_____ ABSTRACT _____

Association of single nucleotide polymorphisms in the endothelial differentiation sphingolipid G-protein-coupled receptor 1 gene with marbling in Japanese Black beef cattle.

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Marbling defined by the amount and distribution of intramuscular fat, so-called Shimofuri, is an economically important trait of beef cattle in Japan. The endothelial differentiation sphingolipid G-protein-coupled receptor 1 (EDG1) gene, involved in blood vessel formation, has been previously shown to be expressed at different levels in musculus longissimus muscle between low-marbled and high-marbled steer groups. It is located within the genomic region of a quantitative trait locus for marbling, and thus was considered as a positionally functional candidate for the gene responsible for marbling. In this study, two single nucleotide polymorphisms (SNPs) in the 5' untranslated region (UTR) and the 3' UTR of EDG1, referred to as c.-312A>G and c.*446G>A, respectively, were detected between the two steer groups. The two SNPs were associated with the predicted breeding value for beef marbling standard number by analyses using a population of Japanese Black beef cattle. The effect of genotypes at each of the SNPs on the predicted breeding value for subcutaneous fat thickness was not statistically significant ($P > 0.05$). Reporter gene assays revealed no significant differences in gene expression between alleles at each of the SNPs. These findings suggest that EDG1 SNPs, although they may not be regarded as a causal mutation, may be useful for effective marker-assisted selection to increase the levels of marbling in Japanese Black beef cattle.

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