The name vitamins derives from “vital amines” as it was originally thought that these substances were all amines. We now know that this is not the case, as vitamins have a range of structures.

Vitamins are classified as either water-soluble or fat-soluble organic compounds that can be naturally found in small amounts in plant and animal-derived foods. Organisms require small amounts of vitamins for proper function of the body and any deficiency can lead to metabolic and physical disorders.

In an optimal environment horses can obtain most of their vitamins from fresh grass and other plants and in the case of vitamin K and/or supplementary sources. In the previous edition we covered carbohydrates into energy. It also essential for proper chemical reactions in the body. Thiamine helps the body cells to express vitamin activity of different sources on a comparable basis. Depending on the age, sex, work load, stage of gestation, pregnancy, lactation and growth, the minimum daily vitamin A requirement for horses is estimated to be between 30 -60 IU/kg body weight (BW).

The most common supplement form for horses is vitamin D₃, cholecalciferol. The NRC recommends minimum intake of 6.6 IU/kg BW for maintenance, breeding and exercising. Growing horse require between 22-14 IU/kg BW, which depends on the stage of growth. Deficiency in vitamin D can cause rickets, a disease characterized by bone deformities. Excess level of vitamin D is associated with calcification of soft tissue.

Vitamin E is the collective name for a group of fat-soluble compounds with distinctive antioxidant activities. Vitamin E and selenium partner and play an important role as anti-oxidants, protecting body tissues from damages effects of oxidation. It also plays and essential role in maintaining proper function of the muscular, nervous, circulation, reproduction and immune systems.

There are eight natural occurring chemical forms (alpha, beta, gamma and delta-tocopherol and alpha, beta, gamma and delta-tocotrienol). They all vary in biological activity and of these, alpha-tocopherol has the highest bioavailability. Fresh green grass and plants contain adequate levels of vitamin E, but Concentrations dramatically drop when plants are processed (e.g. cutting, halving, and storage). Horses that have limited access to fresh pasture benefit from vitamin E supplementation.

Common forms of vitamin E supplements used by horse feed and supplement manufacturers are esters of the alpha-tocopherol such as alpha-tocopheryl acetate. There is an increased interest in the use of natural vitamin E. Vitamin E appears to have 36% greater bioavailability than the synthetic form. The differences between the two forms (isomer) structure and uptake action. The natural source appears to be better transported to and retained in cells and tissues than the synthetic source.

Food stuffs with the highest concentration of vitamin E are vegetable oils (e.g. soya bean oil), followed by nuts and seeds including whole grains. Depending on the age, sex, work load, stage of gestation, pregnancy, lactation and growth, the minimum daily vitamin E requirement for horses is estimated to be between 1-2 IU/kg BW.

Deficiency in vitamin E can cause impaired immunity, muscle degeneration, spinal cord degeneration and equine motor neuron disease (EAMND).

Thiamine (B₁)
Thiamine is also known as vitamin B₁ and is one of the B vitamins, a group of water-soluble vitamins that participate in many of the chemical reactions in the body. Thiamine helps the body cells covert carbohydrates into energy. It also essential for proper functioning of the heart, muscles and nervous system.

Thiamine can be found in cereals, whole grains (especially wheat germ), protein supplements such as soya bean meal and cotton seed meal and brewer’s yeast. In supplements thiamine is generally supplied as thiamine hydrochloride or mononitrate. Recommended levels of thiamine are 0.01-0.125mg/kg BW for moderate to heavy working horses and 0.06mg/kg BW for all others. Deficiency can cause anorexia, ataxia, slow heart rate and muscle twitching.
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Niacin (B3)
Niacin is also known as vitamin B3, nicotinic acid, and vitamin PP. Niacin assists with proper function of the digestive system, skin and nerve system. It also plays a role in the conversion of food to energy.

Niacin is present in most common horse feeds but concentrations and digestibility may vary depending on the food source. Niacin is also produced by microbial fermentation in the caecum of the horse. In supplements, niacin is generally supplied in a nicotinic acid form.

Niacin requirements for horses have not yet been determined. In addition, deficiency and toxicity in horses have also not been described. Deficiency in other species caused severe metabolic disorders and lesions of the skin.

Pantothenic acid (B5)
Pantothenic acid or vitamin B5 is involved in numerous metabolic pathways including carbohydrates, fats, proteins and steroid hormones.

Like niacin it is widely distributed in common horse feeds. Common supplemental form of the vitamin is calcium pantothenate.

Pantothenic acid requirements are not estimated for horses and deficiency and toxicity in horses have also not been reported.

Vitamin B6
Vitamin B6 is a water-soluble vitamin and is part of the vitamin B complex. There are several forms of the vitamins. Pyridoxine is the form that is commonly given as vitamin B6 supplement. Vitamin B6 plays important role in many reactions of amino acid metabolism, glycogen utilization and the synthesis of epinephrine (adrenaline) and norepinephrine and metabolism of fats and amino acids. It also plays a role in the citric acid cycle which is a process by which biochemical energy is generated during aerobic respiration.

Vitamin B6 requirements for horses are not determined and deficiency and toxicity in horses have not been described.

Biotin (B7)
Biotin is also known as vitamin H or vitamin B7. It is involved in numerous metabolic functions and is also member of the vitamin B complex. Biotin is necessary for cell growth, the production of fatty acids and the metabolism of fats and amino acids. It also plays a role in the citric acid cycle which is a process by which biochemical energy is generated during aerobic respiration.

Biotin can be found in plant material and is manufactured in small amounts by the gut microflora. Many horse owners will be familiar with biotin as a supplement for hooves. Although results vary, supplementation of biotin over a period of time has shown to improve hoof health and quality.

Optimal biotin levels are determined yet no deficiency or toxicity of biotin has been reported in horses.