

## Influence of Minpankor on the content of essential mineral elements in blood of cows

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**The purpose.** To determine influence of a new veterinary specimen Minpankor on the content of essential mineral elements in blood of lactating cows at pathology of mineral metabolism. **Methods.** For prophylaxis of osteodystrophy, polymicroelementoses and treatment of lactating cows at these pathologies they got 15 – 20 g of Minpankor every day for 1 animal during 60 days. **Results.** Application of new veterinary specimen Minpankor at pathology of mineral metabolism at lactating cows has shown its high treatment-and-prophylactic efficiency in the Western and South biogeochemical zones of Ukraine. **Conclusions.** By results of probes this specimen needs to be recommended for application.

**Key words:** *essential macro- and microelements, breaking of mineral metabolism, osteodystrophy, microelementoses, Minpankor.*

Violation of the exchange of mineral substances leads to structural changes in all organs and systems of the animal organism and reducing the ability to realize their inherent physiological functions.

For the timely prevention and elimination of violations of mineral metabolism, ensuring optimal metabolic status and productive health of cows, it is necessary to constantly monitor the state of metabolic processes in their body, to carry out preventive measures, and in case of clinical manifestation, appropriate therapeutic measures.

The prevention should be planned, group and include a complex of economic-organizational measures to create a strong forage base, providing animals with the full range of basic and biologically active substances, taking into account the normalized ratio of nutrients in them.

The total nutrition of a diet, depending on the level of annual milk production and body weight of cows, should be 7-11 k. Unit. The structure of the cows diet in the first period of the lactation (100 days) in the winter period, by nutrition should be, %: hay - 15 - 17, haylage - 13 - 15, silage - 15 - 20, root crops - 12 - 15, concentrates - 30 - 35; in the second period of lactation (101 - 200 days) share concentrates should not exceed 30%, in the third (201 - 300 days) - 20%. In addition, it is necessary to control the content of easily digestible carbohydrates and trace elements (iodine, cobalt, cuprum, zinc, manganese, selenium, etc.). Kitchen salt should always be in individual or group feeders for the free access of animals [1 - 5].

Adding to the diet of a mixture of scarce salts of macro- and microelements allows to normalize the exchange of proteins, carbohydrates, lipids, minerals and vitamins in cattle in the case of subclinical forms of metabolic disorders caused by the deficiency of mineral elements in their organisms.

For different forms of osteodystrophia and polymicroelementosis, we have developed a new one highly effective prophylactic veterinary medicine Minpankor, spectrometric, clinical and hematological studies, as well as taking into account the peculiarities of the biogeochemical zones of Ukraine. The drug was a full course of preclinical and clinical trials and registered in the All-Ukrainian State Scientific and Production Center for Standardization, Metrology, Certification and Consumer Rights Protection (Ukrmetrteststandard) for № 02568182/036008.

Minpankor drug is environmentally safe, has a high degree of exposure, which is based on a more rational assimilation of lactate compounds in biochemical cows in cows compared to their analogues, which are traditionally used as inorganic compounds [1, 6].

Normalize the provision of animal organisms with mineral substances by adding to the diet of premixes containing trace elements in appropriate quantities, taking into account the degree of their deficiency in the body. In a daily dose of the premix of each element should be contained in the amount that replenishes its insufficiency in the body of animals. For example, for a deficit of 30% of the trace element in the blood, in the

daily dose of the premix there should be 30% of the element from the calculated need for it according to the norms and rations of feeding animals [5, 7, 8].

The purpose of the research is to determine the effect of a new veterinary drug Minpanchor on the content of essential mineral elements in the blood of the lactating cows for the pathology of mineral metabolism.

Materials and methods of research. For prophylaxis of osteodystrophy and polymicroelementosis and treatment of lactation cows for these pathologies, the veterinary drug Minpanchor was used in farms of the western and southern biogeochemical zones of Ukraine.

To determine the content of essential elements in the blood of cows, control and experimental groups of animals were formed in each biogeochemical zone of Ukraine (Table 1). Cows of the experimental group, which were kept in the western biogeochemical zone of Ukraine, were fed with the mixed fodder or dart, the preparation Minpanchor (a powder of gray color) in a dose of 20 grams, per day for one cow for 60 days, in the south - 15 g. The method of chromatographic mass spectrometry analysis has determined the content of essential macroelements in the blood of lactating cows at the beginning and at the end of the experiment.

Research results. At the beginning of the experiment in lactation cows in the western and southern biogeochemical zones of Ukraine there was hypocalcemia, which was especially clearly manifested in animals in the southern biogeochemical zone. The concentration of phosphorus of inorganic and magnesium in the blood of cows was also reduced or was on the lower boundary of physiological values.

In the lactating cows of the experimental group, which used the veterinary drug Minpanchor in these doses, positive changes in the biochemical parameters of blood serum were revealed, especially those characterizing the processes of mineralization and ossification of bone tissue.

Thus, under the influence of the drug Minpanchor in the blood serum of the lactating cows of the experimental group, at the end of the experiment, the calcium content was generally normalized from  $1.81 \pm 0.02$  to  $2.72 \pm 0.01$  mmol/l in the southern biogeochemical zone. The content of phosphorus inorganic was normalized in serum of blood of cows a pilot group in the western biogeochemical zone, and the most optimum it was in animals of the southern biogeochemical zone and was  $1.65 \pm 0.02$  mmol/l, which is 26% more compared with the control group. The content of magnesium in the blood serum of cows in the western biogeochemical zone has not significantly changed and was within the limits physiological values. The most optimal and significantly higher magnesium content was in serum of cows in the southern biogeochemical zone -  $1.04 \pm 0.02$  mmol/l.

At the beginning of the experiment in the blood of control and experimental cows, the contents of the general iodine were on the lower limit of normative indicators, while the concentration of cobalt was 3.7 - 4.2 times, and zinc - in 1.9 - 2.0 times lower than normal. The content of cuprum and manganese was significantly lower than the normative indicators (Table 2).

At the end of the experiment, the content of iodine, cobalt, cuprum, mangan, and zinc in the blood serum of control group cows tended to decrease compared to the start of the experiment and was below the normative value.

In the blood serum of experimental group cows, the iodine, cobalt, cuprum, manganese and zinc content was lowered at the beginning of the trial and had no significant difference compared with the lactating cows of the control group.

On the 60th day, the application of lactation cows of the veterinary drug Minpanchor had a significant iodine content in their blood ( $P < 0.001$ ) higher by 20.3% and higher than 3.3 times, but these rates were lower than those in the blood cows of reference biogeochemical zones. The concentration of cuprum in serum of lactation cows in the experimental group at the end of the experiment was 2.3 times significantly higher ( $P < 0.001$ ) compared with control group cows during the same period.

The content of manganese in the blood serum of cows of the experimental group was higher than the average values of its values in animals in the reference zones of Ukraine, and the zinc contents was significantly higher by 1.7 times ( $P < 0.001$ ) than that of control group cows and conformed to normative indices.

Research on the study of the therapeutic and prophylactic effectiveness of the drug Minpanchor on lactating cows for violations of mineral metabolism in their body in the southern biogeochemical zone of

Ukraine were carried out in the steppe breeding plant of the Kamyansk-Dniprovsk district of Zaporizhzhia region (Table 3).

At the beginning of the experiment, the general background of the content of essential micronutrients in the serum of cows was: iodine total - 298 -310 nmol/l, cobalt - 0.29 - 0.31 mmol/l, below the lower boundary of normative indicators. It should be noted that the biochemical status of animals was the same for the content of lactation cows in the southern biogeochemical zone of Ukraine of other investigated essential elements (cuprum, zinc and manganese).

At the end of the experimental period, the content of most of the trace elements studied in the blood serum of the lactating cows of the control group tended to slightly decrease, and the content of cobalt was almost unchanged. However, the levels of trace elements in the blood of these animals were lower than the minimum regulatory indicators.

In the blood serum of the lactating cows of the experimental group at the end of the experiment, we established a reliable ( $P < 0.001$ ) increase in the content of all essential micronutrients: iodine - 1.41, cobalt - 2.30, cuprum - 1.45, zinc - 1, 40 and manganese - in 1,33 times. Their level corresponds to the physiological values for these mineral elements.

Consequently, studies on the effectiveness of Minpancor in the western and southern biogeochemical zones of Ukraine show that it has a high therapeutic and prophylactic effect in the event of a violation of mineral metabolism in the body of lactating cows for osteodystrophy and hypomicroelementoses.

In the western biogeochemical zone of Ukraine, in 48% of lactation cows, the positive influence of Minpancor has been detected on the 45th - 50th day after its application. At the same time, with the normalization of morphological and biochemical parameters of blood of cows there was a decrease, and then the disappearance in them of clinical signs characteristic of the pathology of mineral metabolism.

However, in biogeochemical provinces with a clearly expressed insufficiency of essential microelements in soils and forages (the Carpathian and Polissiya natural and climatic zones), the normalization of the content of the indexes of essential micronutrients in the blood cows were observed only on the 90th day after application of the drug. Positive results on the preventive effectiveness of mineral feed supplements, premixes and other drugs used in case of violation mineral metabolism in the organism of animals, were confirmed in the studies of Ukrainian and foreign scientists [3, 5, 9, 10].

In the southern biogeochemical zone of Ukraine, the therapeutic and prophylactic efficacy of the Minpancor drug was detected in 38-41% of lactation cows by the 30th to 35th day after the application of the drug, which is confirmed by a reliable

( $P \leq 0,05 - 0,001$ ) normalization of morphological and biochemical parameters of blood in experimental animals. The higher efficiency of the drug developed by us in these zones is due to a moderate decrease in the content of essential macro- and micro-elements in soils, feeds and rations of cows.

### 1. Content of macronutrients in blood serum of lactating cows after application of the preparation Minpankor ( $M \pm m$ , $n = 10$ ), mmol/l

Indicator	Biogeochemical zone of Ukraine	
	western (Rivne region)	southern (Zaporozhye region)
The beginning of the experiment		
Common calcium	2,48±0,02	1,81±0,02
Ionized calcium	1,78±0,16	0,54±0,03
Inorganic phosphorus	1,25±0,06	1,22±0,05
Magnesium	0,99±0,04	0,84±0,08
The end of the experiment		
Common calcium	2,56±0,02	2,72±0,01***
Ionized calcium	1,62±0,02	1,41±0,02***
Inorganic phosphorus	1,47±0,01**	1,65±0,02**
Magnesium	0,87±0,01**	1,04±0,02*
* $P \leq 0,05$ ; ** $P \leq 0,01$ ; *** $P \leq 0,001$ (as compared to doses of cows at the beginning of the experiment).		

## 2. The content of trace elements in serum of lactation cows in the western biogeochemical zone of Ukraine ( $M \pm m$ , $n = 10$ ), mmol/L

Biometric indicator	Group			
	Control		Experimental	
	Lim	M±m	Lim	M±m
1st day				
I, nmol/l	286,4 – 311,9	298,1±23,02	279,7 – 315,2	290±21,03
Co	0,17 – 0,24	0,18±0,01	0,15 – 0,20	0,16±0,02
Cu	6,21 – 7,10	6,5±0,81	5,9 – 6,43	6,31±0,96
Mn	1,60 – 2,15	1,72±0,08	1,64 – 1,97	1,73±0,01
Zn	8,6 – 11,2	10,2±0,17	9,1 – 10,8	9,6±0,15
60th day				
I, nmol/l	230,4 – 261,1	249,4±18,0	346,8 – 360,0	355,1±15,1*
Co	0,11 – 0,14	0,12±0,01	0,48 – 0,63	0,53±0,02*
Cu	3,14 – 4,50	3,26±0,06	11,31 – 13,42	12,8±0,23*
Mn	1,41 – 2,03	1,50±0,02	2,27 – 2,86	2,71±0,15*
Zn	6,32 – 10,64	7,13±1,02	14,8 – 18,2	16,6±1,05*

\* P <0.001 (compared to control group cows).

## 3. The content of trace elements in serum of lactation cows in the southern biogeochemical zone of Ukraine ( $M \pm m$ , $n = 10$ ), mmol/L

Biometric indicator	Group			
	Control		Experimental	
	Lim	M±m	Lim	M±m
1st day				
I, nmol/l	281 – 315	298,0±18,20	299 – 316	310±15,70
Co	0,29 – 0,34	0,31±0,02	0,21 – 0,32	0,29±0,01
Cu	10,8 – 12,1	11,2±0,05	9,8 – 11,6	10,9±0,05
Mn	2,3 – 3,3	2,90±0,02	2,67 – 3,91	3,07±0,05
Zn	10,7 – 14,9	12,8±0,17	11,3 – 13,2	12,53±0,05
60th day				
I, nmol/l	285 – 308	293±15,10	391 – 426	412,1±21,7***
Co	0,28 – 0,32	0,30±0,02	0,52 – 0,78	0,69±0,02***
Cu	9,18 – 11,8	10,4±0,01	14,5 – 16,7	15,1±0,02***
Mn	2,02 – 3,12	2,21±0,01	1,98 – 3,35	2,95±0,12**
Zn	11,3 – 13,2	12,1±0,16	15,6 – 17,1	16,9±0,04***

### Conclusions

The veterinary drug Minpankor is environmentally safe and has a high degree of exposure, based on a more rational assimilation of the cow biogenic elements from lactate compounds in cows compared to their analogues, which are traditionally used as inorganic compounds. Preparation Minpankor is recommended to use in the dose of 10 grams per cow per day with mixed fodder or other concentrated fodder for 45-60 days in the western and at a dose of 8 grams per cow per day in the southern biogeochemical zones of Ukraine. For the treatment of lactation cows for the above-mentioned pathologies, the preparation of Minpankor is recommended to be used in a dose of 20 grams - in the western and 15 grams - in the southern biogeochemical zones of Ukraine, calculated on 1 basis. every day for 60-75 days. The results of the research of the drug Minpankor confirmed ours preliminary predictions about its effectiveness in pathology of mineral metabolism (osteodystrophy, polymicroelementosis) in lactating cows.

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