



February 20, 2008

Alternative Feeds Initiative
NOAA Aquaculture Program
1315 East-West Highway, Rm 13117
Silver Spring, MD 20910
NOAA.Aquaculture@noaa.gov

Dear Sir or Madam:

For more than 12,000 years, humans have developed agriculture systems that optimize nutritional value, minimize the cost of food, and are more or less sustainable. Ocean fish are the last wild food that we eat regularly. Now, globally, forces are aligned to continue or increase the rate of growth of aquaculture as a food production system. These forces include the widely acclaimed health benefits of eating seafood; global depletion of wild fish stocks with dire warnings for the future; and, in the United States, the huge negative contribution of seafood to the trade deficit. While the development of economic and sustainable marine aquaculture faces significant hurdles, lessons have been learned from land-based agricultural systems that must guide development of the ocean ecosystem.

For more than 15 years, U.S. soybean farmers have invested in developing soy-based feeds and sustainable production methodologies primarily for land-based omnivorous and herbivorous fish. Worldwide, our organizations work with fish farmers to improve their production capabilities with sustainable production methodologies and soy-based feeds. Today that commitment to aquaculture remains strong. Through the American Soybean Association (ASA), the United Soybean Board (USB), and the U.S. Soybean Export Council (USSEC) known overseas as the American Soybean Association - International Marketing (ASA-IM), this work has been extended into ocean waters with newly designed technology and diets high in soy products and plant protein for production of marine finfish, including those targeted by NOAA including pompano, sea bass, sea bream, cobia, cod, amberjack and yellowtail. These studies focus on quantifying the dietary limits for soybean meal and soy protein concentrate in practical diets for each of these species. U.S. soybean farmers expect to be positioned for rapid industry application in U.S. waters when the time comes to implement a permitting system for marine aquaculture.

Well-funded, strategic, highly credible research must be the foundation upon which U.S. aquaculture can be structured to be sustainable; neutral or beneficial to the ocean ecology; economically viable; and technically feasible. Because the development of highly digestible, cost-effective, nutritious diets is the lynchpin, we commend NOAA and USDA for taking the first steps toward coordinating research efforts in order to ensure that the highest quality data is available expeditiously, and without unnecessary redundancy. ASA, USB, and USSEC, representing more than 625,000 U.S. soybean farmers, welcome the opportunity to continue to work with NOAA and USDA by providing the following comments and responses to questions posed to guide the development of the NOAA- USDA Alternative Feeds Initiative:

(1) Groundbreaking research on alternative dietary ingredients (feedstuffs) for aquaculture, including plant based proteins, is expanding in the United States and worldwide. Where should the federal government focus its research efforts in the area of alternative feeds for aquaculture?

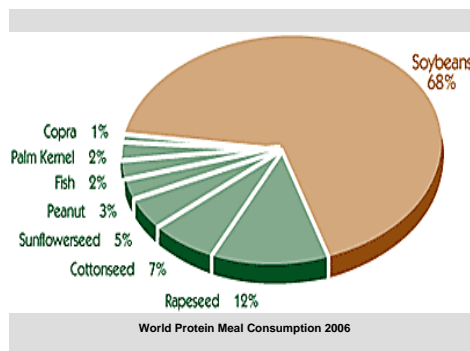
- Both the public and private sectors have supported research on plant-based diets for many years. Yet, there are still factors which limit the use of plant protein in the diets of some fish species of interest to the aquaculture industry. In 2003, the United Soybean Board took the first steps to expedite research breakthroughs by organizing and supporting the Plant Products in Aquafeed Working Group (PPA), an informal association of international experts that has been supported by NOAA and USDA as well as the feed industry. More than 50 experts from industry and academia have developed a roadmap, the Plant Products in Aquafeed Strategic Plan (<http://www.aquafeed.com/ppa-resources.php?site=all&typeid=17>), of the research needed to optimize the use of renewable and sustainable plant feedstocks in diets of cultured marine carnivorous fish. The plan describes seven research goals with objectives and performance measures and includes a spectrum of basic and applied research. We strongly recommend that NOAA and USDA build on the PPA Strategic Research Plan.
- Aquaculturists, feed processors, and environmentalists all understand that sustainable economic alternatives to fishmeal are critical to a viable future for the aquaculture industry. But aquaculture programs in the U.S. technical agencies are small, lack focus and integration, and are mainly directed toward land-based aquaculture. Therefore, we recommend that a mechanism be put in place for coordinating and re-aligning aquaculture research in these agencies with the needs raised by the rapidly growing, global offshore aquaculture industry;
- U.S. soybean farmers have identified increasing demand for soybean meal as a vital complement to producing economic, abundant biofuels. Therefore, while we welcome the collaboration between USDA and NOAA, we suggest that other agencies including DOE become actively involved. At DOE, research is underway on improving the processing of plant feedstocks for biofuels so that co-products (e.g. soybean meal, distillers' dried grain and solubles) are higher quality sources of protein that allow even greater and more widespread use in aquaculture diets.

Are there specific areas that the federal government should not address?

- Research resources are limited and must be used strategically. Much of the research conducted in the United States and elsewhere has been feeding trials. Until standards and protocols are developed for conducting and reporting these trials, the federal government should not compound more than 30 years of data that cannot be compared or reproduced.
- To date, there have been and are planned in the future a plethora of meetings, conferences, and workshops for the purpose of developing alternative aquaculture diets. There has been too little effort on developing funding for integrated projects to address the goals that have been identified.

(2) What are potential alternative sources of protein and oil for aquaculture feeds? For example, are there specific opportunities for greater use of seafood processing waste and other agricultural by-products in aquaculture feeds? Are there specific obstacles to using these alternatives as alternative dietary ingredients in aquaculture feed?

Offshore aquaculture will continue to grow globally, presenting an opportunity to U.S. agriculture at the same time that an offshore industry in the U.S. is in the legislative process. The U.S. soybean industry, through ASA-IM, has directed efforts in China for the past 15 years aimed at increasing soy protein use in aquaculture feeds for freshwater and marine finfish. Diets with 50% soy product inclusion have been developed and demonstrated for both freshwater and marine species. Soybean meal demand by the China aquaculture industry has grown from zero to approximately 5.5 million metric tons annually since the inception of the ASA-IM program. Our overall market share of beans exported to China is about 50%. As demand for soybean oil used in biodiesel continues to escalate, it is anticipated that protein derived from soy will continue to be critical to filling the demand not just in China but globally. (See chart.) Soy is one of the most versatile options and has the best balanced amino acid profile. Therefore, while other sources of protein must be developed, it is clear that soy will continue to play a major role in supplanting fishmeal as a source of protein in aquaculture diets.



Obstacle: It is likely that a combination of plant-derived and perhaps other feed ingredients will be required to replace fish meal. This raises challenges to feed millers who need to identify, purchase, store and mix many more ingredients to achieve the nutritional value of the feed.

(3) What type of treatments or processes show promise for improvement of existing aquaculture feedstuffs and for developing new feedstuffs? How soon could these technologies be commercialized?

We strongly recommend that NOAA and USDA explore ways to develop programs in collaboration with DOE on the most efficient ways to process plant feedstocks for biofuel with high quality, nutrition and proteinaceous co-products such as soybean meal or concentrate for use in aquaculture and other livestock feed.

(4) Fish meal and fish oil contribute important human nutritional components to aquaculture feeds such as omega 3 fatty acids. As the aquaculture feeds industry seeks to replace fish meal and fish oil with alternatives, how can the nutritional benefits of farmed seafood be maintained or enhanced? For example, what technologies exist for producing omega 3 fatty acids?

All of the major seed companies are developing soybeans containing high levels of omega-3 fatty acids for human food. The U.S. soybean industry has funded only limited research on fatty acid metabolism in marine finfish given the expected continued high demand for soy-based biodiesel. However, one industry-funded project currently underway is assessing the feasibility of high stearidonic soybean oil as a fish oil replacement in finfish diets. Research on alternative, high omega 3 oil supplements, such as algal meal concentrates, also shows promise for replacing fish oil in soy-based diets for finfish. Some of these technologies are already commercialized, or have the ability to be rapidly commercialized.

In light of the above comments and recommendations, and in order to move efficiently and effectively toward filling the protein gap caused by the depletion of wild fish stocks for aquaculture diets, we recommend that:

- NOAA and USDA elevate and formalize this Initiative at the Under Secretary level;
- NOAA and USDA take the lead in developing a strategic planning process involving all federal technical agencies to coordinate the efficient and effective use of limited federal funding for research on alternative diets and to guide funding decisions. We suggest that NOAA and USDA build on the existing structure of the Joint Sub-Committee on Aquaculture (JSA) which is in place for the purpose of coordinating federal aquaculture including research. In addition to NOAA and USDA (ARS, CSREES and ERS), there are significant research programs at NSF, EPA, NIH and DOE with relevance to developing alternative feeds. All of these agencies as well as the Office of Science and Technology Policy (OSTP) should have representation on the JSA. Specifically, we suggest that:
 - JSA establish an interagency committee with industry participation to act as a coordinating body for research on alternative diets for marine aquaculture.
 - The JSA Strategic Plan is at present being revised. It is imperative that new goals emphasize the research needed to fulfill demand for alternative diets for marine species.
- the selection of research projects in all USDA and NOAA extra-mural programs be competitive and peer-reviewed and that panelists include experts on plant and other protein sources as well as fish nutritionists;
- the agencies request the National Research Council (NRC) to update the volume, *Nutrient Requirements of Fish, 1993,* and that the NRC be asked to focus on finfish species (after all, the NRC does nutrition requirements for each of the other livestock species individually rather than lump cows, pigs and horses together) and that NOAA and USDA provide the funding needed to complete and expedite that revision.

Other countries will continue to develop marine aquaculture using U.S. developed technology and expertise. There is opportunity to expand aquaculture production in the United States and to make it a sustainable industry based on soy and other plant ingredient feeds. The United States soybean industry commends NOAA and USDA for

working to advance the research agenda on alternative diets for aquaculture that are environmentally responsible as well as economically viable.

We appreciate your consideration of our views.



John Hoffman
President
American Soybean Association



Mark Pietz
Chairman
U.S. Soybean Export Council



Ike Boudreaux
Chairman
United Soybean Board