

President Corner

April is slipping by. How time flies. Speaking of flying, have you made your reservations for the seminar? Check the Internet for those low fares. Time is growing short. Do it today. It's springtime! The days are getting longer. The sun is getting warmer, and your fish are getting more excited because the water is getting warmer. Yes spawning time is upon us. If you have plants in the water check them to see if you have eggs. If you do then in three to five days you just might have little Koi swimming around. How about that? The wonders of mother nature, in our own backyard, working her magic. If you want to know what to do next, come to our April meeting. At this time I would like to thank Debbie and Dave for opening up their home and ponds for all of us to enjoy. We do hope your koi will be better as time goes on. Thanks again. A little pre thanks to Dan Cover, our April host, for letting us meet and share his aquatic habitat with us. Thanks Dan. The first of May is just around the corner. Pond tour 2004 is well on its way. A big thanks goes to the pond tour committee for all your hard work. Soon we will see the fruits of your work. We call on all that can help to do so. We need your support. Just a reminder to check your pond water. If you do not check it at least once a week it will be hard to tell the balance of your pond. Check It!!!

For the love of Koi,

Bob Panter

Bob Panter
SAKA President



Noel & Debbie Shaw

KOI PEOPLE OF THE YEAR



Pond Tour Ticket Locations

The tour is self-guided. Maps will be \$5 and will be available for 14 ponds at the following locations. Help us vote for the People's Choice Award.

Animal Fair
520-298-2961

7215 East Golf Links Rd.
Tucson, AZ

Carl Ragel's Natural Pools
and Garden'
520-323-2627
2145 N. Country Club Rd.
Tucson, AZ

Fountain Centers
520-881-0777
2515 East Fort Lowell
Tucson, AZ

Harlow's
520-886-5475
5620 East Pima Road
Tucson, AZ

Magic Garden
520-885-7466
7009 East 22nd Street
Tucson, AZ

Majestic Sea Life
520-320-7895
3250 North Campbell
Tucson, AZ

Mountain View Koi Fish and
Aquatic Plants
520-378-3710
3828 Keeling Road
Hereford AZ

My Pet Counts
520-573-9967
1787 West Ajo Way
Tucson, AZ

Ponds Plants and More
520-292-6774
2060 West Ruthrauff
Tucson, AZ

Rancho Del Koi
520-886-8797
3400 S. Saguaro Shadows
Tucson, AZ

Reptile Specialists
520-795-0060
5030 East Broadway Blvd
Tucson, AZ

Shaw Chiropractic
520-721-9331
1101 N. Wilmot Rd. Ste. 229
(Above Trader Joe's)
Tucson, AZ

Sheldon's Landscape Center
520-529-0609
4999 N. Sabino Canyon Road
Tucson, AZ

Tropics of Tucson
520-293-7500
801 East Fort Lowell
Tucson, AZ

The following 2 articles were written by Ray Jordan. He has been a hobby for many years. I you get the opportunity to meet this man; you will be amazed by his knowledge and wiliness to share it. I hope you enjoy these articles as they go along with the current club education, as well as I hope these are items that are good for this time of year. All of the articles came out of **"Ponderings" the Texas Koi & Fancy Goldfish Society Newsletter** and can also be found on their web site at www.texaskoi.com
Thanks for sharing Ray.

Help! My Water Has Turned Green!

By Ray Jordan

Originally Published - April 2000

I get lots of phone calls this time of year from pond owners distressed by having their pond water turn green which prevents them from seeing their fish. I have listed below some potential solutions to help get rid of the pea soup and clear up the water in your pond.

Population explosions of microscopic single cell plants called algae are the reason your water turns green. This is also referred to as an algae "bloom." These "blooms" happens most often in the spring and especially in new ponds as they start through their maturation process. These tiny plants have the same requirements as most other plants. They need sunlight, nitrates, carbon dioxide, oxygen, certain minerals, and water. If you deprive the algae of these necessities they will almost disappear. Before we explore some tactics that will help rid your pond of the green water curse it is important to mention a few things about pond filtration. First, I do not know of any practical filtration system that can eliminate planktonic algae. Second, a poorly designed or inadequate filtration system can increase the likelihood that you will have problems with green water. Buy a set of pond test kits for Ammonia, Nitrite, and Oxygen to be sure your pond water is healthy for your fish. Also, there are chemicals that can treat the algae in your pond however; you are treating a symptom and not the cause of the problem when you dump a bunch of chemicals into your pond. Read the instructions if you go this route to be sure they are safe for your fish. **Be sure** you really know the accurate gallon capacity of your pond instead of your pond builder's "estimate". Most people over estimate the size of their ponds by a factor of 50% to 200%. If your pond is only 600 gallons and you treat for 1500 gallons you could kill your fish. The only accurate way to be sure of the size of your pond is to drain it and then fill while recording your water

meter reading at start and finish. Do not use any water elsewhere while you fill your pond. The meter records cubic feet.

To covert to gallons multiply by 7.5.

Sunlight: Reduce the amount of light that strikes your pond. Use plants like water lilies in your pond to shade about 60% of your pond's surface. Use landscaping such as trees or shrubs to shade your pond. Be careful of overhanging plants as they can drop leaves and other stuff into your water and cause other problems. Build a trellis or arbor to shade your pond. Again be aware that if you have light loving pond plants you do not want to prevent them from thriving. This is one of the biggest challenges of trying to keep fish and plants together under the optimum conditions for each. Most plants need lots of direct sunlight. Fish; on the other hand prefer lower light conditions.

Nitrates & Minerals: Nitrate is the end product of the nitrogen cycle that is critical to your fish's health. Fish produce ammonia which is converted by beneficial bacteria into nitrites and then into nitrates. The first two compounds are poisonous to fish while nitrate is relatively harmless except at very high concentrations. Minerals that plants need are supplied by fish waste and decomposing materials like leaves, etc. Nitrate is a necessity for plant growth. The more fish you have the more nitrate is produced. Also, uneaten fish food is broken down into Nitrate and adds to the problem. This is another very good reason to not over feed your fish. Also, reduce the amount of nitrates by doing regular water changes about 10%-20% each week.

During an algae bloom if you do water changes of about 25%-40% several times a week, you will quickly see an improvement in water clarity. *Do not forget to use declorinator.* Another issue is the fertilizer pellets used in your potted water plants. Be sure these pellets are pushed way down in the soil in your pots. Cover with rocks to prevent Koi from exposing them to the water directly which can cause another algae bloom. Plants that are living in your pond will also compete with the algae and reduce the amount of Nitrate available. Plants growing in soil like lilies and bog plants help but the best plants to remove nitrates are submerged plants like elodea or filamentous algae (blanket weed) that grows on the sides of your pond. I have read that filamentous algae secrete a substance that retards the growth of platonic algae as a way to insure clearer water and therefore more sunlight for themselves.

Carbon Dioxide and Oxygen: Plants such as algae use carbon dioxide and give off oxygen during the day. However at night they use oxygen and give off carbon

dioxide. This is why fish kills happen at night or early in the morning when oxygen levels are at their lowest.

It is often said that green water is good for your fish but bad for "viewing" your fish. This is not true if your fish do not have adequate oxygen available. Be sure your pond water is saturated with oxygen if you have fish. This topic could be a separate article. Be sure your pond has plenty of aeration. This is supplied by using an air pump and air stones or a waterfall or better yet, both. A higher level of oxygen in water reduces the amount of carbon dioxide and the reverse is also true. Additional water plants also compete with algae for carbon dioxide in the same manner as with nitrates.

Water: Eliminating water would not be a tactic I could suggest.

UV Systems: Systems using special Ultra Violet lights are made specifically to kill planktonic algae in ponds. These units are very effective when sized correctly but are not inexpensive. The UV light kills the algae by affecting their DNA so that they die very quickly. UV units work and work quickly but it is very important that you set up the system to treat all the water in your pond at least every six hours to be effective. These units come with specific recommendations concerning total pond gallons and water flow rates through the unit. Buying up one size is a good idea. The UV bulbs have to be replaced once or twice a year to be totally effective. Many hobbyists only run their UV units in the spring when algae blooms are more likely.

Barley Straw & other Stuff: I have read about using barley straw and lot of chemicals to get rid of green water algae. One commonly sold chemical dyes your water blue to cover up the green. It reduces the sunlight but is really more of a cover up and you still can't see your fish. When you drain and refill your pond the original problems that caused green water are still there so it starts all over again. If you want to try some of these "treatments" check out articles on different websites like AKCA.com and please be especially careful adding chemicals to your fish pond that are supposed to kill algae.

Summary: There is no reason you cannot have clean and clear pond water provided you try the steps listed above and give them ample time to work. If your pond is in full sun and you want to have your water lilies bloom profusely you may need to install an UV unit. Try to combine the suggestions listed above to maximize their effectiveness. Do not expect dramatic overnight results. Natural methods will work but take time. Four to eight weeks might be required. If you are impatient go for the UV system.

You Might be over Feeding your Koi or Goldfish If.....

By Ray Jordan

Originally Published - May 2000

Many of the phone calls and questions I get concerning Koi or goldfish problems are directly or indirectly related to feeding. Most of this article will apply to both types of pond fish. However, there are some special considerations to feeding goldfish. Feeding is a much bigger topic to present than you might think. First and last, **everyone** feeds his or her fish **too much!** You do it and I do it. It is just so much fun to see them come to us and eat. But, we could be killing our pets with kindness. Please consider the following:

You might be over feeding your fish if... (or feeding the wrong food)

1. Your water is cloudy or green
2. You see foam on the surface of your pond (Turn off your simmer if you have one for several hours)
3. Fish poop is floating instead of sinking
4. Your fish look more like sumo wrestlers than gymnasts
5. The white color in your adult fish is yellow or pink instead of bright white
6. Your fish start losing their color
7. There is unconsumed food more than 90 seconds after feeding begins
8. Your fish are getting sick or dying

The most common questions I get about feeding fish are:

Q - What should I feed my Koi/Goldfish?

A - Most hobbyists feed a basic diet of a manufactured Koi or goldfish food and supplement with fruits, vegetables, cereals, shrimp, krill, worms, etc.

You should feed a fresh high quality manufactured fish food as your fish's basic diet. Koi and goldfish need the same types of nutrients as we do. That is, they need carbohydrates, fats, protein, vitamins and minerals. Fish digest carbohydrates at a lower rate than we do and should receive very little fat. Koi & Goldfish do very poorly on fish food based on corn. Since corn is cheap some pond fish foods or catfish foods use it as the main ingredient. Avoid food that lists corn as one of the top four ingredients. Wheat and Wheat Germ is a much better main ingredient for Koi and Goldfish. Good foods will have about 32%-36% protein based on wheat germ, fish meal and/or shrimp/krill meal, sea weed (spirulina) soybean meal, assorted cereals and added vitamins. Fat should be 6% or less.

Look for vitamins: A, B1, B2, B6, B12,

C & E. If your Koi or goldfish food doesn't clearly tell you what is in it they probably don't want you to know.

TIP: Look at the Champion fish at shows that have deep colors, bright whites, and strong body shapes then ask their owners what they feed their fish.

You want the freshest food you can buy and you need to keep it **fresh**. If possible buy food that has a manufactured or expiration date. Buy from a dealer that sells lots of food and therefore has fresh food. Buy in small enough bags that you can use it within 2-3 weeks of opening. Vitamin levels start dropping as soon as manufactured and even faster as soon as you open the bag. Do not let fish food get warm or damp. It will quickly spoil and get moldy. Many times sick or dead fish can be traced directly to "spoiled" food. I recommend putting opened fish food in airtight containers such as a ziplock bag in the refrigerator. This will allow you to squeeze out the air each time you reseal the bag. If in doubt about your food being spoiled throw it out. I once visited someone that kept having fish die and I noticed some fish swollen from internal infections. When I saw a huge half used open bag of food in the tool shed I check it out. I found just under the surface of the food was a solid lump of moldy disgusting yucky stuff. The owner threw out the bad food and his fish health problems quickly disappeared. I know a big bag is cheaper but please believe me when I tell you it can cost you a lot more in the long run.

Q - How much and how often should you feed your Koi & goldfish?

A - Short Answer - Feed less total food per day and give more frequent feedings.

Long-Long Answer: Everyone I know feeds his or her fish too much! I do it and so do you. Koi and goldfish feeding should be based on a combination of water temperature and total weight of fish in your pond. Fish are cold-blooded creatures and cannot digest food once pond water drops and stays much below 50 degrees. In colder winter months Koi and goldfish in outside ponds become dormant. Yes, they will eat if fed but the food just passes through them and then pollutes the water and your filter system without doing your fish any good whatever. In fact, your biological filter is also mostly inactive below 50 degrees so any ammonia and waste produced by the undigested food cannot be process by your filter system. If ammonia or nitrite levels go high enough it can easily stress or even kill your fish.

Here is the feeding schedule I try to use. Use average weekly water temperature. Optimum water temperature is about

72-76 degrees for Koi and 75-80 degrees for goldfish.

Ø Below 50 degrees – do not feed

Ø Start feeding in spring as water warms and stays above 50 degrees.

For first few weeks feed only every other day and very sparingly maybe 2-3 pellets per fish. Try to feed in late afternoon when water is warmest and fish will be better able to digest.

Ø 50 to 60 degrees - Slowly feed to 1% of fish weight divided into two daily feedings if possible mid and late afternoon.

Ø 60 to 70 degrees feed 1% - 2% of total fish weight divided into three daily feedings

Ø 70-80 degrees feed 3 to 3-1/2% of total fish weight divided into 3-10 feedings.

Ø 80-90 degrees feed 2% to 1% of total fish weight divided into 3-10 feedings

Ø 90-100 degrees reduce feed to less than 1% total fish weight divided into two feedings. Feed early and late when cooler

According to this formula if you had 35 lbs. of fish in your pond (This is a lot of fish folks - about 44 - twelve in. Koi) and the water temperature is 75 degrees you could feed up to 1lb. Of food a day divided into 3-10 feedings. Remember this is the optimum water temperature and in our area you might only feed at this rate for 3-4 weeks in the spring and maybe about the same in the fall. For those of us that are gone during the day we are limited to feeding about three times. Before work, when we get home and then just before dark. On the days you are home you could increase the frequency of feedings. You might also consider using an automatic fish feeder for the mid day feedings. For example if you were going to feed 1 lb of food per day you should still do the first and last feeding to observe your fishes behavior to be sure they are "happy" and also that's one of the pleasures of having Koi. Use the automatic feeder to deliver the rest of the food allocated into feedings every 1-2 hours.

But how do you find out how much your fish weigh? Well you could guess or you could put one of average size in a plastic bag and sneak into the grocery store and.....

Or you can estimate each of your fish's length in inches and use the following chart to calculate each fish's weight and then add up the weight of all your fish. (Example)

Koi Length/Weight conversion Chart* Size Wt/lbs. # Koi Total Wt.

6-7 in 0.15 3 0.45

8-9 in 0.23 3 0.69

10-11 in 0.5 3 1.5

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12-13 in 0.8 3 2.4

14-15 1.3 3 3.9

16-17 2.0 3 6.0

18-19 3.0

20-21 4.2 1 4.2

22 5.3 3 15.9

23 6.6

24 7.9

25 9.4

26 11.5

27 13.8

28 15.3

29 18.8

30 21.6

Totals 22 35.04

**Estimate based on length of "average"*

Koi. Adjust for fatter or skinner Koi. With Long Fin Koi and goldfish I would not include tails in the length estimates.

There is some pretty interesting information in the chart above. Notice how the weight of fish increases almost logarithmically as the length increases. For example almost 50% of the total fish weight is the three 22 in. fish. If you really want to do the calculations and you have excel as a program on your computer click on the attached file an excel spreadsheet will do the work for you.

KOI-WEIGHT-CALCULATOR

With some fish foods such as Tetra Koi sticks almost all the moisture is removed so the food is very light weight. The calculation suggested above would not work with that type of food. In practice this chart and formula is just a starting point. You should look to your fish to tell you if they are getting the right nutrition. Healthy fish will have bright colors, and a very bright shiny white color. Their skin will almost glow and they will be very active and feed vigorously. Look to the clues listed in the beginning of this article for problems that suggest over feeding or poor nutrition.

I feed the amount of food I use by volume. For example, at optimum water temperature I feed my Koi about 2 cups of food a day divided into as many feedings as possible. This weighs about ¾ of a lb. I measure the 2 cups into a zip lock bag each morning and then I can space out the feedings from that bag so that it lasts all day. This way I don't lose track and overfeed. We have a 100-gallon aquarium with 5 small oranda's. I feed ½ teaspoon of goldfish food daily divided into several feedings.

Q – What Feeding Supplements are recommended?

A - In addition to the basic manufactured Koi or goldfish foods I like to feed some additional foods to help insure my fish get

a well balanced diet. Also many of these foods seem to be a real treat for the fish and they turn into a **"Fish Tornado"** when certain foods are offered. The things that my fish seem to like the most are freeze dried krill and baby peas. They go nuts when I offer these treats. You can buy Freeze died krill in most places where you buy fish food or it can be ordered. They also love canned baby peas (silver can of course). I just toss a handful to the fish a few times a week. I bet you can hear the slurping sounds of happy greedy Koi a block away. Koi can also be trained to eat romaine lettuce, oranges, Grapefruit, watermelon, cantaloupe, bananas, bell peppers, carrots, spinach, zucchini, Swiss chard, cooked rice and pasta, whole wheat bread and pinto beans.

I buy a jar of vitamin C powder from a health food store each spring and dissolve a teaspoon in a small amount of water and mix into the Koi food I feed for the first few weeks each spring. I believe this has helped cut down on spring disease problems and is very easy to do.

I bet you could tell me many other things that your fish eat as well. Many of the Koi magazines and web sites offer recipes for making your own fish food if you would like to experiment. Let me know how your fish like the homemade foods if you try any.

Special Foods

There are Koi and goldfish foods that are called **"Color"** foods. These foods contain coloring agents often "spirulina" which is from blue green algae and can enhance red colors. Color food is much more expensive and higher in protein than basic food. Therefore if used it should only be feed at optimum water temperatures an only for short periods of time. If you feed color food too long your fishes white color will turn yellow. Also color food only enhances the reds so fish of any other color will not benefit. I personally, do not feed any color food. I save the extra expense and buy better basic food. This past spring I bough some paste food. I fed this once every other day along with the regular pellet food. The paste food was easy to mix into dough balls and I added vitamins C&E plus an immune booster. It seemed to work well and the fish thought it was great. You have to be careful with this type of food as it tends to make your Koi fat fairly quickly. You should not feed this alone but give in place of one feeding every other day or every third day.

Q – What are the special considerations for Goldfish Foods?

A - Goldfish definitely have some special requirements to consider when feeding. The fancier more rounded goldfish such as

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Ranchus, Orandas, and Ryunkins can develop a condition called floating disease. No one is really sure what causes them to lose their ability to equalize the air in their swim bladders and start to float but this is by far the biggest problem I have with my goldfish. For this reason it is recommended to buy sinking goldfish foods. It is also a good idea to presoak the food in some water before feeding goldfish. If you have goldfish like orandas or lionheads with the special head-growth pattern. There are goldfish foods that contain the hormones to help stimulate this growth. If the growth gets excessive switch back to the basic goldfish food without the hormones.

Q – How can I train my Koi/Goldfish to eat out of my hand?

It is a special treat to train your fish to eat from your hands. This can also be a lifesaver if a Koi gets sick. You could feed medicated food just to that fish without treating your entire pond.

Before hand feeding remove all jewelry including your watch. As your Koi get bolder they will rub all over your hands and arms and can get scratched very easily by your jewelry. Quit feeding for several days to get your fish really hungry. At first the fish will be shy of your hands so place a small amount of food on the water near your hand and hold your hand in the water and stay very still. Don't bother to try this if your fish are small babies. Only the larger adults will be bold enough to approach your hand. As the fish begin feeding and become accustomed to your hand in the water start placing a few pellets very near your hand. Avoid sudden movements. As they approach you do not try to pet them yet. Once they are feeding near your hand put the food only in your hand and again stay very still. It may take a few feeding sessions but soon the bolder fish will be willing to swim up and eat right from your hand. Later you can pet and rub them and let them suck on your fingers. I had a Koi that would let me lift it completely out of the water for a few seconds without trying to flop around. Some fish will never be bold enough to feed from your hands. The friendliest fish and ones easiest to train are an older variety called a Cha Goi. Which is a subdued brown colored Koi with beautiful black edging around each scale that appears like the fish is covered in netting. Goldfish seem to learn hand feeding faster than Koi.


Vacation Feeding

I have heard many sad stores of pond owners leaving on vacation and asking a neighbor to "feed" their fish. They

frequently come home to over feeding disasters. I recommend that if you are leaving town for one week or less do not have your fish fed at all. You will probably be amazed when you come home to the prettiest cleanest pond water you have seen for quite a while. If you are going out of town for longer than one week. Cut back the feeding by ½ and carefully measure the exact amount of food you what fed each day into separate labeled ziplock bags.

Summary

Feeding your fish is a very important part of your responsibilities as a pond owner. Please do not over feed. If you are not into all the calculation stuff just start by cutting the amount of food you have been feeding in half. If your water gets clearer and your fish look and act happier in a few weeks then you know you are on the right track. Feed high quality fresh food and keep it fresh. Divide your feedings in to as many times a day as possible. Then sit back and enjoy your healthier and prettier Koi & goldfish.

 **Nishikigoi International**

Food Glorious Food

by Gerry Preston

Well, that's how the song goes, but is it all so glorious? Strange as it may seem, the reasons why Koi Keepers feed their fish in the first place varies greatly; what the fish might need or want usually being pretty low on the list of priorities. Much more likely, will a particular brand or ingredient make those 'lack luster reds' deep and shine like a newly painted pillar box; or will those 'sure fire' minuscule Tategoi become champion biggies in just a few short months? So why do we choose one particular brand over another? Believe it or not, advertising influences all of us. As such, advertising generally falls into two clear divisions - the informative and the persuasive. Fish food producers, particularly on the ornamental side, spend a great deal of money on fancy packaging and persuasive advertising. Highly paid copywriters are employed to dream up alluring blurb such as 'protein rich', 'highly nutritious', or 'easily digestible' and, in some cases, this may be so. However, first and foremost it is about enticing us to part with our money by telling us all the things we want to hear. Sadly, useful information is often lacking on the pretext that the buying public would not understand it even if given. My inclination is to interpret this as, were we more learned or given comprehensive information, we might not be enticed into buying something just for

the picture on the packet! Just how useful, therefore, is the information given on a packet of fish food? Perhaps before we can attempt to answer that we also need to address the understanding issue. Leaving aside the often effusive content of the marketing ploy, what is on the packet is usually the best we can expect to see. Many have a closed formula, thus are very minimal in what they tell us. Others, perhaps in the hope that we will think more is better, claim the inclusion of almost every ingredient known in their food. Some will simply give percentages of all, or just a few, of the major nutrients and that is all we have to go on. Price, not surprisingly, is the other major factor in the equation. Market research, itself very costly, largely determines the 'sell price' - this is the point just below which there might be product resistance. Conversely, make a food too cheap and everyone thinks it cannot be any good and, therefore, will resist buying it for that reason! For sure, no manufacturer is going to put in a more expensive ingredient than he has to, even though this is highly unlikely to take the price beyond the expected profit level. Of one thing we can be reasonably certain, the product price has little to do with ingredient price. Of course, some will argue that, quite rightly, Koi Keepers expect attractive packaging. Then there is production, handling and transport cost, particularly with goods of foreign origin. There is also an unknown, to us, number of middle merchants before the product finally ends up with a very substantial mark-up in the retail outlet. In spite of all this, every year sees new contenders rushing to enter what, to most of us, already appears to be an over crowded market - each making new claims that their food alone contains the magic ingredients and additives that make it superior to all else, yet offering no independent proof of this whatsoever. Thus returning to our labeling: as already stated, this is often limited to percentage of protein, oil, fiber, moisture and ash. There may also be some vitamin advice stated in weight or international units. The other major nutrient is carbohydrate. Since this is often the largest component in the formulation, I find its omission suspect. However, providing one is aware it will be present, we can usually deduce the percentage by subtraction. Although it is beyond the scope of this article to detail the biochemical make up of the numerous ingredients most likely used in fish feeds, perhaps a precis combined with defining the percentages will suffice. Those specified by the manufacturer will vary from brand to brand as will the number of individual percentages given, some being

confined to just protein and oil. Since these all seem to be infinitely variable between brands, and often within the same brand, we already have a contradiction which begs the question which one is best?

Protein

A major player and vitally important to the well being and growth of all living organisms. However, protein is just a collective word to describe the sum of its structural components, which are the amino acids. There are 10 essential amino acids needed and the same number that, when necessary, the fish can manufacture, and are thus termed nonessential. Of great importance is the amino acid ,I)profile, meaning the fish need the 10 essential amino acids in differing proportions. Just as important, the ratio required vary to a greater or lesser extent from fish to fish, or indeed from animal to animal. Thus the required amino acid profile of an outright fish eater such as pike would be quite different from a herbivorous fish such as roach. Carp are classed as „omnivorous, suggesting they eat a wide range of food stuffs to include some of vegetable and some of animal origins.

After digestion by the fish, consumed protein is reduced once again to amino acids that can either be used to build muscle or, wastefully, further broken down for energy. It is only when the balance of amino acids in the diet is optimal that there is the necessary anabolism to produce efficient protein synthesis and, therefore, growth; yet even then there still 7- 10% indigestible protein. Fortunately, the amino acid requirement for carp is reasonably well defined, and has little tolerance outside that definition. In other words, if any one of the essential-amino acids is only available at under the proportional requirement to its neighbors, then use-f the others will be to that first limiting amino acid ,and the excessive discharged to waste. This unnecessary breakdown produces catabolism and -possible fat deposition. Most of all it produces a high " ammonia load and is, inevitably, bad for waterquality. It will also compromise growth-rate and, if continued long enough, could have a detrimental effect on health status. Methionine is usually the first limiting amino acid in many natural proteins and this plus cystine, which can reduce the methionine demand is often supplemented to a quality food. If the packet would generally boldly state this. We can now already see that a protein declaration is not telling us the entire story, and certainly gives no indication whatsoever of its suitability for our fish; neither is the protein percentage figure itself much help.. The classification of proteins is largely of animal or vegetable

origins. The amino acids contained in many fish meal proteins match well to the profile requirement of carp. As such their inclusion is generally a prerequisite to formulating a nutritious diet. The problem to the manufacturer is that they are expensive, particularly the very high quality white A meals derived from Alaskan Pollack or similar fish often used in Koi foods. The use of the much valued oily herring meal tends to be more in diets for Peruvian anchovy, is regarded as second best but a proportion can be included without too many problems. In the early days of fish farming it was common for the inclusion of bovine proteins in feeds. This practice reduced over the years and since the advent of B.S.E. is now very much frowned upon when included in rations for fish destined for human consumption!

Vegetable proteins are mostly poorly digested and many have a miss-match to amino acids - a low chemical score when measured against the ideal. However, some do have an excellent biological value in their own right and mixing with fish meal proteins brings down the cost of the total protein expenditure. Soya bean is probably the most widely used for dilution but is lacking in several essential amino acids, thus its inclusion above a certain level, although attractive commercially, is undesirable. It also contains natural feeding deterrents. Heating largely overcomes this problem with the addition of chemo-palatable, thereby persuading the fish to eat what its instincts would, almost certainly, make it refuse. The addition of attractors to stimulate a fish's appetite is nothing new. Izzack Walton added honey to his baits to catch carp three hundred years ago. Carp have very well developed gustatory (taste) and olfactory (smell) senses. Present day carp anglers have a seemingly unlimited array of flavors, extracts and oils from which to choose. Many claim even the amino acids themselves to be attractors. Betaine HCl is probably the most used stimulator in baits and commercial feeds. However, should they do so, it is highly unlikely that many ornamental fish food producers would admit to using chemical palatability enhancers to make their product more acceptable.

With the ever shrinking bounty from the seas, seeking alternatives to fish proteins is essential, of that there is little doubt. The inclusion of dairy shows much promise. Perhaps the genus *Scenedesmus*, having a crude protein value of 55%, more than most and *SpIrulinae* could have considerably more value as a protein source than its over-hyped powers of color

improvement. However, trials tend to confirm a reduction in growth as the percentages of these alternatives increase with a corresponding decrease in the fishmeal. Increasing the percentages further leads to heavy losses. A notable exception, however, is krill, (*Euphausia superba*); these tiny shrimp like creatures abound in massive quantities in the Antarctic and are expected to make a considerable contribution to future livestock feed-stuffs. They have long been readily available to the aquarist. Coincidentally, of course, the much heralded inclusion of chitin in some Japanese Koi foods sits nicely with the Japanese peoples fondness for consuming enormous quantities of crustaceans and shell fish!

Wheat germ meal is another protein source well exploited by the ornamental fish food industry. Whether it is even remotely possible to justify all the hype, is impossible to say. Never have I seen independent, or otherwise, trial results published appertaining to growth, health or anything else. For years Koi scribes have played safe and just repeated everybody else - and eventually themselves - over and over again. throughout the summer and winter. Personally, if Koi cannot properly utilize food due to temperatures being too low I can see little point in feeding them at all. On the other hand, if you are going to feed, it makes much more sense to use a good quality high protein food all year round, but especially in the traditional slowing down and warming up period. At these lower temperatures Koi are going to eat greatly reduced quantities anyway. Therefore, even with a high percentage protein feed, their actual intake of protein is very modest.

One only has to examine briefly the sequential events in a natural body of water to realize the validity of this. In high summer there is a profusion of plant growth as well as a multitude of insects and organisms that we can loosely term animal. Nature thus satisfies herbivores, omnivores and even carnivores. Carp undoubtedly consume large quantities of easily available plant life at summer temperatures. Duck weed is a particular favorite and Koi will make short work of any efforts to try to establish water lilies etc, in an existing pond. Contrast this with the depths of winter when virtually all of the higher forms of animal life, so relished by carp in summer, are still available to them in winter should they wish to feed; yet all of the plant life has completely died away - hasn't it?

Koi literature is constantly stating the value of wheat germ revolves around being easily digestible and is, therefore, the ideal

low temperature food. Even assuming that is true, the actual percentage of wheat germ in the food is very small indeed. Thus begs the question, how digestible is the rest of the food? Not very much is the easy answer, and probably a good job too since the major proportion will be carbohydrates. The universal use of carbohydrate is as a binder, to bulk out a feed, and as a cheap energy source. As carp's energy requirements in cold water are very minimal, if these feeds really were highly digestible, much of it would be retained as saturated (solid) fats within the body cavities and internal organs of the fish. In practice most of it simply passes through with little absorption into the blood stream. It probably does no more harm than it does any good! What it does do is to keep the cash registers ringing and the hobbyist content in the belief that they are providing quality food.

Quality and Quantity

Thus returning to the protein in dry diets, it becomes clear that separating quantity and quality is not so easy. A particular pellet having a high claimed protein percentage may well have a large amount of plant proteins in its inclusion. We have no control over this and little hope of identifying the good from the not so good, even when given a long list of ingredients. However, quantity is something tangible and it is very noticeable within the same brand that the higher the protein percentage the higher the cost. So is it okay, or more economical, to feed the cheaper lower protein food? Think of it like this: Koi have a daily quantity protein requirement governed largely by temperature and their size. Should that requirement not be met they certainly will not grow and could have trouble repairing damaged tissue, laying down eggs, etc. In fact most of the functions needed to maintain a fish in good health. Now to keep the maths simple, supposing two Koi Keepers were to each feed 100gm of pellets a day, but M10% protein and the other very with a 30% protein. We can see instantly that the former gives as a daily protein intake of 40gm and the latter only 30gm of the same. Also, supposing the 40gm was the correct daily intake, then in order for the lower protein pellets to meet that requirement, the actual quantity of pellets would have to increase from 100gm to nearly 135gm. Although this is probably better than not meeting the 40gm protein requirement, it could well make the cost of feeding a cheaper food more expensive. Also satiation may be exceeded long before consumption of the required protein quantity. In addition there is the possibility that the resulting excess of other nutrients could have a detrimental effect on the

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health of the fish. For certain it will have a detrimental effect on water quality, particularly with increased suspended solids. Unfortunately, many Koi Keepers feed a quantity of food totally unrelated to protein content! This is exacerbated by feeding Koi with bread, barley, corn, etc., in the belief, quite reasonably, that the fish enjoy a change. Such foods, although well accepted, are very low in proteins and being of vegetable origin have a poor biological value. Therefore, it is only if t Hess supplements are used as well as a high quality protein pellet food, is there a wide enough margin to compensate and maintain adequate daily protein levels. Although the overall cost of a high percentage protein food Will increase, it should not do so proportionally as the percentage of other ingredients, obviously, would have reduced. However, it is certainly gratifying to me after campaigning for so long that Koi foods are generally too low in protein, that many producers now offer a range of foods with increased protein content - usually described as high growth food.

Growth

I suspect that the long held view that carp do not need high protein arose from carp farming traditionally being extensive - the fish getting most their nutrition from natural food in the pond. Daphnia (water fleas) have a protein content of between 48% to 50%, Gammarus (shrimp) 45% to 52% and Chinronomidae (bloodworms) as high as 55%. Thus it was perfectly reasonable to supplement with bulky low cost food-stuffs, causing only modest dilution of the readily available protein rich feeding. A bio-filtered Koi pond has very little in common with these conditions and is indeed, in every sense, very intensive. Consequently, with natural feeding being virtually non-existent Koi, ideally, need foods of an exceptionally high biological value.

Additionally, I am afraid we cannot separate growth from temperature. As my own trials have shown (NI Winter 96/97), it is possible to achieve phenomenal growth using very high protein foods combined with consistently high water temperatures. Unheated Koi ponds are very different. Unless the water is sufficiently warm the fish simply cannot consume enough food to grow at their full potential. All the more reason to feed to a maximum during the normal growing season providing, of course, the filter is able to cope with this, and to feed what makes them grow protein. There have been many studies to find optimum nutrient levels, but with most arrived at by considering the economics, If an additional 5% protein costs, say, 10% more for only a

2% increase in growth-rate, some might not consider that economical. Koi Keepers rarely worry about such restraints and most will happily pay more for only a modest return. However, many authorities seem to concur with around 38% protein as a minimum. I would add, especially if also regularly giving any legume or pulse feeds, 40% plus would be even better and just hope you have bought good quality protein in your chosen brand of food. Certainly if growing on small fish separately, then nearer to 50% protein would show a marked benefit in size and shape of the fish. Last but by no means least, it is quite feasible to reduce the feeding quantity by giving a high protein diet. The benefits, are soon obvious. It encourages fish to clear-up everything on offer but f, u still meeting their essential needs. Also realize that most recalculating systems are far better able to cope with increasing ammonia loads than they are of solids, which tend to inhibit nitrification. Thus by simply upping protein levels makes for a cleaner pond and healthier fish.

AKCA HAWAII 2004

AKCA SEMINAR IN HONOLULU

Hotel

Waikiki Beach Marriott

Seminar Dates

June 24 – June 27th

**“E’ komo mai!”
(Welcome)**

Join us as we celebrate the 23rd Annual Associated Koi Clubs of America (AKCA) Seminar in Waikiki. Enjoy the beautiful and romantic atmosphere of Polynesia in the newly renovated Waikiki Beach Marriott Hotel. Being in the midst of Waikiki, you will walk the well-lit beach at night or cruise through shops in the “Melting Pot of the Pacific” where many cultures blend into a unique Hawaiian experience!

Come and enjoy our Waikiki. E’ komo mai! Plans are being made for tours and trips before and during the convention. A pre-convention side trip to Kauai (including a pond tour) is being planned by one of our Kauai members. Kauai, the Garden Island, is home to some of the most spectacular scenery found anywhere in the world. You have seen beautiful Kauai while watching films such as South Pacific and Jurassic Park.

April 2004

Tours on Oahu (Honolulu) may include touring Pearl Harbor and the Arizona Memorial, round the island tours, tours to historic sites and world famous surfing beaches. Our Pond Tour will include both private homes and some very beautiful ponds found at Oahu business establishments. **Come and enjoy our beautiful Islands! E’ komo mai**



At AKCA Hawaii 2004, we are planning a fabulous **Luau** and entertainment by **Tahiti Productions**. While staying in Waikiki you can also enjoy Pacific Rim Cuisine, the blending of Pacific Rim cooking which emphasizes the fresh harvest of our tropical farms and surrounding ocean. Pacific Rim Cuisine is fast becoming very popular -- with some of Hawaii’s chefs such as Alan Wong, Sam Choy and Roy Yamaguchi appearing on the food network. All of these chefs have restaurants nearby. **Come and enjoy the food! E’ komo mai!**

What better way to spend a vacation for a Koi lover than to be in Hawaii among fellow Koi enthusiasts and to share the hospitality of the members of the oldest organized Koi club in the world? The Hawaii Goldfish and Carp Association, organized in 1959, are eagerly anticipating your arrival and are looking forward to hosting the AKCA for the very first time in our beloved Islands. Many of our members, who grew up with Koi rose by their forefathers in backyard ponds, look forward to sharing their love of Koi with you. In Hawaii, these beautiful creatures have been swimming in our ponds since the early 1900’s, when immigrants from the Orient raised these noble fish as part of their heritage from the “old country”. **Come and enjoy our heritage and love of Koi! E’ komo mai!**

Mountain View Koi Fish, Nursery, & Aquatic

Plants now has excellent show grade Japanese Koi fish! 5"-7" standard, and 4"-6" Butterfly Koi! Over 150 to choose from! Available for sale April 17th.

Also, come join us in celebrating our 7th year Anniversary! Saturday, April 24th 10:30-5:00pm.

Besides a huge sale, we're having a free drawing for koi, goldfish, Aquatic plants, fish food, Pumps, and much more!



**Special Events
Coming UP**

March 1, 2004

2004/2005 Dues are Due

April 25, 2004

Dan & Martha Cover
3:00 pm

May 1 & 2, 2004

SAKA Annual Pond Tour
3 shifts, 5-6 ponds per shift

May 15, 2004

25th Koi Show Committee Meeting
Kino Sports Park

May 23, 2004

Sharron Faulk

June 13, 2004

Kurt & Lisa
Mountain View Koi Fish &
Aquatic Plants

June 24 – June 27th

**AKCA HAWAII 2004
AKCA SEMINAR IN
HONOLULU, HI**

July 25, 2004

Constance Richardson

August 22, 2004

Dennis & Kathy Leonard

September 26, 2004

Noel & Debbie Shaws

October 24, 2004

Tom Ayers

November 12-14, 2004

25th SAKA Koi Show & Auction

Kino Sport Park

December 11, 2004

Sharon Faulk

We are looking for members to host the open dates. (Contact Tom Ayers) It is a great chance to show off your pond and everybody would like to see it know matter what the size is, big or small.



Both Books are in!!! "Judging and Buying Koi" & Basic Koi Ponds, Filters & Water. Please pick them up if you order one at the January or February meeting. There are a few books left.

Club Web site!!!

Come visit it and make your comments. It is your site and I need your help. Go to

<http://sakoia.org>

Have Fun Surfing it.

Our New Logo



SAKA 10% Discount

With your SAKA Membership Card

Boyd Equipment Center

3625 S Country Club Road
Tucson, AZ
792-2244 or
1 (800) 844-2244

**Mountain View Koi Fish &
Aquatic Plants**

3828 Keeling Road,
Hereford, AZ
378-3710

Ponds, Plants & More

(Near the corner of La Cholla & Ruthrauff)
2060 West Ruthrauff,
Tucson, AZ
292-6774

Rancho del Koi

3400 S. Sagauo Shadows Drive
Tucson, AZ
886-8797



Annual Membership

Dues are \$25.00 per family from March 1 to February 28 or 29 of the next year. If paid after August 1 \$17.50, September 1 \$15.00, October \$12.50, November \$10.00, December \$7.50.

Membership Type

_____ Renewal

_____ New Member

Name: _____

Address: _____

City: _____

State: _____

Zip: _____

Phone #: _____

Today's Date: _____

of Koi _____

Years Keeping Koi: _____

Pond size: _____

Would you like to host a meeting?

Would you like to serve on a
committee?

_____ If yes which one?

Make Checks payable to: SAKA

Mail to: Faye & Winton Hall
6775 North Los Arboles Circle

