

## **Horse genetic resources in Central Europe** / I. Bodó 13a 1. Pdf /

I. Bodó Debrecen University  
bodoi@hu.inter.net

### **Summary**

Based upon the common history of horse breeding Central Europe includes the following countries: Austria, Bohemia, Croatia, Hungary, Romania, Serbia, Slovakia, Slovenia,. For warm blooded stock the oriental /Arabian/ influence, the impact of Spanish-Neapolitan horse and the import of English Thoroughbred was significant, also the racing developed well at the 19th century.

The influence of imperial or military studs was decisive, started from the last decades of the 18th century: Mez hegyes, Radautz, Bábolna, Kisbér, Fogaras, Lipizza /1580/ and Kladrub (1579).

Based on Arabian /Shagya/, Spanish-Neapolitanian breeds Lipizzan, the Kladrub gala carossier and Gidran, Furioso, Kisbér later influenced by Thoroughbred and Nonius (Anglonorman) breeds were established. They are protected in official preservation programs. Original cold blooded horses are represented by the Noric, Murinsulaner and Posavina breeds. The mountain Bosnian type and the Hutzul are characteristic ponies of the region.

After World War II the mechanization of agriculture and transport resulted in drastic decrease of horse population through the whole region. New national sport horse breeds are established on international gene basis. The population size of traditional breeds decreased and they became threatened by extinction. The recently established breeders' associations and the survived traditional studs have the task of preservation of endangered breeds. Developing their breeding goal for modern life and market is important and not easy, sometimes impossible. The effect of enthusiastic breeders and subsidies should not be neglected in this respect.

The use of traditional pony breeds for children is slowly developing (Hutzul) and the role of cold blooded horse breeds is more and more also in meat production.

### **The region in hypologic sense**

Austria, Bohemia, Croatia, Hungary, Romania, Serbia, Slovakia and Slovenia are belonging to Central Europe in hypologic sense. It is the consequence of history, geographical situation and it does not correspond the political events. Therefore the horse population and breeds of the region are similar in these countries, in spite of the fact, that Austria got another political development.

Contact with other European regions were important e.g. with Poland (Hutzul), with western Europe (imports in 17<sup>th</sup> -18<sup>th</sup> centuries) with Italy (Lipizzan horses).

According to the European development up to the 15-16 century the ancient type of the horse was dominant in warm blooded horses of the region and after the Turk occupation many oriental genes came in. The role of Spanish-Neapolitan horse type was introduced in 18<sup>th</sup> century and the English Thoroughbred impact started at the beginning of 19<sup>th</sup> century and its influence is in action up to now. Moreover the best Thoroughbred horse was born in this region. *Kincsem* (1874., Cambuscan-Waternymph) 54 starts and 54 victories in different international race courses of Europe. An unbeatable sempiternal World championship.

### **The conservation aspect in horse breeding**

The conservation of genetic resources commonly is not so popular among horse breeders as among sheep or cattle breeders. Therefore here is the summary of some important rules of conservation illustrated with Central European examples.

\* Preservation of traditional breeds

Corresponding to the categories created by *Lauvergne (1982)* the following horse breeds are existing in the region:

*wild populations* the Przewalski stud in Hortobágy puszta, Hungary, can be considered more feral, because it is a reconstruction of Przewalski horses in wild circumstances after keeping in Zoos. There are more than 240 horses in a free pasture.

*Traditional breeds*, may be the Bosnian pony can be considered such a population

*Standardized breeds*. All the traditional breeds in conservation are in this category according to Lauvergne nomenclature e.g. Nonius, Lipizzan etc.

*Selected lines*. There are many horse breeds in this category, first of all Thoroughbreds, Trotters, sport horses, cold blooded improved by Percheron etc. However these are not in conservation.

So, there are examples in Central Europe for all these categories.

According to the general use and in contradiction to Lauvergne the *traditional* word is used hereinafter for all the standardized horse breeds in conservation programme.

\*Maintenance of male lines

The maintained genealogical stallion lines have a role in sustainable biodiversity. More than two hundred year old lines are existing in all traditional breeds: Lipizzan, Kladrub, Nonius, Gidran, Furioso and Shagya. Through some generation the line can reserve a special character and can help in avoiding close inbreeding.

\* Preservation of female families

The importance of females are more and more recognized because of the discovery of mitochondrial DNA. It is inherited from female to female. MtDNA was investigated by Slovenian researcher first of all in Lipizzan and cold blooded Posavina and Murinsulaner breeds. The molecular data nicely support the phenotypic differentiation between the breeds (*Ivankovi et al 2005*).

\*The problem of population size

The class of risk is determined by the size of female population and also the number of males taken into consideration (table 1.). According to FAO risk categories (*Bodó 1993, Bodó 1994*) the horse population of Central Europe can be characterized with examples as follows:  
table 1.

categories	Females in breeding	E x a m p l e s
Normal	10 000	No endangered horse breed
insecure	5000 ó 10000	No endangered horse breed
vulnerable	1000 ó 5000	Kisbér halfbred, Hutzul
endangered	100 -1000	Lipizzan, Nonius, Gidran, Shagya, etc
critical	100	Murinsulaner, Bosnian
extinct		Sicule horses

\*The danger of inbreeding

There are three approaches for evaluation of the level and possible damages of inbreeding:

- Pedigree data, Wright coefficient or other calculations,
- homozygosity calculated by different blood parameters, from blood groups up to molecular genetics
- biological, physiological signs, first of all fertility.

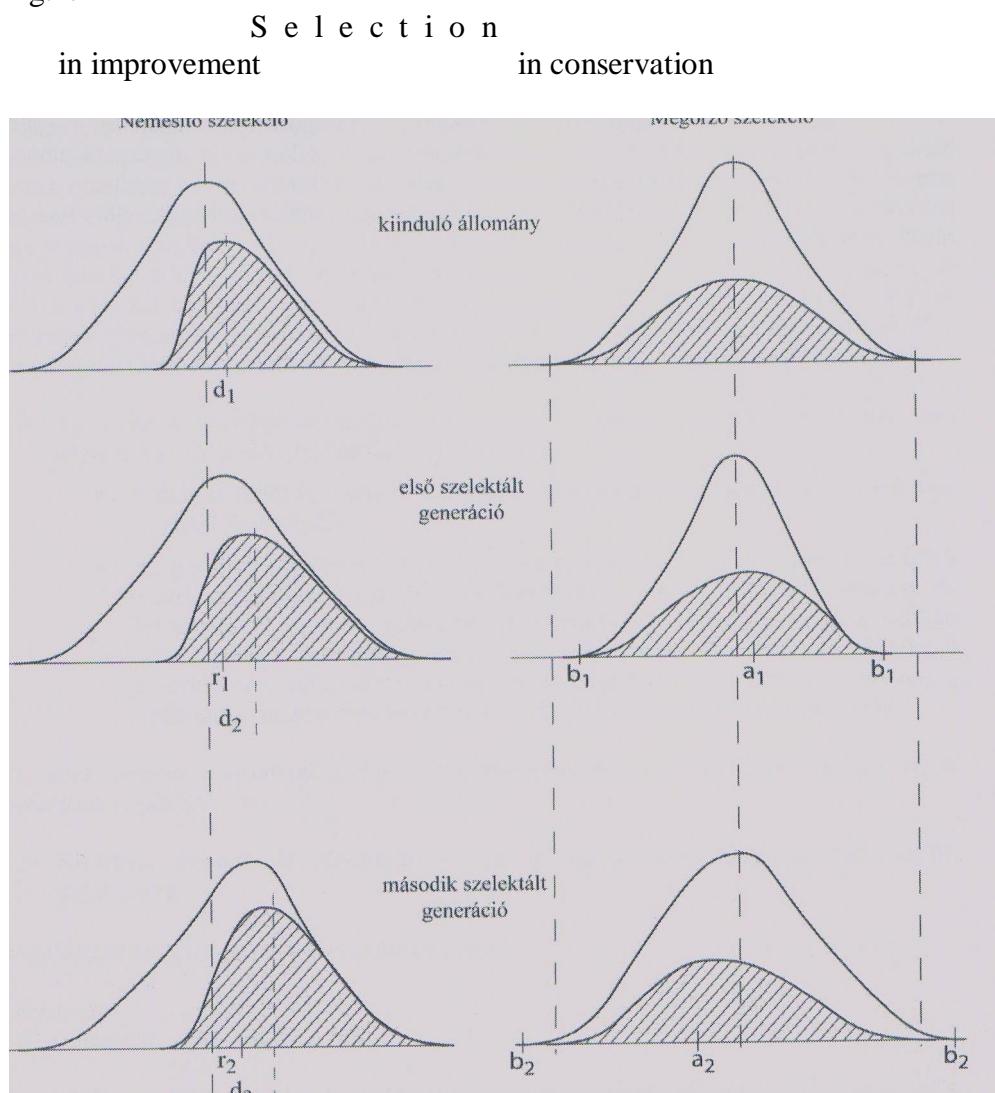
All the breeders are frightening from damages of inbreeding and therefore sometimes it is overcompensated. Therefore Kladrub breeders used Orlov and Friesian stallions for avoiding inbreeding defects and it was not advisable for maintaining the character of the breed. Now the problem was brilliantly solved, with Lipizzan Favory and Siglavy Pakra. The question is however : this crossing was it necessary also for some biologic reason?

\*Selection, parameters, outstanding variants,

To run the breeding of domestic animals is impossible without selection. The following figure 1. shows the difference between the improving selection and that of conservation. In selection for improvement the genetic progress can be seen in two generations and in the curves of selection for conservation, the changing deviation after the parents generation and the minimally changing averages, according to the everyday practice.

In horse breeding of the region both types of selection can be found and more or less the conservation selection becomes dominant in traditional horse breeds.

fig.1.



\* Permissibility of crossing

Theoretically crossing is not allowed in conservation, because it is in contradiction with pure bred breeding and the maintenance of the survival of the traditional genetic structure of a given breed.

There are, however, some exceptions e.g. the Kisbér halfbred breeders use always new Thoroughbred lines and this method belongs to the traditional breeding scheme. On the other hand the commercial crossing is allowed, if the pure bred stock is not hindered in breeding and the crossed animals are not used in the conservation pure bred programme. It happened with the Nonius breed in Hungary, when Nonius mares were mated by Thoroughbred stallions. The F<sub>1</sub> progeny was relatively good in sport.

\* Importance of difference between breeds

It is quite clear that only independent pure breeds have merit for conservation. There are many confusions concerning the names of breeds, and there are many relative breeds for conservation. A good example of the difference is the pure bred Arabian and the Shagya Arabian. The difference is in size, in pedigree, in usefulness and the movement. The exaggerated Arabian exposition movement is not a breeding goal in Shagya.

\*Use of laboratory, molecular genetic methods

Use of different scientific methods is developing e.g. the use of blood groups, DNA, some polymorphic systems in blood and molecular genetic methods (*Mihók et al 2005, Bán et al. 2006.*)

Concerning molecular methods Cothran's opinion must be taken into consideration :

•Molecular methods should be used in combination with all information about a rare breed to make a determination of whether or not the breed is worthy of conservation efforts (Cothran and Luis 2005).

Development of scientific methods, however, is important also in the respect of conservation.

\*Cryogenic storage

The storage of semen and embryos are well developed and used in bovine species. For horses however it is organized as well, and now the development is going on within the framework of a project.

A regional central cryogenic centre for conservation of horse breeds does not yet exist.

### **The role of imperial military studs**

In order to develop horse breeding for military reasons and for the transport state studs (imperial studs) were established in Austrian, Habsburg empire.

The first, all over the world was Kladrub in 1579. and Lipizza in 1580. Later Mezhegyes in 1785. and Bábolna 1789., Radautz, Lucina 1792., Kisbér 1853., (closed down), Djakovo 1855. and Fogaras (Alsószombatfalva, Simbata de Jos) 1875.

Their role:

- Establishment and development of recognized traditional breeds
- Introduction of strict stud technology
- Elaboration and continuous registration of the stud books. These are contemporary with the GStB of Thoroughbreds in England i.e. older than 200 years.
- They preserved and preserve the tradition of the stud (horses, environment, buildings, stables etc.)

Later, after the second World War new studs joined to the work of conservation of genetic resources, and breeding of registered traditional breeds. Some of them can be mentioned here:

Hortobágy, Aggtelek, Piber, Karađorđevo, Ríszentpéter, Tapolcianky, Szilvásvár, Lipik, Beclean, Maróczpuszta, Jucu, Tulucesti, Leutstetten, Motesice, Slatina, Izvin etc. Some remained working as state studs, some are privatized and many of them took part no more in conservation.

Concerning the work of conservation privatization means a danger.

### **Registered standardized warm blooded breeds**

\*Gidran. Established by Gidran senior ox, a chestnut stallion at the beginning of 19. century. His descendents formed the nice chestnut stud in Mez hegyes. Now the original studs are in Tulucesti and Marócpusztá. The impact of ox and xx was important in development of the breed. It suffered huge damages in the first and second World War, like the other breeds of the region.

Survival was based upon the saved original families. The breed proved to be very talented in eventing. Gidran XI-4 got the title "the best cross country horse of the world" at the championship of young horses. Gidran XI-9 was qualified for three day events of Beijing. The breed can be considered the best eventing breed, the small breeding population taken into consideration.

\*Nonius The founder of the breed, Nonius senior an Anglonorman stallion born in France, came into Hungary in 1816. In the framework of inbreeding, four lines were established and the small impact of Thoroughbred improved the elegance of the breed and it developed a calm harness horse, useful in artillery and agriculture. Nice black four in hands are available for high prices on the market. Endurance of Nonius horses was proven in distance driving (100km) competitions. It is popular in Romania, Hungary and Serbia. Constant pedigree and genetic stability make the breed available for commercial crossing.

\*Mez hegyes halfbred, the Furioso North Star. Established by two xx stallions a massive English halfbred breed developed, influenced by the rich environment and nutrition. After the second World War in cooperation with Czech and Slovakian colleagues Przeswith and Catalin, two xx stallions were accepted as new line founders. Useful breed in both riding and driving. Excellent character stallions were used in voltage sport (North Star III, Catalin XII). In Bavaria a good small stud of the breed flourished in time of late Prinz Ludwig von Bayern in Leutstetten.

\*Kisbér halfbred. The breeding goal was : military riding horses, calmer and more massive compared to xx and with correct conformation. A typical hussard horse. Many xx line breeders took part in development of the breed, many of them are extinct and use of new xx and Trakehner stallions is allowed. However use of modern sport horses is not allowed because of the purpose of conservation. The breed is very popular for the successful sport type. In 1936 three Kisbér horses were in Hungarian Olympic eventing team Berlin: 5<sup>th</sup> and 9<sup>th</sup> place and the third could not take part because of an accident. Széplány was the 20th at the Olympic game in Rome. The danger : to follow modern breeding goal without any restriction.

\*Shagya Arabian. The name giving Shagya senior ox imported from Arabia in 1830 and founded the breed among other ox stallions and mares from Radautz, Mez hegyes and Bábolna. In Shagya pedigree the number of ox is limited. Acknowledged as a separate breed by WAHO in 1972. Relatively larger body size, attractive noble appearance useful in riding and also driving. The artificially forced exhibition movement of pure bred Arabian is not obligatory for Shagyas. The dam of the famous Ramses Jordi was a Shagya. Siglavy Bagdady VIII-2, Hungares was world champion of endurance riding in Achen.

\* Lipizzan. An international breed, lead by an organization, LIF. Established in Lipizza. Closed stud book, strict pedigrees. The most of traditional Lipizzan studs are in Central European region. Used in Spanish riding school in Vienna and for driving and dressage. The results of a scientific project lead by prof. Brem were published in a book "Lipizzaner im Spiegel der Wissenschaft" (Brem 2004). This breed preserves the conformation of barock horses and all the traditions belonging to it.

\* Kladrub is the eldest stud of the world . The original breeding goal was to breed gala karossier horses for the imperial court in Vienna. The grey stud is at Kladrub nad Labem and the black variety is not far in Slatinany. It preserves the genetic structure of horses exempt

from xx genes as also the Lipizzan breed. They preserved Spanish-Neapolitan horse type and all traditional cultural value of horsemanship with it.

### **Cold blooded horses of the region**

\*The cold blooded horses are more or less independent from the imperial court, because such horses were not so important for the army. In the time of the Roman Empire the province *Noricum* occupied the Alpine region. The Noriker horse bred in Austria is autochthonous in this region and can be considered as an original native breed, independent from western cold blooded populations. Norikers are a little bit lighter and faster compared to the Ardenne, Percheron or other western horse breeds used for improvement of horse breeds of the region.

\*Two *river-side* cold blooded breeds should be mentioned the Murinsulaner (the River Mura flows through four countries Austria, Slovenia, Croatia and Hungary), the Murinsulaner horse breed is bred in Croatia, Slovenia and Hungary, but Murinsulaner type horses were integrated by Noriker population in Austria. Murinsulaner is a critically endangered breed with about 30 mares in Croatia and used in a conservation programmes in Slovenia and Hungary.

Murinsulaner is faster and smaller compared to Noriker, influenced by oriental horses some centuries ago. In the valley of Sava river another cold blooded breed is native: the Posavina horse. When the cold blooded population are improved by western breeds (Ardenne and Percheron) the Posavina could be independent of this influence and well adapted through centuries to the given environment in Croatia and Slovenia.

### **Pony breeds**

\*The nick name of the Hutzul horse is *the pony of Carpathians*. Hutzul is a small horse (a *Kleinpferd*, in German), according to another distinction, because the height at withers is more than 120 cm. The Hutzul International Federation organizes Hutzul breeders of different countries. The breed was developed by continuous work in mountains, a free range life at altitude of 2000 meters, influenced by cold winter and hot summer. They were baggage horses, going safely through dangerous mountain paths. Hutzul was accepted by the army as military rifleman corps. More and more utilized for children and its good temper makes it suitable for recreation.

\* The Bosnian pony. It is a natural original small horse indeed. Its utilization is similar to Hutzul, but in natural framework and not so officially organized. Baggage, saddle horse and working in agriculture. It is endangered with a population size of 125 females and 25 males estimated on report of Selection S Services responsible for monitoring of breeding (Stojanovic 2012).

### **Danger of extinction**

New national sport horse breeds are established on international gene basis. The impact of sport breeds and xx is enormous on all warm blooded traditional horse breeds. Traditional types and breeds are in danger of extinction, because of the concurrence of modern breeds on the market and it resulted in drastic decrease of horse population throughout the whole region.

The recently established breeders' associations and the survived traditional studs have the task of preservation of endangered breeds.

For cold blooded horse the meat production makes danger, because breeders think that the bigger horses can bring higher income on the market.

Besides the professional arguments also the cultural ones are important.

The interest and support of society for rare breeds is slowly developing all over the region. Subsidies are necessary and obligatory for avoiding the extinction.

## **\*Present and future of traditional breeds in 21<sup>st</sup> century**

At present with some exception the traditional horse breeds of the region are more or less saved from urgent extinction. The importance of the topic is proved by the fact, that Wageningen Academic with EAAP published a book exclusively on conservation genetics of the horse (Conservation 2005).

Developing their breeding goal for modern life and market is important and not easy. A domestic animal a horse breed with neglected use, only running in free stud can not be correctly conserved, because the natural selection can change its traits. Therefore a form of utilization must be found for different breeds. E.g. The warm blooded breeds can be used in modern sport and transport, even if not at the highest level. The ponies e.g. the Huztul is adaptable easily for children, so it is already going on. For cold blooded breeds the meat production can be an income for the breeders, but it is not enough for maintaining the traditional gene structure, the use in agricultural work and transport is necessary as well.

The effect of enthusiastic breeders and subsidies should not be neglected in this respect. The recreation offers a good solution for good temperament horses, bred more or less not on high performance.

Use of traditional horses at festival events is also a good possibility.

In this way, we can hope the survival of our traditional breeds in population size of conservation risk category.

The use of traditional pony breeds for children is slowly developing (Hutzul) and the role of cold blooded horse breeds is more and more also in work of small farms and in meat production.

### **\* Conclusion**

For the unknown far future the names of domestic animal breeds have no value, but their rare traits and the carrier genes contain the worth.

### **References**

- Bán B., Bodó I., Józsa Cs., Mihók S.* (2006): Comparison of Mez hegyes horse breeds also with Thoroughbreds and Hutzul based on blood group and microsatellite (DNA) polymorphisms in *Génmeg rzés Debrecen* 44-55.p
- Bodó I.* (1993): The minimum number of preserved populations. *FAO Animal production and health paper* 104. 91-105p.
- Bodó I.* (1994): Minimum number of individuals in preserved domestic animal breeds The third global Conference on Conservation of Domestic Animal Resources Kingston Ontario, Canada 57-65.p
- Bodó I., Alderson L., Langlois B.* ed. (2005): Conservation genetics of endangered horse breeds EAAP publication No.116. Ed.: Wageningen Academic.187.p.
- Brem G.* ed. (2004): *Der Lipizzaner im Spiegel der Wissenschaft.. Verlag der Österreichischen Akademie der Wissenschaften* 337.p
- Cothran E.G. and Luis C.* (2005): Genetic distance as a tool in the conservation of rare horse breeds. . *Conservation genetics of endangered horse breeds. Wageningen Academic EAAP Publication No116.* 55-71.p
- Ivankovic, A., Dov P., Caput P., Mijic P., Konjacic M.* (2005) Genetic characterisation of the Croatian autochthonous horse breeds based on polymorphic blood proteins and mtDNA data. *Conservation genetics of endangered horse breeds. Wageningen Academic EAAP No116.* 105-110.p

*Lauvergne J.J.* (1982): Genética en poblaciones animales después de la domesticación : consecuencias para la conservación de la razas 2<sup>nd</sup> World Cong. Genet. Appl. Livest.Prod. 6. 77-87.p

Mihók S., Bán B., Józsa Cs., Bodó I. (2005): Estimation of genetic distance between traditional horse breeds in Hungary. Conservation genetics of endangered horse breeds. Wageningen Academic EAAP Publication

No.116 111-121.

Stojanovic S. (2012): Personal information

## Pictures

1. Gidran stallion Gidran IX
2. Nonius mare 244 Nonius öBöXXXI H. Vallomás
3. Mez hegyes Halfbred stallion North Star öAö XVIII
4. Kisbér Halfbred stallion Szikrázó I
5. Shagya stallion OöBajan X
6. Lipizzan stallion 843 Pluto Gaetana XV
7. Kladrub stallion Generalissimus Santona XXXVII
8. Noriker
9. Murinsulaner mare 303 Maja
10. Posavina mare
11. Hutzul stallion Gurgul X
12. Bosnian pony

1.



2.





3.



4.



5.



6.



7.



8.



9.



10.



11.



12.

