

Speirs Group Ltd – AGM, 2009



# Marine Omega-3 (fish oil) enriched foods and Speirs Nutritionals Ltd

Paul J Moughan

*Riddet Institute, Massey University, Palmerston North*



CENTRE OF RESEARCH EXCELLENCE, HOSTED BY MASSEY UNIVERSITY

# The Riddet Institute

- > Centre of Research Excellence (CoRE), supported by New Zealand Ministry of Education focusing on “food and health”.
- > Partnership between Massey University, University of Otago, University of Auckland, Plant & Food Research and AgResearch.
- > Collaborators: University of Canterbury, Victoria University, Lincoln University and Fonterra Research Centre
- > Supported by New Zealand and the international food industry



Farming, Food and Health. **First**

*Te Ahuwhenua, Te Kai me te Whai Ora. Tuatahi*

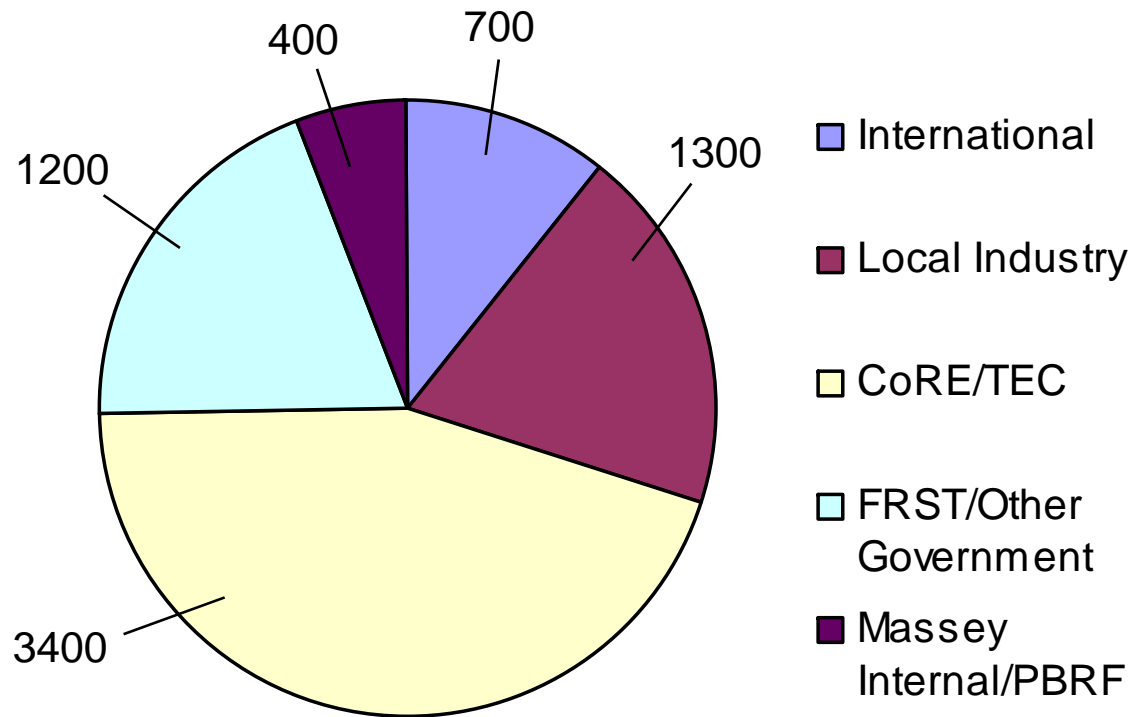


# Riddet Institute Objectives

- > World class fundamental and strategic research.
- > Developing human capital (tomorrow's leaders).
- > Transferring new knowledge to stakeholders.
- > Partnering with industry (preferred partnerships) to identify and develop IP.
- > Exceptional international academic and industrial networks.



# Income 2008 - \$7m



# Industrial Partners and Funders (examples)

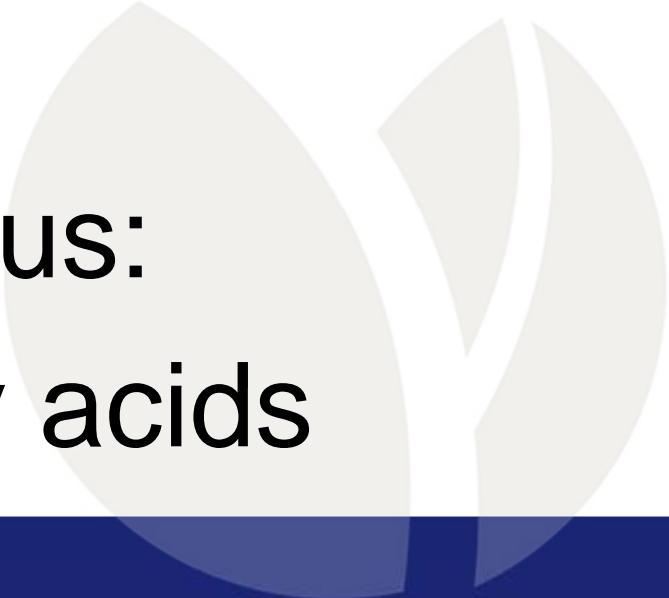
- > **International partners**
  - > PepsiCo Inc
  - > DSM (Netherlands)
  - > Cadbury Schweppes
- > **NZ industry partners**
  - > Fonterra
  - > ZESPRI
  - > Meat and Wool New Zealand
  - > Speirs Foods
- > **Government**
  - > FRST (Future Foods platform)
  - > TEC (CoRE – 6 years)



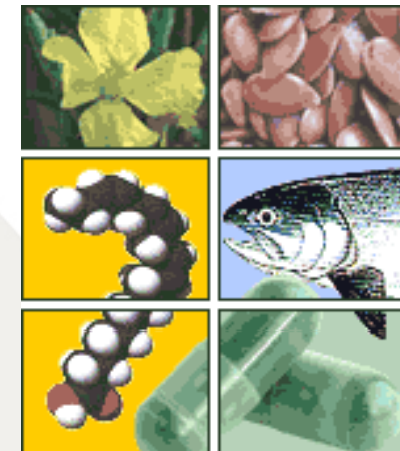
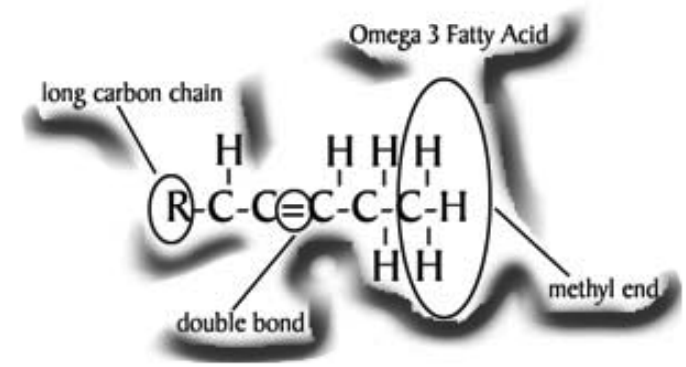
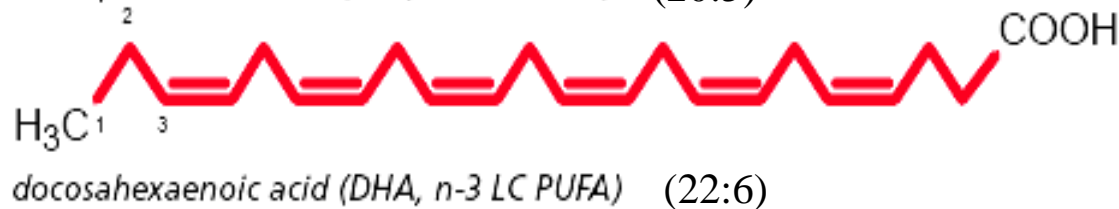
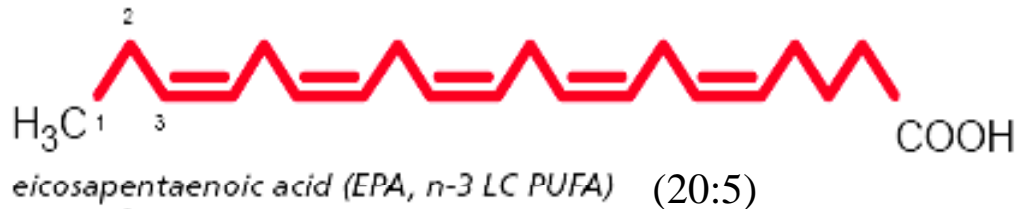


Riddet Institute works at the interface of **Food, Nutrition and Human Health.**

One key area of focus:  
Omega 3 fatty acids



# What is Omega 3?



EPA and DHA need to be supplied (pre-formed) from marine food sources.

# Marine Omega 3 and human health

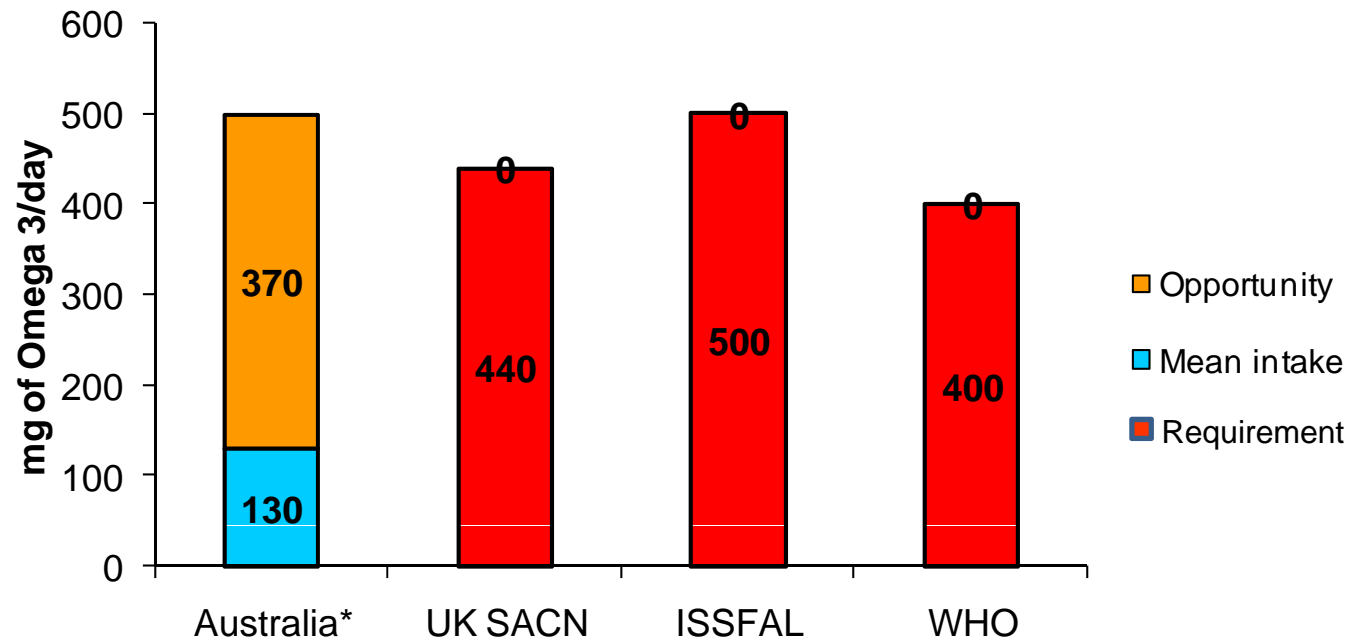
## Epidemiological and Clinical Evidence:

- > Heart health
- > Anti-inflammatory
- > Mental health
- > Diabetes mellitus

UK Joint Health Claims Initiative (2005): “Eating 3g weekly or 0.45 g daily, long-chain n-3 PUFA, as part of a healthy lifestyle, helps maintain heart health”.

# How much do we need?

## Mean daily intake in Australia and the recommended intake Omega 3



\*Source: Mayor BJ et al., 2003

UK SACN: Scientific Advisory Committee on Nutrition

ISSFAL: International Society of Fatty Acids and Lipids

WHO: World Health Organization

# How can the gap be met?

- > Capsules
  - > Pharmacological association
  - > Regurgitation (taste)/GIT upsets
  - > Impaired availability (?) of oil
  - > Oxidation of fatty acids
- > Oily fish
- > Omega 3 enriched foods



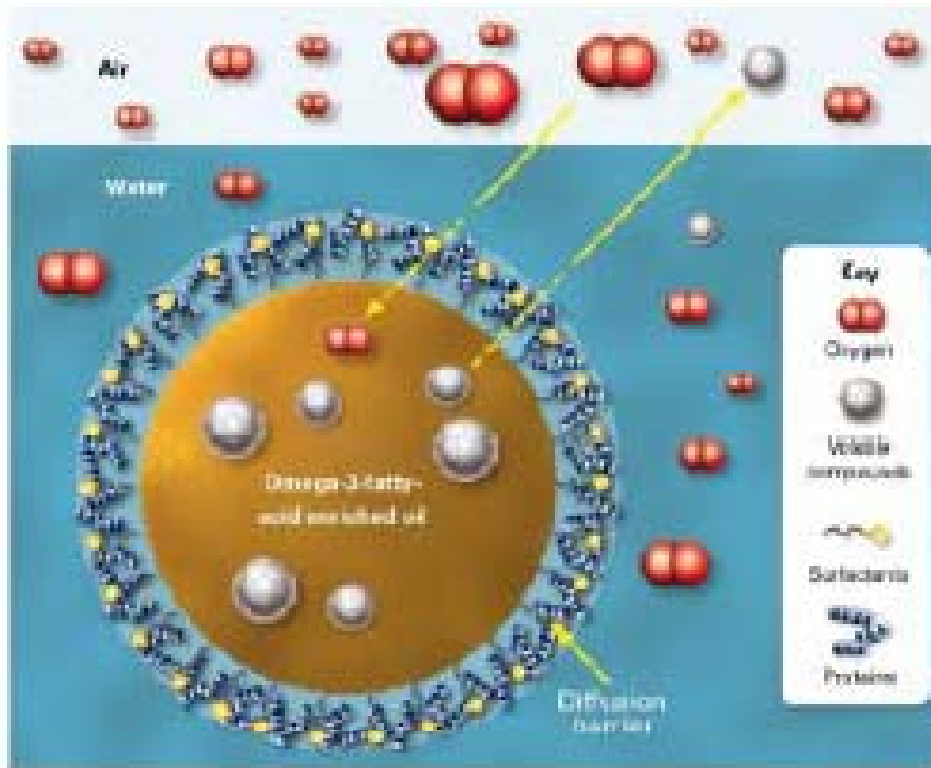
## ... but taste is vital:

- > Consumers want good taste and fit with their lifestyle
  - > Taste is still more important than health
    - > Fish oil has a characteristic taste which is difficult to mask in food products
    - > Fish oil is highly susceptible to oxidation resulting in unacceptable flavour and odour

# The Riddet Solution:

- > Novel patented technology which delivers high amounts of Omega-3 (EPA and DHA)
- > Based on encapsulation ensuring no fishy odour or flavour
- > High process tolerance
  - > Stable in common food processes like pasteurization, extrusion, baking
- > Proven effect on heart health and high bioavailability\*

# Encapsulation



Encapsulation of Omega 3 fatty acids inside an emulsion droplet. An interfacial barrier consisting of proteins, surfactants and other macromolecules can prevent oxygen from entering and volatile compounds from escaping.

**Patent Protected Technology**  
**WO 2006/115420**  
**(Singh, Ye and Zhu)**

***“An emulsion for protecting oxidizable lipids from oxidative damage”***

# Unique Aspects of the Technology

- > Use of different kinds of milk proteins processed to form protein complexes
  - > Caseins have strong ability of bind metal ions, including iron
  - > Whey proteins provide antioxidant effect through free radical scavenging by sulphhydryl groups
  - > Heat treatment of whey proteins exposes sulphhydryl groups – enhances the antioxidant effect
  - > Whey proteins interact with caseins to form large molecular weight complexes – provide thick and strong interfacial structures

# Food Applications

- > Milk pasteurised/ flavoured
- > Yoghurt
- > Ice cream
- > Smoothie/shots-"Yakult" type
- > Bread/baked goods/bars
- > Flaked breakfast cereals
- > Muesli
- > Hummus



# Who is Adding Omega-3's?



According to ProductScan Online there were **1241 omega-3 fortified foods, beverages, pet foods and cosmeceuticals launched in 2006** worldwide, up from 1065 in 2005.

Dha-in-mind.com

# Human Clinical Trials

- > Collaboration between University of Newcastle & Massey University.
- > Hummus Based Dip:
  - Low in fat content (6.5-8.6%).
  - Low in saturated fat (< 20% of total fat).
  - Low in sodium content (< 200 mg/100g).
  - 35 grams of the Dip provides 450 mg EPA & DHA/day.
  - Does not cause GI disturbances.
  - Bioavailability?



# Bioavailability in Humans: Study Design

- > Males and females with T2D (N = 13)
- > 100 grams of fortified dip/day
- > 1.3-1.4 g of LCn-3PUFA
- > Six weeks
- > Outcome measures:
  - Plasma lipids.
  - Plasma fatty acid composition.
  - Biomarkers of glycaemic control.

(M.L. Garg, R.J. Blake, E. Clayton, I.A. Munro, L. MacDonald-Wicks, H Singh & P.J. Moughan (2007). *European Journal of Clinical Nutrition*, 61, 1312-1317)

# Bio-availability

	Pre	Post
EPA	1.38 ± 0.18*	2.99 ± 0.47
DHA	2.42 ± 0.24*	4.34 ± 0.54

(M.L. Garg, R.J. Blake, E. Clayton, I.A. Munro, L. MacDonald-Wicks, H Singh & P.J. Moughan (2007). *European Journal of Clinical Nutrition*, 61, 1312-1317)

# Key Benefits

- > More than double the Omega 3 content of competing products.
- > Liquid form makes it easier to handle.
- > Masks fishy flavours and odours very well without affecting texture
- > Proven bioavailability in humans
- > Excellent shelf life.



# Taking the Technology to Market



## Joint Venture

Speirs Group Ltd

Massey University

BioCommerce Centre



# Commercialisation

- > Manufacturing plant in Marton, New Zealand
- > Marketing and business development team
- > On-going R & D programme to develop novel and improved omega technologies



# Commercialisation



- > Early 2009 Croda Europe signed a deal with Speirs Nutritionals to market our technology in UK, Europe and North America.
- > Croda International, based in the U.K, is a global leader in speciality chemicals and oils.
- > Total sales in 2008: NZ \$ 3.0 billion.



**CRODA** Functional Specialities  
Europe

## Massive omega-3 deal struck

Manawatu company seals supply agreement with European company.



By Grant Miller  
grant.miller@msl.co.nz

Manawatu-based Speirs Nutritionals has sealed a deal with the world's largest processor of fish oil concentrate.

That could see food boosted by large amounts of omega-3 – without the usual fish odour and taste – hitting international shop shelves next year.

Speirs will be the exclusive supplier of omega-3 emulsions to chemical company Croda Europe, which will market the health-promoting properties of omega-3 to food producers in Britain, Europe and North America.

Speirs Nutritionals director David Speirs said the agreement was a milestone for the company.

"It's filled us with confidence," he said, though it was unclear when production at the Marton factory would be ramped up.

"This agreement will see a New Zealand science breakthrough moved to international commercial

application in the fast-growing global market for functional foods with specific health benefits."

Omega-3 is associated with reducing the likelihood of heart failure.

Mr Speirs said Croda had been looking for micro-encapsulation technology, where a coating is added to tiny amounts of fish oil, protecting it from light and oxidation.

"Croda deemed our technology the best in the world," he said.

"That gives us credibility on the world stage."

Croda will launch a range of omega-3 emulsions at the Vitafoods International food fair in Geneva in

May. Mr Speirs said the omega-3 market was in its infancy.

Speirs Nutritionals started in 2006 as a joint venture between Speirs Foods, Massey University, the Bio Commerce Centre and the Riddet Institute research centre.

Riddet Institute scientists Paul Moughan and Harjinder Singh developed the micro-encapsulation process and the Bio Commerce Centre promoted the commercial potential to Speirs Foods.

"We've taken a lab technology to commercial scale," Mr Speirs said.

Massey University Vice-Chancellor Susan Maharaj said the supply agreement was a breakthrough.

"Food innovation is something Massey and the Riddet Institute are world leaders in and this result is a taste of things to come," he said.



David Speirs  
Friday, 27 March 2009, p. 3

**Manawatu Standard, 27 March 2009**

# The Product

- > Launched in Europe, May 2009
- > Launched in the US, June 2009



# Potency



An **OmeLife** enhanced muffin can deliver up to 100% of your RDI\*

\* Based on 450mg EPA+DHA or 2 servings of fish a week recommendations

# Your ingredient for life



## Ωmelife™ Smooth

Do you seek to differentiate your food brand with functional ingredients backed by proven health claims?

Croda's Ωmelife concentrated omega 3 ingredient is manufactured using state of the art micro-encapsulation technology, allowing you to achieve this goal.

By including Ωmelife Smooth in your food recipe you are guaranteed a concentrated, stable and fresh tasting omega 3 ingredient that is readily bioavailable and increases the potency claims of your end product.

Whether you wish to incorporate Ωmelife Smooth in soups or smoothies, muffins or muesli, the end result is the same; a concentrated omega 3 offering that complements and enriches your brand, whilst ensuring there is never a compromise on taste.

With Ωmelife Smooth, less is more.

- Pioneering Potency**  
 Concentrated levels of EPA/DHA per gram of oil for greater health benefits
- Convenient and Flexible Emulsion**  
 Incorporating omega 3 into a wide variety of food products and processes
- Unrivalled Organoleptics**  
 Gaining the goodness of fish without the taste and smell
- Healthy & Natural**  
 Containing naturally occurring ingredients, specially blended for product health claims
- High Stability**  
 Prolonged stability on incorporation into the food matrix

## CRODA

### Healthy and Natural

The ingredients of Ωmelife Smooth are simple; concentrated omega 3, water and milk protein, all naturally occurring ingredients with recognised health benefits. Figure 1 shows that Ωmelife Smooth has much reduced levels of saturated fats and no support matrices, which will enable manufacturers to maintain the nutritional content of their end product (Figure 2).



Figure 2: The incorporation of Ωmelife Smooth has little impact on the nutritional content of the end product.

As an emulsion, Ωmelife Smooth also maintains the fish oils natural liquid composition, making it a more 'natural' alternative to incorporating powdered fish oils.

### High Stability

Our patented technology and processes have been proven to enhance the oxidative properties of Ωmelife Smooth, meaning increased confidence in the shelf life of your finished products. Caseins and whey proteins are both known to improve oil stability, however, the unique technology used in the production of Ωmelife Smooth leads to an enhanced stability of the product.

Trials conducted on cereal bars containing Ωmelife Smooth at 45mg per 40g bar serving have shown excellent results:

- No significant difference ( $p > 0.05$ ) in stability at weeks 1 and 16.
- Pleasing taste and odour throughout the 16 week trial.

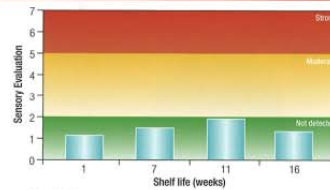


Figure 3: 16 week randomised blind tasting using trained sensory panellists. The intensity of odour and taste was measured using a scale of 1 (no intensity) to 7 (strong intensity), with acceptable taste/odour determined by values below 2.

### Formulating with Ωmelife™

Our food formulation scientists have experience in successfully incorporating Ωmelife at potent levels across a wide range of delicious recipes.

Contact your local Croda sales representative to find out how to make Ωmelife Smooth work for you and your product range.

#### Non-warranty

The information in this publication is believed to be accurate and is given in good faith, but no representation or warranty as to its completeness or accuracy is made. Suggestions for uses or applications are only opinions. Users are responsible for determining the suitability of these products for their own particular purpose. No representation or warranty, expressed or implied, is made with respect to information or products including, without limitation, warranties of merchantability, fitness for a particular purpose, non-infringement of any third party patent or other intellectual property rights including, without limit, copyright, trademark and design. Any trademarks identified herein are trademarks of the Croda group of companies.

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### Qmelife Smooth

<b>Description</b>	Concentrated omega 3 emulsion for use in a wide variety of food applications.
<b>Product Name</b>	Qmelife Smooth EE Qmelife Smooth TG
<b>Form</b>	EPA and DHA available in either ethyl ester or triglyceride form.
<b>Omega 3 Content</b>	150mg/g minimum
<b>EPA Content</b>	80mg/g minimum
<b>DHA Content</b>	50mg/g minimum
<b>Appearance</b>	Milky white emulsion



### Pioneering Potency

Qmelife Smooth is leading the way on potency in the omega 3 food ingredients market. With high EPA and DHA concentrations at low inclusion levels, Qmelife Smooth offers food manufacturers many advantages.

- Half the product inclusion required versus competitor offerings (Figure 1).
- 'One a day' claims achievable across applications based on an omega 3 level of 450mg EPA+DHA.\*\*
- Low in fat and calories, Qmelife Smooth is a more nutritious offering versus competitor products, containing up to 70% less 'non essential' fats per serving (Figure 1).
- Effective targeting of specific health conditions based on high omega 3 content.

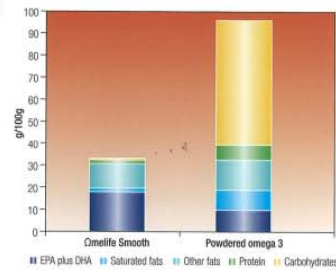


Figure 1: Composition profile of Qmelife Smooth versus a market-leading omega 3 powder



Enhance your brand offering with omega 3 health claims



\*\* Joint Health Claims Initiative, 2005

Your ingredient for life

### Convenient and Flexible Emulsion

Qmelife Smooth is a versatile food ingredient, which can be successfully incorporated into a wide and varied range of applications.



#### Bakery Products

Breads, Muffins, Nutritional Bars, Frozen Dough



#### Dairy Products

Yoghurts, Milk, Ice Cream



#### Cereal Products

Muesli, Cereal Bars



#### Savoury Products

Soups, Pizza Bases, Salad Dressings, Hourours



#### Drinks

Fruit Juices, Smoothies, Nutritional Shots

As an emulsion, Qmelife Smooth is a refreshing alternative to the powder offerings in the marketplace.

In certain applications the inclusion of high levels of powder, sufficient to deliver meaningful doses of omega 3, results in a 'gritty' feel to the recipe, thus having a negative impact on the texture of the end product. Qmelife Smooth actually has the opposite effect in liquid applications, proven to deliver a distinct benefit to the texture of dairy products, smoothies and juices.

### Gaining the Goodness of Fish without the Taste & Smell

Getting many children, and adults alike, to eat omega-rich fish like mackerel or sardines can be difficult due to their potent smell and flavour. Similarly, many struggle to fit a daily omega 3 supplement into their routine. For a growing number of consumers, omega 3 enriched food is a more palatable alternative to eating fish or taking fish oil supplements.

Our unique technology keeps the goodness of the oil, whilst eliminating the fishy taste and odour in the end product. Qmelife Smooth has been rigorously tested in-house to ensure it offers unrivalled organoleptics in the areas of taste and odour.



For many, Qmelife enriched food is a more palatable alternative to eating fish

# Ωme-1-shot™



5g contains 500mg of Omega 3  
(EPA 295mg + DHA 205mg)

CRODA

# Conclusion

- > Marine omega-3 (fish oil) enriched foods is a rapidly growing category of functional foods
- > Health effects are well proven
- > Croda is a major player
- > Major opportunity for Speirs Nutritionals

