

## **Management of agroecosystems around an industrial city for the production of environmentally friendly milk and features of heavy metal excretion in dairy cows with the use of special antidote substances**

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The strained ecological situation has developed today in agroecosystems around industrial cities in almost all countries of the world. They are subject to increased anthropogenic pressure as a result of the use of agrochemicals and polluting emissions from industrial enterprises. Heavy metals Cd and Pb represent the greatest ecological threat to ecosystems. In such an ecological situation, the risk of xenobiotics entering the milk and its contamination by foreign matter significantly increases, they migrate easily in the components of the biosphere through trophic chains entering the organism of farm animals, incl. dairy cows, which negatively affects their health, ecological safety, quality of manufactured milk and human food. Effective methods of managing the resources of agroecosystems for the production of high-quality cow's milk products and ensuring sustainable development play an important role in this.

In four farms located around the industrial city, scientific and economic experiments were carried out on feeding cows with a specially developed adapted to the actual diets of feeding mineral-vitamin premix "MP-A" and subcutaneous injection of biologically active preparation "BP-9" to enhance the excretion of urinary heavy metals Cd, Pb, Cu, Zn and ensuring the production of high quality environmentally sound milk. In plants grown in farms - feeds that were part of the cows diet, high levels of Cd, Pb, Cu and Zn were detected. Getting into the body toxicants from the gastrointestinal tract are absorbed into the blood, spread around the body, accumulate in organs and tissues, pass into urine and milk. The accumulation of Cd in the blood of test cows in control groups was on average from 77.94 to 101.20 nmol/L, Pb – from 4.63 to 8.32  $\mu\text{mol} / \text{L}$ . The transfer of Cd from blood to urine was on average 1.7 to 2.0 %, Pb – 5.4-7.3 %. Elimination of heavy metal data from the body through the kidneys with urine is negligible and without the use of additional agents is unlikely. Acute research has shown that the liver, kidneys are organ-mes "targets" for the action of pollutants. Partially the elements were accumulated in the spleen, muscle and bone tissue, with the milk. There was a chronic form of toxicosis. The applied antidote substances contributed to the exacerbation of heavy metal extermination from the body of animals and the restoration of its homeostasis. In other experimental groups of cows, the transfer of Cd from blood to urine averaged 3.9 to 9.5 %, Pb – 37.7-103.5 %, respectively, in the third – from 7.1 to 12.7 % Cd and 70.7-144.1 % Pb. The combined effect of the antitoxin premix and the biopreparation in the third experimental group of cows gave a better result of the removal of toxic elements from the body. Enhanced excretion of pollutants can serve as proof of their high content in the body. The excretion of heavy metals in the urine of cows reflects the level of loading of the

body that is caused by the eating of feeds from the excess of investigated elements. The premix and biopreparation developed blocked absorption of the pollutants in the gastrointestinal tract, strengthened the protective effect of the intoxicated organism, and facilitated the elimination of heavy metals with urine for such a number of migration activities of Pb, Cu, Zn and Cd; have positively influenced the renal elimination of the excess of essential elements of Cu and Zn, not worsening the health of cows, but rather restoring homeostasis, improving the quality and ecological safety of the produced milk.

The applied methods showed quite good result. Further research is aimed at developing more effective anti-nutritional substances.

Keywords: premix, bioprepared, medicinal plants, cadmium, lead, copper, zinc, contaminated feeds, antidote substances, animal productivity.