Fat Soluble Vitamins

- Vitamin A deficiency may result in reduced resistance to infection, impaired growth and improper tooth and bone formation. Zinc is necessary for the mobilisation of Vitamin A. Return to Analysis~
- Vitamin D plays a dual role as both a vitamin and a hormone. It functions to increase absorption of calcium and phosphorus. Vitamin D conversion in the skin is restricted by lack of sunlight due to our North American northern latitudes as compared to the camelids native to South America. The fiber of both llamas and alpacas decreases the amount of sunlight reaching the skin. In addition, in the warmer parts of the United Stated States, llamas and alpacas are encouraged to spend the daylight hours in the shade. A deficiency of Vitamin D is responsible for rickets. In its milder form it may be blamed on poor conformation in the show ring.
- Vitamin E is an antioxidant and is enhanced by other antioxidants, such as selenium. Its function is to stabilize membranes and protect them against free radical damage and to protect tissues of the skin, eye, and liver. In addition, Vitamin E protects and vitalises the testicles for improved virility.

Water Soluble Vitamins

- Vitamin B1 deficiency may result in gastrointestinal disturbances, constipation and intestinal inflammation. 90-96% of B1 is produced in the rumen by microbial action, it is questionable as to whether this synthesis is adequate for an animal's needs, particularly when hay is fed. ~Return to Analysis~
- Vitamin B2 functions with coenzymes and is important in energy production and essential for normal fatty acid and amino acid synthesis. Deficiency may result in dermatitis, dryness of skin and fiber and also, malformations and retarded growth in young llamas and alpacas. ~Return to Analysis~
- Vitamin B3 deficiencies affect every cell, but most critically the tissues with rapid cell turnover, such as the skin. Classic symptoms are dermatitis and diarrhoea.
- Vitamin B12 plays a role in the activation of amino acids during protein formation. Proper DNA replication is dependent on the function of coenzymes and Vitamin B12 as a methyl group carrier. The need for Vitamin B12 is increased by pregnancy. "Ill Thrift" may in part be a result of cobalt or vitamin B12 deficiency, possibly coupled with a toxic plant.
- Biotin functions to aid the incorporation of amino acids into protein and reducing the symptoms of zinc deficiency. Biotin play a major role in the production of fiber.

Minerals

Minerals are components of body tissues and fluids that work in combination with enzymes, hormones and Vitamins. They work either in combination (synergistic) with each other or compete with each other for absorption. Some minerals actually enhance the absorption of other minerals. That is why it is important to balance the minerals specifically for llamas and alpacas.

- Calcium is the most abundant mineral. 98% of the calcium in the llama or alpaca is in bone tissue and is therefore critical to structure and strength. Calcium absorption is Vitamin D dependent and a lack of either one will result in retarded bone growth. The ratio of Calcium to Phosphorus in the overall diet is critical. Diets high in phosphorus and low in calcium have been linked to soft tissue calcification and bone loss.
- Phosphorus is the second most abundant mineral in the llama and alpaca. Many enzymes and the B Vitamins are activated only in the presence of Phosphorus. Calcium and Phosphorus are closely related. Fluctuations in one mineral will be reflected by subsequent fluctuations in the other. The natural ratio of Calcium to Phosphorus in bones and teeth is 2:1, this is an ideal ratio in the overall diet. Alfalfa and grains are higher in Calcium than the ideal 2:1 ratio; therefore, the supplementation of higher levels of Phosphorus are necessary.
- Potassium is used in intracellular fluid transmission. Potassium functions to maintain cellular integrity and water balance and is involved in muscle contraction and protein metabolism. Hot weather or stress may deplete potassium.
- Iron deficiency may be evident in a low red blood cell count. The condition of anemia will be aggravated by parasites.

- Magnesium is associated with tissue breakdown and cell destruction. Also helps in the formation of urea and as such is important in removing excess ammonia for the body. This helps the llama or alpaca to deal with hot weather and stress.
- Manganese deficiency may be caused by large amounts of calcium and phosphorus in the intestine. Signs of a deficiency are sterility and testicular degeneration, weak offspring and poor survival rates.
- Cobalt can replace zinc in some enzymes and participates in the biotin dependent oxalaxetate. Deficiency shows up as emaciated and anaemic animals.
- Iodine deficiencies may include impaired physical development of the foetus, a lower basal metabolic rate and poorly formed bones.
- Copper competes with zinc for entry from the intestines and an increase in zinc might precipitate a copper deficiency. During growth, the largest concentrations of copper occur in developing tissues. Deficiency may result in a low white blood cell count, kinky or poor quality fibre and impaired growth. Impaired immunity and increased risk of prolonged duration of infections are all indications of a copper deficiency. *CAUTION: Copper should not exceed 60 mg per head per day, or 20 ppm in the total feeding program. Levels of Copper considered normal for other species may be toxic to lamas. Lama-Min 103 adds about 7ppm to the current levels of copper in the animals consumption. If you are in doubt, please contact your Veterinarian. ~Return to Analysis~
- Selenium is a trace mineral that functions either alone or as a part of enzyme systems. Selenium parallels the antioxidant and free radical scavenging action of Vitamin E. In general Vitamin E and selenium do not replace each other but are involved in overlapping systems. In llamas and alpacas selenium plays a major role in the normal development of the fetus during pregnancy and vitality of newborn. Llamas and alpacas require higher levels of selenium than most other species.
- Zinc functions indirectly as an antioxidant and is used in bone metabolism and plays a major role in necessary skin oil gland function. Zinc also functions in DNA synthesis, wound healing, the immune system, and reducing infant morbidity. Stillwater Minerals uses a chelated form of zinc that is less effected by competitions for absorption from other minerals.