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Domestic Biodiversity in Romania From Agrarian Epochs to the Conservation of Indigenous Genetic Resources

Simion (Grosu) Petruța-Simona [1, 2 *] Popescu Gabriel[1], Maria Joița-Păcureanu [1], Todirică Ioana Claudia[1], Petcu Victor[1]

[1]*Center for Study and Research for AgroForestry Biodiversity "Acad. David Davidescu", Bucharest, Romania*
[2]*Bucharest University of Economic Studies, Bucharest, Romania*

[*]**Corresponding author:** Simion (Grosu) Petruța-Simona, Center for Study and Research for Agroforestry Biodiversity "Acad. David Davidescu", Bucharest, Romania.
Bucharest University of Economic Studies, Bucharest, Romania.

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Abstract

This study analyzes the evolution of domestic animal biodiversity in Romania from a historical and socio-economic perspective, highlighting the profound influence of agricultural transformations on the native genetic heritage. Six major stages are identified—from the prehistoric pastoral era to the post-communist transition—each marking significant changes in the structure of domestic animal populations and selection strategies. Political, economic, and technological factors have shaped the profile of local breeds, sometimes fostering and other times marginalizing traditional genetic resources. Today, amid the biodiversity crisis and climate change, the conservation of native breeds such as the Romanian Grey Steppe cattle or the Mangalitsa pig gains strategic importance. This paper explores both the decline and the recent revitalization efforts through in situ and ex situ conservation models, integrated into national and European policies. The approach provides a critical understanding of the relationship between agriculture and genetic diversity, emphasizing its role in the sustainability of agro-ecosystems.

Keywords: Animal Biodiversity, Native Breeds, Genetic Heritage, Romanian Agriculture, in Situ Conservation, Ex Situ Conservation, Historical Evolution.

Introduction

Historical stages in the evolution of agriculture and their impact on domestic fauna. The pastoral stage (Neolithic – Iron Age). This period marks the beginnings of domestication in the Romanian space. The first sedentary communities began to practice animal husbandry alongside primitive agriculture. The domestication of sheep and goats preceded that of cattle and pigs. The animals selected were those that could survive the difficult climatic conditions, thus developing locally adapted types with great genetic diversity. The feudal economy was based on self-sufficiency, and domestic animals had multiple roles: meat, milk, traction, wool. Breed diversity is preserved, and geographical isolation favors genetic differentiation. Animal husbandry was extensive and natural, without intense pressure for improvement. The stage of modernization attempts (19th century – early 20th century). This stage saw the first initiatives for the controlled improvement of breeds, influenced by the Western agricultural revolution. High-performance breeds (Pinzgauer, Simmental, Merinos) were imported, and the first zootechnical stations and genealogical registers were created. The beginning of an imbalance between local and improved breeds was observed.

The collectivization of agriculture and the imposition of the Soviet model caused a major disruption. Small farms were dissolved, and animals were centralized in state-owned units. Artificial selection was based on economic criteria, neglecting adaptability and local genetic characteristics. Many native breeds disappeared or declined dramatically as a result of standardization. The planned economy stage (1962-1989).

An intensified and centralized livestock system is developed. Production was maximized, and animals were raised industrially. Only improved breeds are used. This model leads to a dramatic reduction in genetic biodiversity, with irrecoverable losses in some cases. Disease resistance and adaptability are sacrificed in favor of productivity.

Transition stage II – from a planned economy to a market economy (1990-present)

The post-December period was marked by institutional chaos, underfunding, and the loss of important values. The disappearance of state farms led to the fragmentation of animal husbandry, and conservation policies were delayed. However, since the 2000s, measures have been taken to save local breeds through national in situ and ex situ conservation programs, genealogical registers, subsidies for endangered breeds, and European support for maintaining genetic biodiversity. The conservation of animal genetic biodiversity is a strategic priority in the context of climate change, food security, and the preservation of cultural identity.

The conservation of indigenous zoogenetic heritage is an increasingly pressing priority in the context of biodiversity loss and the risks associated with climate and economic change. In Romania, current strategies for the protection of local breeds include both institutional initiatives and programs run by professional organizations or in partnership with international bodies. The conservation models identified are based on a variety of tools, ranging from genealogical registers and breeding programs to gene banks, pilot projects for economic exploitation, and the inclusion of breeds in financial support schemes. Table 1 summarizes these current models, highlighting their strengths and limitations in relation to the need to ensure sustainable biodiversity.

Table 1: Current Models for the Conservation of Indigenous Zoo Genetic Heritage

National Conservation Models	
Romania applies two main types of conservation	
In situ conservation (achieved by supporting breeders who maintain local breeds on their farms). The following are used:	Official genealogical registers (e.g. for the Sură cow, Bazna pig, Mangalița pig)
	APIA subsidies dedicated to endangered breeds
	Regional support projects (e.g., LAGs, LEADER projects)
Ex situ conservation includes:	Animal gene banks (e.g., at SCDCB Dancu or ICDA Balotești)
	Cryopreservation of semen and embryos
	Demonstration conservation farms (living museums, breeding centers)
International Models and FAO Recommendations	
Romania is a member of the global network for animal genetic resources, under the auspices of the FAO (Food and Agriculture Organization), and participates in:	DAD-IS (Domestic Animal Diversity Information System) – global platform for monitoring breeds
	Global Plan of Action for Animal Genetic Resources (GPA, 2007)
	EU programs for the protection of native breeds (e.g., Horizon, LIFE)
Current challenges	Lack of digitization and centralization of genetic information
	Insufficient funding for the conservation of minority breeds
	The need to involve young farmers and local communities
	Integration of genetic databases into agricultural decision-making systems.

Source: Prepared by the authors based on analysis

An analysis of current models for conserving indigenous zoogenetic heritage shows that, although functional tools exist, they are often fragmented, applied selectively, and difficult to correlate with one another. Genealogical registers, breeding programs, and gene bank initiatives provide a valuable framework, but their effectiveness is limited by a lack of interconnection and restricted access to data. This situation confirms the conclusions of the specialist literature and highlights the need to develop a unified system of bioinformatic databases that integrates information on livestock numbers, genetic structure, and distribution. Such an approach would enable real-time monitoring, prioritization of conservation measures, and the development of public policies tailored to each species and region.

Literature Review

Recent literature highlights the vulnerability of zoocultural genetic resources in Romania, especially in the case of cattle and pigs. Paraschivescu (2023) reports a drastic decline in native cattle stocks, correlated with economic transitions and the lack of coherent genetic protection policies, while Sandu, Străteanu & Udrea (2024) confirm the downward trend for the period 2015-2022, reporting decreases of -12.34% for cattle and -32.44% for pigs and identifying 14 native breeds at risk of abandonment. Although programs to determine genetic quality and genealogical registers have been initiated, their effectiveness remains limited, highlighting the need for modern and integrated databases.

In this context, zoocultural biodiversity is considered a strategic factor for food security and the sustainability of agroecosystems, as native breeds have valuable characteristics—disease resistance, climate adaptability, resource efficiency—that make them viable solutions to current challenges. At the same time,

their decline is fueled by factors such as rural population migration, lack of financial support, high feed costs, and inappropriate agricultural policies, which reduce the capacity of agricultural systems to respond to climate change and market pressures [1].

Current literature provides numerous examples confirming the importance of native breeds for maintaining biodiversity and the balance of agroecosystems in Romania. Case studies are particularly relevant in this regard: Popa, Popa, Maftei, Dronca & Băcilă (2012) highlight the role of the Pinzgau breed in Transylvania, demonstrating that it continues to be a valuable resource for sustainable agriculture due to its adaptability and multiple roles in mountain farms. In the same vein, Necula, Ciupe, Tamas-Krumpe, Todoran & Ognean (2024) emphasize the opportunities for exploiting native breeds in the Carpathian areas, showing that, although ecological constraints limit productivity, these breeds can be effectively integrated into short supply chains. Complementarily, Matiuți & Crăiniceanu (2008) inventory breeds at risk of abandonment in Transylvania and Banat, emphasizing their heritage and cultural value, but also the need for concrete support measures adapted to local specificities [2].

In addition to socio-economic perspectives, recent research has focused on the use of modern genetic characterization tools, which are indispensable for the conservation of zoocultural resources. Grădinaru, Petrescu-Mag, Oroian, Balint & Oltean (2018) demonstrated the usefulness of milk protein polymorphism in assessing genetic diversity, revealing significant differences between native and improved breeds. In addition, Davidescu et al. (2024) applied SNP analyses for the genetic characterization of the Transylvanian Pinzgau breed, confirming its value in bioinformatic databases. Together, these contributions show that integrating traditional knowledge with modern molecular methods and up-to-date IT infrastructure is essential for protecting domestic biodiversity and ensuring the sustainability of the Romanian livestock sector [3].

Methodology (Research Methodology)

The analysis was based on official statistical data provided by INSSE on domestic animal populations in Romania for the period 2014-2024. Two representative species were selected—cattle and pigs—and the method used consisted of descriptive analysis of time series. Beyond the absolute values, the average annual rates of decline were calculated using the CAGR (Compound Annual Growth Rate) formula to capture medium-term trends. The results were summarized in tables and graphs and then interpreted in relation to the specialized literature in order to identify the implications for domestic biodiversity [4].

Results and Discussion

The results of the analysis reveal that Romania's zoocultural biodiversity has strategic potential for sustainable development, especially in rural areas at risk of depopulation. Farms that raise local breeds can capitalize on traditional products (cheese, meat, wool), bringing economic added value and contributing to the protection of cultural identity. Support systems—subsidies, agricultural education, distribution networks—need to be reconnected with the realities of farms that keep native breeds. Active conservation, through direct support to breeders, must be complemented by public education initiatives so that the benefits of biodiversity are understood and supported by consumers [5].

In the field of breed conservation, the use of modern technologies such as artificial insemination (AI) and embryo transfer (ET) is essential for accelerating genetic regeneration. Data analyzed for the period 2013–2023 show that the livestock sector in Romania is attempting to gradually adapt to the new requirements, but it remains dependent on technical infrastructure and qualified personnel. Significant differences between dairy and beef breeds in terms of biotechnology application suggest the need for differentiated intervention strategies. Furthermore, the consolidation of modern cooperatives and integrated services for reproduction, diagnosis, and product valorization is becoming a viable direction for revitalizing zoocultural biodiversity [6].

We concluded the analysis by highlighting the changes in cattle and pig numbers for the period 2014-2024, using queries in the database provided by the Tempo Online platform (Table 2).

Table 2: Evolution of Livestock Numbers 2014-2024

Species	Year 2014	Year 2015	Year 2016	Year 2017	Year 2018	Year 2019	Year 2020	Year 2021	Year 2022	Year 2023	Year 2024
	U.M. Număr										
Cattle	2068888	2092414	2049713	2011128	1977232	1923283	1875169	1826845	1833718	1814720	1809402
Pigs	5041788	4926928	4707719	4406014	3925283	3834136	3784507	3619581	3328734	3154053	3257466

Source: The authors' contribution is based on data available on Tempo Online, accessed on 15.09.2025

Next, Figure 1 illustrates the evolution of cattle and pig stocks for the period 2014-2024 in Romania.

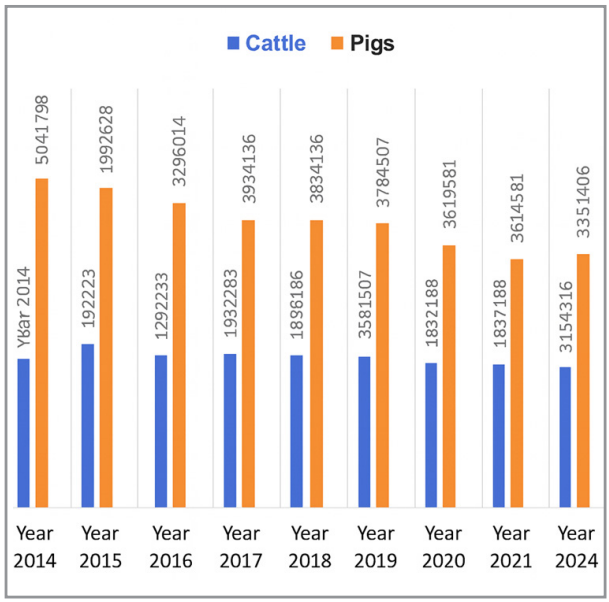

Figure 1: Evolution of Livestock Numbers 2014-2024
Source: The authors' contribution is based on data available on Tempo Online, accessed on 15.09.2025

We can see a slower decline in cattle, which indicates that this species still maintains relative stability compared to pigs.
This information supports the view that Romania needs dynamic databases and distinct policies for each species.
To calculate the average annual rate of decline, we used the CAGR (Compound Annual Growth Rate) formula:
Annual rate = (Final value / Initial value)1/n-1

where:
Final value = actual number in 2024,
Initial value = 2014 stock,
n = number of years (2024-2014 = 10 years)

Cattle

Initial value (2014) = 2,068,888
Final value (2024) = 1,809,402
n = 10

Rate = (1,809,402 / 2,068,888)1/10 - 1
Rate ≈ (0.8746)0.1 - 1≈ -0.0135 ≈ -1.35%/year

Pigs

Initial value (2014) = 5,041,788
Final value (2024) = 3,257,466
n = 10

Rate = (3,257,466 / 5,041,788)1/10 – 1
Rate ≈ (0.6462)0.1 – 1 ≈ - 0.0437 ≈ -4.37%/year

Table 3: Annual Rates of Decline

Species	2014 (heads)	2024 (heads)	Annual decrease rate (%)
Cattle	2.068.888	1.809.402	-1,35%
Pigs	5.041.788	3.257.466	-4,37%

Source: The authors' contribution is based on data available on Tempo Online, accessed on 15.09.2025

In order to highlight the dynamics of domestic animal stocks in Romania between 2014 and 2024, the average annual rates of decline for the main species analyzed were calculated. The results, presented in Table 3, show that cattle numbers declined moderately, by approximately -1.35% per year, while pig numbers suffered a much more pronounced decline, of -4.37% per year. This difference confirms the increased vulnerability of the pig sector, linked to both economic and health factors and structural changes in agriculture, while cattle numbers have experienced a slower but steady decline.

Correlating the information summarized in Table 1 with the results presented in Table 3, it becomes evident that current conservation models, although functional in certain contexts, fail to compensate for the sustained rate of decline in domestic animal populations. The annual decline rate of -1.35% for cattle and -4.37% for pigs reflects the fact that existing measures—pedigree registers, breeding programs, or support schemes—are not sufficient to prevent the loss of indigenous genetic heritage. This discrepancy between the tools theoretically available and the actual dynamics of livestock populations highlights the need for complementary strategies based on integrated monitoring systems and the use of bioinformatics databases capable of providing a coherent and up-to-date picture of domestic biodiversity in Romania [7].

Conclusions

An analysis of the evolution of cattle and pig stocks in Romania between 2014 and 2024 revealed a general downward trend, with an average annual decline of 1.35% for cattle and 4.37% for pigs. These values confirm the marked vulnerability of the pig sector and the relative stability of the cattle sector but reveal in both cases a progressive loss of zoogenetic resources [8].

The results obtained are in line with the specialist literature, which has been reporting for several decades on the decline of native breeds and their marginalisation in favour of improved breeds with high productivity. However, the current situation

shows that the loss of domestic biodiversity is an ongoing and current process, not just a consequence of past economic transitions.The differences between the rate of decline in cattle and pigs indicate that conservation strategies must be species-specific, adapted to both biological and productive characteristics and the regional socio-economic context. In particular, pig populations require urgent support and conservation measures to avoid irreversible losses.

The lack of integrated and up-to-date databases on the status of domestic breeds limits the capacity for effective monitoring and intervention. The data analyzed clearly shows the need to develop national and interoperable information systems that allow real-time tracking of trends and inform conservation policies.

Overall, the research confirms that domestic biodiversity in Romania is under pressure from numerical decline and insufficient conservation policies. The introduction of monitoring tools, such as annual decline rates, and the development of bioinformatics databases are essential steps toward protecting indigenous genetic heritage and strengthening long-term food security.

References

1. Paraschivescu, M. T., Ciornei, L., & Sandu, M. (2024). Opportunities in the development of zoocultural biodiversity in Romania to avoid biodiversity loss to ensure food security. Annals of INCDA Fundulea, XCII, 79–91. http://www.incda-fundulea.ro (Electronic ISSN 2067–7758)
2. Davidescu, M.-A., Pânzaru, C., Mădescu, B.-M., Radu-Rusu, R.-M., Doliș, M. G., Simeanu, C., …& Creangă, Ș. (2024). Genetic diversity and phylogenetic analysis of the endangered Transylvanian Pinzgau cattle: A key resource for biodiversity conservation and the sustainability of livestock production. Agriculture, 14, 2234. https://doi.org/10.3390/agriculture14122234.
3. Grădinaru, A. C., Petrescu-Mag, I. V., Oroian, F. C., Balint, C., & Oltean, I. (2018). Milk protein polymorphism characterization: A modern tool for sustainable conservation of endangered Romanian cattle breeds in the context of traditional breeding. Sustainability, 10(2), 534. https://doi.org/10.3390/su10020534
4. Necula, D., Ciupe, S., Tamas-Krumpe, O., Todoran, D., & Ognean, L. (2024). Analysis of the current opportunities for valorization and conservation of the main autochthonous cattle breeds in the conditions of the Carpathian Mountain areas. Bulletin of the University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca. Veterinary Medicine, 81(1), 1–9. https://doi.org/10.15835/buasvmcn-vm:2023.0011
5. Matiuți, M., & Crăiniceanu, E. (2008). Research regarding native domesticated endangered animal breeds. Scientific Papers: Animal Science and Biotechnologies, 41(1), 221–224. https://www.spasb.ro/index.php/public_html/issue/view/28
6. Paraschivescu, M. T. (2023). Identification of biodiversity losses in indigenous cattle breeds in Romania. Annals of "Valahia" University of Târgoviște. Agriculture, 15(2), 12–17. https://doi.org/10.2478/agr-2023-0012.
7. Popa, R., Popa, D., Maftei, M., Dronca, D., & Băcilă, V. (2012). Animal biodiversity conservation, a key of sustainable agriculture: Case study of the Romanian Pinzgau breed in Transilvania region. Scientific Papers, Animal Science, Series D, LV, 25–29. (CD-ROM ISSN 2285-5769; ISSN-L 2285-5750)
8. Sandu, M., Străteanu, A. G., & Udrea, L. (2024). Study on the evolution of genetic resources of domestic animals in Romania. Annals of "Valahia" University of Târgoviște. Agriculture, 16(1), 51–55. https://doi.org/10.2478/agr-2024-0009.