Mineral State

WANESSA

E-mail address: **horse@example.mail**	Test code: **AABBCCNNIW** Date of the test: **2025-03-23**

Mineral State

Your horse health overview

Nutrition is the foundation of a healthy horse to perform to the best of his ability. A nutritional assessment allows you to confirm that the current nutrition of your horse is adapted to his metabolism and that all required minerals are in the appropriate level.

Disclaimer: The medical expertise of an equine professional is required to interpret the EHAA results and decide on the protocol to follow to adjust the level of minerals and toxins in the horse body. The reader should be aware that a deficiency could be a sign of infections, any other metabolic issues or organ disfunctions. Besides, the reader should be informed that reducing drastically minerals excess could lead to metabolic issues. Do not prescribe supplements to your horse without medical advice as this could lead to excess which could be toxic for your horse. The mineral and toxins balance of a horse should be handled with care and expertise to enable the horse to be on top of his health.

Mineral State

IMMUNE SYSTEM

63%

Although the immune system is healthy, it is worth examining the details of the EHAA result for immunity*

STRESS LEVEL

45%

The content of minerals responsible for the level of stress may indicate disturbance / changes in the temperament of the horse*

DIGESTIVE SYSTEM

42%

The mineral content of horsehair may indicate a malfunction in the digestive system*

METABOLIC RATE

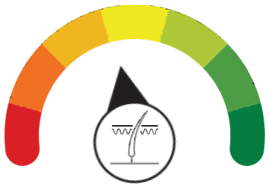
63%

The content of macro and micronutrients does not seem to have a negative effect on the rate of metabolic changes and the possibility of metabolic diseases*

HORMONAL BALANCE

25%

The content of minerals can have a negative effect on the hormonal balance*



HAIR

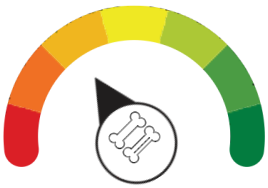
43%

A clear excess / deficiency of elements responsible for the proper condition of the hair coat*

SKIN

50%

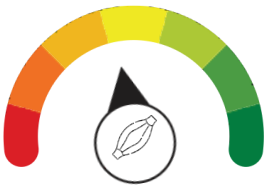
The content of minerals that affect the condition of the skin layers is far from the correct level*



BONES AND JOINTS

33%

Irregularities marked in the content of selected elements may adversely affect the condition and functioning of the osteoarticular system*



MUSCLES

45%

Elements, the presence of which determines the proper functioning of muscles, are not present in the desired amounts*

GROWTH

60%

The content of macro and micronutrients necessary for the proper growth of muscle mass and growth rate has not been determined as optimal*

BREEDING ACTIVITY

43%

The content of macro and micronutrients, the level of which has an impact on breeding activity, is far from the norm*

* Note: the graph shows the average. A positive average can mean a positive result or a complete absence of one element.
A negative average can mean a negative result or just reflect that all elements are in deficit but only at the lower limit of the normal range. So it is crucial to check the report to obtain further details.

Mineral State

EHAA test results

complete information of all minerals in your horse body

CONCENTRATION OF NUTRITIONAL ELEMENTS – MACRO-ELEMENTS

Element	**Patient's result (ppm)**	Normal value	**DEFICIT NORM EXCESS**
Sulfur(S)	**53 075,50**	34 975,54 – 36 228,20	
Calcium(Ca)	**574,60**	1 393,15 – 1 594,84	
Phosphorus(P)	**470,00**	382,63 – 414,74	
Sodium(Na)	**871,00**	192,69 – 269,27	
Potassium(K)	**553,00**	531,38 – 1 212,69	
Magnesium(Mg)	**91,02**	489,20 – 593,63	

CONCENTRATION OF NUTRITIONAL ELEMENTS – MICRO-ELEMENTS

Element	**Patient's result (ppm)**	Normal value	**DEFICIT NORM EXCESS**
Silicon(Si)	**868,00**	519,81 – 665,36	
Zinc(Zn)	**126,50**	137,76 – 153,01	
Iron(Fe)	**293,00**	196,87 – 254,60	
Copper(Cu)	**5,01**	4,75 – 5,30	
Manganese(Mn)	**3,40**	16,36 – 23,55	
Selenium(Se)	**2,50**	1,13 – 1,42	
Chrome(Cr)	**0,01**	0,57 – 0,76	

Mineral State

CONCENTRATION OF TOXIC ELEMENTS

Element	**Patient's result (ppm)**	Maximum value	**EXCESS**
Aluminium(Al)	**404,60**	382,86	
Barium(Ba)	**4,01**	4,20	
Cadmium(Cd)	**0,24**	0,13	
Lithium(Li)	**0,01**	0,20	
Nickel(Ni)	**0,58**	0,80	
Lead(Pb)	**0,01**	1,67	
Strontium(Sr)	**1,08**	4,92	
Vanadium(V)	**0,98**	0,65	

PROPORTION OF NUTRITIONAL ELEMENTS

Proportion	**Patient's result (ppm)**	Normal value	**TOO LOW**	**WITHIN NORM**	**TOO HIGH**
Calcium(Ca) Phosphorus(P)	**1,22**	3,94 – 4,87			
Magnesium(Mg) Calcium(Ca)	**0,16**	0,25 – 0,28			
Zinc(Zn) Copper(Cu)	**25,25**	30,83 – 36,59			
Iron(Fe) Copper(Cu)	**58,48**	35,34 – 47,22			
Copper(Cu) Manganese(Mn)	**1,47**	0,21 – 0,32			
Iron(Fe) Zinc(Zn)	**2,32**	1,08 – 1,51			
Sodium(Na) Potassium(K)	**1,58**	0,21 – 0,40			

Every organism is exposed to toxic elements that enter it from the external environment. The presence of such elements is therefore inevitable and, in excess, dangerous for the horse's health.

The study was performed using the ICP-OES technique - optical emission spectrometry with excitation in inductively coupled plasma. Analyzed on the Avio 200 PerkinElmer spectrometer by the analyst technician, PetsDiag laboratory:

Krystyna Kowalska
Senior Techniker Analytik

The demand for individual macro and micronutrients (daily demand for hard work / 500 kg b.w.) was determined on the basis of Nutrient Requirements of Horses: Sixth Revised Edition, 2007.

European Funds
Smart Growth

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EHAA report

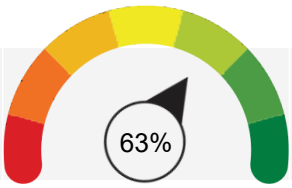
What you will find in this report

- **The result contains information about the proportions and concentrations of nutritional and toxic elements in the body of the test horse.** Both the levels of individual micro and macro elements as well as the degree of the body's load of toxic elements reflect the state of biochemical balance, which is crucial for maintaining health and a good body condition.

- **The reference values to which the elements indicated** in the study refer were developed for the needs of EHAA by a research team from the University of Agriculture in Krakow and based on thorough comparative studies. The content of minerals is expressed in ppm.

- **The EHAA result also includes a descriptive part, based on the reports provided by employees of the University of Agriculture.** The information contained in it allows you to better understand the EHAA result and to introduce appropriate modifications to the diet of the patient in question.

Immune system



Unbalance of the levels of some specific minerals can lead to a weakening of the immune system.

Your horse's EHAA result showed that there are some disturbances in its organism which can cause:

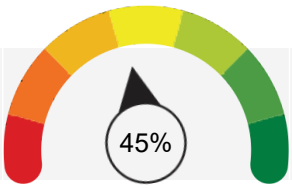
- ▾ Deficit of Zinc – increases susceptibility to infections.
- ▾ Deficit of Magnesium – reduces the tolerance to exercise (rapid muscle fatigue).
- ▴ Excess of Vanadium – poisoning can go to the extreme of exhaustion.

Element	Patient's result (ppm)	Normal value	DEFICIT	NORM	EXCESS
Zinc(Zn)	*126,50*	137,76 – 153,01			
Magnesium(Mg)	*91,02*	489,20 – 593,63			

Element	Patient's result (ppm)	Maximum value	EXCESS
Vanadium(V)	*0,98*	0,65	

Mineral State

Stress level



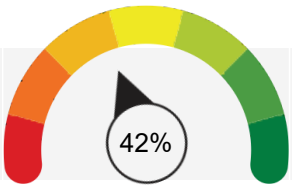
Unbalance of the levels of some specific minerals can lead to an excessive nervousness, anxiety and increase of stress.

Your horse's EHAA result showed that there are some disturbances in its organism which can cause:

- ▲ Excess of Phosphorus – abnormal concentration disrupts the functioning of the entire nervous system.
- ▼ Deficit of Magnesium – magnesium is responsible for the central nervous system. Too low level causes fits, overexcitement, and rapid breathing.
- ▲ Excess of Sodium – abnormal concentration disrupts the functioning of the entire nervous system.
- ▼ Deficit of Calcium – abnormal concentration disrupts the functioning of the entire nervous system.
- ▼ Deficit of Zinc – may reduce concentration.

Element	Patient's result (ppm)	Normal value	DEFICIT	NORM	EXCESS
Phosphorus(P)	*470,00*	382,63 – 414,74			
Magnesium(Mg)	*91,02*	489,20 – 593,63			
Sodium(Na)	*871,00*	192,69 – 269,27			
Calcium(Ca)	*574,60*	1 393,15 – 1 594,84			
Zinc(Zn)	*126,50*	137,76 – 153,01			

Digestive system



An excess or shortage of specific elements may also reflect digestive discomfort.

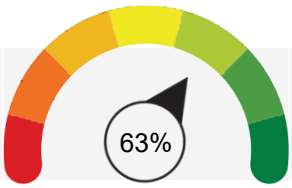
Your horse's EHAA result showed that there are some disturbances in its organism which can cause:

- ▼ Deficit of Chromium – lowers appetite.
- ▲ Excess of Sodium – can causes pollakiuria and diarrhea.
- ▼ Deficit of Magnesium – can cause stomach ulcers.
- ▲ Excess of Phosphorus –contributes to the formation of intestinal stones.
- ▼ Deficit of Calcium – can lead to geophagia (if the ground taken by the horse is sandy, there is a risk of colic).
- ▲ Excess of Vanadium – poisoning may cause diarrhea.
- ▲ Excess of Cadmium – poisoning leads to digestive problems.

Element	Patient's result (ppm)	Normal value	DEFICIT	NORM	EXCESS
Chrome(Cr)	*0,01*	0,57 – 0,76			
Sodium(Na)	*871,00*	192,69 – 269,27			
Magnesium(Mg)	*91,02*	489,20 – 593,63			
Phosphorus(P)	*470,00*	382,63 – 414,74			
Calcium(Ca)	*574,60*	1 393,15 – 1 594,84			

Element	Patient's result (ppm)	Maximum value	EXCESS
Vanadium(V)	*0,98*	0,65	
Cadmium(Cd)	*0,24*	0,13	

Metabolic rate



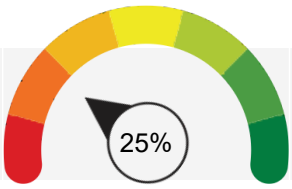
Minerals play an important role in proper metabolic rate maintenance. All nutritional deficiencies could result in metabolic disorders and pose a risk of the development of metabolic diseases.

Your horse's EHAA result showed that there are some disturbances in its organism which can cause:

- Deficit of Zinc – reduces metabolic rate.
- Deficit of Manganese – reduces metabolic rate.
- Deficit of Calcium – reduces metabolic rate.

Element	Patient's result (ppm)	Normal value	DEFICIT	NORM	EXCESS
Zinc(Zn)	*126,50*	137,76 – 153,01			
Manganese(Mn)	*3,40*	16,36 – 23,55			
Calcium(Ca)	*574,60*	1 393,15 – 1 594,84			

Hormonal balance



The right level of minerals is crucial to maintain the body's hormonal balance.

Your horse's EHAA result showed that there are some disturbances in its organism which can cause:

- ▼ Deficit of Zinc – leads to gonad disorder.
- ▲ Excess of Sodium – improper content of this mineral causes adrenal glands disorder.
- ▼ Deficit of Magnesium – improper content of this mineral causes adrenal glands disorder. Low level can impair insulin excretion.
- ▼ Deficit of Manganese – leads to gonad disorder.
- ▼ Deficit of Calcium – improper level of this mineral negatively affects parathyroid glands functioning.
- ▲ Excess of Phosphorus– improper level of this mineral negatively affects parathyroid glands functioning.

Element	Patient's result (ppm)	Normal value	DEFICIT	NORM	EXCESS
Zinc(Zn)	*126,50*	137,76 – 153,01			
Sodium(Na)	*871,00*	192,69 – 269,27			
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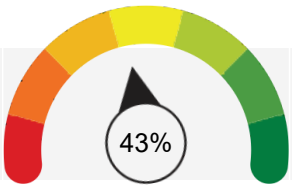
Mineral State

Hair



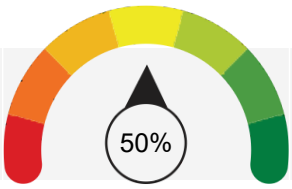
The proper condition of the horse's hair coat depends on the correct level of numerous minerals.

Your horse's EHAA result showed that there are some disturbances in its organism which can cause:

- Deficit of Zinc – even a slight deficiency of this mineral contributes to hair loss.
- Excess of Selenium – contributes to the loss of hair from the mane and tail.
- Deficit of Magnesium – magnesium is the building material of the hair. Its deficiency contributes to a decrease in the overall condition and appearance of the coat.
- Deficit of Calcium – calcium is the building material of the hair. Its deficiency contributes to a decrease in the overall condition and appearance of the coat.

Element	Patient's result (ppm)	Normal value	DEFICIT	NORM	EXCESS
Zinc(Zn)	*126,50*	137,76 – 153,01			
Selenium(Se)	*2,50*	1,13 – 1,42			
Magnesium(Mg)	*91,02*	489,20 – 593,63			
Calcium(Ca)	*574,60*	1 393,15 – 1 594,84			

Skin



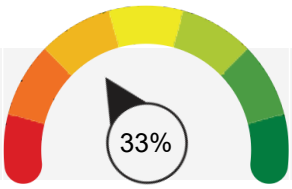
Mineral balance has a huge impact on the health and condition of the horse's skin.

Your horse's EHAA result showed that there are some disturbances in its organism which can cause:

- Deficit of Zinc – leads to skin problems such as parakeratosis (pathological skin damage), hinders wound healing and disrupts the work of the sebaceous glands.
- Deficit of Magnesium – magnesium is the building material of the skin. A low level of this mineral contributes to the decline in its overall appearance and condition.
- Deficit of Calcium – calcium is the building material of the skin. A low level of this mineral contributes to the decline in its overall appearance and condition.

Element	Patient's result (ppm)	Normal value	DEFICIT	NORM	EXCESS
Zinc(Zn)	*126,50*	137,76 – 153,01			
Magnesium(Mg)	*91,02*	489,20 – 593,63			
Calcium(Ca)	*574,60*	1 393,15 – 1 594,84			

Bones and joints



Both the deficiency and excess of minerals can lead to problems with the osteoarticular system.

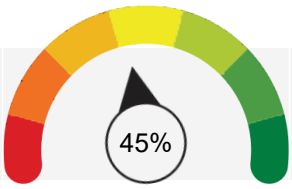
Your horse's EHAA result showed that there are some disturbances in its organism which can cause:

- Deficit of Zinc – leads to hoof deformation.
- Excess of Selenium – can contribute to the separation of the hoof capsule and lameness.
- Deficit of Manganese – causes disturbances in the ossification process and movement disorders.
- Deficit of Magnesium – magnesium is the building material of bones and teeth. Its deficiency creates a risk of bone fragility and other diseases of the locomotor system, may cause glucose intolerance and insulin resistance – the risk of laminitis.
- Deficit of Calcium – calcium is the building material of bones and teeth. Its deficiency creates a risk of bone fragility and other diseases of the locomotor system.
- Excess of Cadmium – poisoning can lead to osteomalacia – a metabolic bone disease.

Element	Patient's result (ppm)	Normal value	DEFICIT	NORM	EXCESS
Zinc(Zn)	*126,50*	137,76 – 153,01			
Selenium(Se)	*2,50*	1,13 – 1,42			
Manganese(Mn)	*3,40*	16,36 – 23,55			
Magnesium(Mg)	*91,02*	489,20 – 593,63			
Calcium(Ca)	*574,60*	1 393,15 – 1 594,84			

Element	Patient's result (ppm)	Maximum value	EXCESS
Cadmium(Cd)	*0,24*	0,13	

Muscles



The quality and condition of muscle tissue also largely depend on the appropriate amount of nutritional elements necessary for its proper structure and functioning.

Your horse's EHAA result showed that there are some disturbances in its organism which can cause:

- Deficit of Manganese – may result in the thickening of the hocks.
- Deficit of Magnesium – causes, (among others) muscle spasms and convulsions.
- Excess of Phosphorus – incorrect concentration of phosphorus disturbs the building function and proper course of metabolism in muscles and also leads to their general weakening. The correct level of phosphorus ensures the efficient course of energy processes necessary for muscle cells during movement.
- Deficit of Calcium – incorrect concentration of calcium disturbs the building function and proper course of metabolism in muscles and also leads to their general weakening. The correct level of calcium activates the muscles to work.
- Deficit of Zinc – causes muscle weakness and tendon contractures.

Element	Patient's result (ppm)	Normal value	DEFICIT	NORM	EXCESS
Manganese(Mn)	*3,40*	16,36 – 23,55			
Magnesium(Mg)	*91,02*	489,20 – 593,63			
Calcium(Ca)	*574,60*	1 393,15 – 1 594,84			
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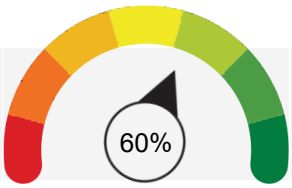
Mineral State

Growth



Proper weight gain at various stages of a horse's development also depends on a properly balanced diet, i.e. satisfying his needs.

Your horse's EHAA result showed that there are some disturbances in its organism which can cause:

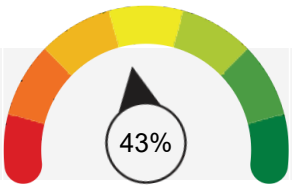
- ▼ Deficit of Chromium – can cause weight loss.
- ▼ Deficit of Manganese – causes poor weight gain.
- ▲ Excess of Cadmium – poisoning leads to reduced growth.
- ▲ Excess of Vanadium – poisoning leads to reduced growth.

Element	Patient's result (ppm)	Normal value	DEFICIT	NORM	EXCESS
Chrome(Cr)	*0,01*	0,57 – 0,76			
Manganese(Mn)	*3,40*	16,36 – 23,55			

Element	Patient's result (ppm)	Maximum value	EXCESS
Cadmium(Cd)	*0,24*	0,13	
Vanadium(V)	*0,98*	0,65	

Mineral State

Breeding activity



Healthy horses should be used for breeding. The right amount of minerals is necessary to maintain the reproductive capacity at the highest level possible.

Your horse's EHAA result showed that there are some disturbances in its organism which can cause:

- Deficit of Zinc – reduces the quality of semen, concentration and sperm mobility decreased.
- Deficit of Manganese – has a negative impact on breeding capacity.
- Deficit of Magnesium – lowers reproductive parameters.
- Excess of Cadmium – poisoning leads to reproductive disorders.

Element	Patient's result (ppm)	Normal value	DEFICIT	NORM	EXCESS
Zinc(Zn)	*126,50*	137,76 – 153,01			
Manganese(Mn)	*3,40*	16,36 – 23,55			
Magnesium(Mg)	*91,02*	489,20 – 593,63			

Element	Patient's result (ppm)	Maximum value	EXCESS
Cadmium(Cd)	*0,24*	0,13	

Mineral State

EHAA Additional information about your horse - assessment of biochemical needs and threats

Macro-elements

20 Ca 15 P Calcium and Phosphorus

Two of the most important macronutrients are Calcium (Ca) and Phosphorus (P). Apart from their building function, these elements are involved in blood clotting, the transmission of nerve stimuli, and energy changes in muscles. The ratio of these elements to each other is also important because too much phosphorus reduces the absorption of calcium. The proper absorption of calcium in the intestines is also reduced by the lack of an adequate amount of the active form of vitamin D.

	THE EHAA result	ROLE	DEFICIENCY	EXCESS	SOURCE	DAILY DEMAND at hard work (500 kg b.w.) (NRC 2007)
Calcium(Ca)	DEFICIT	• proper functioning of the skeletal and nervous systems • energy changes in muscles • blood clotting	• during intensive training, stress, transport • increased risk of bone fragility • restlessness, muscle cramps	• reduces phosphorus digestibility • excreted by the kidneys	• grass • legumes	25-35 g important ratio of calcium to phosphorus: from 1:1 to 3:1
Phosphorus(P)	EXCESS	• a bone component • ATP and nucleic acid synthesis	• rarely	• limitation of calcium absorption • formation of intestinal stones	• cereals • wheat bran	15-18 g

16 S Sulfur

Sulfur is contained in sulfur amino acids. Deficiencies practically do not occur and if they are found, they are caused by the wrong amino acid composition of the food ration.

	THE EHAA result	ROLE	DEFICIENCY	EXCESS	SOURCE	DAILY DEMAND at hard work (500 kg b.w.) (NRC 2007)
Sulfur(S)	EXCESS	• amino acid synthesis • enzyme activation • supporting the regeneration of joints • insulin component	• weakened hooves • hair loss • rough hair	• weaker selenium absorption	• molasses • alfalfa, hay • MSM	18,8 g

11 Na 19 K Sodium and Potassium

Speaking of electrolytes, Sodium (Na) and Potassium (K) are distinguished in a horse's diet. These elements are behind a series of processes such as maintenance of acid-base balance, regulation of osmotic pressure, and membrane transport. The excess of these elements is excreted in the urine. Horses can easily compensate for the shortage with salt licks.

	THE EHAA result	ROLE	DEFICIENCY	EXCESS	SOURCE	DAILY DEMAND at hard work (500 kg b.w.) (NRC 2007)
Sodium(Na)	EXCESS	• proper functioning of the nervous system • regulation of osmotic pressure and bodily fluids	• reduces the use of protein and energy from the food • reduces appetite • deterioration of the condition, weakness	• causes increased urine output, diarrhea • increases potassium deficiency	• feed salt (licks) • molasses, pulp	41 g
Potassium(K)	NORM	• proper work of muscles and heart • acid-base balance • stimulation of nerve receptors	• disorders of muscles and heart • weakness • lack of appetite	• tolerated • increase in water intake and urine excretion at extreme doses (> 500 mg/kg b.w./d)	• oil plants • grass • legumes • molasses	15-18 g

12 Mg Magnesium

Another element – Magnesium (Mg) is an enzyme activator. It participates in cell respiration and muscle contractions. About 60% of magnesium is contained in bones and 30% in muscles. It is a very important macronutrient in the nutrition of sports horses that are prone to stress, fatigue, and infections. It supports better concentration and also helps reduce excitability and irritability.

	THE EHAA result	ROLE	DEFICIENCY	EXCESS	SOURCE	DAILY DEMAND at hard work (500 kg b.w.) (NRC 2007)
Magnesium(Mg)	DEFICIT	• component of enzymes • muscle contraction • cellular respiration	• rapid breathing • excitement • seizures • muscle cramps	• small amounts excreted in sweat • no negative consequences	• wheat bran • cereals • legume hay	15 g

Micro-elements

26 Fe Iron

The most important micronutrients found in horses are Iron (Fe), Copper (Cu), Zinc (Zn) and Selenium (Se). Iron is a part of hemoglobin, myoglobin, most often in combination with proteins. The deficiency of this element in horses usually does not occur, as 90% of it is recovered from the breakdown of hemoglobin. Possible shortages are covered by feeding with feed, such as bran or plants.

	THE EHAA result	ROLE	DEFICIENCY	EXCESS	SOURCE	DAILY DEMAND at hard work (500 kg b.w.) (NRC 2007)
Iron(Fe)	EXCESS	• oxygen transport (hemoglobin)	• loss with sweat, but 90% recovered when decomposing hemoglobin • anemia • decline in performance and resilience	• excess in the dose causes reduced use of phosphorus, copper, manganese and zinc	• beet pulp • legume pulp • grass	450-500 mg

29 Cu Copper

Copper is one of many metalloproteins. It is responsible for the elasticity of connective tissue, carrying iron to the bone marrow and turning it into hemoglobin, the maturation of erythrocytes, and many other functions. The most important symptom of copper deficiency is the change in the appearance of the coat, its depigmentation, and clear dullness. Cu deficiencies are observed in horses fed with fodder collected from light, peat, and muck soils. However, the excess of Cu is perfectly tolerated by horses (even up to 500 mg/kg DM of the ration). The research by Xuezhuang Wu et al. [2015] indicates that copper may negatively affect the activity of certain enzymes in the body, resulting in reduced digestibility of protein and fiber. These authors also show that too much Cu and Zn in a food ration may interfere with the absorption of other minerals, especially Fe. Among the significant correlations shown in the experiment, the influence of an increased Cu uptake on the reduction of Mn absorption was noted.

	THE EHAA result	ROLE	DEFICIENCY	EXCESS	SOURCE	DAILY DEMAND at hard work (500 kg b.w.) (NRC 2007)
Copper(Cu)	NORM	• the formation of nervous tissue, blood • development of bone tissue	• decrease in growth rate • bone disorders • damage to blood vessels • depigmentation	• reduces the absorption of zinc • weight loss	• wheat bran • dried pulp	125 mg

30 Zn Zinc

An important micronutrient in the ration of horses is also zinc - the component of over 100 enzymes. Zinc has a positive effect on the condition of the skin, hair, and hooves. Excessive supplementation does not bring any positive effects. A beneficial effect of this element on the increase in sperm concentration and motility was found. The most important symptoms of zinc deficiency include parakeratosis, i.e. damage to the skin and epidermis, hair loss, poorly healing wounds, deterioration of semen quality. Zinc supplementation is indicated after having found a deficiency. Preparations containing zinc most often also contain magnesium, as the absorption of these two elements is correlated. Proper zinc absorption is difficult in the case of vitamin E deficiency.

	THE EHAA result	ROLE	DEFICIENCY	EXCESS	SOURCE	DAILY DEMAND at hard work (500 kg b.w.) (NRC 2007)
Zinc(Zn)	DEFICIT	• component of enzymes • affects the condition of the skin and mucous membranes	• skin changes • susceptibility to infections	• usually well tolerated • loss of appetite may occur	• most of the feeds low in zinc • wheat bran	500 mg

34 Se Selenium

Another essential micronutrient is selenium. It plays an important role in controlling the metabolism of thyroid hormones, maintaining the integrity of cell membranes, growth, and reproduction. Selenium works together with vitamin E, which enhances its antioxidant effect. Vitamin E deficiency multiplies the effects of selenium deficiency. A large selenium deficit may cause low immunity in animals, infertility in mares, and poor growth of foals.

	THE EHAA result	ROLE	DEFICIENCY	EXCESS	SOURCE	DAILY DEMAND at hard work (500 kg b.w.) (NRC 2007)
Selenium(Se)	EXCESS	• antioxidant • influence on cellular immunity • works together with vitamin E	• when consuming excessive amounts of protein and sulphates • weakening of the immune system • alimentary muscular dystrophy	• toxic • poisoning • separation of the hoof can • hair loss	• flax seeds • wheat bran • the level of selenium in feed depends on the soil conditions	1,5 mg

14 Si Silicon

Silicon is a very important trace element. It plays an important role in the functioning of connective tissues, especially bones and cartilage. It provides them with adequate flexibility and resistance. Additionally, silicon is part of the enzyme involved in the synthesis of collagen. Supports the work of joints, prevents fracture of hooves, and accelerates the regeneration of the epidermis.

	THE EHAA result	ROLE	DEFICIENCY	EXCESS	SOURCE	DAILY DEMAND at hard work (500 kg b.w.) (NRC 2007)
Silicon(Si)	EXCESS	• supporting the metabolism of connective tissues • collagen synthesis	• joint problems • brittle hoof	• in some cases may cause kidney stones	• grass	no generalized data, may be different

25 Mn Manganese

Manganese is a micronutrient with a broad spectrum of activity. Responsible, inter alia, for the activation of enzymes involved in the transformation of fats and carbohydrates, is involved in the synthesis of proteins and nucleic acids. It also affects proper bodyweight, the skeleton, and fertility. A significant surplus causes the inhibition of iron absorption.

	THE EHAA result	ROLE	DEFICIENCY	EXCESS	SOURCE	DAILY DEMAND at hard work (500 kg b.w.) (NRC 2007)
Manganese(Mn)	DEFICIT	• transformation of fats and amino acids • in ossification processes	• rarely • thickening of the hocks • lameness	• development of anemia symptoms	• green fodder • hay	400-500 mg

24 Cr Chrome

Chromium is another micronutrient necessary for the proper functioning of the body. It takes part in metabolic processes and supports the action of insulin. It increases the endurance of horses and improves stress resistance.

	THE EHAA result	ROLE	DEFICIENCY	EXCESS	SOURCE	DAILY DEMAND at hard work (500 kg b.w.) (NRC 2007)
Chrome(Cr)	DEFICIT	• metabolism of carbohydrates and fats • supports the action of insulin • reduces the amount of glucose in the plasma during training	• unconfirmed deficiency symptoms (detectable only with the help of appropriate diagnostics)	• toxic • impaired growth • liver and kidney damage • nerve degeneration	• chromium oxide	- in the form of oxide: 300 mg/kg DM

Toxic elements

Sources of heavy metals

The main threat posed by toxic minerals is due to their antagonistic nature with micro and macro elements. This means that if the animal is heavily loaded with heavy metals, these can block the absorption of the elements necessary for proper development and, consequently, cause serious illnesses.

Most heavy metals are found naturally in trace amounts. Their presence is associated with such processes as volcanic eruptions, evaporation of oceans, forest fires, and rock weathering. Usually, they do not negatively affect the natural environment. However, the progressive urbanization and significant industrialization contributed to an increase in the concentration of heavy metals in nature. The sources that pollute the ecosystem with toxic elements include heat, power plants, steel mills, internal combustion engines, chemical industry, coal-fired furnaces in homes, waste incineration, and incorrect storage of animal excrements in farms. Thus, heavy metals that enter the atmosphere, water, and soil, are deposited on the above-ground parts of plants and are taken up by plant root systems. Therefore, it is important to prevent animals from grazing near busy roads, heat and power plants, and other industrial areas.

Detoxification

Heavy metals are stored by the body in the liver and spleen, as well as in bones and hair. The amount of toxic elements in the blood is kept relatively constant since it is purified by the liver or by the kidneys. After the removal of heavy metals from the blood, subsequent portions of the blood are stored in the body. Therefore, detoxification is a very slow process.

The best way to reduce the risk of heavy metal poisoning is to locate and eliminate its source. You should also take care of a properly balanced diet. A malnourished organism is more exposed to the action of toxic elements. The deficiency of some micronutrients increases the absorption of heavy metals, e.g. calcium deficiency increases the absorption of cadmium and lead. Maintaining a proper level of iron in the body reduces the absorption of heavy metals and reduces the toxic effect of lead on the circulatory system. Zinc has a positive effect on the excretion of arsenic from the body and reduces the absorption of lead. In contrast, antioxidants such as selenium, vitamin C, and vitamin E minimize the oxidative damage caused by heavy metals.

13 Al Aluminum

Aluminum (Al) is one of the most abundant elements on Earth. It is mainly found in soil and plants. In small amounts, it does not pose a risk to horses as it is excreted from the body through the kidneys. However, an excess of this element can damage the liver.

Element	The EHAA result showed
Aluminium(Al)	EXCESS

48 Cd Cadmium

Cadmium is an element that occurs naturally in small amounts in soil, rocks and ocean waters. It is concentrated in plants that take it from the soil. Cadmium is poorly excreted from the body, so it is very important to avoid its sources. Cadmium poisoning leads to kidney damage, digestive problems, reproductive problems, osteomalacia (metabolic bone disease), and reduced growth.

Element	The EHAA result showed
Cadmium(Cd)	EXCESS

3 Li Lithium

Lithium is an element that occurs in the environment in small amounts. Animals are very rarely exposed to an excess of this metal. Symptoms of poisoning include depression, diarrhea, and ataxia (impaired body coordination).

Element	The EHAA result showed
Lithium(Li)	SAFE LEVEL

28 Ni Nickel

Nickel is present in animal food in very small amounts. Its absorption from the gastrointestinal tract is very low, therefore it is described as a low-toxicity element. An excess of nickel can lead to kidney damage, hyperglycemia, respiratory disorders, and reduced growth.

Element	The EHAA result showed
Nickel(Ni)	SAFE LEVEL

82 Pb Lead

Lead poisoning is one of the most commonly reported poisonings among animals. The danger is not only the lead in the soil but also the lead paints used in old buildings or the water pipes made of lead alloys. The effects of prolonged contact with lead are neurological problems, reproductive problems, kidney damage, osteoporosis, and visual disturbances. In case of acute poisoning, e.g. by swallowing a lead element, salivation, blindness, hyperactivity, and convulsions may occur.

Element	The EHAA result showed
Lead(Pb)	SAFE LEVEL

23 V Vanadium

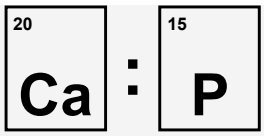
Vanadium is a highly toxic heavy metal. Poisoning with this element leads to decreased growth, diarrhea, dehydration, extreme exhaustion, and hemorrhages.

Element	The EHAA result showed
Vanadium(V)	EXCESS

Mineral State

Proportions of elements

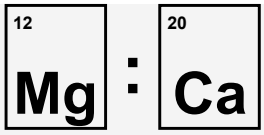
For the assessment of the biochemical balance, the proportions between the elements are as important as the levels of the elements themselves. This is due to the antagonism and synergy between the macro and trace elements. The relationships between the elements directly affect the proper absorption of nutrients by the body, as well as blocking their absorption.



One of the most important proportions for the body is the ratio of calcium to phosphorus. The excess of phosphorus reduces the absorption of calcium and thus contributes to the deficiency of this element in the body. An improper proportion of these two macronutrients leads to a disturbance of calcium-phosphorus metabolism and results in the development of skeletal diseases.

Your horse's EHAA result showed:

Norm for Calcium(Ca)/Phosphorus(P)	**3,94 - 4,87**
Patient's result	**1,22**
Proportion	**TOO LOW**
Limit intake of:	**phosphorus**
Increase intake of:	**calcium**
Check what are the trends for your Ca:P ratio	
TOO LOW	Limited calcium absorption. Increased risk of bone fragility.
TOO HIGH	Excess calcium – excessive bone mineralization.



Another important proportion is the ratio of magnesium to calcium. These elements act antagonistically. Calcium is involved in the process of muscle contraction, while magnesium is involved in the diastolic and relaxing effect. Disturbance of the proportions between these macronutrients leads to problems with the relaxation of tense muscles and, as a result, the occurrence of soreness, tremors, and cramps.

Your horse's EHAA result showed:

Norm for Magnesium(Mg)/Calcium(Ca)	**0,25 - 0,28**
Patient's result	**0,16**
Proportion	**TOO LOW**
Limit intake of:	**calcium**
Increase intake of:	**magnesium**
Check what are the trends for your Mg:Ca ratio	
TOO LOW	Impaired calcium absorption, diarrhea.
TOO HIGH	Malabsorption of magnesium, cramps, muscle tremors.

30 Zn : 29 Cu

Copper and zinc are components or activators of many enzymes. They affect the development of bone tissue, maturation of articular cartilage, and also strengthen the body's immunity. Thanks to an appropriate supply of these two micronutrients, it is possible to prevent OCD, i.e. disorders of the growth of articular cartilage in horses. Long-term excess of one of these elements reduces the absorption of the other.

Your horse's EHAA result showed:

Norm for Zinc(Zn)/Copper(Cu)	**30,83 - 36,59**
Patient's result	**25,25**
Proportion	**TOO LOW**
Limit intake of:	**copper**
Increase intake of:	**zinc**
Check what are the trends for your Zn:Cu ratio	
TOO LOW	Limited zinc absorption, liver damage.
TOO HIGH	Limited absorption of copper, weakening of the skeletal system.

29 Cu : 25 Mn

Research has shown that an increased copper uptake by horses reduces the absorption of manganese. This can result in the thickening of the hocks as well as lameness.

Your horse's EHAA result showed:

Norm for Copper(Cu)/Manganese(Mn)	**0,21 - 0,32**
Patient's result	**1,47**
Proportion	**TOO HIGH**
Limit intake of:	**copper**
Increase intake of:	**manganese**
Check what are the trends for your Cu:Mn ratio	
TOO LOW	Limited manganese absorption – thickening of hocks, lameness.
TOO HIGH	Possible excess manganese in the body – check the EHAA result for this element. If there is too much of it, symptoms of anemia may appear.

Both copper and zinc are very important elements. Their excess, however, may negatively affect iron absorption, thus leading to iron deficiency. Too low iron levels in the body can result in anemia, decreased efficiency, and immunity.

Your horse's EHAA result showed:

Norm for Iron(Fe)/Copper(Cu)	**35,34 - 47,22**
Patient's result	**58,48**
Proportion	**TOO HIGH**
Limit intake of:	**iron**
Increase intake of:	**copper**

Check what are the trends for your Fe:Cu ratio

TOO LOW	The excess of copper reduces the absorption of iron – anemia, weakened immunity.
TOO HIGH	The excess of iron limits the use of copper – depigmentation, slower growth rate.

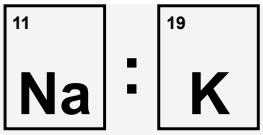
Your horse's EHAA result showed:

Norm for Iron(Fe)/Zinc(Zn)	**1,08 - 1,51**
Patient's result	**2,32**
Proportion	**TOO HIGH**
Limit intake of:	**iron**
Increase intake of:	**zinc**

Check what are the trends for your Fe:Zn ratio

TOO LOW	Excess zinc reduces the absorption of iron – anemia, weakened immunity.
TOO HIGH	Excess iron limits the use of zinc – skin changes, susceptibility to infections.

Mineral State



The concentration of electrolytes has a significant influence on the regulation of body fluid homeostasis. Disruption of this balance can lead to many diseases. That is why it is so important to replenish the deficiencies of electrolytes so that their concentration is adequate. Excess K and Na are excreted with urine, therefore deficiency is a much bigger problem. However, too much Na in a food ration may negatively affect the K content in urine. This means that excess sodium limits the absorption of potassium.

Your horse's EHAA result showed:

Norm for Sodium(Na)/Potassium(K)	**0,21 - 0,40**
Patient's result	**1,58**
Proportion	**TOO HIGH**
Limit intake of:	**sodium**
Increase intake of:	**potassium**

Check what are the trends for your Na:K ratio

TOO LOW	Sodium deficiency – decreased appetite, deterioration of condition.
TOO HIGH	Excess sodium reduces potassium absorption, muscle and heart disorders, decreased appetite.