MINERAL FEEDS

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- Mineral substances play a major role in the organism to carry out the vital activities of each cell.

- The ability to perform these activities adequately depends on a good interaction between mineral substances and organic matter..

If the rations given to the animal are insufficient in terms of mineral matter, they should be added to the rations.

Mineral feeds are divided into 3 categories.

1. Packaged ready products
2. Natural mineral resources
3. Mineral resources for commercial purposes

Considerations for adding mineral substances to feeds

1. Animal characteristics : the age, sex, weight and yield of the animal should be well established.

2. Feed type : Feeding mainly with concentrate or forage feeds changes the need for mineral material.

3. Flora :The structure of the soil directly affects the mineral content of the plant. Therefore, this situation should be taken into consideration when adding mineral.

4. Protection: Mineral compounds should be protected in a way that is not affected by environmental factors such as rain and wind.

5. Other factors: Since animals fed in closed barn do not sufficiently benefit from daylight, sufficient vitamin D yields affect the absorption and evaluation of calcium and phosphorus positively.

CALCIUM SOURCES

- Single mussels and poultry, especially the chickens must be added to the ration of calcium-containing compounds. It is important in ruminants depending on rough eating.

- High levels of calcium are eliminated with eggs and calcium needs cannot be met by normal ration. Calcium is the most common element in organism (1%)

Limestone: There is approximately 93% calcium carbonate in the structure of this compound. Calcium content is 37-40% and also contains 0.20% phosphorus and 0.06% sodium. In this compound the sand should not be more than 3%.

Chalk: Chalk is pure calcium carbonate. Calcium content is similar to limestone.

Mussel shell: all forms calcium carbonate

Eggshells: They contain approximately 90-91% calcium carbonate.

Calcium carbonate: contains 33-38% calcium.

Calcium chloride ($CaCl_2$): They contain 18.3% calcium and 32.4% chlorine. Very easily soluble in the body. it is expensive.

- Calcium sulfate ($CaSO_4 + 2H_2O$): It has 23.3% calcium and 18.6% sulfur. Although it does not dissolve in water, it is very easily soluble in stomach.

- Calcium acetate ($Ca(OOC\text{-}CH_3)$: Calcium content varies from 25.3 to 20.6% due to the water content.

- Calcium lactate ($Ca(OOC\text{-}CHOH\text{-}CH_3)_2 + 5\ H_2O$): Contains about 13% calcium. Rations are not preferred.

PHOSPHORUS SOURCES

- Poultry are only 1/3 of phosphorus due to phytin phosphorus found in feeds of plant origin.

- Ruminants benefit from phytase phosphorus due to the phytase enzyme found in the digestive system more than the poultry.

- Phosphorus requirements in animals vary according to the ratio of Ca / P, vitamin D level and phytate phosphorus.

- Monocalcium phosphate (Ca (H_2PO4) $_2$ + H_2O): Easily soluble in water. Contains 19% calcium, 21% phosphorus, 0.06% sodium and 0.14% fluorine.
- Dicalcium phosphate ($CaHPO_4$ + 2 H_2O): Easily soluble in water. 22% calcium, 19% phosphorus, 1.60% sodium and 0.10% fluorine.
- Tricalcium phosphate: Synthetically produced. The Ca ratio (38%) is higher than P (18%).
- Potassium phosphate (KH_2PO_4): Mono, di and tri potassium phosphate can be incorporated into rations. Of these compounds, mono potassium phosphate contains 22.8% phosphorous and 28.7% potassium.
- Magnesium phosphate ($MgH_4(PO_4)_2$ + $3H_2O$): Only the primary of this compound is water soluble and contains 22.5% phosphorous and 8.8% magnesium.

- Phosphate rock: It is obtained around Mazıdağı in our country. Fluoride content is high (0.3-5.0%).
- To lower the fluorine content:
- High heat applicable
- Treatment with H_2SO_4
- the fluorine content is reduced to 0.2%.
- Ammonium phosphate: This compound is a white crystalline product obtained from the treatment of phosphoric acid with ammonium.
- There are three forms of mono, di and tri ammonium phosphate.
- This compound contains P and N.
- 9% N and 23% P in monoammonium phosphate
- 17% N and 20% P in diammoniumphosphate

MAGNESIUM SOURCES

- Along with calcium, bone, teeth, cartilage, muscle, brain and body fluids are located.
- It is effective in the activation of the enzyme system in the body.
- The effect on growth has gained importance.
- Magnesium compounds are commonly used in areas where grass tetany is seen.
- It has an important role in cellulose digestion.
- Activation of the enzyme system in relation to carbohydrate metabolism,
- It has the effect of providing mineral and electrolyte balance.
- Mostly stored in bones.
- The amount of Mg in the cell is lower than Ca.

- Magnesium sulfate ($MgSO_4$): Bitter taste, good absorption and in some cases cause diarrhea in animals limit the usage area.
- It contains 15-16% Mg.

- Magnesium oxide: (MgO): This water-insoluble compound is readily soluble with diluted acids. This compound has 56% Mg and is used in rations.

- Magnesium carbonate ($MgCO_3$): It is obtained from carbonic acid with Mg salt and takes the name of magnesite. Although it contains 29% Mg in its structure, it is hardly soluble. It limits the use in rations.

SODIUM SOURCES

- It is found in the organism as dissolved in body secretions, in cartilage and bones. Most salts play a role in balancing osmotic pressure.

- Sodium chloride (NaCl): The most commonly used compound in rations. It has 39.3% Na and 60.7% Cl. NaCl can be mixed with diets or mixed with various molds. Animals most susceptible to sodium consumption are birds. The lethal dose is high in pig and ruminant. In poultry, it is 4% salt lethal dose in ration.

- Sodium phosphate: There are three forms of sodium phosphate: mono, di and tri phosphate.
- The content of Na and P varies according to the forms. According to this, Na 15% and P 20% in mono form, Na 12.9% and P 17.4% in di form.

IRON SOURCES

- The amount in the organism is quite low.
- Hemoglobin, myoglobin, ferritin and transferrin.
- It is located in the structure of cytochrome with some enzymes (catalase and peroxydase).
- Iron 2 sulphate ($FeSO_4 + 7H_2O$): Very easily soluble in water and contains approximately 20% Fe. Ration is the most preferred compound. It is useful not to wait outdoors. Otherwise, the compound is converted to iron 3 sulphate.
- Iron 3 sulphate ($Fe_2(SO4)_3$): It is slightly soluble in water and contains 27% Fe. It should not be kept in the open water because it is watered very quickly.
- Iron 3 oxide (Fe_2O_3): Contains approximately 70% Fe. Although slightly soluble in acid, it is not soluble in water at all. Iron 3 Oxide rations are very limited in use.
- Iron 2 chlorite ($FeCl_3 + 4\ H_2O$): It is soluble in water and contains 28% Fe.

- Iron 3 chlorite ($FeCl_3 + 6\ H_2O$): Easily soluble in water and contains approximately 20.5% Fe. It is very limited in rations.

- Iron 2 carbonate ($FeCO_3$): Insoluble in water contains approximately 48.2% Fe.

- Ferros fumarate ($C_4H_2FeO_4$): It is obtained from fumaric acid with iron salt. Usage area is limited.

- Ferros gluconate ($Fe\ (C_6H_{11}O_7)_2$: Iron salt and gluconic acid.

ZINC SOURCES

- It plays an active role in the structure of many enzymes and is especially involved in liver, kidney, pancreas and spleen.

- It is an element that must be included in the rations of many animal species.

- Especially the lack of poultry rations can be seen. In this case, decrease in embryo and hatchability and decrease in egg production are observed.

- Zinc sulfate ($ZnSO_4$ + 7 H_2O): Very easily soluble in water and contains about 22.7% Zn. Most preferred.

- Zinc carbonate ($ZnCO_3$): It has 52.1% Zn and is insoluble in water. It is a compound commonly used in rations.

Zinc chloride ($ZnCl_2$): Very easily soluble in water and contains 48% Zn. It is mostly used in medicine.

Zinc oxide (ZnO): It contains 80.3% Zn. Insoluble in water but soluble in acid medium. Poultry rations its use is low because its evaluation is quite low.

Zinc Acetate ($ZnOOC\text{-}CH_3)_2\ 2H_2O$): Very soluble in water this compound contains about 29.8% Zn. Winged and Pig It is frequently used in rations.

Zinc Chloride Diamine Complex ($Zn\ (NH_3)_2Cl_2$): With Zinc ammonium chloride.

MANGAN SOURCES

- To participate in the structure of some enzymes and synthesis of hemoglobin,
- To play a role in sexual functions,
- Elimination of toxic effects of some metabolic products
- It is an important element due to its role in bone development.
- Manganese sulphate ($MnSO_4$): It is obtained from the mixture of manganese salt and sulfuric acid. The aqueous form of this compound is more preferred and contains about 32.4% Mn.
- Mangan acetate (Mn ($C_2H_3O_2$) 2): This compound is obtained from a mixture of manganese salt and acetic acid. However, its use is very limited.
- Manganese carbonate ($MnCO_3$): It is obtained from manganese salt and carbonic acid. There is approximately 47.8% Mn in the structure.
- Manganese chloride ($MnCl_2 + 4H_2O$): Easily soluble in water, containing 27.8% Mn.
- Mangan oxide (MnO): This compound contains 77.5% of manganese and is obtained by oxidation of manganese. Rations are included in certain proportions.
- Manganese citrate (Mn_3 ($C_6H_5O_7)_2$: It is obtained from citric acid with its water soluble and manganese salt.

COPPER SOURCES

- It is located in the liver, heart, kidney and brain.
- Structure of red blood cells
- It is effective in some enzyme system.
- Copper sulphate (CuSO4): It has 25.5% Cu soluble in water. It is obtained from a mixture of copper salt and sulfuric acid.
- Copper oxide (CuO): It is 88.8%. Although it does not dissolve in water, it is easily soluble in digestive system.
- Copper chlorite (CuCl): This compound obtained from Cu salt and hydrochloric acid is easily soluble in water. It contains about 37.3% Cu. Its use is limited.
- Copper carbonate ($CuCO_3$): Cu salt and carbonic acid. There is 57.4% Cu in this water-insoluble compound.
- Copper gluconate (Cu ($C_6H_{11}C_7$)2: It is hardly soluble in water and is obtained from gluconic acid with Cu salt.

COBALT SOURCES

- Vitamin B12 enters the structure of
- It plays a role in making hemoglobin.
- The organism is mostly located in the liver, kidney, spleen and pancreas.
- Cobalt sulfate ($CoSO_4$): Easily soluble in water, contains 21% Co. It is obtained from cobalt salt and sulfuric acid.
- Cobalt chloride ($CoCl_2$): It is obtained from cobalt salt and hydrochloric acid. It is crystal structure, easily dissolves in water and contains 24.8% Co.
- Cobalt carbonate ($CoCO_3$): There is 26% Co in the structure. This compound is obtained from cobalt salt and carbonic acid. It is used quite frequently in rations.
- Cobalt nitrate ($Co(NO_3)2$): Easily soluble in water, contains 20% Co. It is very limited to use.
- Cobalt oxide (CoO): It contains 78.7% Co, insoluble in water. It is used quite frequently in rations.
- Cobalt Phosphate ($Co(PO_4)_2$): Very little used, 35% are Co.
- Cobalt gluconate ($Co(C_6H_{11}O_7)_2$): It is obtained from cobalt salt and gluconic acid. Its use is very limited.

IODINE SOURCES

- Iodine is the obligatory element in the organism.
- Seafood is a good source of iodine.
- Iodine enters the structure of the thyroxine hormone in the organism, there is 66.5% iodine.
- Iodine deficiency is seen in plants growing in areas that are insufficient for iodine. In animals consuming such plants, iodine deficiency occurs. Animals store and use iodine in the thyroid gland. If the need for iodine is not met, goiter disease occurs because of the growth of the thyroid gland.
- Potassium iodide (KI): This compound is very easily soluble in water and contains 76% iodine. This compound tends to deteriorate rapidly when used in combination with oxidizing agents. It is most commonly used in iodinated compounds.
- Sodium iodide (NaI): This compound dissolves very easily in water and has approximately 84.7% iodine.
- Sodium iodate ($NaIO_3$): This compound, which is not used frequently in rations, has 64% iodine.
- Calcium iodate ($CaIO_3$): This compound is used more than sodium iodate. It is slightly soluble in water and has about 50% iodine.

ORGANIC MINERALS

In recent years, trace minerals have been started to be produced in capsule or chelate forms with advanced technology applications.
-Prevented antogonistic effects in premix.
-Their digestibility was made into high trace mineral forms.
Higher bioavailability of organic minerals, positive effect on growth,
Improvement of immune functions,
Regulation of metabolism,
Improving the carcass quality,
Vitamin-trace mineral premixes are effective in reducing vitamin losses.

The addition of inorganic trace minerals (Cr, Cu, Mn, Se and Zn) to feeds causes these minerals to increase in feces.

With the use of trace mineral organic mixtures;

-reduction in the amount of feed and feces performance,
-elimination of metabolic problems,
-positive effects on the reduction of environmental pollution were observed.

PRODUCTION OF ORGANIC MINERAL COMPOUNDS

1.Mineral - amino acid complex:

It is obtained by the formation of the soluble metal salt complex with the amino acid (or amino acids).

sample; copper-amino acid complex

2. Mineral - special amino acid complex:

The soluble metal salt is combined with a particular amino acid.

sample; copper-lysine complex

3. Mineral - amino acid chelate:

It is obtained by forming a molar metal, usually combined with two moles of amino acid.

sample; copper-amino acid chelate

4. Mineral - polysaccharide complex:

Soluble metal salt is formed by a special metal complex with polysaccharide solution.

sample; iron polysaccharide complex

5. Mineral - proteinate:

The soluble salt in chelate is a complex with amino acids and / or hydrolyzed proteins.

sample; cobalt-proteinat