

LONG CHAIN OMEGA-3 COLLABORATION - NUTRITION FACT SHEET

Omega-3 fatty acids

- Long chain omega-3s in the diet are essential for human health and optimal body function. An increased intake of long chain omega-3s is known to protect against heart disease¹, some inflammatory diseases and autoimmune disorders including rheumatoid arthritis². Long chain omega-3 fats also play a major role in infant growth and development, as well as behavior, attention and learning in children³.
- Nutritionally important long chain omega-3 fatty acids include eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). EPA and DHA are polyunsaturated fatty acids, commonly found in ocean algae and oily fish such as salmon. The typical Western diet does not provide enough EPA and DHA omega-3s, which may contribute to increased risk of chronic diseases and hundreds of thousands of preventable deaths⁴.
- The Heart Foundation recommends that to lower the risk of coronary heart disease, all adult Australians should consume about 500mg of combined DHA and EPA per day through consumption of two or three serves of oily fish a week and other foods and drinks enriched with marine long chain omega-3 polyunsaturated fats and/or fish oil capsules or liquid⁵.
- There is a clear public health benefit in increasing the average intake of essential long chain omega-3 fatty acids.
- World demand for omega-3 oils is increasing at a tremendous rate due to continued research validation of positive affects in human diets. Omega-3 oil sourced from wild fish stocks will be unable to meet future demand and fish farming or 'aquaculture' uses fish meal and oils to feed its stock which is not sustainable in the long term.
- Plant-based long chain DHA omega-3 canola oil production will achieve a high quality, sustainable supply alternative by using advanced precision genetic technologies to transfer a plant gene from microalgae to another plant, canola.

The Project

¹ National Heart Foundation of Australia, "Position statement on dietary fats," *Australian Journal of Nutrition and Dietetics* 1999; 56:s3-s4.

² Rennie KL, Hughes J, Lang R, Jebb SA, "Nutritional management of rheumatoid arthritis: a review of the evidence," *Journal of Human Nutrition and Dietetics* 2003;16:97-109.

³ Omega-3 Centre, "Omega-3 fatty acids – essential nutrients for our children," *Scientific Consensus Workshop* 2007.

⁴ Global Organization for EPA and DHA Omega-3 website <http://www.goedomega3.com/>

⁵ Colquhoun D, Ferreira-Jardim A, Udell T, Eden B, The Nutrition and Metabolism Committee of the Heart Foundation, "Review of evidence: Fish, fish oils, n-3 polyunsaturated fatty acids and cardiovascular health," *National Heart Foundation*, 2008.

- Nuseed (a wholly owned subsidiary of Nufarm Ltd), the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and the Australian Grains Research and Development Corporation (GRDC) have joined in a \$50 million dollar research collaboration to focus on the development of a high value vegetable oil which will contain the same high quality, long chain DHA-rich omega-3 that traditionally comes from fish.
- The three parties have signed two major agreements to develop and market plant made DHA-rich omega-3 oils, utilising world leading biotechnology. The first agreement is a multi-year collaborative research project to achieve a series of development milestones and complete a broad range of studies. The second agreement is a world-wide exclusive commercial license to Nuseed for existing and co-developed long chain omega-3 intellectual property.
- The combined expertise positions this project strongly to successfully develop and commercialise the world's first DHA-rich omega-3 canola oil.
- The DHA omega-3 oil will be used for human consumption and also have applications in the aquaculture industry.
- The project aims to deliver DHA levels equal to or greater than fish oil. In other words, consumption of this oil would provide the same health benefits as eating fish.
- Pending achievements of research milestones, it is expected that the first elite canola line trials will start in 2013 with expected commercial release in 2016.

The Process

- The science behind this research uses advanced precision genetic technologies to transfer one plant gene (from microalgae) to another plant (canola).
- The precision gene technology strategy being utilised to deliver oil comparable to DHA levels in fish of equal or greater quality at commercially viable levels is based on robust world-leading science.
- CSIRO has had a long history of ground breaking research in omega-3 nutrition and plant genetics, providing the scientific basis to develop plants containing long-chain omega-3 polyunsaturated fatty acids typically found in fish oils (such as EPA and DHA).
- The establishment of the CSIRO's Food Futures Flagship eventually provided the vehicle to undertake this significant endeavour in plant metabolic engineering and in a relatively short space of time the Long Chain Omega-3 Land Plants team members from CSIRO Plant Industry, Food and Nutritional Sciences and CSIRO Marine and Atmospheric Research were able to lead the world by being the first group to report DHA synthesis in seeds in a peer reviewed journal.

- CSIRO has initially invested and has conducted the discovery and proof of concept stages of this project in multiple oilseed crops. GRDC has provided financial support to assist in the development of the technology in canola.
- Nuseed joins the collaboration to support the next stage of development, regulatory approval and global commercialisation.

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About the Omega-3 Oil Research Collaboration

This collaboration brings together three of Australia’s leading organisations in grain research. The CSIRO through its Food Futures National Research Flagship providing investment, the research science behind omega-3s and developing transgenic omega-3 canola; Grains Research and Development Corporation (GRDC) providing investment; and Nuseed providing investment and development, including regulatory and breeding expertise to the collaboration.

Company background information

CSIRO

The Commonwealth Scientific and Industrial Research Organisation (CSIRO) is Australia's national science agency and one of the largest and most diverse research agencies in the world. CSIRO applies its world-leading scientific knowledge to create jobs, national wealth, a healthy and sustainable environment and improved living standards for all Australians. CSIRO is enhancing Australia’s food production systems through an integrated ‘farm-to-fork’ approach. CSIRO is delivering science to enable increased productivity and efficiencies at the farm level, improving the quality and yield of Australian crops, developing innovative food processing technologies, creating new value-added foods, and developing the nation’s livestock, aquaculture and fishery industries. www.csiro.au

Nuseed

Nuseed, a wholly owned subsidiary company of Nufarm is a global seed company committed to the breeding and production of high performance planting seed including canola, sunflower, grain and forage sorghum. Nuseed is committed to the development of elite seed products that drive value both on the farm and through the agrifood chain. Nuseed is a member company of the Global Organization for EPA and DHA Omega-3 (GOED).

www.nuseed.com

GRDC

The Grains Research and Development Corporation (GRDC) is one of the world's leading grains research, development and extension (RD&E) organisations. GRDC invests in RD&E to provide growers with vital information, knowledge and resources to support effective competition by Australian grain growers in global grain markets, through enhanced profitability and sustainability.

The GRDC's investment in farming practices, plant varieties, and new products has helped position Australia's growers as the best in the world. www.grdc.com.au