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Molecular cloning, characterization and association analysis of the promoter region of the bovine *CDK6* gene

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ABSTRACT. Cyclin-dependent kinase 6 (CDK6) is a key element of D-type cyclin holoenzymes. It is involved in the regulation of the G1-phase of the cell cycle and is considered to be an important candidate gene for selection of body measurement traits through marker-assisted selection. We cloned the promoter sequence of this gene in bovines and found it to share high similarity with that of the human CDK6 promoter. A 2271-bp sequence upstream of the start codon in the bovine CDK6 5'-flanking sequence is rich in GC; it lacks consensus TATA or CAAT box, but it contains several MZF1 binding sites. Other potential cis-regulatory elements were found in the 5'-flanking region, including CdxA, SRY, p300, GATA-1, and deltaE. Allele frequencies were also analyzed in various cattle breeds (Qinchuan, Qinchuan improvement steers, Nanyang, Jiaxian red, Xia'nan, Luxi, Simmental and Luxi crossbred steers, and Xuelong) and association with a selected single nucleotide polymorphism (SNP) was calculated. The T-1075C SNP in the promoter was found to be significantly associated with body length and

heart girth. This SNP marker was found to be significantly associated with body length and the heart girth in 737 individuals. We conclude that this SNP of the CDK6 gene has potential as a genetic marker for important body traits in bovine reproduction and breeding.

Key words: Cattle; CDK6 gene; SNP polymorphism; Association analysis; Body measurement

