

# DERMATOLOGY PEARLS

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## PEARL OF THE MONTH: FATTY ACIDS

I'll be honest, reading and listening about fatty acids tend to bore me. But I recently attended a truly enlightening lecture on fatty acids given by Dr. Ken Kwochka DACVD, sponsored by Bayer. If you get the chance to see his presentation, by all means do so; for now I thought I would share the details that were most helpful for me.

**Omega 6 vs. Omega 3:** Omega 6 fatty acids include linoleic acid (LA) and its metabolites gamma-linolenic acid (GLA), dihomo-gamma-linolenic acid (DGLA) and arachidonic acid (AA). LA is essential for both dogs and cats and AA is also essential for cats. These fatty acids are found in phospholipids in cell membranes and are incorporated into lamellar bodies/lipid organelles inside the epidermal cells, and then are released into the intercellular spaces in the stratum corneum. The main functions of the omega 6 fatty acids in the skin are to aid the skin barrier function, including aiding skin protection against microorganisms, allergens and skin water loss, incorporation into skin ceramides, and helping to control skin desquamation. Western diets, including many commercial pet foods, contain excessive amounts of omega 6 fatty acids, and this has the potential to result in increased inflammatory AA synthesis/increased proinflammatory eicosanoids in the body, and may ultimately exacerbate pre-existing inflammatory conditions such as skin and joint disease.

Omega 3 fatty acids include flax oil derived alpha-linolenic acid (ALA), and fish oil derived eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). The ALA in flax oil is metabolized to EPA and DHA, and it takes at least 2.3X as much flax oil as fish oil supplementation to obtain the same benefit. Omega 3 fatty acids are essential for normal development and maintenance of nervous and retinal tissue and for normalizing inflammatory responses. Omega 3 fatty acids compete with omega 6 fatty acids for the same metabolic enzymes, resulting in production of less inflammatory, non-inflammatory or anti-inflammatory mediators (cytokines, prostaglandins) and reducing AA-derived pro-inflammatory mediators. Unlike the omega 6 fatty acid linoleic acid, there is currently no regulatory requirement for pet food manufacturers to add omega 3 fatty acids to their products.

**Clinical Indications and Dose:** Omega 6 fatty acids can be indicated to aid treatment of cutaneous barrier defects such as primary seborrhea (very rare), fat deficient diets, cold dry environments, dry skin caused by endocrine dermatoses, and dry skin caused by excessive swimming or bathing. Adding an omega 6 oil to the diet may be helpful, but a commercial omega 3/6 supplement may be more ideal to help with potential concurrent immune dysregulation, and as previously stated, many pet foods already contain increased omega 6 fatty acids.

Omega 3 fatty acids may be helpful as part of combination therapy for inflammatory dermatoses including sebaceous adenitis, mild pemphigus cases, ear margin dermatosis, symmetric lupoid onychodystrophy, and especially atopic dermatitis. It takes 1-3 months of therapy for full effect. Supplementation (by diets or supplements) with omega 6 and omega 3 fatty acids improves skin barrier function and clinical signs of atopic dermatitis. For atopic dermatitis, the most commonly cited dose of omega 3 supplementation is 180mg EPA and 120mg DHA per 10 pounds of body weight per day. The JAVMA Bauer fatty acid review recommended 125mg combined EPA and DHA per kg<sup>0.75</sup> body weight/day, or about 700mg (or 70mg/kg/day) combined EPA and DHA per day for a 10kg dog. The NRC Safe Upper Limit dose in dogs is 370mg/kg<sup>0.75</sup> combined EPA and DHA. Potential side effects of high dose fatty acid supplementation include GI upset, pancreatitis in predisposed breeds/ individuals, and platelet function abnormalities. For full details, see the excellent review in JAVMA's Timely Topics in Nutrition: Bauer JE. Therapeutic use of fish oils in companion animals. JAVMA 2011; 239: 1441-1451.

**Product options/considerations:** There are several chemical forms of fish oil:

A. Triglycerides, fatty acids bound to a glycerol backbone, the most common and cheapest form, with good absorption/bioavailability; 30% of the total fish oil content consists of EPA and DHA, ie. a typical OTC 1000mg fish oil capsule contains about 180mg EPA and 120mg DHA. Veterinary fish oil products which are triglyceride based include Derma-3 Softgels/liquid (Sogeval), Eicosaderm liquid (Dechra), Allerderm EFA caps (Virbac), AllerG3 Capsules and Liquid (Vetoquinol), Omega-3 Pet (Nordic Naturals), and Welactin (Nutramax).

B. Ethyl esters: this form is manufactured by chemically stripping the fatty acids off the glycerol backbone and then reattaching them to an ethyl alcohol backbone, allowing higher concentrations of EPA and DHA to be achieved compared to triglycerides. Many clinical studies of fatty acids in humans have utilized the ethyl ester formulation, but these products appear to not be as well absorbed from the GI tract and so are less bioavailable on a dose by dose basis, though the clinical effects with long term dosing appear to be similar to triglyceride products.

C. Free fatty acids: fatty acids are stripped from the glycerol backbone and then left free; these products contain high concentrations of EPA and DHA (so lowering the volume of oil needed to achieve the same fatty acid levels) and are well absorbed from the GI tract. Veterinary products include FreeForm Snip Tips and Liquid (Bayer) and Derma-3 Twist Caps and Free Form Liquid (Sogeval).

The source and quality testing of fish oil is important; wild salmon have been overfished and farmed salmon may have poor quality due to lack of wild diet and potentially increased PCBs and chemicals. Krill oil has the concern of impacting whale forage. Use of wild caught smaller and more easily renewable fish such as anchovies and sardines is ideal. Additionally, fish oils should be purified via molecular distillation and be screened for heavy metals, PCBs and dioxins, using standards set by the Council for Responsible Nutrition (CRN), World Health Organization (WHO), and International Fish Oil Standards (IFOS). Fish oil is prone to oxidation and loss of activity, which makes quality control testing crucial, especially in formulations more prone to oxidation such as diets, non-encapsulated oils and soft chews. In the United States, the National Animal Supplement Council (NASC) works with the FDA to establish and monitor safety and quality control standards for animal supplements including fatty acids. Products bearing the NASC Seal are subjected to quality audits every 2 years, follow FDA labeling guidelines, and participate in an adverse event reporting system as well as a random finished-product testing program.

**Summary:** When choosing a fatty acid product, it's important to consider the clinical indication, fatty acid dose required, fatty acid dose delivered by the product, and source, quality and testing performed on the products. Cheaper, over the counter fish oil products are often labeled in a confusing manner, making it difficult to determine exact levels of EPA and DHA, and may not indicate fish source/husbandry or type and extent of purification or quality control of the product. The following table lists information for several of the animal and veterinary fatty acid products, as well as a few veterinary diets which are enriched in fatty acids or are marketed for dermatologic indications. As veterinarians, we are responsible for identifying and recommending the best quality products and the appropriate doses of fatty acids for our clients and patients, and I hope that this edition of Dermatology Pearls has helped you to do so.

Product/manufacturer	Source	NASC certified	Omega 3 content
Welactin/Nutramax	Wild caught cold water fish, primarily anchovies, menhaden	No Manufacturer states they follow all GMP manufacturing guidelines, and have third party quality testing.	1 soft gel contains 300mg omega 3 (155mg EPA/100mg DHA) 6ml liquid contains 1450mg omega 3 (750mg EPA, 500mg DHA)
Omega 3 Pet/Nordic Naturals	Wild caught anchovies, sardines	No Certified GMP compliant and have 3 <sup>rd</sup> party quality testing.	1 soft gel contains 310mg omega 3 (150mg EPA, 90mg DHA) 5ml liquid contains 1426mg omega 3 (690mg EPA, 414mg DHA)
Ultra EFA liquid/Rx Vitamins for Pets	Anchovies, sardines	Yes	5ml liquid contains 3000mg omega 3 (540mg EPA, 360mg DHA)
Free Form Snip Tips and Liquid/Bayer (formerly a DVM and Teva product)	Anchovies, sardines	Yes	1 capsule of medium and large breed size contains 515mg EPA and 338mg DHA; 0.5ml or 1 pump of liquid contains 160mg EPA and 96mg DHA
Derma-3 Twist Caps and Liquid/Sogeval	Wild caught anchovies and mackerel	Yes	1 capsule of medium and large breed size contains 540mg EPA and 350mg DHA; 0.5ml or 1 pump of liquid contains 160mg EPA and 104mg DHA
Derma-3 Softgel capsules and Liquid/Sogeval	Wild caught anchovies and mackerel	Yes	1 capsule of large breed size contains 360mg EPA and 240mg DHA; 1ml or 1 pump liquid contains 180mg EPA and 120mg DHA
Allerderm EFA HP/Virbac	Anchovies and sardines	Yes	1 capsule contains 120mg EPA, 80mg DHA, and 88mg omega 6 (LA and GLA)
EicosaCaps and Eicosaderm liquid (Dechra)	Sardines and anchovies	No, website states oil has been fully refined, deodorized, purified and molecularly distilled, tested and certified to be free from pesticides and below testing levels for PCB's and heavy metals, does not specify third party testing	1 large dog capsule contains 47mg EPA, 32mg DHA, 28mg GLA and 300mg LA; 2ml or 1 pump liquid contains 2000mg fish oil (360mg EPA and 240mg DHA)
Science Diet Adult Sensitive Skin formula (canine)/Hill's	No fish Contains flaxseed	n/a	1 cup dry food contains 18.8mg EPA and 17.7mg DHA
Prescription Diet j/d Canine Mobility/Hill's	Anchovies, mackerel, sardines	n/a	1 cup dry food contains 447mg EPA, 284mg DHA
Skin Support SS/Royal Canin	Wild caught whitefish	n/a	1 cup dry food contains 393mg EPA, 167mg DHA