POLLUTION

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Zhumayeva A.K. *[1], Zinullin A.Z.[1], Buralkhiev B.A.[1], Simov Zh.[1]

[1] Kazakh National University, Almaty, Kazakhstan

* Corresponding author (araikon_90[at]mail.ru)

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CHEMICAL COMPOSITION KRYKKUDUK AND CRYOMASSAGE GRAZING AND WATERING

Research article

Abstract

Agricultural ecosystems are the main source of animal food production. The consequences of economic activity are associated with the receipt of substances of anthropogenic origin – xenobiotics in various components of ecosystems, their movement and accumulation.

The first place among the most dangerous for human health toxicants is occupied by heavy metals (HM). A classic example of such migration mechanisms is the "grazing chain", which begins with grazing plants when they are eaten by farm animals. An important role is played by contamination of the plant surface as a result of settling from the air on the leaves and stems of metal-containing particles. In the diet of the person surface akrasanee TM does not play a significant role, since before use they are cleaned and washed. This is not the case with animals that eat superficially contaminated pasture or hay harvested from it. In this case, HMS deposited in the dust should be considered as part of the flow entering the food chain. In this regard, the maximum transition coefficients (KP) from the diet to animal products (milk, meat) differ in the pasture period of animals.

Keywords: heavy metals, pasture, well, pond.

Жумаева А.К.*[1], Зинуллин А.З.[1], Буралхиев Б.А.[1], Симов Ж.[1]

[1] Казахский Национальный Аграрный Университет, Алма-Ата, Казахстан

* Корреспондирующий автора (araikon_90[at]mail.ru)

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ХИМИЧЕСКИЙ СОСТАВ КРЫККУДУКСКОГО И САРЫОМИРСКОГО ПАСТБИЩА И ВОДОПОЯ

Научная статья

Аннотация

Сельскохозяйственные экосистемы являются основным источником производства продуктов питания животного происхождения. Последствия хозяйственной деятельности сопряжены с поступлением веществ антропогенного происхождения – ксенобиотиков в различные компоненты экосистем, их передвижением и накоплением.

Первое место среди наиболее опасных для здоровья человека токсикантов занимают тяжелые металлы (ТМ). Классическим примером подобных механизмов миграции выступает «пастбищная цепь», которая начинается пастбищными растениями при поедании их сельскохозяйственными животными. Большую роль играет загрязнение поверхности растений в результате оседанияиз воздуха на листья и стебли металлосодержащих частиц. В питании же человека поверхностное загрязнение ТМ не играет существенной роли, поскольку перед употреблением их очищают и моют. Иначе дело обстоит с животными, которые поедают поверхностно загрязненный подножный корм или заготовленное из него сено. В этом случае ТМ, осевшие в пыли, следует рассматривать как составную часть потока, поступающего в пищевую цепь. В связи с этим максимальные коэффициенты перехода (КП) из рациона в продукты животноводства (молоко, мясо) отличаются в пастбищный период содержания животных.

Ключевые слова: тяжелые металлы, пастбище, колодец, пруд.

1. Introduction

To determine the possibility of obtaining environmentally safe products of horse breeding on pastures Saryomir and Karykkuduk survey of water sources used in winter and summer.

Water samples are taken from 4 water sources (Krykkuduk and Saryomir from open reservoirs and wells). Sampling of water used in horse breeding was carried out according to GOST 24481-80.

Before starting the study of water, a qualitative analysis was carried out. To do this, 5 cm3 of the test water and three drops of 10% solution of silver nitrate are added to the colorimetric tube. The quantitative composition of chloride ion is determined by deposition or freezing in accordance with the requirements (table 1).

2. Materials and methods

Table 1 – qualitative analysis of chloride Ions.

Characteristics of sediment or turbidity	The composition of CL, mg/dm3
weak opalescence or a precipitate.	1....10
A solid precipitate	10....50
There are flocks, not just pokazyvayutsya	50....100
A voluminous white precipitate	More than 100

After a qualitative analysis, a quantitative analysis was carried out.

Water viscosity GOST 4151 – 72, dry matter content GOST 18164 – 72, calcium and magnesium ions GOST 23268.5 – 78, taste, smell and turbidity GOST 3351 – 74, nitrate content GOST 18826 – 73, nitrite ions GOST 23268.8 – 78, phosphorus content GOST 18309-2014, sulfate content GOST 4389-72, ammonium ions GOST 23268.10-78, as well as the content of heavy metals GOST 31870-2012.

Chemical composition of pasture grasses: humidity ГОССТ13496.GOST 2 – 91, protein GOST 10846 – 91, carotene GOST – 95, calcium GOST 26570 – 95, phosphorus GOST 26657 – 97, cadmium GOST 26933-86 are established. In addition, the content of heavy metals: food raw materials and products using atomic absorption spectrometer Fe, Cu, Zn, Co, Mn, Pb, Cd, Ni, GOST R 256372-2015, GOST 53218, GOST 26934 – 86. Method for the determination of zinc. GOST 26570-95 feed, mixed fodders,mixed fodder raw materials. Methods for the determination of calcium. GOST 26932-86 methods for determination of lead. Raw materials and food products were determined on the atomic absorption spectrophotometer AAS-AA140, respectively.

The experience was carried out in conditions of dry steppe climatic conditions KKH "Nazarabad" Terekty and Akzhaiyk districts in West Kazakhstan region. The study area is located in the mid-latitudes in the range of 490 on the Northern width and 490 on the Eastern longitude. In the North of the Caspian sea, 300 - 400 km from the sea, 35 – 40 km East of the Ural river, is in the flat steppe. This zone is estimated as a zone of sharply continental climate with real periods of the year. Climatic features are continental, plenty of sunlight, dry, intense evaporation, little snow, high wind speed, lack of precipitation. The annual precipitation of the study area ranges from 200-240 mm.

The object of the study was 20 heads of milking mares of the Kazakh breed, which were created for 2 groups with 10 heads in each. The groups were selected on the basis of analog groups, taking into account the origin, age, physiological state and live weight. Mares went to the herd, and in winter and summer were on pastures. Experienced region was: filly cryomassage pastures and the mares Karykkuduk pastures. Normalization of their physiological state indicates hematological and biochemical parameters of blood.

In the farm "Nazarimbet" use of open reservoirs and wells for watering the horses.

Pollution of water, soil, air, plants leads to harmful emissions of heavy metals in livestock products. Because for horses water is needed in significant quantities. Daily watering mares 20-40 liters. The quantity and quality of drinking water directly affect the quantity and quality of products derived from horse breeding. At the same time, special attention is paid to the study of physical and chemical parameters that determine the quality of water. In the experiment, mares were divided into two groups on the grassland Karykkuduk and Saryomir. Therefore, two pastures used wells and open water sources. Their physical and chemical parameters (table 2, 3).

Table 2 – physical and chemical properties of water in the spring and the content of some chemical compounds in wells and reservoirs.

Indicators	Saryomir		Kirukkydyk		TLV
	Well	open waterfall	Well	open waterfall	
Viscosity, mg * EQ/dm3	3,1	50	3	35	10
Chloride, mg/dm3	13,8	362,0	6,9	4741	350
Sulfate, mg/dm3	704,1	1313,1	47,7	522,2	500
Magnesium, mg/dm3	6,6	22,2	0	10,8	40
Calcium, mg/dm3	40	1200	42	330	180
Carbonate, mg/dm3	Not found	Not found	Not found	Not found	-
Bicarbonate, mg/dm3	372,1	890,6	219,6	286,7	-
Dry residue, mg/dm3	602,292	3198	116	638	-
Orthophosphate, mg/dm3	Not found	1,64	0,03	1,91	-
Polyphosphate, mg/dm3	0,01	0,57	Not found	0,90	3,5
Ammonium, mg/dm3	0,9	1,8	0,4	1,2	0,5
Nitrite, mg/dm3	0,082	1,419	0,013	0,083	0,1
Nitrate, mg/dm3	0,6	0,6	0,7	0,6	40

The viscosity of water depends on the level of salt solutions in it. In open water, the viscosity of water is much higher than in wells, as at the basis of open water ducts there is a large number of salt solutions, as on the basis of open water ducts are collected sedimentary water with surface washing. Especially in the bright waters Saryomir in connection with the relief of the land more than on the Earth's surface, the viscosity of an open reservoir Saryomir higher than in the open waters of the spring Karykkuduk 0.5 times and fall 2 times. Now the viscosity of the water well in pasture, two wells 3 times lower than in spring and autumn in the well Karykkuduk 0.5 times, and in the well Saryomir 6 times higher than the MPC. In General, we can say that the water of the well is better than open water. This conclusion proves the level of chloride in open water.

The level of sulfates in water sources of Karykkuduk well as spring and fall below the MPL, and the water sources Saryomir especially higher in the spring in open water, and in the autumn the level of sulfate ions is very low. Therefore, in the pastures of Saryomir it is advisable to use wells as a basis.

According to magnesium, orthophosphate, polyphosphate, ammonium, nitrite, nitrate, water sources in pastures can be called satisfactory.

Table 3 – physical and chemical properties of autumn water and the content of some chemical compounds in wells and reservoirs.

Indicators	Saryomir		Kirukkydyk		TLV
	Well	open waterfall	Well	open waterfall	
Viscosity, mg * EQ/dm3	65	300	16,3	128	10
Chloride, mg/dm3	377,8	1565,9	81,89	4755,3	350
Sulfate, mg/dm3	104,7	189,29	146,3	327,5	500
Magnesium, mg/dm3	12	19,2	0	13,2	40
Calcium, mg/dm3	566,6	2800	110	1500	180
Carbonate, mg/dm3	Not found	Not found	Not found	Not found	-
Bicarbonate, mg/dm3	506,3	286,7	473,7	424,9	-
Dry residue, mg/dm3	476,1	669,174	511,3	1592,0	-
Orthophosphate, mg/dm3	0,03	0,01	0,05	0,11	-
Polyphosphate, mg/dm3	Not found	0,02	Not found	Not found	3,5
Ammonium, mg/dm3	0,4	0,7	0,1	0,2	0,5
Nitrite, mg/dm3	-0,006	0,019	-0,008	-0,08	0,1
Nitrate, mg/dm3	Not found	0,06	Not found	Not found	40

Table 4 – contents of heavy metals in swath and wells in the pastures Karykkuduk and Saryomir mg/L.

Chemical element, mg/kg	TLV	Pastures							
		Saryomir				Kirukkydyk			
		Spring		autumn		Spring		autumn	
		Well	open waterfall	Well	open waterfall	Well	open waterfall	Well	open waterfall
Fe	0,3	0	0	0,04	0,1	0,043	0,003	0,061	0,09
Co	0,1	0,069	0,057	0	0,052	0,060	0,12	0,056	0,25
Cu	1,0	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	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

The concentrations of heavy metals in waters and wells, depending on their type and location, were mainly within the permissible concentrations (MPC-MPC). However, the content of cobalt in the open water in the pastures in the spring Surioara exceeded the MCL to 0.02 mg/l MPC in the autumn of 0.15 mg/l, cadmium at 0.0003 mg/l on aspen, in the fall-0,0009 mg/l.

The nutritional value of pasture grass is determined by its chemical composition. The forage value of pastures depends not only on the Botanical composition, but also on the vegetation period of herbs.

The objects of our survey are pasture grasses located in different areas of natural areas. Natural pastures play an important role in the development of horse breeding. The land on which the research was conducted, restricted to the grassland Saryomir Terekty district, Shalkar lake in the North, the land Genetische district in the South-East, the land of Terekty district in the West and the second area, in the South-East of the grassland Karykkuduk Akzhaik district, land Genetische district, in the North-East QualityStage rural district, in the West Sensascope and Karyotyping rural district. Winter cold, the duration of 140-150 days, summer is hot and very long. Climatic conditions are typical for the dry steppe zone.

In the Botanical composition of the grassland karykkuduk includes the following types of plants: wormwood – wormwood - sagebrush – bald Association, saline Association, solonchak – Artemisia Association, and on pastures Saryomir: forb-Grass Association, the Association Alabama and Wheatgrass-sagebrush-sagebrush Association.

On pastures karykkuduk often there are associations of plants:

1. General provisions Wormwood - wormwood pastures are common in the steppe zone. The composition of the plant community: limonium gmelinii, Tomar dye, limonium gmelinii (willd.) kuntze, quack grass, wheat grass, adgroup repens (l). beauv, a bulbous meadow grass, bulbous bulbous, PoA bulbosa l, meadow foxtail, meadow foxtail, Fox Fox, alopecurus pratensis l, wormwood Austrian, Austrian wormwood, Artemisia austriaca jacq, the cruciferous family, godparents flowers cruciferae juss.

2. Female is an Association consisting of creeping, creeping, creeping, agropyron repens beauv.; bulbous bluegrass, bulbous, bulbous poa bulbosa; a comb-shaped Wheatgrass, Wheatgrass, agropyron cristatum beauv. subsp. pectinatum (b ieb .) t zvel., meadow foxtail, meadow foxtail, Fox Fox, alopecurus pratensis, family cruciferous cruciferae juss. lechowska wormwood, wormwood lerchova, Artemisia lercheana web. the family Euphorbiaceae, alocasia, euphorbiaceae juss., sagebrush unicast-Artemisia monogyna waldst et kit-TUMAR wormwood. Suitable for all grazing seasons. These herbs are the main feed for the herd of horses in the summer-autumn-winter period.

3. The structure of the grassland Association of the Ural licorice, Ural MIA, glycyrrhiza uralensis fisch, wormwood Austrian, Austrian absinth, wormwood Mugwort white; peri creeping, mugwort honeysuckle, agropyron repens beauv; cutter common karataban vulgaris, Filipendula vulgaris; common yarrow, yarrow, cabbage ordinary, Yarrow Ordinary; Potentilla goose, estaban vulgaris, Potentilla anserina, tansy, common tansy Tanacetum vulgare; white wormwood, abbasiya vulgaris, Achillea millefolium.

Yield: in spring-4,5 C / ha, summer-6,4 C / ha, autumn-5,1 C / ha, winter-4,9 C/ha. Ephemera and ephemeroids reach a maximum of phytomass, fruit and in late spring – in early summer, complete vegetation in long-growing species there is a maximum growth of phytomass only in August-September and at this time they are in the period of budding or active flowering.

On pastures Saryomir consists of the following plants:

1. General Different grass-Boone coarse calico of the Association consist of pasture grass Lessing, aristocracy, stipa lessingiana trin. the comb-shaped Wheatgrass, weed, beauv agropyron cristatum. subsp. pectinatum (b ieb .) t zvel; Potentilla goose, estaban vulgaris, potentilla anserina, tansy, common tansy tanacetum vulgare. In these groups, active vegetation and maximum growth of phytomass occur in the first half of summer and mid-summer, approximately in all seasons they complete the vegetation, are in the ripening phase. Only in July-August as the last species blooms and continues vegetation. It is, as a rule, spring-summer-autumn pastures.

2. Pasture structure: wheat mortuk, wheat morticum, eremopyrum triticeum (gaertn.) nevski; the family Polygonaceae, buckwheat, polygonaceae lindl; sedge, navazi, Senegalese; the family Cruciferae, Cruciferae flowers, cruciferae juss; Potentilla goose, estaban vulgaris, potentilla anserina; quinoa gray, meu of bospiek, a triplex spas. But.

With the heavy draw of the mares on pasture in a herd of horses is dominated by ephemera, well fed horses.

3. Type of larch-wheat-wormwood pasture: Kermek Gmelin, stretch Tomar, limonium gmelinii (willd.) kuntze; lechowska wormwood, wormwood lenchovska, Artemisia lercheana web; Piri creeping, creeping sagebrush, agropyron repens (l). Beauv; tolstostolbikovaya sedge, meadow(desert), thick navazi, carex pachystylis J. gay; Kentucky bluegrass, chestnut chestnut, PoA pratensis; wormwood, Artemisia vulgaris, Artemisia vulgaris; mugwort Austrian, Austrian wormwood, artemisia austriaca jacq.

Here grains (by mid-summer) in the main growing season is complete. Only characteristic and massive forms, such as Austrian wormwood, grow until autumn and at this time form the main phytomass. Yield: spring -4,0 kg / ha in the summer-5.7 C / ha, in autumn and 4.6 t / ha in the winter-3,4 t / ha

The results of the examination on the level of heavy metals on the herbs included in the Botanical composition of pasture herbs in the study areas are given in table 5.

Table 5 – content of heavy metal salts in various plants, mg / kg.

№	Name of pasture haymaking	Ni mg/kg	Mn mg/kg	Co mg/kg	Zn mg/kg	Cd mg/kg	Fe mg/kg	Cu mg/kg	Pb mg/kg
1	agropyron repens	2,01	25,91	0,32	3,473	0,035	таб.жоқ	0,64	таб.жоқ
2	poa bulbosa	3,0	36,485	0,53	4,61	0,045	0,041	3,375	таб.жоқ
3	glycyrrhiza uralensis fisch	5,235	27,51	0,935	16,76	0,06	0,038	6,705	1,5
4	potentilla anserina	5,455	42,585	2,165	13,498	0,185	0,148	6,14	2,6
5	achillea millefolium	2,435	49,48	1,04	13,4415	0,1	0,02	7,49	0,665
6	tanacetum vulgare	5,155	53,525	1,915	24,8615	0,21	0,2796	8,345	2,8
	TLV	3,0	60	2,0	50	0,2	100	30	2

As can be seen in this table, the level of Nickel, cadmium, lead is higher than MPC.

At the same time, paying attention to the fact that the changes associated with the vegetation stages of heavy metal levels in the herbs of tansy and horses eating into the trap are presented in table 6 below.

Table 6 – dependence of the biological absorption coefficient of is on the phase of ontogenesis of the studied plants

Month of sampling	Plant species	Zn	Cu	Mn	Fe	Ni	Co	Cd	Pb
May	potentilla anserina	2.63	1.14	0.45	0.03	0.59	0.13	0.30	0.05
June	potentilla anserina	2.63	1.25	0.40	0.02	0.33	0.11	0.42	0.04
	tanacetum vulgare	0.82	0.61	0.07	0.02	0.12	0.01	0.76	0.02
July	potentilla anserina	1.86	1.05	0.27	0.04	0.42	0.0006	0.7	0.04
	tanacetum vulgare	1.11	0.64	0.18	0.01	0.1	0.14	1.10	0.01
	tanacetum vulgare (flowers)	1.74	0.94	0.62	0.02	0.64	0.67	4.24	0.02
August	potentilla anserina	1.19	1.59	0.30	0.03	0.56	0.21	0.28	0.05
	tanacetum vulgare	1.88	1.20	0.85	0.04	0.86	0.82	4.99	0.05
	tanacetum vulgare (flowers)	7.75	2.04	1.20	0.03	0.43	1.26	8.23	0.05
September	potentilla anserina	2.27	1.86	0.53	0.06	1.91	0.37	0.33	0.13
	tanacetum vulgare	9.57	1.55	1.46	0.04	0.62	1.57	19.39	0.05

Most heavy metals in Tansy rose continuously between June and September. This plant, especially since July, thrives and in August reached the maximum level of flowering. The peculiarity of this plant is that the level of heavy metals in the flower, zinc in General, in August more than 6 times.

The content of heavy metals in various communities of grassland Karykkuduk and Saryomir depending on the season of the year are shown in table 7, 8.

Table 7 – content of salts of heavy metals on the grassland Karykkuduk and Saryomir mg / kg.

Association		Chemical element							
		Fe	Co	Cu	Pb	Zn	Cd	Ni	Mn
Association for the grassland Kirykkuduk:									
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	1,00	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
Association for the grassland Saryomir:									
1	Spring	14,9	0,2	0,06	0,23	3,12	0,02	0,04	6,54
	Autumn	14,5	1,0	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	5,0	1,1	7,55	1,3	20,71	0,1	5,2	53,52
TLV		100	2,0	30	2,0	50	0,2	3,0	60

The level of heavy metals in the floodplain of Saryomir as a whole exceeds the level of heavy metals in floodplain Karykkuduk.

So with this in mind, we believe that in the future more profitable to build facilities for the production of Mare's milk and Mare's milk on the pastures of Karykkuduk. However, in the kyrykkkuduk pastures, samples taken from the saline Association area contain copper 4.4 mg/kg (MPC-30 mg / kg), lead 0.6 mg/kg (MPC-2.0 mg/kg), Nickel 2.2 mg/kg (MPC-3.0 mg/kg).

Table 8 – indices of concentration of heavy metals with sorption and ordinary tansy vegetation

The studied area	chemical element	Ni mg/kg	Mn mg/kg	Co mg/kg	Zn mg/kg	Cd mg/kg	Fe mg/kg	Cu mg/kg	Pb mg/kg
Kirykkuduk	potentilla anserina	3.29	0.79	1.24	8.43	3.55	2.13	5.24	0.06
	tanacetum vulgare	3.33	0.81	7.85	4.79	15.86	1.3	3.55	0.03
Saryomir	potentilla anserina	5.17	0.23	2.31	2.26	0.77	4.3	7.87	0.14
	tanacetum vulgare	3.14	0.37	0.75	3.09	2.97	2.85	15.95	0.05

As can be seen from this, these metals are very high level of harmful effects on the human body with animals. We should take into account that organic milk and Mare's milk should not be produced from the mares grown in this valley. At the same time, we believe that the high level of these metals is due to the fact that licorice and licorice have deep roots, as well as a large accumulation of these metals in the stems, leaves and flowers of tansy plants. In order to produce organic Mare's milk and Mare's milk, these three plants in these small areas must be destroyed by appropriate agro-technical measures. We believe that in the floodplain field Saryomir, as mentioned above, heavy metals in plants, should abandon the production of Mare's milk and Mare's milk.

Conflict of Interest

None declared.

Конфликт интересов

Не указан.

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