

Goldfish From the Beginning

Keeping goldfish requires skill and understanding.

By Stephen M. Meyer

Each month the "Ponds and Pond Fish" column in this magazine receives batches of letters from readers regarding problems they are having with goldfish keeping. While some letters describe fairly unique problems, the overwhelming majority deal with a small cluster of issues: basic care, aquarium setup and health problems.

In this series I will attempt to address those issues. I have randomly selected a small number of letters from the letters I receive as the basis of this discussion. Even if you do not see your letter here I want to thank the many readers who have taken the time to write. Each and every letter is important because it helps me to better gauge your interests and the problems you are facing in trying to improve your fishkeeping skills. Please keep those cards and letters coming!

My replies to both the letters used here and those used in my monthly column are often in the form of practical rules of thumb. Please keep in mind that the practicality of these answers is derived from the fact that they are approximations — not precise guidelines. If a rule suggests feeding your goldfish all they can eat in five minutes, and they finish in four minutes, this does not mean add more food! Similarly, if I suggest a stocking level of one goldfish per 30 gallons of aquarium water and you have one fish per 15 gallons, it does not mean your fish will suddenly drop dead one day.

My rules of thumb are targets to shoot for — plus or minus 50 percent. Of course I have noticed that hobbyists always seem to err on the plus side, so I try to be conservative in my recommendations.

Goldfish Basics

Goldfish Pancakes

You will need two jars each of strained baby food (chicken and mixed vegetables), four egg yolks, 1 cup of white flour, ¼ cup of whole wheat flour, 1 cup of milk, 1 tablespoon of sugar, 2 teaspoons of baking soda and ½ teaspoon of salt.

Mix all the ingredients together and fry using as little cooking oil as possible. (Using a teflon-coated pan without any cooking oil is the best approach.) Make the pancakes any size that is convenient for freezing and storage.

Refrigerate only as many pancakes as will last a few days and freeze the rest to retain freshness. To feed, pull the pancake apart into small bits and feed only as much as the goldfish will consume in a few minutes.

Q. I am 13 years old and have been reading your magazine for several months. I really like it and want to get started in fishkeeping. My father says that I should start with goldfish because they are easiest to keep alive. We already have a 10-gallon tank. The pet store has some "feeder" goldfish that are very cheap. Can you tell me what goldfish require? Thanks.

A. Many fishkeepers — beginners, advanced hobbyists and aquarium store owners — share the erroneous belief that goldfish are easier to raise and keep than are tropical fish. If only it were so.

This misperception may be a consequence of the fact that goldfish are fairly adaptable to a wide variety of aquarium conditions. They will tolerate a range of pH from 6.8 to 8.2. They will adjust to soft water or hard water. Being cool water fish, they do not require aquarium heaters in their tanks. They are hardy eaters and will accept a wide variety of foods. Goldfish grow rapidly and they grow large. And, to be sure, "feeder" goldfish are cheap.

But, the fact is, most beginners discover rather quickly that goldfish — and especially the fancy varieties — are not especially easy to raise and keep healthy. Indeed, most beginners are best advised to actually start with tropical fish, which can be easier to keep.

Part of the difficulty in goldfish keeping is explained by the fact that goldfish grow fast and they grow large. Along the way, they consume lots of food and excrete lots of waste. And therein lies the problem. A single goldfish will place a much heavier biological (water quality) burden on the average aquarium setup than will the average tropical fish.

Moreover, too many people believe that "a goldfish is a goldfish." They think about the hapless little single-tailed animal

they purchased in a small bowl (or won at a carnival) when they were children, and how it seemed to "live" forever with total neglect. Faulty memories are certainly at work here.

At the same time, it is also true that the variety, and characteristics, of goldfish available in aquarium stores have changed dramatically during the past 20 years. Most beginners are not really interested in the ordinary goldfish of yesterday — what today's market appallingly labels as "feeder goldfish."

Instead, goldfish keepers are attracted to the growing number of "fancy" goldfish varieties: lionheads, veiltails, moors, bubble eyes, celestials, etc. Each is a human-engineered hybrid, selectively bred to enhance specific characteristics.

Sometimes grotesque head growth is emphasized, as in many oranda varieties. Other times, strange deformities are enhanced, such as the upward bulging eyes of celestial gazers. Bizarre body shapes may become fashionable, so humped ryukins appear on the market.

There is a price to pay for this genetic manipulation, however. These animals tend to be far more fragile than our childhood carnival pet. They are more sensitive to water quality parameters than ordinary (plain) goldfish. In order to maintain their unique body shape, color and overall health, fancy goldfish require special diets, rigorous tank maintenance and a substantial investment in aquarium equipment.

From this perspective, the prospective aquarist should consider contemporary goldfish keeping an advanced challenge, equivalent to raising discus and other more finicky freshwater species. The purpose of this article, therefore, implicitly emphasizes the more stringent requirements of fancy goldfish.

Barry, I think you might be better off not starting out with goldfish — especially feeder goldfish. These animals are raised merely as food for other fish. They are kept under astonishingly poor conditions in which high rates of death are economically acceptable. They are fed marginally and, in many cases, they carry a variety of bacterial, fungal and parasitic diseases. All of this spells disaster ahead for you. You might be better off with a few neon tetras and a couple of clown loaches in your 10-gallon tank. Once you feel comfortable with your basic fishkeeping skills, you might consider a goldfish tank.

RAISING FANCY GOLDFISH

Q. I would like to raise fancy goldfish. I have read that about 30 square inches of tank surface area per inch of fish is a good rule. What size tank would you recommend?

A. Goldfish need to be raised in a large volume of water. Unfortunately, most hobbyists start out with impractical small tanks, often 2½, 5 or 10 gallons. While these aquariums might be fine for a few small tropical fish, they are simply of insufficient size for even young goldfish, which will quickly outgrow the available space.

Certainly small tanks are inexpensive. But given the fact that baby fancy goldfish can cost between \$5 and \$20 each, it is foolish to spend so little on an environment that is supposed to keep the fish alive and healthy while spending so much money on the animal itself.

Consider the fact that the tank (and filtration system) will last at least 10 years, and then consider the actual cost per year for an aquarium of the proper size. From this perspective, a 55-gallon tank might cost \$125, but that is just \$12.50 per year. If you buy a tank that is too small, you will undoubtedly spend several times this amount each year on medications and replacement fish.

The often-quoted rule of 30 square inches of tank surface area per inch of goldfish is a disaster waiting to happen — plain and simple. At best it applies only to fish that are about 1 inch in length. In other words, it is not relevant to fish that are approaching 2 inches or more in length!

(Yes, tropical fish fans, this same point applies to you. If you think a tank that will comfortably hold 12 1-inch neons will also hold one 12-inch oscar, just imagine lining up 12 neons end to end and placing them over a 12-inch oscar. Do they look "equivalent" to you? When was the last time you saw a 12-inch-long oscar that was ¼ inch wide and ¼ inch deep?)

The simple fact is that fish "size" is not proportional to fish "length." Depending on the species, fish "size" grows with the square or cube of fish length. Thus a 1-inch neon is equivalent to four ½-inch neons, not two. And a 2-inch goldfish is equal in size (i.e., mass, waste production, metabolic activity, oxygen demand) to approximately four to six 1-inch goldfish!

Thus, if the 30-square inch rule applies at all, it is only to 1-inch goldfish. A 2-inch goldfish would require 120 square inches

of tank surface area, and a 3-inch goldfish would need 240 square inches.

But even for 1-inch goldfish this rule of thumb is skimpy. It works out to about 1.5 gallons per fish in a tank that is 12-inches deep. This is entirely inadequate.

I will not deny that it is possible to have short-term success with young (small) goldfish kept in inadequately sized tanks. They may well live a year or so before succumbing to any one of a number of common fish ailments. When you consider that goldfish in the home aquarium should live at least 10 to 20 years (and some claim several times longer), being able to keep a goldfish alive for two years is not a tribute to anyone's fishkeeping skills.

Successful and easy goldfish keeping means starting with a big tank — approximately 20 to 30 gallons of water per fish regardless of the fish's initial size. (Actually, the best option in this regard is a garden pond of several hundred gallons or more to raise four high-quality fancy goldfish.)

Although some aquarists recommend so-called "long" tanks over "high" tanks of equal volume for goldfish, the truth is that it does not really matter to the fish. The difference in height and surface area is biologically insignificant. Even typical small garden ponds tend to have the same surface area-to-volume ratio of a 30-gallon "high" or "show" tank.

If you start out with a tank sized for adult goldfish, you will find your goldfish keeping easy and successful and you will not have to face the need to buy a new tank when you suddenly realize the fish have outgrown your starter tank. There are no exceptions to the rule when it comes to choosing the correct size tank for goldfish, and their health and longevity depend on it.

Is an Undergravel Filter Best?

Q. I am setting up a 100-gallon goldfish tank. Originally, I had planned to filter the tank with an outside power filter. However, a friend says that I would be much better off with an undergravel filter. What does it do and why is it better than an outside power filter?

A. The filtration principles for goldfish tanks are identical to those for tropical fishkeeping. It is useful to think in terms of mechanical filtration, chemical filtration and biological filtration.

Mechanical filtration removes particulate matter from aquarium water. Screens, floss and foam pads are the most common mechanical filtering media. Mechanical filtration is especially important in goldfish tanks because of the large amount of solid waste produced by goldfish.

Moreover, goldfish tend to scrounge around the tank bottom and in the process stir up lots of junk from the gravel bed. Therefore, a good mechanical filter is required to clear the water of materials that are resuspended by all this activity. Outside power filters or canister filters are ideal in this role.

Some goldfish enthusiasts prefer to use in-tank sponge filters for mechanical (and biological) filtration. Driven by air pumps, these filters do not create the strong currents that often accompany power and canister filter use. Sponge filters do a fine job of mechanical filtration if they are cleaned frequently (weekly).

Chemical filtration is used to remove some undesirable dissolved substances from the water. Most notably, it reduces the concentration of dissolved organic carbon, a collection of substances that have been shown to reduce the long-term health of fish in the closed environment of an aquarium.

In freshwater aquariums, adding granular activated carbon to an outside power filter (or canister filter) is the simplest, most effective and least costly method of chemical filtration. (In outdoor ponds, foam fractionators provide the same function.) This ability to combine chemical filtration with mechanical filtration is one advantage of outside power filters and canister filters over sponge filters. (By the way, those little carbon inserts that are designed to fit atop the lift tubes of some undergravel and sponge filters are seldom effective for more than a few days and significantly reduce the flow of water through the filter.)

Lastly, there is biological filtration. This is a natural process for removing toxic ammonia from aquarium water. As part of their normal life functions, fish excrete substantial amounts of ammonia. Even at fairly small concentrations this ammonia is poisonous to fish. Therefore, in order to keep fish alive and healthy in the confines of an aquarium, there must be some way of removing the ammonia.

Fortunately, nature has provided a simple, reliable and inexpensive method for detoxifying and removing ammonia from

aquarium and pond water: nitrifying bacteria. These bacteria convert ammonia to less harmful nitrogen compounds that the fish can tolerate. Because the nitrifying bacteria are ubiquitous, all you need to do to initiate biological filtration is add ammonia to the water and wait — they will come.

The fact is, it's impossible to operate an established aquarium without having some degree of biological filtration occurring. Where there is water and ammonia, there are nitrifying bacteria. The problem aquarists face — and especially goldfish keepers — is that the fish loads in aquariums tend to be so large that the total output of ammonia is more than normal tank populations of nitrifying bacteria can handle. Hence, assisted forms of biological filtration have been developed to deal with the high fish loads (overloads) found in many tanks.

After some 10 years of experimentation, I have concluded that undergravel filters are neither necessary nor helpful in my style goldfish aquarium. The ordinary gravel bed in a 20-gallon aquarium is more than sufficient to handle the ammonia load of several goldfish without moving water through the gravel. So, if you follow my rule of thumb of one goldfish per 20 to 30 gallons, you will have more than enough nitrification capacity without the added trouble of an undergravel filter.

What kind of trouble do I have in mind? Like it or not, undergravel filters also act as mechanical filters. By drawing tank water through the gravel bed, particulate matter is unavoidably screened out. This compacts the bed and hinders nitrification. When the goldfish start digging in the gravel bed, they merely resuspend this mess and cloud the water.

Moreover, I, and others, have observed that there is an association between fin damage (and fin rot) of the delicate finnage on long-tailed fancy goldfish and undergravel filters. Although these observations are impressions at best, there is reason to believe that downward currents created by undergravel filtration result in the delicate tails being dragged along the tank bottom. Because blood circulation to these tail regions is poor to begin with, they are easy sites for physical damage and infection. Of course, this concern — real or imagined — is irrelevant for the large number of short tail varieties of goldfish.

In summary, I would suggest you skip the undergravel filter. It will not provide any benefit if you keep your tank stocking levels in the range that I do. The nitrifying bacteria populating the surface of the tank's gravel bed will easily be able to cope with the ammonia load. (Incidentally, a gravel bed of roughly ½ inch depth is all that is needed.)

A good power filter or canister filter is essential, especially if you want to use chemical filtration. Alternatively, many experienced goldfish keepers will argue that several large sponge filters, cleaned weekly and accompanied by large (25 percent) water changes, will do just as good a job.