YOUR CAT'S NUTRITIONAL NEEDS

A Science-Based Guide For Pet Owners

UNDERWEIGHT OR OVERWEIGHT?

UNDERWEIGHT

Your cat is not getting enough to eat if it feels "bony" to the touch, has little or no fat on the ribs, and appears to "cave in" just behind the ribs. If chronically underfed, adult cats may experience damage to internal organs, impaired ability to nurse young, and increased susceptibility to bacterial infections and parasites; kittens may be stunted in their growth; adult cats may develop osteoporosis.

IDEAL

Your cat is at an ideal weight if it appears well-proportioned, shows a moderate waistline behind the ribs, and has a thin covering of fat over the ribs and abdomen.

OVERWEIGHT

Your cat is overweight if it has heavy fat deposits over the lumbar area, face, and limbs and if there is an obvious rounding or distension of the abdomen. Obesity occurs in one out of four cats in westernized societies and is more common in older and neutered animals. Health risks include diabetes and osteoarthritis.

VITAMINS

Vitamins are organic compounds that take part in a wide range of metabolic activities. Vitamin deficiencies can cause a variety of health problems. Cats cannot synthesize some vitamins from precursors (pre-vitamin structures) in the diet. For example, they must get all of the vitamin A and niacin they need directly from the food they eat. Deficiencies in vitamin A can adversely affect the health of the eyes. Adult cats deprived of niacin in the diet will lose weight and may die as a result. The diets fed to many cats, especially canned food containing fat-laden fish products, make them more susceptible to deficiencies of certain vitamins, such as vitamin E. Vitamin E, an antioxidant, provides protection against oxidative damage. Some vitamins are not only essential in small doses, but are also toxic in excess amounts. Too much vitamin A, a natural consequence of feeding large amounts of liver to growing kittens, can cause hypervitaminosis A, a condition characterized by a variety of skeletal lesions.

DAILY RECOMMENDED ALLOWANCES FOR VITAMINS

	Functions	Daily Recommended Allowance*	Signs of Deficiency/ Excess
Vitamin A	Vision; growth; immune function; fetal development; cellular differentiation	63 µg	Conjunctivitis; cataracts, retinal degeneration and other eye problems; weight loss; muscle weakness; reproductive and developmental disorders Skeletal lesions in kittens, particularly outgrowths of the cervical vertebrae; osteoporosis
Vitamin D	Maintenance of mineral status; skeletal structure; phosphorous balance	0.4 µg	Rickets; abnormalities in skeletal development; progressive paralysis; ataxia; lack of grooming; reduction in body weight and food intake Anorexia; vomiting; lethargy; calcification of soft tissues
Vitamin E	Defense against oxidative damage	2.5 mg	Anorexia; depression; pain sensitivity in abdomen; fat tissue pathology
Vitamin K	Activation of clotting factors, bone proteins, and other proteins	82 µg	Prolonged blood clotting times; hemorrhaging
Vitamin B_1 (thiamin)	Energy and carbohydrate metabolism	0.33 mg	Neurological impairments including altered reflexes and convulsive seizures; heart-rate disorders; pathological changes in the central nervous system; severe learning deficits
Riboflavin	Enzyme functions	0.27 mg	Cataracts; fatty livers; testicular atrophy
Vitamin B_6	Glucose generation; red blood cell function; niacin synthesis; nervous system function; immune response; hormone regulation; gene activation	0.16 mg	Stunted growth; convulsive seizures; kidney lesions
Niacin	Enzyme functions	2.5 mg	Anorexia; weight loss; elevated body temperature; fiery red tongue, with ulceration and congestion
Pantothenic Acid	Energy metabolism	0.4 mg	Stunted growth; fatty changes in liver; small bowel lesions
Vitamin B_{12}	Enzyme functions	1.4 µg	Weight loss; vomiting; diarrhea; intestinal disorders
Folic Acid	Amino acid and nucleotide metabolism; mitochondrial protein synthesis	47 µg	Decreased growth rate; increased iron levels in blood

**Daily needs for an adult cat weighing 9 pounds, consuming 250 Calories per day.*
mg = milligram µg = microgram

MINERALS

Twelve minerals are known to be essential nutrients for cats. Calcium and phosphorus are crucial to strong bones and teeth. Cats need other minerals, such as magnesium, potassium, and sodium, for nerve impulse transmission, muscle contraction, and cell signaling. Many minerals that are present only in minute amounts in the body, including selenium, copper, and molybdenum, act as helpers in a wide variety of enzymatic reactions. The requirements for certain minerals may change as your cat ages.

Cats can get too much or too little of a specific mineral in their diets. An excess of dietary magnesium, for instance, has been implicated in the formation of stones in the urinary tract. Foods that maintain relatively low urinary pH levels, however, have been shown to prevent these stones.

DAILY RECOMMENDED ALLOWANCES FOR MINERALS

	Functions	Daily Recommended Allowance*	Signs of Deficiency/Excess
Calcium	Formation of bones and teeth; blood coagulation; nerve impulse transmission; muscle contraction; cell signaling	0.18 g	Nutritional secondary hyperparathyroidism; loss of bone mineral content, which can lead to collapse and curvature of lumbar vertebrae and pelvic bones; bone pain, which can progress to pathological fractures Depressed food intake; decreased growth; increased bone mineral density; increased need for magnesium
Phosphorus	Skeletal structure; DNA and RNA structure; energy metabolism; locomotion; acid-base balance	0.16 g	Hemolytic anemia; locomotor disturbances; metabolic acidosis

Magnesium	Enzyme functions; muscle and nerve-cell membrane stability; hormone secretion and function; mineral structure of bones and teeth	25 mg	Poor growth; overextension of the carpal joints; muscle twitching; convulsions Urinary tract stone formation in the presence of high pH
Sodium	Acid-base balance; regulation of osmotic pressure; nerve impulse generation and transmission	42 mg	Anorexia; impaired growth; excessive thirst and drinking; excessive urination
Potassium	Acid-base balance; nerve-impulse transmission; enzymatic reactions; transport functions	0.33 g	Anorexia; retarded growth; neurological disorders, including ataxia and severe muscle weakness
Chlorine	Acid-base balance; osmolarity of extracellular fluids	60 mg	Increased sodium concentration in renal fluid; excess potassium excretion
Iron	Hemoglobin and myoglobin synthesis; energy metabolism	5 mg	Poor growth; pale mucous membranes; lethargy; weakness; diarrhea Vomiting and diarrhea
Copper	Connective tissue formation; iron metabolism; blood cell formation; melanin pigment formation; myelin formation; defense against oxidative damage	0.3 mg	Reduced weight gain; longer time to conceive
Zinc	Enzyme reactions; cell replication; protein and carbohydrate metabolism; skin function; wound healing	4.6 mg	Skin lesions; growth retardation; testicular atrophy
Manganese	Enzyme functions; bone development; neurological function	0.3 mg	No studies of deficiency in cats
Selenium	Defense against oxidative damage; immune response	19 µg	No studies of deficiency in cats
Iodine	Thyroid hormone synthesis; cell differentiation; growth and development of puppies; regulation of metabolic rate	88 µg	Enlargement of thyroid glands Excessive tearing, salivation, and nasal discharge; dandruff

**Daily needs for an adult cat weighing 9 pounds at maturity, consuming 250 Calories per day.*

FEEDING PRACTICES

Q: Does my cat need to have meat and/or fish products in its diet?

A: Domestic cats are descended from strict meat-eaters, and their behavior reveals their carnivorous nature. When hunting, domestic cats will seek small prey such as mice, birds, and insects. They may even kill and eat a rabbit. They will stop eating a meal of commercial cat food and go off hunting if distracted by potential prey. The particular chemistry and structure of the cat's gastrointestinal system is well-suited to digesting and absorbing nutrients from animal-based proteins and fats. Unsupplemented vegetarian diets can result in harmful deficiencies of certain essential amino acids, fatty acids, and vitamins.

Q: How much fiber is good for my cat?

A: Fiber in the diet is probably good for overall gastrointestinal health and may help overweight cats trim down. Dietary fiber is thought to help maintain proper weight by diluting the caloric density of the food and through physical effects and hormonal interactions. For reasons not yet understood, dietary fiber also seems to help in the management of mild hyperglycemia (high blood sugar), a relatively common problem in older cats.

On the other hand, too much fiber in the diet can decrease the digestibility of other important nutrients. Also, certain features of the cat's intestinal tract, including a relatively small colon and nonfunctional cecum, suggest that cats may not be able to utilize dietary fibers as well as other animals. Meals should not have more than 10% fiber.

Q: How often should I feed and water my cat?

A: If given free access to food, cats will eat between 12 and 20 meals a day, evenly spread out over the 24-hour light–dark cycle. Cats should be fed more than once a day.

Fresh water should be available at all times, but the amount needed varies with the type of diet and the environmental conditions. Cats don't drink as much per kilogram of body weight as do dogs, perhaps because of their evolution as desert animals. Cats will drink approximately 2 milliliters of water for every gram of dry food they eat. Whereas dogs will drink enough water to replace 6% of their body weight in one hour, cats will take 24 hours to do the same. The weak thirst drive of cats puts some cats at higher risk of developing urinary tract stones. While

TIDBIT

Exposure to certain flavors and textures of food early in life can shape strong preferences later on, as can meal temperature, odor, texture, and taste. It's important to gradually mix the familiar food with the new food before switching completely.

they may be better off eating canned cat food, which contains 78–82% water, simply adding water to dry food will also help to protect against stone formation.

Q: How can I help my overweight cat trim down?

A: The most obvious answer is to put less of the same type of food in its bowl each day, still allowing it to eat at all times of the day. This is not the same as letting it eat as much as it wants at all times. About 30 to 40% of cats will overeat and become fat if given this latitude. Some cat owners offer less appealing food. Another option is to feed one of the low-calorie cat foods on the market. It's also important to remember to keep your cat from sampling the cat-next-door's food and to refrain from giving it table scraps.

Q: Is it true that cats are finicky eaters?

A: It is true that taste, texture, and moisture content of food is more important to cats than it is to dogs. Cats will choose foods on the basis of these features rather than nutritional adequacy. That is why it is important for cat owners to make sure their pets are getting the recommended amounts and mix of all of the essential vitamins, minerals, and other nutrients.

In contrast to dogs, cats will not eat a powdered, commercial diet. They will, however, eat the same diet if it is provided as pellets, in a mash, or in gel form. Typically, they like the gel form the best. They are more sensitive to bitter taste than dogs and prefer warm to cold food.

TIDBIT

Cats don't drink as much water as dogs do, perhaps because of their evolution as desert animals.

FOOD CHOICES

Commercial cat foods come in a variety of forms. The most common types are **dry, semimoist, and canned**. The moisture content of these foods ranges from 6 to 10% for dry, 15 to 30% for semi-moist, and 75% for canned. Most canned food has relatively more fat and protein and fewer carbohydrates than dry and semi-moist food, and generally contains much higher levels of animal products.

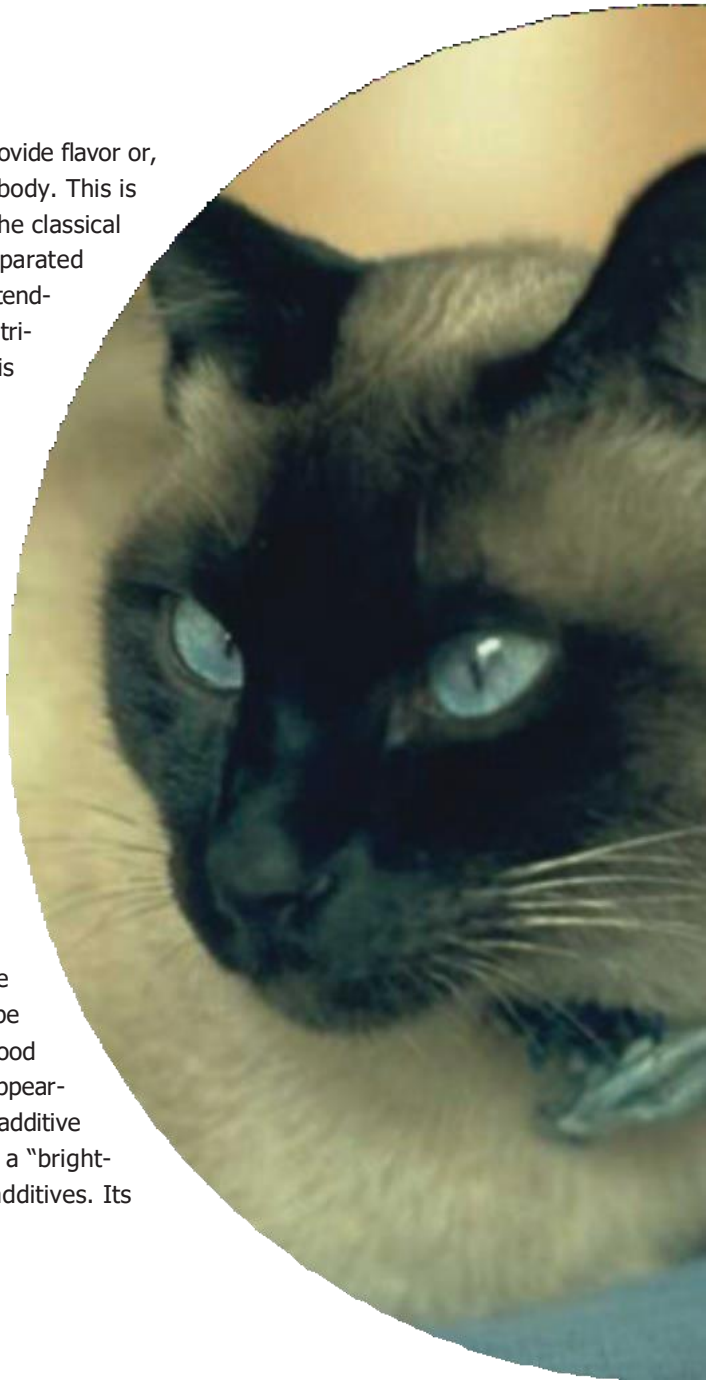
Pet food labels must list the percentage of protein, fat, fiber, and water in the food. When reading labels, it is important to remember that what may appear to be a big difference in the amount of a nutrient—for example, 8% protein in a canned cat food vs. 27% protein in a dry cat food—reflects the fact that there is more water in the canned food.

PET FOOD ADDITIVES

Some other substances that might be found in pet foods, which are not required nutrients, are described below:

Chondroprotective agents are used by the body to make cartilage and joint tissues. Although chondroprotective agents may be indicated for selected clinical conditions, widespread inclusion in the diets of healthy populations may not be warranted at this time.

Antioxidants work to prevent oxidative damage to nutrients and other compounds in the body and inhibit or quench the formation of free radicals. At this time, data are lacking to make specific recommendations beyond those for the essential vitamins and minerals that are components of antioxidants.



Herbs and botanicals are used in pet foods to provide flavor or, more often, to have a medicinal effect on the body. This is especially true in the case of extracts, where the classical nutritive components of the plant may be separated from the extract in the process. Because the intended functions are more pharmacologic versus nutritional in nature, discussion of potential benefit is beyond the scope of this publication.

Flavors and extracts derived from animal tissues such as poultry or fish are considered "natural" flavors. A wide variety of flavors can be derived from other animal and plant materials, including dairy products, eggs, herbs, and spices. Acceptable processing methods include roasting, extraction, and fermentation. Except for artificial smoke and bacon flavors, synthetic substances are rarely used in most dog and cat foods.

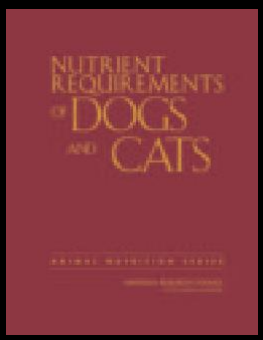
Colors are synthetic compounds used to replace or accentuate the inherent color of the food. Only certified colors approved for use in human foods are allowed in pet foods. Iron oxide is a synthetic but noncertified color that can be used at levels not to exceed 0.25% of the pet food product to give dog and cat food a red, meaty appearance. Titanium dioxide is another common color additive in human and pet foods because it can induce a "brightness" in foods by complementing other color additives. Its use is limited to 1% of the food by weight.

TIDBIT

Pet foods marketed as "snacks" are not required to have nutritional adequacy labels.

For more than 80 years, the National Academies has fostered improved understanding of the nutritional needs of pets, wildlife, laboratory-research species, and food-producing animals through its Nutrient Requirements of Domestic Animals series—a series that is considered the "gold standard" for animal nutrition in the United States and worldwide.

This pamphlet is based on recommendations from the 2006 release of *Nutrient Requirements of Dogs and Cats*. The report contains useful information for companion animal nutritionists, veterinarians, scientists in industry and academe, regulators, pet owners and anyone with an interest in the health and welfare of these important animals. To order the report, contact the National Academies Press, 500 Fifth Street NW, Washington, DC 20001; (800) 624-6242 or http://www.nap.edu.



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