

Full-fat krill meal as a source of proteins, omega-3 and other important nutrients for pet food



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

Pets, such as cats and dogs, need a well-balanced diet for optimal health. To achieve this, the pet food industry traditionally includes various beneficial ingredients and additives in pet food. Antarctic krill is a functional and sustainable MSC-certified marine ingredient that combines a number of important nutrients. Processed into full-fat krill meal, it is an excellent natural source of protein, essential omega-3 fatty acids, anti-oxidants and other nutrients.

Important nutrient

Traditionally, pet food producers use pork, lamb and poultry meat or soybean meals as the main protein sources in pet food. They then add different sources of omega-3 fatty acids to the pet food formula, including fish oil, salmon oil and vegetable oils, such as flaxseed or rapeseed oil. Antarctic krill, however, is rich in both palatable and digestible protein and the most beneficial omega-3 fatty acids as well as other important nutrients.

Antarctic krill (*Euphausia Superba*) are swarming, small, shrimp-like marine crustaceans that live in the Southern Ocean. Antarctic krill meal has a similar nutritional value to that of high-quality fish meal but has a number of additional benefits. Full-fat krill meal can therefore be used in pet food

as a replacement for ingredients such as fish meal, fish oil and sources of animal protein. Full-fat krill meal contains high amounts of low molecular compounds, such as nucleotides and amino acids, which enhance palatability.



Essential health benefits

Omega-3s or n-3s are fatty acids that perform 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.

Antarctic krill is rich in the two most important omega-3 fatty acids; eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). EPA and DHA must be obtained through food, because cats and dogs do not produce them naturally, and offer a number of specific health benefits. EPA can be converted in vivo into anti-inflammatory components, thereby managing inflammatory problems related to joints, muscles, 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, and enhances vision and cognitive function.

Delivery of omega-3

Antarctic krill consists of approximately 58 percent protein, 25 percent fat, 10 percent ash and 6 percent water. A unique aspect of krill is that approximately 40 percent of the fat (lipid) content is made up of phospholipids, which contain more than 20 percent of the two most important omega-3 fatty acids, EPA and DHA.

Phospholipids, a class of lipids, are key components of our cell structures that help transport important nutrients around the body. Phospholipids are very good delivery molecules of omega-3 fatty acids to tissues, including essential tissues such as the heart, liver and brain. In other sources of omega-3, such as fish meal or fish oil, omega-3s are present in triglyceride form (the main constituent of body fat) and therefore cannot be directly integrated into cell membranes. Parts of these omega-3s are therefore used as energy or stored as fat.

Strong antioxidant

Full-fat krill meal is also rich in astaxanthin, a keto-carotenoid or reddish pigment, which is a natural and strong antioxidant. Research shows astaxanthin to be much stronger than other carotenoids and to have a number of important health benefits for cats and dogs, which can absorb astaxanthin from their diet. Astaxanthin can enhance immune responses, inhibit cancer and suppress bacterial infection. Astaxanthin also acts as a natural preservative that protects the EPA and DHA omega-3 fatty acids in full-fat krill meal from oxidation.



Full-fat krill meal contains approximately 120 ppm of astaxanthin. Compared to salmon meal or oil, for example, these only contain 6 – 8 ppm of astaxanthin for aqua culture or 20 – 30 ppm for wild salmon. The recommended dosage of astaxanthin for cats and dogs is approximately 0.3 mg per kilogram of body weight per day. For the average dog, this comes to around 4 – 5 mg per day. Including 3-4% of full-fat krill meal in a diet will add 3.6 – 4.8 ppm of astaxanthin, or an average of 4 mg per kg of pet food. This meets approximately 25% of the daily astaxanthin requirement.

The inclusion level of krill in pet food is limited only by the fluoride content that is naturally present in the shell of krill. Too high fluoride levels in the bodies of cats and dogs may, over time, interfere with calcium absorption and healthy bone development. EU legislation for a safe amount of fluoride in pet food is a maximum of 3,000 ppm in krill meal and a maximum of 150 ppm for the final food.

Production of sustainable full-fat krill meal

Antarctic krill is the predominant of six species of krill that are fished commercially around the world. Antarctic krill is caught whole with krill nets in the Southern Ocean and immediately processed at sea on board factory trawlers to prevent degradation of its proteins and lipids. During processing, the krill is briefly cooked, dried and ground into full-fat krill meal.

Full-fat krill meal is a dry substance, making it easy for pet food producers to process, and contains all of the krill's natural proteins, omega-3 fatty acids, antioxidants and choline. Because Antarctic krill is caught in mostly unpolluted waters, it has a very low content of undesirable substances, such as heavy metals and dioxins. In certain cases, krill oil is extracted from the full-fat krill meal onshore. The krill oil is used as a health supplement for humans while the remaining krill meal is mostly used in aqua feed, although it does not contain the omega-3s or antioxidants of full-fat krill meal.

The stock of Antarctic krill in the Southern Ocean has a total estimated biomass of between 55 and

160 million tons, more than half of which is eaten by other animals, such as whales, seals, penguins, squid and fish. Although Antarctic krill are an essential part of the food chain in polar waters, only a small percentage of the total biomass of krill is fished commercially. The total harvest of Antarctic krill fished commercially amounts to approximately 145,000 tons annually, or around 1/40th of the precautionary total allowable catch set by the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR). Commercial krill fishing therefore has a negligible effect on the total krill biomass.

Furthermore, at Greenpeace's Antarctic 360° Event in 2018, the Association of Responsible Krill harvesting companies (ARK) committed to stop fishing in some of the identified ecologically sensitive areas in the Antarctic Peninsula. This is an important step in ARK's continuous close cooperation with the CCAMLR community member states, marine scientists and NGOs to ensure that the commercial krill fishery remains a sustainable and traceable industry.

Source of choline

Besides beneficial omega-3 fatty acids and antioxidants, full-fat krill meal also contains choline. This is an essential nutrient for both humans and pets, such as cats and dogs. Choline is an organic, water-soluble compound with an amino acid-like metabolism. Similar to the EPA and DHA omega-3 fatty acids, choline has an essential function in the physiological processes that contribute to cardiovascular and cognitive health and helps to prevent heart, liver and kidney disease. Choline has proved effective in treating small cognitive disorders in dogs and cats.

Since mammals only produce a small amount of choline in their own bodies, the rest needs to be obtained from food. Full-fat krill meal contains choline in the form of phosphatidylcholines (PC),

a class of phospholipids or fat molecules. After consumption, PC is broken down into choline that acts as an essential methyl-group donor used by the body in a number of chemical processes, including detoxification of the liver.

The benefits of full-fat krill meal

- Natural source of palatable and digestible protein
- Rich in essential omega-3 fatty acids EPA and DHA
- High content level of astaxanthin, a natural and strong antioxidant
- Source of choline, an essential nutrient
- Sustainable, traceable and MSC-certified ingredient

Full-fat krill meal solution from IQI Trusted Petfood Ingredients

Together with its partner Pesca Chile, a member of ARK, IQI Trusted Petfood Ingredients is a supplier of high-quality, MSC (Marine Stewardship Council) certified, full-fat krill meal to the pet food industry. Our full-fat krill meal contains 24% omega-3 fatty acids of which 21% is EPA and DHA. The fluoride

content in IQI Trusted Petfood Ingredients' full-fat krill meal is well below the EU-prescribed maximum of 3,000 ppm, allowing for the inclusion of up to 5% full-fat krill meal in pet food.

For more information on full-fat krill meal and the finest ingredients for the pet food industry, please visit our [website](#) or contact us directly.

Want to know more?

[Beynen AC, 2020. Krill in petfood.](#)

[Antarctic krill meal as an alternative protein source in pet foods evaluated in mink \(Neovison vison\). II. Growth.](#)

[Association of Responsible Krill harvesting companies \(ARK\).](#)

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 lengths to ensure the quality of its products and develop innovative new products. IQI 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. By working closely with both its customers and suppliers, IQI creates full transparency in the supply

chain. IQI oversees and controls every step in the process from source to shelf and supplies products that are pure and traceable to their 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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