Choosing the right omega-3 source for optimal pet health

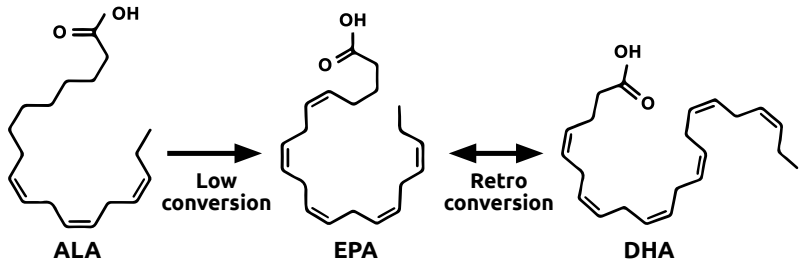
By Geert van der Velden, Innovation Manager at IQI Trusted Petfood Ingredients

Omega-3 fatty acids contribute to the health and well-being of both humans and pets, such as cats and dogs. To achieve this, the pet food industry traditionally includes different sources of omega-3 in pet food. But not all omega-3 fatty acids are alike and they have different kinds of biological functionality in the animal. The type of omega-3 source is crucial to attain the right levels of EPA and DHA omega-3 fatty acids in the final pet food and achieve maximum health benefits.

Different kinds of omega-3

Omega-3s or n-3s are fatty acids with an essential role in the physiological processes of humans and other mammals, such as cats and dogs. They are essential for the proper structure and functioning of every cell in the body. Furthermore, they have many additional benefits, such as increasing the absorption of vitamins and minerals, stimulating hormone production, ensuring healthy growth and development, and helping in the prevention and treatment of diseases. More specifically, the intake of omega-3 fatty acids is reported to have a positive influence on joints, skin/coat, heart, eyes and brain function.
The two most important omega-3 fatty acids involved are eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). These must be obtained through feed because cats and dogs do not produce them naturally. EPA and DHA are derivatives of alpha-linolenic acid (ALA), which is the most common omega-3 fatty acid. ALA is found mainly in vegetable oils, such as flax oil, soya oil and canola oils. However, the conversion process from ALA to EPA and then to DHA is not very efficient and the majority of unconverted ALA is simply used or stored as energy, just like other fats (see figure 1).

Figure 1: Conversion of ALA into EPA and DHA



EPA and DHA can also be obtained directly from food. Both EPA and DHA are mostly found in fish and other types of seafood. Supplying them via pet food is much more effective, efficient and economical than converting them from ALA, because of the low in vivo conversion rate.

Essential health benefits

EPA and DHA offer a number of specific benefits to the health and well-being of cats and dogs. EPA can be converted in vivo into anti-inflammatory components, thereby managing inflammatory problems related to joints, skin/coat and heart and bladder diseases. DHA has a more structural role and is found in high concentrations in nerve tissue, such as the brain and eyes.

Specifically, EPA and DHA can enhance joint health in dogs and thereby improve their walking ability. EPA is the active component that helps to improve clinical symptoms in cats and dogs with osteoarthritis by reducing inflammatory reactions and the breakdown of cartilage. Research has shown that supplementation with EPA significantly increases mean peak vertical force and weight bearing in dogs with osteoarthritis. Furthermore, EPA can reduce the severity of cachexia in cats and dogs, thereby prolonging their life expectancy.

Puppies and kittens need DHA to feed their growing brains, while older pets benefit from the support DHA provides to their aging brains. EPA and DHA are also beneficial to the growth and healthy development of puppies and kittens. EPA specifically can attenuate the immune response after an infection and it stimulates the formation of anti-inflammatory components. At the same time, it impedes the formation of pro-inflammatory components, such as cytokines (e.g. TNF-α) and eicosanoids (e.g. Prostaglandine PGE_2 and Leukotrine LTB_4), thus preventing an overshooting reaction after a bacterial infection.

Effective use

The kind of food given to pets is critical to their ability to obtain sufficient EPA and DHA fatty acids. Traditionally, pet food manufacturers have added different sources of omega-3 fatty acid to the pet food formula, including salmon oil, vegetable oils, such as flaxseed or rapeseed oil, and fish oil. Of these, fish oil is the most efficient and economical option.

Salmon oil was always considered to be rich in EPA and DHA fatty acids but the concentration levels have changed over the years due to changing feed formulations in the aquaculture industry. Fishmeal has been replaced as the primary source of protein fat in aquaculture feed by soya-based feed and other animal proteins. As a result, the percentage of EPA and DHA fatty acids in farmed salmon has fallen. On average, wild salmon oil contains 9% EPA and 11% DHA compared to only 3% EPA and 4% DHA in farmed salmon oil.

Vegetable oils, such as flax or canola oil, are rich in ALA fatty acid but this needs to be converted in the body to EPA and DHA, which can only be done in very small amounts. The conversion rate from ALA into EPA is just 0,2 to maximum 10% and even less for DHA. ALA is converted into DHA at an almost negligible conversion rate of 0 to 1%. Furthermore, vegetable oils are rich in omega-6, which can lead to pet food with an imbalance between the amount of omega-6 and omega-3. High amounts of omega-6 may cause inflammatory health problems.

What are omega-3 fatty acids?

Omega-3s are essential fatty acids for most mammals, including humans. They are characterized by a double bond on the n-3 position of the fatty acid and are a main component of fats used by the body for energy and tissue growth. Omega-3 has many biological functions in the heart, blood vessels, lungs, immune system, nervous system (including brain and eyes) and endocrine system. The three main types of omega-3 fatty acid are alpha-linolenic (ALA), eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). Of these, EPA and DHA are most involved in the physiological processes of mammals. ALA is found mainly in plant oils, while DHA and EPA are mostly found in marine oils and algae. ALA can be converted by the body into EPA and DHA, but only in small amounts. The most efficient and beneficial method to ensure sufficient levels of EPA and DHA is therefore consumption.

Consequently, the most efficient way for the pet food industry to ensure functional levels of EPA and DHA and a healthy balance between omega-3 and omega-6 is to use sources that are naturally rich in these two omega-3 fatty acids. Since EPA and DHA are mostly found in fish and other types of seafood, fish oil is the most effective and economical ingredient to ensure a high concentration of these fatty acids.

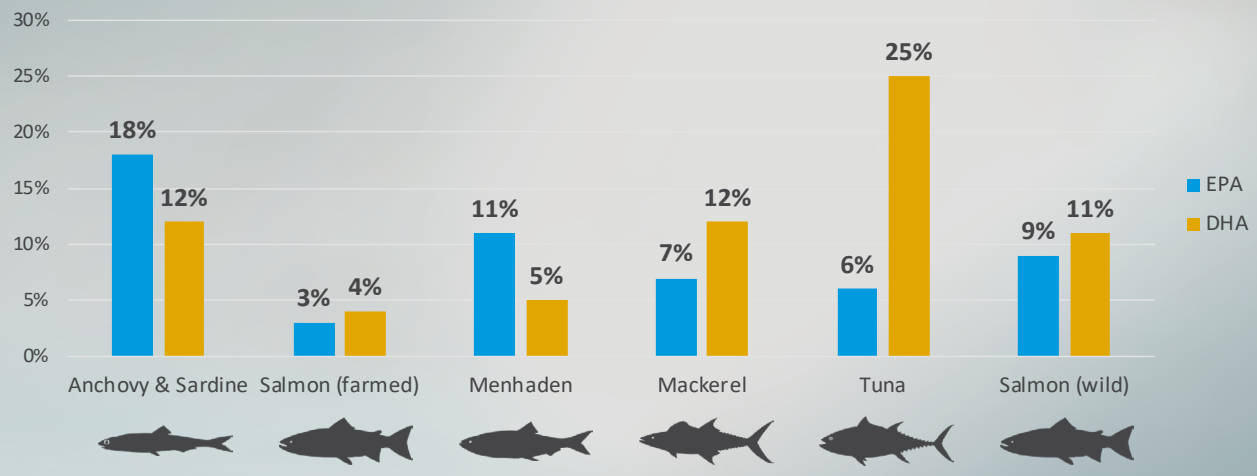
Pet food formulation

In order to be effective and deliver full health benefits, omega-3 levels in pet food should not be measured by the percentage of salmon oil or vegetable oil but by the actual percentages of EPA and DHA. Of the two, EPA is the most important to include in pet food, since the body can convert EPA to DHA. To achieve this, it would be most cost-effective for the pet food industry to use a concentrated source of EPA and DHA. Fish oil, or to a lesser extent fishmeal, is the most effective and economical ingredient due to the high concentration of these fatty acids. Fish oil is widely used as a functional ingredient or food supplement for humans, as well as by the pet food industry.

Fish oil provides excellent opportunities for optimizing pet food with functional levels of EPA and DHA, whilst also providing a more economical alternative to salmon or vegetable oils. It would require a much higher dosage of the latter ingredients to achieve similar levels of EPA and DHA in the body. For example, approximately four times the amount of farmed salmon oil would be required, due to the lower amounts of EPA and DHA in farmed salmon (see figure 2), and around three to four times as much ALA-based ingredient, such as flax oil, would be required due to the low conversion rate of around 10% from ALA to EPA.

According to EU regulations, 3.3% total omega-3 and 0.38% EPA is required to make the claim that a product's use has a particular nutritional health benefit in supporting the metabolism of the joints in the case of osteoarthritis in dogs and cats. This EPA level can be achieved by adding 2.1 to 2.4% of high n3 fish oil.

Figure 2: Ratio of EPA and DHA in fish oils



Note: Total amount and ratio of EPA & DHA can vary during the year (specially for Anchovy and Sardine)

The production of fish oil

Fish oil is made from either whole fish, specific fish parts, such as cod liver or tuna heads, or as a by-product from leftovers of the filleting or canning industry for human consumption. Different species of fish are used in the production of fish oil, such as anchovy, sardine, herring, mackerel, wild and farmed salmon, and tuna. Wild anchovy and sardine have the highest concentration of omega-3 fatty acids, averaging 18% EPA and 12% DHA (see figure 2). However, the total amount and ratio of EPA and DHA can vary during the year. The availability of species such as anchovy, sardine and mackerel depends on the season and geographical location.

Quality is key. Apart from the production process, the quality of the fish oil is determined by the incoming raw material. Further refining of the fish oil offers several advantages. It reduces the amount of free fatty acids (neutralization) and also removes contaminants such as dioxine, heavy metals and PCB, like dioxine and arsenic (see table 1). Furthermore, refining fish oil improves the color (bleaching) and removes odors (deodorization). Refined fish oils are neutral in smell and lighter in color.

Table 1: Typical analysis of fish oil before and after refining

	Crude oil	Refined high n3 oil	Max level
Gardner %	12	4	NA
FFA %	2.4	0.1	NA
Dioxine ng/g	1.7	0.6	5.0
Dioxine + PCB like dioxine ng/g	5.38	0.9	20.0
Lead mg/kg	< 0.1	< 0.1	10
Cadmium mg/kg	< 0.01	< 0.01	2
Arsenic mg/kg	13	< 0.05	25

Fish oil solution from IQI Trusted Petfood Ingredients

Together with its partner Olvea, IQI Trusted Petfood Ingredients is one of the world's biggest suppliers of fish oils for the pet food industry. Reliable sourcing is crucial to secure sufficient high-quality raw materials to cater for the growing demand for high omega-3 fish oils. All fish oil sourced globally by IQI Trusted Petfood Ingredients and Olvea is analyzed for nutrients and can be further mixed, refined, deodorized and winterized according to customer demand to guarantee a specific EPA and DHA content. Since EPA and DHA levels vary between species, geographical location and seasons, IQI continuously adapts the mix of raw materials to guarantee stable levels of EPA and DHA. IQI Trusted Petfood Ingredients thereby provides a guaranteed year-round supply of highly consistent fish oil.

For more information on fish oil and the finest ingredients for the pet food industry please visit our website or contact us directly.

Want to know more?

The Global Organization for EPA and DHA Omega-3s

OLVEA Fish Oils

Multicenter veterinary practice assessment of the effects of omega-3 fatty acids on osteoarthritis in dogs

Evaluation of the effects of dietary supplementation with fish oil omega-3 fatty acids on weight bearing in dogs with osteoarthritis

About IQI Trusted Petfood Ingredients

IQI Trusted Petfood Ingredients is a global distributor of premium claim-ingredients to the top brands in the pet food industry. Founded in 1994 as a trading company in raw pet food materials, today IQI offers an extensive variety of services to aid and assist our customers and suppliers worldwide.
IQI Trusted Petfood Ingredients employs highly skilled personnel, owns and operates a global network of logistical hubs and relies on a global supply network to obtain the purest natural resources available.
For IQI, quality is key. IQI Trusted Petfood Ingredients goes to great length to assure the quality of its products, and also invests a great deal in maximizing the quality of its partnerships. Since this business is all about trust, IQI needs to bond with its partners to succeed. Working closely together with its customers as well as with its suppliers, IQI creates full transparency in the supply chain. IQI oversees and controls every step in the process from source to shelf and supply products that are pure and traceable to the source.

About Geert van der Velden

Geert van der Velden is IQI Trusted Petfood Ingredients' Innovation Manager responsible for Business Development, generating new products and concepts that meet the needs of existing and new customers. Geert has more than 25 years' experience in the international pet food industry and has gained knowledge and experience in many sections of IQI's business.

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