



Minimizing the Use of Fish Meal and Fish Oil in the Diets of White Seabass and Yellowtail

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This study represents the one of the most comprehensive studies of alternative dietary proteins and oil ever conducted on marine finfish in the United States. In that regard, it is the only study of its kind to be performed on California yellowtail or white seabass. The other aspect that makes this study unique is the fact that we will be using an innovative “blended protein” substitution approach, which allows the interactive and additive effects of multiple ingredients to be evaluated. Unlike the results of our study, the results of single ingredients replacement studies are not directly applicable to production diet formulations. The results of this study will then serve as a model for other marine finfish species to be cultured in California and elsewhere.

The search for alternatives to fish meal in rainbow trout diets has been ongoing since the 1970’s. In the last decade, however, rising fish meal prices, intense regulation of nutrients in hatchery effluents, and the debate on the sustainability of fish meal as an aquafeed ingredient has intensified research in this area. Soybean meal has been studied extensively as a partial replacement for fish meal due to its abundance and relative price. Corn products, including corn-gluten meal, corn gluten feed, and whole yellow corn, are also readily available and have been used as a partial replacement for fish meal. Terrestrial animal by-product meals such as blood meal, poultry by-product meal, meat and bone meal, and feather meal have been evaluated due to their relatively low cost and abundant. Fish oil is in shorter supply than fish meal, and the oil affects the acceptance of the feed by the fish and the acceptability of the fish by the consumer. Alternatives to fish oil that do not reduce feed consumption, growth, or sensory characteristics must be determined. Blending oils of marine and plant sources and using oils produced from sea food processing waste has been effective.

The anticipated result of proposed studies will be diet formulas that have reduced fish meal and fish oil compared to diets currently being fed to our cultured fish. The new diets will be manufactured by commercial feed mills for use at HSWRI facilities and also for testing by other marine finfish farmers in the United States. Thus the results of the research are immediately applied. Thus far this project has shown that 100% of fish protein can be replaced by alternative proteins in diets for WSB resulting in equal if not better growth when compared to fish meal control diets. We have also shown that a large percentage of fish based protein (down to 10% fish meal) can be replaced for YT without significantly impacting growth or survival. Currently, research is being conducted to determine the affects of dietary inclusion of Spirulina in both fish meal based and fish meal free diets for WSB and YT, as well.

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Figure: Juvenile yellowtail (top) and white seabass (bottom) cultured at HSWRI.