



Vitamin E and Peak Performance

How it works and why it matters.

HORSEPOWER

Energy production in cells is primarily dependant on oxidation. Just as Oxygen combines with fuel in a fire to produce heat, oxygen in the body combines with fats and carbohydrates to release their energy for muscular work and a host of other cellular functions. A by product of this process is the production of highly reactive molecules called "Free Radicals" or "Reactive Oxygen Species"(ROS) including a variety of chemicals such as Hydrogen Peroxide. These can damage DNA, lipids, proteins and carbohydrates and for example, are contained in tobacco smoke making that toxic. These reactive molecules, once formed, are self perpetuating and continue to cause damage until stopped by a so called "Anti Oxidant" molecule. A range of conditions from joint disease to recurrent airway obstruction and fatigue in horses is thought to be related to stress and damage caused by ROS.

Several essential nutrients are involved in counteracting the effects of ROS, including Vitamins A, C and E and the trace minerals Selenium, Copper, Zinc, Manganese and Iron. One of the most potent of these is Vitamin E whose main role in the body is as an antioxidant. The ROS molecules are reactive because they contain an un-paired electron, giving them a positive charge. Vitamin E can donate one of its Hydrogen atoms to the ROS making it neutral and stable, and safe. Better yet, Vitamin E can then pinch another electron from Vitamin C, recharging its ability to repeat the process. This process requires Selenium which is why Selenium is important – without it Vitamin E cannot work.

Vitamin E is fat soluble so it can operate inside the fatty cell membrane. Vitamin C is water soluble so it can operate both inside and outside the cell, the electron swapping goes on via enzyme systems at the interface between the layers. Vitamin C can be manufactured from Glucose by the horse's liver, but Vitamin E cannot and must come from the diet. Grains are low in Vitamin E, around 15 – 25IU/Kg whereas fresh forages can contain 30 – 100 IU/Kg. However, the amount varies a lot depending on the maturity of the plant when cut, and the storage time. For example, the levels in Lucerne hay can decrease by 50% to 75% after storage for only three months. The amount of Vitamin E in the diet can therefore vary a lot.

Vitamin E's antioxidant effects are important for all cells in the body, but in the racehorse or elite performance horse perhaps the most vital areas are in the muscles and lungs which are working overtime during exercise, burning energy substrates at a tremendous rate and potentially most at risk from oxidative damage. The requirements for this vitamin increase with workload and the minimum recommendation rises from 1.6 IU per Kg of bodyweight in light work, to 2.0 IU/Kg BW for hard work. This equates to around 800 IU per day for a horse in light work up to 1000 IU per day in full work, and that's probably a minimum.

Given the problem of low vitamin E in grains, and also in forages caused by storage, the best way to ensure adequate intake is either by a supplement or incorporation in the hard feed. With this in mind, **Horsepower** has recently increased the levels of Vitamin E in **Sweetfeed #4** to 460 IU per Kg, ensuring abundant protective levels of this vital antioxidant are available for all levels of work.

Performance depends on lung and muscle function, and that's why Vitamin E is so important.

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on behalf of
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