Abstract of Agnieszka's Szumiec doctoral dissertation entitled:

" Identification of alleles in DNA microsatellite *loci* selected for pedigree verification of sheep."

Supervisor: dr hab. Anna Radko, prof. IZ

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Microsatellite markers are widely used in the evaluation of genetic variation in many animal species, as well as in the genetic mapping and the population genetics, including the inbreeding coefficient calculations. Since 2016, pedigree data of sheep in Poland has been verified on the basis of the polymorphism of microsatellite markers recommended by the International Society for Animal Genetics (ISAG). This set of markers must be universal and shouldn't be breed-specific to show sufficient polymorphism for different populations and breeds of sheep. The elimination from the breeding of animals of incompatible origin guarantees the avoidance of the consequences that could arise in the case of using for breeding animals that don't come from valuable parents (given in their pedigrees) or are related individuals. The effect of the conducted parentage control is the correction of wrong pedigrees and the organization of breeding zootechnical documentation.

The aim of the research was to standardize the determination of alleles in markers recommended for the parentage control of sheep in 14 native breeds: Podhale Zackel, Wrzosówka, Pomeranian, Wielkopolska, Coloured Mountain Sheep, Kamieniecka, Uhruska, Old-type Polish Merino, Polish Pogórza sheep, Żelaźnienska, Olkuska, Świniarka, Corriedale and Black-headed. A detailed description of the allele structure of sheep covered by the Genetic Resources Conservation Program in Poland was carried out for the first time in the presented study. The results of the analyzes carried out make it possible to monitor changes in populations and to estimate the genetic variability of native sheep breeds.

In addition, polymorphism in 12 microsatellite *loci* and their usefulness for verifying the origin of sheep in selected breeds were determined. Genetic biodiversity of the studied

populations of sheep breeds was also assessed on the basis of microsatellite markers and genetic differences between these breeds were determined.

A sequencing reaction was used to precisely identify alleles. Then, the number of repeats of the tandem unit of selected alleles in individual *loci* was analyzed in order to determine the allelic ladder.

The results of the conducted research showed that the panel of 12 microsatellite markers recommended by ISAG is sufficiently reliable for the assessment of genetic variability, sheep parentage control and individual identification.

The presented parameters concerning the state of the population genetic structure of the examined sheep indicate the correctness of the breeding activities carried out under the Genetic Resources Protection Program and give guidelines for taking further steps related to the breeding of valuable native breeds. High heterozygosity values and a low level of inbreeding coefficient indicate no risk of inbreeding in the studied sheep population.

The occurrence of private alleles was also observed, which indicates the preservation of racial distinctiveness among the examined sheep, in particular in the Podhale Zackel breed, where 10 private alleles were identified.

On the basis of the obtained results, it was found that the analyzes of the sequencing reaction of the DNA fragments containing microsatellite markers make it possible to determine the number of repeats of the tandem unit and the correct nomenclature of alleles.