

Validation of a molecular marker in the alpha-actin1 gene for performance and carcass traits in broilers

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The alpha-actin1 gene can be considered as a candidate gene, since it is known that it is involved in the muscle development. Thus, the study of genetic association of SNPs in this candidate gene with traits of economic interest may provide a basis for marker-assisted selection. The aim of this study was to evaluate the genetic association between a SNP in the alpha-actin1 gene and performance and carcass traits of broilers. Data from a reference population developed to validate results from poultry genomics research were obtained by the expansion of a paternal broiler line (IT) belonging to the Poultry Breeding Program, developed by Embrapa Swine and Poultry. The population was obtained by mating 20 males to 92 females, generating about 1600 progeny. At 42 days of age, 1465 broilers were slaughtered. The traits studied were breast meat yield (BMY), liver yield (LY), body weight at 35 days of age (BW35), breast weight (BW), thigh skin weight (TSW), and thigh weight (TW). Preliminary least square analyses were performed to study fixed effects of sex and hatch in the general model. We tested the following models for the SNP validation: (1) additive effects; (2) additive and dominance; (3) additive and sex; (4) additive, dominance and sex; (5) additive and covariate body weight at 42 days of age (BW42); (6) additive, dominance and covariate BW42; (7) additive, dominance, sex and covariate BW42; (8) additive, sex and covariate BW42. The association analyses of the SNP with traits of interest were carried out using the QxPak statistical program. The genetic associations between the alpha-actin1 gene were significant ($p < 0.05$) for LY, BMY, BW35, BW, TSW and TW. The effect of sex was important for LY, BW35 and TSW. For LY, the model that also included the effect of dominance was the most appropriate. The covariate BW42 was important for BW and TW. The genotype of the SNP in the alpha-actin1 gene affected all studied traits, being the additive effect the most important. Only LY had a significant ($P < 0.05$) influence of dominance. This SNP could be used as a potential genetic marker for improving these traits, since it was validated in a pure line.