

Written by Jennie Siat

How to secure sustainable fishery when the demand for seafood increases

Human civilization and planet earth are undergoing inevitable significant changes. It starts with the population, which is expected to grow to 10 billion people by 2050. This means food production must be increased by 69 percent. Such significant growth puts a strain on Planet Earth's resources and its capacity to renew.

With these challenges, it would require high-level human ingenuity to ensure that the whole population is well fed and can maintain good health, while also providing the planet's well-being and sustainability.

In this white paper, we will discuss how Axxxx Bxxxxxxxxx is dedicated to helping to ensure human and planetary health, increasing food production, and safeguarding sustainable growth. It provides insights into how this company utilizes advanced Eco-Harvesting technology for capturing krill in the most pristine waters in Antarctica and manufacturing omega-3-rich health supplements (Superba Krill) and feeds for aquaculture (QRILL Aqua) and animals (QRILL Pet) while maintaining sustainable operations.

According to a recent study published in [Nutrients](#), data collected in the United States and Germany concluded that despite adequate knowledge of health benefits and food sources of omega-3, 98 percent of study participants' level of omega-3 in their bloodstream was below the optimal range. This study showed that while enjoying the fast-paced modern lifestyle, urban dwellers are risking their health due to the low omega-3 intake. Exercising at fitness clubs, drinking smoothies, and having the so-called "work-life balance" might give them a "sense of health," but it is insufficient.

A recent report published by the World Economic Forum and the Harvard School of Public Health further stated that in the next 15 years, [healthcare costs related to treating lifestyle diseases would total approximately 22 trillion dollars](#). It actually can be eliminated by consuming sufficient omega-3 on a daily basis, since a good level of this nutrient in our body is crucial for maintaining health and preventing non-communicable (NCD) and lifestyle diseases, such as heart disease, suboptimal brain function, increased likelihood for major depression, and other health issues.

Providing solutions to the demands of health dietary supplement availability and food production increase, Axxxx Bxxxxxxxxx products include krill-based ingredients for nutraceutical and aquaculture and animal feeds. With transparency, Axxxx Bxxxxxxxxx adopts sustainable krill harvesting in Antarctic waters and value chain stretching from its Montevideo logistics hub,

Houston production plant, to distribution to global customers. Axxxx Bxxxxxxxxx is owned by Axxxx ASA, a pioneer in the industry, founded in 1841.

"Our mission, to improving human and planetary health is part of everything we do. From the product we sell to how we operate our business."

Read on to learn more about how Axxxx Bxxxxxxxxx with QRILL Aqua can contribute by delivering more fish on the table in a healthy and sustainable way and how QRILL Aqua feed ingredients helped in boosting our customers' salmon production.

Matts Johansen,
CEO, Axxxx Bxxxxxxxxx

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Food Demand Increases

In addition to population growth, World Resources Institute posts that the world's per capita milk and meat consumption is also growing. These types of foods are more resource intensive to produce than vegetables and other plant-based diets, as they require more energy and other resources to process.

Thus, considering both population increase and shifting of diets, in the same 33-year period, the food gap will likely amount to 69 percent. Such figure is unprecedented and warrants our attention.

Cited from [The Global Foodprint Network](#), humans have consumed 60 percent more resources than the planet's capacity to renew, which is called "ecological deficit." The world's ecological deficit is also known as "global ecological overshoot," which is measured annually. Humans are

known to cause overfishing, overharvesting forests, and emitting more carbon dioxide into the atmosphere than nature can sequester.

Since the 1970s, our planet has been experiencing an ecological overshoot, in which human beings use an equivalent of 1.6 Earth's capacity to regenerate. This means that at the current rate of Earth's resources depletion, it would take one year and six months to renew what the humanity has used up in one single year.

Therefore, without a reliable food production system, it is unlikely that the Earth would be able to provide the amount and the quality of food necessary for the human species to survive. Now, the question is: How can we solve this food production problem, while at the same time ensuring the health of the population and the sustainability of the planet?

Axxxx Bxxxxxxxxx provides a solution to this urgent question with QRILL Aqua and QRILL Pet. It is by utilizing natural krill, which is a small marine crustacean, harvested from the pristine ocean the Antarctic Sea, for aquaculture feed, like farmed salmon and other marine species, and pets.

Due to its natural ocean origin, krill feed comes with several advantages. Farmed marine species prefers the nutritious QRILL Aqua due to the palatable taste. The krill-based feed also increases their immune system. Thus they are more resistant to diseases. Non-ocean origin aquaculture feed is known to be less beneficial.

People Getting Less Healthy

In this modern lifestyle, the notion of "living healthily" is going to the gym, taking Pilates lessons, and having smoothies for breakfast. A little bit of gluten-free diet would not hurt either. The thing is, those "healthy" choices are not necessarily sufficient to live healthily.

On the other hand, the fast-paced environment often compels people to dine in a hurry, consume processed foods, work in sedentary occupations, transport in automobiles, and be less proactive in keeping healthy in general. Among such individuals with fewer healthy choices, their health even takes a more substantial toll.

Sufficient omega-3 intake is crucial for preventing non-communicable diseases (NCD), such as heart attack, high blood pressure, and more. It is good for maintaining overall heart, joint, and brain health. Given these findings in the Nutrients study, where [98 percent of the participants had omega-3 levels below the optimal range](#) in their bloodstream, the lack of omega-3 is a public health issue, just like in the case of Vitamin D deficiency. Addressing this issue, government authorities should be engaged, so they can revise the daily nutrition requirements to include omega-3 EPA and DHA and begin food fortification.

Mission to Improve Human and Planetary Health

Axxxx Bxxxxxxxxx, a biotech innovator, and Antarctic krill-harvesting company, is dedicated to improving human and planetary health. This mission is not a small feat, as it comes with many challenges, ranging from the massive population growth, shifting in resource-intensive diets, modern unhealthy lifestyle, insufficiency in omega-3 EPA and DHA levels, unsustainable growth, to unsustainable harvesting.

The above challenges can be grouped into resource scarcity, non-communicable diseases, climate change, and loss of biodiversity.

At Axxxx Bxxxxxxxxx, resource scarcity and non-communicable diseases are considered "opportunities," as they allow for our human, intellectual, natural, manufactured, social and relationship, and financial capitals to work together in providing solutions and mitigating risks. By "risks," Axxxx Bxxxxxxxxx are thinking about "climate change" and "loss of biodiversity."

However, Axxxx Bxxxxxxxxx has taken these challenges as health and well-being of future generations is necessary and not negotiable. With our capitals, Axxxx Bxxxxxxxxx further create value in the society with Antarctic ecosystem research, science boosting awareness, promoting industry responsibility, prevention of lifestyle diseases, and better resource utilization.

Antarctic ecosystem research is crucial to the overall Axxxx Bxxxxxxxxx's business as it provides the assurance necessary to harvest the Southern Ocean's krill within the guidelines provided by the Antarctic Wildlife Research Fund, WWF Norway, and The Antarctic and Southern Ocean Coalition (ASOC). The research itself is intended to promote and facilitate further studies on the Antarctic ecosystem.

In 2016, Axxxx Bxxxxxxxxx allocated 5 percent of its revenues on various scientific and innovation projects to build knowledge base and popularize the awareness of omega-3 consumption for healthy living. It further launched a study to evaluate how the U.S. Army recruits were affected by the omega-3 use in their overall resilience and performance.

Through its leadership in promoting effective sustainable harvesting practices, Axxxx Bxxxxxxxxx and the Association of Responsible Krill Harvesting Companies (ARK) applied the voluntary no-fishing zone around penguin colonies threatened by the climate change. Together, Axxxx Bxxxxxxxxx continue to promote industry responsibility for planetary health and sustainable growth.

Axxxx Bxxxxxxxxx has committed to improving human and planetary health continuously in alignment to the United Nations' Sustainable Development Goals (SDG) by getting engaged in the integration of the goals.

SDG 2: End hunger, achieve food security and improved nutrition, and promote sustainable agriculture.

SDG 3: Ensure healthy lives and promote well-being for all of all ages.

SDG 12: Ensure sustainable consumption and production patterns.

SDG 14: Conserve and sustainably use the oceans, seas, and marine resources for sustainable development.

Contributing to A Healthier Population

According to Axxxx Bxxxxxxxx's Chief Scientist Dr. Nils Hoem omega-3 deficiency results in higher risk for chronic diseases, such as heart disease, suboptimal brain function, increased likelihood for clinical depression, and other health issues. Through global public health campaigns, sponsored university studies, and producing high-quality Superba Krill health supplements, Axxxx Bxxxxxxxx's dedication in combating such avoidable lifestyle diseases is evident.

A way to address this issue is by engaging the medical professions in providing public education and communicating about the importance of including omega-3 EPA and DHA in daily consumption and taking [Omega-3 Index Test](#). Axxxx Bxxxxxxxx has initiated The Omega-3 Index (O3i) Project with several industry partners, including companies, associations, and non-profit organizations to bring awareness to the ramifications of having low omega-3 levels.

The Omega-3 Index Test is primarily a blood test that measures the amount of EPA and DHA in the red blood cells, where low Omega-3 Index correlates with risk of cardiac death. Those with very low Omega-3 Index are known to significantly increase the risk of cardiac death.

An initiative sponsored by Axxxx Bxxxxxxxx is the comprehensive research study to evaluate the effects of krill oil omega-3 on the performance of military recruits at the U.S. Army Infantry Basic Officer Leadership Course and the U.S. Army Ranger Training School. According to Bernadette P. Marriott, PhD, Professor and Director, Nutrition Section Department of Medicine and Military Division, Department of Psychiatry and Behavioral Sciences, Medical University of South Carolina, "While the potential benefits for the U.S. military are obvious, the physical and cognitive effects omega-3 fatty acid supplements could have on the wider population are significant."

Marriott further explained that intake of omega-3 is essential for living a productive and healthy life. Increased sustained attention, inhibition, and cognitive control are critical for everyday activities, like driving, parenting, studying, and handling workplace stress are made possible with a reasonable level of EPA and DHA in the bloodstream.

Awareness campaign

Another way Axxxx Bxxxxxxxx is addressing this issue is through the [global health campaign](#), which is intended to draw attention to the chronic lack of omega-3 in most people's diets through lifestyle awareness. One of the campaign activities is a video starring a city-dwelling young woman named Maria, who seems like living a typical urban healthy lifestyle. She goes to the gym, exercises well when there is an opportunity, and eats healthy.

The setting of the video is Greenland and her family home is located in Kapisillit, a fishing village of the Greenland Inuits who are known to eat a high-fat diet, yet they still have low levels of cholesterol and triglycerides. The Norwegian award-winning film director Olav Sørensen selects this background setting to strike a nerve and make viewers reflect and improve their lives.

However, when she visits her family home in Greenland, she discovers how imbalanced her life has been. Apparently, her seemingly "healthy" habits are not enough to maintain a truly healthy and balanced life. This fact surprises her and forces her to change her lifestyle.

When she takes the Omega-3 Index test, she finds out that she is omega-3 deficient, which is a risk factor for heart disease, as identified by peer-reviewed scientific papers. Axxxx Bxxxxxxxxx is dedicated to disseminating information about the importance of The Omega-3 Index Test as a prevention measure and early warning against non-communicable diseases, such as heart attack and brain-related illnesses.

[Insert video](#)

Studying the Effects

Collaborating with the Medical University of South Carolina, the Nutrition Section Department of Medicine and Military Division, Axxxx Bxxxxxxxxx sponsored a research study to evaluate the effects of krill oil omega-3 on the performance of military recruits at the U.S. Army Infantry Basic Officer Leadership Course and the U.S. Army Ranger Training School. According to Professor and Director Bernadette P. Marriott, Ph.D., the potential benefits for the U.S. military are obvious.

Dr. Marriott also added that the physical and cognitive effects of omega-3 fatty acid supplements could have a significant impact on the wider population. Overall, omega-3 intake would be beneficial to increase sustained attention, inhibition, and cognitive control for everyday activities. The good level of EPA and DHA in the bloodstream makes them possible.

Distributing Krill Oil

Also with the distribution of Superba Krill in the world market, Axxxx Bxxxxxxxxx has been actively reducing omega-3 deficiency worldwide. More than 80 percent of the world population are omega-3 deficient, and krill is known to be one of the best sources of natural EPA and DHA, which are known to prevent non-communicable diseases (NCD).

In 2016 alone, approximately one billion doses of Superba Krill have been sold worldwide, improving the health of millions of people. The unique phospholipid omega-3 contained in the krill oil products have been scientifically proven to reduce the risk of several lifestyle diseases, including heart and brain-related issues.

Contributing to More Efficient Food Production

The growing world population puts a strain on human food production. Due to being a good source of protein and omega-3, fish farming is one of the focuses of food production increase worldwide. The need for a sustainable sourced marine ingredient has never been higher.

"We are pooling our scientific and practical understanding of fish species and marine ingredients in order to develop feed products that address key aquaculture challenges," said Sigve Nordrum, the EVP Qrill Sales at Axxxx Bxxxxxxxxxxx.

Until 2050, the aquaculture industry must add [2 million tons annually](#), according to the World Resource Institute. This presses an urgency to produce more fish in a relatively short time while taking into account human and planetary health.

One way to increase production in aquaculture is by including marine ingredients in the fish feed derived from lower trophic levels, such as krill. Since krill is located very low in the marine food chain and has biomass in very good condition, it is an excellent source of additional food production.

What fish eat further determines the quality of the fish as human consumption. Feed with krill has optimal omega-3 and omega-6 fatty-acids balance. Thus, the fish have a stronger immune system and reduced mortality. Krill also improves fillet quality, regarding yield and texture. The texture is firmer and has less gaping. In salmon, it reduces the fillet's dark spots.

Krill is rich in Astaxanthin, a natural antioxidant that protects tissues and cells in addition to giving salmon the natural pink flesh color. Thus, it contributes to fish health, quality, and sustainability.

With increasing pressure on the food production to feed the population, Axxxx Bxxxxxxxxxxx with QRILL Aqua can contribute by delivering more fish on the table in a healthy and sustainable way. QRILL Aqua feed for aquaculture drives growth and enhance health and quality of farmed marine species.

QRILL Aqua feed ingredients helped in boosting our customers' salmon production by an additional 175 million servings in 2016. Krill as an ingredient in fish feed also attract fish for its palatable taste, leading to increased appetite, size, and robustness. The fish themselves grow by 10 to 25 larger, thus shortens harvest time, while also have better health and less time to be disease-prone.

The final product, which is the fish fillet consumed by humans, is likely to be firmer, of enhanced quality and richer in omega-3 fatty acids. As a result, consumers also reap the benefit: Increased omega-3 fatty acids in their consumption and bloodstream. Omega-3 fatty acids are known to reduce the likelihood of non-communicable diseases, such as heart attack, diabetes, brain-related, and others.

With QRILL Aqua from Axxxx Bxxxxxxxxx, we can increase food production volume, while maintaining human health and planetary sustainability. By feeding farm marine species with QRILL Aqua, fish quality improves, and the nutritional value of human consumption also increases.

Insert video: [the many advantages of krill](#)

Commitment to Sustainable Growth (When Demand for Seafood and Health Supplements Increases)

Only two percent of global food supply and 0.5 percent of pharmaceuticals originated from the ocean. Moreover, 85 percent of fish stocks worldwide are either overfished or fished to capacity. Historically, we humans have failed to protect our marine resources, which is a problem that we need to solve.

Food producers and fish farmers play a unique role in setting the standard for sustainability in fish feed, by choosing feeds that promote both fish health and the future of fisheries. Dietary supplement industry, consequently, is searching for a healthy ingredient for their Omega-3 supplement pills, which is environmentally sound and safe for planetary health.

“With a growing world population, it has never been more important to make healthy food and nutrients available while also keeping our planet’s ecosystems healthy,” said Cilia Holmes, the Director of Sustainability at Axxxx Bxxxxxxxxx.

Antarctic krill is considered one of the most environmentally sound marine resources that can be used for various purposes, including as an ingredient for health supplement and aquaculture and animal feeds. Krill are small crustaceans of the order Euphausiacea, which can be found in all oceans.

Particularly in the Southern Ocean, one species, the Antarctic krill, *Euphausia superba*, makes up [an estimated biomass of around 379 million tons](#). Out of this, more than half is consumed by whales, fish, seals, penguins, and squid every year. They are replaced through reproduction and growth.

Antarctic krill are important in the food chain because they feed on phytoplankton and zooplankton. Therefore, the nutrients in them are available to others that consume krill as their main diet. For this reason, krill are regarded a keystone species in the Southern Ocean ecosystem.

[Sustainability of the krill fishery is dependent on the size of the catch relative to the population.](#)

In the Southern Ocean of the Antarctic Area 48, which is an area of 12 million square kilometers in size, there are approximately 60.3 million tons of krill.

The regulated catch level is one percent of 620,000 tons of the biomass. However, at the end of the year, only 250,000 tons of krill are caught, which is far below the allowable catch level.

Every batch of krill oil produced by Axxxx Bxxxxxxxxx is also traceable. The coordinates from which each package of krill oil was harvested are included in each batch. This transparency is critical to building trust with consumers.

For sustainability, Axxxx Bxxxxxxxxx has received an ["A" rating from Sustainable Fisheries Partnership](#) for three years in a row. The krill fishery is also governed by CCAMLR (Commission for the Conservation of Antarctic Marine Living Resources), one of the most influential regulatory bodies in fishing. Axxxx Bxxxxxxxxx itself was the first recipient of MSC Certified Sustainable Seafood in 2010.

Commitment to Sustainable Harvesting Methods

Axxxx Bxxxxxxxxx has been taking all measures necessary to ensure the sustainability of the Antarctic ecosystem by minimizing adverse environmental impact. We adhere to international standards, use the most advanced harvesting and at-sea processing technologies, and welcome the independent observers onboard to ensure transparency and reporting of volumes and positions to authorities.

Axxxx Bxxxxxxxxx reinvented the entire mechanics of krill harvesting and at-sea in-fleet production. With a new way to gently harvest and transport krill onboard, we disrupt the timeframe of the factory trawlers that are at sea, the size of their nets, towing speed, and how krill oil is processed and extracted.

Axxxx Bxxxxxxxxx is dedicated to ensuring environmental and planetary sustainability with approved harvesting methods and adhering to international standards for long-term sustainability of Southern Ocean ecosystem and the protection of Antarctic species. For this, Axxxx Bxxxxxxxxx has been recognized for its environmentally responsible Antarctic krill harvesting and processing. It starts with receiving approval from WWF Norway before deploying the first operation, to ensure that it comes with as minimal impact as possible on the Antarctic ecosystem.

"There's no cheap way to fish krill in the Antarctic, only the expensive way! It's all or nothing, and we are consistently committed to going all the way," said Matts Johansen, CEO, Axxxx Bxxxxxxxxx.

Axxxx Bxxxxxxxxx uses the patented [EcoHarvesting® technology](#), which comes with a sophisticated mechanism that eliminates by-catches of other species, by almost 100 percent. In 2016, for the second year in a row, Axxxx Bxxxxxxxxx received an "A" rating by the Sustainable Fisheries Partnership for having krill biomass in excellent condition.

The advanced EcoHarvesting® technology took a decade to complete. The krill harvested are gently transported inside the ships to be processed to ensure freshness and preserve all the important nutrients.

Next, after water is removed, the krill are packed tightly and frozen. They are placed in sacks of 500 kilograms each and stored in the cargo hold. These are the raw materials, which will be shipped to Houston, Texas, in the United States. Once arrived, they will be processed as Superba Krill, QRILL Aqua, and QRILL Pet.

Since harvesting of Antarctic krill is closely managed, monitored, and regulated, Axxxx Bxxxxxxx has been welcoming onboard observers who are responsible for reporting the catch volumes and vessel positions to the authorities.

In 2010, Axxxx Bxxxxxxx's krill harvesting operations in Antarctic waters had received environmental certification by the Marine Stewardship Council (MSC), which is the highest standard for sustainable fisheries. Moreover, this prestigious certification was renewed in 2015.

Summary

Axxxx Bxxxxxxx is the leader in Antarctic krill harvesting and production of krill-based nutraceutical health supplements (Superba Krill), aquaculture (QRILL Aqua) and animal (QRILL Pet) feeds. With a mission in improving human and planetary health, we have been contributing meaningfully to a healthier world population, more efficient food production, and sustainable environment.

Axxxx Bxxxxxxx has reinvented the entire mechanics of gentle krill harvesting with EcoHarvesting®, at-sea production, and production of krill-based products at the 180,000 square-foot Houston plant. Moreover, each product batch is traceable to the exact location where the krill materials were caught with the complete coordinates.

Axxxx Bxxxxxxx's promise to improve the human and planetary health shall continue to set a new benchmark. Customers and end-users can have a peace of mind that our krill-based products are healthy, safe, and sustainable.