



»SEATO BAG»<sup>®</sup>  
For Healthier Seafood

# INNOVATING FOR SUSTAINABILITY IN AQUACULTURE

Sustainability Report 2021



## OUR VISION

To be the most trusted provider of biotechnology solutions that give consistency in food safety and achieve food security of food sources for humanity as well as provide commercial sustainability for all partners in the supply chain towards the future.

## OUR MISSION

We develop breakthrough biotechnologies for a sustainable, robust and resilient food ecosystem to bring environmental, health, social and economic benefits for global economies through the growth and productivity of nature-positive foods.

# CONTENTS

## 01 LETTER FROM THE FOUNDER

## 02 ABOUT SEATOBAG®

Company Profile

SEATOBAG® Milestones

## 03 THE CHALLENGES WE TACKLE

High Mortality Problem in the Aquaculture Industry

Achieving Optimal Fish Health Naturally

Ensuring Food and Nutrition Security

Enabling Circular Economy in Our Value Chain

## 06 OUR SOLUTION – biocrobeX™ POSTBIOTIC

How Our Technological Solutions Contribute to the Aquaculture Value Chain

## 10 NATURE-POSITIVE PRODUCTION

Healthy Seas, Healthy Fish, Healthy People

## 14 CASE STUDY – SMITH MARINE

## 19 OUR CONTRIBUTION TO THE UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS

## 20 PARTNERSHIPS FOR A SUSTAINABLE FUTURE

## 21 OUR BUSINESS

## 23 OUR ENVIRONMENT

## 25 OUR PEOPLE

## 27 ABOUT THIS REPORT

## 28 SUSTAINABILITY MANAGEMENT

## 30 GRI CONTENT INDEX

## 33 APPENDIX

1. Certificate of Analysis of LACTOSEAFOD® Fourfinger Threadfin
2. Laboratory Test Reports (Certificates of Analysis) for Miiome™ Aqua Feed
3. Laboratory Test Reports (Certificate of Analysis) for the biocrobeX™ postbiotic

# LETTER FROM THE FOUNDER

At SEATOBAG®, we are truly thankful for to have like-minded people coming together to work with us towards our vision of making a positive difference to our food sources – using our biotechnology solutions to achieve production of safe and clean food with consistency in quality and quantity, as well as making it commercially sustainable for all partners in the supply chain.

Since our inception in 2018, we are motivated to develop feasible solutions to address the growing levels of food insecurity and issues surrounding food safety, right at the beginning of the supply chain or food source. We have taken upon ourselves to develop the next generation of aquafeeds and aquaculture production system, to address prevailing challenges faced by fish farmers. Through microbiome and genomic studies, we have developed our proprietary postbiotic, biocrobeX™ (biologics of microbes with multiplier effects) to formulate our Miiome™ Aqua Feed (fermented) and Miiome™ Biosphere Farming System. We have also successfully extended the application of biocrobeX™ downstream in the value chain, specifically in the cleaning (gutting of fish) and packaging process, where it has shown its effectiveness in extending the shelf life and maintaining the freshness of blast frozen seafood products.

According to United Nation's Food and Agriculture Organisation ("FAO"), the world will increasingly rely on aquaculture to meet a growing demand for blue food, which is likely to double by 2050. Similar to most food systems, aquaculture presents both opportunities and challenges, particularly around health, sustainability and equity. For us, sustainability means ensuring the resilience of our global food production system – economically, environmentally, and socially, for today and for generations to come. This is central to how we work at SEATOBAG® and integral to achieving our vision and fulfilling our mission.



During 2020 and 2021, the world experienced disruptions in every facet of our lives due to the COVID-19 pandemic. What started as a health crisis, has had consequential negative impacts on the world economy, such as that on the global food and agriculture sectors. Measures to contain the spread of the virus in many countries inadvertently disrupted the supply of agri-food products to markets and consumers both within and across countries. Furthermore, with the conflict between Russia and Ukraine, it has hastened severe and widespread increases in global food insecurity, affecting vulnerable households in almost every country. For an island-state country such as Singapore with limited natural resources, we have seen the importance of increasing domestic food production to ensure a nation's food security, in addition to stockpiling staples and proteins, as well as diversified sourcing.

Having demonstrated our success in the applications of the biocrobeX™ postbiotic in the fish farming supply chain, we are ready to share our success with fellow fish farmers in the aquaculture sector and expand our reach to fellow farmers in the agriculture industry. We believe the pressing need for food security and food safety for most countries can be addressed efficiently through unified efforts of these major food production sectors.

In our inaugural Sustainability Report, we provide an insight to the biotechnology solutions developed by SEATOBAG® which contribute to the aquaculture value chain, as well as the potential of our biotechnology be applied to the wider agricultural and food and beverage sectors. Our biotechnology solutions aim to tackle the challenge of food security and meet the needs of a growing global population. At the same time, we remain focused on addressing opportunities in climate resilience, and mitigation—working within our company, as well as across our industry and beyond.

As we continue to collaborate and engage with consumers, non-profits, regulatory bodies, and our industry to advance our progress globally, we hope to shape the future of food, enriching the lives of those who produce and those who consume.

## ALBERT TAY

Managing Director & Founder  
SEATOBAG® PTE LTD

# ABOUT SEATOBAG®

## COMPANY PROFILE

SEATOBAG® is motivated to making a positive difference to our food sources, particularly in achieving consistency in quality and quantity, as well as making it commercially sustainable for all partners in the supply chain.

SEATOBAG® was established in 2018 with the goal of developing the next generation of aquafeeds and aquaculture production system, to address prevailing challenges faced by fish farmers through microbiome studies and its proprietary postbiotic, biocrobeX™ (biologics of microbes with multiplier effects).

Over the last few years, SEATOBAG® developed its range of Miiome™ Aqua Feed (fermented) with the fundamental objective of improving the gut health of fish, and concurrently introduced high density polyethylene ("HDPE") cages for healthier fish farming to the fish farm located in Pulau Kukup, Johor, Malaysia. This strategic collaboration with the fish farm allowed SEATOBAG® to refine its formulation of Miiome™ Aqua Feed with biocrobeX™ and rolled out its aquaculture production system progressively with the aim of assisting the fish farmers to overcome their challenges. This includes confronting the key challenge of the high mortality rate of fish which impacts the livelihoods of fish farmers.

The reduction in the mortality rate and positive results such as improved overall health of the fish, along with desirable traits, especially in the texture and taste of the fish after cooking, spurred SEATOBAG® to explore other applications of biocrobeX™. biocrobeX™ postbiotic has been successfully applied in the downstream value chain, specifically in the cleaning (gutting of fish) and packaging process, where it has shown to maintain the freshness and extend the shelf life of the blast frozen seafood products. The seafood products are currently marketed and sold under its proprietary brand 'LACTOSEAFOOD®' through retail outlets in Johor and Singapore, as well as e-commerce platforms. As the seafood products met the nutritional criteria laid out by the Health Promotion Board of Singapore, LACTOSEAFOOD® is awarded the Healthier Choice Symbol ("HCS"). LACTOSEAFOOD® is

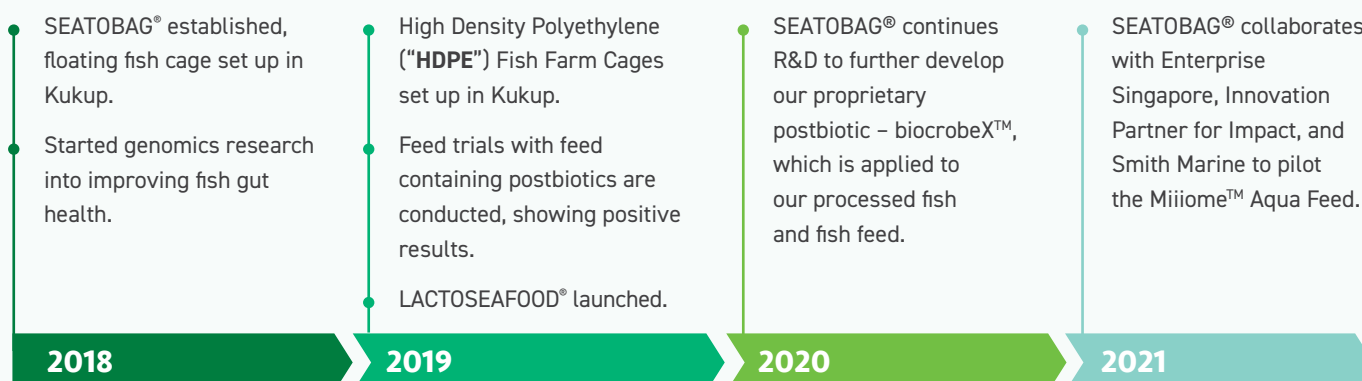
also recognised by the WWF-Malaysia ("WWF") as an 'Aquaculture Improvement Projects' ("AIP") partner effective 26 January 2022.

SEATOBAG® is continuing with new innovative applications beyond aquaculture through further research and development to maximise the potential of its proprietary postbiotic, biocrobeX™. One of the immediate applications is using the discarded fish guts from the fish farm to produce postbiotic fertilisers for plants.

## SEATOBAG® MILESTONES

Approximately covering an area of 6.4 km², Pulau Kukup is an island in the Pontian District of Johor, Malaysia. Once a small fishing village, Kukup has grown in response to a demand for fresh seafood from the rapid growth of Johor and Singapore. Since fish farming started in the 1970s, Kukup has grown to become a town with an estimated population of 1,400. A variety of fish, including groupers, snappers, trevallies, pompanos and Asian sea bass are grown in about 8,000 cages distributed over 79 farms. A large portion of these fishes are sold fresh or live to the Singapore market which is about an hour by boat. However, fish farming in Kukup does not come without problems, one of which is the high mortality rate of fish being farmed, thus impacting the livelihoods of the farmers.

Leveraging on nature and genomics, SEATOBAG® set out to develop the next generation of aquaculture feed with the objective of improving the gut health of fish, and in turn reduce the fish mortality rate. LACTOSEAFOOD® was launched in 2019, enabling the production of healthier fish and nutrient-rich seafood from the waters of Kukup. Surprisingly, LACTOSEAFOOD® also had a beneficial impact on the surrounding environment and appeared to promote restorative properties in the livestock's natural habitat. With these results, SEATOBAG® continued further research and development in the area of microbiome studies and in 2021, pilot studies were done on SEATOBAG® biocrobeX™ postbiotic in collaboration with Enterprise Singapore – Innovation Partner for Impact, and fish farms in Singapore, namely Smith Marine.





# THE CHALLENGES WE TACKLE

## HIGH MORTALITY PROBLEM IN THE AQUACULTURE INDUSTRY

Over the last few years, the poor profitability of fish farms has impacted many of the farmers in Kukup with farmers reporting mortality rates ranging from 50% to 80%<sup>1</sup>. Problems related to handling fish, water quality, algae blooms, temperature changes, parasite infections, extreme weather events, disease or parasite treatments and feed quality can all lead to stress, disease, and ultimately the death of fish before harvesting. Fish that die in cages constitute the largest loss in production.

Similarly, Singapore's coastal fish farms have experienced two major episodes of harmful algae bloom ("HAB") incidents, an oil spill incident resulting from a vessel collision, and occasional low dissolved oxygen conditions at the West Johor Straits, all of which has taken place in the last decade<sup>2</sup>.

An increasingly important threat to the aquaculture industry is disease, which affects all subsectors of aquaculture and causes an estimated US\$6 billion worth of aquatic animal losses every year globally. Diseases caused by parasites such as sea lice in salmon, white spot syndrome virus in prawns, and tilapia lake virus, threaten the economic gains in many low- and middle-income countries. As aquaculture is scaled up, the problem of disease will also become greater<sup>3</sup>.



*Through the use of Miiome™ Aqua Feed, the fish have a healthy gut and a lower prevalence of diseases. This in turn results in a faster growth rate, more efficient feed conversion ratio and a lower mortality rate.*



- 1 WWF-DHI Internal Report to SEATO BAG®
- 2 The Singapore Aquaculture Industry — Contributing to Singapore's Food Security  
<https://www.was.org/articles/The-Singapore-Aquaculture-Industry-Contributing-to-Singapores-Food-Security.aspx#.YNVDbegzaUk>
- 3 Can Aquaculture overcome its Sustainability Challenges? By Sarah DeWeerd. Nature Outlook, 9 Dec 2020.

# THE CHALLENGES WE TACKLE



*The active ingredient which we use for our Miiome™ Aqua Feed is biocrobeX™, a postbiotic which is manufactured from naturally occurring beneficial bacteria and free of antibiotics.*

## ACHIEVING OPTIMAL FISH HEALTH NATURALLY

Pesticides and antibiotics used in the farms may also contribute to bacterial resistance that threatens human health. A recent journal<sup>4</sup> published in 2020 showed that aquaculture is at the crossroads of global warming and antimicrobial resistance. It was found that infected aquatic animals present higher mortalities at warmer temperatures, and thus, countries most vulnerable to climate change will probably face the highest antimicrobial resistance risks, impacting human health beyond the aquaculture sector. The highest antimicrobial resistance levels in aquaculture were observed in economically vulnerable countries (i.e. low- and middle-income countries), especially in Africa and South East Asia, which is consistent with the results of global antimicrobial resistance gene abundance found in sewage waters and farmed terrestrial animals. About 80% of antimicrobials administered through feed to aquatic farmed animals disseminate to nearby environments (water and sediment) where they remain active for months at concentrations allowing selective pressure on bacterial communities and favouring antimicrobial resistance development.

In a 2017 report published by One Health Antimicrobial Resistance Working Group, Singapore<sup>5</sup>, the aquaculture industry was the largest consumer of antimicrobials in animals in Singapore, where annual reported sales showed approximately 1,200 kg sold in 2017. A study carried out in 2020 by researchers from Saw Swee Hock School of Public Health, National University of Singapore and National University Health System found that coastal fish farmers in Singapore tended to use freshwater baths or applied formalin as a last resort for sick fish which showed symptoms such as loss of appetite and slow swimming.

4 Reverter, M., Sarter, S., Caruso, D. et al. Aquaculture at the crossroads of global warming and antimicrobial resistance. *Nat Commun* **11**, 1870 (2020). <https://doi.org/10.1038/s41467-020-15735-6>

5 The One Health Report for Antimicrobial Utilisation and Resistance, 2017 is the first multi-sectoral surveillance report and provides an overview of the main national surveillance activities conducted in the human, animal, food and environment sectors up to the end of 2017. The Report is a collaboration between members of the One Health Antimicrobial Resistance Workgroup, comprising representatives from the Ministry of Health (MOH), National Environment Agency (NEA), Animal & Veterinary Service of National Parks Board (NParks/AVS), Singapore Food Agency (SFA) and PUB, the National Water Agency. The Report was compiled with the assistance of the Antimicrobial Resistance Coordinating Office (AMRCO), National Centre for Infectious Diseases (NCID). <https://www.moh.gov.sg/docs/librariesprovider5/resources-statistics/reports/one-health-report-on-antimicrobial-utilisation-and-resistance-2017.pdf>

# THE CHALLENGES WE TACKLE

## ENSURING FOOD AND NUTRITION SECURITY

Access to nutritious food is a key dimension of food security. Impacts of the COVID-19 have led to severe and widespread increases in global food insecurity, affecting vulnerable households in almost every country. It has also shown the importance of having a buffer in the event of global supply disruptions. Together with the industry, the Singapore Food Agency (“SFA”) is working to build up Singapore’s local capabilities, ramping up local food production, and boosting this buffer. In Singapore, the food items with potential to increase domestic productivity include vegetables, eggs, and fish. According to the SFA<sup>6</sup>, these three types of goods are commonly consumed, but are perishable and more susceptible to supply disruptions.

Fish is widely looked to as a nutrient dense food containing high quality protein (readily digestible, with essential amino acids) and long-chain polyunsaturated fatty acids and is recognised as having “... a special role in nutrition and health”<sup>7</sup>. Currently local fish farms produce around 10 percent of Singapore’s consumption of food fish. As Singapore envisions production of 30 percent of Singapore’s nutritional needs locally by 2030, Singapore’s aquaculture industry needs to transform and adopt technology to raise productivity, strengthen climate resilience and overcome Singapore’s resource constraints.

To ensure a consistent supply of fresh fish, one approach would be to flash freeze the fish after harvesting, which would improve the shelf life of the fish while at the same time retain the flavour and nutritional qualities as the fresh fish. Furthermore, time-sensitive fresh fish often travel by air, which has a lot more of an environmental impact than slower forms of transportation such as train or boat, which can carry frozen fish without affecting the quality of the fish.



*Cleaned and processed raw fish coated with biocrobeX™ postbiotic can be vacuum sealed and flash frozen to help retain the freshness and taste of the fish even after an extended period of storage of 2 years.*

*Fish waste can be composted with biocrobeX™ postbiotic to be used as fertiliser for farming.*

## ENABLING CIRCULAR ECONOMY IN OUR VALUE CHAIN GRI 306-2

The fish industry generates a significant amount of waste. It has been estimated that about 30 to 40 per cent of the fish harvested would be lost as waste, depending on the species processed. The waste generated could result from particles of flesh, skin, bones or entrails. This waste, however, is rich in valuable minerals, enzymes, pigments and flavours and has the potential for numerous applications for different industries. Fish waste can also be utilised in the production of organic fertilisers and composts, which have significant benefits over chemical-based fertilisers.

In Singapore, where the country is working towards becoming a zero-waste nation, the fish waste generated from the processing of fish could be composted and reused as fertiliser for agricultural farming. We are currently doing pilot trials of this fertiliser on a partner farm in Malaysia to explore the benefits of the fertiliser on vegetable growth and colour.

6 <https://www.weforum.org/agenda/2021/04/singapore-urban-farms-food-security-2030/>

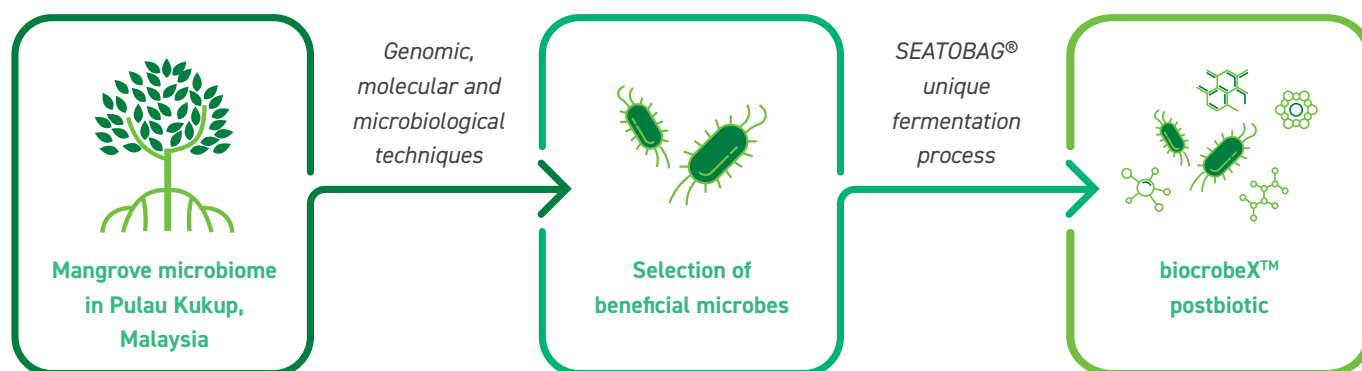
7 Thilsted et al., Maximizing the contribution of fish to human nutrition (2014) ICN2 Second International Conference on Nutrition. Food and Agriculture Organization of the United Nations. <https://www.fao.org/3/i3963e/i3963e.pdf>



# OUR SOLUTION – biocrobeX™ POSTBIOTIC

Mangroves, intertidal forests along tropical and subtropical coasts, are hot spots of productivity and biodiversity. These ecosystems yield valuable services for humanity, including providing a habitat for fisheries species and coastline stabilisation against storm impacts. Globally, mangroves are significant carbon sinks, mitigating climate change by removing atmospheric greenhouse gases through sequestration of organic matter in above- and below-ground biomass, which is where the “coastal blue carbon” can remain stable for millennia. Many of the ecological functions that underpin these activities are carried out or supported by the microorganisms that comprise the mangrove microbiome, including bacteria, archaea, fungi, and protists<sup>8</sup>.

At SEATOBAG®, we believe that the mangrove microbiome is the key to healthier fish. Utilising an array of genomic, molecular and microbiological techniques, we selected naturally occurring beneficial microbes and used a unique fermentation process to incorporate these beneficial microbes and the biochemical compounds they produce into our biocrobeX™ postbiotic.



## WHAT IS A MICROBIOME?

A community of microorganisms (such as bacteria, fungi, and viruses) that inhabit a particular environment. The microbiome of the host and its surroundings play a vital role in its health and well-being.

## THE MANGROVE MICROBIOME

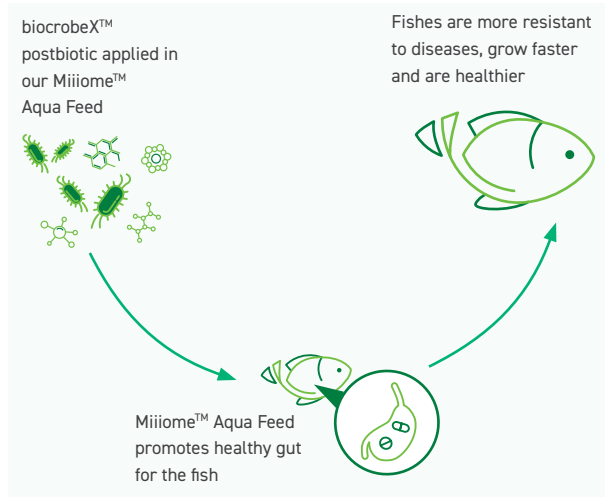
Mangrove-dominated estuaries host a diverse microbial assemblage that facilitates nutrient and carbon conversions and could play a vital role in maintaining ecosystem health. Microorganisms (here meaning single-celled members of the domains Bacteria, Archaea, and Eukarya) are a key component of the mangrove forest and are present in the sediment, the water column, and as biofilms on mangrove roots. These microbes interact with mangroves as co-dependent ecosystem engineers and are responsible for many of the biogeochemical processes attributed to mangrove forests.



8 Allard SM, Costa MT, Bulseco AN, Helfer V, Wilkins LGE, Hassenrück C, Zengler K, Zimmer M, Erazo N, Mazza Rodrigues JL, Duke N, Melo VMM, Vanwonderghem I, Junca H, Makonde HM, Jiménez DJ, Tavares TCL, Fusi M, Daffonchio D, Duarte CM, Peixoto RS, Rosado AS, Gilbert JA, Bowman J. Introducing the Mangrove Microbiome Initiative: identifying microbial research priorities and approaches to better understand, protect, and rehabilitate mangrove ecosystems. (2020). mSystems 5:e00658-20.



# OUR SOLUTION – biocrobeX™ POSTBIOTIC



## WHAT IS A POSTBIOTIC?

A postbiotic is defined as a “preparation of inanimate microorganisms and/or their components that confers a health benefit on the host”<sup>9</sup>.

## Miiome™ AQUA FEED

By applying biocrobeX™ postbiotic in our Miiome™ Aqua Feed, we are able to help farmers to:

- Increase efficiency of Feed Conversion Rate (“FCR”)
- Farm their fish stock without any antibiotics and growth hormones
- Increase the welfare of their fish stock with enhanced immunity
- Lower mortality rate of their fish stock
- Promote growth rate of their fish stock
- Farm richer tasting and more nutritional livestock
- Reduce environmental footprint

## HOW OUR TECHNOLOGICAL SOLUTIONS CONTRIBUTE TO THE AQUACULTURE VALUE CHAIN

Our business is centred around the development of technologies for a sustainable, robust and resilient food system to bring environmental, health and social benefits for global economies. We aim to assist fish farms to (i) produce better tasting and more nutritious fish, (ii) reduce the time taken for harvesting, (iii) improve the feed efficiency conversion ratio, and (iv) preserve the quality of fish after long-term storage. At the same time, we are innovating to recycle the waste by-products generated from the processing of the fish, in a bid to reduce wastage while extending the efficiency of the natural resources.

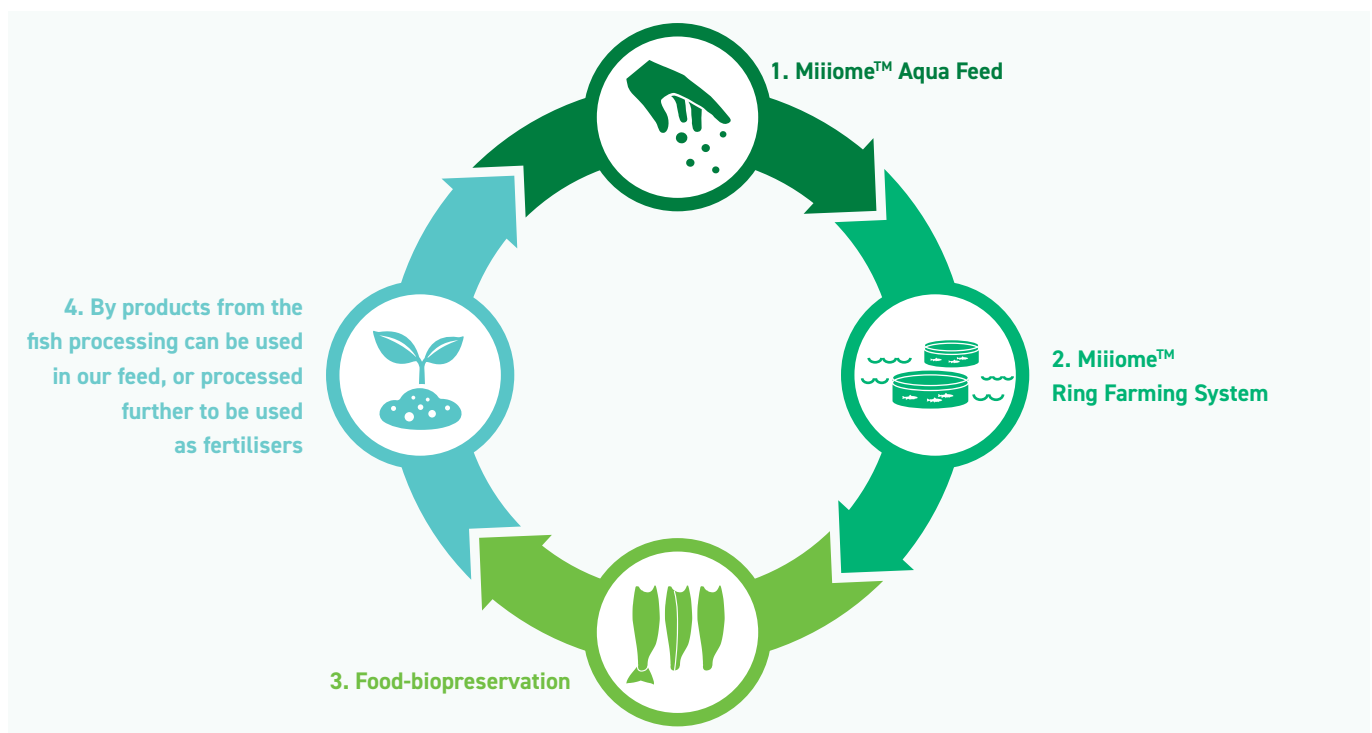


Figure 1. Application of SEATOBAG®'s solutions in the aquaculture value chain.

9 Salminen, S., Collado, M.C., Endo, A. et al. The International Scientific Association of Probiotics and Prebiotics (ISAPP) consensus statement on the definition and scope of postbiotics. Nat Rev Gastroenterol Hepatol 18, 649–667 (2021)

# OUR SOLUTION – biocrobeX™ POSTBIOTIC

We achieve these through the following solutions:

1. Use of biocrobeX™ postbiotic in our Miiome™ Aqua Feed, which promotes a healthy gut for the fish. The gut of the fish is a vital organ, which harbours various microorganisms that are responsible for immune response, nutrient absorption, and overall health of the fish. Through the use of Miiome™ Aqua Feed, we encourage antibiotic free farming, healthier guts in the fish and a lower prevalence of diseases. This, in turn, results in a faster growth rate, more efficient feed conversion ratio and a lower mortality rate. An antibiotic-free approach for the aquaculture industry is important because antibiotics could get bioaccumulated in the fish and ultimately leads to the development of antimicrobial resistance fish. As the fish are consumed, there is also a possibility of antimicrobial resistant genes being passed on in the food chain.
2. The Miiome™ Ring Farming System is SEATOBAG®'s approach to sustainable aquaculture farming. The working principle of this approach is to use a cage with a rigid yet flexible structure, which could be made from plastic, rubber or other materials. This is supported on the surface of the water by special floats, and is commonly referred to as a "floating" cage. This floating structure extends several metres underwater and the fish are farmed inside this "floating cage" based on specific parameters established by the SEATOBAG® team. These parameters cover site selection, environmental conditions such as temperature, current and depth, as well as farming methodology including size of cages, aeration, frequency of feeding and when to harvest. As these cages do not need pumping, heating, cooling or water filtering, the fishes can live in a habitat which simulates their natural environment, while remaining in a bounded area. These cages also allow the fish to swim in a circular motion, which is optimal for their growth. The use of Miiome™ Aqua Feed and Miiome™ Ring Farming System is collectively termed as the Miiome™ Aquaculture System. Fish farmed with Miiome™ Aqua Feed and grown with the Miiome™ Aquaculture System ("MAS") concept showed faster growth rates, improved overall health, improved resistance to diseases and thus a lower mortality rate.
3. Due to the unique properties of postbiotics, biocrobeX™ postbiotic has the potential to be used as an antimicrobial compound to prevent food spoilage. Meat, fish, and related products are highly susceptible to bacterial contamination, and cause a potential threat to consumer health. The Food and Agriculture Organization ("FAO") estimates that approximately 35 percent of fish are lost or wasted between catch and consumption. Once a catch lands at dock, it has to make a few more stops before reaching our plates, such as processing plants, airplanes, traders, wholesalers, dealers, distributors, and transporters. Along this journey, it must stay cold and controlled through careful preservation and processing techniques to be safe and ready for consumption; otherwise, it can be lost to spoilage at any step. To ensure that the fish retain freshness and nutritional value, fish harvested at SEATOBAG®'s partner farm in Kukup is cleaned, gutted, processed and vacuum packed within an hour after the fish are harvested. The cleaned and processed fish are coated with biocrobeX™ postbiotic before they are vacuum sealed and frozen, allowing them to be stored frozen fresh for up to a period of 2 years.
4. About 30 to 40 per cent of a fish harvested would be lost as waste, depending on the species processed. The waste generated could result from particles of flesh, skin, bones or entrails. biocrobeX™ postbiotic can be applied to this waste for composting to turn it into a fertiliser for farming. This would have significant benefits over chemical-based fertiliser products as fish waste contains valuable minerals, enzymes, pigments, and flavours. It is also a valuable resource with potential for numerous applications for different industries. Studies are currently underway to explore the use of these postbiotics fertilisers to replace chemical and synthetic fertilisers for agricultural farming.



# OUR SOLUTION – biocrobeX™ POSTBIOTIC

## Miiiome™ Aquaculture System

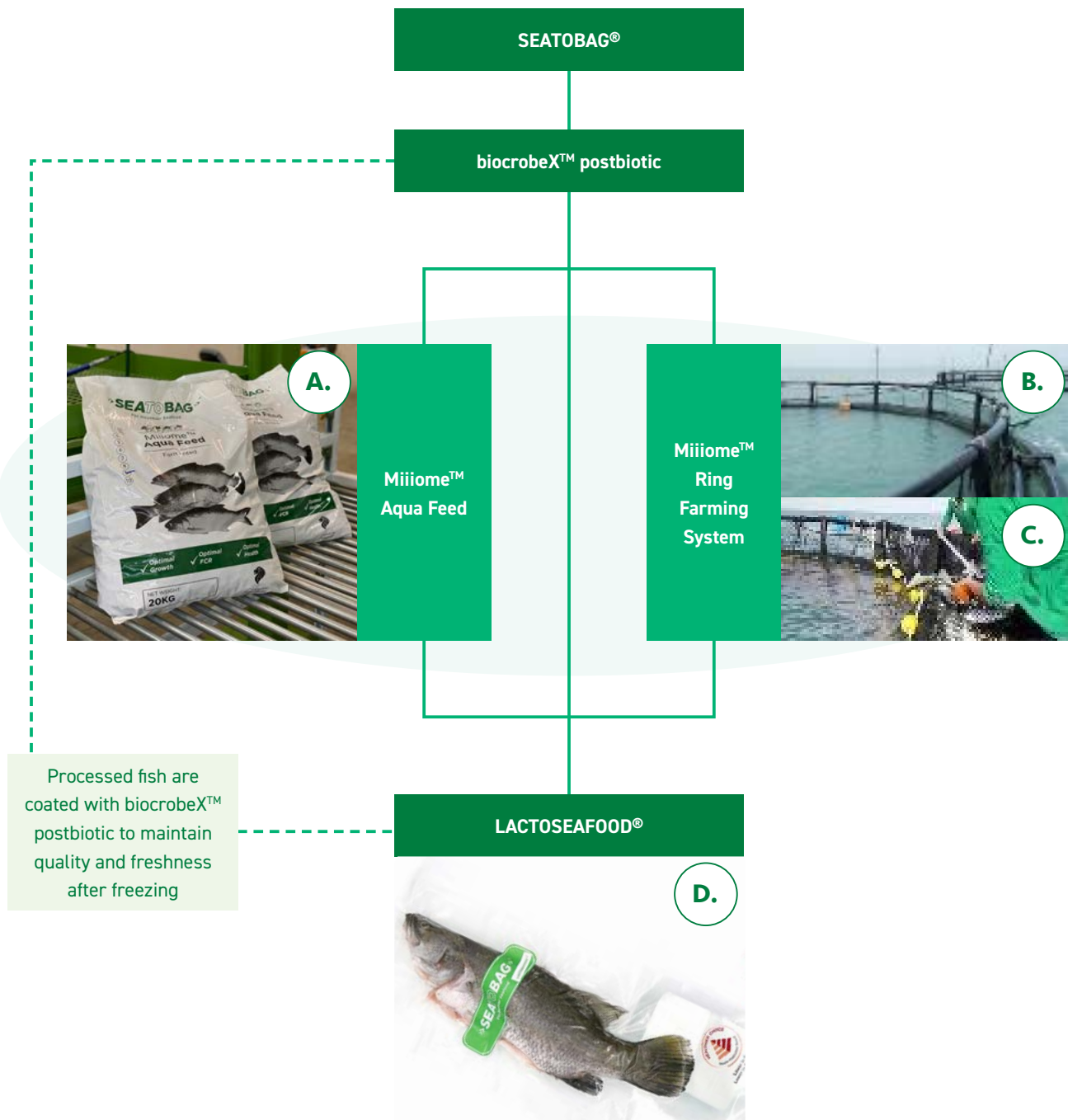


Figure 2. SEATOBAG® solutions: (from top left, clockwise) A) Miiiome™ Aqua Feed, which is available in 12 different pellet sizes for different stages of fish growth. B) Miiiome™ Ring Farming System used in SEATOBAG® partner farm in Kukup to farm Barramundi, Fourfinger Threadfin, Golden Pomfret, Red Snapper and Golden Snapper. C) Harvesting of barramundi. D) One of our SEATOBAG® LACTOSEAFOOD® products – barramundi, which is marketed and sold in Malaysia and Singapore.

# NATURE-POSITIVE PRODUCTION

## HEALTHY SEAS, HEALTHY FISH, HEALTHY PEOPLE

To achieve nature-positive food production systems, we must adopt practices that protect, manage and restore nature, while globally meeting the fundamental human right to healthy and nutritious food for all. Terrestrial, marine and freshwater ecosystems need to be protected to stop them being converted to, or degraded by, food production. Lands and waters used to produce food today need to be sustainably managed to increase input efficiencies, minimise externalities (i.e. the cost imposed on people and nature), improve yields while maximising biodiversity and ecosystem functions, reduce greenhouse gas emissions, and enhance resilience to climate change. Abandoned or degraded areas need to be rehabilitated to support new and more sustainable food production, enabling a reduction in the conversion of natural areas, or be restored to natural ecosystems.

SEATOBAG® strives to enable a nature-positive economy<sup>10</sup> through a transformation in food and ocean use so as to protect the ecosystem while farming fish in harmony with the environment.

### HEALTHY SEAS

We have observed the potential of the Miiome™ Aquaculture System ("MAS") in helping to restore the natural marine environment at our partner farm in Kukup. Since the MAS was used in 2020, there has been more frequent sighting of species of marine flora and fauna in Kukup, such as *Caulerpa lentillifera* (also more commonly known as sea grapes) and green lipped mussels. Sea grapes have not been observed in the past at the farm, but is now a regular occurrence around the cages where fish are fed with Miiome™ Aqua Feed. Sea grapes can be cultivated for local consumption and also potentially exported, providing economic opportunity for local fishermen. Like other edible seaweeds, sea grapes are a rich source of nutrients, including fiber, vitamin A, iron, and calcium.

Although more detailed studies are required to better understand the impact of Miiome™ Aqua Feed on the natural ecosystem, we are heartened to see an improvement in the biodiversity of the waters, and hope that this will in turn help to improve the catch for the fishermen in Kukup.



*Sea grapes*



*Green lipped mussels*



# NATURE-POSITIVE PRODUCTION

## HEALTHY FISH

The carbon emissions intensity of farmed marine fish in East Asia is estimated to be approximately 8 kgCO<sub>2</sub>/ kg CW (carcass weight)<sup>11</sup>. One of the ways in which the emissions intensity from aquaculture can be reduced is through nutrition and feeding, particularly the efficiency of feeding. By optimising the nutritional requirement of the feed for the various species of fish, excessive fishmeal or crop feed materials in the feed can be avoided, which in turn can also have an impact on the water quality. The use of Miiome™ Aqua Feed allows for a lower feed conversion ratio and a shorter harvest time for farmers. This means that potentially less feed is required for farming and farmers are able to harvest their fish earlier. Studies are currently underway to understand the optimal nutritional feed composition for the commonly farmed fishes in Malaysia and Singapore.

At our partner farm in Kukup, data collected in 2020 and 2021 has shown a 20-25 percent reduction in the time to harvest for species such as the Fourfinger Threadfin and Barramundi, while the most significant improvement in feed conversion ratio ("FCR")<sup>12</sup> (16 percent reduction) is observed in the Fourfinger Threadfin. A faster harvest time means that the farmer could have more harvests in a year, and a lower FCR means that it takes less feed to produce a kilogram of fish. A low FCR is important because it reduces the system load of pollutants and protects the quality of water in the marine environment as well as a culture system. It also reduces the environmental loads, lessens the amount of feed required per unit of production and will reduce the oxygen demand imposed by the feed.

FISH TYPE	TRADITIONAL FARM, OTHER FEEDS		Miiome™ AQUACULTURE SYSTEM ("MAS")	
	TIME TO HARVEST	FEED CONVERSION RATIO	TIME TO HARVEST / COMPARISON TO OTHER FEEDS	FEED CONVERSION RATIO / COMPARISON TO OTHER FEEDS
<b>Barramundi</b> (400g – 600g)	5 to 6 months	1.5	4 months / (-2 months)	1.3 / (-13%)
<b>Barramundi</b> (2.5kg – 3.5kg)	14 months	1.8	10 months / (-4 months)	1.8 / (no change)
<b>Golden Pomfret</b> (400g – 600g)	5 months	1.8	4 months (-1 month)	1.8 / (no change)
<b>Red Snapper</b> (400 – 600g)	8 months	1.5	6 months / (-2 months)	1.3 / (-13%)
<b>Fourfinger Threadfin</b> (400g – 600g)	10 months	3	8 months (-2 months)	2.5 / (-16%)

**Table 1. Comparison of harvest times and FCR for fish farmed in MAS as compared to fish farmed in traditional farms using other feeds.**

11 MacLeod, M.J., Hasan, M.R., Robb, D.H.F. et al. Quantifying greenhouse gas emissions from global aquaculture. Nature Research Scientific Reports 10, 11679 (2020) – values based on Figure 2, Marine Fish, East Asia.

12 The feed conversion ratio (FCR) refers to the amount of feed it takes to grow a kilogram of fish. For example, if it requires two kilograms of feed to grow one kilogram of fish, the FCR would be two.

# NATURE-POSITIVE PRODUCTION

## HEALTHY PEOPLE

Fish is the main source of long-chain omega-3 fatty acids, eicosapentaenoic acid (“EPA”) and docosahexaenoic acid (“DHA”) in our diets. Increasing focus and knowledge on the beneficial properties of these fatty acids has increased the demand for omega-3 supplements. Consuming fish directly is an economical and efficient way of providing long chain omega-3s, and additionally providing many essential nutrients, in addition to EPA and DHA. DHA is a major building block of our neural system, and therefore particularly important for optimal brain and neurodevelopment in children. Fish consumption is also known to have health benefits among the adult population. Strong evidence underlines how consumption of fish, and in particular oily fish, lowers the risk of coronary heart disease (“CHD”) mortality. It is estimated that fish consumption reduces the risk of dying of coronary heart diseases by up to 36 percent due to the long-chain omega-3 fatty acids found in fish and fishery products. CHDs are a global health problem affecting all populations. A daily intake of 250mg EPA and DHA per adult gives optimal protection against CHD<sup>13</sup>.

Nutrient analysis of SEATOBAG®’s LACTOSEAFOOD® products has shown that three types of fish have a significantly higher percentage of omega-3 fatty acids as compared to the same fish from other sources. This nutrient analysis was conducted by an independent accredited laboratory in Singapore and as of 31 Dec 2021, SEATOBAG®’s LACTOSEAFOOD® Barramundi, Fourfinger Threadfin and Golden Snapper were listed on Health Sciences Authority Singapore Healthier Choice Symbol (“HCS”) foods<sup>14</sup>. These three types of fish have at least twice the amount of omega-3 when compared to the same fish obtained from other sources, with the LACTOSEAFOOD® Fourfinger Threadfin containing up to 30 times more Omega-3. These LACTOSEAFOOD® products also have 25% more Mono- and Poly-unsaturated Fatty Acids as compared to regular Barramundi, Golden Snapper or Fourfinger Threadfin from other sources.

NUTRITIONAL CONTENT COMPARISON (BASED ON SAMPLE TAKEN FROM WHOLE FISH)			
FISH TYPE	OMEGA 3 FATTY ACID (MG/100G)	MONOUNSATURATED FAT (G/100G)	POLYUNSATURATED FATS (G/100G)
<b>Barramundi</b>			
Other sources	128	0.5	0.6
LACTOSEAFOOD®	392	0.2	0.2
<b>Fourfinger Threadfin</b>			
Other sources	26	0.0	0.0
LACTOSEAFOOD®	792	2.2	1.9
<b>Golden Snapper</b>			
Other sources	213	0.2	0.3
LACTOSEAFOOD®	456	0.7	0.8

Table 2. Nutritional content of LACTOSEAFOOD® compared to normal farmed fish based on nutrient analysis reports.

13 Mozaffarian, D., Rimm, E.B., 2006. Fish intake, contaminants, and human health: evaluating the risks and the benefits. JAMA, 296, 1885-99.  
14 Details of the Healthier Choice Symbol Programme can be found here <https://www.hpb.gov.sg/food-beverage/healthier-choice-symbol>



# NATURE-POSITIVE PRODUCTION

## BARRAMUNDI



### Nutrition Information

Servings per package: Varied  
Serving size: 100g (Around 1/3 pcs)

#### Per 100g / per serving

Energy (kcal*)	94
Protein (g)	19.0
Total Fat (g)	1.7
- Saturated Fat (g)	0.5
- Trans Fat (g)	0.0
- Monounsaturated Fat (g)	0.5
- Polyunsaturated Fat (g)	0.6
- Omega-3 (g)	0.4
Cholesterol (mg)	78
Carbohydrate (g)	0.8
- Total Sugar (g)	0.0
Dietary Fibre (g)	0.0
Sodium (mg)	63

\*1 kcal = 4.2 kJ

25% lower in sodium and saturated fat as compared to regular frozen (plain) seafood.

25% more mono- and poly-unsaturated fatty acids as compared to regular Barramundi fish.

**Ingredients :** Barramundi

**Distributed by :** Crisal Seafood Pte Ltd  
Block 109 Clementi Street 11 #01-09 Singapore 120109

## FOURFINGER THREADFIN



### Nutrition Information

Servings per package: Varied  
Serving size: 100g (Around 1/3 pcs)

#### Per 100g / per serving

Energy (kcal*)	155
Protein (g)	20.3
Total Fat (g)	8.2
- Saturated Fat (g)	2.8
- Trans Fat (g)	0.1
- Monounsaturated Fat (g)	2.2
- Polyunsaturated Fat (g)	1.9
- Omega-3 (g)	0.8
Cholesterol (mg)	69
Carbohydrate (g)	0.1
- Total Sugar (g)	0.0
Dietary Fibre (g)	0.0
Sodium (mg)	52

\*1 kcal = 4.2 kJ

25% lower in sodium and saturated fat as compared to regular frozen (plain) seafood.

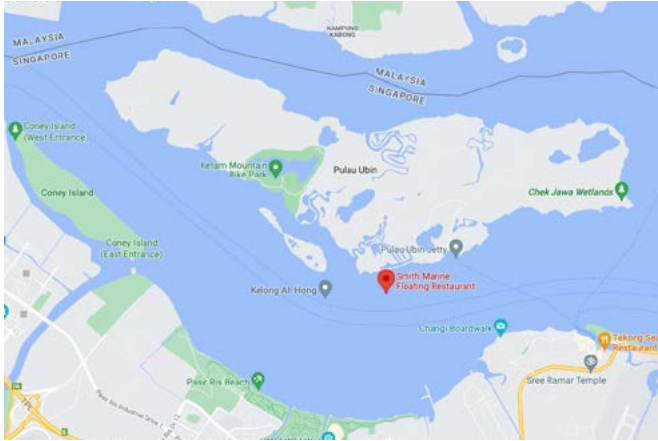
25% more mono- and poly-unsaturated fatty acids as compared to regular FourFinger Threadfin fish.

**Ingredients :** FourFinger Threadfin

**Distributed by :** Crisal Seafood Pte Ltd  
Block 109 Clementi Street 11 #01-09 Singapore 120109

Figure 3. LACTOSEAFOOD® products and their nutritional labels. Top: Barramundi, Bottom: Fourfinger Threadfin.

# CASE STUDY – SMITH MARINE



Maps Data: Google

GPS Coordinates: 01°23'52"N – 103°57'42"E

Smith Marine Fish Farm is located off Changi and Pulau Ubin on the eastern part of Singapore.

The fish farm is made up of a few different floating structures that cover almost 5,000 sqm. Around 30 tonnes of fishes per year are bred annually, including the popular Fourfinger Threadfin, Red Snapper, Golden Pomfret and Grouper. Depending on the species, it typically takes up to 10 months for a fish to be ready for harvesting.



View of the fish cages at Smith Marine



Fourfinger Threadfin farmed at Smith Marine

## CHALLENGE

Mr Ong, the owner of Smith Marine, has been running his fish farm since 2006.

On this farm, there is also a restaurant where he provides customers with fresh fish from the nets. Some challenges that Mr Ong faces at his farm include resources (manpower and materials) to handle the fish when they are unwell. The fish could come down with common ailments such as fin rot and inflammation, resulting in additional cost for the farm as they would need extra manpower and materials to "bathe" the fish when they are sick. This "bathing" exercise may need to be done continuously for one to two weeks and does not necessarily render the fish disease free afterwards. This means there could still be fish which are lost to disease. Mr Ong shared that if there were less episodes of the farmed fish coming down with diseases, it would reduce the fish mortality rate and also reduce his workers' time, which may result in more harvests a year. On average, for a batch of fingerlings that are brought in to be farmed, only about 50% would eventually make it to harvest in a good season. On some occasions, only about 30% - 35% of the original number of fingerlings would make it to harvest.

In 2021, Mr Ong has, for the first time, farmed Fourfinger Threadfins from fingerlings to market size. Threadfins are known to be more susceptible to changes in environmental conditions and tend to have a higher death rate among fish bred at farms, which was the main reason that Mr Ong did not farm Threadfin fish previously.

# CASE STUDY – SMITH MARINE

## SEATOBAG®'S SOLUTION

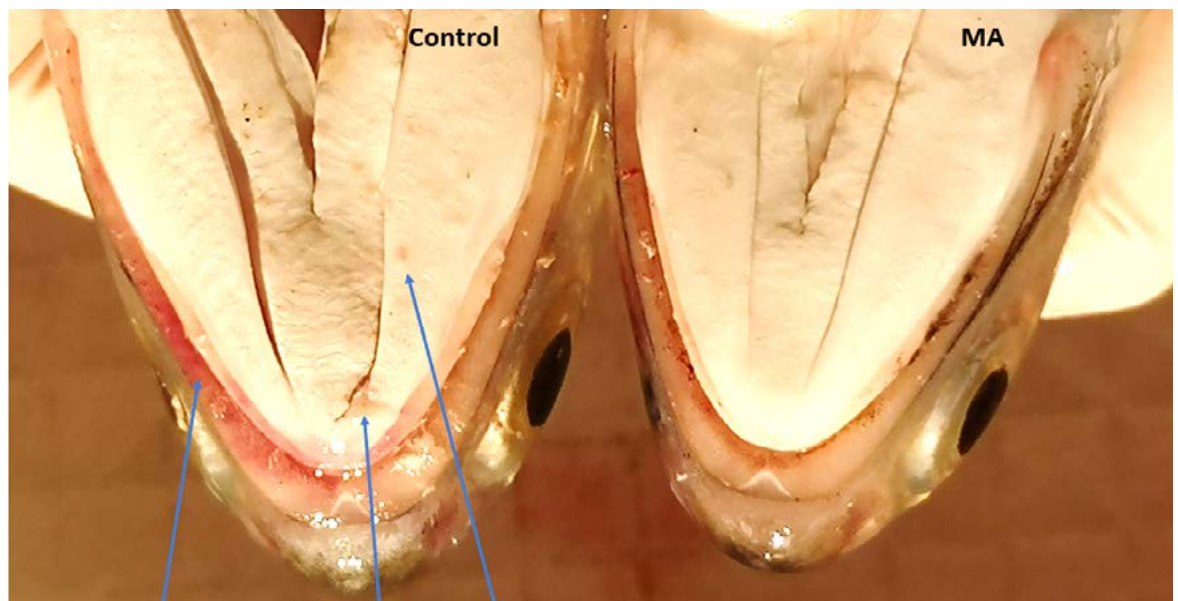
Miiome™ Aqua Feed was introduced to the Fourfinger Threadfin at the farm. These fish were about three (3) months old when they were started on this feed. Two cages were trialled in this study. One cage was fed the original feed ("**Control**"), while another cage was fed the Miiome™ Aqua Feed ("**MA**"). Parameters such as mortality rate, growth rate and colour were observed over a 30-day period.

## RESULTS

It was observed that the fish fed with Miiome™ Aqua Feed had a lower mortality rate during this 30-day trial. At the end of the 30-day trial, the fish from both cages were compared based on their external appearances, and one fish from each cage was also dissected so that we could better understand the effects of Miiome™ Aqua Feed on the guts of the fish. Some significant observations are listed below.

- The fish fed with Miiome™ Aqua Feed
  - Showed less inflammation on the external skin
  - Showed less inflammation in internal organs

*Threadfin: Underside of mouth*



Lesions seen on the underside of the mouth of the Control, fewer lesion seen on MA.



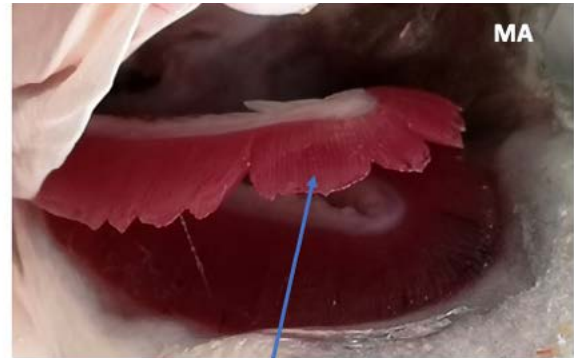
# CASE STUDY – SMITH MARINE

## RESULTS (CONT'D)

### *Threadfin: Gills*



Eroded areas of the gills



Visibly healthier gills, less erosion observed

When dissected Control and MA fish were compared, inflammation was observed in the internal organs of the Control.

### *Threadfin: Internal organs*

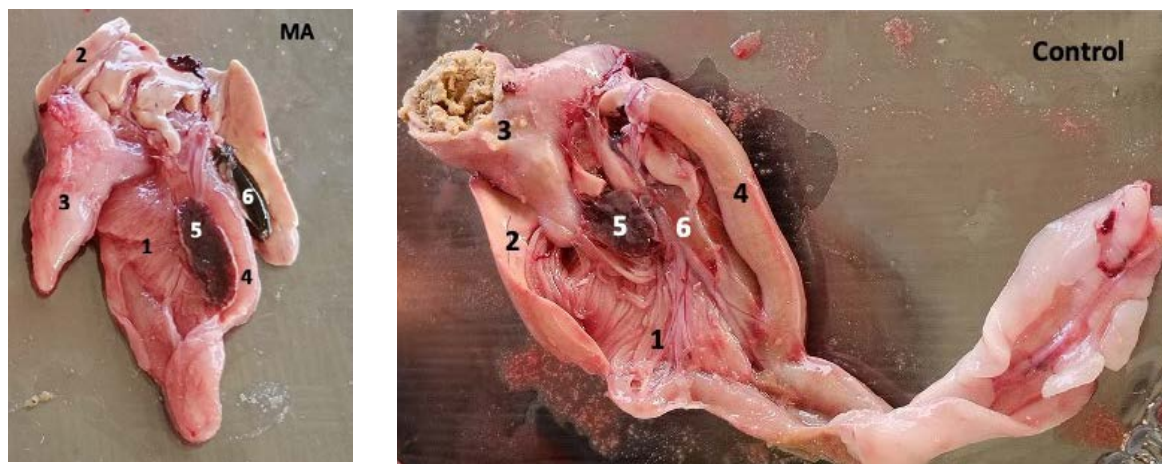


(Left) Size comparison of Control vs. MA internal organs of the Threadfins. Both the fish were of similar size and weight, but the internal organs of the Control appeared almost double the size of the MA one.

(Below) Photo of the MA has been enlarged for clearer view of the internal organs.

# CASE STUDY – SMITH MARINE

## RESULTS (CONT'D)



LABEL			
NO	PART OF GUT	OBSERVATION IN "CONTROL"	OBSERVATION IN "MA"
1.	Pyloric caecae	Grossly enlarged	Half the size of the Control
2.	Liver	Hard	Was firm but not hard
3.	Stomach	Hard, appeared distended and swollen	Was firm but not hard, not swollen
4.	Small intestine	Grossly enlarged and swollen	Was not swollen
5.	Spleen	Does not appear as well formed	Clear and defined structure
6.	Gall bladder	Appears translucent	Appears dark green

**Table 3: Comparison of Fourfinger Threadfins in Control and MA.**

Some unusual observations seen in the Control

- Substantial amount of undigested feed in the stomach. This was despite the last feeding being more than 8 hours prior to the dissection.
- The gall bladder stores the bile that is created by the liver, and bile promotes the digestion and absorption of fat, and improves feed utilisation. The bile appears dark green in the MA, and translucent yellow in the Control.

Although this was only a 30-day trial, we were optimistic that the Miiome™ Aqua Feed had a positive effect on the health of the Fourfinger Threadfin.

5 months later, after the Fourfinger Threadfins were harvested, we understand from Mr Ong that there has been a high demand for the farmed Fourfinger Threadfins due to its exceptional taste. These fish have been sold to Jurong Fishery Port as well as to customers who dine at his restaurant and later purchase the fish home for their consumption.

Typically, in fish farming, there will be some fingerlings which are slow growers and take a longer time to reach market size. After the first batch of Fourfinger Threadfins were harvested, Mr Ong was sceptical if the remaining Fourfinger Threadfins would make it to market size. His previous experience with the slow growing fingerlings was that they were not economical to farm as they take too long to reach market size. However, with the Miiome™ Aqua Feed, he has found that these slow growing fingerlings were able to reach market size in a reasonable time frame and were still profitable.

Smith Marine has continued to use Miiome™ Aqua Feed for other fish at the farm, such as Pomfrets and Red Snappers.



# CASE STUDY – SMITH MARINE



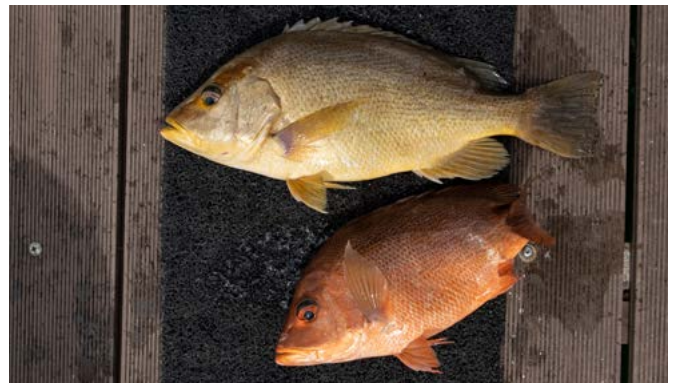
*Pomfrets being fed Miiome™ Aqua Feed at Smith Marine.*



*Mr Ong feeding the pomfrets.*



*Mr Ong holding a Red Snapper from his farm.*



*The colour of Red Snappers from two (2) farms are compared here. The snapper at the top is from another farm, the snapper at the bottom is from Mr Ong's farm which has developed a much darker red colour.*

In another 30-day trial with Red Snappers at Smith Marine, one cage of snappers was fed the original feed (“**Control**”) and another cage was fed the Miiome™ Aqua Feed (“**MA**”). The external physical appearance of the snappers from both cages was compared after 30 days and the following was observed.

- The snappers fed the MA had skin mucus which was consistently thicker across the whole fish. The colour of fish was also brighter and scales were more well-formed compared to the snappers fed with the Control.





# OUR CONTRIBUTION TO THE UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS



As one of the world's fastest growing food sectors, sustainable aquaculture is vital for achieving food security. Miiome™ Aqua Feed enables farmers to improve their yield of farmed fish through healthier fish and lower mortality rates.



LACTOSEAFOOD® fish are free from chemicals and antibiotics, richer in Omega-3 and contain 25% more essential fatty acids.



Many farmed fish species such as salmon require Omega-3s to help them grow. In the wild, they would get these naturally from their diet. Farmed fish are given this in their feed, which typically consists of fishmeal (ground fish) and fish oil. Producing this, however, is extremely resource intensive, with a third of the global fish stocks going toward making fish meal and fish oil. SEATOBAG®'s Miiome™ Aqua Feed aims to reduce the fishmeal content in our feeds without compromising the growth and health of the fish.



LACTOSEAFOOD® which is cleaned, processed and then coated with biocrobeX™ postbiotic enables the extension of the shelf life of the frozen fish for up to 2 years, while still retaining the flavour and freshness. Once the fish is frozen, it can be transported by road/sea instead of air which helps to reduce CO2 emissions from transportation or wastage of resources from fish spoiling.



The Miiome™ Aquaculture System is based on the principles of sustainable fish farming and ensures that the stocking density and growth conditions of the fish are optimal, allowing for lower mortality rates during harvesting.



SEATOBAG® works with various stakeholders, including non-governmental organisations, farm owners and government agencies to promote sustainable aquaculture approaches using our various solutions.

# PARTNERSHIPS FOR A SUSTAINABLE FUTURE

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## INNOVATION PARTNER FOR IMPACT (IPI) SINGAPORE

IPI provides enterprises with access to innovative ideas and technologies by facilitating and supporting enterprises' innovation processes, including commercialisation and go-to-market strategies. IPI curates numerous enabling technologies available for licensing and commercialisation across different industries and domains. SEATOBAG® Miiome™ Aqua Feed is listed on IPI as a Tech Offer and is recognised as a Technology Readiness Level 8 innovation where it is considered a "complete and qualified system" that has gone through prototype demonstration in an operational environment.



## WWF-MALAYSIA

SEATOBAG®'s partner farm in Kukup is recognised by WWF-Malaysia as an Aquaculture Improvement Project ("AIP") partner. The AIP is a partnership between WWF-Malaysia and the aquaculture industry to produce more responsible and sustainable seafood. The objective of AIP is to help aquaculture producers in improving their practices to become greener as well as more socially responsible while ensuring their business continue to thrive through improved management and environmental quality.

It helps farms to take steps toward responsible production of farmed seafood and eventually to achieve Aquaculture Stewardship Council (ASC) certification. The AIP also serves as a tool to improve farm performance in terms of management, biodiversity conservation and also social responsibility.



There are currently 7 AIP farms in Malaysia under this programme and SEATOBAG®'s partner farm in Kukup is one of them. The farm is also partnering with WWF-Malaysia for a pilot project to showcase proof of feasibility for offshore high density polyethylene ("HDPE") modern aquaculture system, innovative feed technologies and implementation of best aquaculture practices and adoption of Malaysian Good Agricultural Practices (MyGAP). LACTOSEAFOOD® products were officially recognised as AIP products effective 26 January 2022.

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# OUR BUSINESS

## ECONOMIC PERFORMANCE

SEATOBAG® was established in 2018 and the feed manufacturing plant was started in Singapore in June 2021. While most of the setting up expenses had been defrayed by the founding shareholders, the founding shareholders have been prudent in expending in its operations. The revenue for FY2021 was S\$227,432. SEATOBAG® is committed to drive revenue and earnings as she rolls out expansion plans in the feed manufacturing and trading, marketing and distribution segments.

FYE 31 DEC (S\$)	FP2020 (OCT-DEC)	FY2021
Revenue	17,882	227,432
Gross profit	3,177	50,367
Net (loss) / profit	1,733	(619,462)

## BUSINESS ETHICS

SEATOBAG® supports the Ten Principles of the United Nations Global Compact, and formally joined as a participant in September 2021. The UN Global Compact provides a universal management framework for sustainable development that will help SEATOBAG®'s long term strategy and also to set out broad guidelines on human rights, labour, environment and anti-corruption practices. The Company has in place policies and practices in place for business ethics, covering anti-corruption and bribery, as well as gifts and entertainment policy for all employees. These policies are part of the orientation materials shared with all new employees who join the Company.

## COMPLIANCE

### GRI 307-1, GRI 419-1

Responsible business starts with compliance. We take steps to ensure that all our activities adhere to relevant laws, regulations and ethical standards. This also helps us to protect our reputation as an employer and business partner. We have stringent requirements for effective compliance management and seek to emphasize compliance by acting in line with our company values. In addition to ensuring that the Code of Conduct, various policies and procedures governing business ethics, environmental performance and health and safety are communicated to all employees, we also maintain clear roles and responsibilities for all employees. We continuously review our compliance requirements and update our

initiatives and programs where necessary. This approach reflects new requirements as well as internal and external risks, such as those resulting from amendments to legislation, relevant industry codes or changes affecting our company. In FY2021, there were no cases of significant fines or non-monetary sanctions in the social, economic area, and environmental area.



*Laboratory Test Reports (Certificates of Analysis) for our Miiome™ Aqua Feed have been carried out to confirm that it does not contain heavy metals, antibiotics, toxins or pathogens which would otherwise be toxic to the fish or accumulate in the body of the fish over time.*



*Laboratory Test Reports (Certificate of Analysis) have also been done for the biocrobeX™ postbiotic to show that it is safe for human consumption.*



# OUR BUSINESS

## FOOD SAFETY GRI 416-2

It is important that the aquaculture feed and food industry ensure that the aquaculture food produce reaching the consumer is safe and wholesome. biocrobeX™, our proprietary postbiotic which is applied to LACTOSEAFOOD® and the Miiiome™ Aqua Feed, has been put through various laboratory tests to ensure that it is safe for human consumption, and that it does not contain any harmful microorganisms, heavy metals or banned substances. We have also engaged independent laboratories to conduct detailed tests on the Miiiome™ Aqua Feed to ensure that it does not contain heavy metals, antibiotics, toxins or pathogens which would otherwise be toxic to the fish or accumulate in the body of the fish over time. In FY2021, we have not received any cases of recall for LACTOSEAFOOD® or Miiiome™ Aqua Feed.

The following certificates and test report are available for review in the Appendix section (Pg. 33 to 38)

- Certificate of Analysis of LACTOSEAFOOD® fourfinger threadfin to show that it does not contain pathogenic microorganisms. This test was done at 26 months on a frozen fish sample.
- Laboratory Test Reports (Certificates of Analysis) for our Miiiome™ Aqua Feed to show that it does not contain heavy metals, antibiotics, toxins or pathogens which would otherwise be toxic to the fish or accumulate in the body of the fish over time.
- Laboratory Test Reports (Certificate of Analysis) for the biocrobeX™ postbiotic to show that it does not contain pathogenic microorganisms and is safe for consumption.

## RESEARCH & DEVELOPMENT

SEATOBAG® takes a strict, consistent approach against intellectual property (IP) infringements. At the same time, we respect the intellectual property rights of others. We have in place clear rules to ensure that our products do not infringe on rights held by others. We also conduct thorough searches of third-party patents to prevent use of intellectual property held by others without permission. Such searches of third-party rights are carried out at all stages, from R&D onward up to final product stage. The organisational structure of the IP divisions of SEATOBAG® include the Head Office IP Division, which is the direct responsibility of the managing director, and the IP divisions at the R&D centre & Laboratory.

To protect our IP, we have implemented procedures to restrict physical access to our facilities as well as restricted electronic access to information stored on our servers. All new employees are also required to read and acknowledge our IP Protection Policy in the Company's Code of Conduct.

# OUR ENVIRONMENT

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## ENERGY AND EMISSIONS

**GRI 302-1, GRI 305-1, GRI 305-2**

Feed, more specifically the production and processing of raw materials, represents the largest component of the carbon footprint of farmed seafood prior to transport to the end consumer. The amounts of feed needed to grow the animals, along with their welfare, health, mortalities and feed management all contribute to the total carbon footprint. Fish quality and processing yields also impact significantly on the carbon footprint.

Within our feed mill, we are working to reduce our greenhouse gas ("GHG") emissions through energy efficiency schemes, which will also help to reduce costs. Our feed mill started operations in 2021 and we are monitoring our energy consumption so as to have a better understanding of our baseline emissions. At the same time, we are conscious of the emissions attributable to suppliers in our supply chain where we procure our raw materials, and thus we aim to partner with suppliers who are located within the South East Asia region to reduce the need for long distance freight.

In FY2021, all our energy consumed was all from electricity use, which was a total of 18,054 kWh. 62% of the electricity consumption is attributable to the lab, while approximately 30% is used by the office, and the feed manufacturing process utilises about 8% of the total electricity consumption. We do not use any fuel in our operations. Our total GHG emissions in FY201, all of which was Scope 2 emissions, was 2,065 kgCO<sub>2</sub>e.

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## WATER

**GRI 303-3**

Water consumed in our operations in FY2021 amounted to 137m<sup>3</sup>, 69% of which was used by the office, 19% by the lab and 12% by the feed manufacturing process. All the water consumed is withdrawn from municipal water. We are aware of the importance to conserve water, which is a precious resource for Singapore. Some of the initiatives we have in place to minimise our use of water include:

- Implement guidelines set by the Public Utilities Board to avoid excess use of water;
  - Install water-saving devices for washbasins and plumbing systems;
  - Regularly check water consumption to find water leakage early.
- 

## WASTE

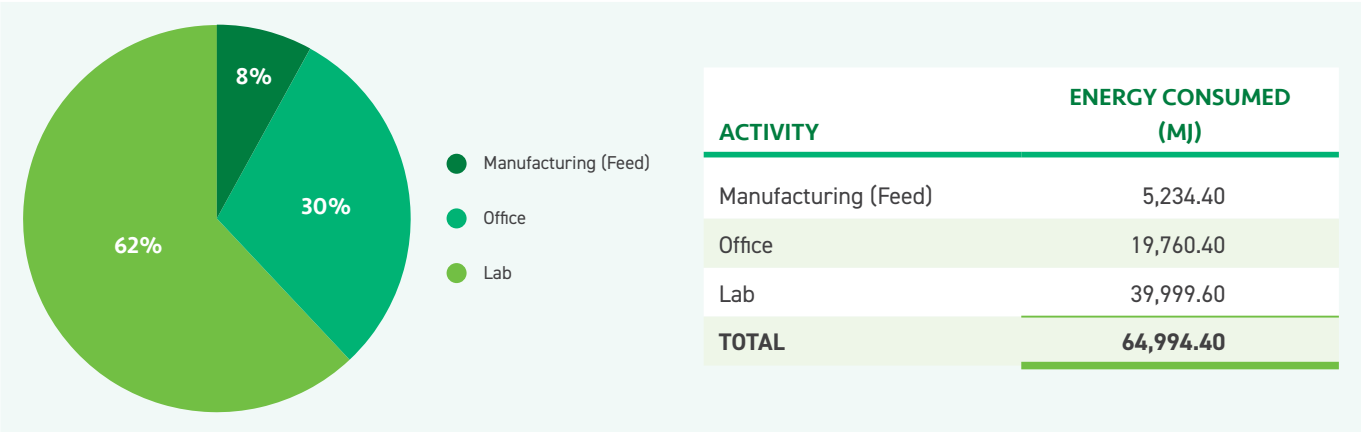
**GRI 306-1, GRI 306-3**

At SEATOBAG®, we are working to reduce waste by reducing, reusing and recycling resources in our feed mill, office and laboratory, for example, product packaging boxes, cartons and other plastics. The total amount of waste disposed in FY2021 was 50.68kg, majority of which was generated from our office activities. All the waste generated was non-hazardous waste and disposed by licensed waste vendors engaged by the building owner.

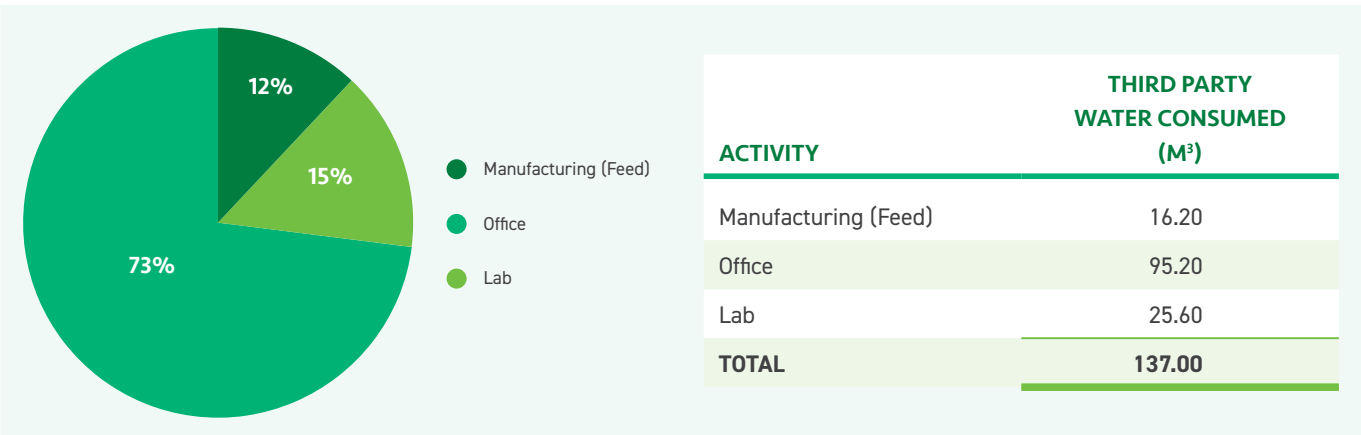
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# OUR ENVIRONMENT

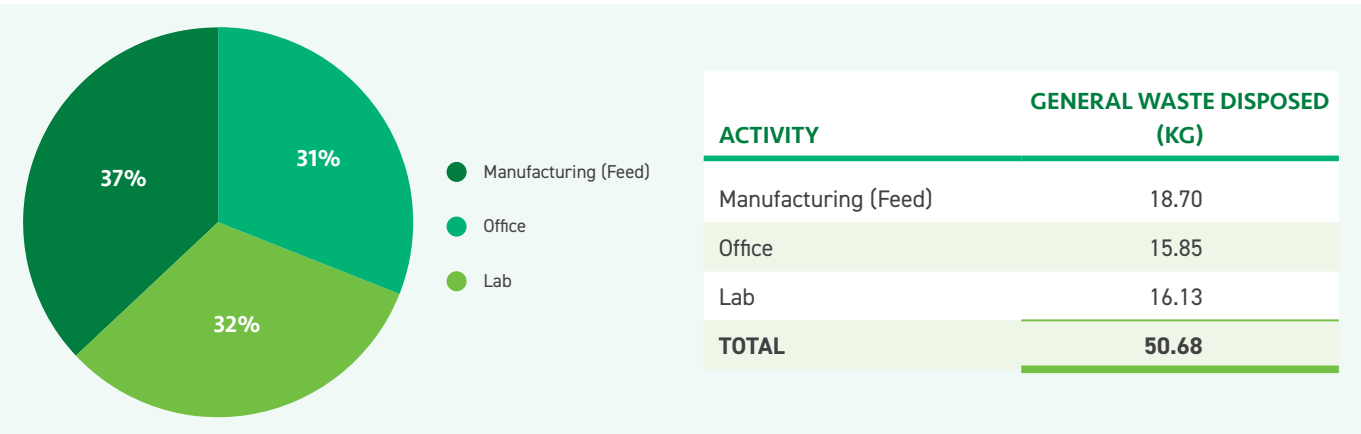
## NON-RENEWABLE ENERGY CONSUMED



## WATER CONSUMPTION



## WASTE DISPOSAL (GENERAL WASTE)





# OUR PEOPLE

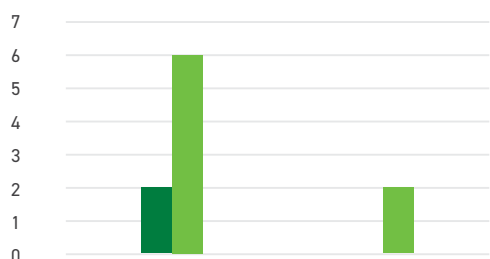
## EMPLOYEE HIRING AND TURNOVER GRI 401-1

The way we treat our employees is fundamental to the way we want to do business, and our employees are essential to the success of SEATOBAG®. This begins with ensuring respect for internationally recognised human rights and labour standards in all our workplaces. We are committed to ensure that all our employees will be treated fairly in a safe and healthy working environment, and we strive to create a working environment where each employee feels valued and can prosper. We operate in accordance with international frameworks and conventions from the UN, ILO, as well as in compliance with local legislation where we operate. The COVID-19 pandemic did not lead to any SEATOBAG® employee losing their job. All new employees are provided with our Employee Handbook, which includes details on the company's policies and procedures related to employment benefits, company regulations as well as code of business conduct. We have clear

policies in place stating that we do not accept discrimination, and we have a whistleblower system with a range of options for our employees to communicate grievances.

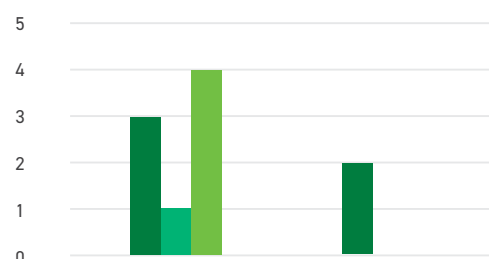
In FY2021, we had a total of eight (8) new hires bringing our total staff strength to nine (9) persons. We hire based on merit and skills across different age groups, and believe that age diversity is important in the workplace as each generation brings with them unique skillsets and helps to strengthen the company as a whole. Hiring older workers also provides us with traditional skills that help to reach different types of customers more effectively. In FY2021, 37.5% of our new hires were under 30 years old, 12.5% were between 30-50 years old and 50% were above 50 years old. 67% of our employees also comprise of females, and females make up 25% of our senior management roles.

NO. OF NEW HIRES & RESIGNATION BY GENDER



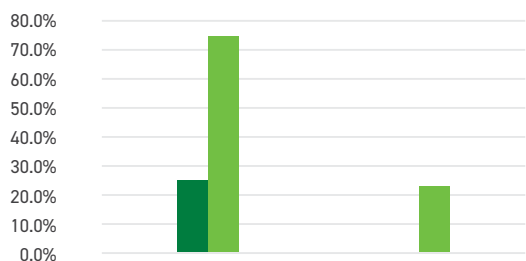
	NO. OF NEW HIRES	NO. OF EMPLOYEES WHO RESIGNED
● Male	2	0
● Female	6	2

NO. OF NEW HIRES & RESIGNATION BY AGE GROUP



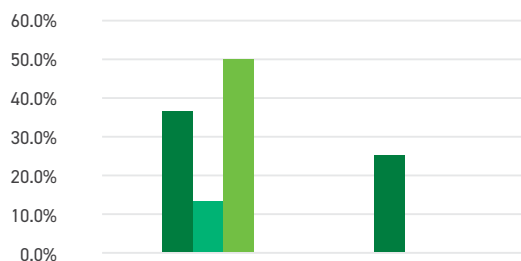
	NO. OF NEW HIRES	NO. OF EMPLOYEES WHO RESIGNED
● Under 30 years old	3	2
● 30-50 years old	1	0
● Over 50 years old	4	0

HIRING & TURNOVER RATE BY GENDER



	HIRING RATE	TURNOVER RATE
● Male	25.0%	0.0%
● Female	75.0%	25.0%

HIRING & TURNOVER RATE BY AGE GROUP



	HIRING RATE	TURNOVER RATE
● Under 30 years old	37.5%	25.0%
● 30-50 years old	12.5%	0.0%
● Over 50 years old	50.0%	0.0%

# OUR PEOPLE

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## TRAINING AND EDUCATION

### GRI 404-1

We have achieved a total of 22 training hours in 2021, which is approximately 2.4 hours per employee. The training programs covered sustainability related topics such as carbon reduction, which were attended by management staff as well courses on software programs, customs declaration or accounting tools which were attended by executive staff.





# ABOUT THIS REPORT



This FY2021 Sustainability Report ("**Report**") is SEATOBAG®'s inaugural report and describes the sustainability initiatives and performance for Seatobag Pte Ltd ("**SEATOBAG®**"). This Report has been prepared with reference to the GRI Standards. We have chosen the GRI Standards as a reporting framework as it is a well-known and globally-recognised sustainability reporting standard. We also referenced the United Nations 2030 Agenda for Sustainable Development and used the United Nations Sustainable Development Goals ("**UN SDG**") to report on our sustainability performance.

This Report is published annually and covers the same period as the financial year of the Company (1 January to 31 December). As our operations only started in April 2021, 9 months of data is reported for our sustainability performance. This Report provides us with a valuable opportunity to engage our stakeholders and respond to issues that matter most to them and to our business. The Report is currently not externally assured but we may consider external assurance in the future.

We welcome comments and feedback on our sustainability report at [sustainability@seatobag.com](mailto:sustainability@seatobag.com)





# SUSTAINABILITY MANAGEMENT

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## STAKEHOLDER MANAGEMENT

Our key stakeholders are suppliers, customers, non-governmental organisations (NGOs), industry associations and local authorities. We meet and communicate with our various stakeholders on a regular basis and information from these discussions is fed back into the organisation at different levels as required. This enables us to proactively work to meet stakeholder expectations and also to ensure our policies and practices are aligned to internationally recognised standards for sustainable aquaculture.

## MEMBERSHIP IN ASSOCIATIONS

In addition to engaging our stakeholders, we participate as members of various organisations, including:

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### UNITED NATIONS (UN) GLOBAL COMPACT

Since 2021, SEATOBAG® has been committed to the UN Global Compact corporate responsibility initiative and its principles in the areas of human rights, labour, the environment, and anti-corruption.

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### CARBON PRICING LEADERSHIP COALITION (CPLC) SINGAPORE

SEATOBAG® has been recognised as a LowCarbonSG participating company by Carbon Pricing Leadership Coalition ("CPLC") Singapore for successfully measuring and monitoring our carbon emissions.

LowCarbonSG is a capability-building programme to enable local businesses in Singapore to start monitoring and where possible, reduce their carbon emissions. CPLC Singapore is the decarbonisation arm of the Global Compact Network Singapore ("GCNS"), and the LowCarbonSG programme is supported by the National Environment Agency ("NEA") and Enterprise Singapore ("ESG").

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## MATERIALITY

SEATOBAG® conducted our first materiality assessment in 2021 through an internal review based on inputs from stakeholders, scientific information, management considerations and our sustainability performance. The UN Global Compact's Sustainable Ocean Principles and the United Nations High Level Panel for a Sustainable Ocean Economy were also reviewed for aquaculture focused material topics. Our leadership team is involved in determining the matrix, which guides our focus and sets our priorities from year to year. The material topics have been prioritised based on perceived importance to our external stakeholders and significance of the topics to SEATOBAG®. Our sustainability performance on these material topics has been described under three sustainability focus areas in our Report: Our Business, Our Environment and Our People.

Sustainability reporting against our material topics is currently carried out internally on a monthly, quarterly or annual basis, depending on the topic and data types, across all our operational facilities. External reporting is annual, through our Sustainability Report, based on these data. Our Managing Director and Communications Manager oversee and interpret the data and also communicate regularly with appropriate business leads and functional team leaders to ensure everyone is aligned to the same goals.

# SUSTAINABILITY MANAGEMENT

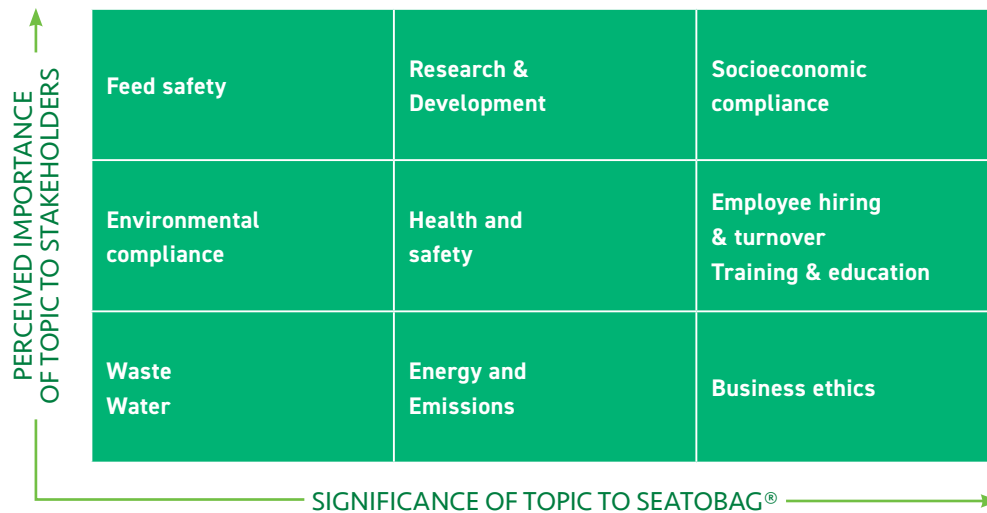


Figure 6. SEATO BAG® materiality matrix

SUSTAINABILITY FOCUS AREA	MATERIAL TOPIC	RELEVANT GRI STANDARD
Our Business	Economic performance	–
	Socioeconomic compliance	GRI 419
	Environmental compliance	GRI 307
	Research & development	–
	Feed safety	GRI 416
	Business ethics	–
Our Environment	Energy and Emissions	GRI 302, GRI 305
	Waste	GRI 306
	Water	GRI 303
Our People	Employee hiring & turnover	GRI 401
	Training & education	GRI 404
	Health and safety	GRI 403

Table 4. Our Focus Areas and Material Topics



# GRI

## CONTENT INDEX

GRI STANDARD	DISCLOSURE		PAGE NO.	OMISSION
<b>GRI 102: General Disclosures 2016</b>	102-1	Name of the organization	2	
	102-2	Activities, brands, products, and services	2	
	102-3	Location of headquarters	2	
	102-4	Location of operations	2	
	102-5	Ownership and legal form	2	
	102-6	Markets served	2	
	102-7	Scale of the organization	2	
	102-8	Information on employees and other workers	25	
	102-12	External initiatives	20	
	102-13	Membership of associations	28	
	102-14	Statement from senior decision-maker	1	
	102-16	Values, principles, standards, and norms of behaviour	(behind cover page)	
	102-40	List of stakeholder groups	28	
	102-42	Identifying and selecting stakeholders	28	
	102-43	Approach to stakeholder engagement	28	
	102-44	Key topics and concerns raised	29	
	102-45	Entities included in the consolidated financial statements	27	
	102-46	Defining report content and topic Boundaries	27	
	102-47	List of material topics	29	
	102-48	Restatements of information	None	
	102-49	Changes in reporting	None	
	102-50	Reporting period	27	
	102-51	Date of most recent report	30 May 2022	
	102-52	Reporting cycle	Annual	
	102-53	Contact point for questions regarding the report	27	
	102-54	Claims of reporting in accordance with the GRI Standards	27	
	102-55	GRI content index	30-32	
	102-56	External assurance	None	
<b>Energy</b>				
<b>GRI 103: Management Approach 2016</b>	103-1	Explanation of the material topic and its Boundary	23-24	
	103-2	The management approach and its components	23-24	
	103-3	Evaluation of the management approach	23-24	
<b>GRI 302: Energy 2016</b>	302-1	Energy consumption within the organization	23-24	



# GRI

## CONTENT INDEX

GRI STANDARD	DISCLOSURE		PAGE NO.	OMISSION
Emissions				
GRI 103: Management Approach 2016	103-1	Explanation of the material topic and its Boundary	23-24	
	103-2	The management approach and its components	23-24	
	103-3	Evaluation of the management approach	23-24	
GRI 305: Emissions 2016	305-1	Direct (Scope 1) GHG emissions	23-24	
	305-2	Energy indirect (Scope 2) GHG emissions	23-24	
Environmental Compliance				
GRI 103: Management Approach 2016	103-1	Explanation of the material topic and its Boundary	21	
	103-2	The management approach and its components	21	
	103-3	Evaluation of the management approach	21	
GRI 307: Environmental Compliance 2016	307-1	Non-compliance with environmental laws and regulations	21	
Water and Effluents				
GRI 103: Management Approach 2016	103-1	Explanation of the material topic and its Boundary	23-24	
	103-2	The management approach and its components	23-24	
	103-3	Evaluation of the management approach	23-24	
GRI 303: Water and Effluents 2018	303-3	Water withdrawal	23-24	
Waste				
GRI 103: Management Approach 2016	103-1	Explanation of the material topic and its Boundary	23-24	
	103-2	The management approach and its components	23-24	
	103-3	Evaluation of the management approach	23-24	
GRI 306: Waste 2020	306-1	Waste generation and significant waste-related impacts	23-24	
	306-2	Management of significant waste-related impacts	5	
	306-3	Waste generated	23-24	
Employment				
GRI 103: Management Approach 2016	103-1	Explanation of the material topic and its Boundary	25	
	103-2	The management approach and its components	25	
	103-3	Evaluation of the management approach	25	
GRI 401: Employment 2016	401-1	New employees hires and employee turnover	25	
Training and Education				
GRI 103: Management Approach 2016	103-1	Explanation of the material topic and its Boundary	26	
	103-2	The management approach and its components	26	
	103-3	Evaluation of the management approach	26	
GRI 404: Training and Education	404-1	Average hours of training per year per employee	26	

# GRI

## CONTENT INDEX

GRI STANDARD	DISCLOSURE		PAGE NO.	OMISSION
Feed Safety				
GRI 103: Management Approach 2016	103-1	Explanation of the material topic and its Boundary	22	
	103-2	The management approach and its components	22	
	103-3	Evaluation of the management approach	22	
GRI 416: Customer Health and Safety 2016	416-2	Incidents of non-compliance concerning the health and safety impacts of products and services	22	
Socioeconomic Compliance				
GRI 103: Management Approach 2016	103-1	Explanation of the material topic and its Boundary	21	
	103-2	The management approach and its components	21	
	103-3	Evaluation of the management approach	21	
GRI 419: Socioeconomic Compliance 2016	419-1	Non-compliance with laws and regulations in the social and economic area	21	

# APPENDIX

## 1. CERTIFICATE OF ANALYSIS OF LACTOSEAFOOD® FOURFINGER THREADFIN

This test was done at 26 months on a frozen fish sample to show that it does not contain pathogenic microorganisms.



### Certificate of Analysis

Lab Ref No.: JL2112-B02726

SN: RS4309622151128239

Page 1 / 1

Dewelli Mohd Amin  
Microbiologist  
Food Analyst No: MJMM0327  
AN1: RA6196358074768640

**KUKUPFRESH SEAFOOD SDN. BHD.**  
NO. 26, JALAN ZAMRUD 2  
PUSAT PERNIAGAAN KUKUP  
82300 KUKUP JOHOR  
MALAYSIA

Date of Issue: 2022-01-17  
Date of Received: 2021-12-27  
Date of Completion: 2022-01-17

Sample Marking: LACTOSEAFOOD® Four Finger Threadfin (Mfg Date : 08/10/2019)  
(Real Time 26 months)

ND denotes as Not Detected

Test Description	Unit	Result(s)	Method or Equipment Used
Total Plate Count	cfu/g	1.9x10 <sup>3</sup>	FDA-BAM Chapter 3
E.Coli (Multiple Tube Method)	MPN/g	ND<3	FDA-BAM Chapter 4
Staphylococcus aureus (Direct Plate)	cfu/g	ND<10	FDA-BAM Chapter 12
Salmonella	in 25g	Absent	FDA-BAM Chapter 5
Vibrio Parahaemolyticus	MPN/g	ND<3	FDA-BAM Chapter 9

### – END OF REPORT –

The above result(s) based on sample submitted. We shall not be responsible or liable for any damages or losses arising thereof.

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COA Authentication



# APPENDIX

## 2. LABORATORY TEST REPORTS (CERTIFICATES OF ANALYSIS) FOR Miihome™ AQUA FEED

To show that it does not contain heavy metals, antibiotics, toxins or pathogens which would otherwise be toxic to the fish or accumulate in the body of the fish over time.





### Certificate of Analysis

Lab Ref No.: SL2111-A01335

SN: RS8147520177737713

Page 1 / 3

  
Dr. Woe Fong Yen  
Chemist  
IKM No.: M/4531/7510/16  
AN1: RA1183442097401785

  
Dewelli Mohd Amin  
Microbiologist  
AN2: RA1181701892919029

SEATOBAG PTE. LTD.  
7 GAMBAS CRESCENT  
#04-11  
ARK@GAMBAS  
757087 Singapore  
Singapore

Date of Issue: 2021-11-26  
Date of Received: 2021-11-12  
Date of Completion: 2021-11-26

Sample Marking: Miihome Aqua Feed (M03, M04, M05, M06, M07, M08, M09)

ND denotes as Not Detected

Test Description	Unit	Result(s)	Method or Equipment Used
Cadmium	mg/kg	0.5	MY/STP/264 based on AOAC 999.11, 20th edition
Mercury	mg/kg	ND<0.01	MY/STP/023 based on AOAC 971.21, 20th edition
Arsenic	mg/kg	ND<0.1	MY/STP/025 based on AOAC 971.21, 20th edition
Lead	mg/kg	0.2	MY/STP/264 based on AOAC 999.11, 20th edition
Salmonella	in 25g	Absent	FDA-BAM Chapter 5
Malachite Green++*	ppb	ND<1.0	LCMS/MS
Leucomalachite Green*	ppb	ND<1.0	LCMS/MS
Steroid*		Negative	BP 2007
Total Aflatoxin(B1,B2,G1,G2)++	ppb	ND<0.1	AOAC 990.33, 17th Ed (by HPLC)
Aflatoxin B1++	ppb	ND<0.1	AOAC 990.33, 17th Ed (by HPLC)
Aflatoxin B2++	ppb	ND<0.1	AOAC 990.33, 17th Ed (by HPLC)
Aflatoxin G1++	ppb	ND<0.1	AOAC 990.33, 17th Ed (by HPLC)
Aflatoxin G2++	ppb	ND<0.1	AOAC 990.33, 17th Ed (by HPLC)

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COA Authentication

# APPENDIX



## Certificate of Analysis

Lab Ref No.: SL2111-A01335

SN: RS8147520177737713

Page 2 / 3

Dr. Woo Fong Yen  
Chemist  
IKM No.: M4531/7510/16  
AN1: RA1183442097401785

*Dewelli Mohd Amin*  
Dewelli Mohd Amin  
Microbiologist  
AN2: RA1181701892919029

Test Description	Unit	Result(s)	Method or Equipment Used
Melamine++	ppb	ND<5.0	In-house Method, MY/STP/184 based on FDA LIB No 4421, Vol 24 (2008)
Pork Origin Identification++		Negative	In house method MY/STP/261, based on real time PCR
Dioxin/Furan (PCDD/PCDF)+++	ppt	ND<2.5	Enzyme-linked Immunosorbent (ELISA) Assay
Ethoxyquin*	ppm	0.9	HPLC method
Phosphate (as PO4)++	%w/w	2.0	AOAC 965.17 17th Ed
Nitrofurantoin (AHD)++	ppb	ND<0.06	In House Method MY/STP/370 Based On Agilent Application Notes: ESI LC/MS/MS
Nitrofurantoin (AOZ)++	ppb	ND<0.06	In House Method MY/STP/370 Based On Agilent Application Notes: ESI LC/MS/MS
Nitrofurantoin (AMOX)++	ppb	ND<0.04	In House Method MY/STP/370 Based On Agilent Application Notes: ESI LC/MS/MS
Nitrofurantoin (SEM)++	ppb	ND<0.02	In House Method MY/STP/370 Based On Agilent Application Notes: ESI LC/MS/MS
Clenbuterol++	ppb	ND<1.0	In house method based MY/STP/144 based on Direct Competitive Elisa Method
Biotinylated++	ppb	ND<1.0	In house method based MY/STP/144 based on Direct Competitive Elisa Method
Carbuterol++	ppb	ND<1.0	In house method based MY/STP/144 based on Direct Competitive Elisa Method
Salbutamol++	ppb	ND<1.0	In house method based MY/STP/144 based on Direct Competitive Elisa Method
Cimbuterol++	ppb	ND<1.0	In house method based MY/STP/144 based on Direct Competitive Elisa Method

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COA Authentication

# APPENDIX



**MY CO2 (PG) SDN BHD** | SAMM No. 384  
201701000001000004-01

**MY CO2 (KL) SDN BHD** | SAMM No. 564  
201701000001000004-01

**MY CO2 (UB) SDN BHD** | SAMM No. 752  
201701000001000004-01



**MY CO2 (PG) SDN BHD** | SAMM No. 384  
201701000001000004-01

**MY CO2 (KL) SDN BHD** | SAMM No. 564  
201701000001000004-01

**MY CO2 (UB) SDN BHD** | SAMM No. 752  
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201701000001000004-01

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201701000001000004-01

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201701000001000004-01



**MY CO2 (PG) SDN BHD** | SAMM No. 384  
201701000001000004-01

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201701000001000004-01

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**MY CO2 (PG) SDN BHD** | SAMM No. 384  
201701000001000004-01

**MY CO2 (KL) SDN BHD** | SAMM No. 564  
201701000001000004-01

**MY CO2 (UB) SDN BHD** | SAMM No. 752  
201701000001000004-01

16, Lengkok Kikik 1, Taman Inderawasih, 13600 Perai, Penang, Malaysia. T: 04-380 8282 F: 04-380 8260  
40, Jalan Sepadu 825/B, 40400 Shah Alam, Selangor, Malaysia. T: 03-5122 3366 F: 03-5122 3386  
15, Jalan Molek 1/8, Taman Molek, 81100 Johor Bahru, Johor, Malaysia. T: 07-355 8811 F: 07-355 9808

enquiry@myco2.com.my www.myco2.com.my


## Certificate of Analysis

Lab Ref No.: SL2111-A01335

SN: RS8147520177737713

Page 3 / 3

Dr. Woo Fong Yen  
Chemist  
IKM No.: M/4531/7510/16  
AN1: RA1183442097401785

  
Dewelli Mohd Amin  
Microbiologist  
AN2: RA1181701892919029

Test Description	Unit	Result(s)	Method or Equipment Used
Mabuterol++	ppb	ND<1.0	In house method based MY/STP/144 based on Direct Competitive Elisa Method
Terbutaline++	ppb	ND<1.0	In house method based MY/STP/144 based on Direct Competitive Elisa Method
Bromobuterol++	ppb	ND<1.0	In house method based MY/STP/144 based on Direct Competitive Elisa Method
Timolol++	ppb	ND<1.0	In house method based MY/STP/144 based on Direct Competitive Elisa Method
Chloramphenicol++	ppb	ND<0.08	In House Method MY/STP/369 based on Agilent Application Note: Analysis of Chloramphenicol by Negative Ion Electrospray LC/MS/MS
Ampicillin++*	ppb	ND<1.0	LCMS/MS
Streptomycin*	ppb	ND<1.0	LCMS/MS
Tetracycline*	ppb	ND<1.0	LCMS/MS

– END OF REPORT –

The above result(s) based on sample submitted. We shall not be responsible or liable for any damages or losses arising thereof.







# APPENDIX

## 3. LABORATORY TEST REPORTS (CERTIFICATE OF ANALYSIS) FOR biocrobeX™ POSTBIOTIC

Samples were tested at 0 months and 6 months to show that it does not contain pathogenic microorganisms and is safe for consumption.

**CERTIFICATE OF ANALYSIS**

Our Reference: 135984-149765/21

**Report Date:** 13 November 2021

**Name of Company:** Seatobag Pte Ltd

**Address:** 7 Gambas Crescent #04-11 Ark @ Gambas

Singapore 757087

**Attention:** Ms Savane Teo

**Date Received:** 9 November 2021

**Sample Description:** Sample(s) was received in centrifuge tube with the following marking:  
biocrobeX - Shell Life Testing - 0 month Production Date: 29/10/21


**RESULTS:** On analysis, the following results were obtained:

Test Parameter(s)	Test Method(s)	Test Result(s)	Specification
Total Enterobacteriaceae Count	(Compendium of Methods for the Microbiological Examination of Foods 5th Edition Chapter 9)	<10 CFU/g	<10 000 CFU/g
Total Escherichia coli Count	(FDA-BAM Online Manual, Chapter 4, July 2017)	<10 CFU/g	<100 CFU/g
Coagulase Positive Staphylococcus Aureus	(FDA-BAM Online Manual, Chapter 12, March 2016)	<10 CFU/g	<100 CFU/g
Bacillus Cereus	(FDA-BAM, Chapter 14, February 2012)	<100 CFU/g	<200 CFU/g
Salmonella Spp.	(FDA-BAM Online Manual, Chapter 5, July 2018)	Not Detected per 25g	Not Detected per 25g
Clostridium perfringens	(ISO 7937:2004)	<10 CFU/g	<100 CFU/g

CFU = Colony Forming Unit      MPN = Most Probable Number

**Remarks:** The above results are based on sample(s) submitted.  
Sample(s) tested on the date of receipt, unless otherwise stated.  
Specification is taken from Sale of Food Act (CAP 283) Food (Amendment) Regulations 2020.

Ugene Laboratory Services Pte Ltd

  
Eunice Ng  
Technical Director

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This report must not be used for advertising purposes.  
The results reported herein have been performed in accordance with the laboratory's terms of accreditation under the Singapore Accreditation Council - Singapore Laboratory Accreditation Scheme.

# APPENDIX



UGENE LABORATORY  
SERVICES PTE LTD



## CERTIFICATE OF ANALYSIS

Our Reference: 36670-41543/22

**Report Date:** 5 May 2022  
**Name of Company:** Seatobag Pte Ltd  
**Address:** 7 Gambas Crescent #04-11 Ark @ Gambas  
 Singapore 757087  
**Attention:** Savane Teo  
**Date Received:** 28 April 2022  
**Sample Description:** #Name?  
 birobeX - Shelf Life Testing - 6 month Production Date: 29/10/21

**RESULTS:** On analysis, the following results were obtained:

Test Parameter(s)	Test Method(s)	Test Result(s)	Specification
Total Enterobacteriaceae Count	(Compendium of Methods for the Microbiological Examination of Foods 5th Edition Chapter 9)	<10 CFU/g	<10 000 CFU/g
Total Escherichia coli Count	(FDA-BAM Online Manual, Chapter 4, July 2017)	<10 CFU/g	<100 CFU/g
Coagulase Positive Staphylococcus Aureus	(FDA-BAM Online Manual, Chapter 12, March 2016)	<10 CFU/g	<100 CFU/g
Bacillus Cereus	(FDA-BAM, Chapter 14, February 2012)	<100 CFU/g	<200 CFU/g
Salmonella Spp.	(FDA-BAM Online Manual, Chapter 5, July 2018)	Not Detected per 25g	Not Detected per 25g
Clostridium perfringens	(ISO 7937:2004)	<10 CFU/g	<100 CFU/g

CFU = Colony Forming Unit

MPN = Most Probable Number

Remarks: The above results are based on sample(s) submitted.

Sample(s) tested on the date of receipt, unless otherwise stated.

Specification is taken from Sale of Food Act (CAP 283) Food (Amendment) Regulations 2020.

Ugene Laboratory Services Pte Ltd

Eunice Ng  
Technical Director

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21 Woodlands Industrial Park E1 • #04-08 Singapore 757720 • Tel : 6368 6625 • Fax : 6368 7150  
 Email : ugenelab@singnet.com.sg • Registration No.: 199707886G

Professional Service with a Personal Touch

Page 1 of 1







**SEATOBAG PTE LTD**

No.7 Gambas Crescent  
#04-11 Ark@Gambas  
Singapore 757087  
<https://www.seatobag.com>