



## Brief on fish nutrition

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### ABOUT THE STUDY

Good nutrition is most important aspect for the economic production of a high quality and healthy product. In fish farming, nutrition and feed play a crucial role because feed represents almost 40% of the production costs. Feed provides the fish with energy and essential nutrients for survival. Good quality fishes can be obtained by feeding them with good quality and nutritionally balanced feeds. The nutritional requirements of fish species can be fulfilled by artificial feeds which are animal or plant based.

Efforts in research, quality control, and biological evaluation is required in production of nutritionally balanced feed for fish. Faulty nutrition results in low fish productivity and eventually leads to deterioration of health until recognizable diseases ensue.

Commercially Produced feeds can be either complete or supplemental. A perfect diet supplies all the nutrients (protein, carbohydrates, fats, vitamins, and minerals) necessary for the health and optimal growth of the fish. Most fish breeders use complete diets, mostly made up of the following components: carbohydrate, (15-20 percent); protein, (18-50 percent); lipids, (10-25 percent); ash, (<8.5 percent); water (<1.5 percent); phosphorus, <10 percent; and trace amounts of vitamins and minerals.

#### Protein

Protein being the most expensive component of fish feed, knowledge of the optimum dietary protein requirements is a prerequisite to formulate a nutritionally balanced low-cost diet for feeding fish for growth and survival. Fish feeds prepared from plant based protein (e.g., soybean meal) are typically low in methionine. Whereas, fish feeds manufactured from bacterial or yeast proteins are often deficient in both methionine and lysine.

A protein requirement usually varies with rearing environment, water quality and water temperature, also on genetic composition and feeding rates of the fish. Protein requirements are usually higher for smaller as well as at early life stage of fish. As fish grow larger and older, their protein requirement usually decreases.

#### Lipids

Lipid plays a major role in optimum utilization of dietary protein for growth and is considered as one of the important nutrient next to protein in fish nutrition. Lipids are almost completely digestible by fish and are a major source of energy than carbohydrates. They supply essential fatty acids, and helps in transportation of fat soluble vitamins. Fish typically require omega-3 and -6 (n-3 and n-6) fatty acids families. Lipids from these sources are mostly deposited into fish muscle and people consuming them are benefited with health.

Marine fish typically require omega-3 fatty acids for optimal growth and health and freshwater fish do not require the long-chain highly unsaturated fatty acids.

#### Carbohydrates

Carbohydrates (starches and sugars) are the least expensive sources of dietary energy for fish diets. Carbohydrates are included in fish diets to reduce feed costs. In fish, carbohydrates are majorly stored as glycogen that can be utilized to satisfy energy demands. Carbohydrates also serve as precursor for various metabolic intermediates which are necessary for growth. It is very important to provide adequate level of carbohydrate in the diet, in order to reduce catabolism of protein for energy and also for synthesis of glucose.

#### Vitamins

Vitamins are micro nutrient and are organic compounds necessary in the diet to support normal fish growth and health. Mostly they are not synthesized by fish, therefore they need to be supplemented. Vitamins are water-soluble and fat-soluble.

Water soluble vitamins include B vitamins (thiamine, riboflavin, niacin, pantothenic acid, pyridoxine, biotin, folic acid, and cobalamins) and vitamin C. Of these, vitamin C is considered important as it is a powerful antioxidant and also enhances immune system of fish.

Fat soluble vitamins include vitamin A, vitamin D, vitamin E, vitamin K. Of these, vitamin E is considered as important because of its role as an antioxidant.

#### Minerals

Minerals are micro nutrients are inorganic elements, necessary in the diet for normal body function.

Based on the quantity required in the diet, they can be divided into two groups — macrominerals and microminerals.

Fish majorly absorb many minerals directly from the water through their gills and skin, allowing them to compensate to some extent for mineral deficiencies in their diet.

adequate feeding is more important. Growth may be affected either due to less intake of feed or due to underutilization of feeds. An undernourished animal cannot be productive and maintain its health, irrespective of the quality of its environment.