



# Evaluation of Aquatic Nutrition of Animal Production and Development of Specific Diet Formulations

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## DESCRIPTION

In animal production systems, good nutrition is critical to the economical production of a healthy, high-quality product. Nutrition is critical in fish farming (aquaculture) because feed accounts for roughly half of the variable production cost. In recent years, fish nutrition has advanced dramatically with the development of new, balanced commercial diets that promote optimal fish growth and health. The development of new species-specific diet formulations helps the aquaculture industry grow in order to meet rising demand for affordable, safe, high-quality fish and seafood. Fish feeds made from plant protein are typically low in methionine. Meanwhile, fish feeds made from bacterial or yeast proteins are frequently deficient in methionine and lysine. As a result, when these protein sources are used to replace fishmeal, these amino acids must be supplemented in the diet. To promote optimal growth and health, it is critical to understand and meet each fish species dietary protein and specific amino acid requirements.

Fish diets are typically very high in protein. Foods for fry and fingerlings frequently contain more than 50% crude protein. Protein levels in diets decrease as fish age and their growth rate slows. Protein levels in grow-out diets frequently approach or exceed 40% crude protein, whereas maintenance diets may have as little as 25%-35%. As fish grow, the particle size of the food must be changed in addition to the protein content. Because their mouth parts are so small, many fish require live food when they hatch. Some fish are large enough to be immediately placed on a fry diet without the expense and labour required for live foods. Protein requirements are generally higher for smaller and younger fish. Protein requirements of fish typically decrease as they grow larger. Protein requirements vary depending on the rearing environment, water temperature, and water quality, as well as the fish's genetic composition and feeding rates. Protein

is used for fish growth if the diet contains enough fats and carbohydrates. If this is not the case, the more expensive protein can be used for survival and energy rather than growth. Fish is an essential component of food security, particularly in developing countries. As the world's population grows, so does the demand for more food and more fish. Aquaculture, or the farming and husbandry of fish and other aquatic organisms, is now a well-established industry that is also the fastest growing food production sector in the world. However, as aquaculture operations expand, the environmental risk increases.

Nutrition is critical to the long-term development of semi-intensive and intensive aquaculture production systems. Currently, the primary goal of aquaculture nutrition is to ensure balanced food portions that do not include or significantly reduce the use of fishmeal and marine oils. Because of their excellent and unique amino and fatty acid content, as well as their high digestibility and energy concentration, these raw materials have been widely used in the manufacture of aquaculture feed for a long time. Given the rising cost of fishmeal and marine oils, as well as their scarcity, the primary focus of recent research has been on developing alternative raw materials. Total replacement is not yet possible without compromising animal production performance. To support sustainable and economically sound aquaculture, feed preparation must be done on a logical approach for simple formulations that are location specific and resource oriented, using a large proportion of alternative protein sources, taking into account less expensive feeds. The establishment of regional feed centres should be prioritised in order to understand and identify farmers' feed-related problems for their development, which could lead to village-level production of improved farm-made feeds through small feed mills, particularly by small farmers, who account for more than 80% of India's population.

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