

ABSTRACT

Replicated association of the single nucleotide polymorphism in EDG1 with marbling in three general populations of Japanese Black beef cattle.

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BACKGROUND: Marbling, defined by the amount and the distribution of intramuscular fat and measured as beef marbling score (BMS), is an economically important trait of beef cattle in Japan. We recently reported that a single nucleotide polymorphism (SNP), namely, c.-312A>G, in the endothelial differentiation, sphingolipid G-protein-coupled receptor, 1 (EDG1) gene was associated with the BMS level in the Japanese Black beef cattle population of Oita prefecture, with the G allele being associated with a high level of the BMS. Thus, the c.-312A>G SNP seems to be a candidate marker for marker-assisted selection. In this study, we investigated whether this association could be replicated in 3 other independent Japanese Black cattle populations and analyzed the effect of the SNP genotypes on the carcass traits other than the BMS.

FINDINGS: Statistically significant differences in the BMS level were detected among the genotypes of the c.-312A>G SNP in the Japanese black beef cattle populations of Miyazaki (P = 0.0377) and Nagasaki (P = 0.0012) prefectures, and marginal difference was detected in the Kagoshima prefecture population (P = 0.0786). The G allele in the SNP was associated with an increase in the BMS level. The G allele also seemed to have a favorable influence, if any, on the carcass weight, rib eye area and rib thickness of the cattle populations.

CONCLUSION: These findings suggest that the association of the c.-312A>G SNP with the BMS level in the Japanese Black beef cattle population was replicated in other beef cattle populations, and revealed favorable effects of the G allele on the beef productivity in the general Japanese Black beef cattle population. Thus, we concluded that the c.-312A>G SNP is useful for effective marker-assisted selection to increase the BMS level in Japanese Black beef cattle.

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