Background on the NOAA-USDA Alternative Feeds Initiative

Photo: NOAA Aquaculture Program

Groundbreaking research on alternative feed ingredients for cultured fish and shellfish is expanding worldwide in an effort to enhance the sustainability of aquaculture by reducing and, in some cases, replacing fish meal and fish oil in aquafeed while maintaining the human health benefits of seafood.

In the United States, fish nutrition and alternative feeds research is being driven by federal agencies, universities, and private industry where experts are developing and evaluating alternative protein and oil sources for feeds, including soybeans, barley, rice, peas, canola, lupine, wheat gluten, corn gluten, and other plant products. Researchers are also examining and evaluating the use of co-products from seafood processing, waste from bio-energy production including ethanol, and algae as potential alternatives. The biggest challenges for researchers so far are developing alternative ingredients that fish will eat, that supply the nutrition fish require to grow, and whether the production of the alternative ingredient is commercially viable.

In November 2007, the National Oceanic and Atmospheric Administration (NOAA) in partnership with U.S. Department of Agriculture (USDA) announced a new joint initiative to help accelerate the development of alternative feeds for aquaculture. The goal of the *Alternative Feeds Initiative* is to identify alternative ingredients that will reduce the amount of fishmeal and fish oil in aquaculture feeds while maintaining the human health benefits of seafood. Ultimately, the initiative will lead to the commercialization of alternatives for some species which will result in reduced dependence on marine fish resources by feed manufacturers and seafood farmers worldwide. The initiative will build upon ongoing USDA and NOAA research to identify alternative protein and oil sources for aquaculture feeds.

For example, the USDA-Agricultural Research Service developed a web-based tool that will help feed manufacturers determine the digestibility of existing and alternative feed ingredients for rainbow trout and hybrid striped bass; a program to identify nutrients essential to fish health contained in existing fish meal, but not found in many alternative feed ingredients; new methods to increase levels of essential nutrients in alternative ingredients; a program to explore genetic selection of fish for their ability to better use alternative feed ingredients; and the

development and testing of fish meal-free diets in laboratory and commercial conditions to demonstrate the commercial applicability of the research.

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Through numerous grant programs, the USDA-Cooperative State Research, Education, and Extension Service funds fundamental and applied aquatic feeds research and, through its scientific partnerships, investigates many aspects of aquatic animal nutrition. Agency-funded scientists have modified fish meals and other alternative dietary protein and oil sources for the development of efficient salmonid feeds; developed novel feed ingredients for inclusion into flounder, black seabass, and Atlantic cod broodstock, larvae, and juvenile diets; converted Pacific whiting carcass waste into high-protein fish meal; made advances in ingredient substitutions for channel catfish, hybrid striped bass, and red drum feeds; replaced fishmeal with poultry byproducts in experimental diets for bluegill; and created new feeds for baitfish and ornamental species in both freshwater and marine environments. The agency's Small Business Innovation Research grants program also offers opportunities for businesses to move novel feeds-related concepts into commercialization.

Since 1998, the National Oceanic and Atmospheric Administration has been supporting alternative feeds research through the National Marine Aquaculture Initiative, a competitive grants program. Through this program, the agency has funded nutrition projects for a variety of marine fish species including black sea bass, cobia, cod, flounder, shrimp, snapper and tuna. This research generated information on live and microparticulate larval diets, use of probiotics, identification of dietary requirements, and use of alternative proteins and processing by-products. Also, since the 1950's NOAA Fisheries Service labs have worked on diet development for Atlantic and Pacific salmon, sablefish, black sea bass, lingcod, rockfish, and several other marine species. NOAA labs helped develop methods for improved recovery and use of seafood processing waste and by-catch for use in aquaculture feeds.

The major components of the joint NOAA-USDA initiative are:

- Solicit ideas and suggestions on alternatives from the public;
- Convene a panel of researchers to gauge the current state of alternative feeds research and suggest priorities for future research;
- Convene a stakeholder panel to discuss issues associated with feeds, including human health and nutrition factors; the environmental effects of feeds production, such as the pressure on reduction fisheries; ongoing research on alternative ingredients, such as plant proteins; the importance of viable alternatives from a manufacturer's perspective. This panel will also inform future research priorities;
- Develop and distribute a white paper summarizing the results of the two panels and charting the course for the development of alternative aquaculture feeds in the United States.