

VITAMINS & MINERALS

Vitamins

Vitamin A

Fat soluble. Important for vision, skin and coat renewal, synthesis of reproductive hormones, and protein synthesis. Stored in the liver's fat cells.

Vitamin D

Fat Soluble "Sunshine Vitamin." Ultraviolet radiation from the sun is important to convert Vitamin D precursors in the skin into the active Vitamin D. Ensures the absorption and circulating blood levels of calcium and phosphorus, both of which are critical in bone health.

Vitamin E

Fat soluble. Plays an important role as an antioxidant. Protects cells against free radicals and help prevent numerous age-related and cardiovascular-related diseases.

Minerals are inorganic chemical elements the body needs for healthy growth and metabolism.

MACRO MINERALS are needed in much larger quantities to sustain normal, healthy cell function. Macro minerals are usually listed as % on the tag and are often referred to as electrolytes.

TRACE MINERALS are needed by the body in very small amounts for healthy living. Trace minerals are usually listed as ppm on the tag.

CHELATED TRACE MINERALS are attached to organic molecules such as amino acids, proteins, or carbohydrates. This attachment allows the trace minerals to be more easily absorbed and delivered to their target organs. Chelated minerals are considered to be organic molecules.

Ranch-Way carries a full line of loose and blocked mineral for all classes of livestock and horses. For additional information please visit our website.

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Macro Minerals

Calcium (Ca)

Ca is the most abundant mineral in the body. Ca is necessary for bone and tooth structure, neural function, and muscle contractions.

Phosphorus (P)

P is the second most abundant mineral in the body. P works along side Ca for the growth and integrity of bones and teeth. P is also involved with metabolism and the transfer of energy in the body, therefore, it is involved in nearly all body processes. Plus, P is needed for the structure of genes and of soft tissues and organs.

Magnesium (Mg)

Mg is found in bone, cells, soft tissues, muscle and blood. Involved in the formation of bone and teeth. Mg is vital for muscle contraction and relaxation, it is also involved with the enzymes that are responsible for the release of energy from food. Mg helps control blood pressure, regulates body temperature and metabolism, and is involved with acid-base balance in the body.

Sodium (Na)

Na, commonly found in *table salt* (along with Chloride), is an electrolyte that plays a crucial role in maintaining blood pressure, fluid regulation (and hydration), and acid-base balance in the body. Na is also involved in nerve transmission and muscle contractions.

Potassium (K)

K, like Na, is considered a positively-charged electrolyte and therefore works in partnership with Na in maintaining blood pressure, acid-base balance, and muscle contraction. Along with Na and Cl, K helps maintain the water balance in and out of body cells. K also plays a role with neural transmission and the rhythm of heartbeats.

Sulfur (S)

S is necessary for the formation of hair, cartilage, and tissue. S is needed for metabolism and a healthy nervous system. Additionally, S aids in bile secretion in the liver.

Chloride (Cl)

In tandem with K and Na, Cl is an electrolyte that helps keep the fluid balance in and out of the body's cells. Additionally, Cl forms part of hydrochloric acid necessary for digestion in the stomach. Cl is necessary for the proper functioning of the liver and for healthy joints and tendons.

Trace Minerals

Zinc (Zn)

Involved in antioxidant reactions. Zn can boost the immune system. Zn is a component of insulin and over 100 enzymes, proteins, nucleic acids and hormones. Zn helps in healing wounds, tissue repair, growth, energy conversion, and sexual development. Zn regulates blood sugar, blood pressure, heart rate and cholesterol levels.

Iron (Fe)

Fe is a part of the blood's Hemoglobin molecules responsible for carrying oxygen throughout the body. Fe is involved in enzyme activities related to energy storage and availability. Fe also forms part of several enzymes and proteins in the body.

Copper (Cu)

Cu is found in the bones, muscles, brain, heart, liver and kidneys. Cu is involved in the absorption and metabolism of iron, protein (muscle) growth, and fertility. Cu helps form connective tissue, nerve fibers and red blood cells. Cu helps keep arteries flexible as well.

Manganese (Mn)

Used in bone formation, muscle coordination, nervous system function, and is involved in several enzyme reactions. Mn is also used, along with vitamin K, to promote blood clotting.

Selenium (Se)

Se works in conjunction with Vitamin E as an antioxidant and is involved with many enzymatic activities. Se is necessary for healthy skin, muscles, and heart function. Se promotes the formation of antibodies and can help prevent infection.

Iodine (I)

I is necessary to form the thyroid hormones, which regulate the body's metabolic rate. I promotes normal cell function, keeps skin and hair healthy, and promotes overall growth and development.

Cobalt (Co)

Co works in conjunction with Vitamin B12 for the functioning of enzymes and production of red blood cells. Co helps form the myelin covering around the nerves.

Molybdenum (Mo)

Mo helps the body use iron and is stored in the liver, kidneys, bones, and teeth. Mo is needed in such minute amounts in the diet (and can be very toxic) that it need not be supplemented in the animal's diet.



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546 Willow Street Ft. Collins, CO 80524
P 970.482.1662 - F 800.333.7929 - E info@ranch-way.com
www.ranch-way.com

Mineral Antagonisms

of the Rocky Mountain Region

| Minerals | Antagonists | Signs of Deficiency | Management Strategies |
|-----------------------------------|---|--|---|
| Calcium | Phosphorous Sulfur Magnesium Vitamin D ₃ Deficiency | Waterbelly (urolithiasis /urinary calculi / urinary struvite calculi), Rickets (weak/soft bones in young animals), Osteodystrophies (i.e. osteopenia, osteoporosis, osteomalacia; demineralization of structural bone in mature animals), and Hypocalcaemia (aka "milk fever" or "downers"). | Evaluate total dietary calcium and insure total diet Calcium:Phosphorus ratio is 2:1 - 6:1, Ammonium Chloride (0.5% of total diet) to acidify the urine and break down urinary calculi stones, increased Vitamin D ₃ in the diet / increased exposure to sunlight, and access to salt. |
| Phosphorous | Calcium Imbalance Vitamin D ₃ Deficiency Phytate (organic sources of P) | Osteodystrophies (i.e. osteopenia, osteoporosis, osteomalacia; demineralization of structural bone in mature animals), impaired reproduction, reduced milk production and fragile bones, lameness, enlargement of upper and lower jaws (aka "big head disease"), and pica. | Evaluate total dietary Phosphorus, but insure total diet Calcium:Phosphorus ratio is 2:1 - 6:1, provide microbial phytase (enzyme) activity in the diet, provide additional inorganic phosphorus in the diet (more available than organic sources), increased Vitamin D ₃ in the diet / increased exposure to sunlight. |
| Magnesium | Potassium Excess Protein-nitrogen | Grass Tetany (anorexia, hyperexcitability, convulsions, respiratory distress, frothing at the mouth and excessive salivation), and calcification of soft tissue. | Provide elevated levels of Mg and Ca during high-risk times of the year when tetany is most likely to occur. Avoid heavily fertilized fields (where potash and nitrogen levels are high). |
| Salt (Sodium Chloride) | Potassium <i>Not provided!</i> | Pica (chewing or licking of wood, fencing, rocks, soil, urine, and bones), dehydration, reduced feed intake, impaired growth and milk production. | As a rule of thumb, the total diet of most animals should contain 0.4-1.0% Salt. Always provide free-choice access to plain white salt year-round. |
| Potassium | Sodium Stress | Reduced feed intake and weight gain, rough hair coat, muscular weakness, and cardiac arrhythmia. | Insure that animals under stress (i.e. heat, environmental, productive, etc.) receive adequate K ⁺ in their diet. |
| Sulfur | PROBLEMATIC ANTAGONIST! | Sulfur is in excess in most water and forages in the High Plains and Rocky Mountain Region and causes severe Cu, Zn, and Thiamin (B ₁) deficiencies. | Test water and forage sources for S concentration and manage it by limiting/eliminating "toxic" sources from the diet. |
| Copper & Zinc | Iron Sulfur Molybdenum Thiomolybdates (S + Mo) <i>Each other (Cu & Zn)!</i> | Infertility, impaired immune response, poor response to vaccination protocol, reduced growth and feed efficiency, swollen feet with scaly lesions, dermatitis (parakeratotic lesions) and discolored hair coat. | Test forages for Cu and Zn levels, plus antagonists. Liver biopsies may be necessary to assess severity of Cu and Zn deficiency. Consider implementation of chelated/organic sources of Cu and Zn for improved absorption. Avoid supplements using Cu and Zn oxides, which is essentially unavailable. Avoid ferrous (iron) oxide supplementation in feed as it exacerbates Cu and Zn deficiency. Keep Zn and Cu in balance with each other (~3:1 ratio)! |
| Manganese | Iron Phytate (organic sources of P) | <i>Rarely a problem!</i> Mn is in excess in the forages in the High Plains and Rocky Mountain Region, therefore Mn deficiencies are extremely rare. | Test forage sources for Mn, typically Mn only requires modest supplementation or not supplemented at all in most diets in our region unless iron and phytate-phosphorus is extremely high. |
| Iron | PROBLEMATIC ANTAGONIST! | Iron is in excess in the forages in the High Plains and Rocky Mountain Region and causes severe Cu and Zn deficiencies. | Test water and forage sources for iron concentrations and provide aggressive supplementation of Cu and Zn. |
| Molybdenum | PROBLEMATIC ANTAGONIST! | Mo is in excess in the forages in the High Plains and Rocky Mountain Region and causes severe Cu and Zn deficiencies. | Test forage sources for Mo concentrations and provide aggressive supplementation of Cu and Zn. |
| Selenium | Sulfur Vitamin E Deficiency Alfalfa Hay | White Muscle Disease: paralysis and recumbency, weak pasterns, stiffness, and acute death (due to pneumonia or heart failure). Additionally, retained placentas, reproductive failure, and depressed immune response. | Often Selenium deficiency is exacerbated with Vitamin E deficiency, insure that both are adequately supplemented in diet. Provide organic sources of selenium for improved absorption. Be aware that Selenium can also be at TOXIC levels in our region, therefore testing forages is prudent. |
| Iodine | Cobalt (deficiency or excess) White Clover Kale, Turnips & Rapeseed | Hypothyroidism: goiter, hairless or stillborn calves, impaired reproduction in males and females (reduced egg production in hens), and retained placentas. | Increasing the iodine (from EDDI) is very affordable to supplement in the diet and should be done, it is also known to be effective against foot rot at aggressive levels. |
| Vitamin A | High Nitrates and Urea Oxidative stress: humidity, moisture/rain, heat, sunlight, rancid fat and trace minerals. | Corneal lesions (blindness), retained placentas, and unthriftiness. | Supplement additional Vitamin A in the diet, avoid weather-stressed forages that are deficient in Vitamin A, identify and reduce the intake of excess nitrate and/or urea in the diet. Provide access to green pasture or leafy green forages. |
| Vitamin E | Oxidative stress: humidity, moisture/rain, heat, sunlight, rancid fat and trace minerals. | White Muscle Disease: paralysis and recumbency, weak pasterns, stiffness, and acute death (due to pneumonia or heart failure). Additionally, depressed immune response. | Supplement additional Vitamin E (and selenium) and protect supplements by storing them in cool, dry, dark locations (keep out of direct sunlight and other elements). Provide access to green pasture or leafy green forages. Insure that supplements are not aged and expired (due to depletion of Vitamin E). |
| Thiamin B₁ | Sulfur Selenium | Polio / Polioencephalomalacia / "brainards" (cerebrocortical necrosis): blindness, muscle tremors, recumbency, and death. | Test water and forage sources for S content and limit sulfur-rich components in total diet. Aggressive thiamin (injectable or dietarily) may be necessary, copper and urea supplementation may also help with excess S. |

