Minerals

Submitted by Cada McCoy

Dietary minerals are a group of inorganic chemical elements required for health and survival. A plant takes elemental minerals from the soil and converts them to more complex organo-mineral compounds that are bioavailable to the animal eating the plant. Minerals consumed in food must be transferred through the digestive tract to target cells and tissues. Essential for almost every reaction and function in the body, some minerals are part of complex enzyme systems necessary to digest and metabolize fats, carbohydrates, proteins and hormones, some compose structural elements of certain tissues, and others work as regulators and signalers.

Macronutrients (macrominerals) are required in large quantities compared to other vitamins and minerals and include calcium, salt (sodium and chloride), magnesium, potassium, phosphorus and sulfur. Micronutrients (microminerals or trace minerals), are required in relatively small quantities and include iron, cobalt, chromium, copper, iodine, manganese, selenium, zinc and molybdenum.

Minerals occur in nature in many chemical forms. Only some of these forms can be used by the body. An individual element can be unusable ("bad") by itself, but when combined with another element, the resulting chemical form can be useful and beneficial to the body. In ordinary table salt, when the burning and poisonous metal, sodium, and equally toxic gas, chlorine, are chemically bound together, they become not only harmless but absolutely essential to life.

Most naturally occurring salt or rock (inorganic) forms of earth minerals must be "processed" before they can be used by the body. First broken down and made soluble by stomach acids, the mineral element then must be surrounded and bound chemically to neutralize the mineral's electronic charge. If the mineral has been correctly surrounded (chelated) by the proper elements (amino acids or hydrolyzed protein), the total package (chelated mineral) can be absorbed and used by the body in metabolism.

Unfortunately, this process occurs only randomly in the body, and, therefore, ordinary mineral supplements in the form of oxides, sulfates and carbonates are not used well by the body.

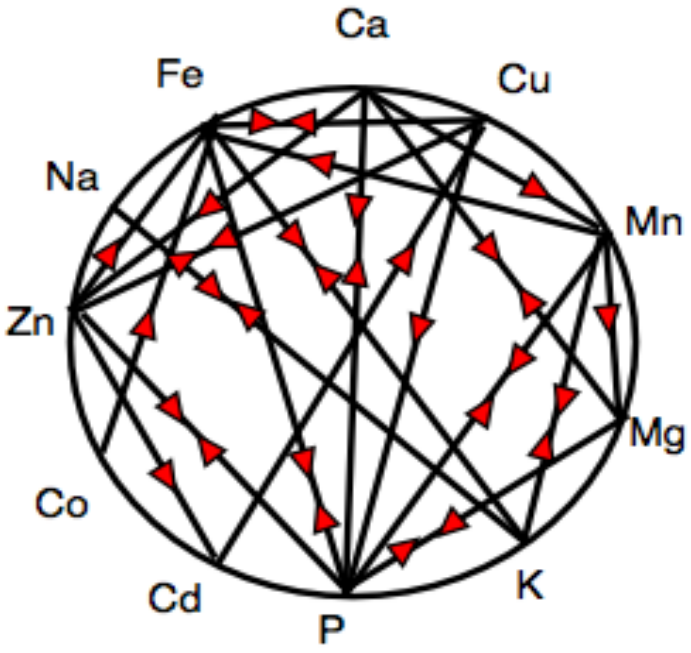
In a perfect world of nutrient-rich soils, a healthful, balanced diet can meet all the body's chemical element requirements. Today's "farmed out" land requires supplementation of essential minerals, especially for race and performance horses. Hay farmers, already challenged to afford nitrogen, phosphorus, potassium and lime to fertilize their fields, cannot economically replace depleted copper, zinc, manganese, iron, magnesium, selenium and cobalt.

In the past, with adequate minerals available in the soil, the only occasional and limited supplementation of common salt or rock inorganic forms of minerals meant they were kept well below toxicity levels. These mineral forms

cannot be given safely in large enough quantities to overcome their chelation inefficiency and can have deleterious side effects (toxicity or deficiency) when used in feeds.

Plants that animals are eating can appear healthy while actually being deficient in minerals needed for animal health, because plants do not require the same minerals or amounts of particular minerals that animals need.

In the body, minerals function in various ways: At too low a level, body systems suffer from inefficient metabolism. However, at too high a level, minerals can interfere with the metabolism of other minerals and cause as much damage as a deficiency will. The calcium/phosphorus ratio is probably the best known example: too much calcium causes depression and excretion of phosphorus, and vice versa. Imbalances or deficiencies in the body's dietary minerals can affect these systems: Immune System: Copper (Cu), Zinc (Zn), Iron (Fe) and Selenium (Se); Energy Production: Magnesium (Mg), Phosphorus (P) and Manganese (Mn); Hormone System: Iron (Fe), Manganese (Mn), Zinc (Zn), Copper (Cu), Magnesium (Mg) and Potassium (K); Vitamin Production: Cobalt (Co); Blood Production: Copper (Cu) and Iron (Fe); Enzyme Systems: Zinc (Zn), Copper (Cu), Potassium (K), Manganese (Mn), Magnesium (Mg), Iron (Fe), Calcium (Ca) and Molybdenum (Mo); Skeletal System: Calcium (Ca), Magnesium (Mg), Zinc (Zn), Manganese (Mn), Boron (B) and Phosphorus (P).



In 1985, Scientists Ashmead, Graff and Ashmead used the Mineral Wheel to show chemical interrelationships between minerals in a body. An arrow pointing from one mineral to another indicates interference that can exist between them as they compete with each other for absorption. An excess of one can cause a deficiency of another, or the toxicity (excess) or deficiency (not enough) of one mineral may influence others to exhibit their own particular excess or deficiency symptoms. This simplified wheel shows only 10 minerals. Imagine one depicting all the 73 naturally occurring minerals and elements.

Chelation Improves Mineral Bioavailability

Decline of essential minerals in farm soils today make mineral supplements important. When a mineral is correctly surrounded (chelated) by the proper elements (amino acids or hydrolyzed protein), the total package (chelated mineral) is able to be absorbed and metabolized by the body. A random process in the body, chelation efficiency is low, particularly with ordinary oxide, sulfate and carbonate mineral supplements. Also, some of these mineral forms can have negative side effects when used in feeds, and they often cannot be used in large enough quantities to overcome their chelation inefficiency.

Modern nutritional science has successfully chelated (bound) the essential minerals to amino acids and hydrolyzed proteins making a "predigested," very nontoxic mineral supplement blended in proportions and ratios fitting the nutritional needs of specific animals. In addition, these amino acid chelates are absorbed up to 300 times better than typical inorganic minerals and do not change the pH of the digestive tract like the inorganic forms. Chelation protects the mineral from negative chemical reactions in the gut creating chemical forms unusable by the body. These are the "Cadillac" of supplements with much higher biological activity.

Nature’s hundreds of chelating agents include gluconates, ascorbates, citrates, saccharides, etc. Amino acid chelates, however, have been shown to be best for supplementation.