

Public Comment on the Development of Alternative Aquaculture Feeds

We write to provide the NOAA Aquaculture Program with information on research conducted by the CSIRO Food Futures National Research Flagship in Australia on the creation of commercial oilseed varieties that produce healthy omega-3 oils. The novel sources of long chain omega-3 oils have an important role to play in the future of aquafeeds given that such sources of oils allow the generation of non-fish aquafeeds that provide the oils for maintenance of fish as an important source of omega-3 in the human diet.

Omega-3 oils are polyunsaturated fatty acids that are considered 'healthy oils'. Docosa-hexaenoic acid (DHA) and eicosapentaenoic acid (EPA) are long-chain omega-3 oils that are particularly favoured for their health benefits.

In the past, long-chain omega-3 oils have been made by lower plant forms, like microalgae. They have then predominantly been acquired by fish, and eventually by humans through the food chain.

The health benefits of a diet high in long-chain omega-3 oils include:

- improved cardiovascular health
- improved foetal and early childhood growth and development
- reduced Type-2 diabetes
- reduced asthma

Omega-3 oils are also useful as an anti-inflammatory agent and may have benefits on neuropsychiatric disorders, such as cognition, mood and depression.

Nutritional authorities suggest a daily intake of at least 430 mg for women and 610 mg for men of long-chain omega-3 oils, including EPA and DHA. Dietary surveys show that most Australians only consume an average of 30 mgs of EPA and DHA each day.

Our team is creating new plant varieties by:

- identifying genes in microalgae that produce omega-3 fatty acids, especially DHA
- inserting the genes into oilseed plants, so they will produce the DHA fatty acids in their oils.

A successful prototype has already been created, by inserting microalgae genes for producing EPA and DHA into Arabidopsis plants (that is, plants from the mustard family). The plants produced EPA and DHA in their seed oil. The team is now working to create commercial oilseed crops containing EPA, DHA and other omega-3 oils. As with all genetically-modified plants, the new crops will need to undergo extensive testing and safety evaluation under the appropriate regulatory authorities before being made commercially available.

Many foods are now enriched with omega-3 oils from fish, but with declining natural fish stocks, and aquaculture's current reliance on fish-based feeds, additional sources of long-chain omega-3 oils are urgently needed.

EPA and DHA enriched crop plants could:

- provide consumers with cheaper and more varied sources of EPA and DHA, particularly valuable to those with fish allergies or who, because of cost, availability or choice, don't have a high level of fish consumption in their diet
- reduce demand on natural fish stocks as a source of EPA and DHA
- allow fish in aquaculture to be fed EPA and DHA enriched plants, rather than continuing to use other fish as a feed, improving the sustainability of aquaculture without compromising quality.

We aim to have a commercial product available by 2013. To find out more about our work, please visit <http://www.csiro.au/science/ps1zn.html>.

We would welcome further dialogue with the National Oceanic and Atmospheric Administration about opportunities to use this exciting technology to deliver a new generation of aquafeeds that reduce pressure on marine resources.

Yours sincerely

Dr Bruce Lee

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