

The content of heavy metals in the grass, in water and milk of Mares according to the season of the year

Z.A. Kazhmukhanbetkizi, N.B. Eleubaevich, B.S. Maksutovna

West Kazakhstan Humanitarian Academy, Ural'sk, Kazakhstan. E-mail: araiikon_90@mail.ru

Received: 10.01.2019. Accepted: 22.02.2019

The article presents a comparative analysis of the content of heavy metals in the herbage of different in the tract Kyrkudyk represented mainly by plant associations with the dominance of long-growing species: 1. Pollen-Wheatgrass communities; 2. Sitnyakovo-belopolye community; 3. Licorice-cereal communities of pastures. The vegetation cover is in the tract Saryomir herbage grow: 1. Swan communities; 2. Forb - grass community; 3. Sitnyakovo-couch-wormwood community pastures and water wells and ponds above-mentioned tracts and also in milk of mares of Vipassana in them. The analysis is performed in relation to the season of the year, in spring and autumn. The actual values were compared with the MPC of the studied metals. Indicators basically did not exceed the MAC.

Keywords: Heavy metal; maximum permissible concentration; watering; pasture; Mare's milk

Introduction

Ensuring the internal and external market, increasing production and improving the quality of Mare's milk in accordance with international standards is an urgent problem for Kazakhstan. In this regard, it is of great practical importance to study the content of heavy metals in the grassland, in water and Mare's milk and to compare the results with the MAC indicators. Kazakh horses of Western Kazakhstan are kept year-round on natural pastures and natural reservoirs and mine wells are used for their watering. The content of heavy metals in the grassland and in the water is transmitted through the process chain to the mares and their milk. In the production of Soumela and koumiss excess heavy metals in their structure can have severe consequences for the health of consumers.

The results of the study of a number of scientists show that many plants have protective mechanisms of the root system and terrestrial vegetative organs that prevent the excessive flow of heavy metals from the soil and their accumulation in plant products (Avramenko, 1999; Voloshin, 2000).

Toxic compounds from plants eaten by animals pass through the trophic chains into the animal organism, then into animal products (milk), which are actively consumed by the population and are the cause of many serious diseases (Veroshnichenko, 2013).

The aim of the study was to study the content of heavy metals in the composition of grass, water and Mare's milk for environmental assessment of the content and feeding of mares and their products.

Materials and methods

To conduct research, we have selected the tract Kyrkudyk and Saryomir, located in the West Kazakhstan region. Study of heavy metals content in part Tavastia tracts have Karykkuduk and Saryomir held in spring and autumn with the different in the tract Karykkuduk predominantly represented by plant associations c the dominance of long-term vegetative types: 1. Pollen-Wheatgrass communities; 2. Sitnyakovo-belopolye community; 3. Licorice-cereal communities of pastures. The vegetation cover is in the tract Saryomir herbage grow: 1. Swan communities; 2. Forb - grass community; 3. Sitnyakovo-couch-wormwood communities grassland communities, in water wells and ponds as well as in the milk of mares, of soderjaschihsya in different sites. Sampling of herbs of pasture, water and milk of mares was performed according to GOST 27262-87, GOST 24027.0-80, GOST 30178-96, GOST 53218-2008. 12 samples of pasture plants and 8 samples of water and 40 samples of Mare's milk were investigated. The level of heavy metals content in troae, water and milk of mares were determined in the laboratory of West Kazakhstan agrarian technical University named after Zhangir Khan atomic absorption spectrophotometer AA-AA140 according to the guidelines of the atomic absorption spectrophotometric method determination of toxic elements.

Results and discussion

Herd productive horse breeding in Western Kazakhstan is a traditional branch of animal husbandry. The concentration of minerals in the milk of farm animals is relatively stable.

In Western Kazakhstan, mainly bred for the production of saumal, Mare's milk and horse horses of the Kazakh, kushum and Mugalzhar breed. The Kazakh breed of horses is well adapted to local ecological and technological conditions of cultivation. Increase milk and meat production of horses of Kazakh breed and improving the quality of the milk from them, soumala, koumiss and horsemeat is a priority and horse breeding (Aliyev, 1997; Georgievsky, Annenkov & Samokhin, 1979). The production of organic horse products involves monitoring the content of heavy metals in both pasture vegetation, water and meat and dairy products. In this regard, we have conducted a study of the content of heavy metals in the grass, water and milk of mares contained in the tract Kyrykkudyk and Saryomir.

According to numerous experimental studies, the concentration of nutrients and their chemical analogues in animal milk is associated with the mineral composition of the diet (Mineral nutrition, 1967).

The chemical composition of the product depends on the chemical composition of the environment-soil, water, plant pastures consumed by horses for food. The main links of the migration chain in the herd horse breeding consist of the following components-pasture plant-water watering-milk, meat.

Indicators of the content of heavy metals in different communities tracts have Karykkuduk and Saryomir depending on the season of the year, and the MPC is given in Table 1.

Table 1. The content of heavy metals in herbage tracts have Kyrykkudyk and Saryomir mg/kg.

Communities		Chemical Elements							
		Fe	Co	Cu	Pb	Zn	Cd	Ni	Mn
Community of the tract Kyrykkudyk:									
1	spring	0	0.2	0.05	0.35	0.96	0.04	0.02	2.37
	autumn	0.5	0.1	0.06	1.5	3.47	0.04	2.01	25.9
2	spring	10.63	0.1	0.35	0.25	0.78	0.03	0.03	11.9
	autumn	7.9	0.4	0.7	0.67	4.61	0.05	3.7	36.49
3	spring	0	0.1	0.09	1	4.66	0.002	0.085	3.65
	autumn	1.5	0.5	34.4	2.6	16.8	0.05	5.2	27.5
Community of the tract Saryomir:									
1	spring	14.9	0.2	0.06	0.23	3.12	0.02	0.04	6.54
	autumn	14.5	1	6.8	2.8	13.44	0.06	5.5	42.59
2	spring	17.8	0.2	0.35	0.27	9.02	0.025	0.01	5.69
	autumn	1.6	2.2	6.2	0.4	24.9	0.19	2.44	49.5
3	spring	15.8	0.5	0.095	0.97	7.31	0.09	0.09	6.97
	autumn	5	1.1	7.55	1.3	20.71	0.1	5.2	53.52
TLV		100	2	30	2	50	0.2	3	60

The study of plant samples of grass stands of different communities of the tract Kyrykkudyk and Saryomir showed that the content of chemical elements in pasture feed does not go beyond the permissible concentrations (MPC). However, the concentration of cobalt in pasture grasses in the tract Saryomir exceed the MCL of 0.2 mg/kg. the Concentration of copper in the 3rd community of the tract Karykkuduk exceeded the MCL by 4.35 mg/kg. the Concentration of lead in the 3rd community of the tract Karykkuduk exceeded the maximum permissible concentration of 0.6 mg/kg and in the 1st community tracts Saryomir 0.8 mg/kg. The Nickel concentration in the 2nd community of The Kyrykkudyk tract was 0.7 mg/kg, in the 1st and 2nd communities of the Saryomir tract was 2.5 and 2.2 mg / kg, respectively. The content of heavy metals in water consumed by mares, depending on the type and location of water bodies is presented in Table 2.

Table 2. Contents of heavy metals in the water of the watering holes have Karykkuduk and Saryomir mg/L.

Chemical element	TLV	In the tract							
		Kyrykkudyk				Saryomir			
		spring		autumn		spring		autumn	
		well	pond	well	pond	well	pond	well	pond
Fe	0.3	0	0	0.04	0.1	0.043	0.003	0.61	0.09
Co	0.1	0.069	0.057	0	0.052	0.06	0.12	0.056	0.25
Cu	1	0.002	0.001	0	0.009	0.0001	0.003	0.007	0.028
Pb	0.03	0.02	0	0	0	0	0.026	0	0.003
Zn	1	0	0	0.045	0.084	0	0	0.043	0.01
Cd	0.001	0.003	0.006	0.003	0.004	0.002	0.013	0.003	0.019

Mn	0.1	0.609	0.476	0.677	0.521	0.121	0.312	0.568	0.422
----	-----	-------	-------	-------	-------	-------	-------	-------	-------

Indicators of the content of heavy metals in water of watering places depending on type and their arrangement was generally limits of admissible concentration. But the content of iron in the water of the well tract Saryomir in autumn exceeded the maximum permissible concentration 0.31 mg/l. the Content of cobalt in the pond tract Saryomir spring and autumn 0.02 0.15 exceeded the MCL. Cadmium concentration in all seasons of the year in wells and ponds in both areas exceeded the MCL for from 0.001 to 0.018 mg/l. the Concentration of manganese in all seasons of the year in wells and ponds in both areas exceeded the MCL for from 0.021 to 0.577 mg/L.

The content of heavy metals in the plant-water-milk chain can be transferred to the final product and get to the consumer's table. Indicators of heavy metals content in mares milk are presented in Table 3.

Table 3. The content of heavy metals in the milk of mares grazing in the tract Kyrykkudyk and Saryomir, mg/kg.

Chemical element	TLV	In the tract			
		Kyrykkudyk		Saryomir	
		spring	autumn	spring	autumn
Fe	1.3	0.1471	0.741	0.1597	1003
Co	0.1	0.14	0.06	0.16	0.02
Cu	1	0.0643	0.2461	0.093	0.05
Pb	0.05	0.09	0.02	0.1	0.04
Zn	5	0.05	0.05	0.06	0.09
Cd	0.02	0.0082	0.005	0.0091	0.0015
Ni	0.23	0.0453	0.0453	0.0507	0.0461
Mn	0.6	0.0668	0.067394	0.0784	0.0368

The concentration of iron, copper, zinc, cadmium, Nickel and manganese in the milk of mares contained in the tract Kyrykkudyk and Saryomir in spring and autumn did not exceed the MPC, which shows a favorable situation for these metals. At the same time, the content of cobalt in the milk of mares in the spring exceeded the MCL (0.1 mg/kg) in 0.4 and 0.6 mg/kg, respectively. Lead concentration in the milk of mares kept on tracts has Kyrykkudyk and Saryomir in the spring exceeded the MCL (0.05 mg/kg) 0.04-0.05 mg/kg, respectively.

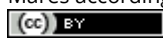
Discussion and conclusion

Studies have shown that the content of heavy metals in the composition of grass, water and milk mares mainly meet sanitary and hygienic standards. Heavy metals from the composition of grass and water watering can enter the milk of lactating mares. The revealed maximum concentrations of some heavy metals may have been associated with low protective properties of herbs of some communities of the surveyed pastures and the organism of lactating mares from the penetration of heavy metals, contributing to their transfer to the mobile form and are mainly in a sedentary form, which does not pollute vegetation, water and milk above the MPC. Established maximum permissible concentrations are exceeded by the performance of some heavy metals require systematic study and determine the causes of nonconformity with standards. Based on the study, recommend a system of integrated monitoring of heavy metals content in herbage of pastures, water and watering places, and the milk of mares, and the Mare. The results of the study can be used in the development of issues related to the standardization and certification of organic products of productive horse breeding.

References

- Avramenko, P. M. (1999) Soil contamination with heavy metals and their accumulation in plants. In: Avramenko, P. M., Lukin, S. V. (eds.). *Agrokhim Notable* 2, 31-32.
- Voloshin, E. I. (2000) Accumulation of cadmium and lead in soils and plants. *Agrokhim Notable* 3, 23-26.
- Veroshnichenko, M. A. (2013) The content of heavy metals in livestock products in the Tula region. In: Veroshnichenko, M. A. (ed.), *Zootechny*, 5.
- Aliyev, A. A. (1997) *Metabolism in ruminant animals*. MSRC Engineer.
- Georgievsky, V. I., Annenkov, B. N., Samokhin, V. T. (1979) *Mineral nutrition of animals*.
- Kolos, O.Y.K. (1967) *Mineral nutrition of animals in various natural and animal conditions*. Kolos, 1967.

Citation: Kazhmukhanbetkizi, Z.A., Eleubaevich, N.B, Maksutovna, B.S. (2019). The content of heavy metals in the grass, in water and milk of Mares according to the season of the year. *Ukrainian Journal of Ecology*, 9(1), 86-88.

 This work is licensed under a Creative Commons Attribution 4.0. License