Vitamin E and the Performance Horse

BY DR. PETER HUNTINGTON, DR. KATHLEEN CRANDELL AND MS. ELIZABETH OWENS

Vitamin E is a non-toxic, fat soluble vitamin which has an important role in many physiological functions such as reproduction, immune response and nerve and muscle function. It also has overlapping yet independent roles with selenium, an essential trace mineral. Together they act to maintain normal muscle function, aid in the prevention of muscular disease and perform as antioxidants to protect body tissues, particularly cell membranes, enzymes and other intracellular substances, from oxidation-induced damage. If vitamin E levels in muscle tissue are inadequate, the risk of exercise-induced muscle damage is increased. One important function of vitamin E is to interrupt the production of free radicals at the initial stage of peroxidative damage. Free radicals attack membranes and cells causing tissue damage. The more active the cell (cells of skeletal and involuntary muscles) the greater the use of fats for energy supply and the greater the risk of tissue damage if vitamin E is limiting.

A deficiency of vitamin E may cause a variety of different symptoms and pathological changes, which may include poor immunity to diseases (recurrent cold and cough) and muscle stiffness, soreness or damage. The result would be reduced physical performance, especially when endurance is important. It is known that the horse is not very efficient in storing vitamin E, although body stores may contain sufficient vitamin E to cover 4 months of inadequate intake in the non-exercising horse. The onset of a deficiency may be accelerated when the diet is insufficient in selenium. Unlike other animals, a diet that is high in unsaturated fatty acids from vegetable oils does not appear to increase the requirement for vitamin E in the horse, although premixed feeds that are high in fat require extra vitamin E to prevent oxidation of the fat in the feed. This is important in feeds that are stored for a period of time before use as vitamin E will be used up to prevent fat oxidation during storage.

For the horse which is kept in a paddock, fed entirely on green grass, it is unlikely that it will have a vitamin E deficiency; however, not every horse is that lucky. While roughages such as alfalfa, green pasture and good quality green hays are excellent sources, the content is variable and is reduced by maturity, harvesting and storage. In the process of hay making, between 30 and 80% of vitamin E activity is lost between cutting and baling the hay and even more is lost during storage. Vegetable oils are relatively high in vitamin E but are generally not fed in sufficient quantities to make a significant impact on supply of this vitamin in the diet. Feeds which contain lower levels of vitamin E are grains, chaff and poor quality, weather damaged, or propionic acid treated hays. The crushing of oats and grinding of cereals results in rapid oxidation of fats and the vitamin E content is quickly lost unless the feed is pelleted. The presence of heat and sufficient moisture for fermentation and mold growth to occur all decrease the vitamin E content in feeds.

A deficiency of vitamin E may cause a variety of different symptoms and pathological changes, which may include poor immunity to diseases (recurrent cold and cough) and muscle stiffness, soreness or damage.

When considering prepared feeds it is important to note that some contain more than adequate amounts of vitamin E to meet requirements. In Australia and the Far East the products HYGAIN TRACKTORQUE or HYGAIN RELEASE would meet or exceed requirements. In the United States, PHASE III fulfills horses' needs for vitamin E. However, many feeds fall short of providing the necessary amount of this essential vitamin. When planning a complete nutritional program it is wise to consider how much is being fed per day as well as the amount of vitamin E per kg. The vitamin E level in general mineral and vitamin supplements is often low, although some, such as EQUIVIT GOLD PELLET or FORTI-PHASE, contain 300 to 500 IU of vitamin

TABLE 1: Kentucky Equine Research Recommendations for Daily Vitamin E Intake for a 550 kg Horse

Work Intensity	Type of Horse	Vitamin E
Maintenance		412.5 IU
Light	Showing / Dressage	770 IU
Moderate	Dressage / Showjumping / 1 Day Event	990 IU
Intense	3 Day Event / Endurance / Hunter / Polo / Driving	1100 IU

E and specific vitamin E supplements such as EQUIVIT PRESERVE and E CONCENTRATE and Myo-Guard are available to "top up" the diet.

When the workload of the horse increases, the energy demand increases. To maintain body condition and energy for work, usually more grain and less roughage is fed. This means the horse may be receiving even lower amounts of vitamin E, because of the lower intakes of green roughages. Therefore, there is a need to consider vitamin E supplementation, especially if the horse is supplied with feeds that are low in vitamin E.

The quantity of vitamin E or selenium required relies on the amount of the other that is available and optimum amounts are needed in order to prevent clinically apparent disease. This reinforces the need to consider vitamin E and selenium together in respect to requirements and the prevention of deficiencies. Daily supplementation is recommended in diets deficient in vitamin E in order to correct the diet. A periodic vitamin E injection is not sufficient nor is it advisable as death can occur from an allergic reaction.

So how much vitamin E is needed? Recent research indicates that the vitamin E requirement of horses is much higher than was thought 10 years ago. Table 1 indicates the Kentucky Equine Research recommendations for vitamin E in IU per day for a 550 kg horse in various intensities of work.

For hard-working and athletic horses which may be prone to "tying-up" there is a definite benefit from vitamin E and selenium supplementation. These antioxidants can reduce the severity of exercise-induced free radical damage to muscle cells. In a small percentage of horses that tie-up, supplementation of vitamin E and selenium alone will alleviate the problem.

Recent research at the University of Kentucky has indicated that the requirement may be higher than the levels in Table 1 in horses exercised daily for a prolonged period of time. In the study horses were trained for 3 months and vitamin E supplementation of 80 IU/kg diet (800 IU/day) did not maintain blood and muscle vitamin E levels whereas 300 IU/kg diet (3000 IU/day) did maintain levels. A basal diet containing less than 40 IU/kg diet (400 IU/day) also failed to maintain blood or tissue levels of the vitamin. However, vitamin E supplementation did not change specific indicators of muscle integrity or damage in an exercise test at the end of the training period. More research needs to be done, but it would not be surprising if recommendations for vitamin E intake were increased in the near future, particularly for prolonged duration exercise.

Vitamin E is important for your horse's health but it is also an expensive supplement. Therefore, it is important not to overuse the vitamin. However, if vitamin E can lead to improved immune and muscle function, better performance and a happier horse, the benefits will outweigh the costs.

Photo submitted by Barbara Silverman

A balanced diet that provides all of the vital nutrients a horse requires enables it to perform to the very best of its ability.