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INFLUENCE OF THE RATIO COMPONENTS ON ^{137}Cs PENETRATION INTO THE ROE DEER ORGANISM IN AUTUMN

After the Chernobyl accident in 1986 the total radioactivity of substances fallen out of the reactor into the environment is about 300 MCi. Kyiv and Zhytomyr regions are the most contaminated areas of Ukraine. By 1996, forest soils with ^{137}Cs contamination density of above 37 kBq/m^2 (1.0 Ci/km^2) occupied almost 440 thousand hectares in Zhytomyr region.

Due to the accident, a significant amount of radionuclides penetrated various parts of food chains in forest ecosystems. Food chains involving herbivores were the most severely affected. Particular attention is paid to the roe deer which serves as an indicator of radioactive contamination.

A number of studies of wild animals contamination were held in Polissia. The data show that the levels of radioactive contamination of wild animals remain high even long after the Chernobyl accident. They also established significant seasonal differences in ^{137}Cs accumulation in muscles associated with feeding behavior of animals.

Sweden was one of the first to record the excess of ^{137}Cs in meat of wild ungulate animals. It was proved that in some regions ^{137}Cs specific activity in the period of initial fallout exceeded permissible level (1500 Bq/kg at the time) in muscles of roe deer. In 1987 and 1988, the average ^{137}Cs specific activity in muscles of roe deer reached almost $12\,000 \text{ Bq/kg}$ in some regions. The increase of specific activity from $1000 - 3000 \text{ Bq/kg}$ to 11800 Bq/kg was observed in muscles of roe deer in 1988.

Taking into consideration that hunting season coincides with the peak of roe deer muscles contamination, this can cause products contamination and lead to the increase of internal exposure of consumers of wild animal meat.

All researchers think that the features and structure of animal diet affect seasonal variations of ^{137}Cs penetration into roe deer organism. Autumn is the most representative season when studying the patterns of ^{137}Cs accumulation in roe deer organism. Roe deer diet is characterized by considerable diversity in species composition. Its structure is determined by the environmental conditions of habitats and has significant seasonal differences. In Polissia, browsable forage is a part of roe deer diet. The consumption of mushrooms, ferns, mosses, as well as lichens and forest fruits is seasonal and depends on the variety and a sufficient amount of basic feed.

Contamination of forage primarily depends on the density of soil radioactive contamination by ^{137}Cs . Comparative calculations of soil radiation contamination density by ^{137}Cs in the same research area in 1996 and in 2016 indicate a tendency to reduce the activity of radionuclides in soil approximately by 2 times (in 1996, the average value of soil radiation contamination density on this territory was about $221 \pm 57 \text{ kBq/m}^2$, and in 2016 – $116 \pm 35 \text{ kBq/m}^2$). It should be emphasized that according to many researchers, physical decay is the only process which withdraws radionuclides outside the ecosystem.

Analysis of the study results on radionuclides content in the components of roe deer diet in 2016 indicate that the value of ^{137}Cs concentration in shoots of plants depends on their type. Only 8 of 13 forage species make 99 % of ^{137}Cs content in roe deer diet in the forests of Ukrainian Polissia. The main contributors to diet contamination are: heather (35 % of total ^{137}Cs content diet), blueberries (14,3 %), aspen (14,3 %) and oak (shoots 10,9 %, acorns 12,2 %).

Some changes in contamination structure of roe deer diet occurred 20 years after the initial study. The increase of heather contribution by 14,1 % and acorns contribution by 10,4 % in total activity of diet was observed. The contribution of aspen shoots (by 13 %) and oak (10 %) decreased. The contribution of such components as birch, blackberry, blueberries and mushrooms into diet contamination leaves almost unchanged.

Thus, some changes in contamination structure of roe deer diet occurred 20 years after the initial study. The total contamination of roe deer diet is formed both by forage with a high content of radionuclides, and by those that are consumed in large quantities and have average ^{137}Cs specific activity. Although, there was a significant reduction in ^{137}Cs forage contamination, but the content of this radionuclide is still high in soil and in plants which, in turn, leads to contamination of roe deer body.

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