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**ВЛИЯНИЯ ФАКТОРОВ ОКРУЖАЮЩЕЙ СРЕДЫ НА КАЧЕСТВА КОРМОВ
В КАРАГАНДИНСКОЙ ОБЛАСТИ
INFLUENCE OF THE FACTORS OF ENVIRONMENT ON THE QUALITY OF THE FEED
IN THE KARAGANDA OBLAST**

ANNOTATION

In the article, the authors present the results of assessing the quality and safety of feed in various districts of the Karaganda region. The following feed studies were carried out: organoleptic and physico-chemical indicators; the total toxicity and residual amount of heavy metal compounds were determined; the quality and safety of feed from various areas of the study area were assessed; organoleptic and physico-chemical indicators of animal feed were carried out; the dynamics of seasonal accumulation of residual amounts of heavy metal compounds in feed was also established.

The following contaminants are most dangerous in feed: toxins of microorganisms (including fungi), toxic elements (heavy elements), antibiotics, pesticides, nitrates, nitrites, dioxins and dioxin-like compounds, radionuclides.

According to the ecological situation, the Karaganda region is one of the ecologically unfavorable territories of our country. This is due to the large concentration of ferrous and non-ferrous metallurgy, energy complexes and other industrial objects, such as Arcelor Mittal Temirtau and Kazakhmys.

From the atmosphere, toxic substances enter the soil and penetrate it directly or with precipitation.

Therefore, the study of the influence of environmental factors on feed in the conditions of the Karaganda region is of great practical and theoretical importance.

Key words: *Veterinary and sanitary safety, feed quality control, food safety, maximum permissible concentration, animal products, heavy metals, contamination, toxicity.*

Introduction. Currently, the concept of "Biological safety" should be considered in relation to all living organisms, meaning by this the balance and the possibility of self-regulation in the ecosystem, as well as the absence of harm to the life and health of living beings inhabiting it. In relation to a person, "Biological safety" should be considered primarily from the point of view of food security, as one of the most important components of his life, as well as from the point of view of sanitary and epidemiological well-being [1, 2, 3, 4].

In the XX century, the sequential expansion of the economic subsystem was proceeding at an accelerated pace due to the displacement of natural systems, which proves that natural resources and the regenerative abilities of wildlife are by no means limitless [5, 6, 7].

In the second half of the XX century, when per capita growth rates increased, health and education systems became more effective, people's nutrition improved, and life expectancy increased [8, 9].

In the Karaganda region, more than 400 enterprises pollute the environment. One of the worst environmental pollutants are the companies Arcelor Mittal Temirtau and Kazakhmys, the share of these two metallurgical industries accounts for 70% of all emissions of the region [10, 11, 12].

The combination of anthropogenic factors increases the pressure on biota components, including living organisms, as a rule, this affects the functioning of various systems, organs and tissues [13, 14, 15, 16, 17, 18, 19, 20].

The purpose of the research work is a veterinary and sanitary assessment of the quality and safety of plant feeds from various districts of the Karaganda region.

To achieve this goal, we have set the following tasks:

1. To study the organoleptic and physico-chemical parameters of plant feeds;
2. Determine the overall toxicity and the degree of accumulation of heavy metal compounds in plant feeds.
3. Give a sanitary assessment.

Materials and methods of research. We conducted studies of samples of plant-based feed and animal products on the basis of the laboratory of the Central Branch of the Republican State Enterprise "Veterinary Laboratory" of the Committee for Veterinary Control and Supervision of the Ministry of Agriculture of the Republic of Kazakhstan of Astana. Feed sampling was carried out according to state standards (Figure 1). Organoleptic, physico-chemical parameters were studied and the total toxicity of feed was determined during the year, as well as the residual amounts of heavy metal compounds in the stable and pasture periods were determined.

In the study of feed, organoleptic and physico-chemical parameters were determined in the stall and pasture period, as well as the seasonal dynamics of the accumulation of heavy metal compounds by month during the year were studied. Organoleptic and physico-chemical parameters of feed were carried out according to state standards, residual amounts of heavy metal compounds were carried out by voltammetric method on a TA-Lab device (Figure 2).

State standards for feed:

State Standard 10967-90 Grain. Methods for determining odor and color;

State Standard 13586.5-93 Grain. Methods for determining humidity;

State standard 13586.2-91 Feed, compound feed, feed raw materials. Methods for the determination of crude fiber;

State Standard 10847-74 Grain. Methods for determining ash content;

State standard 13496.15-97 Feed, compound feed, feed raw materials. Methods for determining the crude fat content;

State standard 13496.7-97 Feed grain, products of its processing, compound feed.

Methods for determining toxicity;

State standard 4808-87 Hay. Technical conditions;

State standard 23637-90 Haylage. Technical conditions.

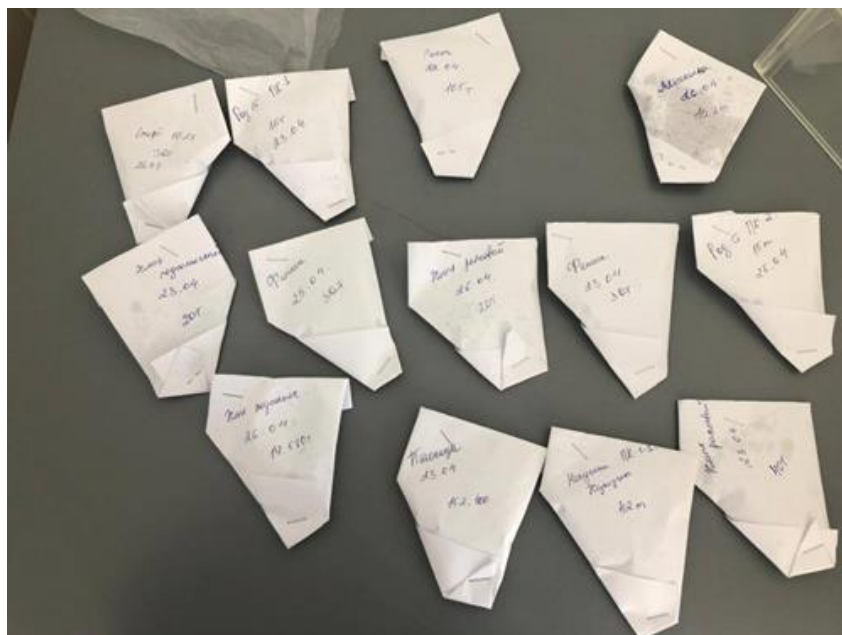


Figure 1 – Selected feed samples



Figure 2 – Determination of feed ash content

Research results. Organoleptic and physico-chemical indicators of feed. We conducted studies of samples of feed of plant origin, organoleptic, physico-chemical parameters were studied and the total toxicity of feed was determined during the year. The main types of feed were subjected to the study - feed grain (wheat), fodder corn, barley, hay (Sudanka). As a result of our research, we have obtained the results. There were no special deviations from the norm in the organoleptic analysis of feed (feed grain, feed corn, barley, hay).

As can be seen from Table 1, the feed grain (wheat) had a normal color characteristic of a healthy grain of this type, the smell was characteristic of a healthy grain, without musty, malt, mold and foreign odors.

Corn also had positive indicators, barley had a light-yellow color characteristic of normal grain, without foreign odors, Sudanka hay was yellow-green, the smell was characteristic without moldy and musty odors.

Thus, no deviations from the norm were found during the organoleptic analysis of feed.

Table 1 – Organoleptic indicators of feed. Assessment of the quality and safety of feed in various districts of the Karaganda region

Type of feed	Indicators	
	Colour	smell
Grain fodder.	Normal, characteristic of a healthy grain of this type	Normal, characteristic of healthy grain (without musty, malt, mold, foreign odors)
Food. corn	Corresponds, characteristic of corn, green	Normal, specific for corn without mold and foreign odors.
Barley	Light yellow color characteristic of a normal grain	Normal, characteristic of healthy grain from (without musty, malt, mold, foreign odors)
Hay Sudanka	Yellow-green	It should not have a musty, moldy and putrid smell

As can be seen from Table 2, the physico-chemical indicators of feed had no significant differences and deviations by region, so grain moisture varied from 12.47% (Bukhar-Zhyrau district) to 14.1% (Shetsky district), in feed corn from 12.4% (Shetsky district) to 26% (Bukhar-Zhyrau district), in barley from 12.0% (Oskarovsky district) to 14.5% (Bukhar-Zhyrau district), in hay from 8.37% (Osakarovsky district) to 13.26% (Bukhar-Zhyrau district) (Table 2).

The content of crude fiber in grain varied from 2.86% (Nurinsky district) to 3.89% (Bukhar-Zhyrau district), in fodder corn without significant differences, with the exception of Bukhar-Zhyrau district, where this indicator was 3.42%, in barley and hay this indicator was practically the same in all districts.

The total ash content in grain varied from 0.98% (Nurinsky district) to 1.49% Bukhar-Zhyrau district), in fodder corn from 1.28% (Bukhar-Zhyrau district) to 01.02% (Nurinsky district), in barley and hay also without much difference, the share of crude fat in grain in the largest amount was 3.42% in the Bukhara-Zhyrau district, in other areas without any special differences, in feed corn, barley and hay, this indicator was normal and had no significant differences.

Thus, the physico-chemical parameters varied within different limits depending on the districts, but there were no deviations from the norm.

Determination of total toxicity and residual amounts of heavy metal compounds in feed.

Table 2 – Physico-chemical indicators of feed

District	Type of Feed	Indicators			
		Humidity %	Raw fiber, %	Total ash content, %	Fat percentage, %
1	2	3	4	5	6
Osakarovsky	Grain fodder.	13,6±0,21	3,3±0,12	1,01±0,06	2,6±0,23
	corn	12,8±0,20	2,86±0,20	1,57±0,12	3,78±0,35
	barley	12,0±0,4	6,60±0,14	3,05±0,14	1,25±0,16
	Hay Sudanka	8,37±0,13	30,58±0,24	4,94±,014	2,20±0,24
Shetsky	Grain fodder.	14,1±0,12	3,6±0,20	1,08±0,06	2,8±0,18
	corn	14,6±0,24	2,78±0,12	1,48±0,10	3,74±0,24
	barley	12,4±0,26	7,24±0,14	3,21±0,24	1,32±0,12
	Hay Sudanka	29,55±0,41	30,84±0,32	4,65±0,21	2,17±0,20

1	2	3	4	5	6
Nurinsky	Grain fodder.	13,2±0,32	2,86±0,32	0,98±0,06	2,74±0,4
	corn	12,8±0,24	2,86±0,14	1,62±0,13	3,78±0,32
	barley	12,5±0,26	6,60±0,12	3,05±0,21	1,25±0,17
	Hay Sudanka	13,31±0,36	29,31±0,35	4,62±0,23	2,49±0,23
Bukhar - Zhyrau	Grain fodder.	12,47±0,24	3,89±0,14	1,49±0,16	3,42±0,42
	corn	26,24±0,26	3,42±0,12	1,28±0,14	3,52±0,12
	barley	14,5±0,24	6,58±0,24	3,21±0,15	1,38±0,10
	Hay Sudanka	13,26±0,32	29,38±0,28	4,65±0,02	2,67±0,14

The determination of the total toxicity of feed was carried out by the main method of bioassay on a skin test on a rabbit. The essence of the method is based on the dermatonecrotic effect of toxic substances of exogenous origin extracted from feed with acetone.

When determining the total toxicity and the degree of accumulation of residual amounts in feed during the pasture and stall period, we obtained the following results. The results are listed in table 3.

As can be seen from Table 3, when determining the total toxicity, barley samples showed a slightly toxic effect during the stall period, the remaining feed samples were non-toxic.

When determining the residual amounts of heavy metal compounds in grain, the cadmium content was 0.0391 mg/ kg, which does not exceed the maximum permissible concentration (MPC), whereas in the pasture period its concentration was 0.4321 mg / kg, which exceeds the norm by 4 times. The amount of lead in the stable period is 0.1082 mg / ct, in the pasture period 0.9032 mg / kg, which is almost 2 times higher than normal. In the samples of granary, the cadmium content was 0.069 mg/kg, in the pasty 48190 mg/ct with a norm of 0.3 mg/ct, which exceeds 2.6 times, the pork content in the stall period was 3.2255 mg/kg; at 8,1273 mg/kg at a rate of 5.0 mg/kg, which is higher than the norm of 1.62. In barley plugs, the cadmium content also exceeded the norm in the pasture period and amounted to 0.3578 mg/kg at a norm of 0.1 mg/kg, which is 3.5 times higher than the norm, the amount of lead is correspondingly observed exceeding the MPC in the pasture period of 2.1376 mg/kg at a MPC of 1.0 mg/kg, which is 2.1 times higher.

Table 3 – Total toxicity and degree of accumulation of heavy metal compounds in plant feeds

Type of feed	Indicators					
	General toxicity		Cadmium (cd), mg/kg		Plumbum (pd), mg/kg	
	Stall period	Pasture period	Stall period	Pasture period	Stall period	Pasture period
1	2	3	4	5	6	7
A Grain of Wheat.	Non-toxic	Non-toxic	0,0391±0,0005	0,4321±0,0115	0,1082±0,0356	0,9032±0,0346
Norm (MPC)			0,1		0,5	
The breadbasket	-	-	0,069±0,0017	0,8190±0,0329	3,2255±0,0564	8,1273±0,0564

1	2	3	4	5	6	7
Norm (MPC)			0,3		5,0	
Barley	-	Slightly toxic	0,0578±0,0154	0,3578±0,0004	0,7531±0,0146	2,1376±0,0108
Norm (MPC)			0,1		1,0	
Hay Sudanka	-	-	0,0232±0,0058	0,22030±0,0051	3,9573±0,0106	4,0813±0,00003
			0,3		5,0	

In the samples of hay (Sudanka), there were no exceedances of MPC for cadmium and lead and, accordingly, it was 0.0252 mg/kg for cadmium in the stable and 0.220230 mg/kg in the pasture, with a norm of 0.3 mg/kg, the lead content in the cost 3.9573 mg/kg and pasture 4.0813 mg/kg, with a norm of 5.0 mg/kg.

Thus, the excess of MPC in terms of the content of heavy compounds in feed is noted mainly in the pasture period, in particular wheat grain, granary and barley.

Conclusion. During the organoleptic and physico-chemical assessment, no significant deviations from the norm were found for plant feeds in the Karaganda region.

When determining the residual amounts of heavy metal compounds in grain, the cadmium content was 0.0391 mg/kg, which does not exceed the maximum permissible concentration, whereas in the pasture period its concentration was 0.4321 mg/kg, which exceeds the norm by 4 times. The amount of lead in the stable period is 0.1082 mg / ct, in the pasture period 0.9032 mg / kg, which is almost 2 times higher than normal. In the samples of the granary, the cadmium content was 0.069 mg/kg, in the pasty 48190 mg/ct with a norm of 0.3 mg/ct, which exceeds 2.6 times, the lead content in the stall period was 3.2255 mg/kg; at 8,1273 mg/kg at a rate of 5.0 mg/kg, which is higher than the norm of 1.62. *In barley plugs, the cadmium content also exceeded the norm in the pasture period and amounted to 0.3578 mg/kg at a norm of 0.1 mg/kg, which is 3.5 times higher than the norm, the amount of lead is correspondingly observed exceeding the MPC in the pasture period of 2.1376 mg/kg at a MPC of 1.0 mg/kg, which is 2.1 times higher.*

For the first time, we conducted a veterinary and sanitary assessment of the quality and safety of plant feeds in the Karaganda region. The excess of MPC in the content of heavy compounds in feed is noted mainly in the pasture period, in particular wheat grain, wheat and barley.

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ТҮЙІН

Мақалада авторлар Қарағанды облысының әртүрлі аудандарындағы жемшөптің сапасы мен қауіпсіздігін бағалау нәтижелерін келтіреді. Жемшөпке мынадай зерттеулер жүргізілді: органолептикалық және физика - химиялық көрсеткіштер; ауыр металдар қосылыстарының жалпы уыттылығы мен қалдық саны анықталды; зерттелетін аумақтың әртүрлі аудандарынан жемшөптің сапасы мен қауіпсіздігіне баға берілді; мал азығының органолептикалық және физика – химиялық көрсеткіштері жүргізілді; сондай-ақ жемшөпте ауыр металдар қосылыстарының қалдық мөлшерінің маусымдық жинақталу динамикасы белгіленді.

Азықта келесі ластаушы заттар үлкен қауіп төндіреді, олар: микроорганизмдердің токсиндері (соның ішінде саңырауқұлақтар), улы элементтер (ауыр элементтер), антибиотиктер, пестицидтер, нитраттар, нитриттер, диоксиндер және диоксинге ұқсас қосылыстар, радионуклеидтер.

Экологиялық жағдай бойынша Қарағанды облысы Қазақстан Республикасының экологиялық қолайсыз аумақтарының бірі болып табылады. Бұл қара және түсті металлургияның, энергетикалық кешендердің ішінде, атап айтқанда: "АрселорМиттал Теміртау" және "Қазақмыс" сияқты басқа да өнеркәсіптік объектілердің көп шоғырлануына байланысты.

Атмосферадан улы заттар топыраққа еніп, оған тікелей немесе жауын-шашынмен енеді.

Сондықтан, Қарағанды облысының жағдайында қоршаған орта факторларының жемге әсерін зерттеу жұмыстары үлкен практикалық және теориялық мәнге ие болады.

РЕЗЮМЕ

В статье авторами приводятся результаты оценки качества и безопасности кормов в различных районах Карагандинской области. Были проведены следующие исследования кормов: органолептические и физико- химические показатели; определена общая токсичность и остаточное количество соединений тяжелых металлов; была дана оценка качества и безопасности кормов из различных районов исследуемой территории; проведены органолептические и физико – химические показатели кормов животных; также была установлена динамика сезонного накопления остаточных количеств соединений тяжелых металлов в кормах.

В кормах наибольшую опасность имеют следующие контаминанты: токсины микроорганизмов (в том числе грибов), токсичные элементы (тяжелые элементы), антибиотики, пестициды, нитраты, нитриты, диоксины и диоксиноподобные соединения, радионуклиды.

По экологической ситуации, Карагандинская область является одной из экологически неблагополучных территорий нашей страны. Это связано с большой концентрацией черной и цветной металлургии, энергетических комплексов и других промышленных объектов, таких как «АрселорМиттал Темиртау» и «Казахмыс».

Из атмосферы ядовитые вещества попадают на почву и проникают в нее непосредственно или с осадками.

Поэтому изучение влияния факторов окружающей среды на кормов в условиях Карагандинской области имеет большое практическое и теоретическое значение.

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MONITORING OF THE EPIZOOTIC SITUATION ON ANIMAL BRUCELLOSIS IN THE REPUBLIC OF KAZAKHSTAN

ANNOTATION

Brucellosis is a particularly dangerous zoonotic disease that is widespread in animals and humans. Despite the fact that more than 120 years have passed since the discovery of the pathogen and the disease has been well studied by domestic and foreign researchers, the problem of brucellosis remains relevant in many countries of the world. A number of economically developed countries have achieved some success in controlling bovine brucellosis caused by *Brucella abortus*. Results for control of brucellosis in small ruminants caused by *Brucella melitensis* are more modest. In some developing countries, the epizootic situation for bovine brucellosis is worsening. Brucellosis caused by *B. melitensis* is also a major public health problem.

According to the World Health Organization (WHO), more than 500 000 cases of newly diagnosed brucellosis are reported each year in more than 170 countries, more than half of them in the Eastern Mediterranean and Middle East. In brucellosis-prone regions, the actual incidence can be 10 to 25 times higher than officially reported. In brucellosis-endemic areas, where brucellosis is a deep-rooted problem, the infection has global, far-reaching negative consequences for the health and