

# NUTRITION AND FEEDING OF FISH

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To my graduate students

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# Preface

Aquaculture is more than a science in its infancy; it is now recognized as a viable and profitable enterprise worldwide. It will continue to grow and supply an increasingly larger percentage of fishery products consumed because the oceans are inadequately managed and their yield is unpredictable. Supply, price, and quality can be controlled more effectively when fish are cultured under managed conditions, like corn in a field. As aquaculture technology has evolved, there has been a trend toward higher yields and faster growth which has necessitated enhancing or replacing natural foods with prepared diets. In many aquaculture operations today, feed accounts for over half of the variable operating cost. Feeding fish in their aqueous environment takes on dimensions beyond those considered in feeding land animals; the nutrient requirements, feeding practices, and feeding environment are unique for fish. Knowledge on nutrition and practical feeding of fish is essential to successful aquaculture.

This book is intended to be helpful to students, scientists, practicing nutritionists, and aquaculturists. It covers the known nutrient requirements and deficiency effects for various fishes. It discusses nutrient sources and preparation of research and practical feeds. It gives direction for designing and conducting fish nutrition and feeding experiments. Feeding practices for several commercially important fishes representing diverse culture systems (coldwater fish, warmwater fish, crustaceans, pond cultures, and highly artificial cultures) are presented. One book, of course, cannot be all-encompassing in the area of fish nutrition and feeding. Practical feeding of other important cultured species of food and ornamental fishes has not been included nor has a thorough coverage of feeding larval fishes. Fish culture is a dynamic area and new technologies are being introduced continuously; some methods discussed in this book may become obsolete quickly. Nonetheless, the material presented has been thoughtfully selected so that it will be of maximum use to persons whose interests range from general aquaculture to animal nutrition to manufacturing fish feeds.

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