UDC: 636.082.1

ECOLOGICAL INNOVATIONS IN ANIMAL BREEDING AND GENETICS

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Topicality. The main products, such as meat, milk, eggs, fur, etc., are obtained thanks to the effective breeding of farm animals. Milk production is very important because it is one of the main foods for humans. Cattle give about 81% of the total milk production worldwide [2]. To obtain the desired productive indicators from animals, more and more research is being conducted in the world, including pangenomic, genomic, transcriptomic, epigenomic, etc. Modern studies illustrate biological processes, phenotypic formations, and evolution in general. Molecular genetics is an intensively developing branch of science that studies the structures that store and form genetic information. New ecological approaches to breeding and selection are systematically created and developed to increase the productivity of agricultural animals.

Keywords: genetics, breeding, selection, agricultural animals, innovation, environmental friendliness.

Goal. The goal was to compare the latest achievements and ideas in the field of genetics research, mechanisms for the regulation of innovative and ecological methods of livestock breeding as well as a study of genetic approaches to improve the breeding, keeping, and growing of agricultural animals.

Materials and methods. The traditional and modern general scientific research methods were used to write a review. The following methods were used: analysis of literary sources; induction and deduction; observation; comparison and analogy; abstraction and generalization; modelling, a systematic approach to objects that are interpreted as complex; formalization (study of sources by displaying their content, structure, form); idealization (creation of ideal models and comparison of the studied situation with the ideal version). The axiomatic-deductive method was used for the biometric data analyse of other scientists.

The results. The results. the latest achievements and innovations in breeding and genetics of agricultural animals were studied and analysed.

One of the useful and effective adaptation mechanisms was the testing of genomic markers in Holstein dairy cows exposed to heat as a stressful environment common in semi-arid or subtropical regions. The researchers tested three genomic markers in the TLR4, GRM8, and SMAD3 genes as molecular

markers for milk production and heat tolerance in heat-stressed Holstein cows. These three genes appeared to regulate metabolic processes that are necessary to meet energy needs and minimal heat production, which contributes to cattle productivity in extremely warm environmental conditions in Holstein dairy cows [2,3].

Further analyses confirmed the beneficial effect of the markers on milk production and physiological traits indicating resistance to heat stress (rectal temperature and respiratory rate) as well as the positive effect of the markers on the prognostic relationship between rectal temperature and milk production. Therefore, the genetic component affects the production of milk produced in dairy cows that have experienced heat stress, which indicates the presence of genes associated with thermotolerance [4,6].

Other researchers proposed the SNP rs382039214 in the SMAD3 gene as a genomic marker of milk productivity and heat resistance based on its ability to regulate other genes as well as molecular pathways, particularly those involved in adipose tissue metabolism and adipogenesis. The SMAD3 gene appeared to be a negative regulator of adipocyte synthesis during heat stress, probably as the body's strategy to minimize heat production. For milk production, a regulatory network of miR-143 and SMAD3 was developed, which had a role in increasing the synthesis of milk fat through the formation of lipid droplets and the synthesis of triglycerides in epithelial cells of the mammary gland of cattle. The SMAD3 gene reduces adipogenesis but ensures a sufficient supply of fat to the mammary gland in dairy cows that have experienced heat stress [1,6].

Genomic technologies and marker-assisted breeding programs have been used to study candidate genes and genetic markers associated with stress response in Holstein cows. SNP genotypes were obtained using TaqMan molecular analysis. Three of these SNPs were tested and confirmed as molecular markers contributing to increased milk productivity [1].

When using gas-liquid chromatography (separation and analysis of milk and milk fat), the results were analysed by conducting a series of one-way variance analyses. it was found that the content of useful essential fatty acids in cow's milk is affected by such genetic factors as the cow's father and breed [5].

Modern ecological methods of molecular genetics include sequencing methods, i.e. determining the nucleotide sequence of DNA fragments; the polymer chain reaction method, which is used to increase the number of DNA fragments; DNA (RNA) hybridization method to detect the desired genes and recognition of DNA sequences, etc.

Conclusions. Effective and ecological innovations in breeding and genetics of agricultural animals are the following: verification of genomic markers, application of genomic technologies and selection programs with the help of markers, molecular analysis to obtain desired genotypes of animals with increased productivity, sequencing method, polymer chain reaction method, hybridization method, method sexed sperm. To obtain accurate and factual data, biometric analyses, in particular dispersion analyses, are used.

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УДК 636.4.082

ВЗАЄМОЗВ'ЯЗОК ПРОМІРІВ ТУЛУБА З ПРОДУКТИВНІСТЮ ТА ЯКІСТЮ ТУШ СВИНЕЙ

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Актуальність. Розвиток галузі свинарства в країні потребує від виробників одержання якісної продукції з низькою собівартістю. Збільшення виробництва свинини, підвищення її якості можливо за умови: ефективного використання високого потенціалу сучасних генотипів, суттєвого вдосконалення племінної роботи, запровадження ефективних сучасних технологій виробництва продукції свинарства [1].