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Monitoring and documentation of the animal genetic resources in Bulgaria

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Abstract: Bulgaria is a country rich in genetic resources, with more than 120 native, locally adapted, and exotic livestock and poultry breeds and lines. The documentation and monitoring of these resources are essential for their management, conservation, and sustainable use. The objective of this work is to analyse the development, current state, and trends in the monitoring and documentation of animal genetic resources in Bulgaria, as well as the presentation of the data at the national and international levels. Data from the periodicals "Farm Animal Breeds in the Republic of Bulgaria" and the world information system DAD-IS were used for the analysis and compared with other countries in Europe.
The results indicate that in Bulgaria there is a well-organized system for collecting and publishing information about livestock breeds, controlled by breeding organizations. It is one of the countries with the most consistent reporting of population data to DAD-IS, providing, on average, data about 87% of its breeds annually in 2019–2023. A trend of increase compared to the values in 2010–2015 (65%) was also observed, which indicates an improvement in the organization of data presentation at the international level. A weakness in reporting data about the state of ex situ in vitro collections was identified: Bulgaria reported data to DAD-IS only in 2017. However, the data about the current state of the national gene bank are regularly published online at the national level. Regarding the completeness of data about genetic resources from Bulgaria in DAD-IS, the country is among the top three in Europe, surpassed only by Austria and Iceland.

Keywords: livestock animals; monitoring; documentation; genetic resources

INTRODUCTION

The animal genetic resources (AnGR) are integral part of the human livelihoods around the world. Livestock and the livestock keeping is essential, especially to poor people (Anderson, 2003). The diversity of the livestock is one of the critical factors to ensure the productivity and adaptability of the breeds in the changing climatic conditions (Cao et al., 2021). In order to maintain this diversity, the AnGR should be properly inventoried, monitored, and of course characterized. Still, globally there are clear knowledge gaps in terms of characterization, e.g. of phenotypes (functional and adaptive traits) (Pilling et. al, 2020). The need for proper monitoring has been long ago recognized on international level, and there is a dedicated Strategic Priority 1 of the Global Plan of Action for Animal Genetic Resources - "Inventory and characterize animal genetic resources, monitor trends and risks associated with them, and establish country-based early-warning and response systems" (FAO, 2007). Globally, the Domestic Animal Diversity Information System (DAD-IS) is the platform developed and maintained by the Food and Agriculture Organization of the United Nations (FAO), where the countries upload data, needed for analysing the status and the diversity of the breeds (DAD-IS, 2025). One integral part of it is the European Farm Animal Biodiversity Information System (EFABIS), which focuses on data from the European region.

Because of its geographic location, the variety of environmental conditions and the diverse climate, Bulgaria is one of the European countries with large variety of breeds (Nikolov, 2015). However, the global process of intensification has also affected the livestock production in the country, and some of the low productive breeds were crossed or replaced by a high productive ones (Christova et. al, 2014). In XXI century, the process of monitoring and documentation of the AnGR in the country is a collective effort of the state and the breeders' organisations. The state organization dedicated for monitoring of AnGR in Bulgaria is the Executive Agency for Selection and Reproduction in Animal Breeding (EASRAB), which maintains database for the flocks and the breeding animals. EASRAB regularly publishes official catalogue of the Farm animal breeds in Bulgaria, containing information about the origin and development of each breed, the current status of the population, geographic distribution, description and performance traits (Farm animal breeds in the Republic of Bulgaria, 2006, 2008, 2011, 2013, 2017, 2023). By legislation, the Executive Director of EASRAB is also National Coordinator (NC) of Bulgaria for the Management of Animal Genetic Resources. The National Council for AnGR, consisting of representatives of the breeding organizations and other experts, supports the NC to fulfil their obligations. The breeders' associations, which are NGOs, maintain herdbooks and registers of animals, and supply annually EASRAB with up-to-date information about the state of the populations. The synergy between these stakeholders in the management of AnGR is well recognized. Tanchev (2015) states "it should be noted that breeder associations and unions, together with EASRAB and the support of various research teams, play an important role for the conservation and management of AnGR of Bulgarian livestock husbandry".

In this research, we analyse the development, current state and trends in the monitoring and the documentation of the AnGR in Bulgaria on national and international level.

MATERIAL AND METHODS

The data analyzed in this study is from the last edition of the Catalogue "Farm Animal Breeds in the Republic of Bulgaria" (Farm animal breeds in the Republic of Bulgaria, 2023), the Bulgarian data in DAD-IS as it was in May 2025, and the data about the collections of the national gene bank for by 01.10.2024, as published on the EASRAB official web page (EASRAB, 2025). For the general data completeness, the FAO's calculations were used, which are published in DAD-IS. When estimating the completeness of reporting the yearly statistics for population and conservation data on international level, we have calculated by species the ratio between number of reported records per year, and the number of all possible records provided by Bulgaria to DAD-IS. In the calculations of the status and trends in reporting of population data, only breeds which are not marked as extinct in DAD-IS were included. For the purpose of this study, all data about poultry species were grouped together, however, for the population data analysis, the individual species were also investigated. Totals per country for Europe were also calculated and compared with values for Bulgaria.

RESULTS AND DISCUSSION

Recorded breeds

In year 2023, the national catalogue lists 120 breeds, lines, and hybrids from the following mammalian and avian species: buffalo, cattle, sheep, goats, pigs, horses, rabbits, dogs, chicken, turkey and goose (Table 1). Out of these 120, 103 breeds are controlled by at least one breeding organization. The number of national breed populations reported from Bulgaria in DAD-IS is larger – 138, from which 12 are marked as extinct. The rest of the difference is due to more breeds recorded in DAD-IS in dogs, rabbits and poultry, than in the catalogue. There are more chicken lines and even poultry species recorded in DAD-IS – ducks, Muscovy ducks and their hy-

brid. On the other hand, the Catalogue lists some cattle and sheep breeds not reported in DAD-IS, due to the small size of the populations and the lack of breeding organization: Wagyu, Normande, Pinzgauer, Belgian blue, Suffolk, Blacknose, Zwartbles, Mouton Vendéen, and Border Leicester.

From all the breeds, or "national breed populations" as used by FAO, recorded by Bulgaria in DAD-IS, 97 are considered "local" (Table 2), and 41 are "transboundary" – present in two or more countries. The transboundary breeds are further subdivided into "regional" – present in several countries in the same region, and "international", i.e. present in more than one region. In Bulgaria, 4 breeds have the status "regional" and 37 have the status "international". Most local breeds are recorded in sheep – 28, and poultry – 34. Of the 34 local poultry breeds, 28 are chicken, 3 – turkey, and one representative each of duck, Muscovy duck, and Mulard (duck/Muscovy duck).

Table 1. Farm animal breeds in Bulgaria

Species	Number of breeds listed in National Catalogue	Number of breeds recorded in EFABIS/ DAD-IS, including extinct ones	Number of breeds controlled by a breeding organization
Buffalo	1	2	1
Cattle	23	19	16
Sheep	39	36	34
Goat	9	9	9
Pig	7	9	7
Horse	14	17	13
Poultry	23	36	19
Rabbit	2	6	2
Dog	2	4	2

Source: Authors' own elaboration

Table 2. Distribution of the breeds recorded by Bulgaria in EFABIS/DAD-IS according to their presence in other countries

	Local	Regional	International
Buffalo	2	0	0
Cattle	9	0	10
Sheep	28	1	7
Goat	5	0	4
Pig	3	1	5
Horse	11	1	5
Poultry	34	1	1
Rabbit	1	0	5
Dog	4	0	0

Source: Authors' own elaboration

In buffalo, there are only local breeds in Bulgaria. Of the two buffalo breeds recorded in DAD-IS, one – the Bulgarian buffalo – is extinct; thus, there is only one breed representing the whole species in our country. In cattle, pig, and rabbit, there are more international than local breeds recorded in this database. This is evidence of the uniform approach toward the documentation of all animal genetic resources in the country, irrespective of their status as "local" or "international".

General data completeness

Bulgaria is one of the countries in Europe with the highest degree of breed data completeness in EFABIS/DAD-IS – 44%, preceded by Austria with 52% and Iceland with 48% (Figure 1). At the time of writing this article, only five countries in the world have more than 50% completeness, with the top one being Brazil at 75%. The average completeness for the European region is 28%. Within the top group of countries (Figure 1), Bulgaria has between 23% and 88% more recorded breeds than the others. When comparing Bulgaria to the group of European countries with a similar number of breeds (less than a 10% difference in numbers), Türkiye (137 breeds), Slovakia (128 breeds), and Czechia (126 breeds) all have the same degree of completeness – 34%. These figures for Bulgaria are the result of the collaborative effort of the Executive Agency for Selection and Reproduction in Animal Breeding, the breeding organizations, other NGOs operating in the livestock sector, and the scientific community.

All breeds recorded from Bulgaria in DAD-IS have a documented adaptedness class (Figure 2).

This also shows a uniform policy regarding the documentation of native and exotic breeds. Only nine other countries in Europe – Austria, Croatia, Czechia, Greece, Italy, Montenegro, Norway, Portugal, and Serbia – have zero breeds with an "unknown" adaptedness status. Within the European region, 32.64% of the populations are still not assigned to a given class.

Population size monitoring

The population size is one of the important parameters for monitoring breed status and trends.

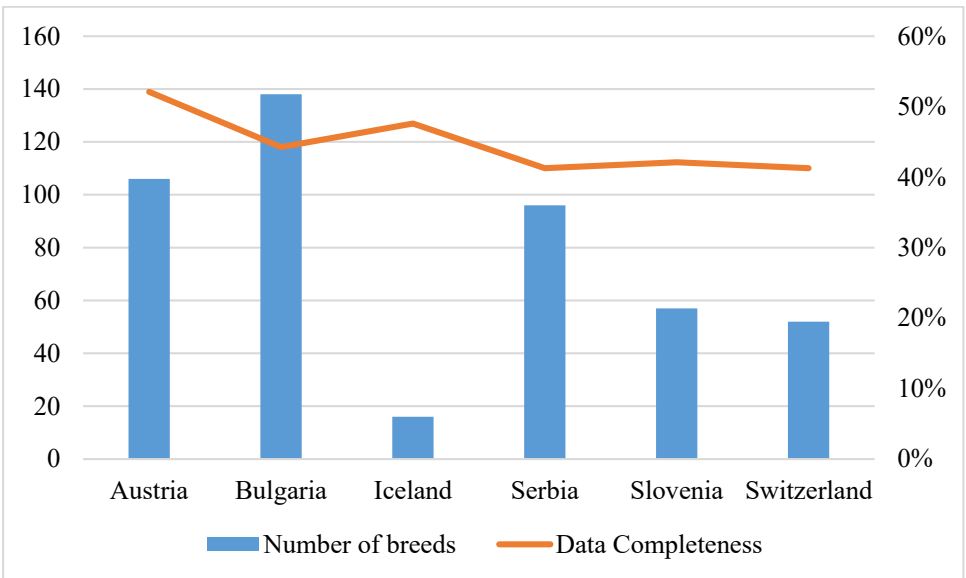


Figure 1. Top six countries in Europe with highest degree of breeds' data completeness

Source: Authors' own elaboration

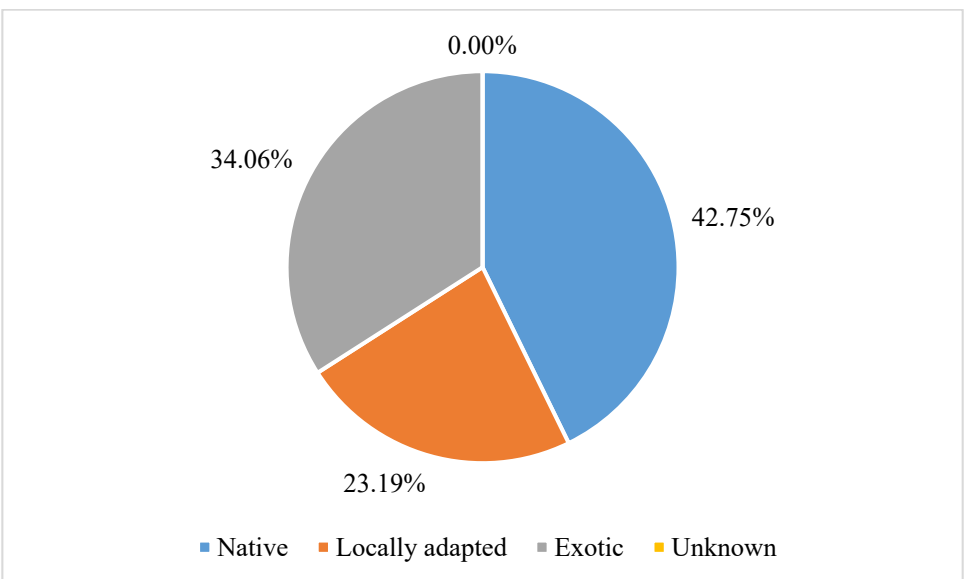


Figure 2. Distribution of breeds recorded by Bulgaria in DAD-IS by adaptedness class

Source: Authors' own elaboration

The frequency of collecting such data depends on the intended use, the generation interval of each species, and the associated costs. A long-term time series of accurate population data allows us to understand population dynamics and to estimate, in a uniform way, the risk of extinction. In this regard, Bulgaria is in a favorable situation, as the breeding organizations regularly report the population size of all breeds under their control to EASRAB, and the latter maintains the register of breeding herds. This well-established data collection procedure is reflected in the quality of the population data recorded by Bulgaria in DAD-IS. As shown in Table 3, in the period 2021–2025, the population record coverage for buffaloes, cattle, sheep, goats, pigs, and horses is above 87%. For buffalo and goat species, it is even 100%, i.e. the population data are reported to DAD-IS for each breed every year. There is still room for improvement in dogs and rabbits, as in these species population data are provided to DAD-IS each year only for half or one-third of the breeds, respectively. In poultry, the reporting shows slow and modest growth from 2010 to 2015, increasing from 56% to 63%, reaching a peak of 78% from 2017 to 2021, followed by a slight decline to 72%, and then to 69% by 2025.

Looking back at data from 2010 to 2025, several trends are noticeable across the various species. Reporting for buffaloes has always been perfect – 100%, which is somewhat expected, as it refers to a single breed.

Reporting for cattle shows strong gains from 28% (2010) to 94% (2016–2023), followed by a slight decline in 2024–2025. In goats, there was steady improvement from very limited to full reporting from 2018 onwards. An improvement of nearly 10% is observed in sheep, where reporting has always been above 84%, regardless of the fact that this is the most numerous species in terms of the number of breeds in Bulgaria. The data for horses also show significant improvement, from 36% in 2010 to 93–100% in recent years. There are only two years – 2013 and 2020 – with data for all dog breeds. The large gaps in reporting are mainly for Balgarski barak and Balgarsko ludogorsko gonche, where no records are present in DAD-IS from 2014 to 2019 and from 2022 to 2024. These breeds are not controlled by a breeding association. In rabbits, the first records are for the year 2017, from which onward data for the Californian and White New Zealand breeds are reported each year. The other four rabbit breeds recorded from Bulgaria in DAD-IS are not controlled by a breeding organization and have data only for one year – 2019. There is a diversity of patterns in reporting among the various poultry species. All turkey breeds have population records for each year from 2010 to 2019, and afterwards, there are no data in the database. In ducks,

Table 3. Population records coverage per year (2010-2025) as percentage of all possible records

Species /Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Buffalo	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Cattle	28	39	28	44	50	83	83	94	94	94	94	94	94	94	89	89
Sheep	85	88	88	91	85	85	94	97	97	100	100	97	97	97	94	94
Goat	22	22	22	44	44	44	44	67	100	100	100	100	100	100	100	100
Pig	88	100	100	100	100	100	100	100	75	63	63	88	88	88	88	88
Horse	36	79	93	93	71	86	93	86	93	93	93	93	93	93	100	93
Poultry	56	56	59	63	59	63	69	78	75	78	78	78	81	72	75	69
Rabbit	0	0	0	0	0	0	0	33	33	100	33	33	33	33	33	33
Dog	25	75	25	100	50	50	50	50	50	50	100	75	50	50	50	50
All species	54	64	63	71	65	72	77	84	85	89	87	87	87	85	85	83

Source: Authors' own elaboration

reporting starts in 2019 and continues regularly until 2025, with the exception of 2022 and 2023. For 14 out of 26 chicken populations, data have been reported annually from 2010 to 2025.

The population record coverage from Bulgaria for all species shows an improvement from an average completeness of 64.8% in 2010–2015 to 86.8% in 2019–2024. This confirms a strong and steady increase in Bulgaria's breed population data reporting over time, moving from moderate completeness to highly consistent and comprehensive reporting in recent years.

For comparison with other countries, only data up to the year 2023 were used. The reason for this is that the data for 2024 in some countries are updated throughout 2025 or even later. These differences in the effort needed to gather and process all the data are the result of several factors: the number of breeds, the breeding organizations, and the procedures for data collection in the various countries.

At the European level, Bulgaria is among the most frequently reporting countries. The highest performance in this group is shown by Slovenia, reporting annually in 2010–2023 population data for 87% of its 50 breeds. The group also includes Switzerland (79%, 48 breeds), Austria (78%, 80 breeds), Bulgaria (76%, 126 breeds), Slovakia (72%, 118 breeds), Spain (70%, 233 breeds), and Germany (69%, 719 breeds). Looking at the three countries with the most breeds in this group, Spain maintains moderate but stable completeness across the years, Germany fluctuates more but reaches high completeness in recent years, and Bulgaria shows a clear upward trend, peaking between 2020 and 2022.

Conservation data

Cryo-conservation is an important measure complementary to in situ conservation. Regular reporting of the state of the gene bank collections to DAD-IS is needed to track progress in the conservation of animal genetic resources. This data, which includes the genetic material stored in medium- or long-term facilities, enables the assessment of progress in preventing the extinction of local breeds, which is crucial for global food security and agricultural sustainability, and is central to monitoring the SDG 2.5.1b indicator of the Sustainable Development Goals.

The Bulgarian national gene bank is maintained by EASRAB, with material collected by the state stations for artificial insemination. In 2010, EASRAB established the National Genetic Reserve (NGR) – a core part of the gene bank for long-term conservation. The initial collection of the NGR was formed by allocating 1,000 samples from each donor in the gene bank. For biosecurity reasons, since 2012 the material of the NGR has been stored in parallel in two locations – Sofia and Sliven. Requests for the use of material from the NGR are approved by the Executive Director of EASRAB.

The Bulgarian national gene bank for long-term conservation, i.e., the NGR, has a large collection of semen samples from five species – cattle, buffalo, sheep, goats, and horses. The collection has increased from 381,394 samples of 509 donors in 2019 to 416,139 samples of 626 donors in 2024 (Table 4). Information about the number of samples per donor, with their location, is published annually on the EASRAB web page.

Table 4. Collection development of the gene bank in Bulgaria

Year	2019		2020		2021		2022		2023		2024	
Species	Donors	Samples	Donors	Samples	Donors	Samples	Donors	Samples	Donors	Samples	Donors	Samples
Cattle	404	327761	454	344519	455	344113	463	348579	469	350910	469	351480
Buffalo	28	24217	30	25752	30	25752	32	27663	33	28104	33	28602
Sheep	54	24359	57	24765	57	24765	58	24833	58	24833	58	24743
Goat	7	475	9	775	9	775	13	1013	13	1013	13	1013
Horse	16	4582	26	6902	25	6852	39	8551	46	9426	53	10301

Source: Authors' own elaboration

However, in the last fifteen years, only data for 2017 have been reported to DAD-IS. The dynamics of the collection changes in the gene banks are very different and much slower than those of the live population; therefore, even lower frequencies of reporting are acceptable. On the other hand, if there is development in the gene bank collections, these should be reflected in order to properly estimate the SDG 2.5.1b indicator. Of the 35 European countries with cryo data in DAD-IS, only four have not updated their data after 2017. Two countries have even reported data annually for their cryo collections – Slovenia and the Netherlands.

CONCLUSIONS

In Bulgaria, the process of data collection and monitoring of AnGR is well organized. Local and exotic breeds are treated equally regarding their documentation, and the important data are regularly made available to society at both the national and international levels. The documentation of AnGR from Bulgaria in DAD-IS is of a high standard, with data completeness among the best in Europe. Bulgaria has demonstrated a strong and sustained improvement in population data completeness, consistently maintaining high reporting levels post-2019, which is still to be achieved for cryo-conservation data.

REFERENCES

Anderson, S. (2003). Animal genetic resources and sustainable livelihoods. *Ecological Economics*, *45*(3), 331 – 339. https://doi.org/10.1016/s0921-8009(03)00088-0.

Cao, J., Baumung, R., Boettcher, P., Scherf, B., Besbes, B. & Leroy, G. (2021). Monitoring and Progress in the Implementation of the Global Plan of Action on Animal Genetic Resources. *Sustainability*, *13*, 775. https://doi.org/10.3390/su13020775.

Christova, D., Tanchev, S., Georgieva, S. & Yablanski, Ts. (2014). Genetic diversity and genetic erosion in the breeds of farm animals. *Bulgarian Journal of Animal Husbandry*, *51*(3), 85 - 95 (Bg).

EASRAB. EASRAB - official page, https://iasrj.eu (accessed on May 30, 2025).

FAO. (2007). Global Plan of Action for Animal Genetic Resources and the Interlaken Declaration. FAO: *Rome, Italy*, 2007.

FAO. Domestic Animal Diversity Information System (DAD-IS). Available online: http://www.fao.org/dad-is/en (accessed on May 30, 2025).

Farm animal breeds in the Republic of Bulgaria. (1st edition). 2006. Sofia. ISBN 13: 978-954-91309-7-3.

Farm animal breeds in the Republic of Bulgaria. (2nd revised and expanded edition). 2008. Sofia. ISBN 978-954-92216-3-3.

Farm animal breeds in the Republic of Bulgaria. (3rd edition). 2011. Sofia. ISSN 1314-538X.

Farm animal breeds in the Republic of Bulgaria. (4th edition). 2013. Sofia. ISSN 1314-538X.

Farm animal breeds in the Republic of Bulgaria. (5th edition). 2017. Sofia.

Farm animal breeds in the Republic of Bulgaria. (6th revised and updated edition). 2023. Sofia. ISBN 978-619-205-194-5.

Nikolov, V. (2015). Review of the specific measures for support of the autochthonous breeds in Bulgaria. *Journal of Central European Agriculture*, *16*(2), 38 - 46. https://doi.org/10.5513/JCEA01/16.2.1584.

Pilling, D., Bélanger, J., Diulgheroff, S., Koskela, J., Leroy, G., Mair, G. &Hoffmann, I. (2020). Global status of genetic resources for food and agriculture: challenges and research needs. *Genetic Resources*, *1*(1), 4 - 16. https://doi.org/10.46265/genresj.2020.1.4-16.

Tanchev, Sv. (2015). Conservation of genetic resources of autochthonous domestic livestock breeds in Bulgaria. A review. *Bulg. J. Agric. Sci*., *21*(6), 1262 – 1271.

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