

Marine Fish Nutrition

Find out how and what to feed your saltwater fish.

Text and photos by Scott W. Michael

Many marine aquarists have not applied the same good advice about their own nutrition to feeding their fish. Part of this may be because the nutritional requirements of captive marine fish were previously not understood by hobbyists. However, now we recognize that the diet we provide our fish will determine how long they live in our aquariums and how good they look.

A poor or unbalanced diet can result in general health problems. For example, marine fish that do not have an appropriate diet can suffer from health issues, such as lateral line and fin erosion, weight and color loss, listlessness and greater susceptibility to pathogens. To help prevent these, we will look at the types of foods available to feed our marine fish, and we will also briefly discuss feeding regimens.

One of the best ways to ensure that you meet the dietary needs of your marine fish is to feed them a diet as close to their natural foods as possible. Unfortunately, this ideal approach is usually difficult, if not impossible, to actually do. So, the next best thing is to provide them with as varied a menu as possible in an attempt to cover all the nutritional bases.

Many of us feed frozen foods. When you use these, remove them from the freezer, and keep them at room temperature until they are thawed. You can soak the food in water to speed up this process, but some vitamins are likely to leach out into the liquid. It's a good idea to pour the food into a fine-mesh net and drain off any liquid before adding to the tank. Do not refreeze the food after it has been thawed, as quality could be compromised.

The modern marine fishkeeper has access to many great frozen foods. One good staple is frozen seafood, which is widely available in many stores. Shrimp, clams, squid and marine fish flesh — rinsed and finely chopped — are great foods. You can run frozen shrimp, squid or fish flesh over a cheese grater to produce bite-size shavings for your fish. Many graters have holes of varying size, so you can adjust the size of the shavings to best suit the size of the fish you're feeding. If offering marine fish flesh, avoid oily species (e.g., tuna, herring), as these will cause a fatty film on the water's surface. Also be aware that fresh foods can quickly become rancid, polluting the aquarium. It's important to remove uneaten pieces from the bottom of the aquarium and filter soon after the food is put into the tank. Although some have suggested that feeding fresh or frozen seafood can spread pathogens to your fish, to the best of my knowledge I have never had this happen.

Commercial frozen preparations are a wonderful staple food for marine fish. Some of these products are made specifically for fish of various feeding categories (e.g., carnivore diet, herbivore diet) or even particular taxonomic groups. (e.g., a specific diet for angelfish, triggerfish or small sharks). Most of these frozen preparations consist of a mix of marine organisms (e.g., scallops, fish, crustaceans), supplemented with pigments, vitamins and essential amino acids.

There are some wonderful nutrient-rich flake foods on the market today that are not only good for your fish but can help maintain their amazing colors. These flakes have added pigments that will reduce the likelihood of a spectacular fish changing from dramatic to dull. As with frozen foods, there are flake foods that target the nutritional needs of carnivores or herbivores. There are also pelletized foods and tablet foods (these vary in nutritional content). Not all fish are as keen to ingest these latter two types of food. Of course, with dried foods, it's easier to offer more frequent feedings because it is more convenient.

Frozen Crustaceans

Frozen mysid shrimp are a wonderful food for captive marine fish. Many that may normally be difficult to feed will accept these succulent little crustaceans with gusto. Mysids are also nutritious, relatively high in protein and fats; the combined crude fat and protein content is approximately 72 percent.

Unfortunately, not all frozen mysid shrimp are equal. Some tend to consist of mushy mysid fragments rather than nice firm, whole shrimp. Be aware that mysids are not high in carotenoids, so if you feed them exclusively, certain fish species may exhibit color loss. I recommend supplementing a mysid diet with some of the frozen preparations or flake food with added pigments.

Another wonderful food making its way into more aquarium stores is frozen cyclops. This is composed of the minute

crustacean in the genus *Cyclops*. It's a very nutritious food — it has a lot of HUFA (high unsaturated fatty acids) and high protein content. It remains in suspension longer, and fish love it. This food is especially good for small, zooplankton-eating fish because it floats around in the water longer than most foods and gives the planktivores time to pick food particles out of the water column. When feeding this food, be aware that very small chunks contains a lot of individual cyclops (so it's easy to overfeed).

I do feed frozen brine shrimp and krill, but would never recommend you use them exclusively. Both foods (and many other crustaceans) are rich in carotenoid pigments and do help fish retain bright colors. Another way to ensure your fish are getting nutritional diversity is to soak fish food in an additive that contains Omega-3 fatty acids and a stabilized form of vitamin C — vital nutrients that are often missing in aquarium fish diets. These can work particularly well if you're feeding freeze-dried foods, such as krill, which soak it up like a sponge.

Plants in the Diet

If you are keeping plant-eating fish, you will need to include fresh vegetables in their diet. Many aquarists feed their herbivores romaine lettuce, spinach leaves and/or broccoli heads. Freeze or steam each leaf before introducing it into the aquarium; this makes it easier for the fish to digest. There are a variety of plastic clips with hangers or suction cups on the market that you can use to hold leaves inside the aquarium. This makes it easier for the fish to graze on the vegetable matter. If you do not have a clip, you can take a piece of coral rubble, attach a leaf to it with a rubber band and drop it to the bottom of the aquarium.

An even better supplement for plant-eaters are the sheets, flakes or chunks of dried macroalgae that are now available. Not too long ago, this type of food product was only available to aquarists who had an Asian food market in their area, as nori is dried algae used in the preparation of sushi. Dried algae are now available at many aquarium stores. They are available in sheets or chopped-up pieces, and they enable aquarists to feed their herbivores brown, green and red algae. Feed these to your herbivores on a daily basis.

Live Foods

A number of live foods can be used to supplement the diet of your fish or help induce a non-eating fish to feed. Live brine shrimp and ghost shrimp are a favorite of many marine fish. It's a good idea to gut-pack them before feeding to your fish: place a nutritious flake food or some cyclops in with your shrimp an hour or so before feeding them to your marine fish. Freshwater crayfish and fiddler crabs are great treats for predators that like large crustaceans. Freshwater livebearers (e.g., mollies, guppies) are very popular foods, but do not feed your predators only live freshwater fish because they lack fatty acids that marine fish need for good health. You should also gut-pack these feeder fish prior to feeding them to the saltwater fish.

Lipid deficiencies can result from offering foods that lack the appropriate fatty acids or have been improperly stored. The lipids most essential in fish diets are the Omega-3 fatty acids, which are abundant in the flesh of many saltwater fish but less prevalent in freshwater fish. This is one reason it's important to feed marine rather than freshwater fish. A lack of these fatty acids can result in fat infiltration of the liver, which can interfere with its function and lead to serious problems.

Feeding Guilds

Marine fish can be categorized into four feeding guilds. There are detritivores (which feed on detritus), herbivores (which feed on plant material), carnivores (which feed on animal matter) and omnivores (which feed on both plants and animals). Some biologists elevate those fish species that eat zooplankton to the level of these four feeding groups but most include them as a subgroup in the carnivore guild.

This yellow tang (*Zebrasoma flavescens*) is an example of a thin herbivore — many of these tangs do not get enough greens to eat in captivity.

An omnivore's diet can be supplemented with frozen or steamed romaine lettuce or spinach (the freeze-dried algae now available at aquarium stores is an even better choice). Pictured is a *Palistoides conspicillum*.

Detritivores and Herbivores

Species in these two feeding guilds consume large quantities of food throughout the day. For example, the Cortez gregory (*Stegastes rectifraenum*) takes more than 3,000 bites in one day, and it takes more than 500 bites to fill its gut once. This fish, which reaches a maximum weight of about 2.5 ounces, consumes about 0.4 ounce of algae per day (that's about 16 percent of its total body weight per day). It consumes large quantities of food because algae contain a limited quantity of digestible nutrients.

If you keep herbivores in your aquarium, bear these facts in mind, especially if your tank is devoid of algae. Rather than giving them one big meal, provide several smaller meals throughout the day. To supplement this, add a piece of dried algae to the aquarium once a day. If your herbivores quickly eat the algae, add another piece. Just remember to remove

any uneaten pieces after 24 hours. For those who keep fish-only aquariums, I strongly suggest you try and encourage a lush growth of filamentous algae, which will act as a natural food source for these fish.

Carnivores

Carnivores are the most well-represented fish on coral reefs, and they vary greatly in the types of food they ingest and their hunting techniques. Species that feed on encrusting invertebrates (e.g., angels, butterflyfish, filefish, triggerfish, puffers) feed often throughout the day. For example, the French angelfish (*Pomacanthus paru*), which feed mainly on sponges, take an average of about three bites per minute during the day. Like herbivores, these species need to be fed several small meals during the day rather than one large feeding. Carnivores that feed on small bottom-dwelling invertebrates (many dottybacks, cardinalfish, wrasses, dragonets, gobies) also feed often. These species should be fed at least a couple of times per day, unless their normal fare is present in appreciable quantities in the tank (e.g., small crustaceans among the live rock). Fish that feed on large prey items (e.g., morays, groupers) usually ingest a large prey item once a day. Some even feed less frequently than this (several times a week).

Zooplankton feeders (anthias, fairy wrasses, flasher wrasses, dartfish) have different requirements than many of the other carnivores. It is very important that active zooplanktivores are fed more frequently than most other carnivores — at least three times a day.

Omnivores

The omnivores are species that feed on plant and animal material. They are the second largest guild (in terms of numbers of species) in coral reef fish communities. The amount of each food group consumed depends on the species and age of the fish, and may vary from one habitat to the other.

A number of herbivores adopt an omnivorous lifestyle as juveniles. By ingesting animal prey when they are younger, these fish can get more of the valuable nitrogen necessary for growth, which is less abundant in plant material. Juveniles are less efficient at assimilating nutrients from plant material. This is probably related (at least in some species) to the relative length of the intestine and the retention time of the food eaten. Like the herbivores, omnivores feed frequently and only during the day. They should be provided with a varied diet that includes plant and animal matter.

So ends our look at foods and feeding. Remember that the key is variety. Feed your fish as many different foods as possible, providing a nutritious frozen prepared food or seafood as the main component of the diet. Happy fish-watching!