

VITAMIN E in HORSES

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Vitamin E is required by all animals and humans. In human nutrition, vitamin E is known for its antioxidant properties. Vitamin E is a general term for several derivatives that have biological activity similar to alpha-tocopherol.

In recent years, more attention has been focused on vitamin E in horse nutrition. As an antioxidant, vitamin E reduces free-radical activity that has deleterious reactions in the body. Because of this activity, vitamin E helps maintain the membrane integrity of virtually all cells in the body. Vitamin E also enhances the body's immune response and is important in nerve and muscle function.

Vitamin E interacts with the trace mineral selenium and aids maintenance of normal muscle function and helps prevent muscular disease.

Vitamin E is abundant in green growing pasture forages, especially in alfalfa. As plants mature, the amount of vitamin E decreases. Hay storage results in further lowering of the vitamin E level. Other sources of vitamin E are the germ of grains and oils pressed from the germ. Wheat germ oil has about 600 International Units (IU) per pound. Oils from corn and soybean are also relatively high in vitamin E being 23-136 IU per pound. Other feeds have variable vitamin E content. Since handling and storage can affect the level of vitamin E, it is a common practice to supplement horse feeds with vitamin E.

Recently, researchers at Virginia Polytechnic Institute have shown that natural forms of vitamin E are better than synthetic forms for the horse. Feeding vitamin E to horses gave better results than injecting vitamin E. The most effective form of vitamin E in this study was d-alpha-tocopherol.

Since vitamin E's main function is to protect cells from peroxidative damage, it has received attention in performance horses. Lipid (fat) peroxidation may be influenced by the level of vitamin E in the ration. Serum vitamin E levels decreased in exercising horses fed a ration low in vitamin E for a period of 4 months.

The National Research Council's requirement for vitamin E is 23 IU per pound of dry ration or 0.45 IU per pound of body weight for maintenance. Young, growing horses, pregnant and lactating mares and performance horses are fed 36-45 IU per pound of dry matter. Based on field studies, feeding 1,000 IU of vitamin E daily is generally recommended.

Signs of toxicity have not been noted in horses but have been observed in other animals.

Supplementation of polo ponies at the University of Connecticut with vitamin E and ascorbic acid (vitamin C) during the polo season was beneficial, especially in these intense performing animals and at the end of the season when the ponies were probably overtrained. In light performance horses, a vitamin E level of about 36 IU per pound of feed should be satisfactory, and ascorbic acid supplementation is not required.

Ascorbic acid (vitamin C) is naturally produced by the horse's body and maintains blood ascorbate levels under normal conditions. However, stress and overtraining increases

the demand for ascorbic acid. Vitamin C may spare tissue vitamin E by reducing the tocopheroxyl radical and restoring the radical scavenging ability of vitamin E. So supplementing intense performance horses, especially toward the end of the season, with both vitamin E and vitamin C may be beneficial.

Another study at the University of Connecticut, showed an advantage of feeding vitamin E to late-pregnant and early lactating mares. Mares in late pregnancy and early lactation were fed either 36 IU or 73 IU of vitamin E per pound of feed. The mares were fed a mixed grass hay and a grain ration that met vitamin and mineral recommendations.

These researchers found that the serum and colostrum Immunoglobulin G (IgG) levels were greater in mares that received the higher level of vitamin E. The foals from all mares had similar levels of immunoglobulins IgG, IgA and IgM at birth. After nursing, foals from mares fed the higher level of vitamin E had higher serum levels of IgG and IgA which was reflective of their dam's colostrum.

Immunoglobulins are large protein molecules which contain antibodies. The immunoglobulins are high in colostrum, the first milk, and provide immune protection to foals since they are born without any natural immunity. This type of immunity from colostrum is known as passive transfer.

Foals that do not get colostrum or get a poor-quality colostrum often have failure of passive transfer which can result in sickness and death where there is an inadequate immunoglobulin intake from colostrum.

One common problem observed in mares that graze endophyte infected tall fescue is they are often agalactic (no milk) or hypogalactic (low milk). Foals from such mares do not

get colostrum; therefore, they often have failure of passive transfer and are very susceptible to disease.

Green pasture forages are a good source of vitamin E but may not be available to some mares in late pregnancy or early lactation, especially those foaling early in the year. Wheat germ oil, corn and soybean oils are also good vitamin E sources. If one cannot obtain these feed products, use a commercial vitamin supplement. One caution is to only use supplements that have 10 parts of vitamin A to 1 part of vitamin D.

It seems advantageous to feed mares in late pregnancy and early lactation with larger than normal levels of vitamin E such as 75 IU per pound of feed. Mares known to have poor quality colostrum, be poor milkers or have had foals that had failure of passive transfer in previous years should be supplemented with vitamin E at twice the required level for at least a month before and after foaling.

A 1,200 pound broodmare consuming 2 percent of her body weight would eat about 24 pounds of feed daily. Seventy-five IU of vitamin E per pound of feed would be 1,800 IU vitamin E (24 times 75 = 1,800 IU) at this level. Five pounds of a pregnant mare feed, which has 100 IU vitamin E per pound, and good-quality pasture should provide about 1,000 IU of vitamin E per day. The additional 800 IU of vitamin E desired (1,800-1,000 = 800) can be provided by a vitamin supplement.

If a supplement provides 800 IU vitamin E per ounce, feed one ounce per day. A supplement that contains 20,000 IU vitamin E per pound would provide 1,250 IU per ounce. One would have to feed 0.65 ounces or 18 grams of this product to obtain 800 IU of supplemental vitamin E.

Pregnant mares fed lower than recommended quality hay this winter are good candidates for supplementation with vitamin E a month before and after foaling. Supplementing all pregnant mares that grazed endophyte infected fescue with vitamin E also could be helpful.

The most effective source of vitamin E is d-alpha-tocopherol.

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