

# Ingredients in Detail

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**Riboflavin, Pantothenic acid, Thiamine, Niacin and Lipoic Acid** are nutrients that are necessary for the conversion of pyruvate to acetyl coenzyme A (CoA) and the release of energy during the Krebs Cycle in the horse's muscles. CoA is the gateway to the Krebs cycle, which releases energy during exercise. When pyruvate cannot be converted to CoA, it ferments to create lactic acid. Researchers point to the buildup of lactic acid in the blood and within the muscle cells as an indication of fatigue, loss of energy, and muscle control. These ingredients reduce lactic acid buildup by serving as substrates for the enzymes that convert pyruvate to CoA, therefore allowing your horse to continue exercise at a high level for a longer period of time.

**DL-Phenylalanine** and **L-Leucine** are D-amino acids that have been shown in studies to produce effective analgesia in horses. They operate by presumably preserving brain endorphins, as well as binding reversibly to enkephalinases and preventing enzymatic degradation of enkephalins. Chronic use of these D-amino acids does not produce tolerance and physical dependence in studies of both humans and mice. It is suggested in studies that D-amino acids may be one of the best drugs for treatment of acute or chronic pain in horses as they are both effective and show no significant side effects.<sup>1</sup>

**BCAAs** (branch chain amino acids) support the process of the repair, building, and replacement of muscle tissue lost during hard physical work. Following heavy exercise, branch chain amino acid levels in the bloodstream are reduced to the point where the body needs to breakdown muscle cells and degrade liver protein to supply more branch chain amino acids for the body to use. When BCAAs are supplemented, the animal will use these added amino acids first, reducing the need to break down and use crucial muscle cells and liver proteins.

**Vitamin E** and **Selenium** support muscle health. Oxidation increases as the need for energy increases. As the oxidation process is heightened, so is the production of free radicals, causing potential damage to vital tissues in the horse. When partnered together, antioxidants Vitamin E and Selenium have the ability to stop cell damage, as well as prevent muscle problems such as "tying up" or "White Muscle Disease".

<sup>1</sup>L.S. McKibbin, R.S.S. Cheng 1982. Systemic D-Phenylalanine and D-Leucine for Effective Treatment of Pain in the Horse 39-40, Canadienne:LaRevue Veterinaire