



Short Communication

Association of *ATP1A1* gene polymorphism with heat tolerance traits in dairy cattle

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ABSTRACT. Heat stress produces oxidative stress and affects the alternation of plasma K^+ and Na^+ . Since Na^+,K^+ -ATPase is sensitive to oxidative stress and critical for maintaining the homeostasis of these two ions, we examined the genetic polymorphism of the *ATP1A1* gene in 160 Holstein cows using polymerase chain reaction low ionic strength single-strand conformation polymorphism and DNA sequencing methods. *G* to *A* at position -14103 in exon 14 and *C* to *T* at position -14242 in intron 14 of the bovine *ATP1A1* gene were identified, but the former single nucleotide polymorphism was silent with respect to the amino acid sequence of the protein. However, we found significant correlations between *ATP1A1* gene polymorphism and the coefficient of heat tolerance ($P < 0.01$) and with respiratory rate ($P < 0.01$). Genotype *AC* was the most favorable genotype for heat tolerance. This polymorphism site has potential as a genetic marker for heat tolerance traits in dairy cattle breeding.

Key words: Dairy cattle; *ATP1A1* gene; SNP; Heat stress; Na^+,K^+ -ATPase