Occurrence of the Kappa-Casein allele B in the white cattle breed reared in government farm of Department of Animal Production and Health in the Eastern Province

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The CSN3 gene encoding kappa-casein (κ-CN), significantly affects both nutritional and health related qualities of milk, making it a candidate gene in marker-assisted selective breeding. Among the κ-CN gene variants, the B allele is associated with higher nutritional content and enhanced bioactive peptide benefits, including anti-inflammatory, antioxidant, antimicrobial, anticancer, antidiabetic, and anti-obesity effects. Hence, determining the presence of the B allele in the indigenous White Cattle breed of Sri Lanka is crucial for improving milk traits. Accordingly, this study aimed to optimize a PCR-RFLP method for CSN3 gene analysis and to examine allele and genotype frequencies in this cattle breed. A facility-based study was conducted on 28 healthy White Cattle at the White Cattle Preservation and Development unit, of Eastern Provincial Department of Animal Production and Health, located in Vakarai, Batticaloa District. Genomic DNA was extracted from 20 blood samples of cattle that fulfilled the inclusion criteria. The study was approved by the Ethics Review Committee, Faculty of Medicine, University of Colombo (EC-24-148). The optimized PCR protocol consisted of an initial denaturation at 95°C for 5 minutes, followed by 35 cycles of denaturation at 94°C for 45 seconds, annealing at 56°C for 45 seconds, and extension at 72°C for 1 minute. Among the 20 cattle, seven (35%) exhibited the AB genotype, while thirteen (65%) had the AA genotype. None of the cattle possessed the BB genotype. Accordingly, the frequency of the A allele was higher (82.5%) compared to the B allele (17.5%). The study findings provide the first molecular insight into kappa-casein allele and genotype frequencies in the White Cattle breed in Sri Lanka. The presence of the B allele is a promising indicator of genetic potential for improved milk properties in this breed and lays the foundation for selective breeding and conservation strategies for indigenous cattle populations.

Keywords: *Kappa-Casein, CSN3 gene, White Cattle, Allele frequencies, Genotype frequencies*