INTRA-LINE AND INTER-LINE GENETIC DIVERSITY IN SIRE LINES OF THE OLD KLADRUBER HORSE BASED ON PEDIGREE INFORMATION

Barbora Hofmanová, Luboš Vostrý and Ivan Majzlík
Czech University of Life Sciences Prague, Kamýcká 129, 165 21 Prague 6, Czech Republic, e-mail: hofmanova@af.czu.cz

CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE

Faculty of Agrobiology, Food and Natural Resources

INTRODUCTION

The Old Kladruber horse is the original Czech horse breed included among the genetic resources of the Czech Republic, currently kept in two colour varieties – grey and black. Pedigree records are available from 18th century. The population is closed from 2002, so there is a concern about the loss of genetic variation.

The current population (58 stallions + 492 breeding mares) is divided into 9 sire lines.

Tab 1: Name, colour variation, year of birth, breed and country of origin of the Old Kladruber horse line founder

Name	Colour	Born	Breed	Origin
Generale	Grey	1787	Old Kladruber	Czech Republic
Generale - Generalissimus	Grey	1938	Old Kladruber	Slovakia
Favory	Grey	1779	Old Kladruber	Slovakia
Favory - Generalissimus	Grey/Black	1965	Old Kladruber	Czech Republic
Sacramoso	Grey/Black	1800	Italo-Spanish	Italy
Solo	Black	1927	Old Kladruber	Czech Republic
Siglavi Pakra	Black	1946	Lipizzaner	Slovenia
Romke	Black	1966	Friesian	Netherlands
Rudolfo	Grey	1968	Lusitano	Portugal

OBJECTIVE
The aim of this study was to evaluate genetic diversity within and among sire lines.

Foto: www.nhkladruby.cz

MATERIAL AND METHODS

❑ The analysis included a total of 324 individuals with fully informative pedigrees of the five generations of ancestors.

❑ The procedure INBREED of SAS (2005) was employed for inbreeding coefficient (F_X) and coefficient of relationship (R_{XY}) calculation.

$$F_X = f_{ZY} = 0.25\,(f_{AC} + f_{AD} + f_{BC} + f_{BD})$$

where: f is the coancestry coefficient between two individuals, such as X and Y, with A and B representing the parents of an individual X, while C and D represent the parents of individual Y.

$$R_{XY} = 2f_{XY}$$

❑ Genetic diversity was assesed by cluster analysis - procedure VARCLUS of SAS (2005).

CONCLUSION

❑ The average inbreeding coefficient of 0.076±0.038 was estimated.

❑ Differences between sire lines were found.

❑ Lower mean values of coefficients of relationship were estimated between sire lines of different colour varieties (grey x black) compared to values estimated within each colour variety.

❑ The results are useful for the development of breeding strategies, as well as for the preservation of genetic diversity at the population.

RESULTS

Tab 2: Descriptive statistics of the inbreeding coefficient (F_x) per line

Line	Average F_x	SD	Min	Max
Generale	0.096	0.022	0.062	0.139
Generale - Generalissimus	0.078	0.019	0.042	0.128
Favory	0.048	0.029	0.003	0.155
Favory - Generalissimus	0.049	0.030	0.005	0.096
Sacramoso	0.091	0.040	0.006	0.222
Solo	0.080	0.035	0.003	0.207
Siglavi Pakra	0.082	0.050	0.011	0.177
Romke	0.084	0.043	0.004	0.151
Rudolfo	0.051	0.025	0.011	0.085
All	0.076	0.038	0.003	0.222

Tab 3: The average intra-line (on the diagonal) and inter-line (above the diagonal) coefficient of relationship

Line	Gen	Gen-Gss	Fav	Fav-Gss	Sac	Sol	SigP.	Rom	Rud
Gen	0.301	0.214	0.152	0.173	0.085	0.039	0.056	0.042	0.198
Gen-Gss		0.304	0.153	0.176	0.087	0.040	0.045	0.043	0.176
Fav			0.179	0.126	0.107	0.080	0.073	0.082	0.132
Fav-Gss				0.231	0.111	0.086	0.090	0.099	0.146
Sac					0.179	0.176	0.159	0.162	0.091
Sol						0.257	0.195	0.212	0.052
SigP							0.279	0.185	0.064
Rom								0.215	0.065
Rud									0.256

Fig 1: Cluster analysis constructed from the average inter-line coefficients of relationship