



Note: Additional information pertaining to this topic can be obtained from the following documents:
Worm B. et al. Impacts of Biodiversity Loss on Ocean Ecosystem Services. *Science* Nov 3. 2006.
File entitled: *Fish meal oil usage*
Fish meal oil production
Croda tuna origin 2

Q. WHAT IS YOUR POSITION ON GLOBAL OVERFISHING?

A. Global overfishing is a major concern that is currently being taken very seriously by countries around the world. Boris Worm from Dalhousie University, Halifax, Nova Scotia, brought the issue to a head in Nov 2006 when he and 13 other scientists from Canada, the United States, Britain, Sweden and Panama published a report showing that global fish stocks could collapse by the middle of this century. According to an interview with Worm published in *Progress* April 2007, Vol. 14, No. 3, the purpose of the article was to draw attention to the issue. It has done that so successfully that media around the world is now following the growing government debates that are taking place internationally. According to Worm, the intent of the report was to “*to prevent this (loss of biodiversity) from happening..... It's not inevitable that this will happen, if we can change our ways.*” He pointed out areas where improvements in fishing techniques could prevent stresses such as restricting certain trawling locations, “*some bottoms can sustain bottom trawls. Others cannot.*” Based on his assessment, if we manage our fishing policies and do not overfish to deplete stocks then fish oil is renewable. Those changes in fishing policies are being discussed and formulated now.

In the meantime use of fish oil in human nutrition is not a major usage. There are over 1.2 million tonnes of fish oil per year produced. In 2000, about 31 % of this was used directly for human nutrition in food and another 2% was used for supplements/pharmaceuticals. It is all a source of EPA and DHA. The other 67% went into either aquaculture, technical use, or was even burnt as fuel in the processing plants. By 2010, the later usage is on track to increase to 98% with only 1% being used for human edible oil and 1 % for supplements and pharmaceuticals. This is a criminal waste of essential nutrients and more effort should be put into using this 0.95 million tonnes for human nutrition. In essence, fish oil use in supplements has negligible impact on fish stocks or overfishing and is instead a means of optimizing return from an undervalued resource.

Reference: Worm B. et al. Impacts of Biodiversity Loss on Ocean Ecosystem Services. *Science* Nov 3. 2006. Also, see files entitled: “Fish meal oil usage” and “Fish meal oil production”.



Q. WHAT IS BEING DONE TO MINIMIZE THE USE OF FISH OIL IN EFAMOL PRODUCTS?

A. The efficacy of all of the Efamol products has been proven in clinical trials and is used to support the products in marketing, but perhaps more importantly to substantiate health claims from a regulatory perspective. In many countries, the health claims associated with the products cannot be made without significant clinical documentation to prove efficacy. Therefore, we cannot change to a vegetable source of short chain n-3 that has insufficient evidence to prove its effectiveness for the purposes for which we sell our products. Unfortunately, nor can we currently substitute algal derived material eg Martek oil, as yet there is little data on this product to support our current efficacy claims in children/adults. Once adequate data is available we will consider inclusion in our formulations.

Q. WHAT FISH ARE USED IN EFAMOL PRODUCTS?

A. High DHA Fish Oil is prepared commercially from fish of the tuna species (mainly Skip Jack – approx 70%, and Yellow fin – approx 30%) obtained from Thailand and Australia. This oil is included in Efalex and Efanatal. Efamarine, Efacal and Efamax contain oil from cold water fish such as sardines and mackerel.

Q. HOW DO YOU KNOW IT'S ALWAYS TUNA FROM THE SAME AREA?

A. The tuna oil is sourced from Thailand and Australia. See supplier "Croda tuna origin 2" certification from our supplier.

Q. WHAT TYPE OF BI-CATCH OCCURS DURING THE TUNA FISHING?

A. Bi-catch is minimal because the majority of tuna are caught using long lines and hooks rather than nets.

Q. HOW LONG IS FISH DEAD BEFORE PROCESSING?

A. The fish is placed on ice as soon as caught and is processed as soon as possible to maintain freshness – note that some of the meat is used in sushi so the product must be maintained in good condition.



Q. WHAT PARTS OF THE FISH ARE USED TO MAKE THE OIL?

A. Whole fish (skin, head, organs, bones, etc) except liver.

Q. WHAT HAPPENS WITH THE FISH FLESH AFTER THE FLUIDS ARE REMOVED?

A. It is used either for sushi (tuna steaks) or canning.

Q. HOW IS THE FLUID ACTUALLY SEPARATED FROM THE ANIMAL?

A. Water and steam.

Q. HOW ARE THE ANIMAL FLUIDS ACTUALLY SEPARATED FROM EACH OTHER?

A. Centrifugation.

Q. WHAT SOLVENTS ARE USED IN THE REFINING PROCESS?

A. See manufacturing flow diagram.

Q. WHAT IS THE SPECIFIC REFINING PROCESS USED TO REMOVE THE ENVIRONMENTAL TOXINS FROM THE OIL (SPECIFIC CHEMICALS, TEMP, TIME, ETC)?

A. See manufacturing flow diagram.

Q. IS MOLECULAR DISTILLATION USED TO REMOVE CONTAMINANTS (OR IS WINTERISATION ENOUGH?)

A. For the tuna oil we use chromatographic refining in which contaminants are absorbed onto a silica column. Winterisation removes saturated fats and stearine; it does not remove contaminants.



Q. IS THE VITAMIN E NATURALLY PRESENT IN THE FISH OIL DESTROYED DURING REFINEMENT? I KNOW THAT THIS VITAMIN IS ADDED LATER TO PROTECT THE OIL.

A. There is very little Vitamin E present in fish oils.

Q. WHAT TESTS ARE PERFORMED TO DETERMINE MOLECULAR DEGENERATION, ALTERATION OR OXIDATION OF THE OIL MOLECULES AFTER REFINING?

A. Peroxide values, anisidine values and acid values. Trans fatty acids are determined by the supplier for high DHA tuna oil and are less than 1%. Product specifications showing all tests performed routinely on Efamol oils and acceptable limits can be obtained by request from our Quality Assurance Manager.

Q. WHAT ARE THE AVERAGE LEVELS OF ENVIRONMENTAL TOXINS (MERCURY, DIOXINS, PCB'S, ETC) IN THE CRUDE OIL BEFORE REFINING?

A. This question is irrelevant because we use refined oil.

Q. WHAT OTHER TOXIC CHEMICALS DO YOU ROUTINELY FIND IN THE CRUDE OIL?

A. This question is irrelevant because we use refined oil.