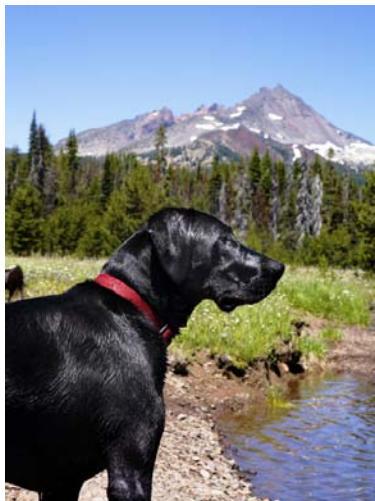


Fatty Acids and Their Importance in a Healthy Diet

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Dietary fat and fatty acids are an important component of our pets' diets. Fat provides a concentrated source of energy, serves as a carrier for fat-soluble vitamins, and plays a role in palatability. Fat, or triglycerides, are made up of fatty acids and glycerol. Depending on the fat source, it may also supply essential fatty acids (EFAs) that cats and dogs are not capable of synthesizing. Fatty acids provide both metabolic and structural functions and can either be saturated (contains no double bonds, linked by only single bonds) or unsaturated (contains at least one double bond). Fatty acids are named based on carbon molecule chain length and the location of the first double bond in the molecule.

We typically think of omega-6 and omega-3 (also called n-6 and n-3, respectively) fatty acids when discussing dog and cat diets because these are the two distinct families of EFAs. The n-6 and n-3 terminology denotes the specific position of the first double bond when counting from the methyl (terminal) end. All EFAs are polyunsaturated, meaning that they have multiple double bonds within the molecule. Sometimes total n-6 and n-3 fatty acids are compared in a ratio format, but this method of comparison is outdated and can be misleading depending upon how the ratio is calculated.¹ The simplest method of evaluation is looking at each specific EFA and its level in the diet.

The most commonly known n-6 fatty acid is linoleic acid (LA) which is essential for both dogs and cats. LA can be found in many different vegetable and oilseed sources, such as sunflower oil and flaxseed, and is generally thought to be responsible for a healthy skin and coat.² After LA, the rate limiting step for desaturation and elongation is controlled by an enzyme called Δ -6 desaturase. Unlike the dog, the cat is deficient in the Δ -6 desaturase needed to synthesize LA into arachidonic acid (AA), making AA an essential fatty acid in cats' diets. In addition, plants cannot synthesize AA from LA thus cats' dietary obligation as carnivores to get AA from common ingredients such as chicken, turkey, lamb, beef, eggs, or dairy.

Predominant Pathways of Essential Fatty Acid Metabolism in Mammals

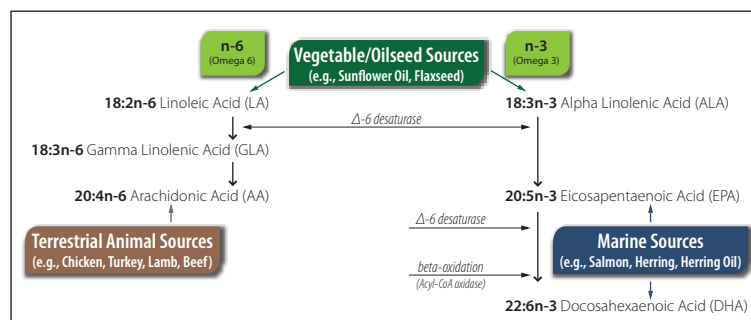


Chart adapted from *Nutrient Requirements of Dogs and Cats, 2006*.

On the n-3 branch of fatty acids, alpha-linolenic acid (ALA) acts as the parent fatty acid for the synthesis of eicosapentaenoic acid (EPA) and the conditionally EFA docosahexaenoic acid (DHA). ALA is also supplied by many of the same types of vegetable and oilseed sources as LA, and although it doesn't have any direct functions, it is thought to provide a sparing effect to LA.² The metabolism of these n-3 fatty acids can actually have an anti-inflammatory effect when compared to the eicosanoids (immunoregulatory molecules) produced from the metabolism of n-6 fatty acids.² Omega-3 fatty acids have recently been examined in dogs with osteoarthritis and have shown some promising effects due to these anti-inflammatory properties.³

EPA is easily incorporated into cell membranes and can serve as a precursor to anti-inflammatory eicosanoids. DHA is commonly found in brain tissue and is one of the most abundant fatty acids found in the retina. It has been shown to be essential for normal neurological and visual development during fetal and neonatal life. In addition, it has been shown that puppies lose the ability to synthesize DHA from ALA after weaning, making it a conditionally EFA during growth and development.⁴ Due to this limitation, it is more beneficial to supplement with marine based ingredients to provide preformed DHA and EPA to your pet than to provide the ALA precursor.⁴ Cats have an even more limited capacity to elongate ALA to EPA and DHA compared to dogs. This makes cats more dependent upon dietary sources of these fatty acids than dogs. Thus, EPA and DHA are best provided in the diet by marine sources, such as salmon, herring and herring oil.

Only small amounts of EFAs are required to meet your pet's metabolic needs (and some can be synthesized from other EFAs). However, providing some preformed long-chain fatty acids, such as DHA during growth and development, seems to be conditionally essential during certain life stages. Feeding diets appropriate to your pet's lifestage is the best bet towards ensuring that all their needs are being met. If you have additional questions, please consult your veterinarian before considering any dietary change.

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