Analysis of diagnostic studies and the epizootic situation of brucellosis of animals in the Turkestan region

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Abstract. One of the factors hindering the growth and development of the country's livestock industry is infectious diseases, among which brucellosis occupies a special place. In this regard, this article presents the results of monitoring the epizootic situation of brucellosis of animals in the Turkestan region, the results of bacteriological and serological laboratory studies of brucella isolates isolated from farm animals, as well as data from the production test of the killed vaccine against brucellosis of animals. Antiepizootic measures for brucellosis infection are reduced to the protection of brucellosis-friendly farms and the rehabilitation of disadvantaged ones and are carried out through a comprehensive simultaneous impact on all links of the epizootic chain. This work is complicated by the susceptibility to brucellosis of many animal species, the presence of a large number of transmission factors of the pathogen, as well as the variability of brucella. The importance of carrying out control measures aimed at preventing the spread of brucellosis among healthy animals through the use of modern drugs is emphasized. In addition, the article presents the results of accumulation and extinction of titers of agglutinins and complement-binding substances in the blood serum of cattle and small cattle immunized with inanimate vaccine. Monitoring of the epizootic situation with infectious diseases is based on a deep understanding of epizootic patterns, features of the clinical course of the disease, biological properties of the pathogen, as well as social and natural factors contributing to the manifestation of the epizootic process. It allows you to identify the causes and epizootic consequences of these changes and makes it possible to carry out a complex of antiepizootic measures in a timely manner.

1 Introduction

Despite the successes achieved in the elimination of brucellosis, the problem of combating this infection remains relevant [1].

The lifetime diagnosis of brucellosis of animals, its timeliness and, most importantly, the complete identification of all patients with brucellosis of animals is an important link in the effectiveness of the entire complex of anti-brucellosis measures [2]. The main method of

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mass diagnosis of brucellosis of animals in our Republic and in most countries of the world remains the serological method based on the determination of specific immunoglobulins in animal blood serum [3].

In the Republic of Kazakhstan, during annual serological studies of animal blood serum for brucellosis, it is customary to widely use the agglutination reaction (AR), prolonged complement fixation reaction (PCFR), the complement binding reaction (CBR), the lamellar agglutination reaction (LAR) and the enzyme immunoassay reaction (ELISA) [4].

It should be noted that some features of the course of brucellosis infection in different species of animals with different forms of their maintenance in modern market economy conditions necessitate the use of complex methods of serological diagnosis and monitoring of the epizootic situation in the regions of the Turkestan region. In this regard, an important area in the system of anti-brucellosis measures is the monitoring of the epizootic situation of brucellosis of animals, which allows for the prediction and control of the disease in the regions of the region and districts up to rural districts, which will contribute to solving the existing problems of veterinary well-being of brucellosis of animals [5].

Therefore, in 2016-2020, in order to establish the true epizootic situation on brucellosis of cattle, small cattle, camels and dogs in the Turkestan region, we conducted serological studies of animals for brucellosis in the LAR, AR and CBR with SR-antigen. The following rural districts of the 3rd category districts were selected for the study:

1. Rural districts with a high degree of infection with bovine brucellosis (0.5% and above) such as Zertas village and Pervomaisky village of Tolebi district.
2. Rural districts with an average degree of infection with brucellosis of cattle and small cattle such as: Khanty village, Kentau, Teguisshil village of Saryagash, Akbastau village of Baidibek and Akshengeldy village of Shardari districts.
3. Rural districts are safe for brucellosis of animals: Shubarsu village of Ordabasy and Kazygurt village of Kazygurt district, as well as Shaulder village of Otrar district.

2 Materials and methods

The work was carried out in the Regional Veterinary Laboratory and in the laboratories of the Department of Veterinary Medicine of the Agrarian Faculty of the M. Auezov South Kazakhstan University. To establish the truth of the epizootological situation on brucellosis of cattle and small cattle, camels and dogs in the Turkestan region, we conducted serological studies of animals for brucellosis in the LAR, AR and CBR with SR-antigen, as well as in ELISA. Bacteriological studies were carried out according to the "Instructions for the diagnosis of animal brucellosis, 1999". For the cultivation of brucellae, agar nutrient media MPB, MPA were used. Indirect ELISA was carried out using the "Test system for the diagnosis of animal brucellosis" manufactured by LLP "Bi Center" in Stepnogorsk. PCR was performed using the BRU-COM test system for diagnosing brucellosis (Russia), according to the manufacturer's instructions.

The work was carried out in stages over 4 years (2016-2020) by the performers of the South Kazakh Scientific Research Institute of Veterinary Medicine together with the staff of the Department of Veterinary Medicine of the M. Auezov South Kazakhstan University in the course of a large-scale production test. Blood serum of 5426 heads of cattle and 9846 heads of small cattle from 43 rural districts, 28 districts of the Turkestan region was examined. Monitoring studies of the epizootic situation for brucellosis in animals were continued in 2021, according to the results of which 349 heads of cattle and 544 heads of small cattle were identified as positive.

The research was carried out in stages over 4 years in the order of extensive production testing by the users of the South Kazakhstan Research Veterinary Station together with the staff of the Department of Veterinary Medicine of the M.Auezov South Kazakhstan State

University. At the same time, serum serologically tested for brucellosis from 5426 heads of cattle and 9846 heads of small cattle proportionally from all rural districts of the three categories. Blood sera were studied in laboratory conditions in CBR, LAR and AR with SR-antigen, as well as in some cases in ELISA. The results of the study are shown in Table 1.

Table 1. Data from own serological studies of blood sera of cattle and small cattle from rural districts with varying degrees of infection with brucellosis.

№	Years	Number of districts	Number of units	Number of samples	Number of positively reacting animals	% infestations
Horned cattle						
1	2016	8	17	1274	7	0,5
2	2017	5	8	2162	2	0,09
3	2018	6	7	790	3	0,38
4	2019	9	11	1200	4	0,34
	Total:	28	43	5426	16	0,3
Small cattle						
1	2016	4	14	2654	16	0,6
2	2017	5	10	3620	30	0,8
3	2018	6	7	1552	23	1,48
4	2019	8	8	2020	19	0,009
	Total:	23	39	9846	88	0,9

From the data in table 1, it can be seen that over 4 years, the performers serologically examined 5,426 samples of blood serum from cattle for brucellosis from 43 rural districts of 28 districts of the region. At the same time, 16 heads of animals responding positively to brucellosis were identified from among the studied animals, which is 0.3% of the infection rate. The highest percentage of bovine brucellosis infection was found in 2016 (0.5%), followed by 2018 (0.38%). Consequently, a lower level of seropositive animals was registered in 2017, when out of the studied 2,162 heads of cattle, positive results were obtained in only 2 cases, which is 0.09% of the infection rate among the studied animals.

Similar serological studies were conducted among small cattle in the same rural districts that were selected as farms with varying degrees of infection with brucellosis of animals.

An analysis of the data in table 1 shows a fairly high percentage of patients with brucellosis of small cattle, which amounted to 0.9% of the infection rate for an average of 4 years. At the same time, 88 animals responding positively to the SR antigen in CBR, LAR and AR were identified. However, a large number of positively reacting animals (30) were identified in 2017 during the study of 3,620 samples of small cattle from 10 rural districts of 5 districts of the region. The highest percentage of brucellosis infection in small cattle (1.48%) was recorded in 2018.It should also be noted that according to the veterinary department of the Department of Agriculture and the regional veterinary laboratory, brucellosis infection in the region among animals was registered mainly among cattle and small cattle. Among camels and dogs tested for brucellosis, single positively reacting animals were identified. In general, over the past 12 years, abortions and stillbirths of brucellosis etiology have not been established in the region .

The last officially declared dysfunctional point for brucellosis of cattle was rehabilitated in 2016 in Ordabasyn district. As can be seen from the data in Table No. 1, in 2019, according to the plan, 3300 animal serum samples were examined by the scientific staff of the branch. Of these, 1,200 are from cattle, 2020 are from small cattle, as well as 50 samples from camels and 30 samples from domestic carnivores.

3 Result and discussion

As a result, 4 samples of cattle, 19 samples of small cattle showed positive results in LAR and CBR, which is 0.34 and 0.9% of the infection rate. Only negative readings were recorded in the samples obtained from camels and dogs.

All the positively reacting animals were isolated and put to slaughter. Samples of biomaterials for bacteriological research were taken from disadvantaged districts where there was a release of positively reacting animals. The results of back-sowing and cultivation on erythritol agar, as well as conducting a biological test on laboratory animals, as well as a PCR study gave negative results. Monitoring studies of the epizootic situation in brucellosis of cattle and small cattle were continued in 2021. The data of the serological examination are presented in Table 2.

Table 2. Results of serological studies of cattle and small cattle for brucellosis by districts of Turkestan region in 2021.

№	The name of the districts	Results of the study					
		Horned cattle			Small cattle		
		Number of animals studied	positive. reacting	%	Number of animals studied	positive. reacting	%
1	Turkestan	32323	2	0,006	139090	8	0,006
2	Arys	30452	7	0,02	33809	24	0,07
3	Kentau	56279	6	0,01	271958	27	0,01
4	Baidybek	44968	13	0,03	468406	122	0,03
5	Zhetysai	46099	5	0,02	145791	5	0,003
6	Keles	54719	5	0,01	308652	44	0,02
7	Kazgurt	70991	3	0,004	313169	30	0,01
8	Maktaaral	35551	3	0,01	51400	3	0,01
9	Ordabasy	66031	3	0,01	340248	12	0,01
10	Otrar	47195	25	0,053	318575	24	0,01
11	Sairam	260412	137	0,053	163590	54	0,03
12	Saryagash	47412	18	0,04	360100	25	0,01
13	Suzac	26943	3	0,01	208535	27	0,01
14	Tolebi	65334	77	0,12	166673	109	0,07
15	Tulcubas	58214	31	0,053	82748	16	0,02
16	Shardara	42808	4	0,009	171979	4	0,01
17	Shymkent	114155	3	0,001	147470	10	0,007
	In the region	1100185	349	0,03	3996693	544	0,014

From the data in table 2, it can be seen that in 2021, 349 cattle reacted positively in a study of 1100185 cattle, which amounted to 0.03% of the infection rate. At the same time, the largest percentage of positively reacting animals is observed in Tolebi 0.12%, Sairam, Otrar and Tulkubas- 0.053%. As for small cattle, 3996693 heads of sheep were studied here in the region, of which 544 heads showed seropositive reactions, which is 0.014% in the region. At the same time, the most positively reacting sheep were detected in Tolebi-109 (0.07%), Baidibek-122 (0.03%) and Sairam -54 (0.03%). It should be noted that the release of positively reacting animals has been registered in all districts of the region, which indicates the widespread spread of brucellosis, especially among cattle and small

4 Conclusions

Thus, analyzing the epizootic situation of brucellosis of cattle and small cattle in the context of the districts of the Turkestan region, it should be noted that despite the veterinary, sanitary and diagnostic measures against brucellosis, the epizootic situation remains tense both among cattle and small cattle. Therefore, we consider it necessary to create immunity in animals against brucellosis in non-poor farms in order to stop infection and take measures by improving farms from brucellosis.

The conducted own serological research for 4 years shows that brucellosis is widespread in the territory of the Turkestan region among large and especially among small cattle. Thus, according to the results of our own diagnostic studies, it can be noted that the incidence of brucellosis in small cattle is becoming stable, and the allocation of positively reacting animals has been registered in all districts of the region, which contributes to the preservation of a tense epizootic situation for brucellosis.

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