Welcome to Petfood Forum Europe 2019


13 JUNE, 2019
COLOGNE, GERMANY

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The impact of natural omega-3 DHA and EPA sources on pet food sustainability
Why are we talking about the omega-3 fatty acids EPA & DHA?

EPA

DHA
Benefits relevant to dog and cat health & wellbeing

Includes ongoing research; Disclaimer: Not for purposes of claims or EPA:DHA ratios
Where do we source EPA+DHA for most pet foods?

16,000,000 TONS WILD CAUGHT FISH

Anchovy
Menhaden
Sprat
Blue Whiting
Herring
Sand eel

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

Sources: IFFO, FAO

Fish oil is the primary source of DHA and EPA

~ 5 million tons fishmeal

~ 1 million tons fish oil
Planetary boundaries Concept

In 2009, Johan Rockström led a group of 28 internationally renowned scientists to identify the nine processes that regulate the stability and resilience of the Earth system.

former center director
Johan Rockström
Stockholm Resilience Centre

Source: https://www.stockholmresilience.org/research/planetary-boundaries.html
Planetary boundaries Concept

In 2009, Johan Rockström led a group of 28 internationally renowned scientists to identify the nine processes that regulate the stability and resilience of the Earth system.

These scientists proposed quantitative planetary boundaries within which humanity can continue to develop and thrive for generations to come.

Source: https://www.stockholmresilience.org/research/planetary-boundaries.html
Crossing these boundaries increases the risk of generating large-scale abrupt or irreversible environmental changes.

Since then the planetary boundaries framework has generated enormous interest within science, policy, and practice.

Source: https://en.wikipedia.org/wiki/Planetary_boundaries
The present extinction rate and loss of biodiversity have been identified as humanity’s most severe passing of the planetary boundaries.
The millennium ecosystem assessment established overfishing as the main driver of biodiversity loss in the sea, as opposed to habitat change for most terrestrial systems.

Johan Rockström
Overfishing creates a challenge for the aquaculture industry
Because there is a rising demand for healthy fish protein ...

Global wild catch and aquaculture production

Source: FAO (2017)
Global wild catch and aquaculture production

Source: FAO (2017)

Facts

EPA & DHA are essential nutrients to grow fish

It takes >1kg ocean fish to grow 1kg farmed salmon!!
Public pressure is coming from non-governmental organizations

“Aquaculture products that are produced using overfished species cannot themselves be considered as sustainable.”

“Greenpeace”

“In the process 3 or 4 pounds of wild fish are converted into 1 pound of salmon. That is not a good thing to do if you are trying to feed a hungry planet.”

“Aquaculture must responsibly source and reduce its dependency upon fishmeal and fish oil—a primary ingredient in feed—so as not to put additional pressure on the world’s fisheries.”
How does this supply challenge impact the dietary EPA+DHA demand for humans and pets?

There is an estimated 1 million tonne gap in future supply!

### Amount of EPA+DHA per year in metric tonnes

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<tr>
<th></th>
<th>Future Est. Demand</th>
<th>Current Est. Supply</th>
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<tbody>
<tr>
<td>Humans</td>
<td>1,400,000</td>
<td></td>
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<tr>
<td>Marine &amp; Microbiol Sources</td>
<td>533,000</td>
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<tr>
<td>Dogs+Cats</td>
<td>90,000</td>
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### Conservative estimate

- **U.S. RDA for Humans**
- **NRC recommendation for adult 3.4kg Cats and 9kg Dogs**

*U.S. RDA from Department of Health and Human Services
NRC adult cat and dog recommendations using 9kg for dog weight and 3.4kg for cat weight and the following world population sources: worldometers.info, worldatlas.com, Legay JM., "Tentative estimation of the total number of domestic cats in the world." C R Acad Sci III. 1986;303(17):709-12.*
Both human and pet industries will face a supply challenge requiring a large scale commercial solution.

Limited supply of fish oil as source of EPA + DHA

Volume

past

future

Market demand for EPA+DHA
GM seed oil:
<22% EPA+DHA
Sourced from GM grain

So what are the most practicable alternatives to marine fish oil in development?

ON MAY 21, 2014 PetfoodIndustry.com published:
Global GMO Free Coalition launched
First globally coordinated network to address GM food and crop industry in media, public and government advocacy areas

US: Percentage of food and drink launches with GMO Free claims, 2013-17

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2018 Mintel report “What’s next for clean label?”
Natural marine algae oil: 
>50% EPA+DHA
Sourced from natural nonGM marine algae cultured in a closed vessel in a food grade facility (not harvested from the ocean)

So what are the most practicable alternatives to marine fish oil in development?

73% of EU pet food consumers in 2017 agreed with the following statement “It makes sense to use a fish free and more sustainable source of DHA omega-3, such as the whole marine algae, DHAgold, that is naturally rich in omega-3 DHA rather than fish oil”

80% of US pet food consumers in 2014 agreed with the following statement “It makes sense to use a high quality marine algae like DHAgold rich in Omega-3 DHA as an alternative to fish oil.”

MetrixLab study results
Natural marine algae oil: >50% EPA+DHA
Sourced from natural nonGM marine algae cultured in a closed vessel in a food grade facility (not harvested from the ocean)

So what are the most practicable alternatives to marine fish oil in development?

"We are excited to be working with alternative ingredient suppliers like DSM (Veramaris) to innovate low impact highly nutritious oils that move the industry toward a more sustainable future for pets, people and planet."

Caitlin Bolton
Sr. Dir. Pet Sustainability Coalition
Sourcing EPA+DHA from marine algal shortens the natural food chain
A truly sustainable solution needs to be validated

United Nations Sustainable Development Goals and marine eco-certification programs

Source: https://sustainabledevelopment.un.org
The problem with any independent program is that it is more vulnerable to public opinion.

Worrisome since the MSC is one of the strongest certifications programs available.
Algal oil made by Veramaris is a validated solution

**LEVERAGING PARTNERSHIPS**

Veramaris is a Joint Venture of DSM and Evonik

- Combining excellence in biotechnology and large-scale fermentation processes
- A business structure designed to create value with all partners along the value chain

**RESPONSIBLE PRODUCTION**

Promoting sustainable aquaculture and pet food

- Zero waste production
- Promote sustainable food production
- Minimizing CO$_2$ emissions of algal oil production

**OCEAN STEWARDSHIP**

Protecting marine habitats

- Reduce the reliance on marine resources
- Sustain biodiversity & curb overfishing
- LCA as a solid basis for measuring environmental impacts
- Support animal health

**NUTRITION AND HEALTH**

Ensuring food security

- Promote health and well-being
- Minimize deficiencies of omega-3
- Achieve food security and improved nutrition via application in agriculture feed and pet food
The traditional approach to LCA, developed to measure the impact on all types of ecosystem

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<tr>
<td>1</td>
<td>Global warming potential</td>
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<tr>
<td>2</td>
<td>Agricultural land occupation</td>
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<tr>
<td>3</td>
<td>Marine eutrophication</td>
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<tr>
<td>4</td>
<td>Acidification midpoint</td>
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Not fully appropriate to measure the impact on marine biodiversity and ecosystem function
Therefore, a renowned review panel certified a new LCA

SP Technical Research Institute of Sweden, TÜV Rheinland, Wuppertal Institute

An LCA based on the latest internationally recognized and validated data
This new LCA measures the appropriate metrics

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<td>1</td>
<td>Primary production of photosynthetic carbon required</td>
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<td>2</td>
<td>Sea surface dependency</td>
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<tr>
<td>3</td>
<td>Overfishing through fishing mortality</td>
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<tr>
<td>4</td>
<td>Forage fish dependency ratio</td>
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Veramaris is the first to incorporate these four new impact categories in a reviewed LCA.*

*F. Ziegler, Technical Research Institute of Sweden (RISE)
Marine Impact Categories described

1. Primary production of photosynthetic carbon required (PPR)
   - PPR is a metric to measure the burden on the marine ecosystem (lower is better)

2. Sea surface dependency (SSD)
   - SSD measures the area required for producing the biomass through photosynthesis in one year (lower is better)
Marine Impact Categories described

3 Overfishing through fishing mortality

4 Forage fish dependency ratio specific to aquaculture

MSY = Maximum Sustainable Yield
An illustrative model to demonstrate the impact of using Veramaris algal oil in premium dry dog food

Commercial premium dog food diet with EPA+DHA from Anchovy fish oil*

- Overfishing
- Sea surface dependency
- Primary production of photosynthetic carbon required
- Global warming potential
- Agricultural land occupation
- Marine eutrophication
- Acidification midpoint

Anchovy is an overfished species

Cat food data similar

*0.59% fish oil
An illustrative model to demonstrate the impact of using Veramaris algal oil in premium dry dog food

Commercial premium dog food diet with EPA+DHA from Veramaris algal oil*

Primary production of photosynthetic carbon required

Sea surface dependency

Overfishing

Global warming potential

Agricultural land occupation

Marine eutrophication

Acidification midpoint

*0.295% algal oil

Cat food data similar
The additional carbon footprint of a dog consuming EPA+DHA sourced from Veramaris algae oil is negligible

Global warming potential evaluation
Unit: kg CO2e per pet and per year

Average annual emissions from car driving:
4 – 4.6 tons CO2e/year/person

1.6 kg CO2 is equivalent to car driving 8 km

*Europe: soy mostly coming from South America → CO2 emissions from Land Use Change attributed to European poultry, and consequently to poultry by-products used in Pet food

Sources: https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle
https://www.offsetters.ca/education/calculators/car-emissions-calculator
The additional land occupancy of a dog consuming EPA+DHA sourced from Veramaris algae oil is also negligible.

**Land Occupation evaluation**

Unit: m² per pet and per year

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Potato field - average yield: 4.3 kg/m²

1.1 m² is the surface to grow 4.8 kg potatoes.
Goal = Help you make an informed decision when it comes to sourcing EPA+DHA needed to support health claims on your pet food brand!
Thank you for your attention!
Thank you for your attention!