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APPRAISAL OF THE ROLE OF VETERINARY AND SANITARY CONTROL IN CHRONIC INFECTIONS

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This article presents statistical data on the sanitary slaughter of infected animals that reacted for brucellosis, campylobacteriosis and leukosis, as well as on the allergy test for tuberculosis. Analysis of the monitoring showed that the slaughter of animals infected with brucellosis accounted for 84,6% of the total number of animals – 13,0 thousand; there were also cases of slaughter of leptospirosis (2 animals) and campylobacteriosis (11 animals). Among diseases of viral etiology the cattle breeding damage is caused by cattle leucosis; only in 2021 672 head of cattle were subjected to slaughter. A comparative analysis was made between the incidence of brucellosis and tuberculosis in animals and infection of people with these diseases. Infections of zoonotic etiology were recorded among the population, in particular, brucellosis of people is registered annually. For the period 2018-2021, the infection rate of brucellosis among the population was 79 people, which was 3.3% of the total number of cases.

Key words: slaughterhouse, chronic infections, brucellosis, tuberculosis.

СОЗЫЛМАЛЫ АУРУЛАРДАҒЫ ВЕТЕРИНАРИЯЛЫҚ-САНИТАРИЯЛЫҚ БАҚЫЛАУДЫҢ РӨЛІН БАҒАЛАУ

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Анықталған қоздырғыштардың ішінде біздің еліміздің солтүстік аймағында өнімді ауылшаруашылық жануарларында жұқпалы инфекциялардың жиі қоздырғыштары Brucella, Mycobacterium, Campylobacter полипатогенді бактериялары және ірі қара лейкемиясы вирусы. Бұл мақалада бруцеллезге, кампилобактериозға және лейкозға оң реакция берген, сондай-ақ туберкулездің аллергиялық сынамада оң нәтижесін көрсеткен, жұқтырған жануарларды санитарлық союға жіберу туралы статистикалық мәліметтер келтірілген. Мониторингті талдау бойынша 13,0 мың жалпы бас санынан, барлық жағдайлардың үлес салмағы 84,6% бруцеллезбен жұқтырған жануарларды союға келеді. Сонымен қатар лептоспирозбен (2 бас) және кампилобактериозбен (11 бас) ауыратын науқастарды сою жағдайлары кездесті. Вирустық этиология ауруларының ішінде мал шаруашылығына ірі қара лейкозы зиян келтіреді, тек 2021 жылы ірі қара малдың 672 бас союға ұшырады. Жануарлардың бруцеллезбен және туберкулезбен аурушаңдығы және адамдардың осы аурулармен залалдануы арасында салыстырмалы талдау жүргізілді. Халық арасында зооноздық этиологияның инфекциясы тіркелді, атап айтқанда жыл сайын адамдардың бруцеллезі тіркеледі. 2018-2021 жылдар кезеңінде тұрғындар арасында бруцеллезбен сырқаттанушылық 79 адамды құрады, бұл жалпы сырқаттанушылық санының 3,3% - ын құрады.

Түйінді сөздер: сою пункті, созылмалы инфекциялар, бруцеллез, туберкулез.

ОЦЕНКА РОЛИ ВЕТЕРИНАРНО-САНИТАРНОГО КОНТРОЛЯ ПРИ ХРОНИЧЕСКИХ ИНФЕКЦИЯХ

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Среди идентифицированных патогенов, в условиях северного региона нашей страны частыми возбудителями заразных инфекций у продуктивных сельскохозяйственных животных являются полипатогенные бактерии родов Brucella, Mycobacterium, Campylobacter и вирус лейкоза КРС. В данной статье приведены статистические данные по санитарному убою инфицированных животных, реагировавших на бруцеллез, кампилобактериоз и лейкоз, а также по аллергопробе на туберкулез. Анализ мониторинга показал, что удельный вес из всех случаев приходится на убой инфицированных бруцеллезом животных - 84,6% от общего количества голов – 13,0 тыс. Также имеются случаи убоя больных лептоспирозом (2 головы) и кампилобактериозом (11 голов). Среди заболеваний вирусной этиологии ущерб животноводству наносит лейкоз КРС, только за 2021 год было подвержено убою 672 головы крупного рогатого скота. Проведен сравнительный анализ между заболеваемостью животных бруцеллезом и туберкулезом и заражением людей данными заболеваниями. Среди населения зафиксированы инфекции зоонозной этиологии, в частности ежегодно регистрируется бруцеллез людей. За период 2018-2021 гг. инфицированность бруцеллезом среди населения составила 79 чел, что составило 3,3 % от общего количества заболеваемости.

Ключевые слова: убойный пункт, хронические инфекции, бруцеллез, туберкулез.

Introduction.

According to OIE/FAO/WHO statistics, in recent decades the importance of infections of animal origin in human pathology has increased enormously, so about 60% of human infectious diseases are zoonotic, 75% of emergent infections are of zoonogenic origin and 80% of potential bioterror agents are zoonotic pathogens [1, p.5]. Among the identified pathogens, in the conditions of the Northern region of our country, the frequent causative agents of contagious infections in productive farm animals are polypathogenic bacteria of the genera Brucella, Mycobacterium, Campylobacter and cattle leukosis virus.

The zoonotic potential of pathogens of food origin and their ability to produce toxins that cause disease or even death are sufficient to recognize the seriousness of the situation. The importance of animals as carriers of pathogenic bacteria is indeed great; for example, it is reported that beef is a carrier of 7% of the 1.7 million cases of foodborne disease in England and Wales [2, p.250]. When eating meat, milk and by-products that have not undergone veterinary and sanitary examination, as well as those purchased from random people and unauthorized trade places, there is a risk of transmission of pathogens of some chronic infections from animal to human.

According to the official data of the Ministry of Agriculture of Kazakhstan, due to the introduction of enhanced veterinary and sanitary control measures, there has been a decrease in the registration of such especially dangerous animal diseases as listeriosis, anaerobic enterotoxemia, the country has the status of being free of foot and mouth disease, African horse and swine fever, avian influenza, classical swine fever. [3, c. 2].

At the same time, the key problem hindering the intensive increase in the capacity of domestic livestock is chronic infections of farm animals. Veterinary (veterinary and sanitary) requirements of the Eurasian Economic Union regulate the absence of brucellosis, tuberculosis, paratuberculosis, and enzootic cattle leukosis in farms, within the last 6 months - within the last 12 months [4, p.4].

Chronic pathogens can cause disease in humans through the consumption of animal products containing pathogens. At the same time these diseases provoke the development and accumulation of secondary bacterial microflora in animals, especially food pathogens and their toxins, such as Salmonella, L.monocytogenes, Campylobacter, toxigenic strains of E. coli [5, p.60].

WHO recognizes that about 1% of the population of Western Europe is annually infected with Campylobacters [6, p.103], so Campylobacter is considered to be one of the most significant "new" zoonotic pathogens capable of causing human and animal diseases.

Many livestock farms treat their livestock for brucellosis, campylobacteriosis, and chlamydia infections by uncontrolled use of antibacterial preparations, which eventually leads to an excessive accumulation of antibiotics in the slaughtered animals [7, p.225, 8, p. 10].

The aim of our study was to identify risk factors associated with infection of animal meat with chronic infections.

According to the aim, the following **research objectives** were set:

- to analyze the location of specialized slaughters on the territory of Kostanay region;
- to monitor the slaughter of cattle with chronic infections and compare the infectious incidence of these pathogens among the population of Kostanay region for 2017-2021.

The main research **method** was a retrospective (epizootological) analysis, with logical justification and statistical confirmation of the hypothesis.

The following documents served as **the material for the study**:

- data of district and city territorial inspections of the Committee for Veterinary Control and Supervision of the Ministry of Agriculture of the Republic of Kazakhstan in the Kostanay region, veterinary report 1-vet, 3-vet, 12-vet, 30-vet;
- data of the Republican State Institution "Department of Sanitary and Epidemiological Control of Kostanay region of the Committee of Sanitary and Epidemiological Control" of the Ministry of Health of the Republic of Kazakhstan, report "Epidemiological situation of brucellosis, tuberculosis, and leptospirosis for 2017-2021";
- logs of registration of sanitary slaughter of animals.

During the research period, 68 slaughter points were studied. Slaughter animals were examined for brucellosis, tuberculosis, campylobacteriosis, leptospirosis and leukemia of cattle.

In 2021, 141 heads of cattle that reacted positively to brucellosis and 226 heads that reacted to leukemia were subjected to forced slaughter at slaughter sites in Kostanay district.

An analysis of zoonotic infections – brucellosis and leptospirosis – was carried out among the population for 2017-2021.

The research was conducted at the Department of Veterinary Sanitation of the Kostanay Regional University, named after A.Baitursynov, and at the state institution "Kostanay Regional Territorial Inspection of the Committee for Veterinary Control and Supervision of the Ministry of Agriculture of the Republic of Kazakhstan.

We are considering the issues linking animals as carriers of zoonotic infections dangerous to humans (Table 1).

Table 1 – Characteristics of significant pathogens of zoonotic chronic infections as sources of human disease

Name ofpathogen	Maintypes	Reservoiranimal	Contaminated material, product	Transmissionroutes	Disease
Brucella spp.	B. abortusB. melitensis B. suis	Cattle, small ruminants, pigs	Raw meat, undercooked meator minced meat, raw milk and raw dairy products	By alimentary route - ingestion of infected products; direct contact with sick animals or raw materials. Less commonly, byaerogenic exposure.	Brucellosis, with lesions of the musculoskeletal system, cardio-vascular, nervous and reproductive systems.
Mycobacterium spp.	M. bovis M. aviumM. africanum	Cattle, poultry	Infected meat, milkand dairy products	Direct contact witha sick animal, consumption of food of animal origin	Tuberculosis, mostly with lesions of the respiratory system
Campylobacter spp.	*C.jejuniC.coli*	Cattle, sheep, poultry	Meat, minced meat, poultry products, water, raw milk	Alimentary, bycontact	Campylobacteriosis, with gastrointestinal lesions

Despite the available methods of diagnostics of infections and full state sponsorship of diagnostic and veterinary-preventive measures, in Kostanay region there are annual cases of chronic infections, of which the most frequent are brucellosis and tuberculosis, as evidenced by the incidence of these diseases among people. The annual registration of cases of these diseases among people causes irreparable harm to public health and indicates the need to tighten measures for the timely detection of chronic infections in farm animals.

According to the Veterinary legislation of the Republic of Kazakhstan in the diagnostic screening, positive serology animals should be subjected to sanitary slaughter, followed by an examination of slaughter products. In addition to intravital methods of diagnosis of chronic infections, quite often they are detected during post-slaughter veterinary and sanitary examination of carcasses coming for sale. Thus, veterinary and sanitary control at slaughter is the guarantor of safety and prevents the arrival of infected meat to the population and prevents outbreaks of disease in people.

According to the Kostanay regional territorial inspection of the Committee for Veterinary Control and Supervision of the Ministry of Agriculture of the Republic of Kazakhstan, 68 sanitary slaughter facilities were registered in the Kostanay region. However, it should be noted that the location of these facilities on the territory is not uniform, most of them are concentrated within 150 km of Kostanay. One of the factors contributing to the uncontrolled slaughter of infected animals is the lack of specialized slaughterhouses in some districts and their remoteness from the regional center.

Information on slaughterhouses of the Kostanay region is given in Table 2.

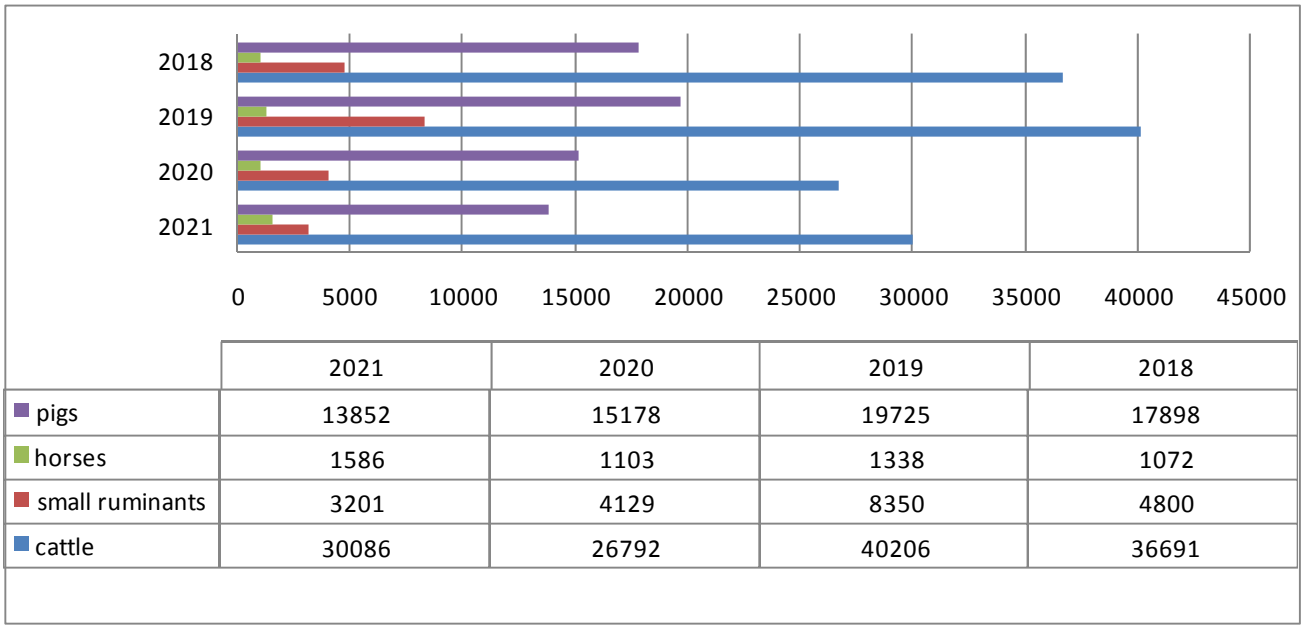
Table 2 – The number of slaughterhouses in the Kostanay region (as of 01.01.2022)

№	City/district	Numberof slaughterhouses	Remotenessfrom the regional center, Kostanay city, km
1	Altynsary, Obagan village	2	55
2	Arkalyk city	2	465
3	Amangeldy district, Amangeldy village	1	410
4	Auliekol district, Auliekol village	2	100
5	Jangeldy district,Turgay village	1	560
6	Denisovsky district, Denisovka village	6	180
7	Zhitikara district, Zhitikara town	3	200
8	Kamysty district,Kamysty village	3	253
9	Karasu district, Karasu village	4	157
10	Karabalyk district, Karabalyk village	4	140
11	Kostanay district, Tobyl town	14	5

12	Mendykara district, Borovskoye village	7	80
13	Naurzum district, Karamendy village	1	200
14	Sarykol district, Sarykol village	3	120
15	B. Mailin district, Aiet village	7	100
16	Uzunkol district, Uzunkol village	2	160
17	Fedorovsky district, Fedorovka village	1	80
18	Kostanay city	3	0
19	Lysakovsk city	1	120
20	Rudny city	1	40

According to the table, it can be seen that from 68 slaughtering sites 40 (59 %) of them are situated near the regional center (within a radius of 100 km); 12 (17,6 %) sites are situated not more than 150 km away, and 16 of them are located far from Kostanay city. It is worth noting that in Arkalyk, Amangeldy village (Amangeldy district), Turgay village (Dzhangeldy district), only 3 specialized slaughter stations are officially registered. Given the remoteness of these areas (more than 400 km), there is a possibility of the uncontrolled slaughter of livestock, including infected ones. The small number of specialized slaughterhouses in remote areas contributes to the backyard slaughter of animals without the presence of a veterinary specialist. In remote farms, slaughters are equipped that do not meet the requirements of veterinary and sanitary title documents.

Information on the number of slaughter of farm animals in the Kostanay region for the period from 2018 to 2021 is shown in Figures 1.



	2021	2020	2019	2018
pigs	13852	15178	19725	17898
horses	1586	1103	1338	1072
small ruminants	3201	4129	8350	4800
cattle	30086	26792	40206	36691

Figure 1 – Information on the number of the slaughter of farm animals in the Kostanay region for the period from 2018 to 2021.

The average number of agricultural animals received for slaughter for 4 years was more than 130.0 thousand head of cattle (59% of the total number of slaughtered animals), pigs – 66.0 thousand animals (30%), cattle – 20.0 thousand animals (9%), horses amounted to an average of more than 5.0 thousand animals (2%).

Among the total number of slaughtered animals, there are sanitary slaughters due to chronic infections such as brucellosis, tuberculosis, leukosis, leptospirosis and campylobacteriosis.

According to domestic researchers, the causative agent of brucellosis strain B.abortus is one of the most common in Kazakhstan. The result of this is, among other things, insufficiently organized veterinary control of sanitary slaughter [9, p.4].

The analysis of official statistics of the regional veterinary inspection, on the number of slaughtered cattle infected with chronic diseases, is presented in Table 3.

Table 3 – Cattle slaughter monitoring for chronic infections (brucellosis, tuberculosis, leukosis, campylobacteriosis) in the Kostanay region (2017-2021)

Year	Total number ofanimals slaughtered	Positive serology and revealed in the course of post-slaughter VSE cattle carcasses					Total number of sick animals
		brucellosis	tuberculosis	leptospirosis	campylo-bacteriosis	leucosis	
2017	36950	3265	17	-	2	394	*3678*
2018	36691	2892	29	-	-	14	*2935*
2019	40206	1959	16	2	5	13	*1995*
2020	26792	2028	28	-	4	546	*2606*
2021	30086	1082	34	-	-	672	*1788*
Total	*170722*	*11226*	*124*	*2*	*11*	*1633*	*13002*

According to the data in Table 3, a considerable number of cattle positives for brucellosis and tuberculosis are annually sent for sanitary slaughter, which for the last 5 years amounted to more than 11,0 thousand and 124 head of cattle respectively. It's worth noting, that during the analyzed period 84,6% of all the cases were the slaughter of animals infected with brucellosis (13,0 thousand animals). There are also cases of the slaughter of leptospirosis (2 animals) and campylobacteriosis (11 animals). Among the diseases of viral etiology the damage to livestock is caused by cattle leukosis, only in 2021, there were 672 head of cattlesubjected to slaughter.

According to official data, in 2021 21 animals out of 11226 had pathologoanatomic signs of brucellosis after veterinary and sanitary examination, which was 0,18% of carcasses culled. This raw meat was sent for technical disposal.

Taking into account statistics on incidence of disease among animals, a comparison of infectious diseases among population of Kostanay region for the period of 5 years was carried out. According to the table it is seen that out of 68 slaughter sites 40 of them (59 %) are located near the regional center (within 100 km); 12 (17,6 %) sites are located within 150 km, and 16 slaughter sites have the highest incidence of these pathogens. The information is presented in Table 4.

Table 4 – Comparative data on the incidence of infectious diseases in 2017-2021

Year	Number of sick humans			Total number
	brucellosis	tuberculosis	leptospirosis	
2017	30	543	1	574
2018	16	514	-	530
2019	16	489	1	506
2020	12	385	-	397
2021	5	363	-	368
Total	*79*	*2294*	*2*	*2375*

The figures in Table 4 indicate infection of zoonotic aetiology among the population, and in particular, brucellosis of humans is registered annually. For the period 2018-2021, the infection rate of brucellosis among the population was 79 people, which was 3.3% of the total number of cases. Tuberculosis infection rate equals 96.5%, which indicates a high intensity of this disease among people, and thus the need to protect the population from the zoonotic source of this infection.

At the same time, the analysis of the dynamics of infectious diseases among the population and animals (Figure 2), shows a steady decrease in the number of registered cases among the population from 30 cases in 2017 to 5 ones in 2021. These figures are consistent with a clear reduction in the slaughter of cattle with brucellosis. This is largely due to strengthened veterinary control, strict compliance with veterinary inspectors' instructions on the slaughter of infected livestock.

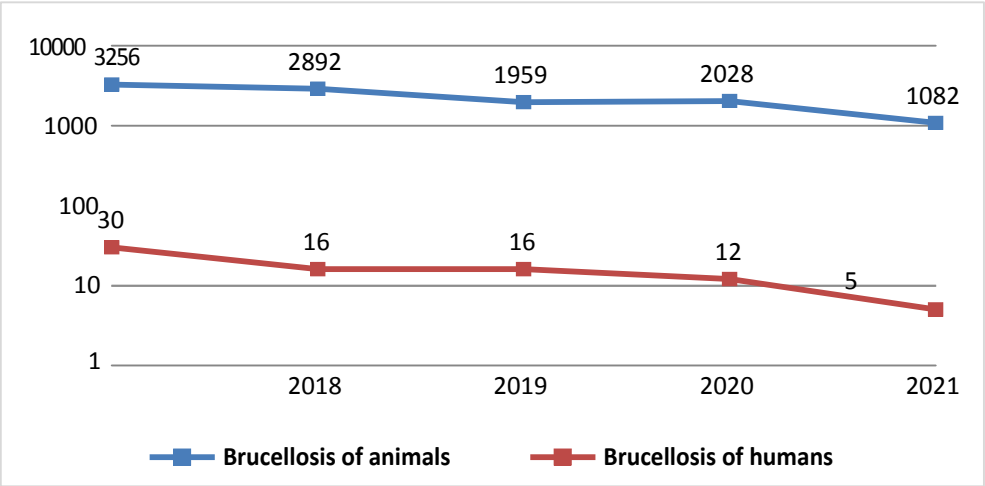


Figure 2 – Trends in reported brucellosis cases

The current version of the law "On Veterinary" defines the leading role of veterinary and sanitary control, which should be carried out at all stages of production, processing, transportation and sale of food products. According to veterinary and sanitary rules of the RK, meat obtained from slaughter of cattle that react to brucellosis, but in the absence of clinical signs of brucellosis or pathological and anatomical changes in the meat and organs, is released without restrictions. Meat obtained from the slaughter of all species of animals that had clinical or pathological signs of brucellosis must be sent for industrial processing – boiling. Subsequently, meat products subjected to high heat treatment are made of such raw materials. The head, liver, heart, lungs, kidneys, stomachs and other internal organs obtained from the slaughter of animals of all species responsive to brucellosis or having clinical signs of brucellosis are not allowed to sell in raw form; they are released after boiling or sent for processing for making sausages or other boiled products.

Conclusions. The current version of the Law of the Republic of Kazakhstan "On Veterinary Medicine" defines the leading role of veterinary and sanitary control, which should be carried out at all stages of production, processing, transportation, and sale of food products. According to the veterinary and sanitary rules of the Republic of Kazakhstan, meat obtained from the slaughter of cattle reacting to brucellosis, but in the absence of clinical signs of brucellosis or pathoanatomic changes in meat and organs, is released without restrictions. Meat obtained from the slaughter of animals of all kinds that had clinical or pathoanatomical signs of brucellosis should be sent for industrial processing – cooking. In the future, meat products subjected to high heat treatment are made from such raw materials. Only from quality and safe raw materials of animal origin, is it possible to produce products that meet the requirements of the Technical Regulations of the Customs Union. Emphasis was placed on the slaughter of cattle infected with chronic infections. At the same time, zoonotic infections are also registered in the population of the region. In the vast majority of them referred to zoonoses and arose as a result of the consumption of products obtained from sick animals, and as a result of secondary contamination during harvesting and processing of livestock raw materials, in the preparation and storage of food.

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