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Gene bank for Animal Genetic Resources in the Republic of Croatia

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Abstract

The Gene bank for domestic animals in the Republic of Croatia is provided by the National Program for the conservation of local and endangered breeds of domestic animals from 2010. For this purpose, the National Gene bank Network was established, which consists of (i) the Gene bank for domestic animals as a central point under the jurisdiction of the Ministry of Agriculture, and (ii) Recognized Gene banks (authorized by the Ministry of Agriculture and operated by organizations, associations and/or authorized institutions). Until 2023, more than 32,000 samples from six types of domestic animals are stored in the Gene bank as follows: cattle (57.7%), horses (13.2%), sheep (12.1%), pigs (10%), donkeys (5%), and goats (1.9%). Tissue samples (29.2%), hair (28%), semen (42.2%) and blood (0.6%) are mainly stored in the Gene bank. The implementation of the National Program is supported by the Reference Expert Network for the Conservation of Animal Genetic Resources, which promotes greater collaboration with stakeholders. Future plans include further characterization of breeds with emphasis on adaptive traits, and the necessary monitoring and implementation of new and improved procedures in the conservation of local breeds.

Keywords: Gene Bank, Republic of Croatia, local breed, conservation

Introduction

The original domestic breeds were bred over thousands of years in specific environmental and economic niches that outlined the unique nature of the breed, the unique records in its genome. Their value is reflected in their adaptability, specificity of genotype and phenotype, and a large preserved genetic variability for future requirements that we do not know what they will be. From a global perspective, local breeds contribute to the conservation of biodiversity. The adoption of the Convention on Biological Diversity (CBD 1992) laid the foundations for the conservation and sustainable use of biological diversity, with emphasis on the equitable sharing of benefits arising from the use of genetic resources. The Republic of Croatia is one of approximately 200 signatory countries to the Convention. Recognizing the importance of biodiversity conservation and protection, the Republic of Croatia has prepared several legal and key documents, such as the Strategy and Action Plan for the Protection of Biological and Landscape Diversity (Official Gazette 81/99, 143/08), the National Program for the Conservation and of Local and Endangered Breeds of Domestic Animals in Croatia (2010, 2023) and others.

History and Organisation

The legal basis, the National Program for the Conservation of Local and Endangered Breeds of Domestic Animals in Croatia (2010) and the Operational Program for the Establishment of the Gene Bank of Domestic Animals in the Republic of Croatia (2012) led to the establishment of the Gene bank for Domestic Animals in the Republic of Croatia within the Croatian Agricultural Agency in early 2013. The Gene bank represents a collection of animal genetic material for ex-situ conservation and is a permanent support for in-situ conservation programs for domestic animals. In 2017, the Gene bank became an integral part of the Genetic Evaluation Service for Domestic Animals, which provides support for the evaluation of breeding value for various species in Croatia. Within the Gene bank there is also a laboratory equipped to perform molecular analyses and cryopreservation techniques and is involved in the implementation of commercial breeding programmes in animal breeding (e.g. pigs, bees).

As of January 1, 2019, the Gene bank organizationally belongs to the Ministry of Agriculture, which becomes the umbrella institution, as shown in the schematic Figure 1.

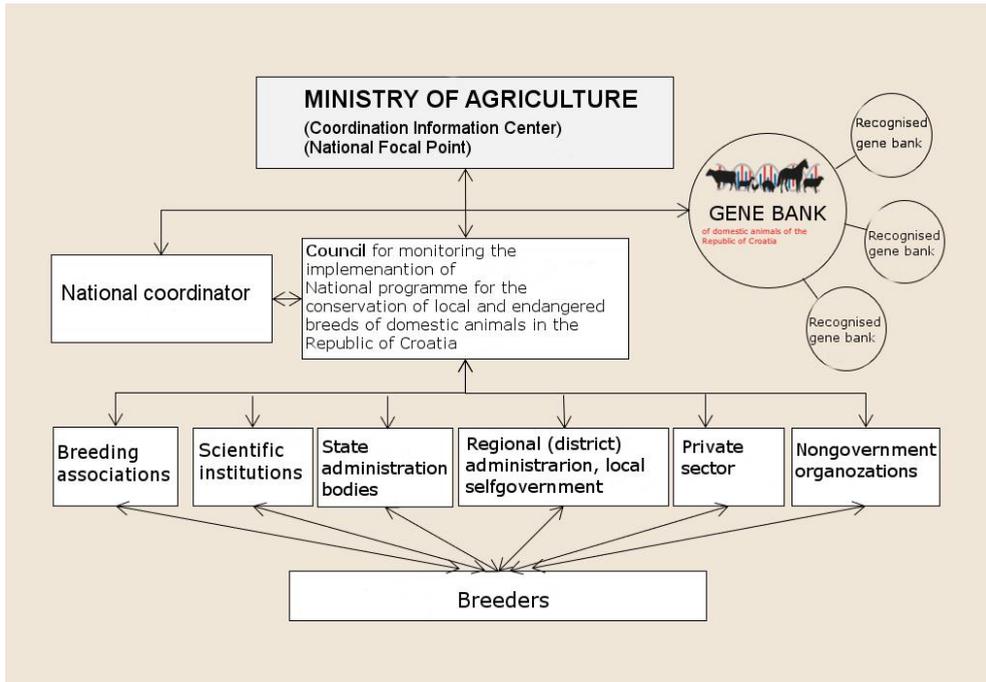


Figure 1. Organisation of a National Network of Gene banks for domestic animals in the Republic of Croatia (<https://bag.mps.hr/nacionalna-mreza-banke-gena/>)

The National network of the Gene bank for domestic animals of the Republic of Croatia is composed of: i) the Gene bank for domestic animals as the National Gene bank and ii) Recognized Gene banks. The National Gene bank is an integral part of the Ministry of Agriculture and is the national contact point and the coordination and information centre while Recognized Gene banks are established according to the Law on Domestic Animal Breeding (Official Gazette, No. 115/18 and 52/21). Currently, there are four Recognized Gene banks: Agency for Rural Development Istria, Central Association of Croatian Cold Blooded Horse Breeders, Central Association of Croatian Posavina Horse Breeders and Croatian Agency for Agriculture and Food. The Council for monitoring the implementation of the National Program and the National coordinator work closely with the Ministry of Agriculture and the stakeholders in the breeding process, taking into account the opinions of breeders, breeding organizations, scientific institutions, state and local bodies and non-governmental organizations, etc.

One of the documents currently in force is the National Program for the Conservation of Local and Endangered Breeds of Domestic Animals in the Republic of Croatia 2021-2025, adopted by the Ministry of Agriculture. The Program defines two key points: i) strategic guidelines for the development of the national policy for the

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conservation of local and endangered domestic animal breeds and ii) the National Network of Gene banks in the Republic of Croatia. In addition, the National program also establishes strategic guidelines for regional and international cooperation and carries out conservation of animal genetic resources at the global level.

The Reference Expert Network for the conservation of animal genetic resources, which consists of scientific and professional stakeholders, participates in the work of the Gene bank. In Croatia, the Reference Expert Network consists of seven main areas, whose activities range from breeding, valorisation of breeding programs and action plans, conservation of local breeds through methods of in-situ and ex-situ protection, economic use and promotion of breeds, health and legislation, with the main goal of preservation of animal genetic resources.

Collections

From 2013 to 2022, more than 31,300 samples from 43 breeds were stored in the Gene bank of the Republic of Croatia, and the dynamics of the collection is shown in Figure 2.

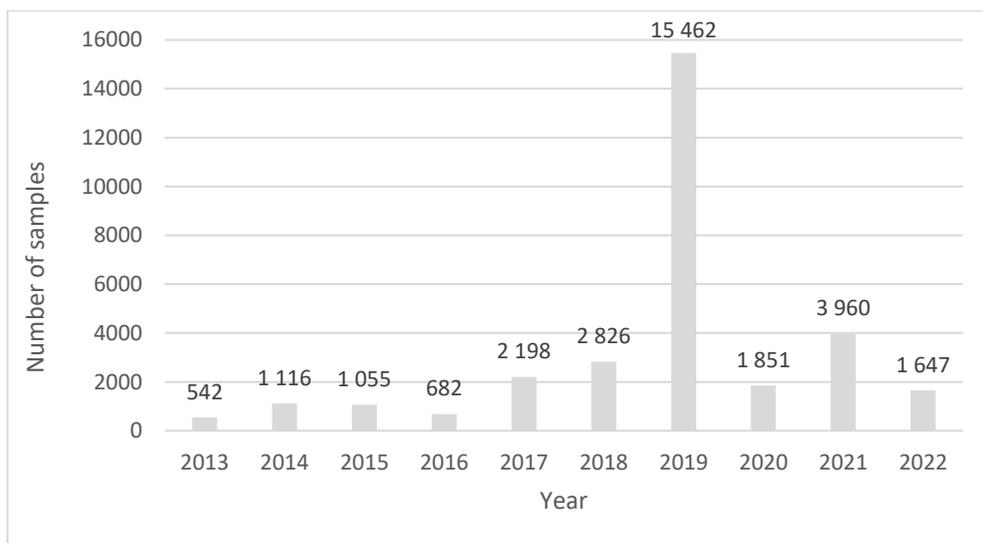


Figure 2. Dynamics and quantity of domestic animal samples collected in the Gene bank of the Republic of Croatia from 2013 to 2022 (HAPIH, personal communication).

It should be noted that 25 local breeds of domestic animals and 22,477 samples are included in the genome collection of the Gene bank of domestic animals of the Republic of Croatia, which is 76% of all collected samples (<https://stocarstvo.mps.hr/app/uploads/2021/12/brosura-banka-gena.pdf>). Genetic

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material of breeds with local, regional and global importance is stored in the Gene bank, and the stored material represents a public good. Cattle (57.7%) account for the largest proportion of stored samples by domestic animal species, followed by horses (13.2%), sheep (12.1%), pigs (10%), donkeys (5%) and goats (1.9%), as shown in Figure 3a. Within the project OPTI-SHEEP (HRZZ IP -2019-04-3559), more than 1,400 samples of Istrian sheep and Pag sheep were collected, which will be stored in one of the Recognised Gene banks after the completion of the project. Such a synergetic action of several institutions and activities is a good basis for a more comprehensive implementation of additional analyzes contributing to the ex-situ and in-situ conservation of the local breeds. The majority of biological samples stored at the National Gene bank are semen (42.2%), followed by tissue (29.2%), hair (28%), and blood (0.6%; Figure 3b).

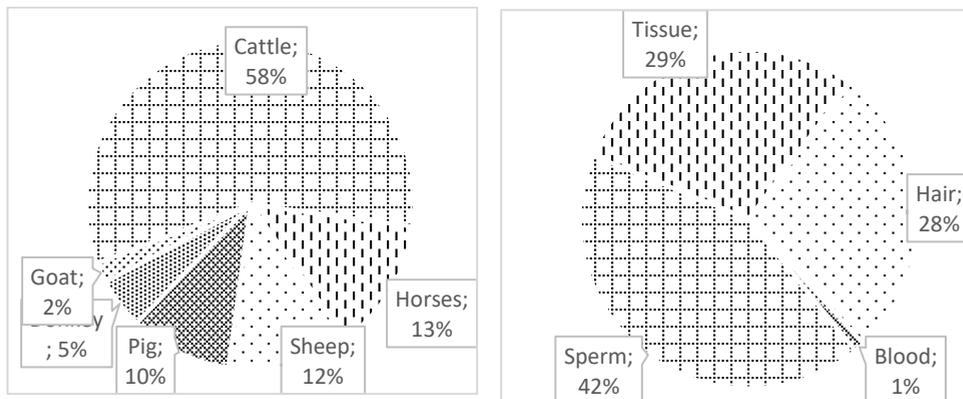


Figure 3a) Proportion of stored samples by type of domestic animals; 3b) Proportion of stored biological samples by sample type in Gene bank.

The introduction should briefly place the study in a broad context and highlight why it is important.

Material and methods

Materials and Methods should be described with sufficient details to allow others to replicate and build on published results.

Results and discussion

This section may be divided by subheadings. It should provide a concise and precise description of the experimental results, their interpretation. Authors should discuss the results and how they can be interpreted in perspective of previous studies and of the working hypotheses.

Conclusion and recommendation

The work of Gene banks (National and Recognised) is of great importance for the conservation and improvement of all domestic breeds, especially local and endangered ones. Therefore, special attention is focused to the future work plans of the Gene banks, which include continuation of necessary monitoring and collection of samples and further characterization of breeds with emphasis on adaptive traits. Special attention must be directed to introduction of new and improved procedures for conservation of local breeds.

References

- CBD (1992): Convention on biological diversity. <http://www.cbd.int/doc/legal/cbd-en.pdf>.
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