

Neurological Disorders and Nutritional Interventions

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Degenerative neurologic disorders can affect horses at any age although many horses show signs by the age of two. For many neurologic diseases medical treatment is often limited, but nutritional therapies may prove helpful. Examples of equine neurologic disorders that may benefit from dietary supplementation include neuroaxonal dystrophy/equine degenerative myeloencephalopathy, equine motor neuron disease, and nutritional myodegeneration.

NAD/EDM

Neuroaxonal dystrophy (NAD) is a degenerative disorder of neural cell bodies and axons throughout the brain and spinal cord. Equine degenerative myeloencephalopathy (EDM) is closely related and believed to be a more advanced form of equine NAD. Clinical signs include an insidious development of symmetric ataxia and proprioceptive deficits.¹ Horses typically develop NAD or EDM early in life, by 6–12 months of age. However, early diagnosis is often challenging as affected horses initially present at an older age with subclinical signs that are often mistaken for lameness or simply poor performance.

Although NAD and EDM are believed to have a genetic component, both conditions are related to vitamin E deficiency,^{2–5} and in some cases vitamin E supplementation may reduce the incidence and severity of NAD and EDM. One case report indicates that mares with a strong history of affected foals, who were then supplemented in a later pregnancy with vitamin E (2000 IU/day), had foals that showed no signs of neurological derangement by 2 to 3 years of age.⁵ Another study evaluated the effect of vitamin E supplementation in Quarter Horse mares following the diagnosis of three index cases of NAD.⁶ Mares, both open and pregnant, were supplemented with 2000 IU/day of natural vitamin E. Newborn foals born to the supplemented mares received 1000 IU vitamin E/day. The following year, a noted reduction in the proportion of affected weanlings and yearlings

was reported on the farm.⁶ The severity of the clinical signs in the foals was also reduced following vitamin E supplementation during pregnancy and during the first year of life.

EMND

Equine motor neuron disease (EMND) is a progressive degeneration of somatic motor neurons in the spinal cord and brain stem that often leads to death or permanent debilitation. It typically affects horses without access to pasture, although horses with access to pasture can develop EMND.⁷ Clinical signs include ataxia and weakness in all four limbs, although the hindlimbs are often more severely affected.⁸ Horses may present with weight loss from muscle wasting, muscle fasciculations, or excessive recumbency.^{9,10} Signs usually develop after the age of two.¹⁰ The etiology of EMND is not fully understood, however, a vitamin E deficiency has been implicated.^{11,12} Although prognosis is often poor, approximately 40% of affected horses may respond to vitamin E supplementation.¹⁰

Nutritional Myodegeneration

Nutritional myodegeneration, or white muscle disease, is a condition that commonly affects young, growing foals born to dams fed a selenium-deficient diet. Selenium deficiency then develops in the foal and leads to clinical disease.¹³ Skeletal muscle involvement results in severe weakness and muscle stiffness; this condition responds to selenium supplementation if begun early enough. Cardiac

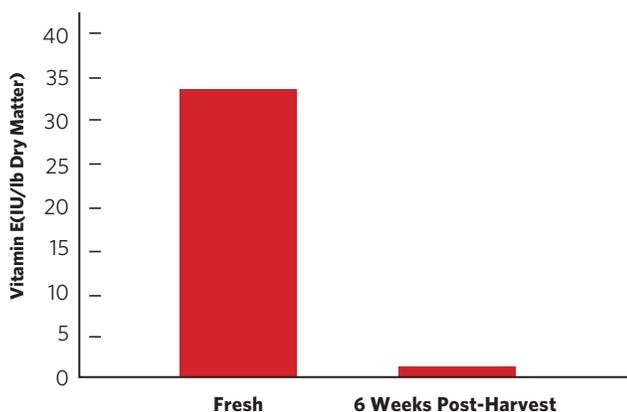
muscle involvement may result in sudden death,¹⁴ making prevention through adequate parenteral and oral supplementation critical.

Antioxidant Supplementation

Vitamin E is a potent fat-soluble antioxidant that protects lipid membranes from free radical attack. Natural vitamin E refers to one of eight forms with antioxidant activity (alpha-, beta-, delta- and gamma-tocopherol and alpha-, beta-, delta- and gamma-tocotrienol). Alpha-tocopherol is the most bioavailable and biologically active form and is designated d-alpha-tocopherol or RRR-alpha-tocopherol.^{15,16} Synthetic vitamin E also exists and is designated with a dl- or all rac- prefix.

Because vitamin E deficiency has been associated with a variety of neurological disorders in the horse, it is critical to maintain adequate intake of this nutrient. Fresh forage can be a source of natural vitamin E, although processing and storage of forage results in a significant decrease in the vitamin E content making supplementation even more important (Figure 1). Vitamin E can be safely added to the ration at a concentration up to 10,000 IU per 1000 pound horse per day.

Figure 1. Concentration of vitamin E in alfalfa hay before and after harvest



Selenium is an additional antioxidant that may help in the treatment of nutritional myodegeneration. Due to the synergistic nature between selenium and vitamin E, supplementation of the two is often recommended

in cases of nutritional myodegeneration to lessen the severity of symptoms. Selenium supplementation should employ the selenium yeast form since this is more bioavailable than inorganic sources of selenium.^{17,18} However, due to the risk of selenium toxicity, total dietary intake must not exceed 2mg selenium per kilogram of dietary dry matter, which equates to approximately 20 mg of selenium for a 1000 pound horse.

Conclusion

Natural vitamin E, in the form of d-alpha-tocopherol, is a potent and bioavailable form of vitamin E and is the preferred form of vitamin E for horses with vitamin E responsive neurologic diseases. Selenium yeast is highly bioavailable and provides essential supplementation for horses diagnosed with nutritional myodegeneration. Supplementing the ration of pregnant and lactating mares and young growing foals with natural vitamin E can help to prevent and lessen the clinical signs of EDM, NAD, EMND, and nutritional myodegeneration making vitamin E an essential part of a health wellness plan.

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