



Single nucleotide polymorphisms of $\Delta 6$ -desaturase and Elov15 segments and their associations with common carp (*Cyprinus carpio*) growth traits

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ABSTRACT. Highly unsaturated fatty acids (HUFAs) are crucial for the nutritional health, physiology, and reproduction of vertebrates. The $\Delta 6$ -desaturase and Elov15 elongase genes produce essential enzymes in the biosynthetic pathway of HUFAs. Single nucleotide polymorphism (SNP) analysis of genes functionally related to the growth traits of the common carp (*Cyprinus carpio* var. Jian) can provide useful information for common carp molecular breeding. In this study, we isolated two $\Delta 6$ Fad genes and two Elov15 genes from the common carp. Polymerase chain reaction-restriction fragment length polymorphism was performed, and the genotypes of three SNPs ($\Delta 6$ Fad-a intron 10_C73T, $\Delta 6$ Fad-b intron 10_A56G, and Elov15-a intron 5_C64A) in 712 individuals (383 females and 329 males) were detected. Correlation analysis between the genotypes and weight gain revealed that intron

10_C73T of $\Delta 6$ Fad-a, intron 10_A56G of $\Delta 6$ Fad-b, and intron 5_C64A of Elov15-a were significantly associated with common carp weight gain. Weight gain increased with the enrichment of molecular SNP markers, consistent with the characteristics of quantitative traits. Our results indicate that $\Delta 6$ Fad and Elov15 elongase genes could be candidate genes for the molecular breeding of the common carp. This study provides useful information for the improvement of this species.

Key words: $\Delta 6$ -desaturase; Elov15; *Cyprinus carpio* var. Jian; Single nucleotide polymorphism; Growth trait