Diagnostic Approach to the Sick Fish

What to do before help arrives

Learning Objectives

- At the end of this lecture you should be able to:
- Have a set up and plan for all newly acquired fish
- Be able to use the quarantine system for all fish suspected of carrying infectious disease
- Have a systematic plan for determining the cause before utilizing any treatments

- Adhere to proper water quality assessments to maintain optimum conditions.
- Recognize problems inherent in your pond that may lead to disease outbreaks.

4 Basic Fish Pathogens

- 1) Viruses
- 2) Bacteria
- 3) Parasites
- 4) Fungi

Fish have excellent immune systems and built in barriers to help them avoid disease-causing pathogens, but they are weakened by poor or fluctuating water quality and nutrition

Remember

- They are essentially living in their own toilets!

Recognizing the Sick Fish

- Flashing/leaping
- Decreased/absent appetite
- Weight loss
- Visible parasites
- Masses/bulges
- Fin hemorrhages
- Thready/mucoid feces

- Ulcers/wounds
- Gasping at the surface/increased respirations
- Difficulty with balance and buoyancy
- Abdominal distension
- Exopthalmous (‘popeye’)
- Pale gills

Money Well Spent

- You have made a substantial investment in construction, plants, water chemicals and fish.
- A quarantine system is your fish insurance policy
- The First Golden Rule of Quarantine: “I will not add any living organism to my pond/tank/display before an appropriate quarantine period”

1st Step: Quarantine

- Without a doubt, the most important step you can take in preventing or controlling a disease or parasite outbreak is quarantine.

- The Second Golden Rule of Quarantine-Any fish that appears sick or requires medication will be removed from the tank/pond/display and placed in quarantine.
- Your goal is to use as little chemical in your display tank or pond as possible.
- All of the common chemicals recommended to you have side effects on your systems. Treat only your quarantine tank and the affected fish.

- A large holding tank is required: 50-100 gallons, heated to 78*F, with a fully functional nitrification system that has already cycled

Quarantine- New Fish

- Fish- 30 -60 days
- During this time, they are evaluated for appetite, parasites and infectious/contagious diseases.
- Check ammonia and pH every day. Ammonia should always be ZERO

Quarantine-Plants

- Place in a separate tank for 2 weeks. They can be vigorously rinsed in water and hand inspected for snails, rotted vegetation and hair algae.
- They can be dipped in a dilute solution of potassium permanganate to decrease the chances of introducing parasites.

OK, Fish are quarantined, now what?

- Get busy assessing the water quality- Your primary goal is to maintain excellent water quality. Poor water quality cause 90% of the problems in ponds and aquariums
- Need to measure:
- Temperature, pH, hardness, oxygen, ammonia, nitrites, nitrates

Primary Diagnostic Plan

- 1) Water Quality tests
- 2) Skin scrape
- 3) Gill sample
- 4) Fecal sample

- Blood samples
- Culture and sensitivity
- Diagnostic necropsy

- Temperature- thrive at 68*F (35-95) No more than 5*F/day.
- Rapid shifts in temperature causes shock.
- Many diseases and parasites become active in warming water

pH

- pH- 7 to 8 (tolerant to gradual changes ranges in 6-10) Chemicals to change pH are often temporary so it is best to let them get used to local water. The higher the pH, the more toxic ammonia becomes! NH_4+ converts to NH_3. Changes in ph should not be more than 0.3-0.5u/day. Low pH toxicity- fish are hyper active and erratic

Hardness

- Hardness-Hard water tends to be more basic and resists changes in pH, acidic water has more fluctuations. Remember, as plants and other living organisms decay, pH lowers. Hardness is measured as dH. The higher the number, the harder the water. As water evaporates, hardness increases as minerals are concenrated.
- Calcium and Magnesium are the main ions measured. Aluminum, zinc, copper and iron contribute to a lesser extent.

- Ammonia is more toxic in hard water.
- Calcium carbonate can be added to soft water to increase dH.
- Koi do well in moderately hard water (75-150 mg/L)

- Oxygen- the oxygen carrying capacity of the pond is dependant on temperature, salinity, population density, aeration, plant respiration, added chemicals(formalin) dead material in the pond. Remember- oxygen is used in the deeper layers of the pond first so sampling should be from 2 feet down. Optimum reading in 9mg/L. Below 5mg/L, fish will be gasping at the surface.

- Plants use oxygen at night for respiration so O2 levels are lowest just before sunrise. Keep aeration systems and waterfalls running all the time to increase oxygen diffusion at the surface. Oxygen depletion causes flared opercula and pale mucus membranes.

  Do a partial water changes, remove organic debris. For emergencies, add hydrogen peroxide 1ml/gallon to increase oxygen concentration

- Ammonia-maximum level of toxic ammonia (NH_3) is less than 0.02mg/L. To lower ammonia- do 20-50% water changes daily, add salt at 1lb/100gallons, decrease water temp and pH if possible, decrease feesing and clean up organic debris. Increase oxygenation, add a commercial water treatment.

- Nitrites- high levels are absorbed into the blood stream interfering with the oxygen binding capacity of the blood. Toxic at 0.10/L in soft water and 0.20mg/L in hard water. Treat with water changes, increased oxygen, salt, (1 tsp/gallon or 1 lb per 100 gallons) added biological filtration. The nitrification cycle is fastest at pH 7.1-7.5, 77-95* and full O2 saturation. Adding salt allows for the cl- ion to compete with nitrite for absorbtion from the gills.

- Nitrate- Relatively non toxic and koi can tolerate levels up to 200mg/L but do best if kept below 20mg/L. Nitrate reduces buffering capacity of the water and lowers the pH. Hi levels stimulate algal blooms
- Nitrites are converted by bacteria

  (Nitrobacter spp) to nitrates

- Chlorine-levels greater than 0.2mg/L are toxic. Lower levels are stressful and cause gill damage. Most municipalities chlorinate their water between 0.5-1.5 mg/L
- You must dechlorinate- chlorine takes7- 15 days to evaporate from water depending on aeration.
- Should also treat for chloramines- used in water treatmetn plant to neutralize organic acids that turn into chloroform and other toxins

Other Factors to Consider

- CO_2-Respiration from fish, plants and other aquatic animals produces CO_2. CO_2 acidifies water. Agitation releases CO_2 preventing acidification

- Hydrogen sulfide-Toxic to fish and humans!
- Produces the black ooze in ponds and smells like rotten eggs
- Results in rapid fish loss

Salinity

- Salinity-Salinity- increasing the salinity helps convert toxic ammonia into less toxic ammonium.
- Pond salinity should be between 0.1-0.3%
- Water hyacinth, water cress, and water lettuce a sensitive to salinity.
- Don't use salt with Zeolite- it will cause ammonia to be released.

Alkalinity

- Alkalinity refers to the buffering capacity of water. Buffering capacity is the ability of the water to resist changes in pH.
- Alkalinity is measured by dissolved anions- CO_3, HCO_3, OH-, Cl-, P-, and S-.
- Adding Baking soda to soft water will increase alkalinity (1 tsp/10 gal) to raise pH

Physical Diagnostics

- Skin Scrape
- Gill biopsy
- Fecal samples
- Radiology
- Ultrasound
- Cultures and sensitivities

List of Equipment

- Microscope
- Slides and cover slips
- Scissors/forceps
- Exam gloves

References and Credits

- Saint-Erne, Nicholas, Advanced Koi Care for Veterinarians and Professional Koi Keepers. 1eErne Enterprises
- Stoskopf, Michaeal- Fish Medicine 1e, ISBN 0-7216-2629-7 WB Saunders