Fish Health In A Trout Nursery
Detection, Identification, Treatment, and Solutions

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Fisheries Technician
Cooperative Nursery Unit

Mission: To protect, conserve, and enhance the Commonwealth’s aquatic resources and provide fishing and boating opportunities
Overview

- Advantages of Proper Fish Health Management
- Indications of Problems
- Common Parasites/Bacteria
- Treatments
- Summary
Proper Fish Health Management

• Starts Before Fish Are Delivered
  • Drying Period and Disinfection
• Fish Distribution Day
  • Water Temperature/Flow
  • Salt/Feed
• Routine Schedules
  • Cleaning/Salt
Proper Fish Health Management

- Healthy Fish Leads to Quality Fish
- Sick Fish Have Reduced Growth
  - No Feeding On Treatment Days
  - Anywhere From 3-10 Days
- Fish Must Re-Acclimate
Disinfecting Your Nursery

- Dry Everything
  - Nets/Buckets/Raceway
  - After Every Use
- Clean RW
  - Organic Material
  - Pressure Washer/Scraper(s)
  - Salt Solution
  - Iodophor Solution
## Disinfection Table

<table>
<thead>
<tr>
<th>Chemical</th>
<th>1 Gallon Water</th>
<th>2 Gallons Water</th>
<th>5 Gallons Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>250 ppm Iodophor</td>
<td>95 ml</td>
<td>190 ml</td>
<td>475 ml</td>
</tr>
<tr>
<td></td>
<td>or 3.3 oz.</td>
<td>or 6.7 oz.</td>
<td>or 16.6 oz.</td>
</tr>
<tr>
<td>Virkon\textsuperscript{\textregistered} Aquatic 1%</td>
<td>38 grams</td>
<td>76 grams</td>
<td>190 grams</td>
</tr>
</tbody>
</table>
Fish Distribution Day

- **Disinfection**
  - Prior to Delivery Day
- **Nursery Water**
  - Temperature/Flow/Turbidity
- **Nursery Equipment**
  - Disinfect After Stocking
  - Before Use In Nursery
Fish Distribution Day - Salt

- Prophylactic Treatment
  - Hi-Grade Granular Untreated Salt
- Head of Raceway/Pond
  - No Salt Blocks
- Know Your Flow
  - Salt @ 0.5% Solution
Calculating Water Flow

- **Weir Method**
  - Width of the weir (feet)
  - Depth of the water flowing over the weir (inches)
  - Use the average of 3 measurements
Water Flow

42"

1 1/8"

Pennsylvania Fish & Boat Commission
FLOW OVER RECTANGULAR WEIR WITHOUT END CONTRACTIONS

Width Weir = 1 foot

\[ Q = \text{gals. per min. (gpm)} \]

\[ H = \text{head in inches} \]

| \( H \)   | \( Q \)  | \( H \)   | \( Q \)  | \( H \)   | \( Q \) 
|---------|---------|---------|---------|---------|---------
| 1/16    | 0.562   | 11/4    | 50.3    | 3 1/2   | 236     |
| 1/8     | 1.59    | 1 3/8   | 58.0    | 3 3/4   | 261     |
| 3/16    | 2.91    | 1 1/2   | 66.1    | 4       | 288     |
| 1/4     | 4.49    | 1 5/8   | 74.5    | 4 1/4   | 315     |
| 5/16    | 6.28    | 1 3/4   | 83.3    | 4 1/2   | 343     |
| 3/8     | 8.26    | 1 7/8   | 92.4    | 4 3/4   | 372     |
| 7/16    | 10.4    | 2       | 104     | 5       | 402     |
| 1/2     | 12.75   | 2 1/2   | 111     | 5 1/4   | 433     |
| 9/16    | 15.2    | 2 1/4   | 121     | 5 1/2   | 464     |
| 5/8     | 17.8    | 2 3/8   | 132     | 5 3/4   | 496     |
| 11/16   | 20.5    | 2 1/2   | 142     | 6       | 529     |
| 3/4     | 23.3    | 2 5/8   | 153     | 6 1/2   | 596     |
| 13/16   | 26.3    | 2 3/4   | 164     | 7       | 666     |
| 7/8     | 29.5    | 2 7/8   | 175.5   | 8       | 814     |
| 1       | 36.0    | 3       | 187     | 9       | 971     |
| 1 1/8   | **42.9**| 3 1/4   | 211     | 10      | 1137    |
|         |         |         |         | 11      | 1312    |
|         |         |         |         | 12      | 1495    |
Water Flow

- Flow = Weir Width (ft) x gpm

- Weir Width = 42”/12” = 3.5’

- Flow = 3.5’ x 42.9 gpm

- Flow = 150 gpm
### Salt Treatment Table

#### 30 Minute Treatment Concentration

<table>
<thead>
<tr>
<th>Flow (gpm)</th>
<th>0.5%</th>
<th>1%</th>
<th>2%</th>
<th>3%</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>1.25</td>
<td>2.5</td>
<td>5</td>
<td>7.5</td>
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<tr>
<td>10</td>
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<td>75</td>
<td>150</td>
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<td>200</td>
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<td>50</td>
<td>63</td>
<td>125</td>
<td>250</td>
<td>375</td>
</tr>
<tr>
<td>100</td>
<td>125</td>
<td>250</td>
<td>500</td>
<td>750</td>
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</table>
Salt Treatment

• 0.5% Salt Treatment
  • Lbs. of salt = 1.25 lbs. of salt x water flow (gpm)
  • Lbs. of salt = 1.25 lbs. of salt x 150 gpm = 187.5 lbs. of salt

• Flow Reduction
  • Saves Time, Money, and Your Back
Fish Distribution Day - Feed

- When To Feed Your Fish
  - No Feed for 3 Days
- Hatchery Provides Feed for 7-10 Days
  - Call CNU For Correct Feed Size
- Use Feed Chart Provided by CNU
Nursery Maintenance

- Routine
  - Do Not Wait Until Nursery Looks Dirty
- Remove Excess Organics
  - Scrape/Sweep RW
- Salt Fish @ 0.5% Solution
Nursery Maintenance

- Routine Upkeep Prevents Many Parasites and Bacteria
  - Populate in Organic Material
- Train Nursery Staff
  - Maintain Schedule
- Accurate Record Keeping
Indications Of Problems

• Know Your Fish Behavior
  • Fish Not Eating
  • Fish Act Disoriented
  • Crowding Head
  • Sores/Fin Condition/Outward Signs
Common Parasites/Bacteria

- **External Parasites**
  - Ich, Gyrodactylus, etc...

- **Bacteria**
  - Furunculosis, Bacterial Gill Disease, etc...

- **Treatments**
  - Chemical, Antibiotic, Low Regulatory Drug
Ichthyophthirius multifiliis

- Ich
- One of Largest Parasites
  - Most Prevalent @ 59°-77°F
- Horizontal Transmission
Ich Life Cycle
Gyrodactylus

- Monogenetic Trematode
- Common Aquatic Parasite
- Degraded Water Quality
  - Oxygen/Temperature/Flow
VIDEO CALIBRATION
Ichthyobodosis necator

- Costia
- Size of A Red Blood Cell
- Wide Temperature Range
  - 36°-86°F
- Fingerlings Very Susceptible
- Bluish Hue on Fish
Trichodinosis & Chilodonellosis

- “Trich” & Chilodonella
- Relatively Mild Pathogens
- Low Level Mortalities
- Indicator of Other Issues
Epistylis & Apiosoma

- Very Common Pathogen(s)
- Attach to Scales/Fins/Gills
- Chronic Infection
- Indication of Organically Polluted Water
- Clean RW
External Parasite Treatments

- Formalin
- Treat Based On Flow
  - Concentration
- Must Check Flow Every Time!
- Therapuetic Salt Treatment

1. Add the pre-measured Parasite S (Formalin) to a bucket with a (2) two gallon mark.
2. Add water to the (2) two gallon mark.
3. Pour solution into the treatment bucket (3/32” hole drilled into the bottom) at the head end of the raceway.
4. Note treatment start time and observe fish throughout the one-hour duration.
5. Use the chemical treatment for ____ days.

REMEMBER TO ALWAYS WEAR RUBBER GLOVES AND EYE PROTECTION WHEN WORKING WITH THESE CHEMICALS;
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Bacterial Diseases

- Bacterial Gill Disease
- Furunculosis
- Columnaris
- Cold Water Disease
Bacterial Diseases

• Cause Acute Mortality

• Longer Detection Time
  • Fish Health Lab

• Identify Antibiotic Sensitivity
  • TM or Romet
Bacterial Gill Disease

- *Flavobacterium branchiophila*
- Gills Only Organ Affected
- Excess Mucus
- Indications of Disease
  - Appetite/Crowd Head
Treating BGD

- Previously - Hydrogen Peroxide
  - Flawed Treatment
  - Burned Bacteria
  - Hard On Fish

- Currently - Chloramine-T
  - Three Day Treatment
  - Drip Bucket
Furunculosis

- *Aeromonas salmonicida*
- Brook Trout Most Susceptible
  - RT Least Susceptible
- Affects ~6” and Larger Fish
- Chronic and Acute Mortalities
Furunculosis

- Bloody Discharge From Vent
- Hemorrhaging On Skin
- Hemorrhaging At Base of Fins
Columnaris

- *Flexibacter columnaris*
- Saddleback, Fin Rot, Peduncle Disease
- Pathogenic @ T >59°F
  - Mortality Temperature Dependent
- Uneaten Feed Supports Growth
Columnaris

- Necrosis Behind Dorsal Fin
- Acute If On Gills
- Easily Treated
  - Improve Environment
Cold Water Disease

- *Flexibacter psychrophilus*
- Affects All Salmonids
- Acute Mortality In Hatcheries
  - < 6 Months
- Uncommon In CNU
Treating Bacterial Infections

- Biomass of Nursery
- Drug Sensitivity
- TM or Romet

- Mix With Feed
- Feed All Medication!
- Lead To Antibiotic Resistance
### Romet Slurry

<table>
<thead>
<tr>
<th>Pounds of Feed</th>
<th>Ounces of Water</th>
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<tbody>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
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<tr>
<td>3</td>
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### TM 200 (Terramycin)

1. Weigh or measure ______ pounds (lbs.) of feed.
2. Measure one-half (1/2) to one (1) ounce of cooking oil per pound of feed.
3. Pour the cooking oil over the feed and mix thoroughly.
4. Open one packet of medication and mix it well into the oil-feed mixture.

### Romet TC

1. Weigh or measure ______ pounds (lbs.) of feed.
2. Add the contents of one packet to ______ ounces of water and stir to a slurry.
3. Add the pre-measured daily feed to the slurry and mix thoroughly.
4. For best results, the coated pellets should be spread out on a clean surface and allowed to air-dry.
Summary

- Clean RW = Healthy RW
  - Disinfection/Routine Maintenance
  - Bacteria Accumulate In Organics
- Know Your Fish
  - Early Detection Is Key
- Routine and Preventative Maintenance
- Call CNU When Issues Happen
Acknowledgements & Questions

• Coja Yamashita
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• Brian McHail