

Review

Zhanat Baigazinov «GENERAL METHODOLOGY FOR ASSESSMENT THE CONTENT OF ARTIFICIAL RADIONUCLIDES IN LIVESTOCK PRODUCTS PRODUCED IN AREAS POLLUTED BY NUCLEAR TESTS»

PhD thesis

Novelty and Relevance of the Dissertation Topic

The novelty and relevance of the dissertation topic lie in the assessment of the content and parameters of transfer of artificial radionuclides (^{137}Cs , ^{90}Sr , $^{239+240}\text{Pu}$ and ^{241}Am) in livestock products produced in areas contaminated by nuclear tests at the Semipalatinsk test site. The study addresses the most important aspects of radiation safety associated with the consumption of contaminated food products, which is of direct importance for the health of the population in the affected regions. For the first time, data were obtained on the coefficients of radionuclide transfer in the tissues of horses and broilers, and age differences in the accumulation of radionuclides in animals were revealed.

The relevance of the work is confirmed by the need to develop scientifically based models for predicting the risk of radiation exposure through food products of animal origin. These models are important for ensuring the safety of agricultural products in regions exposed to nuclear tests and can be used to create recommendations for reducing the radiation load on humans.

Structure of the Dissertation

The dissertation consists of an introduction, *five chapters*, a conclusion, a list of references and appendices.

The introduction sets out the relevance of the topic, the purpose of the study, the objectives, as well as the scientific novelty and practical significance of the work.

The first chapter is a historical and environmental review of the Semipalatinsk Test Site (STS), including a description of the key test zones, climatic conditions, soil cover, vegetation and water bodies contaminated with radionuclides.

The second chapter presents the materials and methods of the study. It describes the object of study (horses and broilers), the experimental scheme for studying the transfer of ^{137}Cs , ^{90}Sr , ^{241}Am and $^{239+240}\text{Pu}$ radionuclides into animal and bird tissues, as well as analytical methods for determining radionuclide concentrations.

The third chapter is devoted to the results of the study on the transfer of radionuclides into horse tissues. The data on the concentration of radionuclides in organs, as well as the transfer coefficients and the dynamics of accumulation of radionuclides are presented.

The fourth chapter describes the dynamics of accumulation and transfer coefficients of radionuclides in the tissues of broilers. The processes of removing radionuclides from the body of birds after a long period of exposure are also considered.

The fifth chapter assesses the possibility of conducting agriculture in the territory of the STS. The regulatory acts of the Republic of Kazakhstan, permissible levels of contamination with radionuclides, as well as an analysis of the

contributions of soil and feed to the accumulation of radionuclides in the body of animals are considered.

The conclusion summarizes the results of the work, draws conclusions and gives recommendations for reducing radiation risks for the population living in areas contaminated by nuclear tests.

Quality of the Literature Review

The literature review in the dissertation is performed at a high level. The author comprehensively analyzed both domestic and foreign sources concerning the transfer of radionuclides in livestock products contaminated with radiation. The review covers key works published on radiation safety, biology and ecology in the context of the impact of nuclear tests at the Semipalatinsk test site.

The author cited both fundamental research and modern publications, including materials from the International Atomic Energy Agency (IAEA) and other authoritative scientific organizations. The review demonstrates the author's deep understanding of existing gaps in knowledge, which substantiates the relevance of the research and the need for further study of radiation safety issues.

Modernity of the Experimental Section and Quality of Research Results

The experimental part of the dissertation is carried out at a high scientific level using modern methods and equipment for the analysis of radionuclides in livestock products. The use of gamma spectrometry and radiochemical methods for determining the concentrations of radionuclides in the tissues of animals and birds meets modern standards of scientific research. The experiments were carried out taking into account the real conditions of the contaminated environment at the Semipalatinsk test site, which gives the work additional significance and practical applicability. The quality of the results obtained also deserves high praise.

The author was able to demonstrate the dynamics of accumulation and excretion of radionuclides ^{137}Cs , ^{90}Sr , ^{241}Am and $^{239+240}\text{Pu}$ in various tissues of animals and birds, and for the first time obtained data on their transfer coefficients. The results obtained are highly accurate and reproducible, which makes them a reliable basis for developing radiological safety models and assessing the health risks of the population consuming livestock products from contaminated areas.

Overall Evaluation

The candidate has demonstrated the ability to conduct independent research and publication activity. He has published three articles on the topic of the dissertation, one of which as the first author. He also participated in 14 conferences, where he was the first author in 7 cases. Publication activity meets the established requirements. The dissertation meets the formal criteria and is recommended for public defense and awarding of an academic degree upon successful defense.

Questions:

Do you plan to extend your study to other farm animal species to assess the transfer of radionuclides into their tissues and products?

Are you considering the possibility of studying the content of organically bound tritium (OBT) in animal products, given its importance for assessing radiological safety?

What do you think are the prospects for using the results of your study to develop more accurate models for predicting radiation risk in agriculture?

Data: October 27th 2024

Signature:

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