



Genetic variability of Mezőhegyes horse breeds using genealogical and molecular information

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Seven-at-hand with Nonius horses from Hortobágy

Materials and methods

Blood samples were collected from Nonius, Gidran and Furioso-North Star breeds. 136, 138 and 58, respectively. Additionally, pedigree information of horses with blood samples was collected from the studbooks and was analyzed. Microsatellite data (twelve markers) were analyzed using Molkin, pedigree analysis was done using EnDog.

Microsatellite markers were compared based on their PIC value. Distances among the breeds were measured with Nei's genetic distance and Reynold's genetic distance based on the microsatellite information. Distances were measured based on the pedigree information was characterized using Nei's genetic distance also.

Results and Discussion

The most informative marker was "ASB2" marker (15 alleles) with 0.818 PIC value, less informative was "HTG4" marker (8 alleles) with 0.428 PIC value (Table 1.). Both heterozygosity and number of alleles were highest for "ASB2". Lowest heterozygosity was found for "HTG4" and was the lowest number of alleles was found for "AHT5", respectively.

Genetic distance based on molecular information was highest (Nei's minimum distance=0.0449; Reynold's distance=0.0308) between Gidran and Nonius, and was the lowest (Nei's minimum distance =0.0396; Reynold's distance=0.0225) between Gidran and Furioso-North Star (Table 2.,3.). Each distance based on molecular data was significant.

Nei based genetic distances among breeds were also computed based on pedigree information (Table 4.). Highest distance was found between Nonius and Gidran, while Nei based genetic distance was lowest between Gidran and Furioso-North Star. The results based on the molecular information and based on the pedigree information resulted similar relationship among Mezőhegyes originated breeds.

Inbreeding level was also computed based on pedigree results. There were 94, 61 and 29 horses with higher than 0.01 inbreeding coefficients from Nonius, Gidran and Furioso-North Star, respectively (Table 5.). Mean inbreeding level was lowest for Furioso-North Star, and was almost similar for Nonius and Gidran.

Table 2.

Nei's genetic distance based on microsatellite information

	Furioso-North Star	Gidran
Gidran	0.0396	
Nonius	0.0422	0.0449

Table 3.

Reynold's genetic distance based on microsatellite information

	Furioso-North Star	Gidran
Gidran	0.0225	
Nonius	0.0242	0.0308

Table 4.

Nei's genetic distance based on pedigree information

	Furioso-North Star	Gidran
Gidran	0.0401	
Nonius	0.0529	0.0482



Gidran XI-4 (Sóhaj) in the Young Horse World Championship

Introduction

Three horse breeds were founded in the Mezőhegyes National Stud (founded in 1785), namely the Nonius, Gidran and Furioso-North Star based on Spanish origin mares and Anglo-Norman, Arabian and Thoroughbred stallions, respectively. These breed were originally used for military purposes, nowadays are bred for various sport disciplines (show-jumping, eventing, driving etc.).

Each breed has limited number of brood-mares, so maintaining of the heterozygosity of the breeds is very important.

The aims of the study were to analyze microsatellite variability and genetic diversity of Mezőhegyes horse breeds.



Blokád V. Furioso-North Star stallion

Table 1.

The description of allele frequencies of the microsatellite analysis

Name	Alleles	Heterozygosity	PIC
AHT4	10	0.82	0.796
AHT5	6	0.72	0.671
ASB2	15	0.84	0.818
HMS2	12	0.83	0.809
HMS3	9	0.81	0.785
HMS6	7	0.77	0.743
HMS7	7	0.83	0.805
HTG10	12	0.83	0.805
HTG4	8	0.46	0.428
HTG6	9	0.72	0.672
HTG7	7	0.59	0.524
VHL20	9	0.82	0.796

Conclusions

Results of the microsatellite analysis showed that Mezőhegyes originated breeds have a reasonable level of genetic diversity.

The closer relationship between Gidran and Furioso-North Star might be the result of using Thoroughbred stallions during the history of the breed.

Mean inbreeding shows that avoidance of inbreeding more important for Nonius and Gidran breeds.

Table 5.

Number of inbred horses and mean inbreeding coefficients

	Inbred horses	Mean inbreeding
Nonius	94	0.05428
Gidran	61	0.05322
Furioso-North Star	29	0.02886

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