

February 29, 2008

To whom it may concern:

I, along with my colleague, Dr. Christopher Kohler, submit the following in response to the NMFS's request for public commentary on the NOAA-USDA "Alternative Feeds Initiative".

We cannot over-emphasize the need for additional research to address fish oil (FO) and fish meal (FM) alternatives in aquaculture nutrition. The need for this research is particularly acute for commercial culture of carnivorous species, which is growing rapidly in the U.S. and abroad. Culture of carnivorous species is expanding because of the high market value these fish command. Unfortunately, these species tend to have higher protein and fat requirements, and are less amenable to FM/FO replacement than omnivorous or herbivorous species.

Aquaculturists, nutritionists, and economists have seen the FO/FM crunch coming for years, predicting a time when demand for these products would outstrip landings. Virtually every estimate has been wrong—demand for these products, largely driven by global expansion of aquaculture, has surpassed predictions, year after year. Crunch time is coming, and apparently faster than we might expect. Although this is true for both marine-derived protein and fat, we are likely to feel the crunch for FO sooner than for FM, simply because the reduction process yields less FO than FM.

The issue of FM replacement has been given a tremendous amount of attention, and research to identify suitable FM alternatives has received considerably more funding than research addressing FO replacement. We fully support further research to identify FM replacement (see below), but suggest that FO replacement be given equal emphasis.

We further suggest two research areas that should be targeted as part of a 'triage' approach to FM/FO replacement. The first, and perhaps most important area of research is to define amino and fatty acid requirements of species of interest. Although FM/FO replacement research was gaining ground in the 1970s and 1980s, most of the major advances in this field have occurred over the past two decades. This is due, in part, to advances in alternative feedstuff processing and manufacturing techniques, but also because the nutrient requirements of common culture species were relatively well-characterized by this time. For example, we have been very successful in replacing FM and FO in hybrid striped bass, so long as we ensure the requirement for essential fatty acids (EFA) is met. Without knowing the EFA requirement, our research would have been confounded by failed attempts and formulations which did not meet the fish's nutritional needs. Now, as we try to develop new culture species, particularly marine carnivores, we are faced with the challenge of formulating reduced FM/FO feeds without knowing what the fish need to grow and survive. Trying to reformulate feeds without knowing nutrient requirements is effectively a stab in the dark. Accordingly, results of FM/FO replacement in feeds for

marine carnivores have proven variable and generally unsatisfactory. Once the nutritional constraints of these species are identified, FM/FO replacement will be much less problematic.

A second area of focus should be multi-feedstuff strategies and joint FM/FO replacement. Studies which manipulate a single dietary variable are of obvious importance for demonstrating causality with ultimate experimental control. However, this approach is not representative of modern feed formulation and is limited by its inability to encompass the diet complexity and potential interactions among feedstuffs. The issues of marine feedstuff dependence will not be resolved by individual substitution of FM or FO, just as it is unlikely that a single feedstuff will emerge as a panacea replacement for FM or FO. It is more likely that complex formulations and product blends will provide the solution, and studies which address the possibility for interactions among feedstuffs are needed.

We encourage NOAA and USDA to consider our comments in setting priorities for their Alternative Feeds Initiative.

Sincerely,

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