

***O. P. Plivachuk, T. M. Dyman. Interdependence of complex genotypes of alpha-lactalbumin and beta-lactoglobulin with composition and technological properties of milk of Ukrainian Black-and-White Dairy cattle***

The objective of this work was to study the effect of phenotypic combination of genetic variants  $\alpha$ -LA and  $\beta$ -LG on the content of technologically and nutritionally important components of milk in cows of Ukrainian Black-and-White Dairy breed.

Method PCR-RFLP was used to identify cow's genotypes on the indicated genes. Milk yield was calculated based on the results of monthly control milking. It has been determined such indices of cow's milk: fat content, protein content, total solids content, milk solids non-fat (MSNF) content, lactose content, casein content, casein number, milk density, milk rennet ability, heat stability (alcohol number) of milk. Statistical analysis was carried out using program Statistica 6.0.

The study of genetic structure of the herd of Ukrainian Black-and-White Dairy cattle showed the high level of polymorphism on  $\alpha$ -LA and  $\beta$ -LG genes. 6 genotypes were identified. Genetic structure of the herd on two genes simultaneously was determined. 9 complex genotypes were revealed. Phenotypic variants  $\alpha$ -LA AB/ $\beta$ -LG AB,  $\alpha$ -LAAA/ $\beta$ -LG AA and  $\alpha$ -LAAB/ $\beta$ -LG AA had the highest frequency – 26, 21,5 and 14 % respectively. Frequencies of remaining genotypes were not higher than 10 %.

The highest milk yield (5617 kg) was received from cows with genotype  $\alpha$ -LA BB/ $\beta$ -LG AA. The percentage of these animals in the herd was only 7,5 %. The lowest milk yield (5367 kg) was fixed for the group of animals with complex genotype  $\alpha$ -LA AA/ $\beta$ -LG BB. The frequency of this genotype was 7 %. Three the most distributed complex genotypes (61,5 %) characterized by medium features of milk yield.

Cows with genotypes  $\alpha$ -LAAB/ $\beta$ -LG BB had the highest indices of fat content (3,93 %). The percentage of these animals in the herd was 5 %. The difference between cows' groups with the highest and the lowest indices of fat content was 0,14% ( $t_d=2,5$ ;  $p<0,05$ ).

Cows with genotypes  $\alpha$ -LAAB/ $\beta$ -LG AA had the highest protein content. Their percentage in the herd was 14 %. The difference between cows' groups with highest and lowest indices of protein content was 0,06 % ( $t_d=1,1$ ;  $p<0,05$ ).

The highest indices of casein content and casein number (2,42 % and 78,3 % respectively) were observed in animals with complex genotypes  $\alpha$ -LABB/ $\beta$ -LG AB and  $\alpha$ -LABB/ $\beta$ -LG BB, their frequency in the studied herd was 11 %. The difference between cows' groups with highest and lowest above indicators was 0,05 % ( $t_d=1,8$ ;  $p<0,05$ ) and 3 % ( $t_d=2,38$ ;  $p<0,001$ ) respectively. Thus, milk from 11 % of cows of the studied herd of Ukrainian Black-and-White Dairy breed complied with the requirements for cheese manufacture better. Indicator of rennet ability confirmed this. The lowest time of milk coagulation (rennet ability) we observed in milk from cows with complex genotype  $\alpha$ -LABB/ $\beta$ -LG BB – 27,7 min. We can assume that expression of alleles B of  $\alpha$ -LA and  $\beta$ -LG in this phenotypic combination determines such desirable properties for cheese making.

At the same time, milk from cows with complex genotypes  $\alpha$ -LABB/ $\beta$ -LG AB and  $\alpha$ -LABB/ $\beta$ -LG BB had the worst indices of heat stability, its alcohol number was 2,17 ml. High heat stability of milk was determined by expression of A allele of genes  $\alpha$ -LA and  $\beta$ -LG in phenotypic combination  $\alpha$ -LA/ $\beta$ -LG.

Milk from cows with genotype  $\alpha$ -LA AB/ $\beta$ -LG AB had the highest lactose content (4,53 %). The difference between cows' groups with highest and lowest indices of lactose content was 0,06% ( $t_d=1,1$ ;  $p<0,05$ ).

Significant differences between the cows of different complex genotypes were not found for the total solids content. At the same time, some differences on MSNF content were observed. The highest indices (8,65 %) were revealed in groups of animals with genotypes  $\alpha$ -LAAA/ $\beta$ -LG AA and  $\alpha$ -LABB/ $\beta$ -LG AA, lowest (8,57 %) – with genotype  $\alpha$ -LAAB/ $\beta$ -LG BB, but these differences were not statistically significant.

The result presented here shows the relationship between the combination of alfa-lactalbumin and beta-lactoglobulin genetic variants in Ukrainian Black-and-White Dairy cattle and the productivity traits of animals, technological properties of their milk.

***Keywords:* complex genotype,  $\alpha$ -LA,  $\beta$ -LG, milk yield, milk content, cheese-making properties, heat stability.**