



THE IMPORTANCE OF Magnesium, Vitamin E AND Vitamin B1



Magnesium, Vitamin E and Vitamin B1 all play an important role in energy metabolism, hormonal control, sodium conduction, calcium metabolism and stress management. Deficient horses can show signs of nervousness, muscle weakness and poor tolerance to work. It can also predispose 'tying up' in performance horses. Understanding the functions of magnesium, vitamin E and vitamin B1 in the equine body can help shed some light on why adequate supplementation is so important.

MAGNESIUM

Horses evolved consuming large quantities of roughage, which supplied adequate amounts of magnesium daily. Nowadays, feeds are high in other nutrients, such as calcium, which can hinder the absorption of magnesium and speed the digestive transit, so there is less time for magnesium to be absorbed (Altura et al, 1996).

When a horse is exposed to stress, there is a chain reaction of flight or fight responses. In response to stress, the body releases hormones and nerves assist in increasing heart, metabolic and breathing rates, redistribute blood flow to the muscles, increase blood pressure, blood glucose and delay the onset of fatigue (Elin, 1994). The most significant hormone in the reaction is adrenaline, and magnesium is the key to controlling this onset.

The far-reaching systemic nature of the stress response means that magnesium supplementation can benefit and prevent many health issues.

VITAMIN E

Vitamin E is an essential vitamin that needs to be supplemented in the horses diet, as they are unable to synthesize it themselves. It is first and foremost an antioxidant that plays a role in protecting cells from free radical damage. As exercise increases, the number of free radicals increases. Free radical formation is a natural consequence of the body utilizing fat and carbohydrate stores for energy.

Antioxidants in the body control free radical damage as they bind to the free radicals, inhibiting their ability to 'steal' electrons. To avoid damage to muscle cells during exercise, adequate levels of antioxidants must be available to counteract all the extra free radicals. As the horse's workload increases, the requirement for Vitamin E supplementation increases (White et al, 2001). Signs of oxidative stress in working horses include muscle soreness and slower than normal recovery from intense exercise.

VITAMIN B1

Vitamin B1, also known as Thiamine is a water-soluble vitamin. This means it is not stored in the body and needs to be replenished daily. Thiamine plays a vital role in carbohydrate metabolism, converting carbohydrates to energy and nerve transmission, development of the myelin sheath that surrounds the nerve to enable efficient transmission of signals (Irvine et al, 2011).

Hard working horses, or those on high grain, low forage diets may have reduced availability of thiamine in the hindgut due to stress or hindgut acidosis.

References:

Altura, B.M., Altura, B.T. 1996. Role of magnesium in pathophysiological processes and the clinical utility of magnesium ion selective electrodes. J Clin Lab Invs. 56, 53-67.
Elin, R.J. 1994. Magnesium: The fifth but forgotten electrolyte. J Clin Pat. 102, 612-622.
Irvine C. H. and Prentice N.G. (2011) The effect of large doses of thiamine on the horse. NZ Vet J, 10, 86-88
White, A., Estrada, M., Walker, K., Wisnia, P., Filgueira, G., Valdes, F., Aranceda, O., Behn, C. and Marinez, R. (2001) Role of exercise and asorbate on plasma antioxidant capacity in Thoroughbred racehorses. Com Biochem Physiol. 128, 99-104.

NRC (2012) Recommended Daily Magnesium Requirement

8-15
g/BW

(Dependent on horse's workload)

NRC (2012) Recommended Daily Vitamin E Requirement

50 IU/kg DM OR **1** IU/kg BW

NRC (2012) Recommended Daily Vitamin B1 Requirement

5 mg/kg DM OR **3** mg/kg DM

Working Horse

All Other