

THINK E FOR

# xcellent Nutrition

Mark Llewellyn

Vitamins are often clumped together as a single entity, and the contributions of individual ones are sometimes overlooked. In recent years, scientists have been taking a closer look at vitamin E. Though the nutrient was first discovered more than 80 years ago, the scientific community continues to find new uses for this much-heralded vitamin.

The far-reaching effects of vitamin E in equine nutrition are well known. Vitamin E plays imperative roles in immune, cardiovascular, circulatory, neuromuscular, and reproductive functions.

## All Vitamin E Created Equal?

The vitamin E family is extensive. Eight compounds have been identified; they are categorized as either tocopherols or tocotrienols. Fresh forages and grains consumed by horses usually include the eight compounds in sufficient quantities to maintain health; supplements, however, typically contain just one, alpha-tocopherol. Alpha-tocopherol is the most familiar of the octet because of its abundance in the horse's body.

Natural and synthetic alpha-tocopherol are not molecularly identical. Each molecule in natural vitamin E is alike, whereas synthetic vitamin E contains a mixture of eight molecules. Only one of these is identical to the natural form. The other seven do not exist in nature and thus are purely man-made.

Natural alpha-tocopherol is extracted from a by-product of vegetable oil processing. One of the final steps of refining food-grade vegetable oil is deodorization, a process that strips the oil of undesirable flavors. The by-product, called deodorizer distillate, is collected during soy oil, corn oil, and canola oil purification. The amount of natural alpha-tocopherol harvested from distillates depends largely on the raw product.

## A Superior Source

Aside from structural differences, there is a disparity in the potency of natural and synthetic alpha-tocopherol. Natural forms of alpha-tocopherol have superior bioavailability, being more highly digestible and preferentially metabolized by horses. Moreover, natural alpha-tocopherol is retained in tissues for longer periods of time, creating a reservoir that allows it to be instantly available when horses need it most, namely in times of stress or during periods of confinement.

How does a savvy shopper differentiate between natural and synthetic alpha-tocopherol when looking at the labels of nutritional supplements? Natural alpha-tocopherol is designated by a d (d-alpha-tocopherol) on labels, and synthetic is designated by a dl (dl-alpha-tocopherol). In some instances, a product may not have a designation. If this is the case, assume that the alpha-tocopherol therein is syn-

thetic. Because natural alpha-tocopherol is more expensive than synthetic, manufacturers will usually tout the inclusion of natural alpha-tocopherol on the packaging.

If natural alpha-tocopherol is superior to synthetic, why would manufacturers bother with the latter? Supply and demand dictate the production of natural alpha-tocopherol; there is only so much deodorizer distillate from which to extract the product. No such constraints surround synthetic alpha-tocopherol production.

In order for vitamin E to remain chemically stable in feeds and dry supplements, it must be in a form known as alpha-tocopherol acetate. The acetate protects the alpha-tocopherol from degradation in the feed or supplement. During digestion, an enzyme in the gastrointestinal tract removes the acetate from the alpha-tocopherol molecule.

Once this occurs, the vitamin can cross into the bloodstream and be used in body-wide processes. Purer forms of alpha-tocopherol, such as those found in Elevate (see sidebar), are more available to horses.

### For What Horses?

Because of vitamin E's influence on nearly all body processes, horses of all ages can benefit from supplementation, particularly if they do not have regular access to fresh pasture.

### HORSES AT MAINTENANCE

Vitamin E supplementation is essential for horses that are not allowed to graze. The vitamin E content of dried forages such as hay is severely diminished, with forages often losing 75% or more of their vitamin content upon harvesting and storing. Therefore, supplementation with vitamin E is most crucial during the winter when horses are fed diets almost exclusively composed of preserved forages. Inadequate fortification of textured feeds or the feeding of straight grains (oats, for example) may also contribute to vitamin E deprivation.

Supplementation may be indicated year-round for racehorses and show horses confined to stalls.

### PERFORMANCE HORSES

Vitamin E is an essential component to body-wide antioxidant defenses, with one of its most important duties being cell membrane maintenance. Cell membranes are composed largely of unsaturated lipids and are therefore vulnerable to assault by free radicals, compounds that can irreparably damage cell membranes.

As athletic effort increases, free radical production flourishes and natural stores of antioxidants have difficulty providing sufficient protection against the flood of free radicals generated. Supplementation is therefore necessary to help ward off the ill effects of mass-produced free radicals associated with intense exercise. Horses with an inadequate reserve of vitamin E may experience muscle soreness or stiffness during an exercise bout and prolonged recovery following strenuous work.

### BROODMARES AND FOALS

Recent research has lauded the use of vitamin E on breeding farms. Mares supplemented



*Performance horses benefit from vitamin E supplementation because it helps decrease muscle damage caused by free radicals.*



## Elevate - Unsurpassed Vitamin E Nutrition

Kentucky Equine Research has propelled vitamin E technology into the millennium with Elevate, a revolutionary liquid vitamin E (d-alpha-tocopherol) supplement. The natural vitamin E in Elevate has undergone state-of-the-art processing that allows it to be converted into a water-soluble molecule that is absorbed efficiently from the digestive system. Because the product is absorbed immediately, the vitamin E in Elevate is dispersed into the blood and to outlying tissues more readily.

Elevate provides 500 IU of vitamin E per milliliter. Under normal circumstances, horses require 500-1000 IU of vitamin E daily. Horses that are stressed, such as those in intense work or in rehabilitation from illness, may require more liberal doses of vitamin E. Elevate can deliver megadoses of vitamin E more effectively than powders and other supplements.

Administered orally or topically on feed, Elevate is easier to give than injectable vitamin E products and is more comfortable for the horse.

**For more information on Elevate, contact Kentucky Performance Products at 1-800-772-1988.**

with vitamin E have shown increased passive transfer of antibodies to foals, which ensures the strength of the neonatal immune system. Failure of passive transfer leaves foals susceptible to septicemia and bacterial infections. In a study conducted at the University of Connecticut, researchers found that mares supplemented with vitamin E had higher antibody concentrations in blood and colostrum than control mares. The concentrations of foals reflected those of their dams, with foals from supplemented mares having increased levels of antibodies.

There is also increasing evidence that vitamin E supplementation may increase fertility in mares. Due to modern management practices, including winter breeding dates, mares may not be receiving adequate vitamin E nutrition through rations composed solely of hay and grain. Supplementation will increase circulating levels of vitamin E and may positively affect fertility.

In addition, in some areas of the United States vitamin E is customarily given to all newborn foals to stave off white muscle disease, a serious malady caused by deficiencies of vitamin E and/or selenium.

### **HORSES WITH NEUROLOGICAL AND MUSCULAR DISEASE**


Over the past several years, researchers have been studying the effectiveness of megadoses of vitamin E in the prevention and treatment of neurological diseases such as equine degenerative myeloencephalopathy (EDM),

equine motor neuron disease (EMND), and equine protozoal myeloencephalitis (EPM).

EDM is a progressive disease of the brain stem and spinal cord. The disease occurs principally in young horses, and the primary sign is progressive ataxia or incoordination. Researchers have determined that EDM is not a congenital disease, though a horse may have a genetic predisposition to it.

Scientists linked vitamin E deficiency with EDM more than a decade ago. Of particular interest is research conducted at the University of Florida, where scientists worked with EDM-affected get of two Standardbred stallions. The mares bred to these stallions and the resulting foals were given 1500 IU of vitamin E per day. A year after supplementation began, only 10% of the foals were affected. Further offspring of the stallion were not diseased.

Cornell University first identified EMND. Although the cause of the syndrome is unknown, a commonality among affected horses is reduced exposure to green grass for more than a year and availability of poor-quality hay during that time. Dramatic clinical improvement was documented in horses that were allowed unrestricted access to lush pasture and vitamin E supplementation.

Vitamin E is often prescribed for horses with equine protozoal myeloencephalitis (EPM), to be used concomitantly with antiprotozoal medications. It's not unusual, for instance, for horses to be supplemented with up to 8000 IU of vitamin E per day during convalescence. 

# Make a **SMALL** change...



# ...see a **BIG** difference!



Photo by Mark Llewellyn

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