



Fish nutrition is an area all hobbyists need to consider when keeping an aquarium, not only for the health of the fish but also the impact food has on the overall bio-system of the aquarium. The importance of food lies in the fact that it will usually be added on a daily basis, and through your fish being fed, fish waste is going to be produced. This means the type of food you feed, and the way in which you feed, will determine fish health and vitality, but also how much necessary maintenance is to be performed. Even today, overfeeding is still a leading cause of poor water chemistry, couple this with poor quality food and disaster can occur.

Diet is important for fish in a number of different ways; it is a combination of assorted ingredients, all of which contain different nutrients needed by fish. Keep in mind; 'fish have a special requirement of essential nutrients and not for the ingredients'. Also understand that the digestibility of those ingredients is also vital to the process of nutrient absorption and overall performance of the diet.

These include;

- Proteins which contain the essential amino acids
- Lipids to gain fatty acids (omega 3s & 6s)
- Vitamins & minerals
- Immunostimulant effects in fish diets.
- Carbohydrates & fibre

Proteins are organic compounds needed for growth and metabolic energy; the structural components of the protein are made up of the essential amino acids.

Fishmeal is the best source for all essential amino acids, a rich source of fatty acids including omega 3s which play a major role in fish development. Fishmeal also contains high amounts of vitamins, especially fat-soluble vitamin A and D, and minerals like highly digestible phosphorus. The type and source of fishmeal is crucial because protein, being organic in nature, will break down and lose essential nutrients up until the manufacturing process begins and then ends with the creation of dry food. The fishmeal value is high in dry food composition, as too others protein sources like squid, krill and crab meal. Each item is prepared and utilized for certain properties to enhance different food diets, ensuring clean and fresh product used to maximize the nutrient content, 'fresh is best'.

Lipids are important components of fish diets to provide a concentrated source of energy, giving the feed palatability and serve as a vehicle for the absorption of fat-soluble vitamins. The main active components of dietary lipids are fatty acids, which are made up of essential and non-essential parts, fish need adequate supply of both to sustain normal growth and fish health. Omega 3 & 6 fatty acids are both poly-unsaturated fatty acids found primarily in fishmeal and the fish oil; they need to be in sufficient amounts to meet the nutrient requirements of fish.

Deficiency signs may include;

- Reduced growth rates and feed efficiency
- Reduced resistance to bacterial infections
- Fatty degeneration of the liver
- Dermal signs
- Increased mortality

The Importance of Fish Nutrition

By Dr. Hubert Kurzinger

This issue, we present a great article on fish nutrition which has often been the hardest thing for new and established fish owners to fathom--after the chemical and physics issues of water and balances. It's hard for us to source credible, well-presented, factual and non-self-promoting pieces and our policy since day one is not to run 'advertorial', articles submitted by advertisers pushing their own product or philosophies.

This article is exceptional and is written to help people to understand the needs of ornamental fish. It was written by a nutritional scientist, Dr. Hubert Kurzinger Head of Research & Development Tetra Germany, but it is neither dry nor overly technical, and we believe is informative and educational. Therefore we found it an excellent addition to the five previous articles we generated to help fish fans maintain their slippery little suckers in health and high spirits.

The living aquatic world in your home, is a mini eco-system needing to be kept in balance, if it can be done right then fish become one of the lowest cost animals you will ever own. Although there are many aspects to an aquarium, if you have a tank with proper filtration, with proportionate fish load, to tank size and right nutrition for those fish, overall maintenance can be reduced. This will ultimately give greater enjoyment to owning an aquarium and less perceptions of 'being lots of work'.

All the fatty acids need to be in balance and in right proportions, as too much may result in excessive fat deposition in the visceral cavity and tissues, not unlike people who eat high fat diets, balance is the key. This will also unlock powerful immunostimulatory effects the fatty acids contain, the related benefits to fish resistance from disease and palatability of the feed, 'how much fish want the food'.

Vitamins and minerals are needed in varying quantities and are dependant on the direct needs of the fish. Minerals are inorganic substances and are required in large quantities for major minerals like calcium, phosphorus, magnesium, sodium, potassium, chlorine, and sulfur. Small or trace quantities of trace minerals like iron, iodine, manganese, copper, cobalt, zinc, selenium etc. Fish will also absorb dissolved minerals from the water, either through the gills, fins and oral epithelia. Minerals play an important role in cellular membranes, components of soft tissues, blood and all structural constituents of bones, fins and scales.

Vitamins are organic compounds required in the diet in relatively small quantities, all vitamins are essential for fish and are classified as water-soluble and fat soluble. The role vitamins play for fish relate to growth and health benefits, better performance of the metabolic functions, enhanced immunity with some vitamins also having a precursor which is converted in the body from a pro-vitamin into a true vitamin, e.g.: β -carotene (= carotenoid) is the precursor of vitamin A.

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For a happy and healthy aquarium, place the aquarium where there is plenty of natural light, but not in full sunshine, as algae grows rapidly in direct sun.

Plastic aquariums can be cheaper than glass, but they are harder to clean and can scratch easily.

Fishy tips

Vitamin deficiency syndromes are the result of missing essential nutrients for the fish, which include poor appetite, growth retardation, increased mortality and severe tissue deformities. Vitamin degradation is also subject to oxygen, light and temperature, so package does play a role in maintaining food proficiently throughout the shelf life of the product.

Today's food technology has become a dedicated science, with a key aspect of diet related to the immunostimulant effects of certain elements to strengthen the immunity of fish. Immunity being the power of an organism to resist infections, certain elements will help to activate cells in the immune system to stimulate the nonspecific immune response. This then improves the resistance a fish has against bacterial diseases and stress related conditions, such as transport or the aquarium environment itself.

Substances with immunostimulatory effects include β -glucan (found in yeast / cereals / bacteria / fungi), algae (Spirulina), vitamins, minerals and omega 3 fatty acids. Each plays a specific part, such as feeding glucan to help prevent negative effects of stress, and with added vitamin C it also has positive effects against bacteria. Spirulina is a rich source of carotenoid, a natural colour enhancer, with 55 % protein and additional vitamins and minerals this helps to increase the immunostimulatory potential for disease resistance. Spirulina has a thin cellular wall that guarantees easy digestion into fish bodily systems. A vitamin called biotin bolsters the fish metabolism and helps to reduce the effects of stress. The key here again is both digestibility and balance, easy assimilation into the organism to ensure there is no undue bodily stress and stability of the elements as they do compliment each other in varying circumstances.

Plant extracts also play an important part with several plant proteins and grain by-products used on a regular basis in fish diets. Certain plant protein products have a good nutritional value (high in protein, good amino acid profile and high digestibility) while other plant ingredients improve the physical characteristics of the food. Rice and wheat contain nutrients essential for fish, and with proper thermal processing to enhance digestibility, they become a great source product for energy. Corn is another plant product used for energy and has also a high amount of the amino acid lysine again good for the immune of the fish. With high carotenoid effects corn also needs proper thermal processing prior to manufacture, to ensure digestibility is correct.

All the above ingredients and nutrients show that the science behind aquatic food has become more than just a little bit of this and that. A lot of thought, time and energy go into creating good, nutritious food for our aquarium fish. Quality of product adds a greater level to the nutrient base of the ingredients ensuring the fish needs are met nutritionally and absorbed efficiently.

Now that the nutrition of the fish diet has been covered, consideration is needed in the proper feeding habits of the aquarium owner. When feeding fish the first rule to follow, you can always add more it's hard to remove if not eaten. So when first offering foods do it in small portions, allowing half a minute for the fish to consume all the food, once gone and there is none floating on the top or sitting on the bottom add some more. This process may be repeated several times in a 3-4 minute period or until fish are suitably full. Fish should be fed on a daily basis to help maintain metabolic functions; this can vary between fish types, and is dependant on size, age and temperature requirements. Fish feeding is similar to our own human habits, small amounts throughout the day over a big feed once a day, problem with this though is our time, so recommended feeding is usually 2-3 times a day in right proportions. The key to ensure proper water quality after feeding is allowing fish time to eat the food and ensuring any excess has been removed. Fish, as a general rule, will not consume food which has been in the water for a number of minutes; dry food does absorb water which in turn adds to the process of oxidation and nutrient breakdown.

Through understanding the food you feed your fish and how much of that particular food is needed to meet the requirements of your fish, you can help maintain the balance of the eco-system in your aquarium. This will ultimately lead to less time spent maintaining the aquarium and more time spent enjoying the world beneath the sea.

Credit note:

Dr. Hubert Kurzinger Head of Research & Development Tetra Germany

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