SUMMARY

When improving the production traits of dairy cattle, great emphasis is placed on milk yield and its composition, especially fat and protein content. Studying the genetic basis underlying preferred phenotypes can help improve breeding strategies. Genes and polymorphisms with a positive effect on milk performance traits have been identified, but there are candidate genes that require analysis for suitability as genetic markers supporting selection. The aim of the study was to estimate the effect of selected polymorphisms in the *SLC27A1*, *LIPE* and *SCD1* genes on the milk performance traits of Polish Holstein-Friesian black-and-white cows.

The analysis covered 634 cows on one farm. Four single nucleotide polymorphisms within the coding sequence were selected, two located in the *SLC27A1* gene (g.14996C>G and g.14791C>T), one in the *LIPE* gene (g.13298A>C) and one in the *SCD1* gene (g .10153G>A). Genotypes were determined using the PCR-RFLP method. The frequency of alleles, genotypes and combined genotypes was estimated. The relationships between genotypes and milk production traits, as well as selected reproduction traits, were estimated. Statistical analysis was performed using the Statistica program.

In the examined cow herd, the presence of all possible genotypes in each of the analyzed polymorphisms was demonstrated. Significant relationships were found between: the *SLC27A1* g.14996C>G polymorphism and the fat and dry matter content in milk; *SLC27A1* g.14791C>T polymorphism and protein content in milk; *LIPE* g.13298A>C polymorphism and daily milk yield, fat content, dry matter and the somatic cells count in milk; *SCD1* g.10153G>A polymorphism and daily milk yield, fat, protein and dry matter content and the somatic cells count in milk. In the analysis of combined genotypes, the vast majority of these relationships were confirmed. The analyzed polymorphisms did not affect reproduction traits, such as age at first calving, calving interval and pregnancy interval. The results indicate the potential usefulness of the analyzed polymorphisms in the *SLC27A1*, *LIPE* and *SCD1* genes in improving the milk performance traits of Polish Holstein-Friesian black-and-white cattle, however, their unambiguous indication as marker genes to be used in selection requires confirmation in studies on other herds of cows of this breed.

Keywords: *SLC27A1*, *LIPE*, *SCD1*, milk performance, cattle

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