

Polymorphism of SNPs dedicated for parentage testing in two Polish cattle populations

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Recent years have seen increasing interest in the use of SNPs (Single Nucleotide Polymorphisms) in parentage testing. The continuous development of molecular biology techniques enables increasingly rapid and accurate determination of a large number of SNPs. Among the techniques used for high-throughput SNP analysis, particular attention is given to the microarray method. The present work is an attempt at preliminary determination of the parameters of an ISAG (International Society of Animal Genetics) SNPs panel for parentage verification of cattle in two genetically distinct Polish cattle breeds.

The study was performed with samples obtained from 192 Polish Red cows (RP) and 71 Polish Holstein-Friesian cows (HO). Genotypes of ISAG SNPs dedicated for parentage testing were determined using BovineSNP50 BeadChip assay (Illumina) according to the standard Infinum Ultra protocol. Basic parameters including probability of identity (PI), combined power of exclusion - CPE1 (with offspring and their parental genotypes) and CPE2 (without one of the parental genotypes) were calculated using GenomeStudio and Cervus software.

Table 1. Basic diversity parameters for the studied panel of SNPs

	HO	RP
MAF (σ)	0.380 (0.093)	0.383 (0.097)
H _o	0.468	0.456
PI	1.75E-47	1.84E-47
CPE ₁	0.99999835	0.9999999
CPE ₂	0.99999842	0.9999999

Minor allele frequency (MAF) for the SNPs in Holstein cattle ranged from 0.1 (except for two monomorphic markers) to 0.5, with mean and median values of 0.38 (± 0.093) and 0.39, respectively. For Polish Red cattle, these parameters were similar: mean MAF of 0.38 (± 0.097) and median of 0.41. The observed heterozygosity for the analysed markers ranged from 0.21 (HO) and 0.08 (RP) to 0.65 (HO) and 0.56 (RP), with a mean value of ~ 0.46 . For the analysed panel, very low PI values were observed for both populations: 1.84E-47 for RP and 1.75E-47 for HO. CPE1 and CPE2 values were 0.99999835 and 0.99999999 for RP cattle, and 0.99999842 and 0.99999999, respectively, for HO cattle.

It is concluded that the tested SNP panel included in the Bovine SNP50 assay except for 2 monomorphic loci in HO cattle and 1 in RP cattle, could be successfully used for parentage tests in the studied breeds.