

## INFLUENCE OF NATURAL SORBENTS ON RADIONUCLIDES BUILD-UP IN ANIMAL ORGANISMS

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The article deals with the aspects of using natural sorbents in order to protect animal organisms from harmful long-lived radionuclides. The influence of natural sorbents on reproductive qualities, growth and development of animals is considered. The influence of various natural sorbents on the level of radionuclide in the animal organism has been studied in terms of farm animals, in particular cows.

*Keywords:* sorbents, radionuclides, cesium, strontium, animals.

Rapid development of industry and agricultural production in the country has led to the contamination of the biosphere by chemicals. The catastrophe at the Chernobyl nuclear power station has only exacerbated the ecological situation in the country. Since that moment the concentration of radionuclides in natural environments has exceeded pre-emergency levels significantly. Most of the territory of Belarus is polluted with long-lived radionuclides, which pose a potential hazard to humans and animals. Currently, biological hazards are caused by long-lived isotopes, mainly  $^{137}\text{Cs}$  and  $^{90}\text{Sr}$ .

Radionuclides in chain order "soil-plant-animal" enter the human body and accumulate. This contributes to the formation of an internal exposure dose of the population and its level is often higher than the permissible average annual radiation standard [1]. Therefore, one of the serious tasks of agriculture is to prevent from the accumulation of radioactive elements in the organisms of farm animals and to manufacture ecologically "clean" production.

About 95–98 % of radionuclides enter animals through the gastrointestinal tract with feed and water [2]. Reduction of the radionuclides intake by animals can be achieved by balancing the animals diet according to mineral elements and vitamins, which will decrease the concentration of radionuclides and other toxicants in livestock products.

The most effective and simple way, preventing the entry of radionuclides into livestock products, is the natural sorbents in the diet of farm animals. They include common clay, zeolites, bentonite, humolite, vermiculite and others.

According to N. Lysenko's research, zeolites can reduce the amount of radioactive cesium in milk and muscle tissue of cows by 30 %. Mordenite in experiments of this author on goats at a dose of 5–10 g / day contributed to an increase in the rate of urinary excretion of radioactive cesium more than 2 times. The bentonite, used at a dose of 200–500 g / day, reduced the amount of radioactive cesium in milk and muscle tissue of cows by 50 %. Such sorbent as humolite at a dose of 100 g / day decreases in 1,6–2,8 times the amount of radioactive cesium in the milk of cows on the 11th day [3].

It was also revealed a positive effect of natural sorbents in diets of cow-heifers on the reproductive qualities, as well as the growth and development of young stock. Thus, animals of the 1st experimental group have the best conception rate, which equals to 1,4, and it is significantly lower than in the control group by 0,5 ( $P > 0,001$ ) and in the 2nd experimental group by 0,3 ( $P > 0,001$ ). Average daily gains show the high energy and growth rate of cow calves of the experimental groups: in group I – 840 g, and in group II – 830 g [4].

Nowadays manufacturing of the clean livestock products takes on national, social and political significance, and it is impossible without various ways of reducing the radionuclides intake in the organism of animals. The most effective and simple way, preventing the entry of ecotoxicants into livestock products, is the use of sorbents. In conditions of technogenic pollution of the environment, the study of the effectiveness of natural sorbents for removing radionuclides from the animal organism is becoming increasingly important. It determines the need to carry out radioecological and toxicologic investigations in zones of the environmental risk.

### BIBLIOGRAPHY

1. *Smirnova, M. A.* Radiation contamination influence of the Bryansk region on the agricultural lands and the socio-ecological situation of the population / M. A. Smirnova // Herald of St. Petersburg State University. – 2010. – Series 7. – No. 2.
2. *Radioecology of agricultural animals* / A. N. Sirotkin, R. G. Ilyazov. – Kazan: Fen, 2000. – 381 p.
3. *Lysenko, N. P.* Effectiveness of the immune preparations and sorbents for cattle in the radiation zone affected by use of the vaccine / N.P. Lysenko // Herald of AIK of Stavropol. – 2015. – No. 4 (20).

## ECOLOGICAL FEATURES OF THE COMMUNITY STRUCTURE OF WATERBIRDS AND SHOREBIRDS OF THE WATER RESERVOIR "DROZDY" MINSK

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The paper presents data on the structure of the community of water-marsh and waterbirds in the Drozdy reservoir in Minsk. Ecological groups, ecological status with respect to migration, and bird density were also determined. 39 species of birds belonging to 7 orders were identified. The greatest variety is characterized by water-swamp and waterbirds.

**Keywords:** avifauna, ecological status, birds, environmental groups, biodiversity, the water reservoir "Drozdy"

In connection with the rapid urban development, the interest of zoologists to animals in the city has increased, birds among them are most noticeable and important [1]. Nowadays there are almost no territories left untouched by human activity, but the forms and extent of this impact are different. In the city, the influence of human activity on nature is expressed particularly clearly [3].

The purpose of the study was to study the structure of the community of water-marsh and waterbirds in the reservoir "Drozdy" in Minsk.

The research site is the reservoir "Drozdy", located at the north-western margin of Minsk, on the river Svisloch. On the banks there are artificial sandy beaches. On the west bank, residential complexes are being built. On the east side, the forest adjoins the reservoir.

When studying the structure of avifauna, it was revealed that 39 species of birds belonging to seven orders inhabit the Drozdy reservoir: Podicipediformes, Anseriformes, Gruiformes, Charadriiformes, Columbiformes, Apodiformes, Passeriformes (Passeriformes).

On the territory of the reservoir, species belonging to three groups have been identified according to the status of migration: nesting migratory and in a limited number of wintering – 7 species, nesting migratory – 17 species, nesting sedentary – 15 species [4].

Birds of the reservoir Drozdy by ecological groups are divided into waterfowl, water, synanthropic, forest, airships, birds of open landscapes. 33 % of the recorded species are waterfowl, 31 % are waterfalls, 13 % are cyananthropic, 10 % forestalled, 8 % airships, and 5 % birds of open landscapes [2].

The bird population density was 557,14 individuals / km<sup>2</sup>. The largest density is in the lake gull – 53,81 individuals / km<sup>2</sup>. The white stork has the lowest density – 1,90 individuals / km<sup>2</sup>.

Thus, the territory of the Drozdy reservoir plays a huge role in preserving the species diversity of birds. The reservoir is an important stopping point for birds on the migration route.

### BIBLIOGRAPHY

1. Gomel, V. C. Monitoring of structure and population density of communities of waterbirds reserve "Lebyazhy" / K. V. Gomel, A. V. Khandogiy // Sakharov readings 2015: environmental problems of the XXI century: proceedings of the 15th Intern. scientific. Conference. – Minsk, 2015. – P. 134.
2. Nikiforov, M. E. The formation and structure of the avifauna of Belarus / M. E. Nikiforov. – Minsk: Belarusian. science, 2008. – 297 p.
3. Ostapenko, V. A. Waterbirds in nature, zoos and farms / V. A. Ostapenko, B. F. Bessarabov. – Moscow: Zootechnica, 2014. – 250 p.
4. Yurko, V. V. Biodiversity and breeding success of waterbirds in the reservoirs of Minsk / V. V. Yurko // Problems of biological diversity conservation and use of biological resources: materials of III International scientific-practical conference, devoted to 110-anniversary from birthday of academician N. I. In. Smolsky. – Minsk, 2015. – P. 333–337.