VITAMINS AND MINERALS

The Recommended Allowances for most vitamins and minerals have been established by the National Research Council (NRC) as a point of reference for horse owners to help show how a specific feed compares and fits into a healthy diet for your horse based on age, weight, and activity. Horse Nutrition and Conditioning makes it easy because it compares your feed with the NRC with a click of a button.

It is important to understand that the Recommended Allowances listed are usually the minimum requirements given. The Recommended Allowances are not meant as a cure or treatment for disorders and do not cover special nutritional needs -- each horses requirements may differ. In humans, many vitamins and minerals, particularly antioxidants, have been shown to help fight infections and diseases. For this reason, many nutritional and health experts recommend doses several times greater than the Recommended Allowances. This is a trend that is rapidly being followed in the horse industry.

Antioxidants play a key role in fighting free radicals that can weaken cells and wear down natural defenses, eventually causing tissue and organ damage. This can deteriorate the natural defenses. Antioxidants have the ability to neutralize free radicals without becoming one themselves and thus assist in cell health while fighting cell damage, sickness, and disease.

VITAMINS

Vitamins are organic substances found in all living things. There is a common misconception that they give horses energy. That’s not true. Vitamins differ from the energy nutrients: carbohydrates, fats, and proteins. They don't provide energy for the body, but they do help enzymes with growth and healing. Vitamins are divided into water soluble and fat-soluble.

There are two groups: fat-soluble and water-soluble vitamins. Fat-soluble are stored in the horses body, liver. Most of these are pro-vitamins and are abundant in fresh green leafy plants. Horses are able to take in more than their needs in the summer and then store the vitamins for use in the winter. High quality leafy plants and sunshine give the horse many of the vitamins he requires. If you feed the horse poor quality forage or high quantities of un-supplemented refined feeds then vitamin deficiencies can occur.

Water-soluble vitamins are changed by the microorganisms found in the horses stomach. They are not stored in the horse’s body. Water-soluble vitamins are involved with the metabolism or utilization of the fats, protein and carbohydrate that the horse eats. More specific details on water-soluble vitamins are below.

WATER-SOLUBLE VITAMINS

The water-soluble vitamins are carried in the bloodstream, excreted in the urine, needed in frequent, small doses, and unlikely to be toxic. The water soluble vitamins include C and the eight B vitamins, each having an important role in nutrition. It is true that without B vitamins you would lack energy, since it is instrumental in handling the assimilation of the energy nutrients.

Thiamin or B1 occupies a special site on the nerve cell membrane and plays an essential role in the energy metabolism of cells. As a result, processes in nerves and in their responding muscles depend heavily on thiamin.

Riboflavin (B2), like thiamin helps enzymes release energy from nutrients needed in every cell of the body.

Niacin (B3) Niacin participates in many metabolic activities that are fundamental to the work of B1 and B2.

Pantothenic Acid (B5) is part of coenzyme 4, which is used in energy metabolism and seems to help with stress and alleviate symptoms of stress-related exhaustion.

Pyridoxine (B6) is essential for a healthy nervous system.

Cobalamin (B12) maintains the sheath that surrounds and protects nerve fibers and promotes their normal growth. Bone cell activity and metabolism seem to depend on its presence.

FAT-SOLUBLE VITAMINS

Vitamin A is the most versatile vitamin because of the many roles it serves. It promotes growth of the body tissues and improves immunity to disease. Vitamin A helps to maintain the stability of cell membranes and helps to manufacture red blood cells. When vitamin A levels are low, mucous membranes are more vulnerable to infection.

Beta Carotene is another antioxidant that helps fight infections and disease. This vitamin forerunner helps convert to vitamin A in the body.

Vitamin D is different from all other nutrients in that the body can synthesize it with the help of sunlight. Given enough sun, it's possible that you don't need vitamin D at all in the foods you feed. Vitamin D promotes normal bone mineralization and is a member of large bone-making and bone-maintenance team made up of nutrients including vitamins A and C and minerals including calcium and magnesium.

Vitamin E is an antioxidant like vitamin C, but is fat-soluble. One of the most important places in the body in which vitamin E exerts its antioxidant effect is the lungs, where the

exposure of cells to oxygen is the highest. Remember, antioxidants such as vitamin E help to combat free radicals that are trying to oxidize and damage healthy cells.

Vitamin K seems to act primarily in leading off blood clotting and working with vitamin D for healthy bones

MINERALS

Minerals are inorganic atoms or molecules, even smaller than vitamins. Minerals are in the fluids of the body, and help with many essential roles in nutrition, but they are not metabolized nor do they provide energy. Minerals are elements, whereas the other five nutrients are all compounds. This means the minerals cannot be rearranged or lose their identity when they are cooked, like vitamins can. Minerals, although small, play very important roles in nutrition that cannot be compromised. Minerals fall into two categories: major minerals and trace minerals. Listed below is an overview of the major and trace minerals.

MAJOR MINERALS

The major minerals influence the body's fluid and acid-base balance, contribute to the structure of tissues and bones, and play a variety of other specific roles in the body.

Sodium is an electrolyte that maintains normal fluid and acid-base balance while assisting in nerve-impulse transmission.

Chloride is also an electrolyte that maintains normal fluid balance and proper acid-base balance.

Potassium is another electrolyte that maintains normal fluid- and acid-base balance and facilitates many reactions, including the making of protein. Potassium supports cell integrity and assists in the transmission of nerve impulses and the contraction of muscles, including the heart.

Calcium is the primary mineral of bones and teeth and is also involved in normal muscle contraction. Calcium is also essential in proper nerve functioning, blood clotting, blood pressure, and immune defenses. Along with magnesium, calcium works to calm the nervous system, and relax muscles.

Phosphorus is a principal mineral in bones and teeth and is found in every cell. It is also important in energy transfer and serves as a buffer system that maintains the acid base balance.

Magnesium is also involved in bone mineralization, the maintenance of teeth, and the building of proteins. Magnesium is involved in normal muscle contraction, bone mineralization, the building of protein, and transmission of nerve impulses

Sulfur The body does not use sulfur by itself as a nutrient-- but assists with other nutrients such as thiamin and certain amino acids. Sulfur helps with the body's detoxification process..

Trace Minerals The body requires trace minerals in very small quantities. Minerals function in very similar ways, assisting enzymes. Although they are small in quantity, they perform some vital roles which no other nutrients do. A deficiency in any of these can be fatal and an excess can be deadly.

Iron is vital to cellular respiration, the process by which cells generate energy. Iron is a part of the protein hemoglobin, which carries oxygen in the body. It also makes oxygen available for muscle contraction and is essential for the utilization of energy.

Zinc is active everywhere in the body, as a cofactor for more than 70 enzymes that perform specific tasks in the eyes, liver, kidneys, muscles, skin, bones, and male reproductive organs.

Iodine helps to regulate growth development and metabolic rate.

Copper is necessary for the absorption and the use of iron in the formation of hemoglobin and helps to form the protective coverings of nerves.

Manganese cooperates with and assists many enzymes, helping to facilitate dozens of different metabolic processes.

Floride is an element involved in the formation of bones and teeth.

Chromium Studies have shown that chromium makes gaining or preserving muscle and losing fat easier because it helps regulate insulin production, which affects fat levels. It also helps to stabilize blood-sugar levels.

Selenium works with vitamin E to help fight the oxidation of cells, and is therefore considered an antioxidant.

Molybelenum is a facilitator with enzymes in many cell processes.
