

Annotation
for the dissertation of Ismagulova Gulzhikhan Talgatovna
on the topic: "Biosafety of the Shchuchinsk-Borovskaya resort area and
the development of veterinary and sanitary measures" for the degree of Doctor
of Philosophy (PhD) in the educational program
6D120200 – Veterinary sanitation

Relevance of the research topic. Every year, in the President's Message, Kassym-Jomart Kemelevich pays special attention to the problems of ecology and respect for the environment. The President noted that it is necessary to take measures to preserve the ecological balance between the development of industries, urbanization and environmental conservation, as well as the need to introduce modern emission monitoring methods and advanced technologies to protect the country's ecology.

There are a lot of resort areas in the Republic of Kazakhstan where people relax, are treated and the flow of domestic tourism increases every year, however, the most attractive place for recreation was and remains "Kazakhstan Switzerland", namely the Burabai resort, which took 1st place in the ranking of the Top 5 resorts of the CIS, according to the analytical agency "Tourstat". The rating was compiled based on the results of an analysis of the attendance of resorts by Russian tourists. Every year, millions of tourists from Kazakhstan and neighboring countries come to relax in the shopping center. For comfort and convenience, most tourists come by private cars or order buses to move around the park area, which occupies a large area and in which there are a lot of natural and historical attractions, which attracts tourists. The ecological and sanitary condition of the SHCHBKZ is deteriorating more and more every year as a result of anthropogenic impact, air, water, soil, and livestock products are polluted, which has a negative impact on human health.

When studying the lakes of the Shchuchinsk-Borovsk zone, a number of authors note changes in the hydrological, hydrochemical and hydrobiological regime. caused not so much by natural factors as by the influence of economic activity. In conditions of increasing anthropogenic load, characterized by an increase in the flow of biogens, a powerful eutrophication of lakes occurs, which, as a rule, leads to their gradual waterlogging as a result of the death of macrophytes. As a result, the water quality deteriorates, the content of dissolved oxygen decreases, the presence of hydrogen sulfide is noted, which leads to the suppression of hydrobionts.

Also, a significant contribution to pollution and adverse environmental changes is made by the transport and road complex, which emits a huge amount of polluting waste into the atmosphere, which has a detrimental effect on the health of people, plants and animals. Pollution of the natural area with exhaust gases, dust particles, aerosols containing various toxic substances causes global consequences in the form of "greenhouse-forming" and "ozone-forming" gases.

In accordance with the decision of the Kyoto Protocol, an inventory of greenhouse gas emissions and ozone-depleting substances into the atmosphere is being conducted in the Republic of Kazakhstan. Monitoring studies of atmospheric air pollution in large cities such as Almaty and Shymkent are being conducted in the Republic. In the countries of the near and far abroad, many scientists are working to

study the pollution of the atmospheric air of megacities with man-made pollutants.

The research results can be used in the laboratory of veterinary and sanitary examination of markets, food laboratories that control the quality and safety of animal products, in scientific and educational institutions, in the State Institution "State National Natural Park "Burabai" of the Office of the President of the Republic of Kazakhstan" in assessing the ecological state of the Shchuchinsk-Borovskaya resort area.

The purpose of the dissertation research. determination of biosafety of the Shchuchinsky-Borovskaya resort area and development of veterinary and sanitary measures to improve them.

Research objectives.

1. Sanitary and ecological studies of the environmental objects of the Shchuchinsk-Borovskaya resort area;
2. Study of the influence of contamination of environmental objects;
3. To find methods for indicating contaminated livestock products and to develop safety maps of man-made and biogenic factors of the Shchuchinsk-Borovskaya resort area;
4. Provide a scientifically based veterinary and sanitary assessment of animal products and develop veterinary and sanitary measures

Research methods.

The research work was carried out in the period from 2018-2021, on the basis of the Kazakh Agrotechnical University named after S. Seifullin, the laboratory of "Food Safety" of the Department of Veterinary Sanitation; in the branch of the RSE at the National Center of Expertise of the Committee for Public Health Protection of the Ministry of Health of the Republic of Kazakhstan in Akmola region (Kokshetau), the RSE at the National Reference Center for Veterinary Medicine "KVK and N of the Ministry of Agriculture of the Republic of Kazakhstan, LLP "Nutritest" Kazakh Academy of Nutrition, LLP "Yerkin talgam" (Almaty), RSE at the National Veterinary Laboratory "Republican Veterinary Laboratory" (Almaty Astana), UDP GNPP "Burabai", Laboratory of Animal Immunology of the Academy of Agricultural Sciences of Henan Province, China, Laboratory of Animal Immunology of the Department of Food Safety of Henan Agrarian University, China.

The material for the study was: air samples - 1080; water from surface sources (lakes of Shchuchinsk-Borovsk resort area – Burabai, Shortan, Ulken and Kishi Shabakty, Katarkol, Maybalyk, Balpash Sor) - 193; milk -115; meat, various animal species - 168; fish - 178; honey -96; total -1830 samples.

Atmospheric air research. Air sampling was carried out using a GANK-4 gas analyzer, at the entrances to the Shchuchinsko-Borovskaya resort area, at four checkpoints and at the central point, the most visited cultural and historical place by tourists (Abylai Khan's glade), in accordance with the methodology of air sampling and research, MVI KZ 07.00.01612/1-2013 "Methodology for measuring the mass concentration of harmful substances in atmospheric air with the GANK-4 gas analyzer". Measurements of atmospheric air indicators were carried out in the period 2018-2020, during cold, warm and transitional periods.

The study of the water of surface reservoirs. Water sampling from

reservoirs of the resort area was carried out in accordance with ST RK GOST R 51592-2003 "Water. General requirements for sampling". Indicators of water quality and composition were determined according to the Sanitary Rules "Sanitary and epidemiological requirements for water sources, places of water intake for household and drinking purposes, household and drinking water supply and places of cultural and household water use and without danger of water bodies" dated 03/16/2015 No. 209. Physico-chemical parameters were determined using GOST 31954-2012, GOST 4011-72, GOST 26449.1-85, MVI No. 01-05-2012 (KZ 07.00.01667-2013).

Elements of heavy metal salts were carried out according to GOST 31866-2012 "Drinking water. Determination of the content of elements by inversion voltammetry", GOST 31870-2012 "Drinking water. Determination of the content of elements by atomic spectrometry methods".

The study of radioactivity of water samples from surface sources was carried out in accordance with Hygienic standards "Sanitary and epidemiological requirements for radiation safety" No.155, dated 02/27/2015, MIA KZ 07 00.00304-2009, MIA KZ 07 00.00303-2009, using the Progress spectrometer As-B-G.

Research of livestock and fish farming products. Milk sampling for the determination of physico-chemical and organoleptic parameters was carried out according to GOST R ISO 707-2010 "Milk and dairy products. Sampling Guide". The physico-chemical parameters of milk were determined on the device "Lactan 1-4", "EKOMILK-TOTAL" and "Super Plem Combo" and "Lactoscan SCC" in accordance with the operating instructions of the milk analyzer and the methodology for determining somatic cells in raw milk. Milk and dairy products. Acceptance rules, sampling methods and sample preparation for analysis GOST 26809-86. Milk and dairy products. Methods for determining fat GOST 5867-90. Milk and dairy products. Methods for determining the purity of GOST 8218-89. Milk and dairy products. Methods for determining the density of GOST 3625-71. Milk and dairy products, titrimetric methods for determining acidity, GOST 3624-92. Cow's milk. The method of organoleptic evaluation of odor and taste GOST 28283-89.

Meat sampling was carried out according to GOST R 51477-99 "Meat and meat products. Sampling methods". Studies of organoleptic, physico-chemical parameters were carried out according to "Meat. Sampling methods and organoleptic methods for determining freshness" GOST 7269-79. "Meat. Methods of chemical and microscopic analysis of freshness" GOST 23392-78. "Bird meat. Sampling methods organoleptic methods of quality assessment" GOST 7702.0-74. "Poultry meat. Methods of chemical and microscopic analysis of meat freshness" GOST 7702.1-74.

Fish sampling was carried out in accordance with GOST 31339-2006 "Fish, non-fish objects and products from them. Acceptance rules and sampling methods". Organoleptic, physico-chemical studies were carried out according to "Fish, marine mammals, marine invertebrates and products of their processing. Acceptance rules, organoleptic methods of quality assessment, sampling methods for laboratory tests" GOST 7631-85

Trace elements of heavy metal salts in meat and fish samples were determined by inductively coupled plasma chromatography-mass spectrometry in accordance with GOST 31671-2012 "Food products. Identification of trace elements. Sample

preparation by mineralization at elevated pressure". The study was performed using an inductively coupled plasma chromatography-mass spectrometer Agilent Technologies 7700 Series ICP-MS.

Sampling for research on radionuclides was carried out in accordance with GOST 32164 "Sampling for research on radionuclides". Meat and fish samples were examined in accordance with the Interstate standard GOST 32161-2013 "Food products. Method for determining the content of caesium-137" and GOST RK 1623 - 2007 "Radiation control. Strontium – 90 and caesium – 137. Food products. Sampling, analysis and hygienic assessment", using the Progress spectrometric complex.

Amino acids were determined using a SHIMADZULC–20 Prominence liquid chromatograph (Japan) with a fluorimetric and spectrophotometric detector. A chromatographic column with a size of 25cm*4.6 mm SUPELCOC18. 5 microns (USA) with a pre-column was used to protect the main column from impurities.

The contamination of meat samples with antibiotics and hormones was determined using immunochromatographic test strips for Clenbutyrol, Chlorophenicol and Ractopomine.

The calculation of vehicles was carried out according to the generally accepted methodology in the cold, transitional and warm seasons of the year, at checkpoints and the glade of Abylai Khan.

For the calculation, cars were differentiated by engine displacement, buses and trucks by class, overall length and load capacity.

Statistical processing of the results was performed using the Student's t criterion for independent samples in the STATISTICA v. 12 program (StatSoft Inc, USA).

The main provisions submitted for protection.

1. The research described in the dissertation is not trivial, but new, since for the first time in Kazakhstan, research involving several scientific areas is being conducted;

2. The biosafety of the Shchuchinsk-Borovskaya resort area was revealed using the "one health" principle, which combines the relationship between the ecological situation of the region, the quality of atmospheric air, water, fish and livestock products;

3. For the first time, 5 security maps of the Shchuchinsk-Borovskaya resort area were created based on the conducted research;

4. Recommendations on veterinary and sanitary measures to protect people, animals and the environment in the resort area have been implemented in the relevant organizations.

Description of the main results of the study.

1. According to the indicators of the "Standard Index" and "Highest repeatability", the purity of atmospheric air in 2018 was heavily polluted (SI from 3.38 to 6.4, NP from 50 to 100%.); in 2019, moderately polluted (SI – 2.14, NP 16.6%); in 2020, the indicators of the standard index and the highest repeatability corresponded to non-polluted air;

2. In terms of atmospheric air pollution in 2018, an excess of sulfur dioxide concentration was established by 5-6 times, which ranged from 0.9967 ± 0.006 to 2.3 ± 0.0067 mg/m³ in the Abylai Khan clearing and in 2019 by 2 times and amounted to 1.07 ± 0.006 mg/m³ at checkpoint No. 4;

3. It is established that the largest number of vehicles passes and enters the territory of the resort area during the warm period, the bulk is passenger transport: in 2018 – 24,833 of them 21,690 passenger vehicles, in 2019 – 7180 of them 6541 passenger vehicles and in 2020 – 3603 of them 3564 passenger vehicles;

4. The water of lakes Shortan and Kishi Shabakty of the resort area belongs to the 4th class according to the unified classification of the quality of water bodies, lakes Burabai; Ulken Shabakty; Katarkol; Maybalyk, Balpash sor belongs to the 5th class. According to international regulatory data, the water quality of water bodies in resort areas should correspond to at least 2-3 safety classes;

5. Fish safety: in fish samples from Burabai and Shortan lakes, according to organoleptic indicators, there were whitish inclusions on the surface of internal organs, an unpleasant, musty odor, a pH deviation in the alkaline side of 6.95 ± 0.07 , as well as the presence of parasites (genus Anisakis). In fish samples from lakes Burabai, Shortan, Kypshakty, trace concentrations of heavy metal salts mercury 0.06 ± 0.008 mg/kg and cadmium 0.05 ± 0.001 mg/kg;

6. The nutritional value of fish meat protein in terms of the content of essential and interchangeable amino acids is insignificant. The ratio of the sum of essential to interchangeable amino acids in fish meat protein has been reduced by 32%. The amino acid composition of fish meat protein from lakes Shortan, Kypshakty and Katarkol had a lower amount of amino acids compared to the norm (42%, 42,1%, 42,3%);. The limiting essential amino acids in all samples are valine (21.6-27.8%) and isoleucine (72.1-77.25%);

7. In meat and milk samples obtained from various manufacturers, the quality and safety are questionable. According to organoleptic and physico-chemical parameters, meat samples from private farmsteads had: sour smell, loose consistency, the pit is leveled slowly, red in color, the broth is not transparent, a large amount of flake-like sediment. This suggests that such meat belongs to the category of questionable freshness;

8. The limiting amino acids in the protein of meat of various animal species were: valine (22.3- 28%) and isoleucine from (70.1 to 82.1%). The amount of amino acids in meat protein was reduced: pork by 13%; beef by 4%, poultry meat by 2.6%.

9. The concentration of lead heavy metal salts was 0.03 ± 0.002 mg/kg in a sample from the village of Katarkol. Some milk samples were adulterated with water, the water content from 14.3 to 18%;

10. In the course of our research, we have developed methods for indicating potassium permanganate in meat using a benzidine solution, as well as a semi-quantitative method for determining the concentration of hydrogen ions to determine the freshness of meat. 5 safety maps of the Shchuchinsko-Borovskaya resort area were compiled and developed, which reflected the results of the study of the quality and degree of purity of atmospheric air;

11. The total environmental and economic damage from atmospheric air pollution and oxygen consumption by motor vehicles amounted to 2,543,167.5 tenge in 2018, 1,643,813 tenge in 2019 and 589,586.5 tenge in 2020.

Substantiation of the novelty and importance of the results obtained. For the first time, data were obtained on the study of the environmental situation in a single

chain of the quality of livestock products, surface water and atmospheric air, and on the basis of the data obtained, safety maps of the Shchuchinsk-Borovskaya resort area were developed. Based on our research, we have developed "Recommendations for the veterinary and sanitary assessment of livestock products and environmental facilities." These recommendations were implemented in the work of the food safety laboratory "Kokshe LLP" in Shchuchinsk, "Buraibai district territorial Inspection KVKiN Ministry of Agriculture of the Republic of Kazakhstan", "Express Vet" LLP, GU "Buraibai district Veterinary Laboratory", GU "State National Natural Park "Burabai" of the Office of the President of the Republic of Kazakhstan, RSE on PCV "Republican Veterinary Laboratory".

Safety maps of man-made and biogenic factors, methods for determining the freshness of meat and foreign substances have been developed, for which applications for copyright certificates have been submitted.

Compliance with the directions of scientific development or government programs. The research was carried out within the framework of a scientific project funded by the Ministry of Education and Science of the Republic of Kazakhstan, under subprogram 102 "Grant financing of scientific research"; under the priority "Science of life and health"; under the sub-priority "Environmental problems. Assessment of the state and problems of conservation of biodiversity of flora and fauna of the Republic of Kazakhstan. Scientific foundations of rational use and reproduction of biological resources"; on the topic "Problems of the ecological situation of the Shchuchinsk-Borovsk resort area and the development of veterinary and sanitary measures" No.AR05132302 (2018-2020), Project manager – Maykanov Balgabai Sadepovich.

Description of the doctoral student's contribution to the preparation of each publication. The dissertation for the PhD degree, personally completed by the author, is a completed research work and meets the requirements of the Committee for Control in the field of education and Science of the Ministry of Education and Science of the Republic of Kazakhstan. The reliability of the research results of the dissertation work and the validity of the experimental work are confirmed by photographic materials published by scientific papers. The main research indicators are reflected in 10 publications, 3 of which are published in journals included in the Scopus database, 3 articles in journals recommended by the Committee for Quality Assurance in Science and Higher Education of the Ministry of Education and Science of the Republic of Kazakhstan, 3 in the materials of international conferences and methodological recommendations.

The volume and structure of the dissertation. The dissertation is presented on 116 pages of computer text. The dissertation consists of an introduction, a review of the literature, materials and methods, the results of their own research, discussion and conclusion. The work contains 201 sources of used literature, 7 appendices, 21 tables and 20 figures.