

вирустың нуклеин қышқылын аурудың алғашқы кезеңдерінде анықтауға мүмкіндік береді. Жұмыста ірі қара малдың лейкозын КТ-ПТР әдісімен зертханалық диагностикалау үшін тест-жүйенің компоненттік құрамын іріктеу және оңтайландыру нәтижелері келтірілген. Жүргізілген зерттеулер нәтижесінде біз екі жұп арнайы env(gp51)_3F және env(gp51)_3R, env(gp51)_4F және env(gp51)_4R праймерлерін таңдап алдық, сондай-ақ реакция қоспасының негізгі компоненттерінің концентрациясын оңтайландырдық. Ірі қара малдың лейкозының ПТР өнімін жасау үшін Enzyme Mix - 0.5 мкл (10 мкл); 5xПЦР-буфер - 5 мкл; 0.5 мкл-ден арнайы праймерлер (10 мкл); dNTP (10 мкл) қоспасы - 0.5 мкл; РНҚ - 3 мкл; деондалған су-15 мкл. 25 мкл көлемінде жеткілікті пайдаланылған температура - уақыт режимімен реакция жасалды. Ірі қара малдың лейкозын диагностикалау бойынша жүргізілген зерттеулер реакция қоспасының таңдалған құрамдас бөлігі және КР-ПТР қою үшін таңдалған температура режимі реакцияның жоғары аналитикалық және диагностикалық ерекшелігі мен сезімталдығын беретінін көрсетеді.

РЕЗЮМЕ

На сегодняшний день, одним из широко распространенных заболеваний среди крупного рогатого скота является лейкоз. Заболевание встречается на всех континентах земного шара, и приводит к различным экономическим потерям. В этой связи, одной из главных задач в борьбе с заболеванием является лабораторная диагностика. Применение современных молекулярно-генетических методов исследования позволяют выявить нуклеиновую кислоту вируса уже на ранних стадиях болезни. В работе приведены результаты подбора и оптимизации компонентного состава тест-системы для лабораторной диагностики лейкоза крупного рогатого скота методом ОТ-ПЦР. В результате проведенных исследований нами были подобраны две пары специфических праймеров env(gp51)_3F и env(gp51)_3R, env(gp51)_4F и env(gp51)_4R, а также была произведена оптимизация концентрации ключевых компонентов реакционной смеси. Для наработки ПЦР продукта лейкоза крупного рогатого скота достаточно Enzyme Mix - 0.5 мкл (10 пМ); 5xПЦР-буфер - 5 мкл; специфические праймеры (10 пМ) по 0.5 мкл; смесь dNTP (10 пМ) - 0.5 мкл; РНК - 3 мкл; деонизированная вода - 15 мкл в объеме 25 мкл для постановки реакции с отработанным температурно-временным режимом. Проведенные исследования по диагностике лейкоза крупного рогатого скота показывают, что подобранный компонентный состав реакционной смеси и выбранный температурный режим для постановки ОТ-ПЦР дает высокую аналитическую и диагностическую специфичность и чувствительность реакции.

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TOPICAL ISSUES ON RABIES CONTROL IN THE WEST KAZAKHSTAN REGION

ANNOTATION

This article provides an analysis of the results of epizootological monitoring of animal rabies in the West Kazakhstan region, showing the dynamics of the functioning of this parasitic system in the study area over a 10-year period. The dynamics of the manifestation and spread of rabies is studied -

the results of retrospective and operational epizootological development and manifestation of rabies in the agrobiocenosis with its application to all districts of the region are presented. The results of the effectiveness of antiepidemic measures on the territory of the region are shown, namely, a review of preventive vaccination of farm animals, due to the increase in anthropogenic foci of the disease - oral vaccination of wild carnivores with the use of briquettes, the problems of regulating the number of neglected dogs and cats are described. An assessment of veterinary and sanitary measures for rabies in the conditions of the West Kazakhstan region was carried out, some additions were noted in the strategy to combat the zoonosis under study, regarding strengthening control over compliance with the rules for keeping pets, identifying (chipping, certification) of all pets, mandatory vaccination, the creation of shelters for the population of neglected dogs and cats, as well as strengthening information and educational work on the importance and danger of rabid infection with the population, first of all, among those living in the suburbs and rural areas, through the involvement of modern technologies and the media.

Keywords: *rabies, rabies prevention, immunization, oral immunization, stray animals.*

Introduction. It is known that one of the epizootological parameters of the population of farm animals is their epidemic danger. And this, first of all, is generated by the presence and functioning of infectious diseases common to animals and humans in the studied territory [1].

Rabies infections have played an important role in the formation of epizootological and epidemic danger throughout the world for many years.

In various regions of the country, foci of rabies are registered annually, the natural reservoirs of which are wild carnivorous animals – foxes, corsacs, raccoon dogs, wolves, and in urban conditions – stray dogs and cats [2].

The epizootology of the manifestation of rabid infection in the territory of the West Kazakhstan region has not been properly studied. The system of veterinary measures does not have complexity, and therefore there is a need to study diverse information concerning the peculiarities of the course of the epizootic process of rabies and the development of effective veterinary and sanitary measures to improve epizootic situations for this disease [3].

Epizootological monitoring of the spread of rabid infection in the region is very relevant: successful minimization of cases of rabid infection and further eradication of rabies is possible only by improving veterinary and sanitary measures to combat and prevent this zoonosis with the help of a comprehensive and thorough analysis of the epizootological course of rabies, with the study of the features of its manifestation in the territory of the West Kazakhstan region [4,5].

The scale of rabies epizootics in the region is variable - the area of the fox settlement area is much larger than similar indicators of European countries—oral immunization of wild predatory animals has been successfully applied there. At present, when there are tight budgetary frameworks in most regions, it is still necessary to optimally focus on reducing the potential epidemiological risk. To do this, it is necessary to vaccinate domestic carnivores, create buffer zones around large settlements in which oral vaccination of wild carnivores will be carried out [6,7]. First of all, preventive measures against rabies should be aimed at compliance with the annual mandatory preventive immunization with rabies vaccines, especially for dogs, and oral vaccination of wild predators [8,9]. In other words, the main goal of immunization is to break the second link of the epizootic chain of rabies (domestic carnivores—wild carnivores), since it is the continuity of successive animal infections that ensures the preservation of pathogenic microorganisms in nature as biological species, i.e. the existence of the infectious pathology itself, as well as the prevention of infection among animals by regulating the population of wild carnivores, trapping stray animals, compliance with the standards of keeping domestic dogs and cats [10,11,12].

Modern methods of preventing rabies of domestic and farm animals include carrying out their strict accounting at the same time with the use of preventive anti-rabies vaccination as the most effective method of managing the infectious situation, including areas with rabies problems [13,14]. Also, in foreign countries (Poland, France), the successful eradication of rabies was achieved as a result of the use of oral vaccines for the immunization of wild animals, especially foxes – there was a significant decrease in the incidence of rabies of foxes and raccoon dogs in the treated territories [15,16,17].

Materials and methods. The initial materials were formed by conducting retrospective and operational epizootological monitoring of rabies in the territory of the West Kazakhstan region, based on materials provided by the Veterinary Department of the West Kazakhstan region, for the period 2010-2021. With the help of operational epizootological analysis, the development of rabies epizootics in the agrobiocenosis with its application to the administrative territories of the region was studied.

Results and their discussion. During the last 10 years studied, rabies among animals has been registered in almost all administrative districts of the West Kazakhstan region, including the cities of Uralsk and Aksai. Rabic infection, despite the studied aspects of etiology, diagnosis, epizootology and specific prevention, still has a significant prevalence and, according to WHO, is included in the five infectious diseases common to humans and animals that cause the greatest economic damage. Due to the absolute lethality and the need for a course of therapeutic and preventive vaccinations for vital indications, rabies remains a serious medical, veterinary and social problem. The elimination of rabies epizootics causes significant economic damage, consisting of direct losses from the death of farm animals, veterinary and hunting activities, oral vaccination of wild carnivores, shooting of predators, the implementation of measures to regulate the number of stray and neglected animals in settlements, sampling of pathological material, virological studies, etc.

During the period 2010-2021, 420 cases of laboratory-confirmed rabies among animals were registered in the region, which exceeded the absolute number of diseases recorded over the same period of the last decade by 1.5 times. Of these, 198 positive cases of rabies of productive animals were noted, or 47% of all animal species. Domestic carnivores account for 149 positive cases of rabies, which is 36% of the total. The registration of rabies among wild predators is 73 cases or 17% of all animals. Figure 1 shows the structure of the incidence of rabic infection in animals as a percentage.

Of this number of positive samples, the largest share (47%) falls on farm animals (mainly cattle), which indicates their role in maintaining epizootic distress. Productive animals during epizootological monitoring act as an indicator of the intensity of the epizootological process with the main feature that these cases of rabies are recognized and taken into account almost always. This is followed by domestic carnivorous animals (dogs and cats) – 36%, the incidence of dogs is slightly higher than cats, apparently this is due to the fact that dogs are more often kept in courtyards, in suburban areas for protection, often without a leash, and animals move freely around the neighborhoods of residential areas where their contact is most likely with wild carnivorous predators.

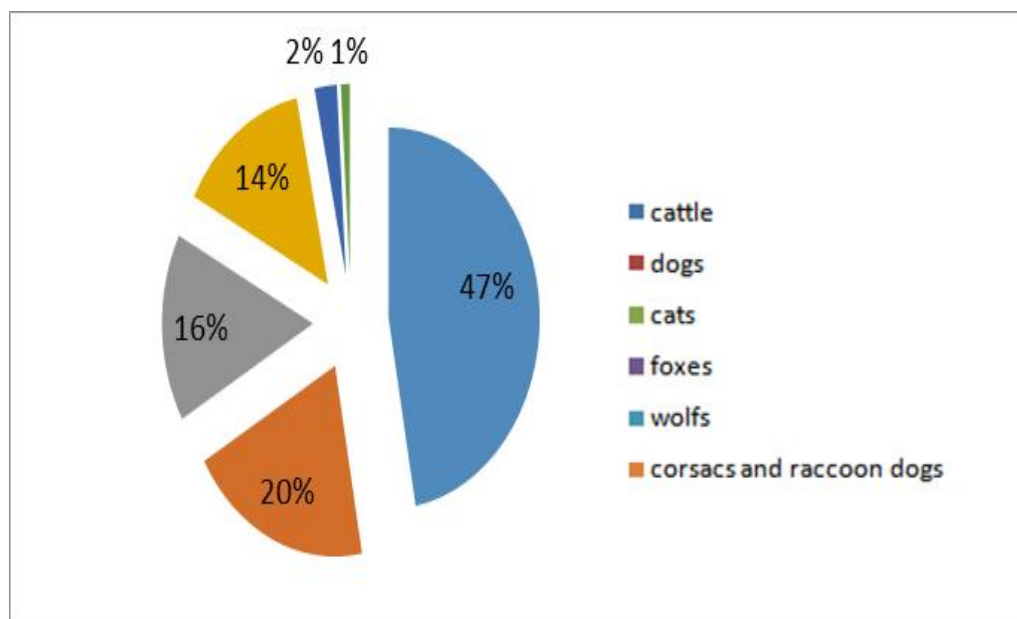


Figure 1–Laboratory confirmed cases of rabies among various animal species in the West Kazakhstan region as a percentage for the period 2010-2021

The incidence rate of wild carnivores is 17%, of which the majority falls on foxes–14%. It should also be noted that along with the increase in the number of cases of rabies, there is a parallel increase in laboratory research on its diagnosis.

The epizootological monitoring of the spread of rabies among various animal species indicates the disparity of the districts of the West Kazakhstan region in terms of the intensity of the epizootic process.

Table 1 – Distribution of cases of laboratory-confirmed rabies of various animal species by districts of the West Kazakhstan region for the period 2010-2021.

Name of the district	2010	2011	2012	2013	2014	2015
1	2	3	4	5	6	7
Akzhaik	0	0	0	12 cattle 2 dog 2 fox	1 cattle 1 dog 1 fox	4 cattle
Bokeiorda	0	0	1 cattle	1 fox	4 cattle 1 corsac	2 cattle
Borili	0	0	0	2 cattle 2 dog 2 fox	0	0
Zhangala	1 fox	0	0	1 wolf	0	0
Zhanibek	1 cattle	1cattle	0	0	0	0
Zelenovsky	1 dog	1 dog	0	3 cattle 2 dog 1 racoon dog	1 dog	1 dog 1 cat
Kaztal	0	2 cattle	0	2 cattle 1 cat	1cat	0
Karatobe	3 cattle	0	0	2 cattle	2 cattle	1 cattle
Syrym	1 cattle 1 dog	0	0	1 cattle 1 cat	4 cattle 2 cat 2 dog	1 fox
Taskala	2 cattle	0	0	0	0	0
Terekty	0	0	1 dog 1 cat	2	2 cattle 1 fox	0
Shingirlau	0	0	0	0	1 cattle	0
Uralsk	0	0	0	1 cattle 1 cat 1 fox	0	0
Total:	10	4	3	42	24	10
Name of the district	2016	2017	2018	2019	2020	2021
Akzhaik	1 cattle 1 cat 1 fox	2 cattle	2 cattle	0	1 cattle	1 cattle
Bokeiorda	0	0	1cattle	0	0	1 cattle

1	2	3	4	5	6	7
Borili	1 dog 1 wolf	1 cattle 2 dog	0	0	0	0
Zhangala	0	0	1 cattle	0	2 cattle 1 fox	0
Zhanibek	0	1 cattle	0	0	0	0
Zelenovsky	1 dog	1 cat	0	0	2 cattle 1 dog	0
1	2	3	4	5	6	7
Kaztal	0	0	0	0	1 fox	1 fox
Karatobe	0	2 fox	0	1 cattle	0	0
Syrym	1 dog 1 fox	2 cattle	1 fox	1 cattle	2 cattle	1 wolf
Taskala	0	0	1 cattle	0	0	0
Terekty	1 dog	0	0	0	0	1 cat
Shingirlau	0	1 dog	0	0	1 dog	1 dog
Uralsk	2 dog 1 cat 1 fox	1 fox	1 cattle 2 dog	0	0	0
Total:	13	11	9	2	11	5

From the analysis of the territorial occurrence of rabies cases, it can be seen that in the period from 2010-2021, a group of the most disadvantaged districts was formed – Akzhaik, Borili, Zelenovsky, Karatobe, Syrym, where the incidence of rabies exceeds similar indicators for the rest of the districts by 1.5–3 times. In these areas, animal rabies is recorded with the greatest frequency. It should also be noted that in the north-eastern regions, cases of wild carnivores are recorded in greater volume than in the south-western regions. Apparently, this is due to the introduction of the pathogen and migrations of wild predators from the border territories of cities of the Russian Federation, where the epizootological situation for rabies is extremely unfavorable, as well as with the places of settlement of a high density of wild carnivores.

Epizootic well-being for rabies of agricultural and domestic carnivores is created by creating an immune layer. The main task is their annual vaccination with registered anti-rabies vaccines allocated at the expense of the republican budget. Mass preventive immunization of animals is carried out in the areas of distilling and pasture animal husbandry. Immunity, as a rule, is formed 10-12 days after vaccination. In the West Kazakhstan region, veterinary services used five variants of different vaccines. At the same time, in order to prevent rabies for the period 2009-2021, 548891 animals were vaccinated in the region, including cattle – 217088, horses – 1066, sheep–21545, pigs–1308, dogs–300220, cats - 7670.

The percentage of vaccinated animals ranges from 42 to 22% among horses, from 37 to 60% – in cattle and from 17 to 32% – among small cattle. In 2019-2020, the scope of preventive vaccination of farm animals increased slightly in the region as a whole. 274.0 and 280.0 thousand heads of cattle were vaccinated, respectively (in 2018 – 166 thousand) and 301.5 -260.0 thousand heads of small cattle (in 2018 – 178.7 thousand). However, almost 50% of cattle and 80% of small cattle remain unimmunized, due to low vaccination plans for animals against rabies.

As for vaccination and trapping among dogs and cats, in the period 2016-2021, the number of vaccinated was in the range of 18000-33400 among dogs and 7960-12200 among cats.

In the West Kazakhstan region, the issue of depopulation of stray dogs and cats is very acute. For 2021, 63.1 million tenge was allocated from the regional budget for trapping and sterilization of stray animals. Of these, 28.4 million tenge was allocated for trapping and sterilization of stray dogs

and cats in the city. The city veterinary station is engaged in this. And 12 more wind stations are operating in the districts. Since the beginning of this year, 555 dogs and cats have been captured and sterilized, 387 of them in the city. This year it is planned to sterilize over 2,400 dogs and cats. Special teams catch stray animals around the city, bring them to the veterinary station, then the captured dogs and cats are vaccinated against rabies, chip them, enter them into the database, give anthelmintics, treat them from parasites and sterilize. After all the procedures, these animals are taken to their habitat.

It is worth noting that today there are no state nurseries in the region, but there are several private ones, which are mainly supported by volunteers, but their capacity does not cover even a third of the neglected animals of the region. Unfortunately, the main problem lies in the irresponsibility of people, due to the lack of legal responsibility of a person for keeping an animal, many people easily refuse to keep a pet or its offspring, leaving them literally on the street. In turn, neglected animals are extremely dangerous, maintaining contacts with wild carnivores on the outskirts of villages and cities, ensuring the circulation of urban-type rabies.

Thus, the rabies situation in the region remains tense, due to the fact that there are pockets of both urban and natural rabies on its territory, constantly communicating with each other, and thus maintaining the circulation of the virus. Oral immunization is the most promising and realistic method of breaking the second link of the epizootic chain of rabies (stray domestic carnivores–wild carnivores) by preventing rabies of wild carnivores today. For its implementation, blister briquette vaccines are used, which contain a bait with the addition of a virus vaccine.

According to the plan of veterinary and preventive measures in Kazakhstan, in 2011, 2013 and 2014, the veterinary service of the region carried out vaccination of wild carnivores in the territory of the region. For vaccination, an anti-rabies virus vaccine was used for oral immunization of wild carnivorous animals against rabies "Oralrabivak-KZ", this is a bait vaccine made from rabies virus and packaged in 1 dose blisters, it contains a biomarker (from the tetracycline series), to control the eating of baits. A dose of the vaccine creates and maintains immunity against rabies for at least 12 months. Vaccine-containing baits (483400 briquettes in 2011, 76530 in 2013 and 297700 briquettes in 2014) were laid out using small aircraft, using GPS navigation, to fix the places of drug release at the rate of 25 briquettes per 1 km² of area. In Figure 2, the curve showing the number of decoys with anti-rabies vaccine is inversely correlated with the curves showing the number of sick animals of various species

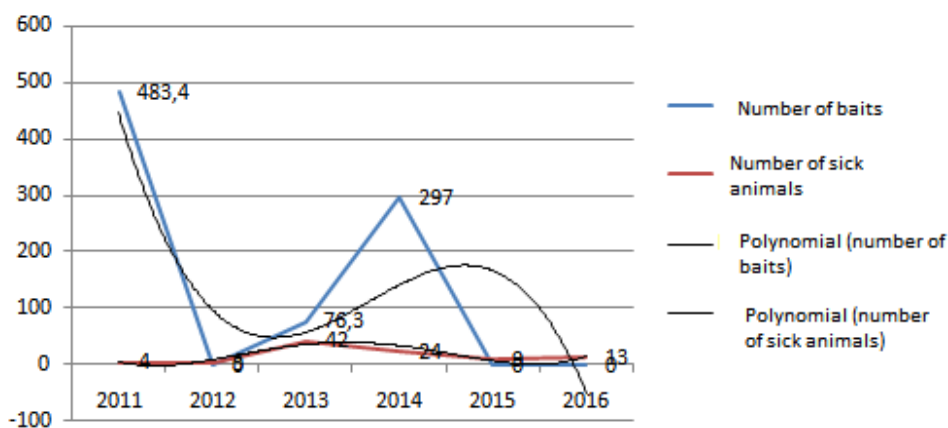


Figure 2 – Results of oral vaccination of wild carnivores in the West Kazakhstan region

Despite one-time vaccination campaigns and incomplete coverage of the territory, the epizootic situation for rabies improved significantly in 2011-2012. The disease was registered in isolated cases (2011–4 cases, 2012–3 cases), which indicates the effectiveness of this decoy vaccine and this event. In 2013 and 2014, there were no significant improvements in the territories of vaccinated disadvantaged settlements. A positive result in this case was not obtained for the following reasons: the manual on oral immunization of animals was violated, instead of 2-fold use of the vaccine - it was used once a year, low density of the spread of baits, limited territory of the spread of the vaccine. With the cessation of vaccination of wild carnivores, the number of animals infected with rabies has acquired a pronounced upward trend.

To date, on the territory of the country, and in particular the West Kazakhstan region, the implementation of the listed measures to combat animal rabies has yielded the following results:

The main measure of antiepidemiological measures was preventive anti-rabies vaccination of farm animals, domestic and wild carnivores. But, despite the volume of anti-rabies vaccination among productive farm animals, most of the susceptible livestock remains not immunized due to incomplete coverage when planning specific prevention and low plans for immunization of animals in the region.

The program for oral immunization in 2011 and 2013-2014, which was not systematized in time and carried out without due consideration of the epizootic situation in specific territories of the region, gave only temporary positive results. This was the result of non-compliance with the rules for the spread of vaccines (single use, instead of the generally accepted double use, non-compliance with the recommendations of the OIE, WHO and the EU on the density of the spread of vaccines (25-30 briquettes per km²), termination of regulation of wild animals to an acceptable density of 2 animals per 10 km², lack of confirmation of the effectiveness of oral vaccination by detecting a tetracycline marker in bone tissue teeth of wild predators, lack of confirmation of the immune status of wild animals (for the presence of protective antibodies in serum).

Measures are not being carried out effectively enough in relation to the reservoir of the causative agent of the urban type of rabies disease. Trapping stray dogs and cats is carried out irrationally, with violations of humane measures, veterinary services are shooting animals in front of local residents, including children, there are currently no kennels and shelters for captured dogs and cats in the region that can accommodate the entire contingent of stray animals caught.

There is currently no national rabies control strategy program in Kazakhstan and in the West Kazakhstan region. The consequence of this is this epizootological situation of rabies. The solution to the problem of rabies control should include the following tasks in natural foci: large-scale oral vaccination among wild animal populations, determination of the eatability of bait vaccines, serological control; differentiation of rabies virus isolates for compliance with vaccine strains. Reducing cases of rabies in anthropogenic foci requires strengthening control over compliance with the rules of keeping pets, identification of all animals, mandatory vaccination, and the creation of shelters for the pet population.

It is also necessary to strengthen information and educational work on the importance and danger of rabid infection with the population, especially among those living in the suburbs and rural areas, by attracting modern technologies (videos via TV and ID communications, educational and explanatory information – mass media).

Conclusion. The problem of stray animals in cities and their epidemiological role remains open, requires serious and systematic research and improvement of methods of accounting and distribution of them in the region. Stray dogs, which have the closest contact with wild fauna and are a conductor of rabid infection in the city, pose a high degree of danger [18]. Therefore, the main attention in these conditions should be paid to specific immunization and depopulation of stray animals. Among the various measures to reduce the number of dogs, their capture and destruction has been widely used and is being used, which causes condemnation from the public. Indeed, this method of struggle cannot be called humane, but at present it is hardly possible to do without this method. At the same time, we are not talking about animals with rabies, the destruction of which is mandatory. At the same time, sterilization is widely used abroad, which in some countries has almost completely replaced extermination [19, 20]. The positive experience of reducing the number of stray animals through mass sterilization and castration has been noted in many countries. In order to systematically monitor rabies and organize rabies control measures, in addition to veterinary services, medical, environmental, housing and communal services, forestry and hunting organizations, and others should take part. The veterinary service was entrusted with monitoring the epizootic situation of rabies, laboratory diagnostics of the disease, monitoring of specific prevention, monitoring of animals that have inflicted injuries to people, conducting sanitary and educational work [21].

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ТҮЙІН

Бұл мақалада Батыс Қазақстан облысындағы жануарлар құтыруының эпизоотологиялық мониторингінің нәтижелеріне талдау жасалып, зерттелетін аумақта осы паразиттік жүйенің 10

жылдық кезеңдегі жұмыс істеу динамикасы көрсетілген. Құтырудың пайда болу және таралу динамикасы зерттелді-ретроспективті және жедел эпизоотологиялық даму нәтижелері және құтырудың агробиоценоздағы көріністері облыстың барлық аудандарына аппликациямен ұсынылды. Облыс аумағында эпизоотияға қарсы іс - шараларды жүргізу тиімділігінің нәтижелері, атап айтқанда - ауыл шаруашылығы жануарларын профилактикалық вакцинациялауға шолу, аурудың антропоургиялық ошақтарының ұлғаюына байланысты-жем-брикеттерді қолдана отырып, жабайы ет қоректілерді ауыз арқылы вакцинациялау, қараусыз қалған иттер мен мысықтардың санын реттеу жөніндегі проблемалар сипатталған. Батыс Қазақстан облысы жағдайында құтыру ауруы кезіндегі ветеринариялық-санитариялық іс-шараларға бағалау жүргізілді, зерттелетін зоонозға қарсы күрес жөніндегі стратегияда үй жануарларын ұстау ережелерінің сақталуын бақылауды күшейтуге, барлық үй жануарларын бірдейлендіруге (чиптеуге, паспорттауға), міндетті түрде вакцинациялауды жүргізуге, қараусыз иттер мен мысықтардың популяциясы үшін баспаналар құруға қатысты кейбір толықтырулар атап өтілді. сондай-ақ халықпен құлдық инфекцияның маңыздылығы мен қауіптілігі туралы ақпараттық-ағарту жұмыстарын күшейту, ең алдымен, қала маңындағы және ауылдық жерлерде тұратындар арасында заманауи технологиялар мен БАҚ-ты тарту арқылы.

РЕЗЮМЕ

В данной статье приводится анализ результатов эпизоотологического мониторинга бешенства животных в Западно-Казахстанской области, с отображением динамики функционирования данной паразитарной системы на исследуемой территории за 10-ти летний период. Изучена динамика проявления и распространения бешенства-представлены результаты ретроспективного и оперативного эпизоотологического развития и проявления бешенства в агробиоценозе с его аппликацией ко всем районам области. Отображены результаты эффективности проведения противоэпизоотических мероприятий на территории области, а именно - обзор профилактической вакцинации сельскохозяйственных животных, ввиду увеличения антропоургических очагов заболевания- оральной вакцинации диких плотоядных с применением приманок-брикетов, описаны проблемы по регуляции численности безнадзорных собак и кошек. Проведена оценка ветеринарно-санитарных мероприятий при бешенстве в условиях Западно-Казахстанской области, отмечены некоторые дополнения в стратегии по борьбе с изучаемым зоонозом, касательно усиления контроля за соблюдением правил содержания за домашними питомцами, идентификации (чипирования, паспортизации) всех домашних животных, проведения обязательной вакцинации, создания приютов для популяции безнадзорных собак и кошек, а также усиления информационно-просветительной работы о значимости и опасности рабической инфекции с населением, прежде всего среди проживающих в пригородах и сельской местности, путем привлечения современных технологий и СМИ.

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