

## Farm animal genetic resources in the Slovak Republic

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**ABSTRACT:** At present, farm animal genetic resources are used to a various extent and with different objectives in Slovakia. The use of highly productive breeds or hybrids aimed at profitable and competitive production prevails. To a smaller extent, breeds that are a part of Slovakia's and world cultural heritage are kept. The improvement of these breeds for high production or reproduction traits is not a priority. Diversity of farm animals is viewed through the variety of species and breeds used for production of food for people and, also, through the variety of production systems in livestock. Within livestock species, populations of cattle, sheep, goat, pig and horse breeds were analysed in detail. Preferably, breeds were evaluated with respect to the extent of endangerment (number of breeding females) and conservation programmes involved. The origin of breeds was also taken into account. Within respective species, twenty-three local breeds, including native or indigenous, and twenty-nine imported or exotic breeds, thirteen being newly imported and sixteen being imported for a longer time, were identified in Slovakia. Out of local breeds, fifteen breeds were classified as endangered.

**Keywords:** farm animals; genetic resources; breed; diversity; conservation

In most cases, a lack of economic profitability of local breeds is the main factor of rapid erosion of farm animal diversity (Gandini and Oldenbroek, 2002). The use of few globally spread, highly productive breeds dominates. However, it is important to conserve all animal genetic resources available. Many local breeds represent a source of genes for improving health and performance traits for mainstream breeds, and are well adapted to a specific environment (Ruane, 2002). They also utilise low quality feed and are effective from the viewpoint of land cultivation (Závodská and Urban, 2001). Disappearance or drastic modification of local breeds by crossbreeding, and absorption or replacement by exotic breeds, would have a dramatic impact on the environment and human population.

Recognizing the important role farm animals play in food security, preservation of farm animal diversity has been a FAO initiative since 1990 when FAO's Council recommended the preparation of a comprehensive programme for the sustainable use of farm animals at the global level. The Global Strategy for the Management of Farm Animal

Genetic Resources was developed in 1993. The ratification of the Convention on Biological Diversity further encouraged the development and design of the Global Strategy. Based on survey data, a system of breed monitoring and classification (extinct, critical, critical-maintained, endangered, endangered-maintained, not at risk) as the Global Early Warning System has been put in place (Scherf, 2000). Recent initiative of FAO focuses on the preparation of the Report on the State of the World's Animal Genetic Resources (mammalian and avian species) aimed at promoting the wise use and sustainable development of farm animals worldwide. In 2001, a country-driven process was launched as 145 countries (including the Slovak Republic) accepted to be involved in preparatory work on country reports. The report of the Slovak Republic was submitted in June 2003.

The objective of this study was to provide an analysis of main livestock species and breeds reared in Slovakia with respect to conservation of the existing state of diversity as it was presented in the above-mentioned report (Hetényi *et al.*, 2003) even though necessary updates were done.

## MATERIAL AND METHODS

In accordance with the FAO methodology (FAO, 2001), diversity of farm animal genetic resources in Slovakia was evaluated with respect to:

1. Number of breeding females or males in individual populations (breed level), total population size and changes in population size (species level)
2. Extent to which farm animal genetic resources are used for food production
3. Variety of production systems in which farm animals are produced
4. Ways of preservation of farm animal genetic resources

To evaluate the state of endangerment in which Slovak livestock breeds actually are, the following breed categorization (Scherf, 2000) based on criteria such as overall population size, number of breeding females, number of breeding males, trend in population size, active conservation programme was taken into account:

1. Extinct breed – it is no longer possible to recreate the breed population
2. Critical breed – the total number of breeding females is less than or equal to 100 or the total number of breeding males is less than or equal to 5, or the overall population size is decreasing
3. Critical-maintained breed – critical breed for which an active conservation programme is in place
4. Endangered breed – the total number of breeding females is higher than 100 and less or equal

to 1 000 or the total number of breeding males is higher than 5 and less than or equal to 20

5. Endangered-maintained breed – endangered breed for which an active conservation programme is in place
6. Breed not at risk – the total number of breeding females and males is higher than 1 000 and 20, respectively

The identification of endangered breeds was done taking into account the origin and local adaptation of breeds (Alderson, 2003). Thus national breed populations were interpreted in the context of their international populations.

Data of annual statistical yearbooks of the Slovak Republic, Farm Census of the Slovak Republic (2002), commodity reports and questionnaires prepared according to the principles adopted within the framework of FAO guidelines (FAO, 2001) and disseminated to respective breeders' associations were used for analyses which included the following livestock species: cattle, sheep, goats, pigs, horses, rabbits, poultry and fur animals. However, data on poultry, rabbits and fur animals need further investigations. Therefore surveys of these species were omitted.

## RESULTS AND DISCUSSION

Table 1 gives a survey of numbers of livestock species during the period 1989–2002. Due to transformation, numbers of all species, except for goats

Table 1. Numbers of farm animals in Slovakia (thousand heads)

Species	Years					
	1989	1993	1996	1998	2000	2002
Cattle	1 559	993	892	705	646	608
cows	537	386	335	284	271	260
Sheep	600	411	419	326	348	314
ewes	355	286	284	226	211	210
Goats	9.5	25	26.1	50.9	51.4	40.2
Pigs	2 520	1 179	1 985	1 593	1 488	1 554
sows	169	166	152	138	131	117
Horses	15	11	10	10	10	8
Poultry	16 478	12 234	14 147	13 117	13 580	13 959
hens	4 600	7 300	7 400	6 200	5 800	6 200

Table 2. Changes in livestock across Central and Eastern European countries during the transition period (thousand heads)

Species	Slovakia		Czech Republic*		Hungary**		Bulgaria***	
	1989	2002	1989	2001	1989	2000	1990	2000
Cattle	1 559	608	3 481	1 574	1 598	845	1 575	682
Sheep	600	314	399	84.1	2 216	1 258	8 130	2 549
Goats	9.5	40.2	40.6	32	****	****	433	1 046
Pigs	2 520	1 554	4 685	3 688	8 327	5 032	4 332	1 512
Horses	15	8	27	23.8	****	****	****	****
Poultry	16 478	13 959	32 479	30 784	56 719	43 182	36 338	14 963

\*Mátlová *et al.* (2003); \*\*Wagenhoffer *et al.* (2003); \*\*\*Dinev *et al.* (2003); \*\*\*\*not available

and poultry dropped significantly. Cattle and pigs decreased from 1 559 thousand to 608 thousand and from 2 520 thousand to 1 554 thousand heads, respectively. However, further decrease of cattle and pigs was recorded in 2003 and 2004. More or less drastic decline was observed also for sheep, horses and poultry over the analysed period.

When numbers of livestock species in Central and Eastern Europe countries during the 1990ies transition period were compared, similar trends in Slovakia, Czech Republic, Hungary and Bulgaria were found (Table 2). In general, numbers fell down, except for Slovakian and Bulgarian goats. Decrease of cattle was highest (by 60%) in Slovakia. Slightly lower decrease (by 48% up to 57%) was reported by Wagenhoffer *et al.* (2003) for Hungary, Mátlová *et al.* (2003) for the Czech Republic and Dinev *et al.* (2003) for Bulgaria. Decrease of pigs, by 21% or 39%, was less drastic in Central European countries than in Bulgaria (by 65%). Lower changes were also recorded for poultry in Central European countries than in Bulgaria (less than 25% vs. 59%). In sheep, num-

bers were reduced by 70% in the Czech Republic and Bulgaria, whereas in Slovakia and Hungary decrease of sheep did not exceed 50%.

According to human intervention expressed by input-output relations, livestock farming systems in Slovakia (Table 3) were reviewed in a standard way: low-input production systems of small holders with low inputs and outputs; medium-input production systems and high-input production systems in which inputs are managed to ensure high levels of animal output, reproduction and survival. All farming systems could be found across livestock in Slovakia. High-input systems prevail mainly in dairy and dual-purpose cattle (85%) that is a result of increasing absorption of local cattle by cross-breeding with Holstein breed. High-input systems also dominate in the pig sector (90%). Beef cattle, sheep and horses are kept under medium-input systems (up to 80%). In goats, the proportion of low-input systems dominates (80%). Only 10% of goats are kept in commercial herds (Dubravská and Vajs, 2003).

Table 3. Distribution of livestock according to production systems (%) in Slovakia

Species	Production systems (%)		
	low-input	medium-input	high-input
Dairy and dual-purpose cattle	10	5	85
Beef cattle	15	55	30
Sheep	20	45	35
Goats	80	10	10
Pigs	5	5	90
Horses	15	80	5

Table 4. Survey of livestock breeds in Slovakia (breeding females recorded in herdbook in 2003, heads)

Species	Autochthonous or locally adapted breeds	Newly imported breeds	Breeds that have been imported for a longer period
Dairy and dual-purpose cattle	Slovak Pied (20 000) Slovak Pinzgau (2 500)	Swiss Brown (300)	Holstein (70 000)*
Beef cattle		Charolais (380) Hereford (120) Simmental (80) Aberdeen Angus (100) Piedmont (400)** Limousin (105) Blonde d'Aquitaine (20)	
Sheep	Improved Wallachian (24 000) Tsigai (13 000) Merino (5 500) Wallachian (50)	Lacaune (370) Charollais (150) Oxford Down (275) Bergschaf (30)	East Friesian (150) Suffolk (330) Romanov (100) Ile-de-France (260) Berrichon du Cher (100)
Goats	White Shorthaired (1 000) Brown Shorthaired (3)	Alpine***	
Pigs	Large White (12 000) White Meaty (2 000) Landrace (2 000) Slovak Meaty (300) Black Pied***		Duroc (80) Hampshire (40) Yorkshire (250) Pietrain (40) Belgian Landrace (10)
Horses	Arab (10) Slovak Warm-blooded (320) Hutsul (50) Furioso (40) Nonius (40) Slovak Sport pony (42) Lipitsa (60) Shagya-Arab (85) Noric of Murany (115) Thoroughbred (180)		Czech Warm-blooded**** Haflinger (68)* Hanoverian**** Quarter horse**** Holstein horse****

\*including crossbreds; \*\*only crossbreds; \*\*\*no females recorded in herdbook in 2003; \*\*\*\*not available

Numbers of breeding females recorded in herdbooks are given in Table 4. In addition to FAO categorisation, breed adaptation to a local environment was taken into account and breeds were divided into the three groups: local – autochthonous or locally adapted breeds, i.e. originated or traditionally kept in Slovakia, newly imported breeds (since the early 1990ies), and breeds that have been imported to Slovakia for a longer period of time. In total, fifty-two breeds of cattle, sheep, goats, pigs and horses were identified. Out of them, twenty-three

breeds are local breeds. Number of breeding females was less than or equal 100, or was unknown (i.e. no female recorded in the herdbook) in ten local breeds. These breeds were categorised as critical or critical-maintained (Wallachian sheep, Brown Shorthaired goat, Black Pied pig, and Arab, Hutsul, Furioso, Nonius, Slovak Sport pony, Lipitsa and Shagya-Arab horses). The number of breeding females higher than 100 or less and equal to 1 000 was found in five local breeds. These breeds were categorised as endangered or endangered-main-

tained (White Shorthaired goat, Slovak Meaty pig, and Slovak Warm-blooded, Noric of Murany and Thoroughbred horses).

With local breeds, the most critical situation is in horses and goats. Numerical scarcity was found in all horse and goat local breeds categorised as critical or endangered breeds. Of the remaining species, one sheep breed (Wallachian) and two pig breeds (Slovak Meaty and Black Pied) were reported as critical or endangered local breeds. On the contrary, no local cattle breeds are endangered with respect to the actual number of breeding population. Due to rapid crossbreeding with Holstein resulting in reduction mainly of Slovak Pinzgau population, careful monitoring and preservation programmes are necessary to prevent its endangerment or even extinction. Most of the imported populations of beef cattle, sheep and pig breeds (Table 4) are also less numerical according to FAO criteria. Taking into account the origin of these breeds or their spreading worldwide (Anderson, 2003), they represent large and thriving populations. No pressing need of their preservation arose from this aspect.

Conservation activities in Slovakia are oriented towards a limited support to local breeds, mainly of historical importance. Public awareness of conservation needs increased during the last few years. Both *in situ* and *ex situ* conservation techniques have been used. State incentives have been provided for live animals (purebred females) reared in their natural environment since the mid-1990ies. However, this support varies in both the amount per head and the breeds to cover, as public funds are limited. In this context, Black Pied pig and Brown Shorthaired goat need to be mentioned as the breeds that have never been recognised of conservation interest and ceased to exist now. Due to their actual numbers, reconstruction of these breeds from native sources is not possible any more. Only some of local cattle, sheep and horse breeds have been supported. It is expected that after joining the EU, breed conservation in Slovakia will be managed under the common agricultural policy scheme (subsidies for local breeds indigenous for the area, suckler cow subsidies, etc.). Of *ex situ* conservation, only cryopreservation of cattle and horses (semen and embryos) has been developed in Slovakia. The long-term storage for non-commercial purposes covers Slovak Pinzgau and Slovak Pied cattle, Nonius, Furioso, Hutsul, Lipitsa, Shagya-Arab, Arab and Slovak Warm-blooded horse breeds. Shortcomings in this area are briefly characterised by the fact that

no central farm animal genebank has been established yet.

The findings about livestock diversity in Slovakia are in consistency with global trends. Economic pressure, increasing globalisation and financial limitations due to transition movements are the main factors of its decline.

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Received: 04–05–17

Accepted after corrections: 04–09–10

**ABSTRAKT****Prehľad o stave genetických zdrojov hospodárskych zvierat v Slovenskej republike**

V súčasnosti sa genetické zdroje hospodárskych zvierat využívajú v rôznom rozsahu a s rozdielnymi cieľmi. Výkonné plemená sa v čistokrvnej forme a hybridizácii využívajú s cieľom rentabilnej a konkurencieschopnej produkcie. V menšom rozsahu sa však chovajú i plemená, ktoré predstavujú súčasť svetového, resp. národného kultúrneho dedičstva, neplniace prioritne produkčné úlohy. Diverzitu genetických zdrojov hospodárskych zvierat v Slovenskej republike sme hodnotili z hľadiska rozmanitosti druhov a plemien, ako i rozmanitosti produkčných systémov v živočíšnej výrobe. Ďalším kritériom bola početnosť populácií a trendy vo vývoji v rámci druhov a plemien, s prihliadnutím na pôvod plemien. V rámci hovädzieho dobytku, oviec, kôz, ošípaných a koní sme identifikovali dvadsaťtri miestnych plemien (autochtónnych, resp. miestnym podmienkam prispôsobených plemien) a dvadsaťdeväť importovaných plemien, z ktorých trinásť je novo importovaných (importy od 90. rokov 20. storočia) a šesťnásť dlhodobo importovaných, pri ktorých je tradícia ich chovu na Slovensku dlhšia. Pätnásť miestnych plemien sme klasifikovali ako ohrozené plemená.

**Kľúčové slová:** hospodárske zvieratá; genetické zdroje; plemená; diverzita; ochrana

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