

ABSTRACT

Association of a single nucleotide polymorphism in titin gene with marbling in Japanese Black beef cattle.

Yamada T¹, Sasaki S, Sukegawa S, Yoshioka S, Takahagi Y, Morita M, Murakami H, Morimatsu F, Fujita T, Miyake T, Sasaki Y.

¹ *Laboratory of Animal Breeding and Genetics, Graduate School of Agriculture, Kyoto University, Sakyo-ku, Kyoto 606-8502, Japan. tyamada@kais.kyoto-u.ac.jp*

BACKGROUND: Marbling defined by the amount and distribution of intramuscular fat is an economically important trait of beef cattle in Japan. We have recently reported that single nucleotide polymorphisms (SNPs) in the endothelial differentiation, sphingolipid G-protein-coupled receptor, 1 (EDG1) gene were associated with marbling in Japanese Black beef cattle. As well as EDG1, the titin (TTN) gene, involved in myofibrillogenesis, has been previously shown to possess expression difference in musculus longissimus muscle between low-marbled and high-marbled steer groups, and to be located within genomic region of a quantitative trait locus for marbling. Thus TTN was considered as a positional functional candidate for the gene responsible for marbling. In this study, we explored SNP in TTN and analyzed association of the SNP with marbling.

FINDINGS: A SNP in the promoter region of TTN, referred to as g.231054C>T, was the only difference detected between high- and low-marbled steer groups. The SNP was associated with marbling in 3 experiments using 101 sires ($P = 0.004$), 848 paternal half-sib progeny steers from 5 sires heterozygous for the g.231054C>T ($P = 0.046$), and 820 paternal half-sib progeny steers from 3 sires homozygous for C allele at the g.231054C>T ($P = 0.051$), in Japanese Black beef cattle. The effect of genotypes of the SNP on subcutaneous fat thickness was not statistically significant ($P > 0.05$).

CONCLUSION: These findings suggest that in addition to the EDG1 SNPs, the TTN SNP polymorphism is associated with marbling and may be useful for effective marker-assisted selection to increase the levels of marbling in Japanese Black beef cattle. Further replicate studies will be needed to confirm the allelic association observed here, and to expand the results to evaluate all possible genotypic combinations of alleles.

END