FEEDING FISH, FISH MEAL AND FISH OIL FULFILL ORGANIC TENETS

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*Alternative nutritional technologies to Fish Meal (12%) and Fish Oil (12%) of Total Feed*

**6. Is utilization of wild-caught sources in organic fish farming system feasible or acceptable to the organic community? Why or Why not?**

## Introduction

The use of wild caught sources of fish for organic fish farming systems is feasible, acceptable and should be encouraged. The use of fish meal and fish oil for rearing fish is an excellent use of these resources and it is ecologically more prudent to use these resources for rearing fish than many of the other common uses of these materials such as; fuel, fertilizer, industrial raw material and food for terrestrial livestock. A primary hindrance to the use of fish meal and fish oil in organic fish farming has been political.

Fish have been harvested for the purpose of producing fish oil and fish meal for centuries. Aboriginal communities used fish oil for heating and lighting. Fish for reduction were initially harvested primarily for the value of their oil. The meal or cake was a byproduct of oil production. The first commercial uses of fish oil where industrial with the oil being used for fuel and in industrial applications such a oil based paints and lubricants. The meal or cake was most commonly used as a fertilizer. With the development of larger scale fisheries following the widespread introduction of steam powered fishing vessels much larger amount of fish oil and fish meal were produced.

The production of oil and meal from these larger fisheries was still being used primarily for fuel and other industrial purposes and for fertilizer. It was not until the latter half of the 20th century that fish meal and fish oil began to make a significant contribution to animal feeds. The advances being made in animal science and nutritional sciences throughout the 1940's and 1950's discovered that fish meal was an excellent supplement for animal feeds. Fish oils began to enter the animal feed supply once they could be stabilized and transported from production sites to market. The extensive use of fish oil in animal feeds did not actually occur until the advent the expansion of the aquaculture industry during the 70's and 80's. The fat sources for the first successful complete fish diets were tallow and it is only in the past 20 years that fish oils were used as the preferred energy source for fish diets. During the 80's and 90's there was a technological change in fish feed preparation with a switch from palletized feed to extruded feed. This technological change made it possible to increase the level of lipid in the diet. Higher lipid levels had were sparing on protein which resulted in the adaptation of higher lipid diets and a concomitant increase in the use of fish oils.

During these experimental years it was also discovered that pisciverous fish (fish which eat fish) such as salmon and tuna would thrive on diets based primarily on fish meal and fish oil and that diets based on carbohydrate energy sources were far less efficient and such diets can be detrimental. Today's fish diets are nutrient dense with high concentrations of fish proteins and fish lipids resulting in very efficient conversion of feed nutrients to fish flesh.

Despite the rapid biological and technological advances in fish nutrition there has been little advancement in the politics of fish nutrition. Prior to the rapid growth of the salmon farming industry and the collapse of markets for Alaskan salmon there was very little concern about the use of fish meal and fish oil for fish feeds. Feeding fish meal and fish oil to fish only became a hot button issue with the collapse of the value of wild salmon and the entry of a wide variety of NGO's into the debate. The premise that fish meal and fish oil should not be used for growing fish was introduced and promoted by these NGO's as part of the demonization of fish farming. In its attempts to discredit fish farming the anti-fish farming NGO community has also railed against the development of organic aquaculture standards.

The fight to prevent the development of organic aquaculture standards in North America are political and not based on the principles underpinning organic agriculture. One of the tenets of organic production is the preservation of biological capital. Once the overlay of the political objections of the NGO's is removed, it becomes apparent that the use of fish meal and fish oil for the rearing of organic fish should be encouraged.

## Fish Meal and Fish Oil Should Be Preferentially Used for Feeding Fish

Fish meal and fish oil used for rearing fish is a better alternative than using these products for fuel, industrial raw materials, or for feed ingredients for poultry, swine and cattle. Fish meal and fish oil have very high biological values. Fish meal contains a high concentration of the sulfur containing amino acids (lysine and methionine) which are limited in plant proteins and required for the efficient growth of both birds and mammals. Also, fish oil has very high concentrations of highly unsaturated long-chain fatty acids which have many health promoting properties.

Although birds and mammals can thrive on fish meals they are not very efficient in conserving the inherent biological value of these materials compared to the ability of fish to preserve the inherent biological value of fish meal and fish oil. Conversion efficiency based on the edible protein and energy recovery basis in fish is about twice that of poultry and many more times efficient than cattle.

The NOP standards currently allow the use of fish meal and fish oil for use as a non synthetic supplement for feeding to birds and mammals. The conservation ethic underlying the many of the principles of organic farming should also apply here and the NOSB should actually encourage the use of fish meals and fish oils for the feeding of fish. By doing so the NOSB is recognizing the high biological value of fish meal and fish oil and will be encouraging a best use practice for a feed ingredient which represents a lot of biological capital.

## Inter-trophic Energy Transfer – Aquatic vs Terrestrial Systems

Understanding the difference in inter-trophic energy transfer between terrestrial and aquatic ecosystems is fundamental to understanding the debate on the use of fish meal and fish oil for growing fish. The aquatic ecosystem food chain is quite different from the terrestrial ecosystem food chain. Terrestrial plants using sunlight as their energy source, convert atmospheric $CO_2$ and various nutrients from the soil into plant structures consumed by terrestrial animals and birds (leaves and seeds) that contain protein, cellulose, other fibrous materials and starch , the primary storage form of energy in plants. Terrestrial farm animals have evolved to be relatively proficient at using starch for energy and a large group of terrestrial animals have also adapted to use cellulose as a source of energy. In contrast, the food chains in aquatic ecosystems depend on primary production by algae, which use sunlight as their energy source to convert water borne carbon dioxide and water borne nutrients into protein and lipids rather than starch. Not surprisingly, aquatic species have primarily evolved to be very efficient at using proteins and fat for energy sources and are poorly equipped to use starches or other carbohydrates as energy sources. For pisciverous fish (fish which eat other fish), such as salmon and tuna, primary dietary inputs are protein and lipid (fat). Lipids are more energy dense than either starches (carbohydrates) or proteins and the inter-trophic transformation of energy using lipids are extremely efficient.

Not only are the food energy and protein transfers efficient in fish but fish also require much lower amounts of maintenance energy compared to terrestrial animals. This difference is associated with the fact that fish are not required to oppose gravity because they are neutrally buoyant and because fish are poikilothermic (cold blooded); they are not required to expend energy to maintain a constant body temperature. A direct comparison of energy efficiency of terrestrial, herbivorous, homoeothermic (warm-blooded) farm animals and farmed fish is difficult but possible. By looking at retained digestible energy and protein we find that fish are the most efficient of all the commonly raised farmed animals.

Organic standards allow the use of fish meal and fish oil as an addition to livestock feeds. Because fish are much more efficient than other species of livestock for using these resources, the use of fishmeal and fish oil for the production of organic fish should be encouraged rather than restricted.

## Fish Meal and Fish Oil From Sustainable Sources?

The sustainability of various fisheries is in constant flux and subject to a wide variety of definitions. In order to advance this discussion the definition of a sustainability fisheries resource will first need to be addressed.

Sustainability of fisheries resources is constantly under review. Governments of all strips, large international bodies such as the FAO and private organizations such as the Marine Stewardship

Council have put forward sustainability criteria for fisheries. Although they generally agree on the principle of sustainability (that the exploitation and management of the fishery is such that the fishery will be around for future generations) there are significant differences in the details of the application of the principles. The applications of the principles also becomes complicated politically because of different national governance structures which regulate fisheries. Despite the apparent differences and difficulties there are global fisheries which are managed sustainably. The large Alaskan fisheries for salmon and Pollock, the menhaden fishery and the large pelagic fisheries in South America are all intensively managed for sustainability. All of these fisheries have been very productive for a very long time and indications are that they will remain productive.

These fisheries are very large covering vast oceanic areas and have a very large biological bases to drawn on for raw materials. The sheer size of these fisheries and the broad biological underpinnings contribute to their apparent stability. The relative harvest volumes from these fisheries based on the tonnages of small pelagics which support the fisheries are between 0.5 and 0.7 million tonnes for the menhaden fishery, between 8 and 12 million tonnes for the south American pacific fishery and 30 to 35 million tonnes for the Alaskan salmon and Pollock fisheries. These fisheries have been active for about a century and although there are some dramatic variations in harvest volumes during some short periods of time these fisheries have produced sustained volumes of fish for a very long time. In addition to the large size of these fisheries contributing to their stability the governments responsible for these fisheries have implemented several strong fisheries management initiatives to ensure sustainability, including closed seasons, strict quotas and third-party inspections at port of unloading and in many cases onboard observers.

Once a sustainable fishery has been established it can be used to produce fish for human consumption, fish meal and fish oil, or a combination of both. The large scale small pelagic fisheries along the Pacific coast of South America and the North American menhaden fishery are primarily used for the production of meals and oils and only relatively small amounts of the these fisheries are used for direct human consumption. By contrast the ranched salmon and the Pollock fisheries of Alaska which are based on the consumption of large volumes of smaller fishes are harvested primarily for production of food for human consumption but a significant portion of this fishery is also used for the production of fish meals and fish oils. In the case of the Alaskan fishery the fish meals and oils are considered to be byproducts.

These fisheries are examples of sustainable fisheries which can supply fish meal and fish oil to the organic fish farming community. There are several smaller fisheries which also meet the requirements of sustainability and can be secondary sources of meals and oils for organic production. In addition to these established sources of sustainable feed ingredients there is a large potential source from by-catch. By- catch is however a complicated political issue and it is likely that it will be many years before this source of feed ingredients is available.

**Fish Meal and Fish Oil for Food Ingredients for the Production of Organic Fish is Controversial.**

There is a well orchestrated targeted campaign by several NGO’s and their affiliates to prevent

the development of organic fish farming standards for fish which primarily eat fish. This anti organic fish farm campaign is not based on how to apply organic principles to the rearing of fish but rather to generate emotional arguments to influence the decision making process. The recommendations before the NOSB on the use of fishmeal and fish oil in organic fish diets appear to reflect the specific wishes of these NGO's rather than being driven by organic principles.

This anti organic fish farming campaign is well organized and well financed. For example there is a $190 million dollar "Wild Salmon Ecosystems" Initiative of the Gordon and Betty Moore Foundation[1] which has supplied funds to many of the groups which are opposed to the farming of salmon. In addition much of the literature both scientific and non-scientific which has been published criticizing salmon farming has been funded by the Pew[2] and the Packard Bell Foundations[3]

A clear example of the campaign to demonize salmon farming can be found on the The Moore Foundation web site., SeaWeb, based in Washington D.C., was granted $560,000 for ***"identification of antifarming audience and issues, integration of aquaculture science messages into antifarming campaign, standardization of antifarming messaging tool-kit, creation of an earned media campaign and co-ordination of media for antifarming ENGOs***.", and according to page 76 of their 2004 tax filing to the Internal Revenue Service, the $560,000 grant to SeaWeb was to provide "***a high quality tool-kit and coordination infrastructure for use by ENGOs (environmental organizations) in their campaigns to shift consumer and retailer demand away from farmed salmon."*** The CAAR (Costal Alliance for Aquaculture Reform) group in BC and the David Suzuki Foundation have also received funds from some of these groups to support their anti-salmon farming campaign.

The politics of this debate became crystal clear this year in BC when during a court case correspondence between the president of the Certified Organic Associations of BC, (COABC) and member of the CAAR group were entered as evidence. The COABC had been warned by government staff that if it opposed aquaculture directly the COABC would lose their monopoly on the regulation of organics in BC. The government would set up a separate process to deal with certification of aquaculture. In order to prevent this from happening the COABC came up with a political solution which was to prescribe a set of objections to the proposed standards which simply made it impossible to farm fish organically. In an email from the President of the COABC to CAAR the president of the COABC stated " *So the [COABC] board is currently developing this list of decision which would almost certainly make salmon aquaculture not feasible at this time. This motion is good from our perspective because it does not shut down the*

[1]Alaskan Marketing Behind Salmon Farming Controversy? Westcoaster
September 28, 2007 By Vivian Krause
http://www.westcoaster.ca/modules/AMS/article.php?storyid=2671

[2] International Foundation for the Conservation of Natural Resources "Pew spends money developing a sympathetic infrastructure within the U.S. social framework. It funds training programs for the media, underwrites academic research, and, of late, plays an increasingly more public role in creating or affiliating with organizations highly critical of global aquaculture"
http://www.fisheries.ifcnr.com/article.cfm?NewsID=509

[3] Aquaculture Strategy Executive Summary Marine Fisheries Subprogram June 2007, The David and Lucile Packard Foundation
http://www.packard.org/assets/files/conservation%20and%20science/aquaculture_exec_summ_Web_091907.pdf

*issue entirely but puts the ball squarely back in the proponent's court.*" The sentiment in this email from a senior member of the organic community strikingly illustrates how the central focus of the development of organic aquaculture is political. The COABC, who in BC has the responsibility for the administration of the Provincial regulations was working directly with the anti-fish farming NGO's to thwart the attempts of the Pacific Organic Seafood Association to bring forth standards for the organic production of fish. The rationale for stopping the development of organic aquaculture standards was purely political. It had nothing to do with organic principles or with the science of rearing fish or with the fate of wild fisheries.

The decision facing the NOSB and the NOP are NOT decisions based on science they are political decisions based on the "needs" of the organic community real or perceived. Scientific debate is readily beclouded by scientists who fail to recognize the boundaries between intrinsically scientific and intrinsically political questions and advocate their own ideological beliefs. Often the only credible course for scientists to fallow is to admit the magnitude of uncertainties. Public acceptability of a given policy is a political, not a scientific issue.

Organic fish farming is being practiced in most counties where fish farming occurs. There are currently at least 15 standards or draft standards being used to guide and control organic fish farming. Some of the organizations, which have organic standards are; Bio Suise – Association of the Swiss Organic Agriculture Organizations, Codes Alimentarius– Codex Alimentarius Commision, DEBIO – Norway, EU Regulation 1804/99, IFOAM – International Federation of Organic Agricultural Movements, KRAV – Kontrollforeningen for Ekologisk odling (Sweden), Naturland – Naturland e.V., SGS – SGS Organic Production Standard, Pacific Organic Seafood Association and Conseil des appellations agroalimentaires du Québec Canada, Soil Association Britian, BFA – Biological Farmers of Australia , BIO GRO – New Zealand Organic Standards and Danish Veterinary and Food Administration – Red O label, Demark. None of these standards limits the amount or prohibits the use of fishmeal or fish oil in fish diets but they do provide a variety of restrictions usually based on the source of the fish meal[4].

The current recommendations before the NOSB regarding the use of fishmeal and fish oil are of a political nature. Organic principles, taking into account the ecology of aquatic systems would

[4] **IFOAM 5.10.3** Operators who bring in feed that contain aquatic animal protein in a diet shall use only by-products not suitable for human consumption. Operators may use a limited amount of aquatic animal protein fit for human consumption on an emergency basis. Such protein shall not exceed 50% of the fish diet.
**KRAV** 7.5.1.1 Feed for aquaculture organisms shall basically consist of 100 percent KRAV certified feed and/or feed which is approved for use in KRAV certified production originating in wild aquatic stock.
7.5.1.3 Feedstuffs from wild fish can be used in KRAV certified production on the following conditions: Wild fish shall come from sustainable stock and shall be environmentally certified by a certification body approved by KRAV Or Where feedstuffs from an environmentally certified wild aquatic stock are not available or only constitute a proportion of the feed mix, at least 50 percent of the aquatic protein in the remaining proportion shall come from by-products. The remaining part shall consist of aquatic feedstuffs from species that are not normally used for human consumption.
**BIOSUISSE**
3.11.5 For salmonides and other carnivorous fish species, the addition of fish meal an fish oil is allowed. It has to be produced either from residues of edible fish processing or come from provably sustainable fishing.
**DEBIO**
7.1.3 Raw materials from wild fish can be used in organic production under the following conditions: Wild fish shall come from sustainable stocks and shall be certified as such by a certification body accepted by Debio. Or: Where raw materials from sustainable fisheries are not available or only constitutes a proportion of the feed, at least 50 percent of the aquatic protein in the remaining proportion shall come from by-products.

promote the use of fish meal and fish oil, not restrict their use as is currently the case. The organic principles guiding the vast majority of organic standard setting organizations include the use of fish meal and fish oil as key components of fish diets with the only caveat being that these products are derived from sustainable fisheries.

I urge the NOSB to modify their approach to the use of fish meal and fish oil in organic fish diets. In the terrestrial ecosystem birds and animals eat plants and we eat the birds and animals that eat the plants. In the aquatic ecosystem fish eat fish and we eat the fish that eat fish. The NOSB and the NOP have developed a set of organic standards for terrestrial animals which allows a variety of production schemes which can include the use of fish products. It should also be possible for the NOSB/NOP to develop and adopt a set of standards for the rearing of aquatic species using the same basic principles with appropriate adaptation taking into account the differences between terrestrial and aquatic ecology.

The difficulty will be the politics of these decisions. The Organic Consumers Association (OCA) (*a national organization representing the interest of over 850 000 members*) in an open letter to the NOSB is already playing the political card that they represent a large constituency and are urging the NOSB not to proceed with the development of organic standards for pisciverous species living in open net pens. The OCA does not supply any scientific information to support their thesis. They have simply presented their political clout – 850,000 members. It may be very difficult for the NOSB to make decisions based on organic principles and science when there is such and overwhelming political influence at play but I would still encourage the NOSB to make their decisions about aquaculture standards without allowing the OCA or others to in effect carry a veto into the NOSB's deliberations.

**Summary**

Fish meal and fish oil from sustainable sources should be used for the production of organic fish. The use of fish meal and fish oil as an ingredient in fish feed is the best way to preserve the high biological capital inherent in these products. Organic governing bodies the world over allow the use of fish meal and fish oil for use in organic fish feeds. In North America the use of these fish meals and fish oils for fish feed has become highly politicized. The reasons for the politicizing and polarizing of this issue are complex. Part of the reason is that farmed fish in general have markedly displaced wild fish in the market and the wild fish interests are fighting for market share. And part of the driving force to make the process political is that a lot of money is available to the NGO community if it is willing to prevent the growth of all forms of aquaculture including organic aquaculture.

The NOSB and the NOP have an exceptionally difficult decision to make. Biologically and ecologically aquaculture is very well suited for the development organic standards. Politically, it will be difficult for the NOSB to proceed because many of their constituents are politically opposed to the idea of developing organic standards for aquaculture. Globally, the organic community is supportive of organic aquaculture standards. Perhaps, by drawing on global experience and by accepting that the larger global organic community is supportive of organic aquaculture the NOSB and the NOP will be able to muster the political will to develop organic aquaculture standards for the United States which are in sync with the rest of the world and are biologically and ecologically sound rather than politically expedient.

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## APPENDIX

Material for possible wording of the standard from the Pacific Organic Seafood Association 2006 standard

## 3.10 NUTRITION AND FEEDING

### 3.10.1 Raw Materials

#### 3.10.1.1 Required

1) Aquaculture feeds must contain 100% certified organic raw materials and/or CB approved wild feed resources.

#### 3.10.1.2 Allowed

1) Other permitted ingredients:

    a. Algae, crab meal and other aquatic by-products, if they come from a fishery approved by the CB.

    b. The certifying body must approve additional materials added to the feed.

2) Non-aquatic animal meal protein sources may be used but must be of certified organic origin.

#### 3.10.1.3 Regulated

1) Foodstuffs from wild fish can be used in certified organic production on the following conditions: At least one half of the feed ingredients of aquatic origin must be derived from the by-products of wild caught fish for human consumption. Preference must be given to local materials. Non-local by-products and/or other marine source ingredients may be used with the approval of the certifying body when sufficient quantities and/or quality of local by-products are unavailable.

2) The certifying body may from time to time require testing of inputs for contamination.

3) The certifying agency may give dispensation for the use of an ingredient of conventional origin for a time-limited period if a certified organic feed ingredient is commercially unavailable.[8]

#### 3.10.1.4 Prohibited

1) Feeds containing more than 28% lipid.
2) Feedstuff derived by solvent extraction.