

QRILL™ PET

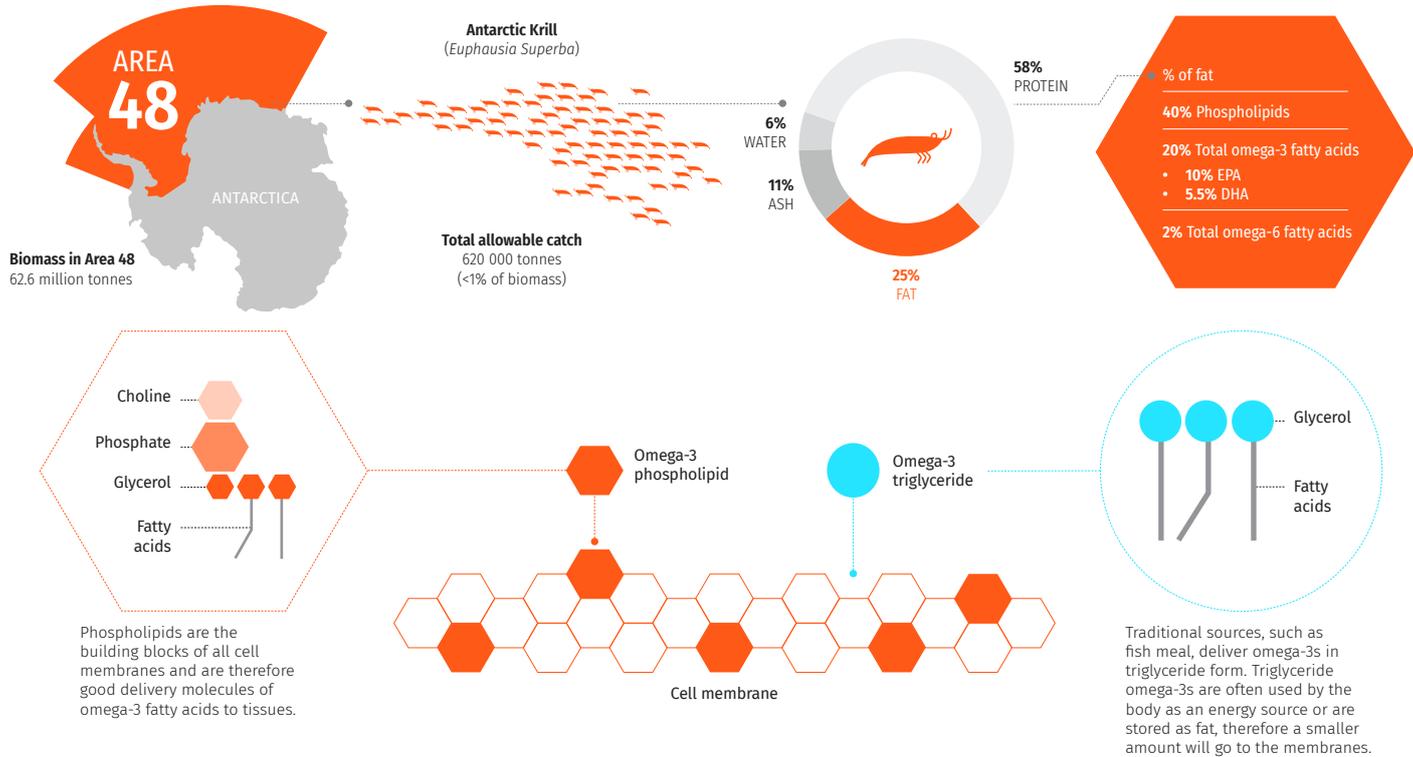


THE QRILL PET SCIENCE GUIDE

SCIENTIFICALLY SHOWN HEALTH BENEFITS FOR DOGS

 AKER BIOMARINE

The power of QRILL Pet - a unique functional marine ingredient



The krill advantage - a combination of important nutrients



Phospholipid Omega-3s

- A lipid consisting of a phosphate, glycerol group and two fatty acids
- One of the most efficient source of EPA & DHA
- Represent the building blocks of all cell membranes



Marine proteins

- Krill is rich in highly palatable and digestible marine proteins
- The marine proteins in krill offer a complete amino acid profile
- 100% sustainable & traceable



Astaxanthin

- A powerful antioxidant that acts as a natural preservative
- Supports immune function and protects all body cells from oxidative stress

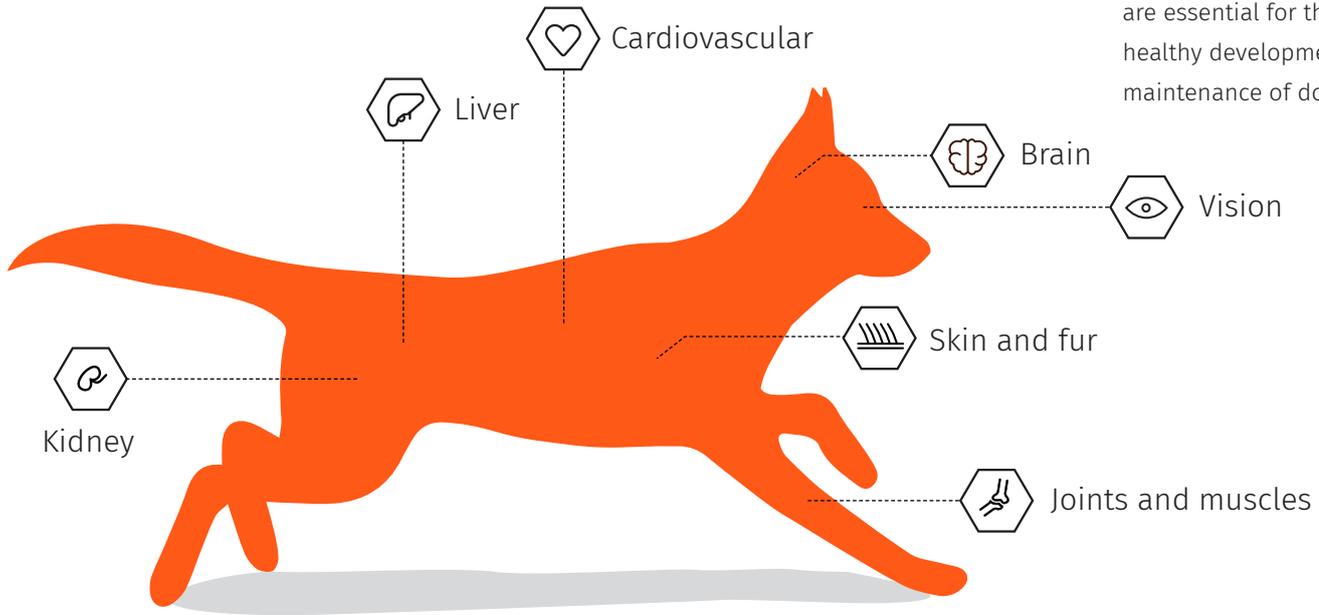


Choline

- Phosphatidylcholine - a natural source of the essential nutrient
- Important for muscle function, memory and liver health

Omega-3s and other nutrients are shown to have positive effects on vital organs of dogs

Omega-3 fatty acids and other nutrients are essential for the healthy development and maintenance of dogs.



Scientific research on dogs

Aker BioMarine embraces research and is committed to document the effects of krill feed inclusion. Studies were performed to ensure and understand the advantages and mechanisms of dietary krill meal inclusion in dog diets.

Study 1

Palatability study

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Study 2

Omega-3 Index study

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Study 3

Inflammation & muscle damage study

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Study 4

Choline study

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Study 5

Comparison study: Phospholipids vs. Triglycerides

12

Research has shown that the majority of dogs prefer QRILL Pet

Study 1

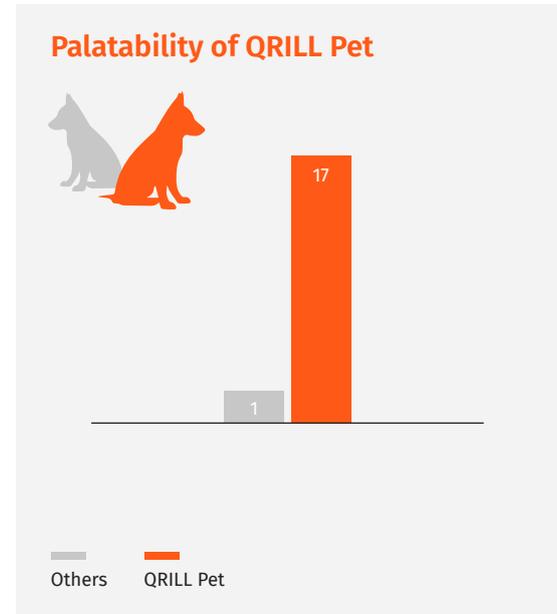
18 Dogs - introduction to QRILL Pet

BACKGROUND

The objective of this study was to investigate the palatability of a QRILL Pet rich diet. 18 dogs were introduced to pet food containing QRILL Pet.

CONCLUSION

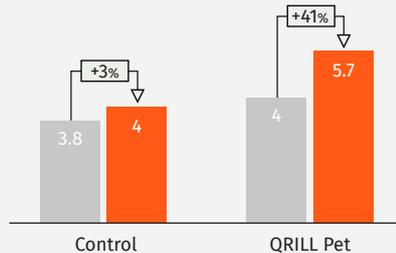
17 out of 18 dogs preferred the food that contained QRILL Pet.



Study 2

A krill-rich diet increased the Omega-3 Index of active dogs by 41%

Omega-3 Index (%)



30 Huskies - 52 Days



STUDY BACKGROUND

The objective of this study was to investigate the Omega-3 Index in Husky dogs with an inclusion of 8% QRILL Pet.

The Omega-3 Index was investigated in a 52-day randomized study with 30 dogs. 16 dogs received a diet with 8% QRILL Pet inclusion, while 14 dogs were in the control group. Blood samples were taken of all dogs at the beginning and the end of the study.

CONCLUSION

Results showed that dogs on a diet that contained 8% QRILL Pet had their Omega-3 Index increased by **41%**. There was no significant increase in the control group.

Iditarod race - QRILL Pet supports sled dogs during ultra-endurance race in Alaska

Study 3

32 Huskies - 5 weeks



BACKGROUND

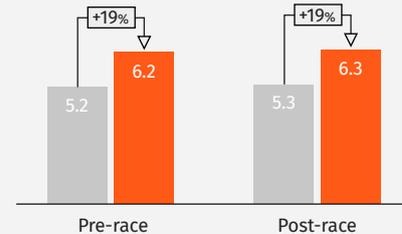
The effect of QRILL Pet on the **Omega-3 Index, inflammation and muscle damage** were investigated in a 5-week study with 32 dogs. 16 dogs received a diet with 8% QRILL Pet inclusion, while 16 dogs received a control diet. Blood samples were taken from all dogs at the beginning and the end of the 1000 miles/1600 km race.

OMEGA-3 INDEX RESULTS

Dogs in the QRILL Pet group had a significantly **higher Omega-3 Index** at the start (6.22% vs. 5.05%) and end (6.25% vs. 5.14%) than the dogs in the control group.

There was no significant difference in each group in the Omega-3 Index between the start and end of the race. However, EPA was increased during the race in all dogs participating, while DHA was decreased.

Omega-3 Index (%)

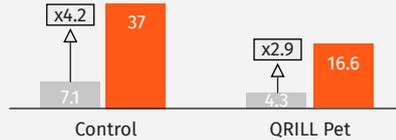


Control QRILL Pet

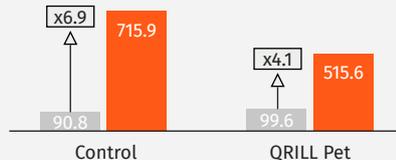
Study 3

Iditarod race - QRILL Pet supports sled dogs during ultra-endurance race in Alaska

C-reactive protein ($\mu\text{mol/L}$)



Creatine kinase (IU/L)



Pre-race Post-race

32 Huskies - 5 weeks

SECOND OBJECTIVE

Another objective of the Iditarod study was to investigate the effect of 8% inclusion of QRILL Pet on **inflammation and muscle damage** of these highly athletic dogs during the long-distance sled dog race. The 1000miles / 1600km race spreads over 8-15 days.

PROMISING RESULTS

- **55% less inflammation** in dogs with krill inclusion
- Creatine kinase (marker for tissue damage) has a higher increase in the control group than the QRILL Pet group

Dogs on a krill diet had their choline plasma levels increased by 52%

Study 4

20 Huskies - 6 weeks



BACKGROUND

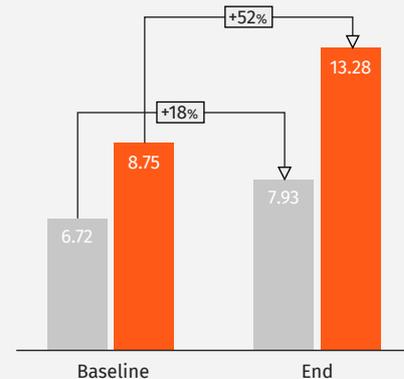
The study investigated if 8% dietary krill meal inclusion for six weeks can increase the concentration of choline and its metabolites in plasma of Alaskan Huskies in comparison to a control group.

CHOLINE RESULTS

Plasma Choline concentrations increased in the 8% QRILL Pet group. After 6 weeks, the dogs which received a QRILL Pet diet have an average **increase of 52%**.

The results demonstrated that a nutritional strategy, such as the addition of phosphatidylcholine to the diet, can help to significantly increase plasma choline concentrations.

Choline levels ($\mu\text{mol/L}$)

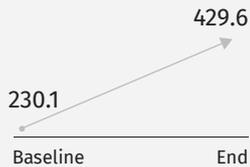


Control QRILL Pet

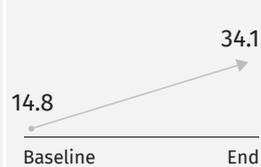
Study 4

Krill supplementation significantly changed important choline metabolites of dogs

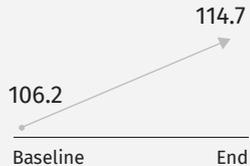
Betaine*
($\mu\text{mol/L}$)



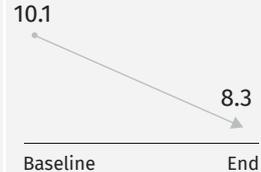
Dimethylglycine*
($\mu\text{mol/L}$)



Methionine
($\mu\text{mol/L}$)



Homocysteine*
($\mu\text{mol/L}$)



*Statistical significant results

MORE POSITIVE RESULTS

Correlations of metabolite changes of QRILL Pet supplemented dogs show increases for betaine, dimethylglycine (glucose metabolism) and methionine (methyl donor) and a reduction for homocysteine (heart disease risk factor).

All changes, except for methionine, are significant.

Comparison study - Omega-3 attached to phospholipids vs. triglycerides

Study 5

20 Huskies - 6 weeks



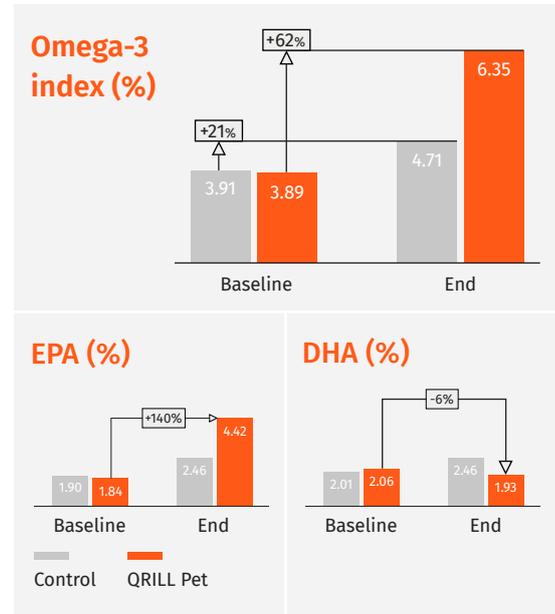
BACKGROUND

The objective of this study was to compare **Omega-3 Index** concentrations when provided in phospholipid versus triglyceride form.

20 dogs were involved in a 6-week study. 10 dogs received a diet with 8% QRILL Pet inclusion, while 10 dogs in the control group received a diet that included omega-3 triglycerides (Appetit Adult). Blood samples were taken at the beginning and after 6 weeks.

PROMISING RESULTS

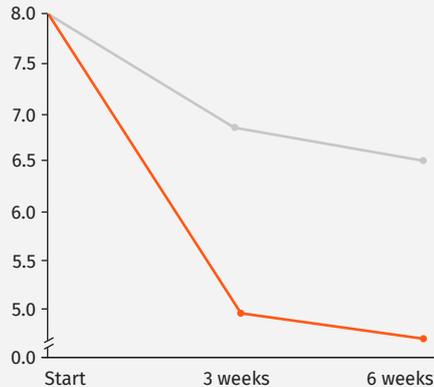
The main increase was seen in EPA. Results showed that dogs on a diet that included 8% QRILL Pet had their Omega-3 Index **increased by 63%**. Dogs on triglyceride omega-3s had a lower increase.



Study 5

Dogs receiving a krill diet showed reduced Omega-6 to omega-3 PUFA ratio

n-6/n-3 PUFA Ratio



Fish Oil QRILL Pet

STUDY RESULTS

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.

All studies were done in collaboration with champion sled dog teams



Team Sigrid Ekran

Sigrid Ekran and her dogs are two times world champions in long distance sled dog racing (2011 and 2015). She started her professional career in the Iditarod Race in Alaska.

Today, she and her dogs live in Alvdal, Norway on a big farm. Her dogs play an important role in her life. During the studies her dogs continued with their daily routines as professional sled dogs.



Team Thomas Wærner

Thomas Wærner is a professional long distance musher. He won the Finnmarksløpet in 2019 and 2013, as well as the Femundløpet in 2019. In 2015 he was crowned as “Rookie of the year” at the Iditarod race, where he finished 17th.

He owns and runs the Berserk kennel in Synnfjell, Norway. During the study his dogs continued with their daily activities and training as professional sled dogs.

Why choose QRILL Pet? One ingredient with many benefits



Unique Distinction

Omega-3s come in different forms. The majority of QRILL Pet omega-3s are in the phospholipid form.



Palatable proteins

Marine proteins - A healthy and at the same time tasty ingredient choice for pets.



Powerful Astaxanthin

No additives required, since the omega-3s are naturally protected by astaxanthin.



Additional nutrients

Choline, containing phospholipids, is a natural component in krill, allowing pets to benefit from this nutrient.



Responsible fishery

From one of the most sustainable fishery in the world, with 100% traceability guarantee.



Aker BioMarine is a leading biotechnology company developing and supplying krill-derived products for consumer health and animal nutrition. Dedicated to improving human and planetary health, the company has a strong position in the industry. Our functional marine ingredients come from a 100% traceable and sustainable supply chain.



QRILL Pet is a 100% natural product made only from whole Antarctic krill. When developing this functional marine ingredient, 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.

“Aker BioMarine is committed to continuously increase scientific documentation of health and nutrition benefits throughout the Superba and QRILL product segments – whether for people, pets, or aquaculture.”

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