## HYGIENIC ASSESSMENT OF HEAVY METALS ON MORPHOLOGICAL STRUCTURE OF SOWS END PIGLETS

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**Abstract:** The research background levels of heavy metals (cadmium, cuprum, Plumbum, zinc, mercury) in organs and tissues of sows, newborn piglets and their negative impact on the morphological structure of organs and tissues of pigs are given.

**State of issue:** The issue of chemical pollution of the biosphere by heavy metals are "red thread" in many areas of modern research (Israel JA, 1987, Klimenko, M., 2008). Many scientists have studied the problem of the negative impact of high concentrations of heavy metals in the body of animals (Zasyekin DA, 2004, Donnyk IM, 2008). Example, according to experts in the waters of the seas and oceans each year receive about 10 million tons of oil, domestic and industrial wastewater containing hazardous contaminants such as: Lead, mercury - that exhibit toxic effects on living organisms. Background concentrations of these substances in many places already exceeds ten times the MCL.

**Research Objective:** To study the background levels of heavy metals in the organs and tissues of sows and newborn piglets. Compare the results obtained with the maximum allowable concentration . Set action of toxicants on the morphological structure of organs and tissues of piglets.

**Materials and methods.** The material for the conducted studies were samples of tissue samples of sows and newborn piglets Ukrainian Large White breed AF "Dniester" Artsyz district of Odessa region. Content of heavy metals in the organs and tissues of animals was determined by stripping voltammetry on the device

ABA-2.

**Results.** Consumption of animal feed contaminated with heavy metals contributed to their cumulation in body of sows (Table 1).

The elem ent	Liver	Kidne ys	Lungs	Heart	Spleen	Muscles	Colon	Thin bowels
Cd	0,001±	0,54±	0,04±	0,001±	0,16±	0,015±	0,001±	$0,0009\pm$
	0,0001	0,044	0,006	0,0001	0,008	0,0025	0,00004	0,0001
Cu	11,5±	9,3±	25,5±	1,92±	13,71±	1,58±	1,97±	1,22±
	0,25	0,10	0,42	0,04	0,14	0,06	0,08	0,049
Pb	$0,007\pm$	0,2±	0,112±	$0,0072\pm$	$0,097\pm$	0,011±	$0,0008\pm$	0,00011±
	0,0006	0,03	0,008	0,00046	0,014	0,0016	0,00005	0,00001
Zn	20,92±	5,6±	9,4±	1,32±	76,9±	2,74±	$0,80\pm$	0,64±
	0,25	0,11	0,19	0,06	0,99	0,11	0,044	0,054

1. Contents of heavy metals in the organs and tissues of sows mg / kg (M  $\pm$  m, n = 3)

The results obtained on the content of heavy metals in the body sows show the excess of cadmium in the kidneys, spleen, respectively, in 10.8 and 3.2 times, copper - the liver, kidneys, lungs and spleen 2.3; 1.8; 5.1; 2.74 times.

The latter is likely to have a negative impact on the detoxification function of the liver, metabolic processes in the body. Excess zinc was observed in the spleen by 9.8% compared to the MAC (70 mg / kg). Significant concentrations of cadmium and copper are reported in the brain, adipose tissue (Table 2).

2. Distribution of heavy metals in the lymph nodes, adipose tissue and brain of sows mg / kg (M  $\pm$  m, n = 3)

The element	Cerebrum	Fat	Lymph nodes		
Cd	0,04±0,001	0,042±0,0043	0,03±0,001		
Cu	1,0±0,47	3,86±0,067	2,3±0,08		
Pb	0,02±0,003	0,09±0,004	0,006±0,001		
Zn	0,051±0,0055	88,76±0,99	0,12±0,0076		

Lipidotropni properties of heavy metals indicate the possibility of maximum accumulation is particularly important in the structure of the body - the brain. Accumulation of heavy metals in the organs and tissues of newborn piglets are presented in Table. 3.

3. Contents of heavy metals in the body of newborn piglets, mg / kg  $(M\pm m,\,n=3)$ 

The		Концентрація важких металів в органах і тканинах, мг/кг										
elem	Liven	Kid	Lungs	Heart	Selson	Cereb	Musc	Calan	Thin	Fat	Lymph	MAC
ent	Liver	neys	Lungs	nean	Spieen	rum	les	Colon	bowels		nodes	
Cd	0,0011±	0,65±	0,05±	0,006±	0,24±	0,08±	0,012±	0,009±	0,006±	0,039±	0,07±	0,05
	0,0001	0,042	0,003	0,007	0,08	0,005	0,003	0,0002	0,0001	0,006	0,003	
Cu	13,1±	12,1±	15,4±	3,42±	13,42±	4,0±	4,23±	3,24±	2,12±	3,22±	4,15±	5
	0,18	0,12	0,12	0,06	0,23	0,47	0,12	0,32	0,44	0,21	0,21	
Pb	0,04±	0,53±	0,22±	0,052±	0,23±	0,54±	0,21±	0,005±	0,0014±	0,41±	0,08±	0,5
	0,019	0,12	0,01	0,0012	0,061	0,065	0,042	0,0008	0,0005	0,031	0,005	
Zn	22,41±	8,97±	12,36±	10,33±	60,8±	17,4±	7,56±	6,54±	8,33±	54,22±	45,61±	70
	0,11	0,21	0,67	1,7	4,56	6,45	0,44	0,98	0,71	2,31	3,61	70
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Excess of cadmium in the liver , kidneys , lungs , heart , spleen of newborn piglets compared with the mother being respectively 1.17 ; 1.20 ; 0.11 ; 5.45 ; 1.5 times. There were also a significant excess of cadmium in the brain and lymph nodes of pigs respectively by 18.2 ; 20.4 times compared with the mother and the kidneys and lymph nodes 1.3 and 1.4 times, respectively MAC.

The studies found excess of copper in the liver , kidneys , lungs , spleen piglets compared with MPC 2.62 respectively ; 2.42; 3.08; 2.68 times.

Increased content of lead is registered in the kidney and brain of pigs respectively 1.06 and 1.08 times, and zinc content in the range of MAC. The level

of cadmium in the kidneys, liver, spleen , lungs , fat pigs exceeded the norm by 16.2; 5.4; 15.8; 9.6 2.7; 2.4 times (0.05 mg / kg) of lead in the spleen 1.2 times (0.6 mg / kg).

Thus, the results indicate that the blood-brain and placental barriers is not an obstacle for migration of heavy metals in tissues of the foetus. Heavy metals through the placenta and blood-brain barrier pigs migrate into the body and accumulate in concentrations higher than in the mother and MAC. An important issue is the development of methods for in vivo diagnosis of intoxication of animals. We worked out options for determining intoxication on the content of heavy metals in bristle from different parts of animal skins. Vivo diagnosis by the degree of accumulation of heavy metals in pig bristle suggests that the best predictor is a month old pigs , the content of cadmium in bristle (areas grits ) which exceeded the maximum permitted limit by 6.4 times, of copper - 1.5 times, of lead - by 1,1 times.

It was determined the excess of heavy metals in the bristle of sows of different parts of the body. Thus, the bristle area of the back marked excess of cadmium 1,2 times , limbs copper - 1.4 times , band grits of lead -2,4 times, in the head section copper exceeding by 1.2 times according to established maximum allowable level. Heavy metals accumulated in the organs and tissues of pigs affect their morphological structure. Thus, we set the focus of granular degeneration of the epithelium of the renal tubules, granular degeneration of hepatocytes of the liver of pigs , hyperplasia of the reticular tissue in the red and white pulp of the spleen of the type " granules " focus of atelectasis in the lung tissue , cellular infiltration of lymphoid elements of the lung tissue.

## Conclusions

- 1. It was experimentally proved the excess of cadmium in the body sows: kidney, spleen by 10.8 and 3.2 times, copper the liver, kidneys, lungs and spleen by 2.3; 1.8; 5.1; 2.74 times respectively MAC.
- Excess of cadmium was found in the body of piglets compared with the mother in the liver, kidney, heart, spleen, brain, lymph nodes in 1.17; 1.20; 5.45; 1.5, 18.2; 20.4 times. It was proved the highly embryotoxic effects of heavy metals.

3. Research has established degenerative changes in the spleen, lung tissue, liver, renal tubules of piglets for the actions of heavy metals.

## Literature

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