S. Kruhlyk, V. Dzitsiuk, V. Spyrydonov. Analysis of genetic structure of dogs of French Bulldog breed using microsatellite DNA markers

Genetic variability of domestic dogs is a source for effective process of breed formation and creating unique gene complexes. In the world, for preservation of genetic resources of dogs, there are dog training associations which have great confidence: American Club Dog Breeders (AKC), the British Kennel Club (KC) and the Federation Cynologique Internationale (FCI), aimed at protecting breeding dogs, standards creation, registration of a breed, and issuance of accurate pedigrees.

Evaluation of the genetic diversity of dog breeds is able to significantly complement and improve their breeding programs. Since breeds of dog differ in morphological and economic characteristics, the problem of finding of the breed features in the genome of animals is becoming more topical. From this point of view, French Bulldog is an interesting breed of dog (FRANC.BULLDOGGE, FCI standard number 101) which belongs by the classification of breeds, adopted in FCI, to the group IX – a dog-companion for health and fun, but to a subgroup of fighting dogs of a small format. French Bulldog breed has been researched slightly not only in Ukraine and also abroad, as the main work of all dog association is focused on solving theoretical and practical issues of breeding, keeping, feeding, veterinary protection and others.

The study was conducted at Research Department of Molecular Diagnostic Tests of Ukrainian Laboratory of Quality and Safety of Agricultural Products. 33 animals of French Bulldog breed, admitted to use in dog breeding of Ukrainian Kennel Union (UKU), were involved for the genetic analysis using DNA markers. The materials of the research were buccal epithelial cells, selected before the morning feeding of animals by scraping mucous membrane of oral cavity with disposable, dry, sterile cotton swab. Genomic DNA was extracted using KIT-set of reagents for DNA isolation according to the manufacturer's instructions.

PEZ1, PEZ3, PEZ6, PEZ8, FHC 2010, FHC 2054 markers, recommended by International Society for Animal Genetics (ISAG), ACN, KC and FCI, were used for research.

As a result of research 25 alleles for all the loci were detected in the experimental sample of dogs. The average number of alleles at the locus Na, obtained by direct counting, was 4.16. The most polymorphic loci for this breed were PEZ6 and PEZ3 with 8 and 6 allelic variants. Monomorphic loci were PEZ8 and FHC 2054 which had 4 and 3 alleles and the lowest level of polymorphism was observed for PEZ 1 and FHC 2010 loci in which only 2 alleles were identified.

On analyzing the molecular genetic characteristics of dogs of French Bulldog breed, we found a high variability of genotype on rare alleles, which included alleles: M, C, D, E, J, K, L, O, N and representing 60% of the total number of the identified alleles. C, D, E alleles for PEZ3 locus and O allele at PEZ6 locus are unique to the sampling of dogs because they are not repeated in other loci. Typical alleles: N, F, R, I, P, K, M are 40% of the total. But F, R alleles for PEZ3 locus and P allele for locus PEZ6 are not repeated either in standard allelic variants or in rare one, indicating a high information content of these alleles and loci to be used for further monitoring of allele pool, genetic certification and identification of dogs.

Microsatellite DNA loci were analyzed as a result of investigations of French Bulldogs and the most informative: PEZ3, PEZ6 and PEZ8 were found, which have high efficiency in individual and breed certification of dogs due to high variability. These data allow further monitoring of the state of genetic diversity of the breed and the development of measures for improvement of breeding to preserve the structure of breeding material. The study of individual and population genetic variability is advisable to continue for breeding of French Bulldogs "in purity" and preserving valuable gene complexes.

The results are the basis for further monitoring of the proposed informative panels of microsatellite DNA markers for genotyping dog of French Bulldog breed and their complex evaluation.

Keywords: **locus, French Bulldog dog breed, genotype, allele pool, typical alleles, rare alleles, microsatellite DNA markers, homozygosity, heterozygosity, polymorphism**