



Identification of polymorphisms associated with production traits on chicken (*Gallus gallus*) chromosome 4

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ABSTRACT. Genetic selection for production traits has resulted in a rapid improvement in animal performance and development. Previous studies have mapped quantitative trait loci for body weight at 35 and 41 days, and drum and thigh yield, onto chicken chromosome 4. We investigated this region for single nucleotide polymorphisms and their associations with important economic traits. Three positional candidate genes were studied: *KLF3* (Krüppel-like factor 3), *SLIT2* (Slit homolog 2), and *PPARGC1A* (peroxisome proliferator-activated receptor gamma, coactivator 1 alpha). Fragment sequencing of these genes was conducted in 11 F₁ animals, and one polymorphism in each gene was selected and genotyped in an F₂ population (N = 276) and a paternal broiler line TT (N = 840). Associations were identified with growth, carcass, and fat traits in the F₂ and the paternal line (P < 0.05). Using single markers in both the F₂ and the TT line, *KLF3* was associated with weight gain (P < 0.05), *PPARGC1A* was associated with liver and wing-parts weights and yields (P < 0.05), and *SLIT2* was associated with back yield (P < 0.05) and fat traits (P < 0.05).

Using multiple markers, *KLF3* lost its significance in both populations, and *SLIT2* was associated with feed conversion only in the TT population ($P < 0.05$). The QTLs mapped in the F_2 population could be partly explained by *PPARGC1A* and *SLIT2*, which were associated with body weight at 35 and 41 days, respectively, and with drum and thigh yield in the same population. The results of this study indicate the importance of these genes for production traits.

Key words: Broiler; Production trait; Candidate gene; Polymorphism; QTL