Association between a polymorphism of the α-lactalbumin gene and milk production traits in Chinese Holstein cows

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ABSTRACT. The traits particularly important for milk production include milk yield, protein percentage, fat percentage, and the somatic cell score. Alpha-lactalbumin (α-LA) is an important whey protein of cow milk, and is also present in the milk of many other mammalian species. In this study, we analyzed the genetic polymorphisms of the α-LA gene and their relationship to milk production traits (milk yield, protein percentage, fat percentage, and somatic cell score) in Chinese Holstein cows. The goal of this study was to contribute further molecular genetic information related to dairy cattle, to determine the molecular markers that are most closely linked with milk production traits, and to provide a scientific basis for the improvement of economically relevant traits in cows. Fluorescence-based conformation-sensitive gel electrophoresis, DNA sequencing, and ligation detection reaction techniques were used to analyze genetic variations of the α-LA gene (5'-UTR, exons 1, 2, 3, 4, and 3'-UTR) in 923 Chinese Holstein cows. One novel single nucleotide polymorphism (SNP), α-LA2516, was identified in exon 4 of the α-LA gene. Allele frequencies were as follows: T 0.674, C 0.326. Association analysis revealed that α-LA2516 was not associated with milk yield,
protein percentage, fat percentage, or somatic cell score (P > 0.05). These findings suggest that the SNP α-LA2516 in the α-LA gene likely does not have potential as a molecular marker for milk production traits in Chinese Holstein cows.

**Key words:** Chinese Holstein cows; Milk production traits; SNP; Alpha-lactalbumin gene; Association analysis