

ASSOCIATION OF THE *RUNX2* GENE WITH CARCASS TRAITS IN AN F2 CHICKEN POPULATION

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In the last decade, improvements for growth traits have been observed in the poultry industry. With the advance of molecular techniques, genomic studies involving production traits are becoming widely applied to the livestock, providing an additional tool to be used in animal selection. The *RUNX2* gene (Runt-Related Transcription Factor 2) is essential for osteoblast differentiation and chondrocyte maturation. The *RUNX2* has been associated with bone traits in several animal species, therefore being considered an important functional candidate gene for genomic studies in poultry. Thus, associations of a SNP in the *RUNX2* gene with economic important traits were investigated. A region spanning 1044 pb on *RUNX2* was sequenced using 15 animals (10 from a paternal broiler line TT and 5 from a layer line CC). Sequences were analyzed using Phred/Phrap/Consed/Polyphred software for SNPs identification. Seventeen intronic SNPs were identified. The SNP g.57397A>G was selected to genotype 894 individuals from the EMBRAPA F2 Chicken Resource Population, which was created by a broiler-layer cross (TT x CC). Chickens were genotyped with RFLP-PCR using the *BstCI* restriction enzyme. Traits evaluated were: weights of carcass, head, feet, back, wings, legs, breast and abdominal fat, and carcass crude protein (CP), ash and dry matter. The association analysis was carried out using QxPak v.4.1 software. A mixed model including the fixed effects of sex, hatch, SNP and the covariate body weight at 42 days of age, and animal and residual as random effects were used. The additive and additive + dominance effects of the SNP were tested. The genotypic frequencies of the *RUNX2* SNP were 13.31% for AA, 51.34% for AG and 35.35% for GG, being this marker in HWE ($p > 0.05$). The additive model had the best fit for head ($p < 0.038$) and CP ($p < 0.017$) weights. For CP, the allelic substitution effect of the *RUNX2* SNP (A to G) resulted in a decrease in carcass protein content ($a = -1.44 \pm 0.60$) and an increase in head weight of 0.37g. Under the additive + dominance model, significant associations were found for back ($p < 0.035$), breast ($p < 0.003$) and feet ($p < 0.05$) weights. Higher magnitude of dominance effects was observed, indicating that heterozygotes chickens (AG) were heavier than the homozygotes for back and feet. However, AG chickens had lower breast weight than AA and GG ($d = -2.90 \pm 0.86g$). Breast is one of the major premium cuts, where the greatest portion of protein is located, which implies in high economic value for the industry. Bone integrity traits were not evaluated in this study. Nevertheless, the positive effect of the *RUNX2* on head, feet and back weights is in agreement with its function in bone metabolism. Besides that, the associations found with breast and crude protein weights suggest a possible influence of this gene in carcass protein deposition.

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