.06, respectively. It was observed that BW42, AFC, and SW showed heritability estimates of medium magnitude, thus they are able to respond positively to selection. Genetic correlation varied from -0.61 ± 0.15 for WG3541 and AFC to 0.82 ± 0.06 for BW42 and SW. This positive and high genetic correlation between BW42 and SW indicated that these traits are mainly determined by the same genes of additive action. However, this estimate is unfavorable because skin weight is strictly related to HDL cholesterol and for the final consumer, a carcass with this feature becomes unattractive. The negative genetic correlation between AFC and WG3541 is favorable because selection for WG3541 could reduce AFC. In conclusion, selection for body weight at 42 days of age, abdominal fat content, and skins weight showed enough additive genetic variability to respond to selection. Selection for body weight at 42 days of age could result in animals with higher weight skins, which would not be interesting. Furthermore, a direct selection for weight gain from 35 to 41 days of age for this strain, it would result in decreased abdominal fat content.
Keywords: body weight, genetic correlation, heritability, meat quality, skins weight.

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