

Animal Genetic Resources in Slovakia

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ABSTRACT: Availability of animal genetic resources has an impact on the current and future quality of life and significant impact on food security. Ratification of the Convention on Biological Diversity committed by SR to protect biodiversity ensures sustainable use of its components (as well as animal genetic resources) and ensures the fair and equitable sharing of benefits from the utilization of genetic resources. The situation with animal genetic resources in Slovak Republic is not satisfactory, due to the fact that DNA samples and semen doses stored are only from the breeds Slovak Pinzgau cattle, Slovak Spotted cattle breeds and original Valachian sheep. From the last update statuses of animal breeds in the Slovak Republic, which took place at the end of 2011 it is obvious that 3 breeds of cattle and two breeds of pig are subjected to extinction.

Keywords: animal genetic resources; Slovak animal; cryopreservation,

Introduction

The European Biodiversity Action Plan for Agriculture, The Global Strategy for the Management of Farm Animal Genetic Resources FAO OSN, Council Regulation (EC) No 870/2004 established a Community programme on the conservation, characterization, collection and utilization of genetic resources in agriculture; Act No. 194/1998 Coll. on breeding and reproduction of the farm animals. In cattle it threatens that within a few following years one breed can monthly die out, what may result in a complete loss of this genetic potential. Therefore, it is really necessary to conserve and maintain animal genetic resources as an insurance against climatic changes, occurrence of diseases, social changes, genetic problems, selective failures and unexpected catastrophic events that can markedly affect biodiversity (Prentice and Anzar, 2011).

NGB should be part of the national programme for protection and management of the animal genetic resources. It should guarantee monitoring, collection and preservation of samples from genetic resources (spermatozoa, oocytes, embryos, somatic cells, tissues, DNA etc.) in original condition, deeply frozen or lyophilized; their storage, molecular-genetic characterization of samples, research comparison of the genetic biodiversity, management of information system about stored samples and their use for original breed restoration.

As a consequence of the farm animal breeding and intensive use of the relatively small breed number there is a progressive decrease in the genetic variability. The loss of genetic variability can lead to decrease in breed adapta-

tion abilities, to worsening of the health state and in a final consequence to reduction of its farm use. Many of the original (autochthonous) farm animal breeds, which were substituted by more efficient breeds in the past, are now endangered and preserved “*in situ*” as small populations in some regions. The possible extinction of these breeds would also mean irrecoverable loss of the genetic variability and therefore the loss of unique gene and allele combinations that would be very useful in the future e.g. for the generation of new farm animal genotypes. The Wallachian sheep (Valaška), Oravka hen and Slovak Pinzgau cattle belong to these endangered breeds in the Slovak Republic.

Embryo freezing enables genetic material cryopreservation of males as well as females and represents a big opportunity for the preservation of population heterozygosity and integrity. However, it is more complex and economic demanding procedure than the spermatozoa freezing. Moreover, in case of the complex population reconstruction big amount of embryos is required and it could not be assumed that the embryos may be obtained anytime for example from the donors of endangered species (Boettcher et al., 2005). Embryos from almost all mammals had been successfully frozen, thawed and transferred in the past, but embryos of some animal species, such as pigs or horses are more cryosensitive in comparison to the others (bovine, sheep). Different freezing sensitivity of embryos is subject not only to the animal species, but also to the embryo developmental stage. Earlier developmental stages of *in vivo* embryos survive the freezing better than the later stages and *in vitro* produced embryos. Therefore, there is an effort to create standardized protocols that could be used for embryos from different animal species and at different developmental stages (Peireira and Marques, 2008; FAO, 2007).

Perspective chance how to preserve endangered animal species (breeds) appears to be the use of stem cells. Of course, before their use the cells have to be collected, cultivate *in vitro* for the purpose of their proliferation, evaluated in the terms of originality and quality for the subsequent freezing. Thawed stem cells could be used either for the reproductive cloning when new individual has the genetic information from the nucleus of thawed stem cell or for the genetic modification of thawed stem cells (iPSc) and desired differentiation for the purpose of gamete (spermatozoa or eggs) generation of endangered species or breed (Ben-Nun et al., 2011). Stem cells (SC), mainly embryonic, but also of other origin are extraordinary, because they afford an opportunity to study developmental biology and potential source of cells useable for cell or tissue regeneration. Embryonic stem cell lineages

Table 1. Number of animal breeds in Slovak Republic at 2011

Species	No. of animal breed in the Slovak Republic	Actualization of animal breed at 2011 in the Slovak Republic	No. animal breeds died out in the Slovak Republic	No. actualized (no. monitored, unknown)
cattle	14	11	3	0
horse	11	11	0	0
pig	10	6	2	2
gout	3	2	1	0
rabbit	43	20	3	20
hen	30	15	0	15

were successfully obtained from more than 12 animal species including rabbits (Honda et al., 2008), but some unsolved questions still remain, mainly about successful production of isolated and defined embryonic stem cell generations related to the differences between rabbit breeds.

In the time when Slovak agriculture and mainly the animal production permanently year by year achieve reduction in the farm animal number it is necessary to be aware of the fact that the farm animal breeding has not only production function, but also out of production functions which supply culturally country cultivation, countryside development etc. In the last fifty years there was a significant decrease in the animal number in SR (tab. 1) and in some species the origin, autochthonous breeds completely disappeared (Chrenek et al., 2013).

Protocols for the genotyping of selected endangered or original farm animal breeds will be developed on the basis of markers (microsatellites, genes) and genetic characterization of the biological material meant for the cryopreservation will be carried out within the solved project. The collection of DNA samples in a required purity and amount will be created for the purpose of the long-term storage. Obtained results will be part of the archived documentation about genetic resources and will be open for the comparative studies, breeding programs within SR as well as for the foreign institutes involved in the programme for animal genetic resource protection, mainly national gene banks.

The protection of farm animal gene pool has no direct economic function. We can only assume that breeding of the Slovak Pinzgau cattle and sheep of Wallachian breed, representatives of the mountain breeds adapted to the pasture conditions on the mountain up to alpine meadows and pasturelands, will preserve a kind of tradition from the regions of north Slovakia. The milk of Pinzgau breed is rich in proteins and from them especially rennet type of casein (kapa-casein). Therefore, this milk is more suitable for the cheese production. Wallachian sheep belongs to the most primitive sheep breeds with the multiple performances. Although it has coarse wool assortment, lower milk and meat yield, its outstanding feature is great walking ability and resistance against unfriendly environment conditions. It is very suitable for the farming in the alpine regions what helps to maintain cultural character of the country. Similarly, also Oravka hen belongs to the breeds with multiple efficiencies. It was bred on the basis of the domestic fowl from the north regions of

Orava. It is adapted for the extremely cold weather and so mainly by the crest type and high reaction ability against flying predators. Nitra rabbit was bred at VÚŽV Nitra (APRC Nitra) in the seventieth years of the last century and belongs to a group of breeds with a quick growth and relatively big body frame. All mentioned breeds belong to the cultural heritage of the Slovak nation and are suitable for small farming mainly in the sub-mountain and mountain regions of Slovakia. They fit in the production and sale scheme of agricultural products from the yard (milk, cheese, eggs and meat), so they participate in the maintaining of countryside settlement and contribute to the nutrition of population. Changing of the consumer orientation toward the domestic product purchase may help Slovakia not to be a market for not always the high-quality products of the developed economics. The whole added value is retained in Slovakia by the purchase of the domestic product from the domestic manufacturer.

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