Koi and Goldfish Food—Everything You Ever Wanted to Know But Were Afraid to Ask by Diana Lynn Rehn

(Note: The nutrition requirements and growth rates for goldfish and koi are very similar so for the purpose of this article I will reference "fish" to reflect both goldfish and koi.)

Fish get nutrition from three sources: food, water and sunlight. They take in nutrition through their intestines and gills. Water temperature is the number one factor that affects feeding and growth rates in fish. Fish are ectothermic which means their body temperature changes with the temperature of their environment. Fish feed more actively when the water temperature is above 59 degrees and therefore, growth is more rapid.

In the winter months when the water temperature is below 50 degrees, growth slows down or stops because they are not able to digest or assimilate food as easily. In past years the thought was to "not feed" when the water temperature was below 50 degrees. However, some very respected koi keepers now feed very small quantities all through the winter, watching carefully that no food remains uneaten. We have fed our koi for the last two winters with no ill effects. We feed them small handfuls about once a week in the middle of the winter and as it gets warmer we feed a couple of times. We always watch to see how the koi are feeding and if they are interested making sure to leave no uneaten food in the water after five minutes or so.

Water quality also affects the growth of your fish. Fish lose their appetite when the water quality is poor and they may even stop eating. The amount of food you feed your fish can affect the water quality.

Food starts through the digestive system of koi by passing thru the pharyngeal teeth at the back of the throat (on the bottom). The pharyngeal teeth grind or break it up as needed against a hard cartilaginous pad (on top) at the base of the skull. Food needs to be ground so that the digestive juices can more easily process it. From time to time, new pharyngeal teeth grow to replace the older ones.

Koi have no stomach but rather a long intestine that extends from the end of a short, wide esophagus to the anus (vent) and is about three times the length of the fish in adult fish. This allows them to extract much of the nutrients from the food by the time it exits the fish and to process a variety of materials that, in nature, includes a lot of plant material. By comparison, the length of the intestine in very young fish is only about the length of the fish's body and is therefore better suited to the digestion of more protein-rich food. The intestine is lined with tiny finger-like projections that increase the surface area for greater absorption of the nutrients. The intestinal wall also contains mucus-secreting cells that help lubricate the food and protect the intestinal wall from the harshness of some of the material ingested. The cells lining the intestines are replaced every few days because of damage by the food passing through the gut.

Goldfish do have a small stomach and due to its willingness to eat all you give it, they can actually cause their stomach to burst or become constipated. So, make sure you don't keep feeding them "just because" but feed regular amounts. If they seem to be constipated (floating upside down), feed them skinless peas.

Nutritional fish food should contain protein, fats, carbohydrates, vitamins, minerals, and trace elements. Each of these food nutrients has a specific function in nutrition. Nutrition and health go together. A healthy, low or zero stressed fish will heal itself from an injury, can fend off bacterial infections, and resist other diseases through immunity and protein-charged barriers (e.g., a healthy mucous coating). The other leading contributor to fish health is their environment (and the stress it creates) which includes water quality, friends (mates), size of pond, and water parameters.

High quality of raw materials means less waste of product and less fish waste. And less waste means the filter works better, and better water quality means happier fish. It is important that you look at the analysis of the food you buy. The higher the ash, fiber and moisture content the higher the content of waste. High priced fish food does not mean better quality. Read the label to ensure the first item listed is fish meal (protein). Whole fish meal is better than white fish meal. Whole fish made by drying and crushing the entire fish, not just bones and scales like white fish meal.

Watch out for fish food that contains fillers such as corn, corn meal, corn gluten, soybean meal as these add no nutritional value and may not have the enzymes needed to digest efficiently. Also, watch for "splitting" of ingredients such as fish meal, corn meal, and corn gluten. It may be more "corn" than "fish" by splitting essentially the same ingredient! Corn or soybean meals are okay if listed low in the ingredients list.

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In general, animal origin proteins contain more of the essential amino acids and are considered to be a higher quality than plant origin protein. The ten essential amino acids are arginine, histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptopitan, and valine. Meat and fish tissues supply almost all of the essential amino acids in sufficient quantity, and including them in the diet insures an adequate balance.

The most common mistake made by fish owners is over-feeding their fish. This results in degradation of water quality. Protein levels often approach or exceed 40% crude protein in grow-out diets. Maintenance diets may contain as little as 25-35% protein.

All fish need fewer calories than terrestrial animals because they are cold blooded and do not burn calories to stay warm. Also their water environment supports them. Growth, disease, reproduction and increased environmental temperatures all increase energy requirements and should be considered in formulating proper nutrition plans.

Fish can also be fed live foods such as prawns and shrimp which are high in protein, earthworms, mosquito larva, silkworm pupae (only as occasional treat) and tadpoles. Never feed your fish white bread as it has a form of bleach in it. Fish can't digest the outer casings of peas, beans or corn. If you feed your fish peas make sure you pop the pea shells and drop only the innards into the water.

Koi and goldfish are bottom-feeders so sinking food is probably best but there are differences in opinion amongst fish enthusiasts. Sinking food is made by compressing the mixture through a die at high pressure. The meal is held together by fats and the pellets take a long time to be dissolved in cold water. A disadvantage is that you don't get to watch your koi feeding so you don't how much each fish is eating.

Floating food is hollow and is made by steam cooking. The outer shell of the pellet does not dissolve as fast as sinking pellets but eventually it does dissolve. It is easy to see when the fish have had enough when using floating pellets. Uneaten floating pellets usually end up in your skimmer or filter. Not only is it easy to see when the fish are full, but you can examine their bodies as they come up to feed making sure you look for injuries or sores on their undersides. It is a good idea to have a feeding ring which contains the food and you can locate it in an area where you can observe your fish carefully and enjoy them to the fullest.

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When you feed your fish, throw in a small quantity and watch your fish eat. If they have gobbled it all up then give them a little more. The goal is to have all the food you have given them eaten within 5 or 10 min. Do this more than once a day and you will begin to know exactly how much food your fish will eat during the day. If you feed them more than once a day they will grow more, especially in the summer, the peak growing season. Remember they have long intestines that take in the nutrition at a certain pace, therefore feeding them during several sessions helps growth.

Whether you use floating of sinking pellets, they should always be stored in a cool dry place, perhaps even in a cooler. Food should never be kept in sunlight as it could degrade the ingredients. If you purchase in large quantities, consider vacuum packing amounts needed for couple of weeks feeding.

In summary, protein, carbohydrates, and fats are all sources of energy for fish. Vitamins, trace elements, water, and oxygen are the essentials needed to get the energy from the protein, carbs and fats. Ultimately, it is the fish keeper's responsibility to provide nutritional food, in the proper quantity, for the correct water temperature. Type and quality of food vary according to size of fish so choose a food small enough to be eaten by the smallest fish in the pond. Use fresh fruits and vegetables as treats for Koi and skinned peas for goldfish to aid in digestion.