

SANITARY, HYGIENIC, ECOLOGICAL, VETERINARY-SANITARY EXAMINATION AND BIOLOGICAL SAFETY

САНИТАРИЯ, ГИГИЕНА, ЭКОЛОГИЯ, ВЕТЕРИНАРНО-САНИТАРНАЯ ЭКСПЕРТИЗА И БИОБЕЗОПАСНОСТЬ



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Uncontrollable Mortality in Agricultural Animals in the Russian Federation: A State-Level Problem in the Context of Sanction Restrictions

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Abstract

Introduction. Uncontrollable mortality in agricultural animals causes significant economic damage to the producers, and threatens the national food security. In the context of sanction restrictions, and the need to ensure the independence from import supplies, the problem of livestock mortality control has become particularly acute in the Russian Federation. Although the statistical data are available, the comprehensive analysis of the correlation of livestock mortality and population dynamics, as well as analysis of the factors inducing the growth of mortality are insufficiently presented in the scientific literature. This determines the relevance and purpose of the present study.

Materials and Methods. The study was conducted based on the data of the Federal State Statistics Service of the Russian Federation (Rosstat) for the period of 2019–2023. The methods of economic and statistical analysis were used, including the analysis of time series, calculation of livestock population growth rate, structural analysis of the share of mortality in the total figure of livestock population, and comparative analysis of the mortality and population rate changes in the main groups of agricultural animals.

Results. The situation has been identified as critical in pig farming, where the livestock mortality-to-population ratio has increased from 32.2% in 2019 to 43.1% in 2023, and in reindeer herding, where this indicator has reached from 14.9 to 19.0%. In most of the animal groups (cattle, pigs, sheep, goats, and horses), the mortality growth rate was found to significantly exceed the population growth rate, and the amplitude of mortality fluctuations was higher, indicating the insufficient level of process control. The key groups of factors influencing mortality have been identified: natural and climatic factors (natural disasters, dangerous diseases), technical and organisational factors (feed shortage, unsatisfactory condition of the premises), and organisational and human (low qualified staff, belated veterinary care).

Discussion and Conclusion. The obtained results confirm the existence of a systemic problem of uncontrollable mortality in agricultural animals in the Russian Federation, which requires a transition from the local measures to the State regulation. A set of measures has been proposed, including planning the actions of agricultural enterprises that face the livestock mortality threat, developing an insurance system, strengthening the state support, upgrading employee qualifications, and expanding statistical recording. Implementation of these measures will improve the predictability of livestock population dynamics, reduce the socioeconomic damage caused by the livestock mortality, and strengthen the food security of the country.

Keywords: livestock mortality, Russian Federation, agricultural animals, uncontrollable mortality, pig farming, reindeer, cattle, food security, state regulation, veterinary control, mortality statistics, veterinary internship

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Неконтролируемый падеж сельскохозяйственных животных в Российской Федерации: государственная проблематика в условиях санкционных ограничений

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Аннотация

Введение. Неконтролируемая гибель сельскохозяйственных животных наносит значительный экономический ущерб производителям и создает угрозу продовольственной безопасности государства. В условиях санкционных ограничений и необходимости обеспечения импортонезависимости проблема управления падежом скота в Российской Федерации приобретает особую остроту. Несмотря на наличие статистических данных, в научной литературе недостаточно внимания уделяется комплексному анализу соотношения динамики падежа и поголовья, а также выявлению факторов, приводящих к росту смертности, что определяет актуальность и цель данного исследования.

Материалы и методы. Исследование выполнено на основе данных Федеральной службы государственной статистики РФ (Росстат) за 2019–2023 гг. Используются методы экономико-статистического анализа, включая анализ динамических рядов, расчет темпов прироста, структурный анализ доли падежа в общем поголовье, а также сравнительный анализ темпов изменения падежа и поголовья по основным видам сельскохозяйственных животных.

Результаты исследования. Выявлено, что критическая ситуация наблюдается в свиноводстве, где доля падежа к поголовью выросла с 32,2 % в 2019 г. до 43,1 % в 2023 г., а также в оленеводстве, где этот показатель достигает 14,9–19,0 %. Установлено, что по большинству групп животных (крупный рогатый скот, свиньи, овцы и козы, лошади) темпы роста падежа значительно превышают темпы роста поголовья, а амплитуда колебаний падежа выше, что свидетельствует о недостаточном уровне управления процессом. Определены ключевые группы факторов, влияющих на падеж: природно-климатические (стихийные бедствия, опасные болезни), технико-организационные (недостаток кормов, неудовлетворительное состояние помещений) и организационно-человеческие (низкая квалификация персонала, несвоевременная ветеринарная помощь).

Обсуждение и заключение. Полученные результаты подтверждают наличие системной проблемы неконтролируемого падежа скота в РФ, требующей перехода от локальных мер к государственному регулированию. Предложен комплекс мероприятий, включающий планирование действий сельскохозяйственной организации при угрозе падежа, развитие системы страхования, усиление государственной поддержки, повышение квалификации работников и расширение статистического учета. Реализация данных мер позволит повысить прогнозируемость динамики поголовья, снизить социально-экономический ущерб от падежа и укрепить продовольственную безопасность страны.

Ключевые слова: падеж скота, Российская Федерация, сельскохозяйственные животные, неконтролируемая смертность, свиноводство, северные олени, крупный рогатый скот, продовольственная безопасность, государственное регулирование, ветеринарный контроль, статистика падежа, ветеринарная интернатура

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Introduction. Livestock mortality is a significant socio-economic problem not only for agricultural enterprises engaged in livestock farming but for the country as a whole. Excessive livestock mortality leads to losses of livestock products, valuable animal genetic resources, labour and financial investments, and expected profit due to the inability of the agricultural enterprises to fully complete the production cycle. At the state level, livestock mortality can entail a chain of inflationary processes, starting with the rise of livestock product prices and leading to the rise of prices in the related sectors. Such processes are highly probable, as the demand for the livestock products won't decline, but rather increase with population growth due to

essential role of livestock products in a human diet. Uncontrollable livestock mortality can cause social problems such as unemployment in livestock farming and related sectors, and serious environmental problems due to the need to dispose a large number of cadavers of dead animals. All this poses a real threat to the food security of the country.

The problem is highly relevant for the Russian Federation: reduction of beef production leads to the growth of prices for this type of meat and fall of its affordability for people, which automatically results in increased share of pork and poultry in their diet, and can cause problems in these sectors in the event of crises similar to the one in

poultry farming in 2025. On the other hand, this may require enlargement of meat and meat products' export, which creates risks for the domestic market of the Russian Federation in case of changes in political and economic situation. Therefore, livestock mortality control is crucial for the development of agricultural enterprises and improvement of their cost-efficiency, as well as for ensuring the economic, food, and environmental security of the country in the context of sanction restrictions⁶ [1]. However, despite the availability of statistical data, little attention has been paid in the scientific literature to a comprehensive analysis of the correlation between the dynamics of livestock mortality and livestock population, as well as to identifying the factors influencing excessive mortality.

The aim of the study is to evaluate the state of livestock mortality in the agricultural enterprises of the Russian Federation, identify factors leading to excessive livestock mortality, and propose measures to improve livestock mortality control and reduce socio-economic damage.

Materials and Methods. The empirical study was based on the official data of the Federal State Statistics Service of the Russian Federation (Rosstat) for the period of 2019–2023. Monthly and annual bulletin “Livestock Population in the Farms of All Categories” served the source of information on the numbers of agricultural animals by species; the bulletin “State of Livestock Farming” served the source of information on animal mortality in the agricultural enterprises (small business entities excluded). In this study, livestock mortality is understood as the death of an animal due to the direct impact of certain factors

(dangerous diseases, natural disasters, etc.) or due to euthanasia reasoned by the inability to help an animal suffering from these factors.

The research was carried out using the following economic and statistical methods: the analysis of time series of livestock population and mortality per each year in absolute values; calculation of the rates of changing (increase/decrease) of both livestock population and mortality for each animal species separately; the structural analysis to determine the mortality-to-population ratio (as a percentage), which made it possible to evaluate severity of the situation. For each animal species, the direction and fluctuation amplitude of livestock population and mortality growth rate were compared. Mortality rates exceedance over livestock population rates, divergency of trends, and increased volatility of mortality were interpreted as signs of insufficient process control.

Research Results

Dynamics of livestock population and mortality in the Russian Federation. To objectively assess the impact of livestock mortality on the state of livestock farming, it is necessary to understand the volumes of livestock farming production in the country. According to the Rosstat data for 2019–2023, there was a positive growth dynamics in the amount of produced and raised livestock and poultry, by volume (thousand tons): the largest upsurge of this indicator equal to 6.28% was observed in 2022 compared to 2021; in 2023, the increase was 2.18% compared to 2022 (Fig. 1).⁷

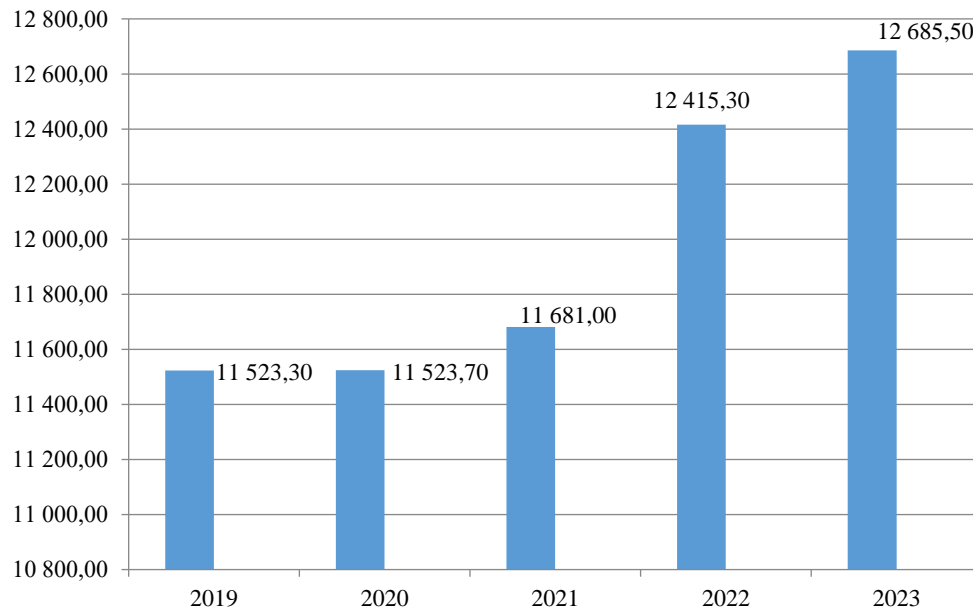


Fig. 1. The amount of produced and raised livestock and poultry in the Russian Federation in 2019–2023, thousand tons

⁶ On Approval of the Doctrine of Food Security of the Russian Federation. Executive Order of the President of the Russian Federation No. 20 of January 21, 2020. URL: <https://www.garant.ru/products/ipo/prime/doc/73338425/> (accessed: 09.09.2025)

⁷ State of Livestock Farming. Bulletin for 2019–2023. Federal State Statistics Service. URL: <https://rosstat.gov.ru/compendium/document/13277> (accessed: 12.02.2024)

The analysis of Table 1 shows that in 2023, compared to 2022, cattle population decreased by 1.98%; cow population decrease dynamics in 2023 compared to 2022 was 2.48%; during the studied years, negative population dynamics was observed in horses, sheep and goats, and reindeer. Positive population dynamics was observed in pigs (by 6.85% in 2022 compared to 2021 and by 3.13% in 2023 compared to 2022). In 2023, there was an increase in the population of camels by 1.88%, donkeys — by 20.83%, mules and hinnies — by 75% compared to 2022.⁸

The analysis of Table 2 shows an increase in livestock mortality in the agricultural enterprises in 2023 compared to 2022, which was observed for all groups of agricultural animals except for cattle (the mortality in this group decreased in 2023 compared to 2022 by 4.917%). In 2023,

the greatest increase of mortality was observed in the following groups of animals: camels by 73.3%; sheep and goats by 22.35%; pigs by 12.95%; poultry by 12.32%. Also, an increase of young cattle mortality should be noted in 2023 compared to 2022, especially that of reindeer calves (by 20.15%), although in previous years there was a constant decrease in mortality. The mortality in lambs and goatlings also increased significantly in 2023 — by 13.18%. A positive trend for steady decline of mortality was observed in foals from 2019 to 2023, although, in adult horses, the mortality was observed to increase in 2023 by 2.6%. It should be noted that in 2022, the mortality had decreased in most animal groups, whereas in 2023, on the contrary, it increased significantly.⁹

Table 1

Livestock population dynamics in the agricultural enterprises of the Russian Federation in 2019–2023

Livestock population, thousand heads	2019	2020	2021	2022	2023	Rate of changing			
						2020/2019	2021/2020	2022/2021	2023/2022
Cattle	8107.5	8123.8	7978.6	7 959.7	7 801.9	0.20	-1.79	-0.24	-1.98
including Cows	3274.1	3270.8	3227.5	3 227.4	3 147.4	-0.10	-1.33	-0.003	-2.48
Pigs	22418.5	23311.3	24005.2	25 650.2	26 453.7	3.98	2.98	6.85	3.13
Sheep and Goats	3552.2	3237.7	3115.7	3 170.4	3 098.9	-8.85	-3.77	1.76	-2.25
Horses	262.4	251.4	238.5	229.7	219.4	-4.18	-5.12	-3.72	-4.46
Reindeer	904.1	881.7	869.2	920.6	890.6	-2.47	-1.42	5.91	-3.25
Camels	4547	4585	4319	3889	3962	0.84	-5.80	-9.96	1.88
Donkeys	37	23	102	96	116	-37,84	343,4	-5,88	20,83
Mules and hinnies	10	5	2	4	7	-50.00	-60.00	100.0	75.00

We will analyse the ratio of the livestock mortality to population for the period of 2019–2023 (Figures 2–9).

Figure 2 shows the proportion of mortality to the total number of livestock population in various animal groups during 2019–2023. The analysis shows that for such groups of agricultural animals as “camels”, “horses”, and “cows”, the proportion of mortality didn’t not exceed 2%, which means the damage from mortality was not critical. A positive trend for the decrease in the values of this indicator in the “cows” and “horses” groups in 2023 compared to previous years is observed.

The proportion of mortality to the total number of livestock population in the “cattle” and “sheep and goats” groups ranged from 2–4% in the studied period.

The agricultural enterprises may suffer significant damage in relation with the “reindeer” group, due to fluctuation of the mortality proportion in this group during the studied period in the range from 13.24% in 2022 to 19.03% in 2019. A positive trend to note is the decrease of the mortality proportion to the total population in 2022–2023 compared to 2019–2021.

⁸ Livestock Population in the Farms of All Categories. Bulletin for 2019–2023. Federal State Statistics Service. URL: <https://rosstat.gov.ru/compendium/document/13277> (accessed: 12.02.2024)

⁹ State of Livestock Farming. Bulletin for 2019–2023. Federal State Statistics Service. URL: <https://rosstat.gov.ru/compendium/document/13277> (accessed: 12.02.2024)

The most critical situation is observed in the “pigs” group: proportion of pig mortality to their total population ranged within very high values, moreover, there was a negative trend for mortality increase from 32.17% in 2019 to 43.07% in 2023. Bearing in mind that pigs are the most

numerous group in the total population of agricultural animals, and due to pork being a highly demanded product on the food market, such high mortality numbers indicate significant damage to both the agricultural enterprises and the state as a whole.^{10,11}

Table 2

Livestock mortality dynamics in the agricultural enterprises of the Russian Federation in 2019–2023

Mortality, thousand heads	2019	2020	2021	2022	2023	Rate of changing			
						2020/2019	2021/2020	2022/2021	2023/2022
Cattle	166.9	167	197.6	211.5	201.1	0.060	18.323	7.034	-4.917
Cows	10.6	11	19.1	5.5	6	3.774	73.636	-71.204	9.091
Pigs	7 211.1	8 450.5	9 598.80	10087.0	11393.3	17.187	13.589	5.086	12.950
Sheep and Goats	101.9	103.5	113.9	92.6	113.3	1.570	10.048	-18.701	22.354
Horses	3119	2460	2681	1917	1967	-21.129	8.984	-28.497	2.608
Reindeer	172	150.3	141.9	121.9	133	-12.616	-5.589	-14.094	9.106
Camels	56	50	63	45	78	-10.714	26.000	-28.571	73.333
Poultry	192 160.00	222 656.00	229 525.30	224 702.30	252 387.30	15.870	3.085	-2.101	12.321
Young cattle mortality, thousand heads									
Calves	108.1	105.2	104.2	98.8	108.5	-2.683	-0.951	-5.182	9.818
Piglets	5 449.7	6 194.7	6 805.4	7 464.0	8 241.7	13.670	9.858	9.678	10.419
Lambs and Goatlings	48.6	45.6	45.9	47.8	54.1	-6.173	0.658	4.139	13.180
Foals	1295	799	799	604	532	-38.301	0.000	-24.406	-11.92
Reindeer Calves	64.2	54.8	51.8	40.2	48.3	-14.642	-5.474	-22.394	20.149

Another negative trend in livestock farming is the exceedance of livestock mortality increase rate over the population growth rate. This situation makes us to forecast further increase in mortality numbers, and decline in livestock population numbers as well as in the potential for herd reproduction. Figures 3–9 illustrate the correlation between the rates of changing the mortality and population numbers in each group of agricultural animals under study.

According to Fig. 3, the rate of changing cattle population is insignificant, ranging from 0.2% in 2019 to -1.98% in 2023. There is a large gap between the rate of changing

cattle population and the rate of changing its mortality, which may indicate the uncontrollability of cattle mortality process^{12,13}. The situation is aggravated by the fact that, with the exception of 2023, the increase of cattle mortality is taking place against the background of the decrease of its population. This could lead to serious problems in this group of animals and contribute to a sharp decline in the amount of beef and veal produced as well as milk and dairy products, which are included in the consumer basket and have a significant share in the structure of food products.

¹⁰ *Livestock Population in the Farms of All Categories*. Bulletin for 2019–2023. Federal State Statistics Service. URL: <https://rosstat.gov.ru/compendium/document/13277> (accessed: 12.02.2024)

¹¹ *State of Livestock Farming*. Bulletin for 2019–2023. Federal State Statistics Service. URL: <https://rosstat.gov.ru/compendium/document/13277> (accessed: 12.02.2024)

¹² *State of Livestock Farming*. Bulletin for 2019–2023. Federal State Statistics Service. URL: <https://rosstat.gov.ru/compendium/document/13277> (accessed: 12.02.2024)

¹³ *Livestock Population in the Farms of All Categories*. Bulletin for 2019–2023. Federal State Statistics Service. URL: <https://rosstat.gov.ru/compendium/document/13277> (accessed: 12.02.2024)

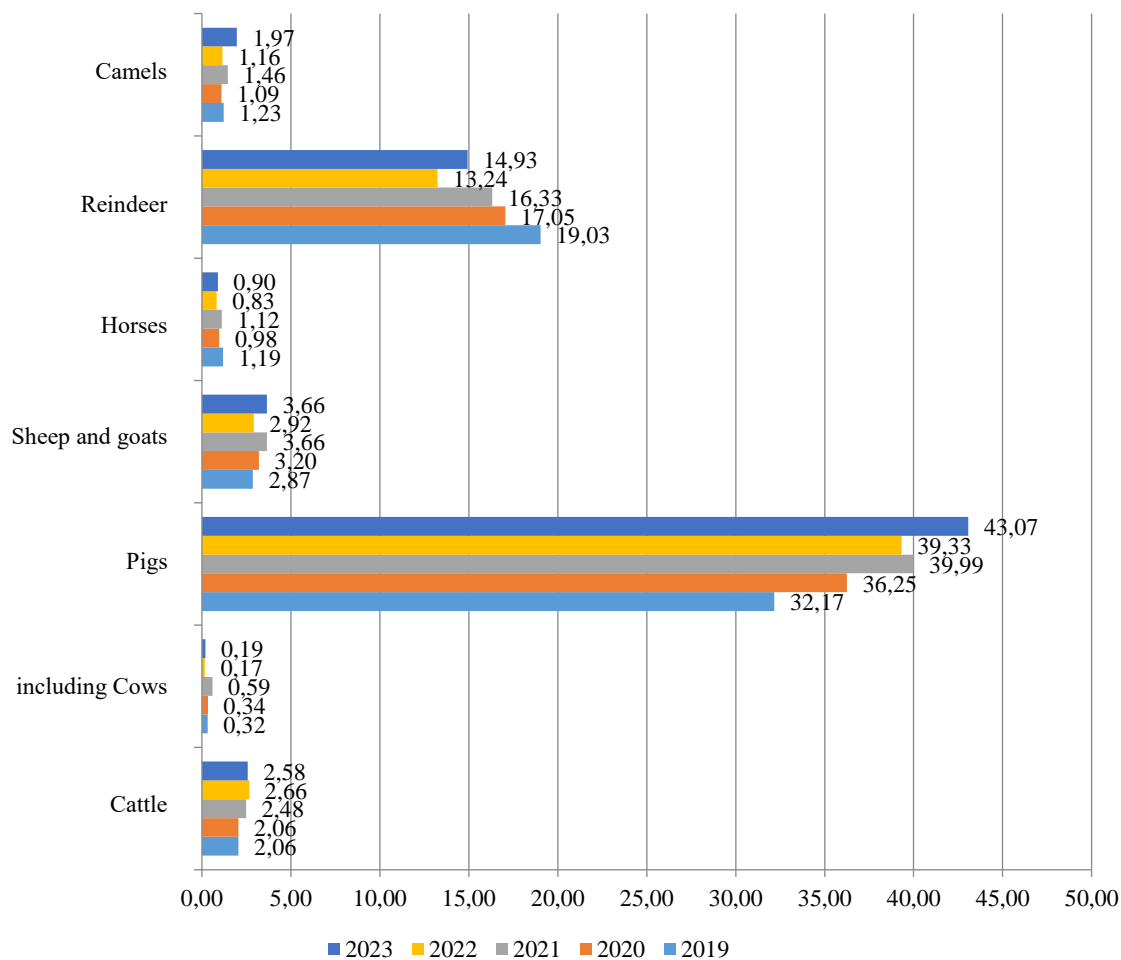


Fig. 2. The proportion of mortality to the total number of livestock population in various groups of agricultural animals in the Russian Federation in 2019–2023

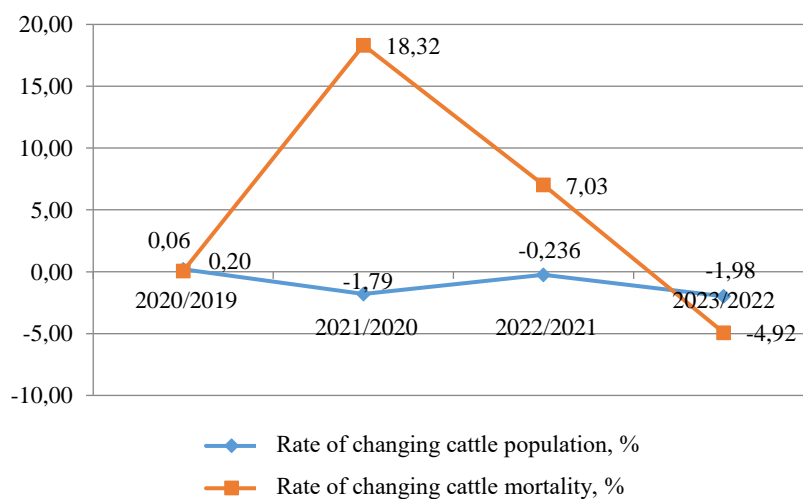


Fig. 3. Rates of changing the cattle population and mortality in the agricultural enterprises of the Russian Federation in 2019–2023

Figure 4 clearly confirms the fact that in cows the fluctuation amplitudes in the rate of changing the mortality are much wider than that in the rate of changing the population. Moreover, according to Rosstat data, the cattle and small ruminant population continues to decline: in the first half of 2025, cattle population decreased by 4.1% compared to the same period of 2024, and cow population decreased by 3.7%^{14,15,16}

According to Fig. 5, throughout the entire period, except for 2022, the rate of mortality growth in pigs exceeded significantly the rate of their population growth. It is also worth noting that the sharper amplitude in the rate of changing pig mortality compared to the rate of changing pig population. This is especially dangerous due to pig mortality proportion reaching more than 40% in 2023 relative to pig population, and pigs are the most numerous group of agricultural animals.^{17,18}

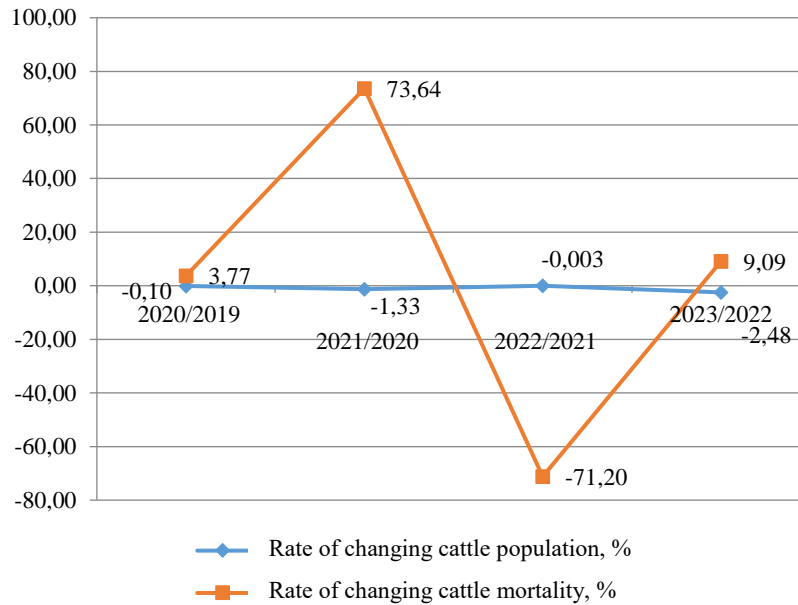


Fig. 4. Rates of changing the cow population and mortality in the agricultural enterprises of the Russian Federation in 2019–2023

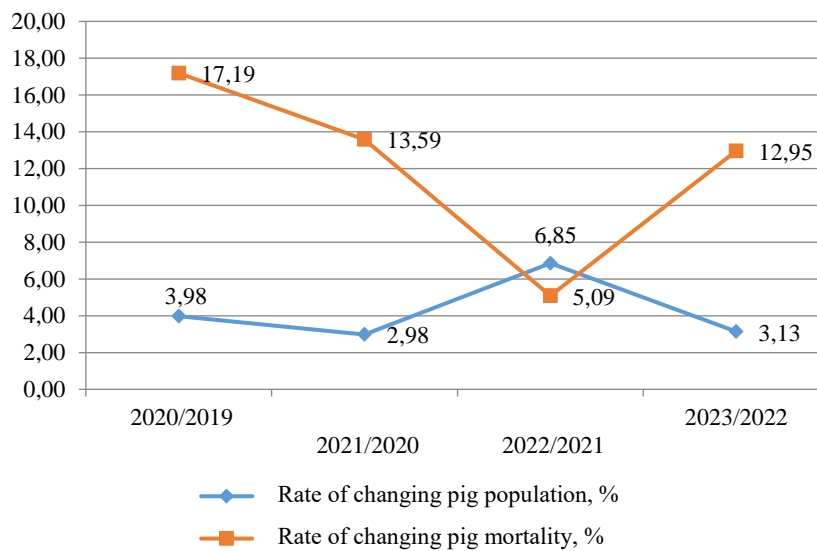


Fig. 5. Rates of changing the pig population and mortality in the agricultural enterprises of the Russian Federation in 2019–2023

¹⁴ Livestock Farming: Results of the First Half of 2025. Agrotrend. URL:

<https://agrotrend.ru/news/52775-zhivotnovodstvo-itogi-i-polugodiya-2025-g> (accessed: 14.02.2026).

¹⁵ State of Livestock Farming. Bulletin for 2019–2023. Federal State Statistics Service. URL: <https://rosstat.gov.ru/compendium/document/13277> (accessed: 12.02.2024)

¹⁶ Ibid.

¹⁷ Livestock Population in the Farms of All Categories. Bulletin for 2019–2023. Federal State Statistics Service. URL: <https://rosstat.gov.ru/compendium/document/13277> (accessed: 12.02.2024)

¹⁸ State of Livestock Farming. Bulletin for 2019–2023. Federal State Statistics Service. URL: <https://rosstat.gov.ru/compendium/document/13277> (accessed: 12.02.2024)

The analysis of Fig. 6 shows the increase in the mortality of sheep and goats against the background of their livestock population decrease registered in 2020, 2021, and 2023. Moreover, the rate of changing the mortality in sheep and goats had a greater amplitude than the rate of changing the livestock population.^{19,20}

The analysis of Fig. 7 also shows a significant amplitude in the rate of changing mortality in horses compared

to the rate of changing their population^{21,22}. However, it is necessary to take into account that in this group of animals the population numbers are significantly greater than the mortality, therefore, the changes in mortality will be more noticeable and will have greater amplitude compared to the population numbers.

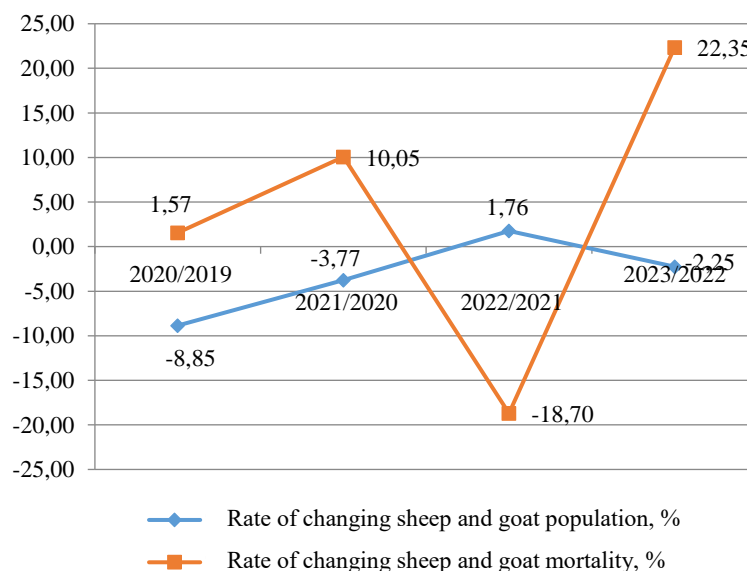


Fig. 6. Rates of changing the population and mortality in sheep and goats in the agricultural enterprises of the Russian Federation in 2019–2023

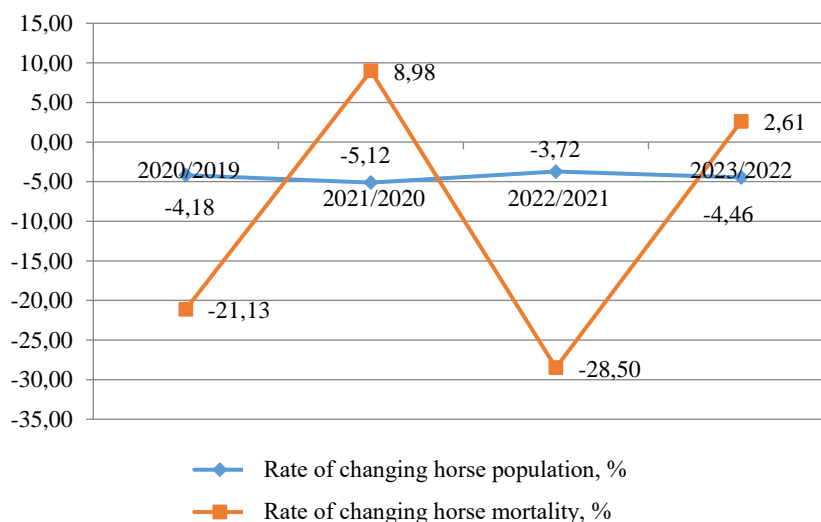


Fig. 7. Rates of changing the horse population and mortality in the agricultural enterprises of the Russian Federation in 2019–2023

¹⁹ *Livestock Population in the Farms of All Categories*. Bulletin for 2019–2023. Federal State Statistics Service. URL: <https://rosstat.gov.ru/compendium/document/13277> (accessed: 12.02.2024)

²⁰ *State of Livestock Farming*. Bulletin for 2019–2023. Federal State Statistics Service. URL: <https://rosstat.gov.ru/compendium/document/13277> (accessed: 12.02.2024)

²¹ Ibid.

²² *Livestock Population in the Farms of All Categories*. Bulletin for 2019–2023. Federal State Statistics Service. URL: <https://rosstat.gov.ru/compendium/document/13277> (accessed: 12.02.2024)

The dynamics in the rate of changing mortality in reindeer in the agricultural enterprises of the Russian Federation during the studied period was unstable (Fig. 8): in 2022, a sharp decrease in mortality rate is observed compared to 2021 (up to -14.09%); and already in 2023, compared to 2022, there was a significant increase in mortality rate in this group of animals.²³ The rate of changing reindeer population is slower and more predictable. It should be noted that the proportion of reindeer mortality relative to the total livestock population is significant: for example, over the years studied, it reached 19.03% in 2019 and

equalled to 14.93% in 2023²⁴. The “reindeer” group has a small share in the total population of all agricultural animals, therefore, an increase of mortality in this group could lead to the reduction of the reproduction capacity of the reindeer herd.

In the “camels” group (Fig. 9), significant fluctuations in the rate of changing mortality are observed, which does not correspond to the directions in which changing of camel population was going in most of the studied years^{25,26}.

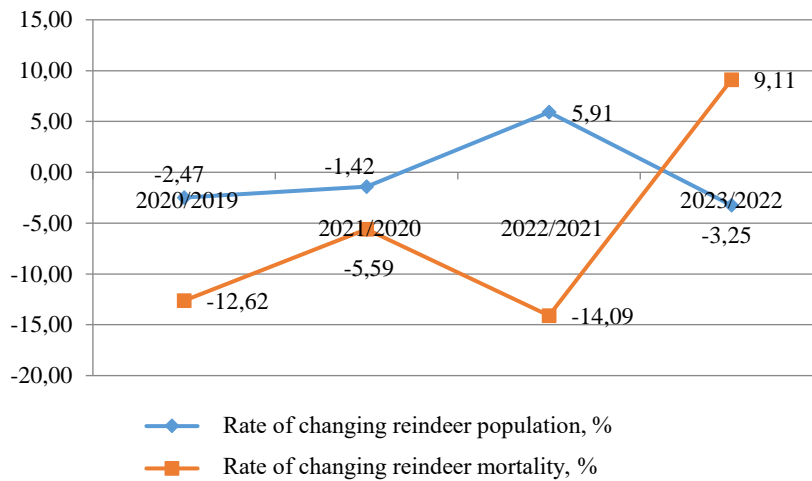


Fig. 8. Rates of changing the reindeer population and mortality in the agricultural enterprises of the Russian Federation in 2019–2023

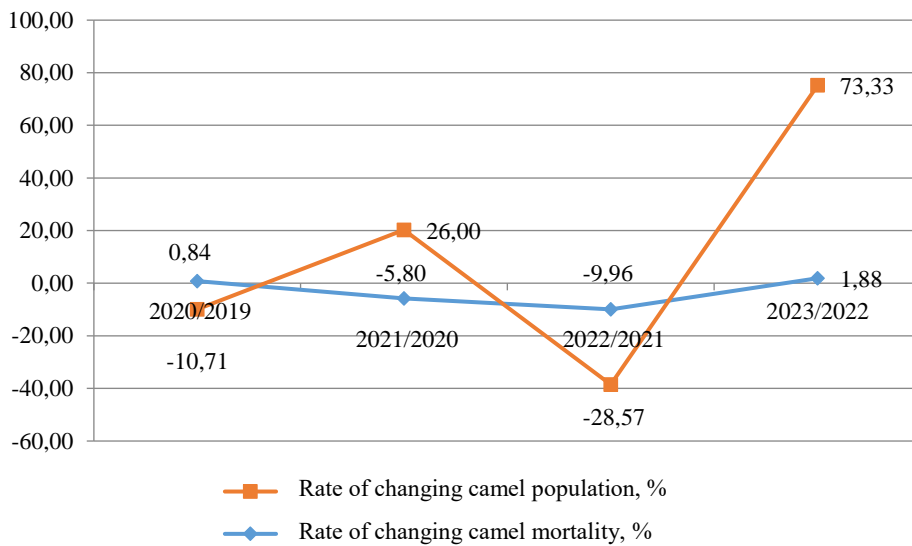


Fig. 9. Rates of changing the camel population and mortality in the agricultural enterprises of the Russian Federation in 2019–2023

²³ State of Livestock Farming. Bulletin for 2019–2023. Federal State Statistics Service. URL: <https://rosstat.gov.ru/compendium/document/13277> (accessed: 12.02.2024)

²⁴ Livestock Population in the Farms of All Categories. Bulletin for 2019–2023. Federal State Statistics Service. URL: <https://rosstat.gov.ru/compendium/document/13277> (accessed: 12.02.2024)

²⁵ Ibid.

²⁶ State of Livestock Farming. Bulletin for 2019–2023. Federal State Statistics Service. URL: <https://rosstat.gov.ru/compendium/document/13277> (accessed: 12.02.2024)

Key Factors Affecting the Increase of Livestock Mortality. The authors have identified the factors affecting animal mortality in the agricultural enterprises of the Russian Federation and the corresponding causes (Table 3).

The analysis of the factors makes it possible to summarise and identify the problems that underly these situations. Firstly, meat and dairy production often proves to be unprofitable for various reasons leading to reduction of investments in this subsector and, subsequently, to reduction

of milking and breeding herds. On the other hand, the resulting financial problems can lead to mass livestock mortality, as occurred in the poultry industry in July 2025: some farms were unable to maintain operations due to financial debts, which had led to the death of birds. The hidden costs resulting from animal mortality must also be taken into account: disposal costs, reduced production, deterioration of milk and meat quality, and the spread of infections.

Table 3

Factors affecting animal mortality in the agricultural enterprises of the Russian Federation

Causes	Specifics of influence
Environmental factors	
Natural disasters	Are often seasonal (floods, fires), therefore the time of their occurrence can be forecasted; in most cases, develop gradually, which gives time for undertaking measures to protect animals.
Dangerous animal diseases	Can be highly contagious and rapidly spreading, thus, require prompt veterinary care and early vaccination; in case of severe disease outbreaks, governments issue the Resolutions on the mass culling of animals potentially affected by the disease.
Technical and organisational factors	
Feed shortage (feed availability level for grazing animals)	Insufficient and unbalanced feeding leads to illnesses and problems in development of fetus in pregnant animals; feed shortage and feed-related cost saving lead to animal underweight, which reduces the yield of end livestock products and, consequently, the profit of agricultural enterprises.
Unsatisfactory condition of agricultural premises and equipment	Unsatisfactory zoohygienic conditions lead to deterioration of animal health and untimely death of young animals.
Organisational and human factors	
Insufficient level of qualification and discipline of the employees of agricultural enterprises	Noncompliance with animal feeding technologies, established requirements for the microclimate of livestock farming buildings, and the absence of on-duty agricultural specialists lead to an increase in animal morbidity and mortality.
Belated veterinary care and insufficient prophylaxis	The influence of this factor is possible in the event of discipline violations by the personnel of agricultural enterprises and noncompliance with the animal care regulations, the absence or violation of vaccination schedules.
Poor quality veterinary care	Insufficient qualification of a veterinarian; negligent attitude towards animals at the veterinary clinics; insufficient supply of necessary medications; use of low-quality or counterfeit medications; insufficient equipment in the veterinary clinics, including diagnostic equipment; inefficient organisation of work in the veterinary clinics [2].

Secondly, a neglectful attitude toward livestock welfare and pasture quality is currently observed, which, of course, reduces livestock productivity and increases uncontrolled disease incidence. Despite the measures taken, the epizootic situation in Russia remains tense. In early 2025, Federal Service for Veterinary and Phytosanitary Surveillance (Rosselkhoznadzor) reported new cases of rabies and bovine leukemia.²⁷ The incidence of anthrax in 2025–2026 is expected to depend on the scale of vaccination and monitoring.

Thirdly, weakening of state regulation of these processes at both the federal, regional, and local levels, as well as the lack of transparent and efficient state policy, hinders the development of livestock farming sector and does not foster solution of the existing problems.

Discussion and Conclusion. Tracking the causes and trends of livestock mortality at the local and national levels is essential for planning, monitoring, and developing programs aimed at reducing mortality in agricultural animals. The study revealed a persistent negative trend developed in the Russian Federation over the period of 2019–2023, characterized by mortality growth rates exceeding population growth rates in most animal species, high volatility in mortality numbers, and the presence of critical aspects in pig and reindeer farming.

Particular attention should be paid to the decline in cattle population (including cows), one of the most significant and numerous groups, as well as to decline in the popula-

²⁷ Data as of April 7, 2025, on the Epizootic Situation in the Russian Federation. Federal Service for Veterinary and Phytosanitary Surveillance (Rosselkhoznadzor). URL: <https://fsvps.gov.ru/files/informacija-ot-7-aprelja-2025-goda-po-jepizooticheskoi-situacii-v-rf/> (accessed: 14.02.2026)

tions of horses, reindeer, sheep, and goats. Although currently the proportion of mortality does not exceed 2% (in camels, horses, and cows), which is considered acceptable, it should still be kept under control and measures developed to prevent livestock mortality growth in the future. In the “sheep and goat” group, the proportion of mortality to the total population is approaching 4% and has the trend for rising. The growth of the mortality proportion in camels in 2023 is also a concern: management of the agricultural enterprises should investigate the causes underlying this situation and take measures to prevent further increase of this indicator.

High livestock mortality level poses a threat not only due to direct economic losses but also due to reducing the herd reproduction potential. This is particularly valid for reindeer mortality, which reached 19.0%, and even with a decline to 14.9% in 2023, the situation remains tense. A critical situation has also developed in pig farming, where the proportion of mortality relative to population increased from 32.2% in 2019 to 43.1% in 2023. It is recommended to develop the state programs aimed at reducing pig mortality, and strictly control the compliance with the disciplinary and technological requirements for pig farming in the agricultural enterprises, as well as to develop the preventive measures to reduce animal mortality [3, 4].

Table 4

Measures to reduce socio-economic damage from livestock mortality

Measure	Essence
Planning the actions to follow in the event of arising a livestock mortality causing situation	Knowing the main causes of livestock mortality makes it necessary to develop an action plan in the face of a threat of adverse events. This will allow the staff of agricultural enterprises to rationally assess the severity of the situation and the scale of potential losses and follow a clear plan of actions for preventing the situation or mitigating its negative impact. This measure is crucial in combating such causes of livestock mortality as natural disasters and dangerous diseases.
Livestock insurance	It is an efficient financial tool that protects agricultural producers in the event of emergency situations resulting in mass livestock mortality, as well as reduces damage from other negative factors. However, livestock insurance programs must be elaborated at the state level [5, 6].
Examining and testing animals throughout transportation and inclusion into the food chain	Constant monitoring of animal health will help promptly identify deviations and take measures to stabilize or isolate sick animals. Implementation of this measure will mitigate the influence of the factors increasing livestock mortality.
State support of agricultural enterprises in case of significant losses	Elimination of consequences of the natural disasters and combating especially dangerous animal diseases will require state support, since the scale of socio-economic damage may be so significant that the agricultural enterprises will not be able to solve the arising problems themselves to resume normal functioning [7].
Training and continuous professional development of employees of agricultural enterprises	Understanding the specifics of livestock management and proper technical and ethical handling of animals is crucial for increasing their productivity: improved keeping and care conditions reduce stress in animals, thus, lead to greater weight gain and improved quality of meat, milk, and other livestock products; such attitude reduces animals' losses caused by accidents, negligence, and staff ignorance. Furthermore, the introduction of internships in veterinary medicine opens up new opportunities for improving the quality of diagnostics: the specialty of “veterinary pathologist” is introduced, which improves postmortem examination of animals, allowing for more accurate determination of the true causes of mortality. Accurate diagnostics, in turn, provides the basis for the development of efficient preventive measures and targeted reduction of livestock mortality [8].
Expansion and disclosure of statistical data on animal mortality and its causes with respect to time period and location	Sufficient statistical data will enable the analysis of the causes of agricultural animal mortality, provision of a reliable and adequate assessment, and direction of resources for solving the identified theoretical and applied problems faced by modern livestock farming. This will increase awareness among the employees of the agricultural enterprises and enable them to make more efficient decisions.
Sensitizing scientific research in the fields of livestock farming, veterinary medicine, and economics	The availability of targeted scientific studies will enable the development and implementation of more efficient methods of combating livestock mortality, depending on the influencing factor.

Thus, in the studied period, across all groups of studied agricultural animals, significant fluctuations in the rate and direction of changing the mortality were observed, which indicates uncontrollability of this process and the lack of systemic management of this process in the agricultural enterprises. Uncontrollable livestock mortality can cause a cascade effect, with losses in agricultural industry entailing increased losses in related and dependent sectors of the country's economy. The state must not simply initiate some actions, but rather formulate a clear action plan, propose the tools and appoint the responsible bodies to prevent the catastrophic consequences of the uncontrollable processes in this area. To overcome these challenges, including achievement of import independence in technologies and means of production, as well as overcoming deficit of human recourses, the national project "Technological Support for Food Security" is being implemented since this year. It is stipulated that by 2030, Russia should provide

72% of its needs in improved breeding stock of dairy cattle and 10% — in improved breeding stock of poultry.

To complement the initiatives mentioned, we propose a set of practical measures (Table 3), including planning the actions in the face of mortality threat, developing the livestock insurance system, strengthening the state support in case of significant losses, improving the qualifications of workers, expanding and detailing statistical record on mortality with spatial and time reference, as well as intensifying scientific research in the field of veterinary medicine and livestock farming economics.

Consistent and ongoing implementation of these measures will ensure control over livestock mortality in agricultural enterprises, improve the predictability of livestock population dynamics, and eventually reduce the socio-economic damage to the state by strengthening the food security of the Russian Federation.

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