



Polymorphisms in *GJA1* and their association with growth traits in chicken

M. Shahjahan¹, R.R. Liu^{1,2}, G.P. Zhao^{1,2}, J.J. Zhang^{1,2}, M.Q. Zheng^{1,2}, Q.H. Li^{1,2} and J. Wen^{1,2}

¹Institute of Animal Sciences, Chinese Academy of Agricultural Sciences, Beijing, China

²State Key Laboratory of Animal Nutrition, Beijing, China

Corresponding author: J. Wen
E-mail: jiewen@iascaas.net.cn

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ABSTRACT. This study aimed to screen single nucleotide polymorphisms (SNPs) in the chicken gap junction protein alpha 1 (*GJA1*) gene, and to investigate their association with five growth traits measured in 269 chickens encompassing Chinese indigenous Beijing-You (BJY) and commercial Cobb broiler (CB) populations. Four variants were detected in the chicken *GJA1* gene, in which one synonymous mutation was located in an exon (C61223231T or c.-1110 C>T), two in an intron (A61229799C or c.5460 A>C, T61229928A or c.5589 T>A) and one in the promoter (A61230599C or c.6260 A>C) regions. Genotyping was performed by high-resolution melting analysis (SNP in an exon) and DNA sequencing (SNP in the introns and promoter). Association analysis revealed that each SNP had a significant effect on growth traits in chicken. A higher level of genetic diversity was observed in the indigenous BJY breed than in the commercial CB breed. Strong linkage disequilibrium was observed between the C61223231T and A61229799C polymorphisms, and four previously undiscovered haplotypes (CA, TC, CC, TA) were constructed from those two mutations. Association analysis between haplotype combinations (diplotypes) and growth traits was highly significant where diplotype CC + CC was dominant for all traits.

We speculated that *GJA1* either is a major gene, or is associated with a major gene, affecting chicken growth traits. Therefore, further studies are needed in large populations to evaluate polymorphisms located in different regions of this gene, as well as its functional study, to better understand its role in muscle development in chicken.

Key words: Chicken; *GJA1*; Polymorphisms; Growth traits; Association; Diplotype