

The Role of Vitamins in Dairy Cattle Nutrition

Vitamins are classified as either fat-soluble or water-soluble. Water soluble vitamins include thiamine (B₁), riboflavin (B₂), niacin, pantothenic acid, folic acid, biotin, choline, myoinositol, para-aminobenzoic acid, vitamins B₆, B₁₂, and C. These vitamins can all be synthesized either by microbes or within body tissues, so they are not normally supplemented. However, they are not stored in the body and there is some evidence that supplementation of folic acid and vitamin B₁₂ in the diets of high producing cows might be beneficial. Biotin supplementation has been shown to reduce the incidence of some types of hoof lesions and Niacin is often included in transition diets for fat cows although evidence to support this use is inconclusive.

Fat soluble vitamins include A, D, E, and K. These vitamins are transported through the body in association with lipids. They are also absorbed and stored with fat in the body. Vitamin K can be synthesized by rumen microbes and does not need to be supplemented. Vitamins A, D, and E must either be provided in the diet or administered by intramuscular or subcutaneous injection.

Specific functions of the vitamins and signs of their deficiency are as follows:

Vitamin A: Essential to the development of the epithelial cells, reproductive success, bone growth and proper vision.

Natural sources of Vitamin A include green plants and organ tissues.

Signs of Deficiency: Tough skin, reproductive disorders, reduced bone growth, blindness, thinning, diarrhea and nervous behaviour.

Vitamin D: Prevention of Milk Fever in lactating cows by increasing the absorption of calcium and phosphorus in the small intestine and mobilization from bone. Vitamin D is produced in the skin of animals exposed to sunlight. If animals are housed indoors, then Vitamin D must be supplemented. Natural sources of Vitamin D include good quality forages and fish oils.

Signs of Deficiency: Rickets, Osteomalacia, Osteoporosis.

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Vitamin E: In conjunction with selenium, vitamin E is an antioxidant. Natural sources include germ or germ oils of plant seeds and green plants.

Signs of Deficiency: White Muscle Disease in newborn calves; reproductive disorders in mature animals.