

The functioning of the cryobank and the in situ facilities of the indigenous breeds of cattle of the Carpathians is important to science and practice

TERPAI, VasyI*

Association of the Brown Carpathian Breed, Schönborn, 2 Mukachevska St., Mukachevo District, Zakarpattia Oblast, Ukraine

*corresponding author: v.terpai@gmail.com

Abstract

Climatic conditions and human activity negatively affect the number of native species and mountain meadow ecosystems of the Carpathian region countries due to their scale and unprecedented speed of development. The article describes the main specific features and advantages of local breeds. Their multifunctionality is indicated. The results of the study of the distribution are presented, the current state is revealed, limited numbers, threats of extinction are identified. Attention is drawn to their participation in the restoration of anthropogenically disturbed meadow ecosystems, an important sector for the preservation of genetic biodiversity. Attention is focused on and the feasibility of creating the Carpathian Scientific and Production Centre at the Research Institute of Animal Science, Balice, Poland is scientifically substantiated.

Keywords: meadow high-mountain ecosystems, native breeds, Carpathian Centre, Biodiversity

Introduction

Carpathian Biosphere Reserve

An indicator of the health of natural pasture and meadow ecosystems of the Carpathians is their biodiversity, including indigenous cattle and the processes occurring in them. Energy-saving, ecological technologies, long-term use of these animals ensure the sustainable development of local communities and high-quality food products for the population. For example, 100 g of cheese satisfies the daily human need for proteins by 25-40%, need for fat – by 25-30%.

The purpose of the work was to highlight the prerequisites for the establishment of the Carpathian Scientific-Production Centre for the development of the potential, research and conservation, management and development of indigenous cattle breeds and natural pasture-meadow ecosystems of the countries of the Carpathian region.

Material and methods

The current state of local cattle breeds was determined by us based on the results of previous research. The analysis was based on the Convention on Biological Diversity and the Report on the State of the World's Animal Genetic Resources for Food Production and Agriculture (FAO, 2015). Mountain meadows are included in the habitats of Resolution 4 of the Bern Convention (E2.3) and Annex 1 of the Habitats Directive of the European Union (6520) (cit. NATIONAL HABITAT CATALOGUE OF UKRAINE, 2018).

Results and discussion

A study of the status of populations of local cattle breeds in the Carpathians showed the presence of 1 in the Czech Republic, 1 in Hungary, 2 in Poland, 1 in Romania, 1 in Slovakia, 2 in Serbia, 1 in Ukraine, 9 in total. There is instability, a systematic decline in the breeding stock to 451,891 heads, being a genetic reservoir. Environmental conditions, selection, feeding and maintenance have significantly influenced the exterior of these animals. They belong to the mid-season, combined type, are compact, present good phenotypic and productive qualities. They have strong limbs, hooves and well-developed chest, a proportional body structure, adapted to local ecological and feed conditions. They effectively use pasture, green and dry grasses of natural meadows and pastures. They produce milk of very good chemical composition with a special variant of β -casein A2 and the highest cholesterol content compared to Holstein and other factory breeds. On rich green fodder, bulls rapidly increase their live weight, more than 1000 g per day. Milk and meat have excellent taste and technological qualities. At the same time, due to the anomalous reduction in livestock, only 2.5-6.5% of 200,000 hectares of natural meadows and pastures are used in each of the two regions: Podkarpacie, Poland, and Transcarpathia, Ukraine. As studies show in traditional Polonyna farming using rotational grazing, the plant groups of the mentioned agricultural lands, especially high-mountainous ones, are saturated with a variety of forage grasses. After the cessation of livestock grazing, the change of meadow phytocenoses occurs after 4-5 years. Thickets of uncharacteristic species of horse sorrel, ferns, shrubs and trees

appear. The representative of the Ministry of Agriculture of Austria-Hungary, Ede Egan (EGAN, 2010), studying the natural pasture and meadow ecosystems of the Carpathians back in 1890, pointed out their high value for livestock breeding, which arose on the peaks naturally, on the lower altitude zones – as a result of diverse centuries-old human activity.

The most critical situation is with the Braunvieh (Bruno-Schwyz breed in Romania - 3000 cows), Polish Red breed (Poland - 2399 cows), Pinzgau (Slovakia - 3412 cows), Carpathian Brown breed (Ukraine - 24,051 cows). In some countries there are no sperm cryobanks, lack of system for obtaining, growing and evaluating of bulls-breeders, gene pool herds.

It has been established that only by long-term storage of bull semen, oocytes, DNA samples and embryos the problem of preserving the gene pool of breeds in the Carpathian region is extremely difficult to solve. There is a need to breed populations of female and male individuals, *in situ* conservation. DRAGANESCU (1975) proposed the minimum-optimal size of the reserve native gene pool population for each cattle breed of 10 bulls and 50 cows. All this together becomes a prerequisite for the creation on the basis of the scientific-research Institute of Animal Science in Balice, Poland of a powerful scientific-research and economic structure – the Carpathian Scientific-Production Centre for the development of the potential, research, conservation, use, management and development of aboriginal cattle breeds and natural meadow-pasture ecosystems of the countries of the region, which will serve as a laboratory and will carry out the development and practical implementation of:

- Provisions of the Convention on Biological Diversity, Report on the State of the World's Animal Genetic Resources for Food Production and Agriculture of the FAO, the Framework Convention on the Conservation and Sustainable Development of the Carpathians and its Protocols, On the Conservation and sustainable use of biological and landscape diversity and other documents.
- Regulatory and legal documents, provisions of a systemic and ecological approach to the modernization of production in order to reveal the potential, research, preservation, use, management and development of indigenous cattle breeds and the environment. Conducting a full inventory of indigenous cattle breeds and natural grassland ecosystems of the Carpathians, monitoring the progress of processes and changes that will occur.
- Will generate and implement innovative ideas in production to increase the safety of manufactured products
- Will develop and popularize strategies for the sustainable development of local communities and the region as a whole, using available resources – indigenous breeds and natural grassland ecosystems and unique traditional mountain farming. Target standards for the main exterior features and

desired types of animals, breeding plans. Will solve the issues of individual selection, centralized reproduction of bulls and their assessment, the formation of the genetic structure of breeds, the creation of necessary reserves, the preservation and targeted use of cryopreserved sperm, the functioning of a virtual gene pool cryo-herd and a transboundary *in situ* facility of indigenous cattle breeds of the Carpathians.

- Will create effective monitoring systems that will make it possible to receive constant information about the ongoing multifaceted processes in populations of indigenous cattle breeds and natural meadow and pasture ecosystems with the prompt identification of threats and, based on the analysis, the adoption of preventive measures to eliminate them.
- Will attract scientists and scientific potential, European investments and grant projects.
- Will create an automated information system on breeding, which will be connected to the global biodiversity information system. Prepare and publish catalogues and studbooks of animals.
- Conduct a systematic assessment of animals according to the main economic characteristics and the degree of realization of their genetic potential in the conditions of interaction "genotype - environment" with current global and regional climate changes. Genetic testing of each breed. Consulting and advisory activities, implementation of scientific developments. International scientific and practical conferences.

Thus, the creation of a centre at the named institution in Poland is advisable due to the presence of complexes of instruments and equipment that allow conducting in-depth research at the molecular, organismal and population levels. It will be a modern material and technical base for creating collection gene pool herds in Krasny (Poland), there is a station for growing, evaluating bulls-breeders, cryopreservation of sperm and artificial insemination.

Conclusion and recommendation

The Carpathian Scientific and Production Centre for the development of the potential, research and conservation, management and development of indigenous cattle breeds and natural pasture-meadow ecosystems of the countries of the Carpathian region will radically change approaches to livestock breeding models, using local resources and environmentally friendly methods that will improve the protective, health-improving, socio-economic attractiveness of the territories. It will conduct fundamental and applied research, generate ideas, projects in the field of biodiversity conservation and natural meadow-pasture ecosystems, and implement

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them for the sustainable development of the Carpathians. It will solve priority problems of humanity.

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