



Equi-Analytical Laboratories

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In This Issue

[Mineral Analysis](#)

[Pasture Management Package](#)



Mineral Analysis: How is it measured? What is "normal"? Can it be changed?

Sally Flis, Ph.D.

Feed and Crop Support Specialist, Dairy One

There are different groups of minerals needed for body function, macro minerals and micro minerals. Macro minerals are needed for multiple body functions and in the largest quantity. Macro minerals for horses listed by the 2007 Nutrient Requirements of Horses are calcium (Ca), phosphorus (P), magnesium (Mg), potassium (K), sodium (Na), and chloride (Cl). Micro minerals are needed in lower quantities and can usually be met with high quality hay. Micro minerals for horses are listed by the 2007 Nutrient Requirements of Horses are iron (Fe), zinc (Zn), copper (Cu), manganese (Mn), and molybdenum (Mo). This also means they can easily be overfed if not monitored, and can interfere with the absorption of other minerals. Minerals in horse diets come from feed and water. The mineral concentrations in hay are largely influenced by the mineral concentrations of the soil, nutrient applications, and irrigation practices.



Calcium (Ca) and Phosphorus (P)

Calcium and phosphorus are both important for bones, muscle function, and energy. These minerals can be determined by near infrared technology or wet chemistry procedures with acid digestion and plasma spectroscopy. The ratio of Ca:P should be close to 2:1 to prevent problems in growing horses. Mature horses are more tolerant and can withstand wider ratios.

Alfalfa Hay Averages: Ca %: 1.51 ± 2.65 , P %: 0.27 ± 0.05

Grass Hay Averages: Ca %: 0.51 ± 0.23 , P %: 0.24 ± 0.09

Plant concentrations of Ca and P are related to the concentration of Ca and P in the soil. Calcium in the soil can come from naturally occurring sources, like limestone bedrock weathering or from liming the soil to change pH. After taking a soil sample, lime can be applied to adjust soil pH into the range where nutrients are most available to

plants. Low or high soil pH can inhibit the uptake of nutrients. Phosphorus in the soil is more directly related to historical and current P applications, from animal manures, composts, or purchased fertilizers. Phosphorus application to the soil should be based on soil test results.

Magnesium (Mg), Potassium (K), Sodium (Na), and Chloride (Cl)

Macro minerals, including magnesium (Mg), potassium (K), and sodium (Na), can be determined by near infrared technology (except Na), and with wet chemistry procedures with acid digestion and plasma spectroscopy. Chloride (Cl) is determined by a wet chemistry extraction and determination of concentration with a silver electrode. High quality forages are typically adequate in Mg and K. The Na and Cl requirements are generally met by providing salt. However, a performance horse that sweats a great deal may require K, Na, and Cl supplementation to replace excess mineral loss via the sweat.

Alfalfa Hay Averages: Mg %: 0.31 ± 0.07 , K %: 2.34 ± 0.53 , Na %: 0.15 ± 0.13 , Cl %: 0.73 ± 0.33

Grass Hay Averages: Mg %: 0.21 ± 0.08 , K %: 1.85 ± 0.64 , Na %: 0.07 ± 0.14 , Cl %: 0.60 ± 0.44

Soil concentration of Mg and K is the primary source of the nutrients for plants. Low concentrations of soil Mg and K can be replenished with animal manures, composts, or purchased fertilizers. The source of Na and Cl for plants is from water, irrigation water, and K fertilizers for Cl as KCl is the most common K purchased fertilizer. Excess concentrations of salt in the soil can cause plant growth problems. Testing irrigation water and managing for salt concentrations can help decrease the risk of accumulating salt in the soil.

Iron (Fe), Zinc (Zn), Copper (Cu), Manganese (Mn), and Molybdenum (Mo)

Micro minerals are determined with wet chemistry procedures with acid digestion and plasma spectroscopy. These micro minerals can interfere with the uptake of other minerals if they are not monitored. For example, very high levels of zinc can interfere with copper utilization, even though copper requirements have been met.

Alfalfa Hay Averages: Fe ppm: 385, Zn ppm: 27.5, Cu ppm: 9.1, Mn ppm: 37.1, Mo ppm: 1.98.

Grass Hay Averages: Fe ppm: 194, Zn ppm: 33.1, Cu ppm: 9.1, Mn ppm: 79.6, Mo ppm: 1.09.

Soil is the primary source for these nutrients. However, fertilizing soil to raise the concentration of these minerals can be very costly and ineffective. Managing soil pH and applying animal manure or compost to the soil should adequately supply these nutrients for crop growth. Mineral content of feedstuffs is quite variable and needs to be determined via laboratory analysis for an accurate assessment if you intend to formulate a ration from common feedstuffs alone.

Introducing the Dairy One and Agro-One Pasture Management Package

The Dairy One Forage Lab and the Agro-One Lab are offering a package to help you better understand your pasture. The package is designed for use in one pasture during a growing season. Testing your pasture from top to bottom (clippings and soil) will tell you what you are providing for your animals and what you might need to supply for your pasture.

Pasture Management Package Includes:

Forage Testing - You will get 3 Forage testing kits and sample submitting sheets to be used through the grazing season

Soil Testing - One soil sample to determine the nutrient needs of the pasture (Phosphorus, Potassium, and pH)

Interpretation - Each forage sample result will come with an interpretive sheet. The sheet will have the Dairy One Forage Lab sample ranges for comparison to your results and some management suggestions for changing your pasture.

Price \$75.00

(includes all shipping costs and is a 15% savings over list price)



Dairy One
Forage Laboratory



Agro-One
Agronomy Services

For More Information Contact:

Phone: 1-800-344-2697 ext. 2172 ·

www.dairyone.com · E-mail: forage@dairyone.com

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Equi-Analytical Laboratories
730 Warren Road ~ Ithaca, NY ~ 14850
Phone: 1-877-819-4110
service@equi-analytical.com

www.equi-analytical.com