### Of course there's an AD on the front of the document!



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Brood Stock Health By Dr. Erik Johnson



### **Controlled Crosses**

- Controlling crosses has become paramount
- Some folks still cage their brood stock in ponds
- Many accumulate the brood stock and control the spawn with temperature shock / injection of CPE (Carp Pituitary Extract) or other...

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• So there may be a "wait" with fish mixing.

### Risks of Accumulation

- Mingles fish from various ponds
- Risks disease transmission
- Enables parasitic proliferation
- Taxes O<sub>2</sub> Carrying capacity of facilities
- "All Your Eggs In One Basket" Phenomena.

### **Condensing Pathogens**

- Costia, Trichodina, Chilodonella, and other parasites of the body and esspecially gill can be massively fatal to Koi
- Not when spread out through a pond.
- When condensed, it's like (for the parasite) fishing in a barrel.

### **Capture Stress**

- Large fish demand more oxygen
- Yet they are challenged to absorb enough.
- Gravidity is the most stressful thing a female fish confronts in her life.
- Chasing a fat guy.
- Cardiac rupture or other forms of stroke are possible.

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### Handling / Nets Fish are not made for bearing their own weight. They are engineered for weightlessness in water.

- Rough handling opens the integument
- Carrying broodstock in nets can break backs or luxate the caudal lobe of the airbladder.
- Carry in a sock net ONLY or bin in water

### **Temperature Issues**

- Very low temperatures (40-50°F) are ideal for fish handling because O<sub>2</sub> levels are typically high
- Warmer water is dangerous because it carries less oxygen.

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 Stressing fish in warm water, or a power failure – can kill the fish.

### **Oxygen Issues**

- Oxygen should be near saturation
- Oxygen levels 8-11 are great
- Oxygen levels 5-8 are tolerated
- Oxygen levels 3-5 usually cause piping, especially when the fish are alone.
- Oxygen levels below 3-4 are fatal to fish

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### CO<sub>2</sub> Issues

- When Oxygen levels are high, CO<sub>2</sub> levels must be low, RIGHT?
- WRONG CO<sub>2</sub> and Oxygen can exist independently and CO<sub>2</sub> levels can harm fish if they are not degassed.
- $CO_2 \dots \rightarrow Carbonic Acid (Lowers pH)$
- Water must be agitated and buffered.

### Nitrogen Issues

- "The Cycle" is the formation of Ammonia by fish / decay of anything.
- Ammonia reduced by Nitrosomonas to Nitrite.
- Nitrite reduced by Nitrobacteria to Nitrate.
- Nitrate used by plants or weakens fish.

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### Ammonia

- Produced by the gills to the tune of 75%
- The Kidney only produces 25%
- (You work the opposite way)
- Ammonia is more toxic at a higher pH
- Can be controlled by "BINDERS" which bind for about 48-72 hours.
- Can be controlled by flow through water replacement.

### Nitrite

- Not a common problem in broodstock facilities which are usually either holding for a FEW DAYS ONLY or are completely cycled (The nitrogen cycle mentioned before is "complete")
- Blocked by salting to as low as 0.1%
- Removed by constant flow through.

### Nitrate

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- Common, COMMON in broodstock holding facilities which are often INDOORS and free of green foliage / algae to reduce same.
- Still, it takes weeks to months for Nitrate to weaken fish to cause:
  - Slow healing wounds
  - Increased vulnerability to other infections

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# A measurement An important one though. Any pH higher than 6.9 is "okay" for Koi Koi don't care about a pH rise of two points. They hate a pH drop of any two points. Carbonic acid drops pH Bicarbonate / carbonate supports pH

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### Preventing Spread

- Feed medicated food in these holding facilities if you feed at all
- Medikoi is well formulated and contains a good mix of antibiotics.
- I am no where near as enthusiastic about other formulations.
- Ultraviolet Sterilizers may be helpful

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### Controlling Bacterial Issues Broodstock often have some dents and scratches. If body language is good and they will be detained for a short time, no treatment may be indicated. If treatment is desired – Nuflor is

 If treatment is desired – Nution is suggested... One injection is good before return to pond.



### Parasitic Issues

 Condensing fish populations make parasite spread easier.

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- Populations transmit and grow exponentially.
- Early or pre-emptive diagnosis is best, prophylaxis is okay.

# Biopsy all groups of fish (Three fish three times or nine fish one time but not one fish nine times!) Treat all parasites found. Shotgun treatments take unnecessary risk. "Nip it in the bud" with the Costia treatment regimen. (Next)

### Stopping Parasite Issues All brood fish come from ponds in to adequately large holding facility. This holding facility provides 24 hours of safe, well aerated rest. Possibly feeding antibiotic medicated food. Treat to 50ppm with Formalin-37% which is: Two-milliliters per each ten gallons of vat water. Aerate vigorously. At 120 minutes, move all fish to <u>second</u> vat. Clean out of vat one.

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	Salt
Salt is touted as a o	cure-all
0.3 % is 3 pounds	per 100 gallons water.
0.6% is 6 pounds p	per 100 gallons water
Kills floating plants plants.	. Spares most rooted
Should be no trace	minerals in it. Iodized is
fine. Leave in at 0.3	3% in non-Formalin
Ireated water	
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### SVC – Spring Viremia

- A rhabdovirus that kills 10% of the fish it infects by making them vulnerable to Aeromonas or other bacterial pathogens.
- Low mortality with HIGH morbidity in studies by Ken Wolf, USFWS.
- Reportable Disease Meaning if detected your pond / farm will be closed and quarantined, for a very long time.
- Testing for this has been <u>downgraded</u> as a priority for APHIS and other regulatory agencies.

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# Infectious in warm water, with a narrow window of 70-80° F Too cold (< 70°F) – Virus resides inactive.</li> Too warm (83-86°F) – Clinical signs resolve. Shows up 4-7 days after infection depending on temperatures Skin, gills and kidneys basically peel and die. 90% of infected fish are dead by Day 14

### Prevention / Diagnosis

- Don't have, own, or keep KHV infected fish
- Keep KHV infected fish <u>off</u> your farm or lot
- Don't do breeder exchange programs with any <u>UNTESTED</u> fish.
- Testing is done with SEROLOGY on blood of any fish that proposes to come onto your lot.
   Fish are bled and samples sent to UGA
- Samples.koilab.com

### Control KHV

 During infection – you can stop losses and restore fish health by:

- Diagnose any parasitic or bacterial co-infections.
- Treat and parasitic or bacterial co-infections.
- Heat fish water to 86°F at a rate of one degree Fahrenheit per hour until 86°F is reached.
- Research may be underway that suggests the fish may be cured by heat – so don't kill survivors. Simply store them in landlocked ponds offsite until we know.
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### Last Considerations

- Broodstock are big fish which are highly resistant to a lot of things that might kill smaller younger fish.
- Split fins and ulcers, and luxated caudal airbladder lobes are common and may not need treatment.
- The most expensive broodstock will jump out of the tank.
- The power will go out on the tanks if you leave town for a conference or delivery.

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