DSM and Evonik establish joint venture for omega-3 fatty acids from natural marine algae for animal nutrition

Bergen, Norway – 8 March 2017

DSM and Evonik combine complementary expertise

- Specialist for the cultivation of marine organisms including algae
- Biotechnology capabilities in development and operations

- Specialist in developing industrial biotechnology processes
- Know-how in operating competitively large scale manufacturing sites for fermentative amino acids.

50:50 Joint Venture Veramaris™

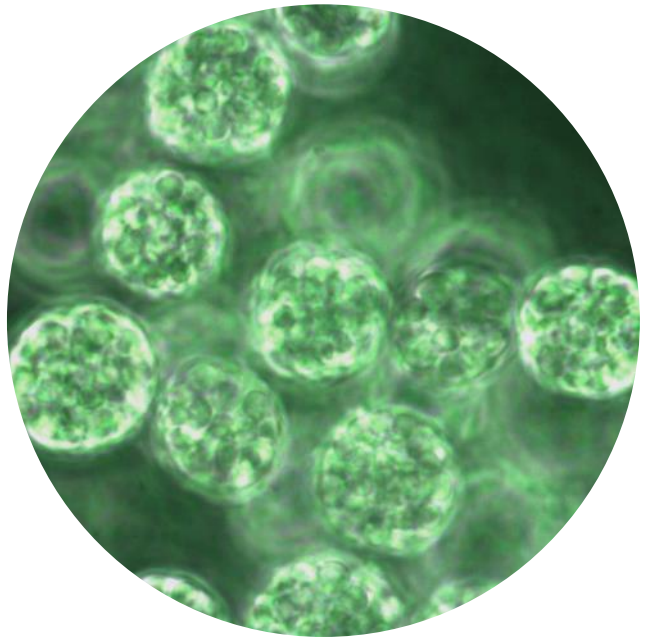
- DSM and Evonik to found a **50:50 joint venture** to be named ***Veramaris™***, headquartered in The Netherlands
- Joint venture for high value omega-3 fatty acid products rich in **EPA and DHA** for **animal nutrition** produced from **natural marine algae**
- Facility is scheduled to **open in 2019**
- New facility will be built in the **United States**, at an existing site of Evonik
- Joint venture's **capital expenditure** in the facility will amount to **around US$ 200 million** over the next 2 – 3 years
- Initial annual **production capacity** will meet roughly **15% of the total current annual demand for EPA and DHA** by the salmon aquaculture industry
- Finalization of the joint venture is **subject to regulatory approvals** and other customary closing conditions

DSM and Evonik breakthrough

The algal oil from DSM and Evonik enables the animal nutrition industry to keep up with the increasing demand for EPA and DHA omega-3 fatty acids without endangering fish stocks, while contributing to healthy animal nutrition as well as to the ecological balance and biodiversity of the oceans.

Algal oil as a high-quality source of omega 3 for the use in animal nutrition

- Highly concentrated (> 50%) algal oil with both omega-3 fatty acids EPA and DHA produced from natural marine algae
- High purity, free from fish-based ingredients and genetic modification
- Since algal oil can be applied in feed production like fish oil, it can easily be introduced by feed and pet food producers without process modification
- Broad use in animal nutrition from aquaculture to pet food
- DSM and Evonik pursuing applications for other aquatic and terrestrial animal species
- Broad IP protection of strain, product and process



Omega-3 fatty acids are essential for animal and human health

Salmon need EPA and DHA

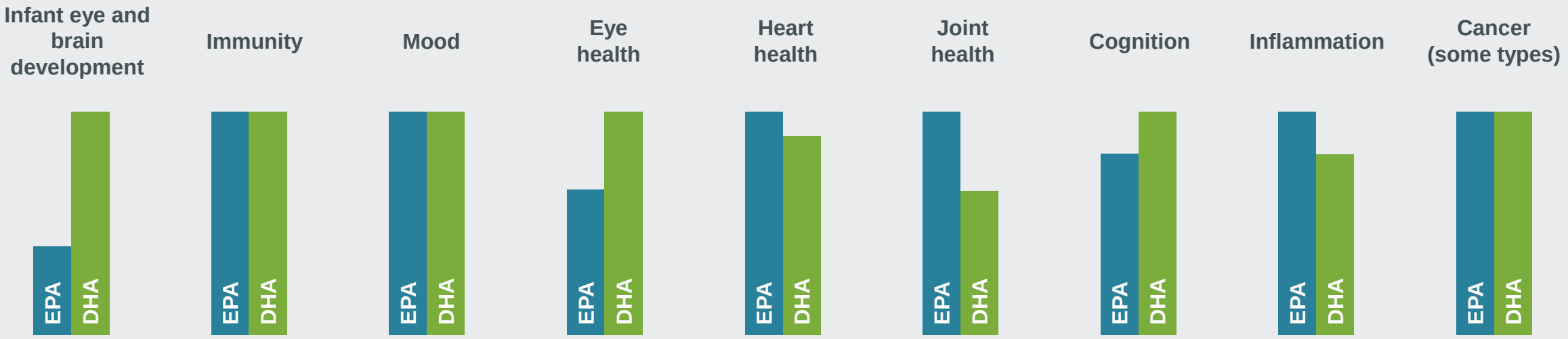
- Nature's choice – 2 omega-3s – key fatty acids found in natural balance
- Essential nutrients to support normal growth and health

EPA and DHA are key for human health

- Humans need – 2 omega-3s – essential at all life stages
- British Nutrition Foundation advises a weekly intake of 1.5 g EPA and DHA

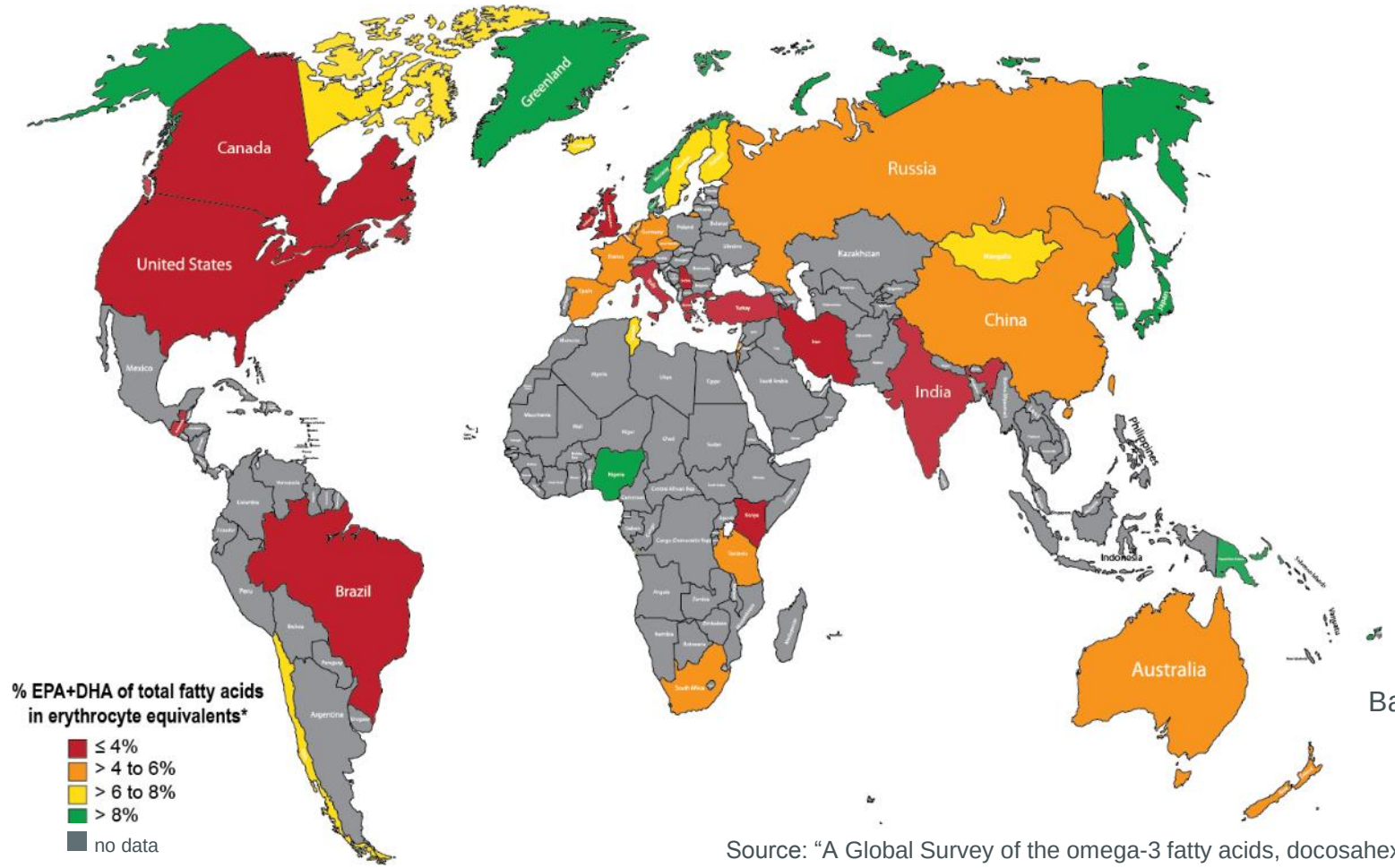
EPA and DHA have numerous health benefits at all life stages

Relative importance of DHA and EPA for various health aspects*:



* Includes ongoing research; Disclaimer: Not for purposes of claims or EPA:DHA ratios

The EPA and DHA deficiency world map shows regional differences



Based on analyses of red blood cells

Source: “A Global Survey of the omega-3 fatty acids, docosahexaenoic acid and eicosapentaenoic acids in the blood stream of in Healthy Adults”, **Progress in Lipid Research,** *July 2016*; 63:132-152.

We approach the entire value chain including influencers to create a strong market pull

Influencers

NGOs

Governments

Regulatory bodies

Industry organizations

Health associations

Value chain

Feed producers → Farmers → Processors → Retailers → End consumers

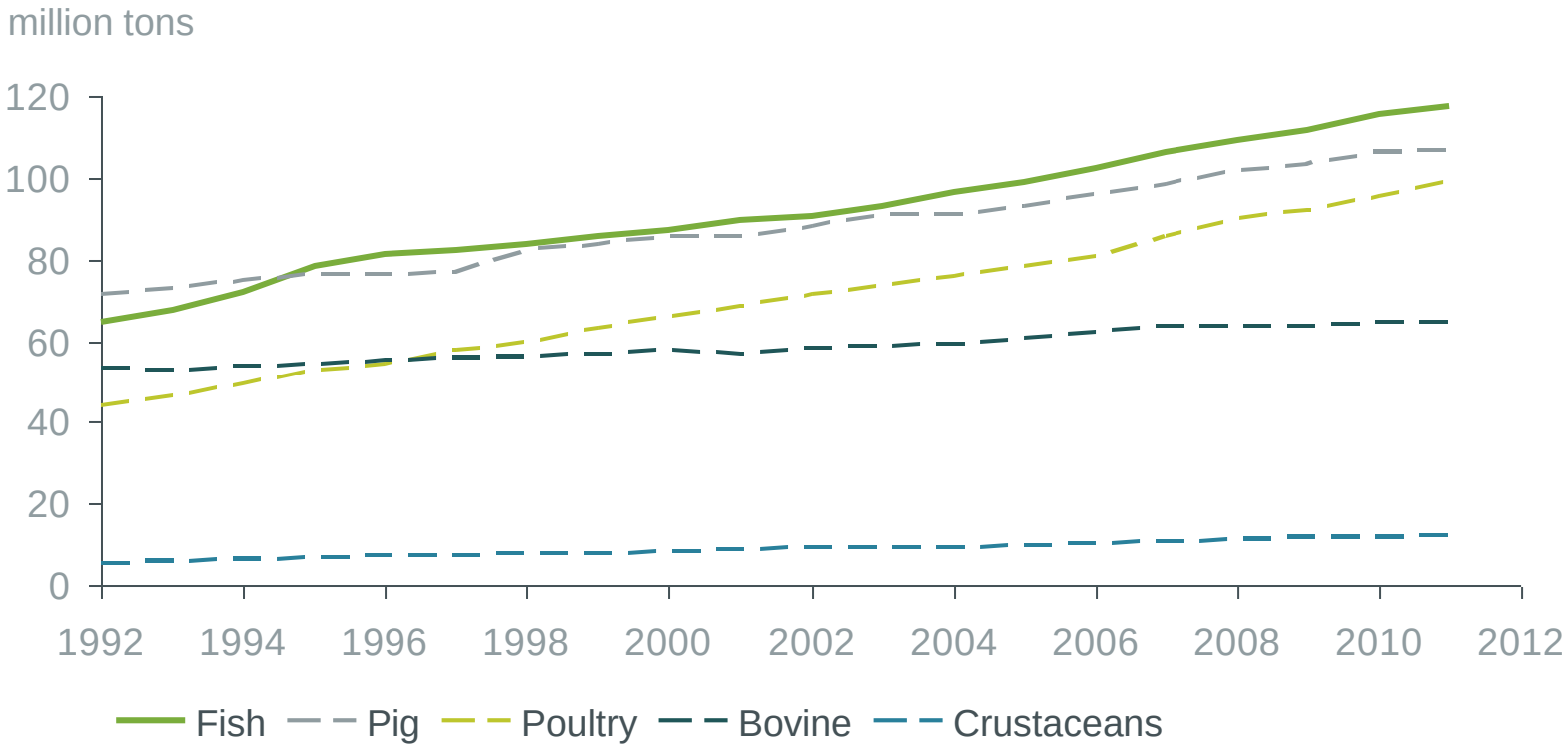
MARKET PULL

Sustainable Nutrition

Natural, healthy and tasty seafood products

Fish is the most important and most efficient animal protein source in human diets

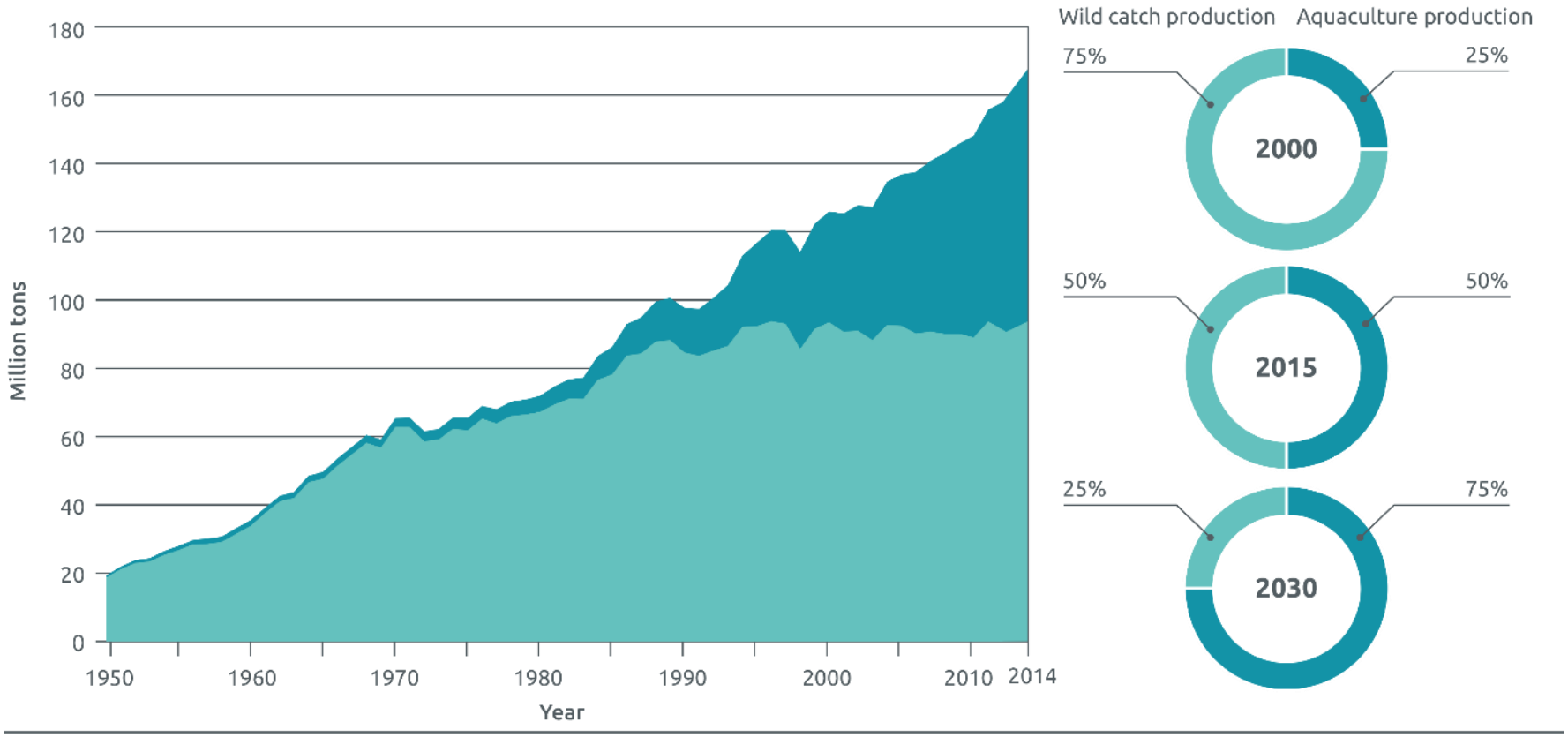
Development of global meat and fish supply



Source: FAO 2015

Demand for fish drives growth of aquaculture

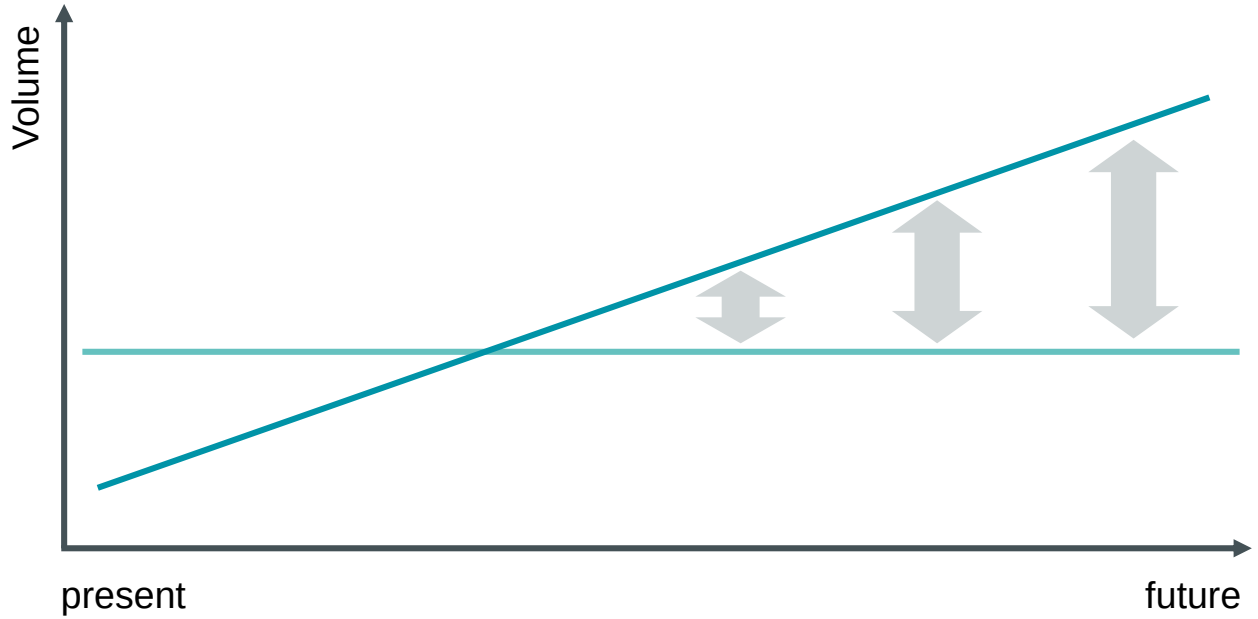
Global wild catch and aquaculture production



Source: FAO (2016)

A supply-demand gap for fish oil will limit the growth of the aquaculture industry

Market size of fish oil and alternatives



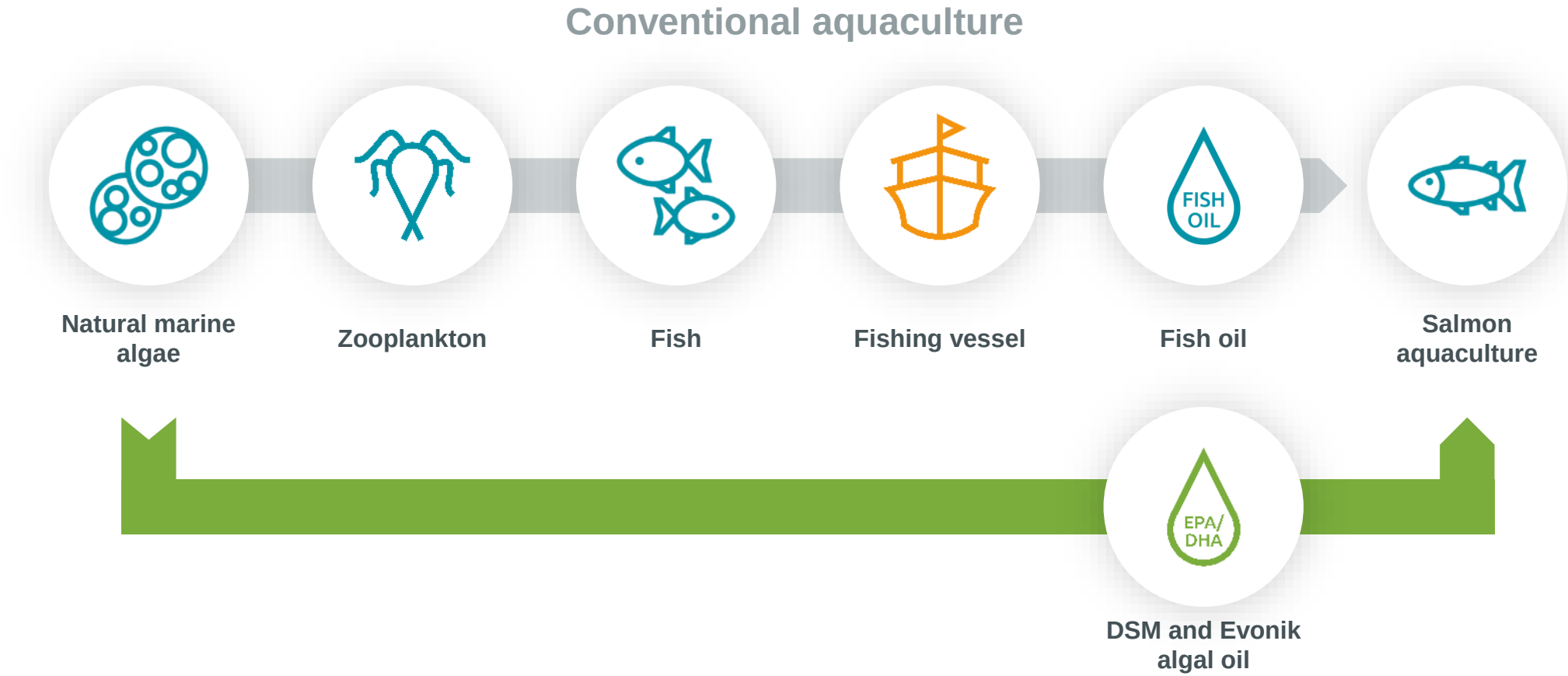
Meeting the demand for omega-3 fatty acids by utilizing new and sustainable sources of EPA + DHA in the future.

Increasing demand for fish oil and alternative omega-3 sources

supply-demand gap
will emerge in the near future

approx. 1 million tons per year
limited supply of fish oil
as source of omega-3 fatty acids

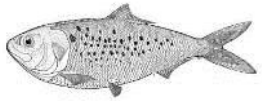
Natural marine algal oil is a sustainable alternative solution for EPA and DHA



DSM and Evonik breakthrough – shortening the natural food chain

Wild fish stocks are used on an industrial scale to produce fish oil and fishmeal


Anchovy


Menhaden


Sprat


Blue Whiting


Herring


Sand eel

16,000,000 tons wild fish

~17% of global wild catch is consumed for the production of fish oil and fishmeal

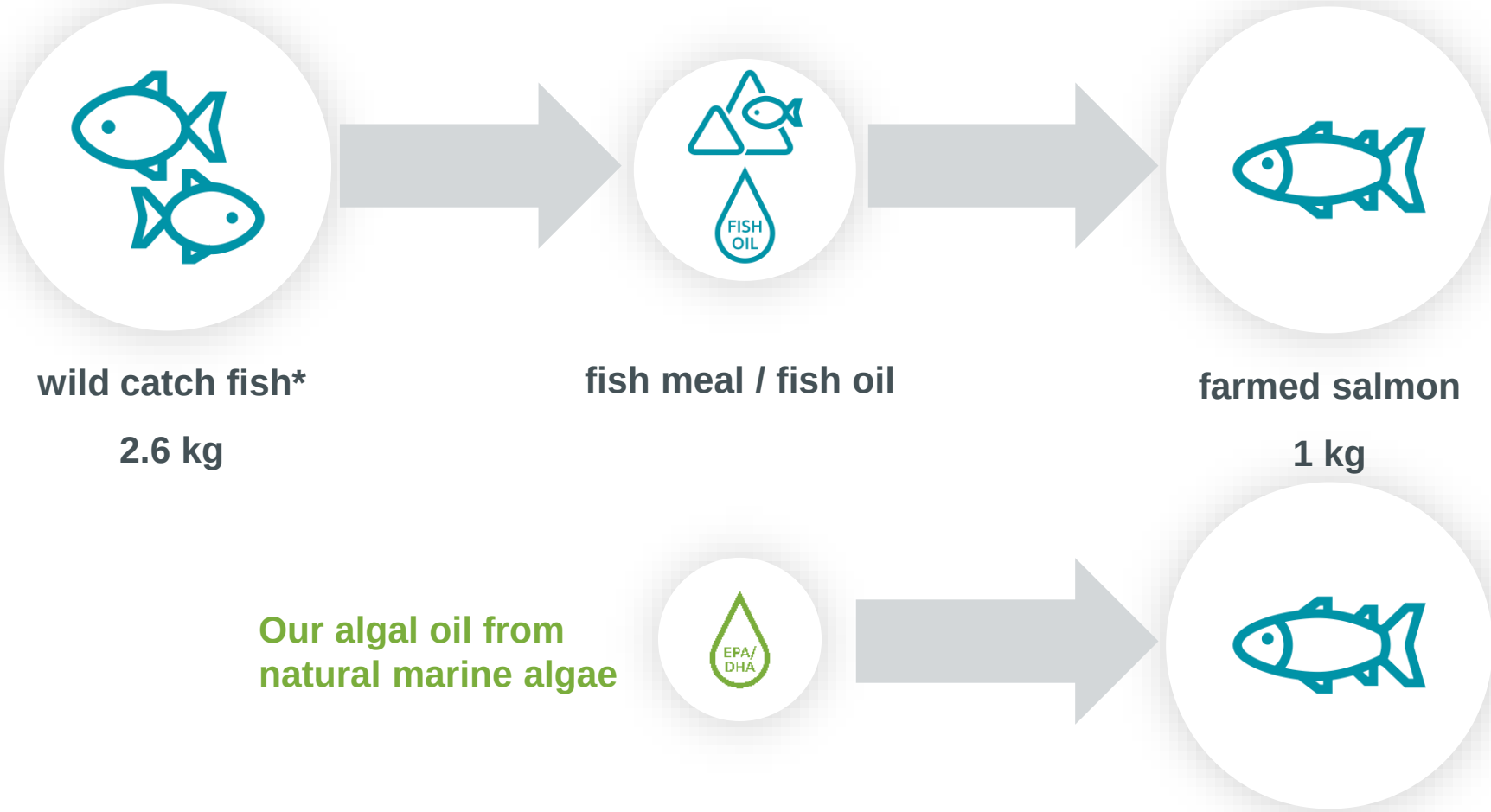
~ 5 million tons fishmeal

FISH OIL

~ 1 million tons fish oil

Sources: IFFO, FAO

By replacing fish oil by the algal oil, the fish-in-fish-out ratio could substantially be reduced



* production of farmed salmon in 2014 - source: A.G.J. Tacon, M. Metian, Aquaculture 285 (2008) 146–158 and own calculations.

DSM and Evonik develop a new standard in aquaculture thanks to superior product properties

	Fish oil standard	DSM and Evonik breakthrough
EPA	✓	✓
DHA	✓	✓
EPA + DHA (%)	20% – 28%	≥ 50%
Product form	Oil: Typically derived from anchovies, sardines, herring, sprat, capelin, menhaden	Oil: Derived from *Schizochytrium* sp. algae
Handling properties	+	+
Concentration of EPA and DHA	+/–	+++
Oxidation stability	+/–	++
Absence of dioxins and PCBs	–	+++
GMO status	None	None
Supply security	+/–	+++
No price volatility	–	+++
High flexibility in feed formulation	+/–	+++

Our measurable impact: preventing natural resources from further exploitation

1 kg of our EPA and DHA algal oil can replace **60 kg** wild catch fish

Meeting roughly 15% of the EPA and DHA demand of the global salmon industry

Our Joint Venture contributes to five United Nations Sustainable Development Goals

SDGs: Sustainable Development Knowledge Platform. (n.d.). Retrieved July 28, 2016, from https://sustainabledevelopment.un.org/sdgs

Game changer for the aquaculture industry

1. 50:50 joint venture Veramaris™ created by two trusted industry partners
2. Setting THE industry standard with maximum purity product from natural marine algae
3. First alternative omega-3 fatty acid to contain natural balance of EPA and DHA
4. Commercial scale production facility in the United States with significant capacity