



February 29, 2008

NOAA Aquaculture Program
Alternative Feeds Initiative
1315 East-West Highway
Room 13117
Silver Spring, MD 20910

Delivered via e-mail to NOAA.Aquaculture@noaa.gov

Thank you for the opportunity to comment on the NOAA-USDA Alternative Feeds Initiative. I represent a private Aquaculture Biotechnology company, Advanced BioNutrition Corp. located in Columbia, MD.

If aquaculture is to become an increasing contributor to the human food supply, it is critical that aquafeeds rely less on marine-derived fishmeal and fish oil as the preferred source of essential proteins and lipids. Not only is the wild fishery, from which fishmeal and oil are extracted at maximum sustainable levels of harvest, in addition, there is increasing concern that these marine feed stocks may contain contaminants and pollutants that have bioaccumulated in the fish from which the fishmeal and fish oil were derived. Bioaccumulation and biomagnification of toxic chemicals in marine ecosystems is a known and growing problem. Reduction or elimination of fishmeal and fish oil from aquaculture diets can help to reduce the potential for contamination and dependence of the industry on pelagic fisheries. However, fish oil provides important omega-3 fatty acids essential to animal health and that are beneficial to humans that consume them. Removing all marine ingredients from aquaculture diets produces farmed seafood that is not the nutritional equivalent of the marine seafood it replaces. To replace marine protein sources and oils in commercial feeds, one must have a complete strategy that allows for the replacement of all required nutrients. With suitable considerations of nutrient profiles and palatability, a variety of animal and plant proteins have been used as substitutes for marine protein sources with good success in a variety of species. However, the use of alternative protein sources must be accompanied by a source of marine lipids, especially docosahexaenoic acid (omega-3 DHA) if growth and health of farmed animals and their nutritional value to consumers are to be optimized.

Algal meals are a readily available source of DHA and other omega-3s and have been successfully used to replace marine ingredients in broodstock maturation and larval rearing diets for over 50 species of aquatic animals. Our current research at commercial scale has shown that algal meals, when used in combination with sustainable protein sources, can replace fishmeal and fish oil in salmon, trout, catfish, tilapia, swine and poultry grow-out diets while delivering statistically identical growth rates to diets containing marine

ingredients and while delivering a superior nutritional product for human consumption. We have identified three ways in which marine-based inputs can be reduced or eliminated in aquafeeds.

- 1) It is currently technically feasible and economically viable to completely eliminate fishmeal and fish oil in the diets of lower food chain species such as shrimp, tilapia, catfish and carp.
- 2) In carnivorous species such as salmon, rainbow trout and cobia, marine ingredient inputs can be partially eliminated in an economical stepwise fashion by incrementally reducing marine inputs as the costs of fishmeal and fish oil increase.
- 3) In all species which benefit from the inclusion of fishmeal and fish oil in their diets, animals may be grown on diets containing no marine ingredients for a substantial part of the production cycle and then switched to finishing diets containing high levels of HUFA to enrich the flesh of the animals prior to processing and thereby restoring the nutritional qualities of the final product.

All three of the above strategies have the potential to improve environmental sustainability, reduce or eliminate the source of contaminants, and provide for complete ingredient traceability in aquafeeds.

Based on our research and commercial success using algal meals as ingredients for aquafeeds, we therefore recommend that the federal government focus its research in the following areas:

- 1) Verification of the criticality and minimal essential levels of HUFA required for broodstock maturation, larval rearing and grow-out in all commercially important species
- 2) Demonstrations for all species that marine ingredient replacement can be achieved in aquafeeds without loss of productivity
- 3) Demonstrations for each species that clean feeds produce clean food products at commercially viable production levels.

Respectfully submitted,

A handwritten signature in black ink that reads "Robert A. Bullis, DVM". The signature is written in a cursive, slightly slanted style.

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