
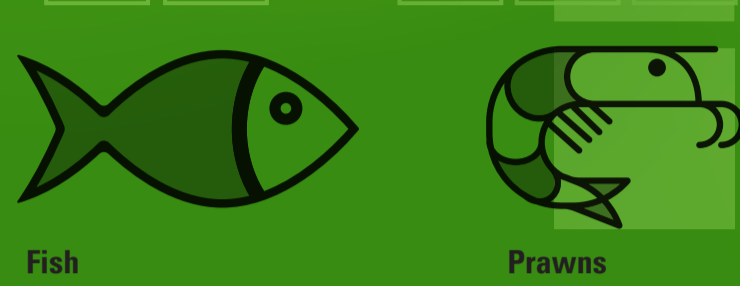
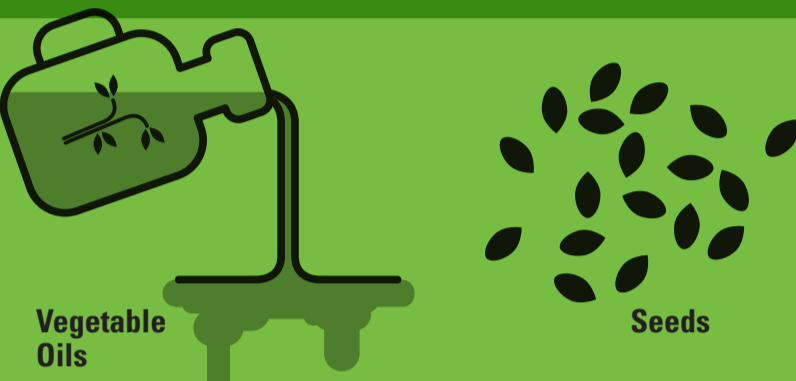
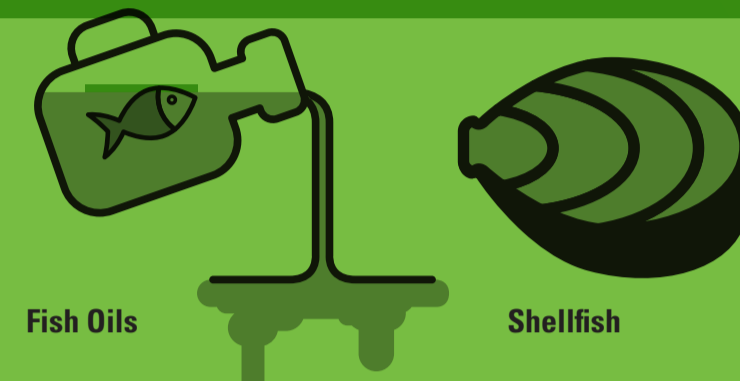




WHAT ARE OMEGA-3s AND WHY DO THEY MATTER?

Omega-3 fatty acids are considered necessary for optimum human health. We cannot make these critical nutrients, so we must consume them in the foods we eat. Currently the main source of the healthiest omega-3 oils is marine animals, however as demand is increasing around the world, supply sustainability is being challenged.

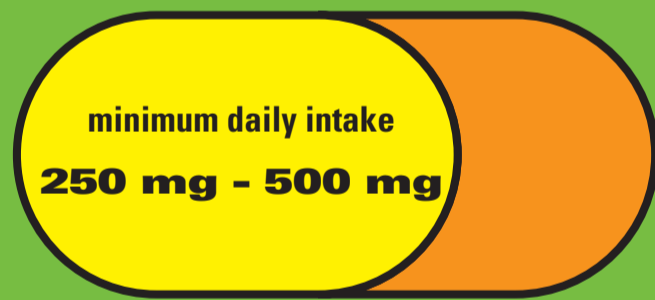
What are omega-3s?

Omega-3s are polyunsaturated fatty acids. The terms long- and short-chain refer to the length of the carbon chains in each type of omega-3. Our bodies need the longer-chain omega-3s (generally found in fish, marine animals and algae) to achieve the most significant health benefits. While we can convert short-chain omega-3s (found in some nuts, seeds and vegetable oils) to the longer versions, the process is very inefficient. Consuming more long-chain omega-3s provides maximum health outcomes.

Short-chain omega-3	Long-chain omega-3
 <p>Nuts Eggs</p>	 <p>Fish Prawns</p>
 <p>Vegetable Oils Seeds</p>	 <p>Fish Oils Shellfish</p>
<p>Short-chain omega-3</p> <ul style="list-style-type: none"> ALA (alpha-linolenic acid) Found in some nuts, seeds and vegetable oils Limited ability for humans to convert these to the long-chain fatty acids required for maximum health outcomes 	<p>Long-chain omega-3</p> <ul style="list-style-type: none"> EPA (eicosapentaenoic acid) DHA (docosahexaenoic acid) Found in fish and other marine animals Available as supplements or added to foods Efficient uptake and utilization by humans providing maximum health benefits
	

The health benefits of long-chain omega-3s

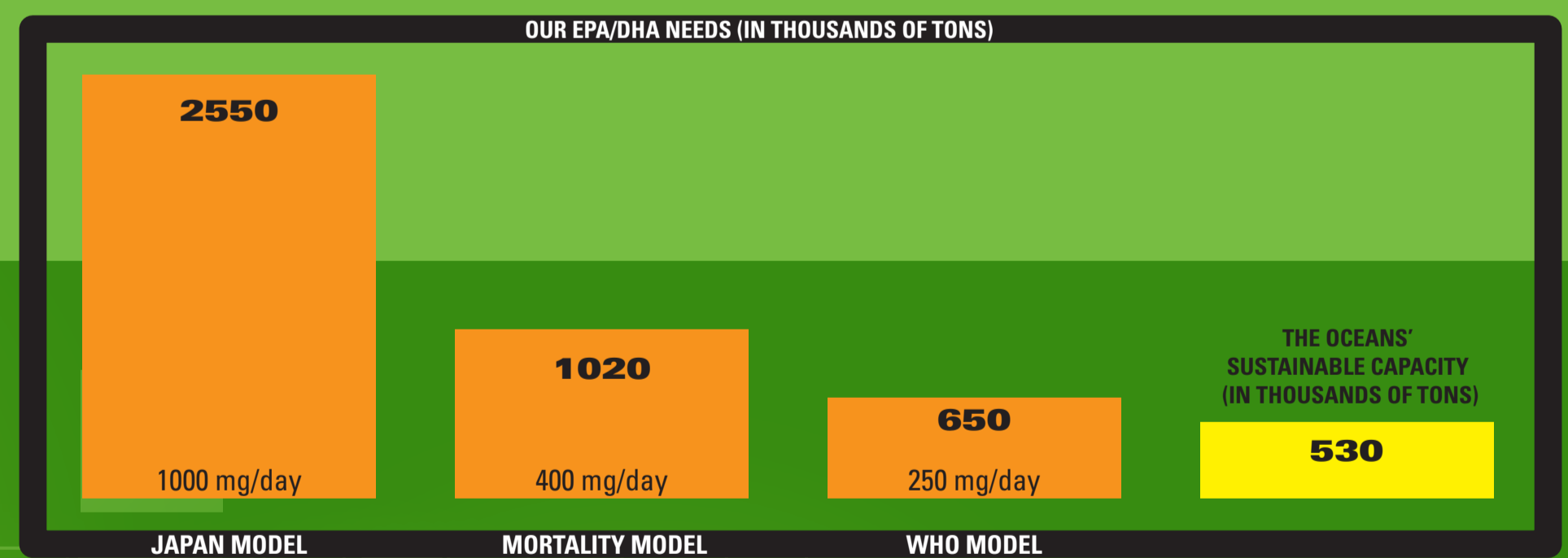
The benefits of long-chain (DHA and EPA) omega-3s in human health are well documented, with adequate intake having an overall positive impact on brain, eye and heart health, and inflammation management. DHA also plays an important role in child and infant development.



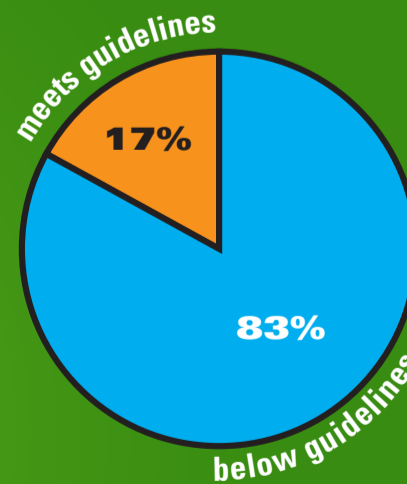
Global health advisory bodies have established daily intake recommendations based on current scientific evidence, with minimum intakes generally ranging from 250mg to 500mg for healthy adults. The World Health Organization recommends 250mg per day, and the International Society for the Study of Fatty Acids and Lipids (ISSFAL) recommends at least 500mg daily for cardiovascular health. Those with specific health needs are advised to take higher amounts.

Daily intake recommendations could pressure ocean sources

With scientific research supporting these compelling health benefits the global demand for long-chain omega-3s is steadily increasing, placing pressure on existing sources for this vital nutrient; sources that are critical for the marine ecosystem.



Current consumption level across the world is generally below the daily intake recommended by the World Health Organization. This contributes to public health concerns.



We must develop sustainable, reliable land-based sources of healthy omega-3 fatty acids to ensure we protect our oceans while providing the best health solutions to those who need them.

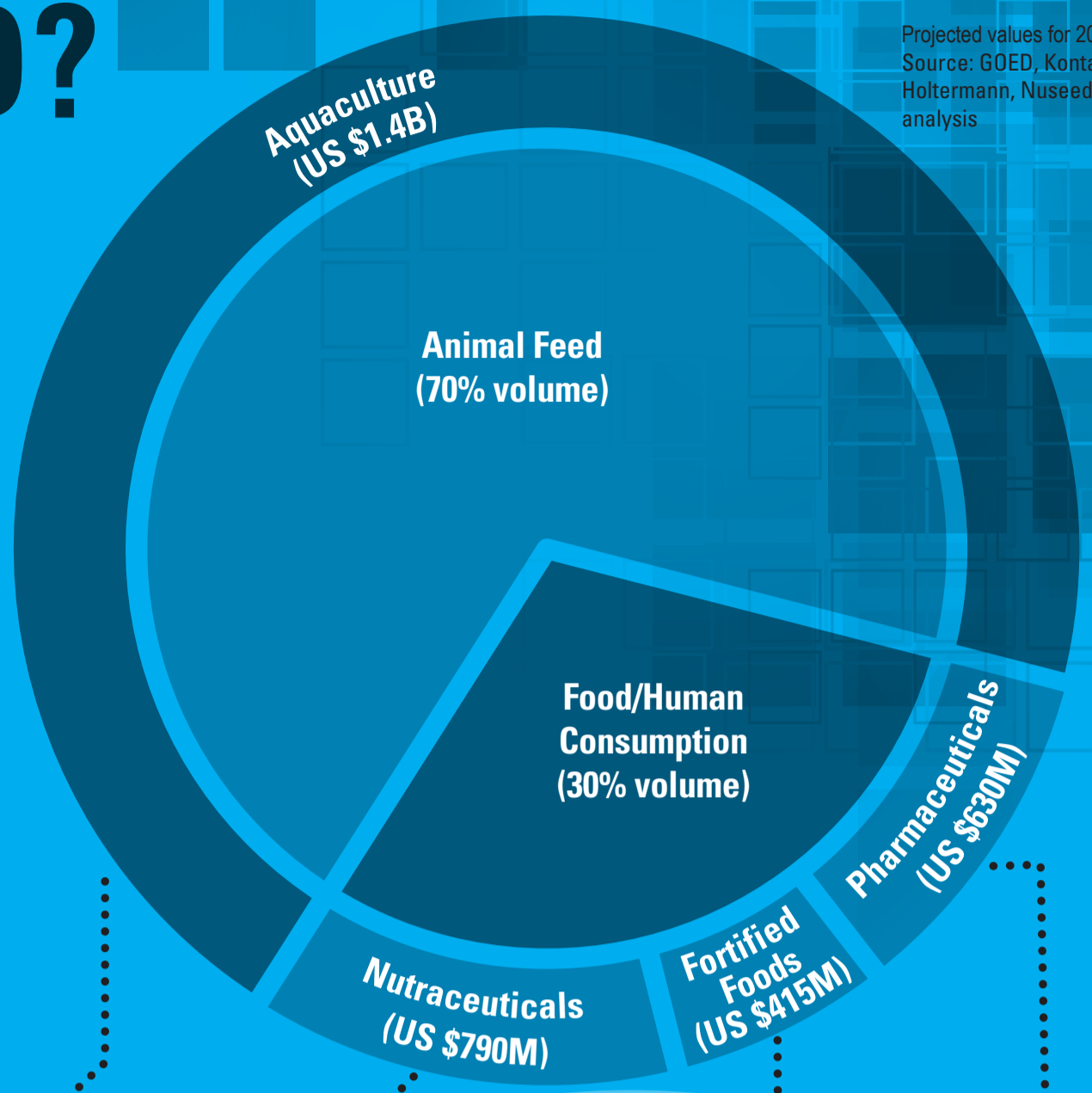
HOW IS OMEGA-3 OIL USED?

Projected values for 2023
Source: GOED, Kontali, Holtermann, Nuseed analysis

Omega-3 oils, particularly the long-chain EPA and DHA types typically found in oily fish, are important for human and fish health. Demand for these oils is increasing year-on-year, while existing supply from fish oil is limited. Developing new, sustainable sources of these healthy long-chain omega-3 oils is essential.

Market sectors

The global omega-3 oil market is broken into a four key sectors, all aimed at providing long-chain omega-3 oils for direct and indirect human consumption. It is used in multiple ways; in the production of feed for animal consumption (mainly fish) and in producing supplements and other functional applications for human nutrition.



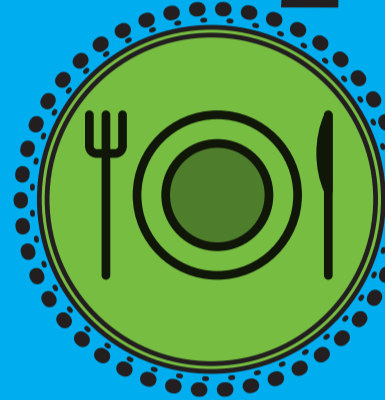
Aquaculture

Aquaculture (farming fish and other marine animals) is the main feed-based market for omega-3 oils. While fish are a source of omega-3 oils, they do not make them; ocean microalgae make the oils which the fish consume in the food chain. Adequate consumption of long-chain omega-3s is important for fish health and consumers.



Nutraceuticals

Nutraceuticals are dietary supplements for human consumption that provide nutrients which are typically not consumed in sufficient quantities for optimum health. Research completed in 2016 found that DHA and EPA consumption rates are insufficient in most regions of the world, leading to avoidable health problems.



Fortified Foods

Fortified Foods have essential nutrients, such as vitamins and minerals, added to improve the nutritional function of the food for improved health outcomes. This can help address health concerns by enhancing every-day foods in a convenient way for consumers.



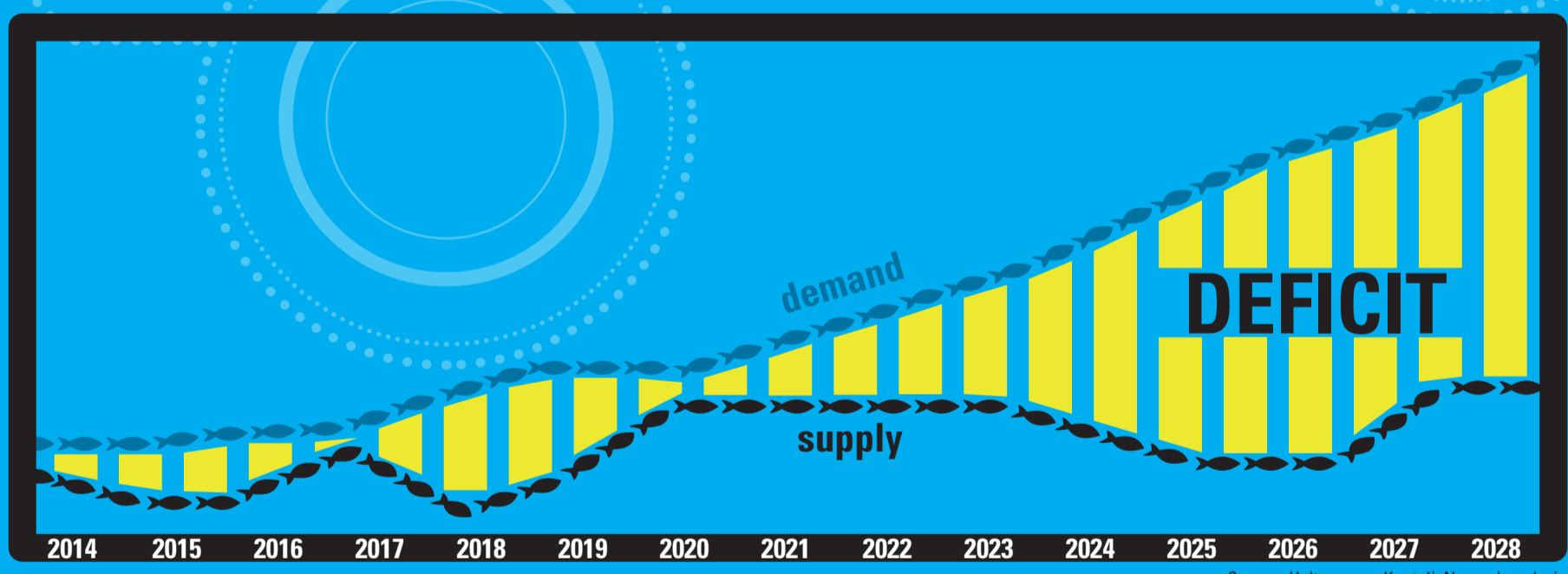
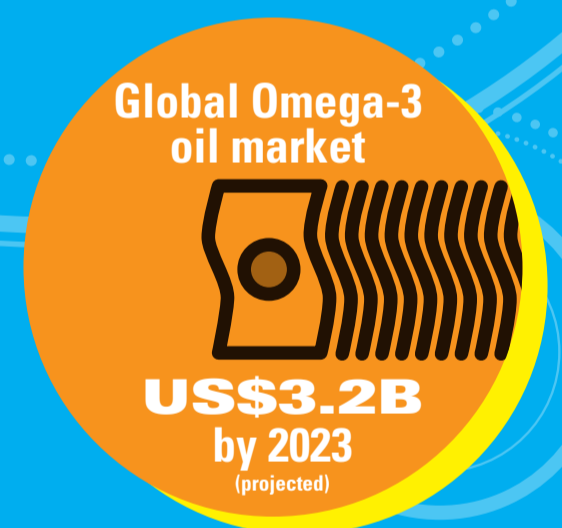
Pharmaceuticals

Pharmaceuticals are aimed at treating a medically diagnosed illness or condition using specific dosages for specific health outcomes, under a physician's care. Products take many years to develop, with additional testing often at higher doses than supplements.

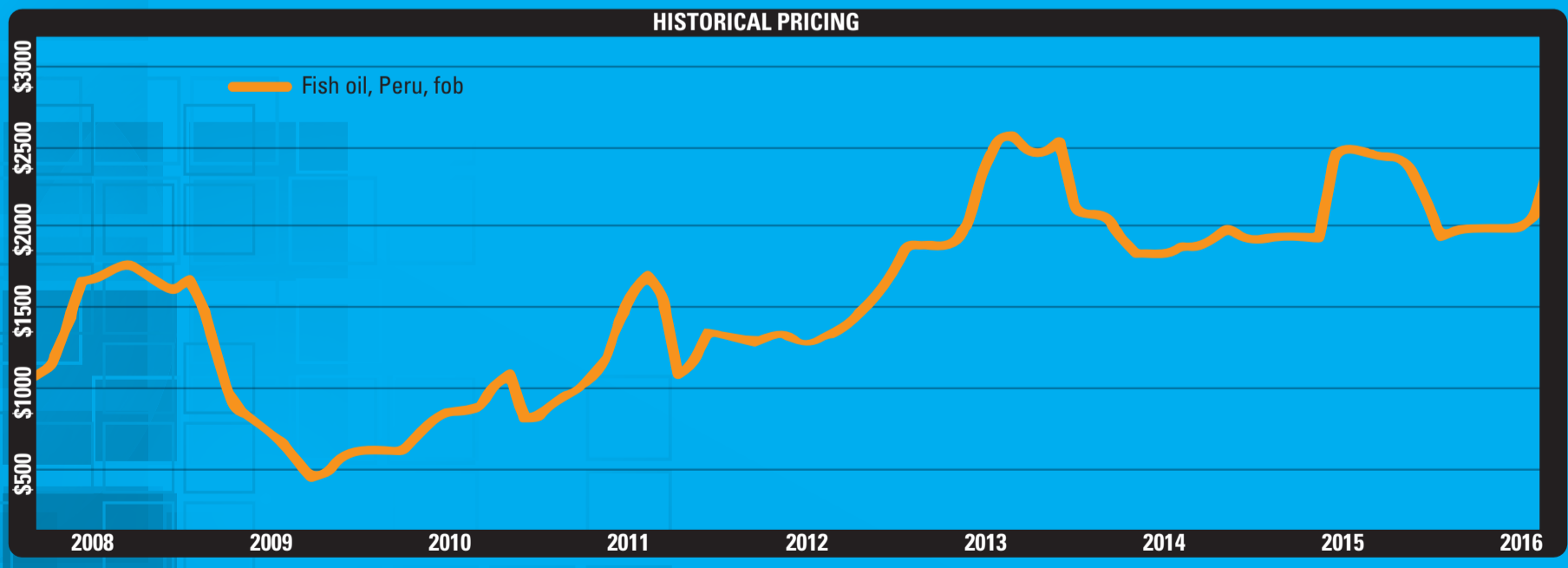
Market trends

The global omega-3 oil market is projected to reach approximately US\$3.2 billion by 2023.

Demand for long-chain omega-3 oils is growing as awareness of the health benefits of this important nutrient increases, along with increased consumption of fish and growing populations with higher disposable incomes in emerging markets. However, with limited supply options – primarily wild-caught fish – current levels of production are not sustainable and there is increasing concern to protect wild fish stocks.

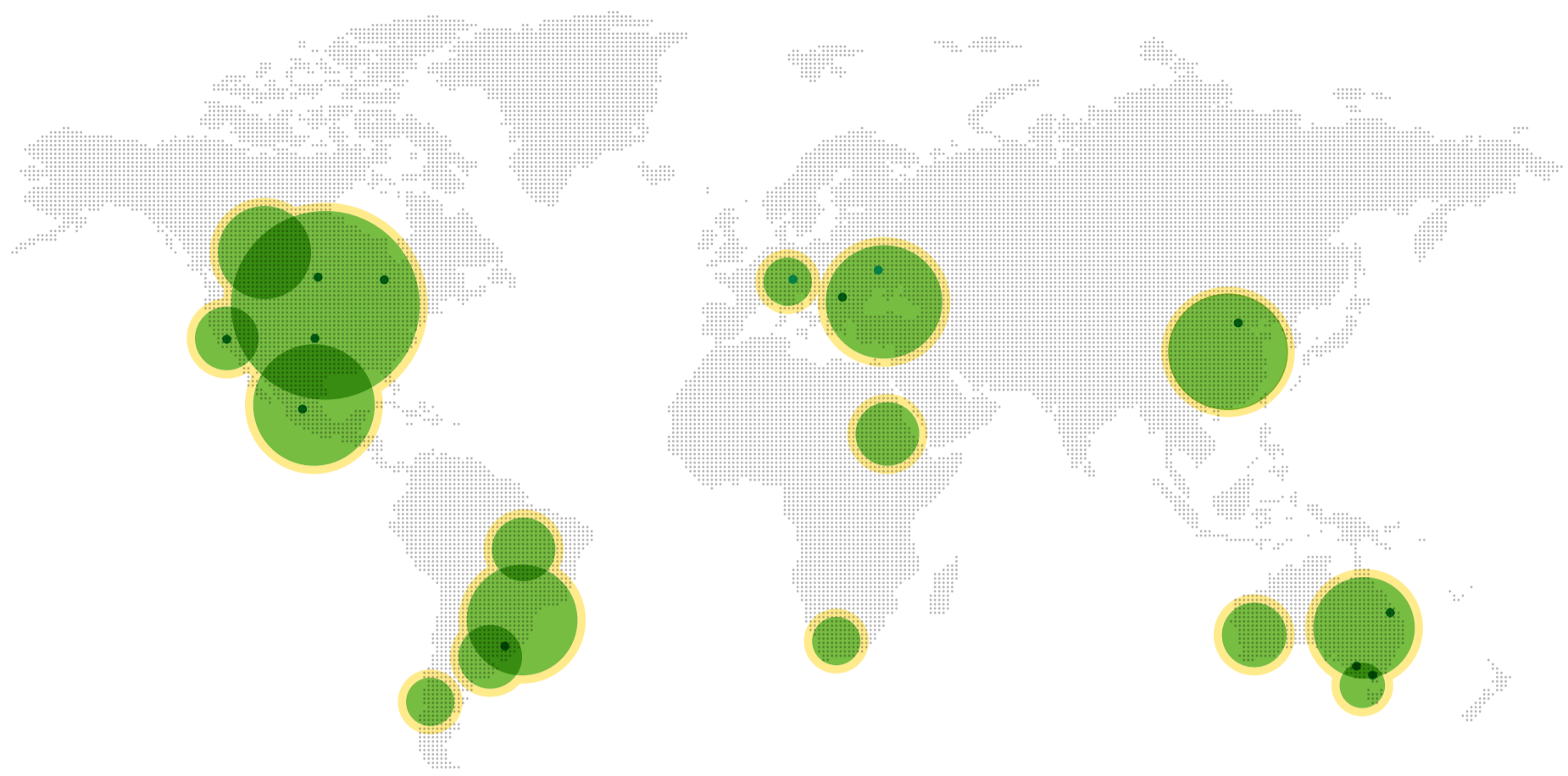


This is reflected in fish oil price trends over recent years.



Addressing this issue with sustainable sources of long-chain omega-3 oils is essential to keeping pace with demand for this important nutrient.

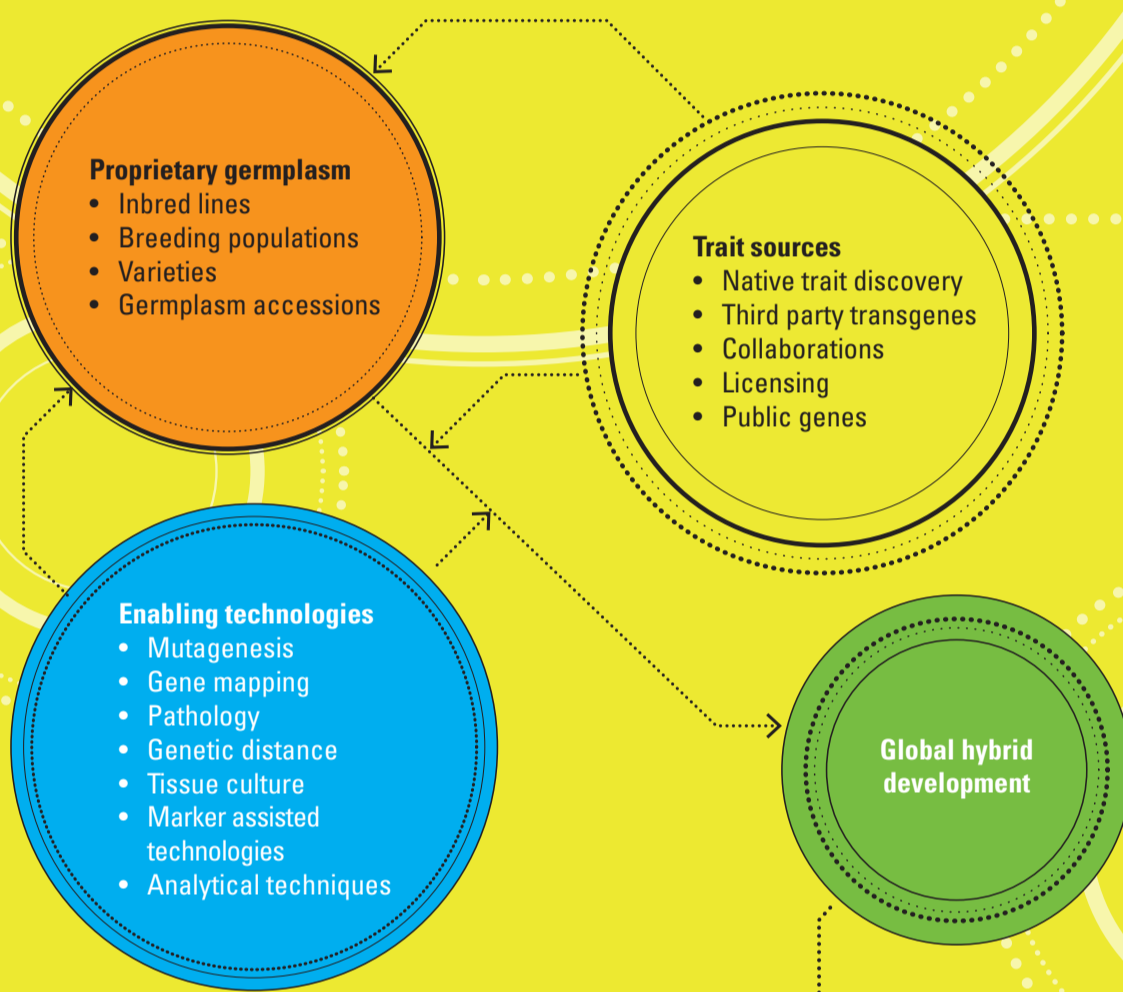
WHO IS NUSEED?



A global seed company, Nuseed is focused on improving the performance and downstream value of its three core crops – canola, sorghum and sunflower. Backed by the strength of our parent company Nufarm Limited, we develop innovative seed-based solutions aimed at meeting consumer and market needs.

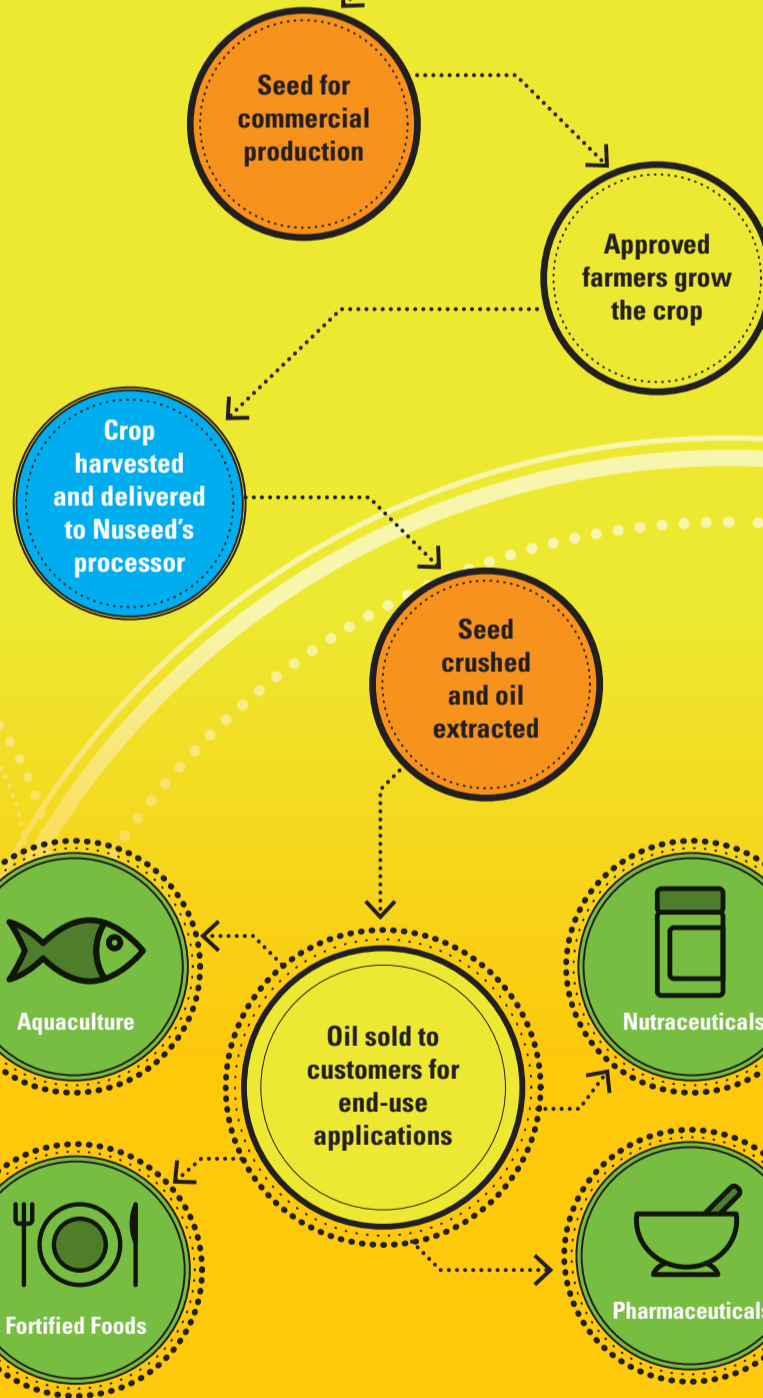
International R&D capability

Nuseed's expertise in canola breeding is world-class with our research teams located in the main global canola growing regions. We have access to the best technical expertise from around the world for exceptional trait discovery and development, genetic mapping, breeding technologies, pathology screening and regulatory science.



Our business model

Pending regulatory approvals, Nuseed's DHA canola will be produced by growers in Australia, Canada and the USA in a closed-loop system to protect the quality and value of this important crop. We will closely manage the production, processing and delivery of the product to end-use markets including aquaculture feed and for direct human nutrition via supplements, food or pharmaceuticals. We aim to be ready for commercial production in 2018-2019.



DHA Canola

In collaboration with CSIRO and GRDC, Nuseed has developed an innovative canola crop that will provide healthy long-chain omega-3 oils, similar to those found in fish oil.

Demand for these healthy oils is outstripping supply as global consumption continues to grow. Our aim is to help relieve pressure on wild fish stocks and maintain adequate supply of this important nutrient via a proven land-based, sustainable source.

With decades of breeding and marketing experience, our expert team is applying the best international knowledge and technical proficiency to make sure the DHA canola performs at scale and meets market needs.

This DHA canola is the first Nuseed product of this kind, and our approach has the flexibility to deliver alternative oil profiles that contain other long-chain omega-3 fatty acids.



More than **300** people worldwide



Sales in **30+** nations



3 core crops – canola, sunflower & sorghum



2 state-of-the-art Innovation Centres



9 world-class crop-specific field stations



Advanced trials in **>30** countries



Supported by more than **100** researchers

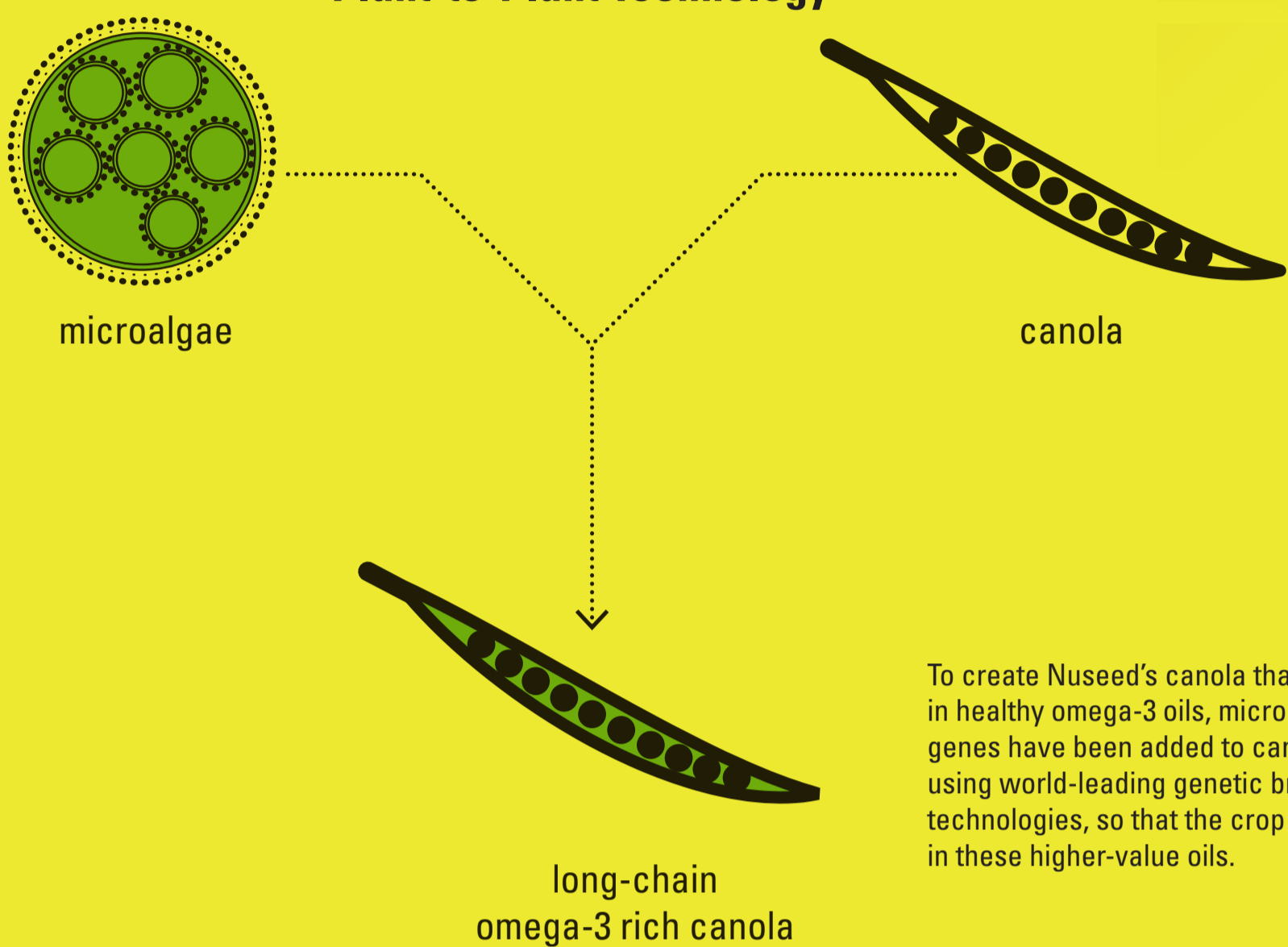
HOW DOES THIS TECHNOLOGY WORK?

In 2011, a research collaboration was formed to develop a high quality, sustainable, renewable and reliable source of long-chain omega-3 oil. The supply of this important nutrient is under pressure, with wild fish stocks the current main source. A more scalable and reliable supply option is needed to meet current and future demand.



Healthy long-chain omega-3 oils typically originate in ocean microalgae. Fish consume the microalgae-derived oils via their food-chain and are the current primary source of long-chain omega-3 oil for direct or indirect human consumption.

Plant-to-Plant Technology



Scalable, sustainable supply from a land-based source

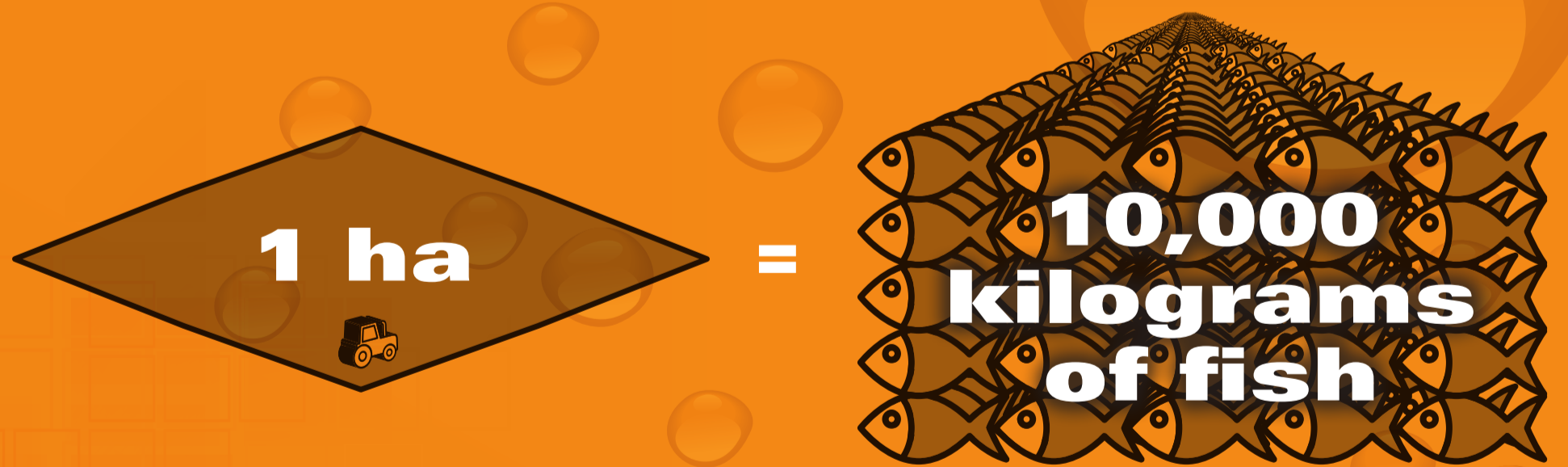
A well-known global crop, canola is familiar to many farmers in key growing regions such as Australia, Canada and the USA. This good agronomic and commercial understanding of canola, along with its already high oil production, made it the ideal candidate for this project.



10 million hectares of canola are grown in Canada, USA and Australia annually

Nuseed's long-chain omega-3 rich canola

We have successfully achieved high levels of DHA in the oil, making it suitable for many potential end-use markets. The unique profile of our oil meets the needs of multiple market applications in a commercially viable way.



1 hectare of this canola has the potential to provide the omega-3 oil yield from 10,000 kilograms of fish.

WHAT IS THE PROCESS TO DEVELOP NUSEED'S DHA CANOLA?

As with all innovative new technologies, Nuseed must achieve product development milestones (prove that the concept will work) and obtain the necessary regulatory approvals (government requirements for commercialisation). There are different regulatory requirements depending on the country involved, however the overall process follows similar patterns.

The development and pre-commercialisation process

A new product can take more than 10 years from concept to commercialisation. In the case of Nuseed's long-chain omega-3 canola, initial concept development started in 1999 at CSIRO. In 2010, a collaboration was formed between Nuseed, CSIRO and the Grains Research and Development Corporation aimed at commercialisation.

Gene discovery and selection of the best gene combination

Controlled testing and analysis of the crop and oil

Laboratory and glasshouse trials, small scale field trials, large scale field trials, product performance testing for end-market uses

Proof of concept

Select plants for development to commercialisation

Deregulation process

Specific trials and tests to meet regulatory requirements for each production country and each country where the oil may be used as a food or feed ingredient

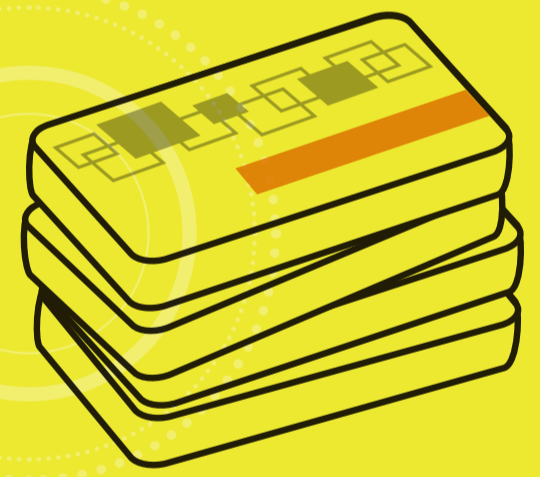
Seed production
Scale up enough seed for commercialisation

Commercial production of DHA canola
Grain production on farm, oil delivery to end users



For Nuseed's canola, all our testing and analysis is conducted under strictly supervised and controlled conditions, as required by government regulations. The best plants are selected for full development, based on agronomic performance, oil yield and long-chain omega-3 content. The oil is also tested to make sure that it is safe and meets the needs of end-use markets, including analysis by independent research organisations.

The deregulation process requires the provision of extensive and detailed testing data and analysis which is collected over a number of years. Once the crop is approved by the regulators, seed production is scaled-up so that it can be grown commercially.



Initial production countries

In the countries proposed for initial production, relevant government agencies ensure the product has been tested under appropriate growing conditions and assess it for health and environmental safety. The regulatory agencies review all the agronomic, environmental and safety data provided before granting approval for commercial production and product entry into feed and food market uses.



Office of the Gene Technology Regulator
Food Standards Australia and New Zealand

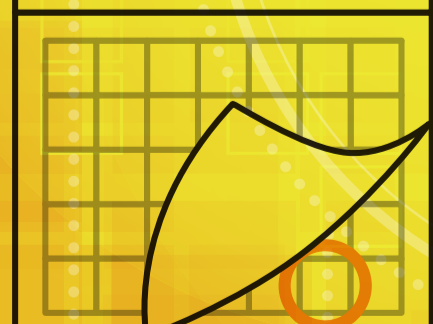


Canadian Food Inspection Agency
Health Canada



US Department of Agriculture
Food and Drug Administration

ready for commercialisation
2018/2019



Timing for commercialisation

Provided that key development milestones and regulatory requirements continue to be met, Nuseed aims to be ready for commercialisation in 2018 or 2019.

Initial product volumes will depend upon the timing of regulatory approvals relative to the growing season and the scale of plantings.

HOW WILL NUSEED'S DHA CANOLA BE GROWN AND MARKETED?

Nuseed's innovative DHA canola has been developed in collaboration with the CSIRO and GRDC. The crop provides healthy long-chain omega-3 oils, similar to those found in fish oil.

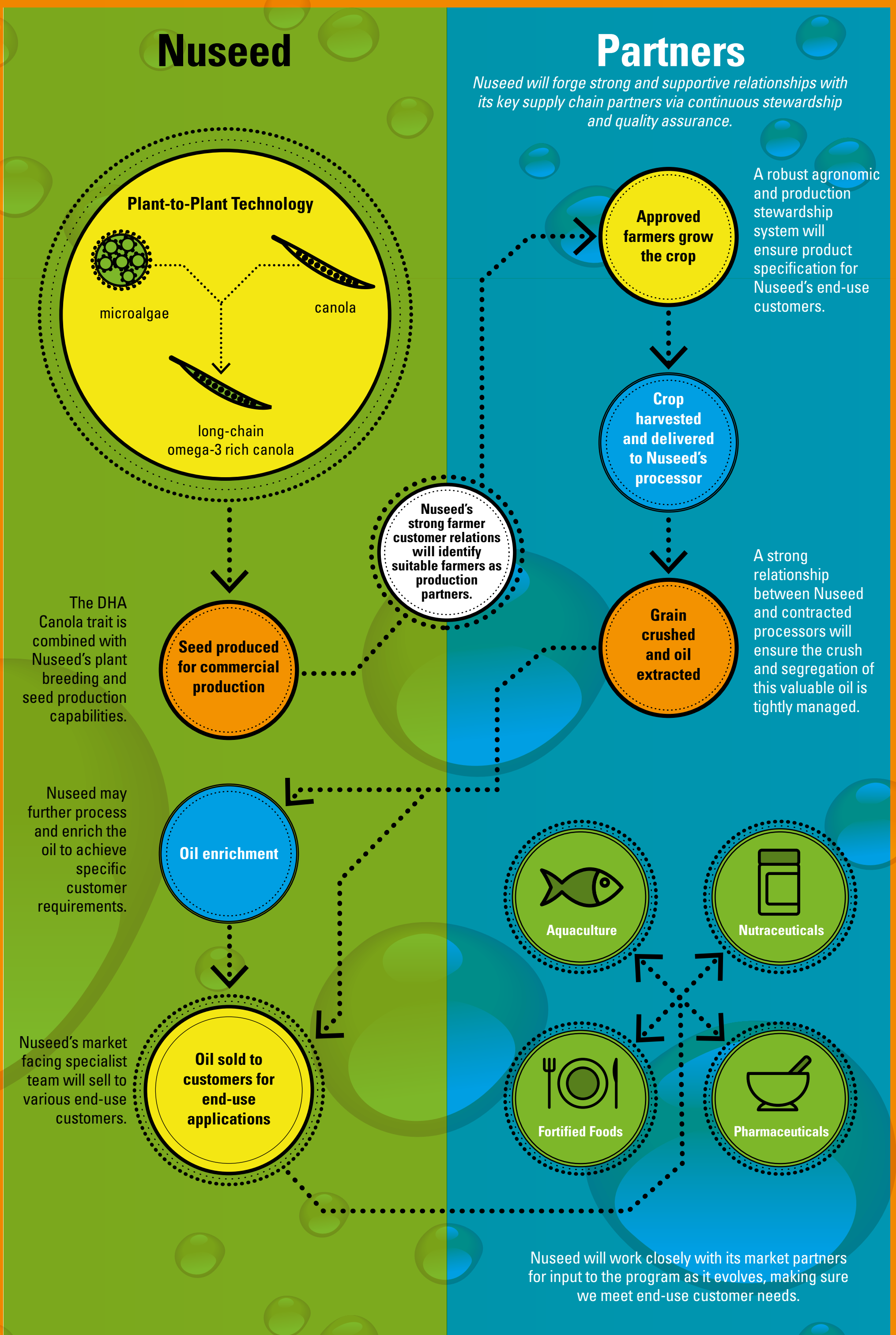


The Business Model

Pending regulatory approvals, Nuseed's DHA canola will be produced in a traceable system to protect the quality and value of this important crop. Nuseed will retain ownership while coordinating and supporting the growing of the crop; the processing of grain from the crop into oil; and the delivery of the oil to end-use markets.

Fully stewarded supply chain

The production and supply process for this DHA canola is the same as other canola types, but will be fully stewarded by Nuseed across the supply chain, from beginning to end.



Farmers who contract to grow this DHA canola will be fully supported by experienced Nuseed staff. We will help every step of the way to ensure the success of the crop and its delivery to end-use customers.

With high quality production parameters (similar to breeding quality standards) of the utmost importance, suitable farmers will be selected to grow Nuseed's DHA canola under contract. Stewardship requirements will be in place to support optimal seasonal performance and ensure crop security and segregation for delivery.



Initial production countries

Nuseed's DHA canola will initially be grown by farmers in Australia, Canada and the USA, with end-use markets throughout the world. We are aiming to be ready to produce the crop commercially in 2018-2019.