Animal Clinic of Michigan City

CATS
THE COMPLETE CARNIVORE

There has been in the last few years a revolution when it comes to feeding cats, from urinary health to weight control and longevity in general. Are we feeding as close to nature as possible? If you look at cats from a dietary perspective they and other members of the suborder Feloidea are strict carnivores. If you look at the evolutionary history of the domestic cat it indicates that this species has eaten a purely carnivorous diet throughout its entire development for thousands of years, the primary economic value of cats has been their hunting ability. Until recently, there has been little to no change in their behavior or their looks (selective breeding), the prey drive is so strong they will stop eating what they have already killed to make another kill. This behavior ensures survival by optimizing food availability.

Cats typically eat 10-20 small meals throughout the day and night. Small rodents makeup about 40 percent or more of the feral domestic cat's diet, with small rabbits, insects, frogs, and birds making up the remainder. The average mouse provides an estimated 8% of a feral cat's daily energy requirement. Repeated hunting cycles throughout the day and night are required to provide sufficient food for the average feral cat. House cats continue with this behavior, eating small frequent meals all day long, the only problem with this feeding pattern is that the house cats don't have to hunt for their food and therefore don't burn off the extra calories consumed.

Cats are very sensitive to the physical form, odor, and taste of foods. They consume live prey starting with the head first; this head-first consumption is dictated by the direction of the of hair growth on the prey. Food temperature also influences acceptance by cats. They do not readily accept food served at either temperature extreme but rather prefer body temperature as would be found with freshly killed prey.

House cats accustomed to a specific texture or type of food may refuse foods with different textures.

Cats also show a decided preference for the taste of various animal products, including fat, protein hydrolysates (digests), meat extracts, and certain free amino acids abundant in muscle tissue. Cats do not seem to be attracted to the taste of sugars and are adverse to flavors from plant products. They prefer solid moist foods typical of flesh and do not readily accept powdery, sticky, or very greasy textures.

Since cats are not able to tell that an individual kibble is in the shape of a star, triangle, or circle, they are checking for the "mouth feel" of the food. If a kibble is not the preferred shape, it is rejected.

Cats have adapted physiologically to the life of a hunter. Their visual acuity is greater than that of dogs. In addition, their sense of hearing is very well developed – their ears are upright, their face is forward, and they have 20 associated muscles to help them precisely locate sound. Their highly sensitive facial whiskers and widely dispersed tactile hairs are thought to help them hunt in dim light and to protect their eyes. Sharp and dagger-like, their retractable claws are ideal for

capturing and securing prey, yet they are easily retracted to minimize noise when stalking.

Because cats lack some premolar and molar teeth, they have fewer permanent teeth than do dogs. Feline premolar teeth are conical and sharply pointed, making them suited for tearing and shearing flesh. They lack flat, grinding surfaces more suitable for chewing plant material. Their scissor-like carnassial teeth are ideal for delivering the cervical bite used to sever the spinal cord and immobilize or kill prey.

Keeping in mind the typical eating pattern of most domestic cats (small, frequent meals); it is not surprising that their stomachs are smaller than dogs' stomachs and simpler in structure. Because cats do not consume large meals, their stomach is less important as a storage reservoir.

Intestinal length, as determined by the ratio of intestine: body length, is markedly shorter in cats than omnivores and herbivores. The ratio for cats is 4:1, meaning that the intestines are four times longer than the length of the cat. By contrast, this ratio is 6:1 for dogs and 14:1 for pigs. Cats do have greater villas height in their intestinal lining, improving their absorptive capacity over that of dogs; thus cats are only about 10% less efficient in digestion, especially of complex starches or fibers – even with their shorter intestinal length.

Salivary amylase, the enzyme used to initiate digestion of dietary starches, is absent in cats. This enzyme was not necessary in a prey-based diet with minimal starch content. Cats are not able to adapt to varying levels of carbohydrates in their digestive and absorptive functions of the intestine.

Intestinal amylase appears to be exclusively derived from the pancreas. The level of pancreatic amylase is only 5% that of dogs. The sugar transporter in the intestine is nonadaptive to changes in dietary carbohydrate levels. Disaccharide activity (enzymes responsible for sugar digestion) is also nonadaptive and only about 40% of that found in dogs. These changes evolved because cats had little natural carbohydrate intake and it was not necessary to have systems intact that were of little use to the animal.

Despite these adaptive changes, cats are able to still use carbohydrates in their diets, with digestibility of approximately 94% for most sugars. Lactose digestion declines sharply in kittens after about 7 weeks of age. This is because of a decrease in intestinal lactase activity that is typical in mammals. Most adult cats can consume small amounts of milk without problems, but larger amounts can lead to signs of bloating, diarrhea, and gas.

High levels of dietary carbohydrates can have a negative impact on diet digestion.

Cats have a vestigial cecum and short colon, which limit their ability to use poorly digestible starches and fiber for their energy through bacterial fermentation in the large bowel.

Domestic cats are thought to have descended from the small African wild cat, which is found in the deserts of Africa. Because of this ancient relationship, cats today maintain this adaptation to a dryer environment. Cats seem to be less sensitive to the stimulus of thirst and are able to survive on less water than dogs. Because of their status as strict carnivores, they are also able to obtain much of their water requirements from their prey.

With this decreased response to thirst, cats may ignore minor levels of dehydration (up to 4% body weight). They are able to compensate for this reduced water intake by forming highly concentrated urine. Cats adjust their water intake based on the dry matter content of their diet rather than the moisture content. They consume 1.5 to 2 ml of water per gram of dry matter. This 2:1 ratio of water: dry matter is similar to that of their typical prey. This means that cats on a dry diet will consume half as much water as cats on canned diet. If a cat is prone to stone formation, especially in light of its urine-concentrating ability, changing to a canned food diet will significantly increase water turnover, thereby diluting the urine and decreasing stone formation.

Protein metabolism in cats is unique; this is apparent because of their unusually high maintenance requirement for protein in the diet compared with dogs or other omnivores. Cats have both a higher basal requirement for protein and increased requirement for essential amino acids.

Cats depend on protein not only for structural and synthetic purposes but also for energy.

Taurine is an essential amino acid that cats can only get from their diets therefore if cats are not hunting and are being fed a commercial diet as most cats are these days this essential amino acid must be added to the food supply. Three syndromes have been identified related strictly to taurine deficiency in cats:

Central retinal degeneration, Reproductive failure/impaired fetal development and, Dilated cardiomyopathy. Clinical signs of tarurine deficiency occur only after prolonged periods of depletion (from 5 months to 2 years).

Cats are particularly sensitive to deficiency of the essential amino acid arginine. Infact, they will exhibit signs of hyperammonemia within 1 to 5 hours of eating a single arginine-free meal. Affected cats will show severe signs of ammonia toxicosis and may die within 2 to 5 hours. Without arginine, the urea cycle cannot convert ammonia to urea and toxicosis occurs. Arginine deficiency is rare and has been reported only in cats fed experimental foods specifically formulated to be arginine deficient or certain casein-based human enteral diets.

Methionine is an essential amino acid for cats; this species has a higher requirement than do dogs or other omnivores. Cystine is also required for production of hair and felinine, an amino acid present in cat urine. Felinine is found in the largest amounts in intact male cats and is thought to be used for territorial marking. Cystine can replace up to half of the methionine requirements of cats; methionine tends to be the first limiting amino acid in many food ingredients.

Nutritional deficiencies are possible, especially in cats fed homemade vegetable-based diets or human enteral diets.

With vitamin metabolism cats are unable to convert beta-carotene to retinol (vitamin A) because of lack of intestinal enzymes necessary for the conversion; therefore, this species requires a dietary source of preformed vitamin A. Vitamin A is necessary for the maintenance of vision, bone, and muscle growth, reproduction, and healthy epithelial tissues. Because vitamin A is fat soluble and is stored in the liver, deficiencies are slow to develop and are seen only in cats with severe liver failure or gastrointestinal disease resulting in fat malabsorption.

Cats also lack sufficient enzymes to meet the metabolic requirements for vitamin D synthesis in the skin; therefore, they require a dietary source of vitamin D. The primary function of vitamin D is calcium and phosphorus homeostasis, with particular emphasis on intestinal absorption and retention and bone deposition of calcium. As with vitamin A, deficiency is rare and slow to develop. Vitamins A and D and arachidonic acid are plentiful in animal fats.

Dog foods are nutritionally less adequate for feline maintenance, growth, and reproduction than are cat foods. Dog foods are likely to lack the protein, taurine, nicin, vitamin B6, and methionine that cats require.

Veterinary Recommended Diets:

Hills M/D
Innova Evo
Royal Canin Neutered Cat Diet