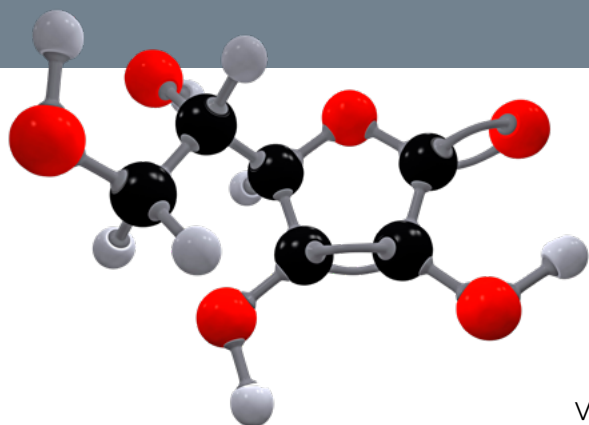


HOT TOPIC

Vitamins in pet food



VITAMIN C



In focus

Vitamins are important nutrients for pets and people. What are their functions, and should pets be given vitamin supplements?

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What are vitamins?

Vitamins are micronutrients – present in the diet and used by the body in small amounts. They assist many critical metabolic functions in the body.¹

VITAMINS ARE DIVIDED INTO 2 GROUPS:

- **Fat-soluble vitamins** are vitamins A, D, E and K. Fat-soluble vitamins are digested and absorbed with dietary fat, and their metabolites are excreted in the feces. Excesses of fat-soluble vitamins can be stored in the body, predominantly in the liver, thus deficiencies of fat-soluble vitamins develop more slowly than water-soluble vitamin deficiencies. However, fat-soluble vitamins, specifically vitamins A and D, have the potential to reach toxic levels.¹
- **Water-soluble vitamins** include vitamin C and the B-complex vitamins. Water-soluble vitamins are absorbed in the small intestine and excreted in the urine. The body is unable to store significant levels of water-soluble vitamins except for cobalamin (vitamin B12).¹

What are the functions of vitamins in pet food?

Several vitamins can be produced by the body (produced endogenously): biotin, vitamins B9 (folate), K, and possibly some B2 (riboflavin) in the large intestine by bacteria; vitamin C in the liver; and limited amounts of vitamin D in the skin secondary to sun exposure. Although the levels of endogenously produced vitamins may be enough for most healthy pets, these vitamins can be included in the diet to ensure the pet is receiving complete and balanced nutrition or for specific needs, e.g., therapeutic diets. The remaining vitamins must be supplied in the diet.¹

Fat-soluble vitamins

Vitamin	Key roles in pet health ¹	Considerations in cats and dogs ¹
A	Vision, skeletal development, reproduction, skin and mucous membrane health. Beta-carotene (a carotenoid and vitamin A precursor) and the carotenoid lutein have immune-modulating and antioxidant effects.	Unlike dogs, cats lack sufficient levels of the enzyme that converts vitamin A precursors (plant pigments known as carotenoids, e.g., beta-carotene) to active vitamin A and thus need preformed vitamin A in the diet.
D	Regulates calcium and phosphorus metabolism, skeletal development; immune-modulating effects. ² Studies in other species show effects on microbiome and that vitamin D deficiency increases risk of chronic diseases. ^{3,4}	Cats and dogs cannot produce sufficient vitamin D3 from sun exposure, thus need a dietary source.
E	Antioxidant – protects against oxidative stress.	Vitamin E requirements increase when diets contain high levels of long chain omega-3 polyunsaturated fatty acids.
K	Blood clotting.	—

Water-soluble vitamins

Vitamin	Key roles in pet health ¹	Considerations in cats and dogs ¹
C	Antioxidant, formation and maintenance of collagen and connective tissue, normal immune function.	Unlike humans, cats and dogs produce vitamin C in the liver from glucose.
Thiamine (B1)	Metabolism of carbohydrates, fats, and protein in the diet into energy; DNA synthesis; red blood cells; nerve/brain function.	Cats have a much higher requirement than dogs. Raw fish contains thiaminase, which destroys thiamine.
Riboflavin (B2)	Energy metabolism.	—
Niacin (B3)	Energy metabolism.	Although dogs can derive some niacin by converting the amino acid tryptophan, cats cannot do so. Both species benefit from a dietary source of niacin.
Pantothenic acid (B5)	Energy metabolism.	—
Pyridoxine (B6)	Energy metabolism, hemoglobin production, conversion of tryptophan to niacin.	—
Biotin*	Energy metabolism, skin and coat health.	Raw egg whites contain avidin, which binds biotin making it unavailable for use by the body.
Folate (B9)	Cell maintenance and growth, energy metabolism.	—
Cobalamin (B12)	Cell maintenance and growth; energy metabolism; production of myelin, brain function; red blood cell production.	Gastrointestinal disease is frequently associated with inadequate B12, especially in aging cats. ⁵
Choline†	Metabolism, component of cell membranes, precursor to acetylcholine, transport of fatty acids.	—

* Depending on the reference, B7 or B8

† vitamin-like nutrient

Would a pet benefit from vitamin supplementation?

Nutritionally complete and balanced diets contain all the vitamins that healthy pets need, so dogs or cats fed exclusively on these diets should not need supplemental vitamins. Several vitamins may occasionally be supplemented for specific indications (e.g., liver disease, anticoagulant rodenticide toxicity) under veterinary management.



Vitamins are included in the correct levels and ratios in complete and balanced pet foods.

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