



## Trout in the Classroom (TIC)

### Pisgah Chapter of Trout Unlimited

#### From Eggs to Fry

#### An Overview of Trout Development in the Classroom

### Egg Development

In the hatchery, eggs are taken from the female fish and fertilized with milt (sperm) from the male. The sticky eggs are soaked in water during which time they become firm. These are called green eggs. They are very delicate and any roughness can kill them at this stage.

As the eggs develop, an eye can be seen forming in the embryo. These eyed eggs are still fragile, but stronger than green eggs. At the eyed stage, eggs are ready for your classroom aquarium. You will receive eyed rainbow eggs on September 23, 2016 from the Setzer Fish Hatchery, Brevard. Eggs will be delivered by Pisgah Chapter Trout Unlimited members to your school. The eggs will be kept moist and cool during the transport to your classroom. An insulated cooler will keep the eggs cool during the trip to the school.

Back in the classroom, open the egg container that contains your eggs and place them in the aquarium to acclimate the temperature.

- Have your students pick out the dead, non-viable eggs with the tweezers or eye dropper..
- These eggs will appear white or opaque in color. Students will need to work quickly at this stage, but it gives them an immediate hands-on experience with the program.
- After the eggs have been picked through, they will need to go into your hatching basket.
- The eggs need to be in one single layer. Do not expose the eggs to sunlight or fluorescent light. Even fifteen minutes of light can kill both eggs and fry. It is suggested to enclose three sides of the tank with foam. Leave the front side open so students can see what is happening in their tank.

Check the aquarium each day for dead eggs or eggs with fungus—they will appear white. Some eggs will die, even though all your systems are working properly. Remove dead eggs to prevent the spread of fungus that will form on them. Use an eye dropper or turkey baster to remove the eggs. Record the number of dead eggs you take out of the tank on your daily record sheet.

#### Alevins

When the eggs hatch the alevins (pronounced Al-a-vin ) will swim out of the egg basket to the spaces in the bottom of the tank. They will remain there until they consume their yolk sacs. They are still fragile at this stage, so avoid any handling of them. **Any egg cases with fungus and any dead alevins should be removed and their numbers recorded on your daily record sheet. If you are using a hatching basket, leave your alevins in the hatching basket until they are free swimming.**

During development, alevins use the food in their yolk sacs. The size of the sac will gradually become smaller. After a week or so the sac will be used up. The alevins will begin to swim about looking for food. At this stage you will begin feeding the fry.

### Guidelines for Feeding the Fry

You will receive enough food to last the entire school year. If you run out, chances are high that you are overfeeding your fish. More fish food can be obtained from your local pet store.

- Timing: Your hatchlings do not require feeding for 7 to 14 days after hatching. They will feed from their yolk sack as they stay low, at the bottom of the hatching basket. When you see the first hatchling begin to rise off

the bottom of basket, you can start providing food. Much of this first food will go uneaten, but by providing it to the developing fish, it will be there when they're ready to eat.

- There WILL be some mortality as the fish start to feed...some hatchlings just never start eating, and die.
  - When your fish reach about 1" in length, it is time to switch to Size 1
  - When your fish reach about 1 1/2" in length, it is time to switch to Size 2.
- Quantity: When born, your hatchlings are very small...Assuming 200 trout, feed them approximately the following amount of food each day...interpolate as needed:
  - First feedings fish still in hatch box: feed very little food
  - Fish just out of hatch box: 0.34 grams (0.01 oz) of food
  - Fish = approx. 1": 1.36 grams (0.05 oz) of food (Switch to size 1 now)
  - Fish = approx. 1 1/2": 3.4 grams (0.12 oz) of food (Switch to size 2 now)
  - Fish = approx. 2 1/4": 10.9 grams (0.38 oz) of food (This is about the size where you will release)

## NOTE

You can calculate feeding amounts quite precisely, but this is totally unnecessary. We have provided the formula at the end of this page for those of you into the math.

The 0 and 1 sized feed needs to be sunk down to the fish, because the oil added to the food will cause it to float. A small plastic paddle will work fine. When the food is introduced to the water directly above the fish, a slight back and forth motion should get the food down to the fish.

## Calculating Food Quantity

The formula is simple.

1

----- x 0.03 = weight of food needed to feed fish in POUNDS

(P/N)

Where

P = Number of fish per pound

N = Number of fish in tank

## Example

If you started with 200 eggs, they will require only 0.012 ounces or 0.34 grams per day. They will reach about 1" before you need to move up to size 1, by then they will weigh about 2000 to the pound (bigger fish, less per pound), and will require about 0.048 ounces or 1.36 grams of food.

Approximate number of fish per pound...based on average length:

- At Birth: 8000
- At 1": 2000
- At 1 1/2": 800
- At 2 1/4": 250

Over the next six months you and your students will watch the fry develop and grow. During this stage it is important to keep a check on water temperature (twice a day). You will also be testing pH, dissolved oxygen and ammonia. As the fry grow, ammonia levels in the aquarium will rise. Be prepared to change the water. A 1/2 to 2/3 water change will improve water quality. Always keep buckets of dechlorinated water available for changes.

## Critical Water Quality Elements

### Temperature

Use a standard aquarium thermometer to monitor the water temperature. The ideal temperature range for raising trout is between 48° F. and 52° F. Temperature affects ammonia and oxygen concentration and fish metabolism. A sudden increase or decrease of 3 to 5 degrees within a 15-minute period (even within the acceptable temperature range) can create major problems for eggs and alevins. When doing a water change, make sure the new water is within 1 to 2 degrees Fahrenheit of that in the aquarium.

### Dissolved Oxygen

Dissolved oxygen is defined as the amount of oxygen, measured in parts per million (ppm), that will dissolve in water at a given temperature. Trout are active and consume a lot of oxygen from the water. Dissolved oxygen levels of 10-12 ppm is most desirable. 8 ppm for developing eggs and alevins is the absolute minimum. 5 ppm is the absolute minimum for fry. At the 5- 8 ppm you can expect some problems for eggs and fry. Use a dissolved oxygen test kit (available from aquarium supply stores) to check for dissolved oxygen.

## pH

pH (the power of Hydrogen) is an indicator of water acidity or alkalinity. The pH values range from 1 to 14. Pure, pH-balanced water has a value of 7. Any number less than 7 is acidic. Any number more than 7 is basic or alkaline. A pH below 6.0 or above 8.0 in your aquarium water is reason for concern. Make a partial water change or use a buffering agent, such as baking soda, to correct the situation. Use a pH test kit (available from aquarium supply stores) to test pH.

## Ammonia

As the eggs, alevins and fry develop both ammonium ions ( $\text{NH}_4$ ) and ammonia ( $\text{NH}_3$ ) are produced through excretion. Ammonia is highly toxic to fish. High levels can cause gill damage, anemia, and even death for eggs and fry. At pH levels above 7 the ammonia increases its concentration. Total ammonia levels (the sum of both forms) should be less than 5 mg per liter. Monitor ammonia levels with a test kit available from an aquarium supply store. If the ammonia level is high you will need to do a partial water change.

## Pollutants and Chlorine

Pollutants are not a problem if you are using tap or well water in your aquarium. Chlorine in drinking water is toxic to fish and to the bacteria making up the aquarium's biofilter. Because chlorine is an active element it can be quickly and easily removed from tap water. Dechlorinate a bucket of tap water by leaving it exposed to the air for 24 hours. Tap Water Conditioner also rids your water of chlorine.

## Monitoring and Record Keeping

Before the eggs arrive, instruct students on how to conduct a daily inspection of the aquarium. Show them how to check that the equipment is working properly and how to read and record the temperature. Explain that when the eggs arrive, they will also be checking for egg mortality.

Assign three students to conduct the inspection twice daily for a week. At the end of the week rotate out one student and put a new student in. That way, after the first week, you will always have two students with experience in conducting the inspection. Have students inspect the aquarium early in the morning and at the end of the day and record their findings both on the daily inspection record and on the progress chart.

Record keeping is an essential part of the program. Records can identify potential problems and can be used to reference experiences from past years. Students should record everything that is done or observed. For example:

- Dates
- Temperatures
- Egg/alevin/fry numbers
- Problems and solutions
- Water quality testing results
- Mortality
- Observations: hatching, predation, etc.

**At the end of each week, student inspectors should report to the class on the data they collected for the week.**

**Use the daily inspection record and progress report that follows or have students create recording sheets of their own..**