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NEW TRENDS IN GENETIC CONSERVATION IN SHEEP

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Abstract: *This paper examines contemporary trends in genetic conservation in sheep, based on a bibliographic analysis of studies published between 2000 and 2025. Biodiversity conservation, defined as the protection of ecosystem, genetic, and species diversity, is presented as an essential ecological, economic, and ethical obligation, responding to global pressures such as climate change, habitat fragmentation, invasive species, and resource overexploitation. Within this broader context, the study identifies two major directions in sheep genetic conservation: conserving local, rare, or limited number breeds and safeguarding genetic diversity. Genetic diversity is described as the fundamental biological resource enabling adaptive capacity, ecological resilience, and long term species viability, with conservation strategies including controlled breeding, genetic monitoring, ex situ gene banking, and in situ population management. The second direction focuses on local and rare breeds, which hold significant cultural, ecological, and genetic value but face high extinction risk because of low productivity and competition from improved breeds. Conservation measures include economic incentives, genetic characterization, ex situ and in situ preservation, pedigree management, and market valorisation of traditional products. Romanian legislation and research institutions play a central role in implementing conservation programs and monitoring genetic heritage. Overall, the paper argues that genetic conservation in sheep is a multidimensional process integrating ecology, genetics, rural development, and zootechnics, essential for climate resilience, food security, and the preservation of Romania's pastoral heritage.*

• Introduction

Biodiversity is important because it ensures the stability and resilience of ecosystems; it has intrinsic value, no matter its utility to humans; it provides vital ecosystem services such as climate regulation, pollination, soil fertility, and water purification; it represents a source of economic resources, food, and medicine. Biodiversity conservation is the set of measures by which we maintain and protect the variety of life forms on Earth – from genetic diversity to species and ecosystems diversity. It is a strategic activity, essential for the functioning of ecosystems, for human well-being and for the planet's resilience to climate change. Biodiversity conservation involves limiting anthropogenic pressures such as climate change, habitat fragmentation, invasive species, and pollution; maintaining genetic diversity to allow organisms to adapt and evolve; managing natural resources in a sustainable manner to avoid overexploitation; protecting ecosystems and natural habitats to allow them to preserve their ecological functions; and protecting species (especially endangered or threatened ones). Biodiversity conservation responds to major pressures such as: climate change, habitat fragmentation and loss, introduction of invasive species, overexploitation of resources, and pollution. Biodiversity conservation is regulated, at international level, by the Convention on Biological Diversity adopted in Rio, 1992, and by the Kunming-Montreal Global Biodiversity Framework – the objective of protecting 30% of the terrestrial and marine surface by 2030; at European Union level, the EU Biodiversity Strategy 2030; and, in Romania, by the National Biodiversity Conservation Strategy 2026-2030. Biodiversity conservation is an ecological, economic, and ethical obligation, necessary to ensure a sustainable future by maintaining natural balance. It combines public policy, science, and social responsibility in a global effort to protect life on Earth.

• Material and method

The material used in this paper consists in articles published during the period 2000-2025. The research method is the bibliographic one and it aims at identifying the new trends in genetic conservation in sheep. The topics aimed at in the choice of the articles authored by both foreign and Romanian researchers are conservation of genetic diversity and resources and conservation of local / rare or limited-number sheep breeds.

• Results and discussion

The main elements of the conservation of local / rare sheep breeds are:

- conserving ex situ in archives of rare genetic lines for future use or in gene banks (e.g. embryos, semen);
- conserving in situ by maintaining breeds in their traditional environment (hilly areas, mountain pastures), where they express their ecological adaptations;
- ensuring economic support and public policies at European level (where the conservation of local breeds is integrated into agri-ecological policies and biodiversity indicators) and in Romania (where de minimis aid is granted to breeders of local breeds in danger of abandonment to prevent the reduction of herds);
- identification and genetic characterization, i.e. establishing inclusion / exclusion criteria in conservation programs (genealogical documents, origin, phenotype) based on evaluating breeds through genetic studies (e.g. microsatellites) to determine degree of inbreeding, diversity, and gene flow (given that the Rața, Teleorman Negru, Țigaie, and Țurcană sheep breeds present both high polymorphism, and risks of inbreeding in some populations;
- limiting the introduction of external genetic material;
- maintaining pedigree registers to ensure the traceability and purity of the breed;
- maintaining reproductively viable herds by avoiding uncontrolled crosses with improved breeds, controlling inbreeding through mating plans and ram rotation, and treating breeding nuclei in farms, research stations and traditional households;
- valorizing products economically through creating niche markets (e.g. for premium meat, specific wool, traditional cheeses), ensuring market demand is essential for sustainability, and promoting breeds in agrotourism, cultural education, and rural tourism.

• Conclusions

The analysis of the scientific literature published between 2000-2025 shows that genetic conservation in sheep is a strategic component of biodiversity protection, essential both for ecological resilience and for the long term sustainability of zootechnical systems. The two major directions identified – conservation of genetic diversity and conservation of local or rare breeds – are complementary and interdependent.