

Genetic Polymorphism of Milk Protein Gene and Association with Milk Production Traits in Local Latvian Brown Breed Cows

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Abstract : The beta-lactoglobulin and kappa-casein are milk proteins which are important for milk composition. Cows with beta-lactoglobulin and kappa-casein gene BB genotypes have highest milk crude protein and fat content. The aim of the study was to determinate the frequencies of milk protein gene polymorphisms in local Latvian Brown (LB) cows breed and analyze the influence of beta-lactoglobulin and kappa-casein genotypes to milk productivity traits. 102 cows' genotypes of milk protein genes were detected using Polymerase Chain Reaction and Restriction Fragment Length Polymorphism (PCR-RFLP) and electrophoresis on 3% agarose gel. For beta-lactoglobulin were observed 2 types of alleles A and B and for kappa-casein 3 types: A, B and E. Highest frequency in beta-lactoglobulin gene was observed for B allele - 0.926. Molecular analysis of beta-lactoglobulin gene shows 86.3% of individuals are homozygous by B allele and animals are with genotypes BB and 12.7% of individuals are heterozygous with genotypes AB. The highest milk yield 4711.7 kg was for 1st lactation cows with AB genotypes, whereas the highest milk protein content (3.35%) and fat content (4.46 %) was for BB genotypes. Analysis of the kappa-casein locus showed a prevalence of the A allele - 0.750. The genetic variant of B was characterized by a low frequency - 0.240. Moreover, the frequency of E occurred in the LB cows' population with very low frequency - 0.010. 54.9 % of cows are homozygous with genotypes AA, and only 4.9 % are homozygous with genotypes BB. 32.8 % of individuals are heterozygous with genotypes AB, and 2.0 % are with AE. The highest milk productivity was for 1st lactation cows with AB genotypes: milk yield 4620.3 kg, milk protein content 3.39% and fat content 4.53 %. According to the results, in local Latvian brown there are only 2.9% of cows are with BB-BB genotypes, which is related to milk coagulation ability and affected cheese production yield. Acknowledgment: the investigation is supported by VPP 2014-2017 AgroBioRes Project No. 3 LIVESTOCK.

Keywords : beta-lactoglobulin, cows, genotype frequencies, kappa-casein

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