EUCALCIS

Feed supplement for cats and dogs to support increased needs in Calcium and Phosphorus

EUCALCIS < U-CÁL-CIS

The name is inspired by the Greek word « $\varepsilon \tilde{\upsilon}$ », which means « good » and the Latin word « calcis », which means « limestone, lime », sharing the same etymology with Calcium Andrews EA, Freund W, Lewis CT, Short C. *A Latin dictionary*. Oxford: Clarendon Press; 1879

A combination of minerals and fat-soluble vitamins for ensuring nutrient balance in cats and dogs eating raw meat–based diets. Raw meat–based diets are those that include uncooked ingredients derived from domesticated or wild-caught food animal species and that are fed to dogs or cats living in home environments. These ingredients can include skeletal muscles, internal organs, and bones from mammals, fish, or poultry as well as unpasteurized milk and uncooked eggs. From experience it has become evident that it is difficult to get all the vitamins and minerals from natural ingredients into muscle-based food in an economical combination. Vitamins and minerals usually must be added to a diet of meat and vegetables, and the calcium to phosphorus ratio needs to be approximately 1:1¹. Eucalcis can also be helpful during growth, pregnancy and lactation based upon specific veterinarian recommendation.

Dicalcium phosphate, Calcium gluconate and vitamin D

Calcium, phosphorus, and vitamin D have a key role in skeletal development and health as well as other important metabolic functions². Calcium and phosphorus are stored mostly in skeletal tissue, although they are present throughout the body. Bone metabolism and calcium and phosphorus absorption and retention are influenced by vitamin D as well as the relative dietary concentrations of these and other minerals. Because the bone is the major reservoir of calcium and phosphorus, its metabolism is impacted by their relative homeostasis. Vitamin D plays a key role in bone remodeling and bone growth by activating osteoblasts and osteoclasts.

Calcium, phosphorus, and vitamin D are important essential nutrients in the dog and the cat. As such, these nutrients are required as a part of a complete and balanced diet³. Most commercial diets for dogs and cats provide sufficient amounts of calcium, phosphorus, and vitamin D, but unconventional diets may be deficient or unbalanced in these nutrients, which may lead to negative outcomes⁴.

A US study in 2001⁵ revealed that all of the home-prepared and commercial RMBDs (Raw meat–based diets) tested had multiple nutritional imbalances, some of which could have important adverse effects on the health of the animals. Examples included a calcium-to-phosphorus ratio of 0.20, vitamin A and E concentrations

below the minimum detectable value, and a vitamin D concentration nearly twice the maximum amount. Authors of a case report⁶ of a growing dog fed an RMBD (a commercial carbohydrate premix plus raw ground beef prepared in accordance with instructions on the package label) reported that the nutritionally unbalanced diet resulted in vitamin D–dependent rickets type I and nutritional secondary hyperparathyroidism. In a recent study in Europe⁷, investigators calculated amounts of 12 nutrients (e.g., calcium, phosphorus, and vitamin A) for 95 homemade RMBDs being fed to dogs, as reported by the owners. In that study, 57 (60%) diets had major nutritional imbalances. Therefore, there is concern that both commercial and homemade RMBDs may have important nutrient deficiencies and excesses.

It is essential for proper animal growth that provision be made for not only the quantities of calcium and phosphorus to be those required for development, but also for the ratio between the two elements to follow the feeding recommendations⁸. During growth, imbalances of these nutrients have the most detrimental consequences, resulting in factures and limb deformities. All growing puppies and kittens can be harmed by diet imbalances and excessive food intake, but to describe those seen predominantly in large-breed dogs, the term developmental orthopedic disease is used.

Contrary to the belief that additional calcium would be helpful for skeletal health of growing animals, excess calcium supplementation results in hypercalcemia, in response to which the body excretes calcitonin on a continual basis, reducing reabsorption by the bones leading to abnormal morphology of certain bone structures⁹. Although rarer, the risks of deficiencies must not be neglected either. Vitamin D, calcium and phosphorus deficiencies are responsible for osteomalacia in nursing females and rickets in the young. Calcium deficiency can still be observed in animals fed solely on (muscle) meat. Phosphorus deficiency is often secondary to diet that is very high in calcium. A diet high in lipids should also be supplemented with phosphorus⁹.

In adult animals, hypocalcemic emergencies, such as periparturient hypocalcemia (eclampsia), may be less common but are often life threatening. Eclampsia occurs most commonly during the first 4-weeks postpartum, but can also occur in the last few weeks of gestation¹⁰. In dogs with eclampsia, calcium is given orally 25-50 mg/kg/d in 3-4 divided doses for the remainder of lactation period¹¹. The same dose may be used for long-term therapy for hypoparathyroidism, recognizing that the goal of therapy is not to return calcium levels to normal in this disease, but to achieve levels just below the normal range.

Vitamin A

Vitamin A promotes the differentiation of mesenchymal stem cells into osteoblasts and osteoclasts and the maturation and mineralization of cartilage in the skeleton.

Vitamin A deficiency is rarely observed in dogs and cats because commercial pet foods contain adequate amounts and because dogs are able to convert the carotenoids found in plant matter into active vitamin A³. The cat differs from the dog because it cannot use carotenoids and must consume all of its vitamin A as preformed retinyl palmitate or free retinol from animal tissues. The absorption of preformed vitamin A is not regulated by the intestinal mucosa, and high amounts of this vitamin are readily absorbed by the body. If cats are fed foods having a concentrated source of vitamin A, they are unable to protect themselves from absorbing toxic levels.

Vitamin A concentrations can be found below the minimum detectable value in unconventional diets⁵, hence the need for supplementation with recommended amounts of vitamin A.

Vitamin E

Vitamin E functions as a biological, chain-breaking antioxidant that neutralizes free radicals and prevents the peroxidation of lipids within cellular membranes. An animal's requirement for vitamin E depends on dietary levels of polyunsaturated fatty acids (PUFAs) and selenium, a trace mineral³. Vitamin E and selenium function synergistically. Increasing the level of unsaturated fat in the diet causes an increase in an animal's vitamin E requirement. In commercial pet foods, vitamin E also protects unsaturated dietary fats from destructive oxidation, as the vitamin is preferentially oxidized before the unsaturated fatty acids, thus protecting them from rancidity. Therefore, as the level of unsaturated fatty acids in a food increase, its concentration of vitamin E should also increase. The addition of large amounts of fish products to a cat's diet appears to be the most common cause of low levels of vitamin E.

A naturally occurring deficiency of vitamin E is not common in dogs and cats. However, the ingestion of poorly prepared or poorly stored foods or supplementation with large amounts of PUFAs can precipitate a relative deficiency of this vitamin. In unconventional diets vitamin E concentrations can be found below the minimum detectable value⁵, hence the need for supplementation with recommended amounts of vitamin E.

References

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