



Association of a hypoxia-inducible factor-3 α gene polymorphism with superovulation traits in Changbaishan black cattle

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ABSTRACT. This study was designed to examine a single nucleotide polymorphism (SNP) in the *HIF-3 α* gene in three hundred Changbaishan black cattle using PCR-restriction fragment length polymorphism to determine whether there is an association between this SNP and superovulation. The cloning and sequencing results indicate that the polymorphism is due to a point mutation at the 278-bp position in the *HIF-3 α* gene, resulting in 3 genotypes (AA, AB, and BB). Association analysis indicated that the polymorphism has a significant effect on the number of unfertilized embryos (NUE) ($P < 0.05$) in the cattle. Cattle with genotype BB had a higher NUE than those with genotype AA, but the difference in NUE between AB and AA or BB was not significant. The polymorphism

also has a highly significant effect on the number of degenerative embryos (NDE) and the number of total embryos (NTE) ($P < 0.01$). Genotype BB was associated with a higher NDE than AA, but the difference in NDE between AB and AA or BB was not significant. Genotype BB showed a higher NTE than AA or AB, but the difference in NTE between AA and AB was not significant. No significant conclusions could be drawn with respect to susceptibility to other traits. *HIF-3 α* could serve as a useful biomarker for donor selection, superovulation improvement, and assisted fertility.

Key words: *HIF-3 α* ; Polymorphism; Superovulation traits; Cattle