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Overview of animal infectious disease situation in the Republic of Dagestan in 2023

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ABSTRACT
An epizootiological survey of livestock farms of Dagestan was conducted, the main infectious diseases common in the region were considered, and measures taken to protect against them were described. At present, the Veterinary Service is undertaking systematic efforts to prevent the occurrence and spread of infectious diseases such as brucellosis, leukosis, rabies, pasteurellosis, blackleg, bradsot and enterotoxemia in the Republic. Among the above-mentioned diseases reported in 2023, brucellosis and leukosis are responsible for the vast majority of outbreaks and diseased animals detected in them. In particular, the following diseases have the largest share in the nosological profile of quarantinable infectious diseases based on the number of detected infected localities during the period under study: brucellosis (52.63%), bovine leukosis (30.70%), rabies (8.77%), enterotoxemia (3.51%), pasteurellosis (1.75%), bradsot (1.75%) and blackleg (0.88%). In total, 1,812 animals were affected with quarantinable infections and 35 animals died in 114 infected localities. Most often over the past year, quarantinable infections were reported in cattle (69.59% of cases) and small ruminants (29.36%); in 1.05% of cases, the diseases affected horses, cats, wild animals and birds. In order to maintain animal disease freedom and sustainable growth of livestock production, the Veterinary Committee of the Republic of Dagestan annually implements measures to prevent the occurrence and spread of 75 diseases of animals and birds, including 10 highly dangerous ones. Anti-epizootic measures taken in the past year included a total of 93.8 million vaccinations and 6.2 million tests performed in the diagnostic institutions. Plans for the prevention of highly dangerous and other contagious diseases of animals and birds were fully implemented.

Keywords: monitoring, animal disease situation, Republic of Dagestan, infectious diseases, quarantinable diseases, infected locality, disease outbreak

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Обзор эпизоотической ситуации по инфекционным болезням животных в Республике Дагестан в 2023 году

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РЕЗЮМЕ
Проведено эпизоотологическое обследование животноводческих хозяйств Дагестана, рассмотрены основные инфекционные заболевания, характерные для региона, описаны мероприятия, проводимые для защиты от них. На данный момент ветеринарной службой ведется систематическая работа по предотвращению возникновения и распространения в республике таких инфекционных заболеваний, как бруцеллез, лейкоз, бешенство, пастереллез, эмкар, брадзот и энтеротоксемия. Среди вышеперечисленных заболеваний, зарегистрированных в 2023 г., подавляющее большинство эпизоотических очагов и выявленных в них заболевших животных приходится на бруцеллез и лейкоз. Так, в нозологическом профиле карантинных инфекционных заболеваний наибольший удельный вес по числу выявленных неблагополучных пунктов за исследуемый период занимают: бруцеллез (52,63%), лейкоз крупного рогатого скота (30,70%), бешенство (8,77%), энтеротоксемия (3,51%), пастереллез (1,75%), брадзот овец (1,75%) и эмфизематозный карбункул (0,88%). Всего в 114 неблагополучных пунктах карантинными инфекциями заболело 1812 и пало 35 животных. Чаще всего за истекший год карантинные инфекции регистрировали среди крупного (в 69,59% случаев) и мелкого (29,36%) рогатого скота, в 1,05% случаев болезни поражали лошадей, кошек, диких животных и птиц. Для сохранения эпизоотического благополучия и устойчивого роста производства животноводческой продукции Комитетом по ветеринарии Республики Дагестан ежегодно проводятся профилактические мероприятия по предупреждению возникновения

и распространения 75 заболеваний животных и птиц, из которых 10 являются особо опасными. Общий объем противоэпизоотических мероприятий в истекшем году составил 93,8 млн головообработок и 6,2 млн исследований в диагностических учреждениях. Планы по профилактике особо опасных и других заразных заболеваний животных и птиц выполнены в полном объеме.

Ключевые слова: мониторинг, эпизоотическое состояние, Республика Дагестан, инфекционные заболевания, карантинные заболевания, неблагополучный пункт, очаг заболевания

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INTRODUCTION

Studying an epizootic process plays a major role in the development of effective anti-epizootic measures for infectious disease control. A set of measures aimed at the eradication of infection outbreaks and the prevention of pathogen introduction into disease free farms should take into account the specificities of krais and regions [1, 2].

Maintaining sustainable freedom of the country's livestock from quarantinable infectious diseases is the most important task of veterinary science and practice, it is crucial in protecting the health and life of humans and animals, in providing the population with ecologically safe food products and industry with high-quality raw materials [3, 4, 5].

Therefore, anti-epizootic measures should be developed taking into account the knowledge of the animal disease situation based on the analysis of long-term data on epizootic process development for each infectious disease in a particular area. An effective solution to this problem requires appropriate information support, the establishment and implementation of an epizootological monitoring system [6, 7, 8, 9, 10, 11].

Disease freedom of a particular animal population is achieved through the implementation of a set of special, general and organizational measures aimed at the effective control of the epizootic process, the main condition of which is the commitment to achieve biological equilibrium in any parasitic systems in all cases at the territorial and population levels [12, 13].

Dagestan Republic is one of the largest regions in the North Caucasus. Its total area is 50.3 thousand square kilometres. It occupies the northeastern slopes of the Main Caucasian Ridge and the southwestern part of the Caspian Depression. The territory of the Republic is divided into four main physico-geographical zones: flatland, foothill, mountain and highland, based on which the zonal classification of municipal areas and urban districts was approved by a Decree of the Government of Dagestan Republic[1].

Animal husbandry occupies a leading place in the agriculture of Dagestan Republic and is represented by the following sectors of great importance: cattle, sheep, pig, horse, poultry farming, beekeeping, pond fish farming and others. The most essential conditions for their successful development are the prevention and eradication of quarantinable infectious diseases, which cause significant economic damage resulting from animal deaths, reduced performance and product quality, as well as the costs of basic organizational-economic, veterinary-sanitary and anti-epizootic measures. In the light of the above, studying the animal and bird infectious disease situation in Dagestan Republic is currently important and serves as the basis for the improvement of regional programmes aimed at animal contagious disease eradication.

The aim of the study is to monitor and assess the quarantinable animal and bird infectious disease situation in Dagestan Republic in 2023.

MATERIALS AND METHODS

The examination and analysis of statistical reports were carried out at the Laboratory of Infectious Pathology of Caspian Zonal Research Veterinary Institute – Branch of the Federal Agrarian Scientific Center of Dagestan Republic and in the administrative districts.

The quarantinable animal infectious disease situation was examined by analyzing data from the veterinary reports of the Veterinary Committee of Dagestan Republic, the republican, inter-raion and raion veterinary laboratories, the municipal and raion veterinary departments.

The epizootological survey of livestock establishments located in different physical and climatic zones and of individual settlements and farms was carried out in accordance with "Methodical guidelines for epizootological study"[2] and "Recommendations on epizootological study methods"[3].

The data were statistically processed and analysed using generally accepted methods [14].

[1] On approval of the zonal classification of municipal areas and urban districts of Dagestan Republic: Decree of the Government of Dagestan Republic No. 48 of 11 March 2019. https://docs.cntd.ru/document/553164815 (in Russ.)

[2] Bakulov I. A., Yurkov G. G., Peskovatskov A. P., Vedernikov V. A. Methodical guidelines for epizootological study. Moscow: Kolos; 1982. 20 p. (in Russ.)

[3] Bakulov I. A. Recommendations on epizootological study methods. Pokrov; 1975. 75 p. (in Russ.)

Table 1
Data on animal and bird contagious diseases reported in Dagestan Republic in 2023

Disease	Species	During the reporting period				Ongoing as of the end of the reporting period	
		number of detected infected localities	outbreaks			total number of infected localities	total number of outbreaks
			number of detected outbreaks	number of diseased animals/birds	number of dead animals/birds		
Brucellosis	cattle	48	117	1,236	–	71	252
	small ruminants	12	13	500	–	9	10
	horses	–	–	1	–	–	–
Leukosis	cattle	35	110	18	–	96	214
Rabies	cattle	4	4	4	4	–	–
	cats	3	3	3	3	–	–
	wild animals	3	3	3	3	–	–
Pasteurellosis	cattle	–	2	2	2	–	1
	small ruminants	2	4	5	5	–	–
Blackleg	cattle	1	1	1	1	1	1
Bradsot	small ruminants	2	2	4	4	–	–
Enterotoxemia	small ruminants	4	4	7	7	–	–
Dysentery	small ruminants	–	–	1	1	–	–
Epididymitis	small ruminants	–	–	15	–	6	6
Dourine	horses	–	5	7	–	–	5
Avian influenza	birds	–	1	5	5	–	–
Total	–	114	269	1,812	35	183	489

RESULTS AND DISCUSSION

The priority areas of the activities of the State Veterinary Service are maintaining the animal disease freedom of the region, ensuring the production of veterinary-safe animal products and protecting people from diseases shared between humans and animals.

The data on the animal and bird infectious disease situation in Dagestan Republic for the period under study are presented in Table 1.

It was found that a total of 114 quarantinable animal infectious disease infected localities were reported in the region in 2023, of which 60 were for brucellosis in cattle and small ruminants, 35 for bovine leukosis, 10 for rabies in domestic and wild animals, 4 for enterotoxemia in sheep, 2 for pasteurellosis, 2 for bradsot and 1 for blackleg.

The following diseases have the largest share in the nosological profile of quarantinable infectious diseases (Fig.) based on the number of detected infected localities during the period under study: brucellosis (52.63%), bovine leukosis (30.70%), rabies (8.77%), enterotoxemia (3.51%), pasteurellosis (1.75%), bradsot (1.75%) and blackleg (0.88%). In total, 1,812 animals became diseased in 114 localities infected with quarantinable infections.

Over the past year, quarantinable infections were most often reported in cattle (in 69.59% of cases) and small ruminants (29.36%); in 1.05% of cases, the diseases affected horses, cats, wild animals and birds (Table 2).

During the monitoring period, 35 animals died of infectious diseases in Dagestan Republic; in particular, 28.57% of domestic and wild animals died of rabies, 20.0% of cattle and small ruminants died of pasteurellosis, 20.0% of sheep died of enterotoxemia, 11.43% of sheep died of bradsot; 14.29% of birds died of influenza, 2.86% of cattle died of blackleg, and 2.86% of sheep died of dysentery.

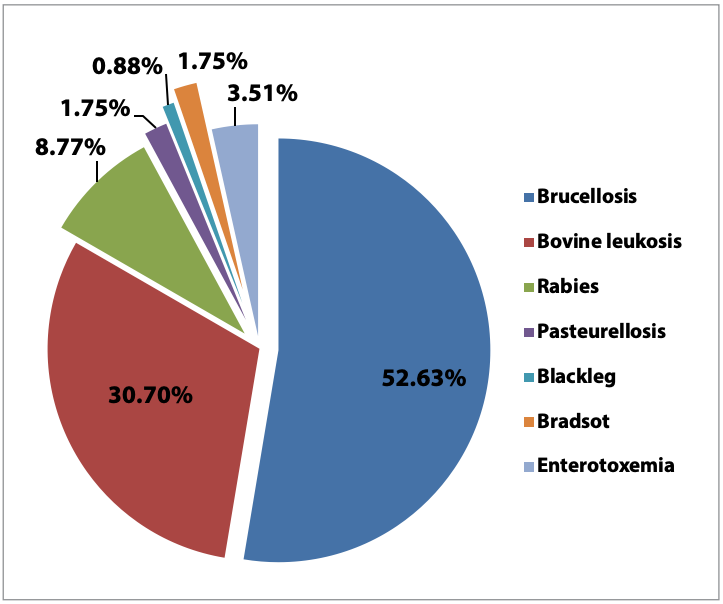

Fig. Nosological profile of quarantinable infectious diseases in Dagestan Republic in 2023

Table 2
Quarantinable infection occurrence in animals and number of infected localities in Dagestan Republic in 2023

Species	Infected localities		Diseased animals/birds	
	abs. number	%	abs. number	%
Cattle	88	77.19	1,261	69.59
Small ruminants	20	17.54	532	29.36
Horses	–	–	8	0.44
Cats	3	2.63	3	0.17
Wild animals	3	2.63	3	0.17
Birds	–	–	5	0.28
Total	114		1,812	

For many years, Dagestan has been a region where brucellosis persists in cattle and small ruminants [15]. In the past year, 48 bovine brucellosis infected localities and 12 small ruminant brucellosis infected localities were reported, 117 and 13 outbreaks were detected, with the diseased animals in them representing, respectively, 68.21 and 27.59% of the total number of animals affected with quarantinable diseases. In order to improve the situation, the Veterinary Service of the Republic implements a set of veterinary-sanitary and organizational-economic anti-brucellosis measures. In 2023, 1,210.492 thousand cattle, 494.238 thousand small ruminants and 22.091 thousand horses were examined, of which 1,236; 500 and 1 animals, respectively, were found to be brucellosis positive. Vaccination against brucellosis covered 830.735 thousand cattle and 3,284.252 thousand small ruminants. The disease eradication measures for infected holdings, establishments and farms are implemented within the framework of the overall set of the disease control activities, including the culling of reactor animals based on the diagnostic test results and the simultaneous use of anti-brucellosis vaccines to ensure immune protection.

One of the most common infectious diseases causing significant economic damage is viral leukosis, which has been reported in dairy cows and young animals in the majority of municipal entities of Dagestan Republic for many years [16, 17, 18]. To detect the disease, a serological method such as agar gel immunodiffusion (AGID) test is used. In 2023, the Veterinary Service of the region conducted AGID tests of 1,104.244 thousand cattle; 2,778 animals (0.25% of the tested cattle) were found to be the virus carriers. It was established that in 25 rural areas, municipalities and transhumance zones, leukemia virus occurrence in animals was moderate (from 0.01 to 9.2%). Hematological tests detected 18 leukosis affected animals. During the period under study, 35 new leukosis infected localities were identified; the association of bovine leukosis with specific territories, namely the farms of the Babayurtovsky, Kizlyarsky, Kizilyurtovsky, Kumtorkalinsky, Tarumovsky raions and the city of Makhachkala, was noted. The implementation of measures provided for by the subprogramme "Prevention and eradication of bovine leukosis in the holdings of Dagestan Republic" of the governmental programme of Dagestan Republic "Development of agriculture and regulation of agricultural product, raw material and food markets"[4] made it possible to eradicate the infection on many farms.

Dagestan remains a rabies infected region [19, 20]. The rabies situation is challenging to a certain extent; during the period under study, the disease was reported in 10 infected localities: in cattle in 4 localities (Gunibsky, Tarumovsky, Khasavyurtovsky raions and the city of Makhachkala), in cats in 3 localities and in wild animals in 3 localities. In order to control the disease, monitoring tests and vaccination of susceptible animals are carried out in the region. In 2023, 4 wild animals, 5 cattle, 9 cats, 3 dogs were tested for rabies; 7,080 cats, 38,570 dogs, 118.311 thousand cattle, 725 horses and 21.210 thousand small ruminants were vaccinated.

Over the past year, 2 bradsot outbreaks were detected in the Republic, in which 4 sheep became diseased and died. Bradsot is an acute, often fulminant toxicoinfection of sheep and goats, which is characterized by sudden death of animals. In some cases, severe seizures, nervous manifestations are observed, and animals die within a few hours. A characteristic sign that provides grounds for bradsot suspicion is the hemorrhagic inflammation of the abomasum, which is detected by necropsy. In order to prevent bradsot, 872.144 thousand sheep were immunized on the farms of Dagestan.

In February 2023, high pathogenicity avian influenza (HPAI) outbreak was detected in the area of a natural body of water located 1 km northeast of the settlement of Solnechnoye (Khasavyurtovsky raion), where 5 swans became diseased and died. The diagnosis was confirmed by laboratory tests, and restrictive measures (quarantine) were imposed. Subsequently, no new death cases were reported in synanthropic, wild birds and poultry. In order to control the HPAI situation, 5 wild birds and 8,410 poultry were examined, 36,608 poultry were vaccinated against high pathogenicity avian influenza.

As for other quarantinable infectious diseases such as pasteurellosis, blackleg, enterotoxemia, dysentery, ovine epididymitis and dourine, single cases were reported, and the measures taken made it possible to contain the diseases and prevent economic damage.

In order to maintain animal disease freedom and sustainable growth of livestock production, the Veterinary Committee of Dagestan Republic annually implements measures to prevent the occurrence and spread of 75 diseases of animals and birds, including 10 highly dangerous ones.

Anti-epizootic measures taken in the past year included a total of 93.8 million vaccinations and 6.2 million tests performed in the diagnostic institutions. Plans for the prevention of highly dangerous and other contagious diseases of animals and birds were fully implemented.

CONCLUSION

The analysis of the study findings shows that animal infectious diseases mentioned in the paper are the main factors hindering the development of livestock farming

[4] On approval of the governmental programme of Dagestan Republic "Development of agriculture and regulation of agricultural product, raw material and food markets": Decree of the Government of Dagestan Republic No. 673 of 13 December 2013. https://docs.cntd.ru/document/422452925 (in Russ.)

in Dagestan Republic. The complete eradication of these infections is not yet possible. However, it is possible to monitor changes in the animal disease situation and reduce its tension, using real epizootological monitoring data for this purpose. The risk of animal infectious disease occurrence dictates the need for the implementation of the systematic monitoring and careful analysis of the animal disease situation. In 2023, 114 quarantinable animal disease infected localities were reported in Dagestan Republic, including 60 for brucellosis in cattle and small ruminants, 35 for bovine leukosis, 10 for rabies in domestic and wild animals, 4 for enterotoxemia, 2 for pasteurellosis, 2 for bradsot and 1 for blackleg. As of the end of the period under study, there were 183 infected localities, including 96 for bovine leukosis, 80 for bovine and small ruminant brucellosis, 6 for ovine epididymitis and 1 for blackleg. The presented data on the occurrence of quarantinable animal diseases contribute to the scientific and practical studies of the epizootiology of the main infectious diseases reported in Dagestan Republic.

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