

OPTIMIZING OMEGA-3 LEVELS IN PET DIETS WITH



THE IMPORTANCE OF THE RIGHT OMEGA-3 DELIVERY FORM

WHITE PAPER by Lena Burri, PhD



Q OVERVIEW

Krill meal (QRILL Pet) is produced from Antarctic krill (*Euphausia superba*), which is harvested in the Southern Ocean around Antarctica.

It is a natural, pure and sustainable source of omega-3 phospholipids and astaxanthin. Long-chain omega-3 fatty acids are important for e.g. a robust immune system and astaxanthin is a strong antioxidant that helps prevent damaging effects of free radicals. Together they influence cell membrane fatty acids, the production of inflammatory mediators and oxidative damage. Supplemented feed with krill meal, gives dogs the best basis to maintain the right omega-6 to omega-3 balance and a strong antioxidant defense system.

🍯 AN OPTIMAL DIET CONTAINS OMEGA-3 FATTY ACIDS

In humans the long-chain omega-3 polyunsaturated fatty acids, in particular eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), are best known for their cardioprotective and anti-inflammatory effects [1-4]. In comparison, omega-6s are considered to be pro-inflammatory, and therefore it is important to have a balanced diet of omega-3 and omega-6 fatty acids.

If a diet contains too much omega-6 and not enough omega-3 fatty acids, this promotes inflammation of the cells in the body. While inflammation is important for a quick response to challenges such as an infection, uncontrolled and prolonged inflammation affects health and disease progression.

Krill - small, shrimp-like crustaceans, rich in omega-3 phospholipids and astaxanthin. Antarctic krill can grow to six centimeters in length and weigh two grams. They live in large and dense swarms throughout Antarctic waters.

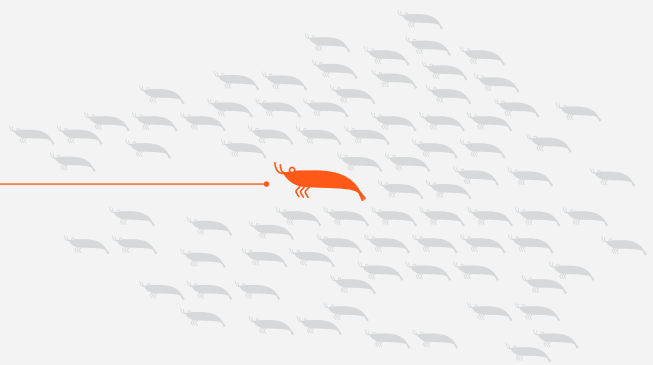


Figure 1: Krill

BALANCE OF OMEGA-3 TO OMEGA-6 FATTY ACIDS

Compared to our ancestors, who consumed a ratio of 1:1 of omega-6 to omega-3 in their diet, the ratio is now between 10-20:1, due to the increased use of vegetable oils rich in omega-6 fatty acids. It is therefore not surprising that inflammatory diseases, like heart disease, cancer and diabetes have increased drastically.

The same is true for dogs, where a ratio of 6:1 has been proposed as optimal ^[5]. It is important to not distort this ratio, and various studies have shown that dogs profit from omega-3 consumption for heart health ^[6, 7], joints ^[8, 9], skin and coat ^[10-12], renal function ^[13, 14], immune system function ^[15, 16], as well as growth and reproduction ^[17, 18].

The right level of the omega-3 fatty acids EPA and DHA can be achieved by the inclusion of krill meal in dog food. Antarctic krill is a shrimp-like swarming pelagic crustacean, which is harvested in the Southern Ocean.

It can be used as a feed ingredient in pet diet formulations, mainly in the form of an all-natural krill meal, QRILL Pet. It is a sustainable and pure alternative to fish oil and is characterized by omega-3 phospholipids and the natural antioxidant astaxanthin.

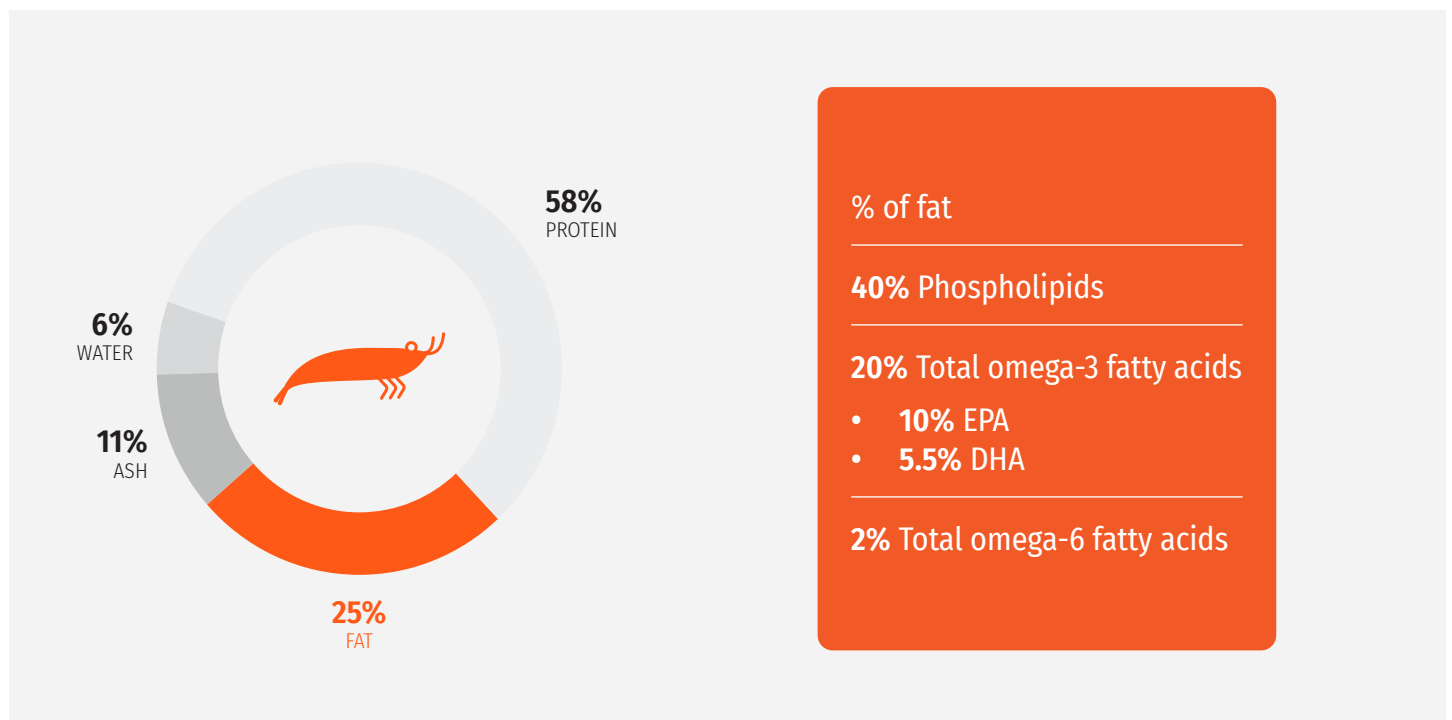


Figure 2: Typical nutrient composition of QRILL Pet

MEASURING OMEGA-3 LEVELS

In humans, the Omega-3 Index has been proposed as a novel biomarker for cardiovascular risk and is defined as the percentage of EPA and DHA in red blood cell fatty acids ^[19], which correlates with other tissue membranes, like e.g. heart tissue ^[20-22]. A higher Omega-3 Index, meaning more EPA and DHA in cell membranes, indicates a lower risk of e.g. sudden cardiac death ^[23].



Figure 3: For humans optimal Omega-3 Index is above 8%

A 52-day study with adult dogs of the Alaskan Husky breed that were fed 8% QRILL Pet compared to a control group not receiving QRILL Pet showed that the dietary inclusion of QRILL Pet increases the Omega-3 Index by around 40% (unpublished results).

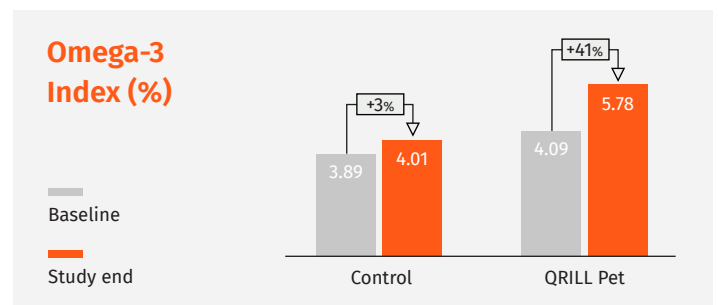


Figure 4: The Omega-3 Index of the dogs eating QRILL Pet increases by around 40%

ALL OMEGA-3S ARE NOT EQUAL

It is important to note that EPA and DHA can be provided either in the form of triglycerides, as seen in fish oil, or in the form of phospholipids like in QRILL Pet. Being that phospholipids are the building blocks of all cell membranes, it is postulated that they more effectively deliver omega-3s in the body ^[24-27]. Triglycerides, on the other hand are more likely to be used for energy ^[28].

The difference between phospholipids and triglycerides as omega-3 delivery molecules has been investigated in a 6-week study with Alaskan Huskies ^[29]. Ten adult dogs of both genders were supplemented with daily 1.7 g EPA and DHA from krill meal, while another ten dogs received 1.7 g EPA and DHA from fish oil. Fatty acid and Omega-3 Index measurements of the two groups were taken after 0, 3 and 6 weeks for comparison.

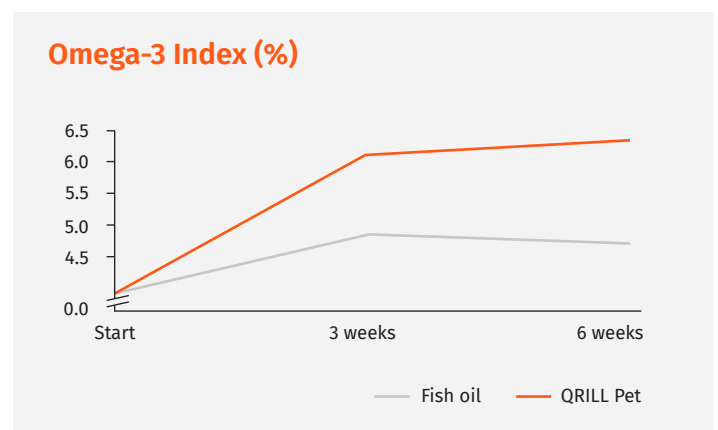


Figure 5: The Omega-3 Index

The influence of the different delivery molecules became evident already after 3 weeks of feeding, and at study end there was a 62% increase in the Omega-3 Index in the krill meal group, whereas the triglyceride form of the fish oil group was associated with a 21% increase.

EPA and DHA can only increase in red blood cell membranes, when the relative amount of other fatty acids decreases in parallel and thereby also their bioactive derivatives. This study found that there was a compensatory decrease in omega-6 fatty acids, i.e. arachidonic acid decreased by 8.1% in the krill meal group, which contributed to a reduced omega-6 to omega-3 PUFA ratio. The results of the study suggest that phospholipids are efficient delivery molecules of omega-3 fatty acids.

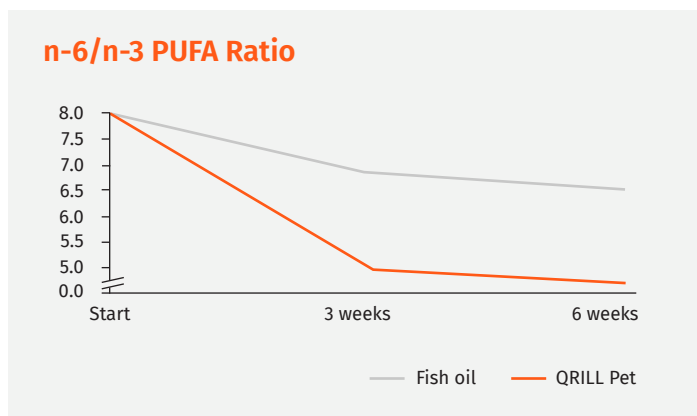


Figure 6: Omega-6 fatty acids, which are pro-inflammatory, were reduced after 6 weeks of treatment

☆ BENEFITS OF A HIGHER OMEGA-3 INDEX

The benefits of an increased Omega-3 Index were shown after feeding 8% QRILL Pet to Alaskan Huskies for 5 weeks prior to the start of the 2016 Iditarod sled dog race with a second team not receiving any krill meal supplementation as control [30]. This 1000-mile ultra-endurance test is known to induce muscle damage and inflammation.

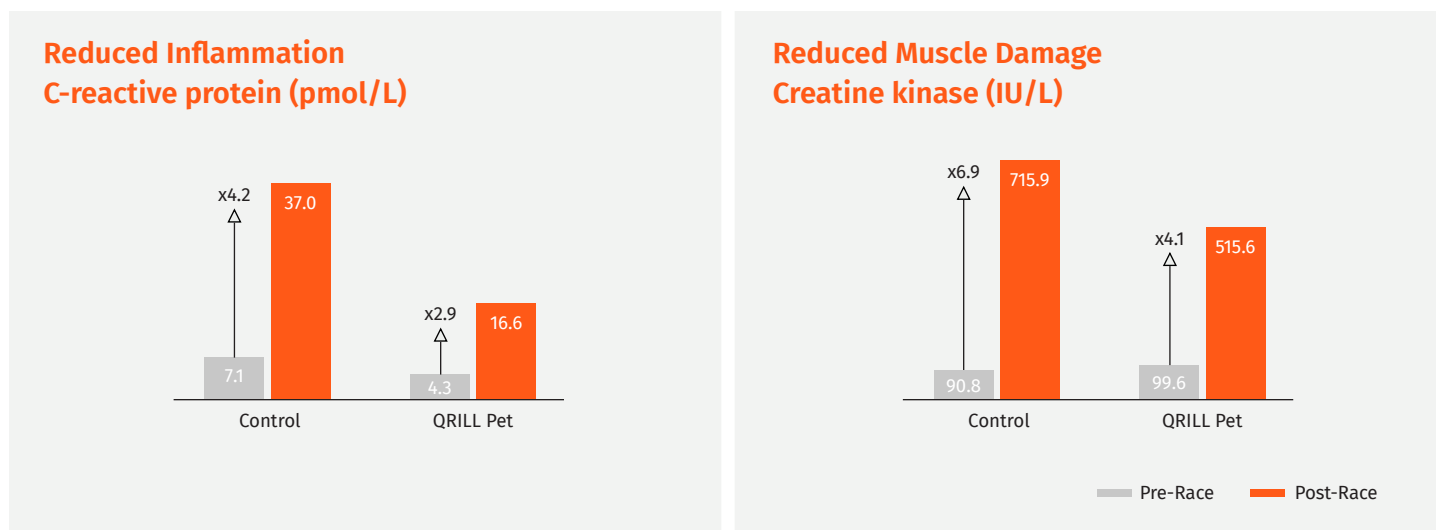


Figure 7: Results from the 2016 Iditarod race, the world's longest and toughest dog sled race

However, the dogs receiving QRILL Pet with a higher Omega-3 Index at the start of the race, showed lower muscle damage and inflammation at the end of the race, when compared to the control group.

WORLD CHAMPIONS EAT QRILL PET

Thomas Wærner is a professional dog musher and a member of the QRILL Pet Mushing Team, the world's first professional long-distance dog sled team. His dog team participated in the krill meal supplementation study described in ^[29].

He started feeding his dogs QRILL Pet in 2017 and he declared prior to the 2020 Iditarod race: 'a key component for success, which will make the dogs running all the way to Nome, is an ideal feed. Krill contains some of that little extra, which I believe can contribute to winning the race.'

9 days later, with 57 professional dog teams and the unpredictable nature of Alaska, the orange team was the first to cross the finish line in Nome. In 2019, Thomas and his dog team also won both of the biggest long-distance dog sled races in Norway, the Finnmark and Femund races.



“Krill contains some of that little extra, which I believe can contribute to winning the race.” Thomas Wærner

✓ CONCLUSION

The addition of omega-3 phospholipids from QRILL Pet, benefits dogs' health by increasing their Omega-3 Index, meaning the amount of omega-3 fatty acids in cell membranes. This is of importance since an increased omega-3 fatty acid tissue content will affect many biochemical and physiological functions in dogs that can result in health benefits for e.g. skin, heart, liver and the immune system.

Moreover, QRILL Pet contains the antioxidant astaxanthin, which has the ability to scavenge free radicals, thereby counteracting oxidative stress and damage to proteins, lipids and DNA ^[31].

Antarctic krill is protected from overfishing by CCAMLR and Aker QRILL Company Antarctic AS has obtained MSC certification assuring sustainable fishing practices, which makes QRILL Pet an attractive feed ingredient that ensures optimal health of pets in a sustainable manner.

ABOUT THE AUTHOR

Lena Burri, PhD, earned her Master of Science from the University of Basel (Switzerland) and her PhD at the Ludwig Institute for Cancer Research (Switzerland).

Her post-doctoral education included stays at Melbourne University (Australia), University of British Columbia (Canada) and University of Bergen (Norway). She now works as R&D Director for Animal Nutrition and Health for Aker QRILL Company.



THE IMPORTANCE OF SELECTING A SUSTAINABLE MARINE OMEGA-3 INGREDIENT

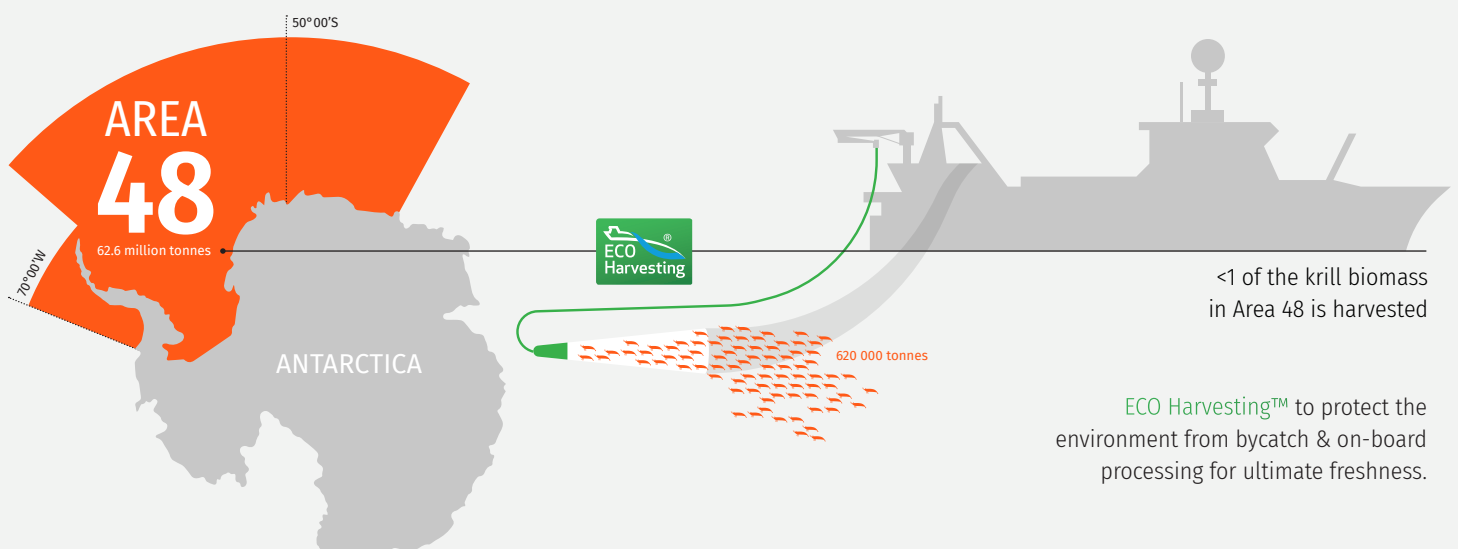


The use of sustainable seafood products is crucial to ensure that the world's oceans are healthy today and for future generations. Protect our oceans and their ecosystems by choosing marine feed ingredients that are obtained from a sustainable fishery.

COMMERCIAL KRILL FISHING

The krill fishery in Antarctica is managed and regulated by the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR). Responsible for the conservation of Antarctic marine ecosystems, CCAMLR practices an ecosystem-based management approach. This means that harvesting is allowed as long as it is carried out in a sustainable manner and takes into account the effects of fishing on other components of the ecosystem.

Currently, the annual krill catch is less than 1% of the unexploited krill biomass, which is estimated to be 62.6 million tonnes in the commercial fishing region, Area 48. This is below the precautionary catch limit of 5.6 million tonnes set by CCAMLR.



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ABOUT QRILL PET

QRILL Pet is a product of Aker QRILL Company, a leading biotechnology company developing and supplying krill- derived products for consumer health and animal nutrition.

When developing our functional marine ingredient for pets, we kept our focus on the needs of pets and pet food formulators. Aimed at keeping pets healthy, QRILL Pet delivers long-chain omega-3 fatty acids, marine proteins, choline and the antioxidant astaxanthin. The unique distinction of krill omega-3s is that they are mainly bound to phospholipids.



QRILL Pet is currently the only MSC (Marine Stewardship Council) certified krill meal in the world. The ingredient comes from one of the most sustainable fisheries in the world and can be traced back to the exact catch location of the krill.