



## ***Aquatic Animal Nutrition:***



### ***Understanding Differences in Fish Food***

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**Grade Level:**

9-12

**Subject Area:**

Aquaculture, Nutrition

**Time:**

45 minutes

+introduction/discussion  
times

#### **Student Performance Standards (Sunshine State Standards):**

*11.09* Develop an information file in aquaculture species (LA.910.1.6.1, 2, 3, 4, 5)

*11.10* List and describe the major factors in the growth of aquatic fauna and flora (LA.910.1.6.1, 2, 3, 4, 5; SC.7.L.17.1, 2, 3)

*14.09* Determine kinds of feed to use in growing seed (SC.912.E.6.4; SC.912.E.7.4; SC.912.L.14.3, 4, 6, 7, 8; MA.912.A.1.1, 2, 4, 6; MA.912.G.1.1, 2, 4; MA.912.S.3.1, 2).

*15.05* Determine feeding methods and feed aquaculture species (LA.910.1.6.1, 2, 3, 4, 5; MA.912.A.1.4).

**Objectives:** Students will be able to:

1. Identify and explain key differences in larval and adult food and how it applies to daily operations.
2. Report the basic culture techniques of rotifers or brine shrimp.
3. Identify the differences between larval and adult fish foods.
4. Describe food fed to adult fish.

#### **Abstract:**

They say that size doesn't matter. Not so in the world of aquatic animal nutrition. A fish, which doesn't eat, doesn't grow. Understanding the concept of fish feeding is critical to aquaculture operations and fish growth and health. The bottom line is that **fish that don't eat, don't grow, or no feed, no gain!**

**I. Feeding Basics.** Students need to know and appreciate the differences between small and large fish. This difference is particularly apparent during feeding. Fish need different foods at different times.

**II. Feed size vs. fish size:** Often you must consider feeding from the fish's

point of view. (You could use the slides under objective 2 during this discussion.)

**III. Key features of larval vs. adult fish:** Larval fish: Small, small gape size, gut undeveloped or lacking, need high protein, high fat, rapidly developing (feed often).

Understanding the above concept will provide students with knowledge to discuss key differences in larval and adult food and how they might apply to day-to-day operations of a fish farm. Students will also be able to identify the pros and cons of live and commercial feeds through comparison of preparation methods for each feed type.

**Interest Approach:**

**Q: Do we feed the smallest fish in the pond (or aquarium), or the largest?**  
(Depending on the answer you receive here an entire discussion could break out.)

**Q: Why?**

**A:** If small fish can't eat, they will grow slowly, or not at all.

**Feed size vs. fish size:** Often you must consider feeding from the fish's point of view (You could use the slides under objective 2 during this discussion). In ponds with mixed sizes of fish use mixed feed sizes, or use feed that can be eaten by the smaller fish, the latter method being preferred.

**Key features of larval vs. adult fish:**

Larval fish: Small, small gape size, gut undeveloped or lacking, need high protein, high fat, rapidly developing (feed often),

First food:

Explain to the students that during the initial phases of fish growth, larval fish rely on a nutrient rich yolk sack, hence the name sac-fry, containing vitelline (a mixture of protein and fat) which serve as a nutrient reserve until they can grow enough to begin feeding on their own. When it is gone, they must eat on their own (exogenous feeding) very soon, or starve to death.

Adult fish: Larger gape size, well developed gut and immune system. Require less dietary protein and fat. Growth is reduced.

**Student Materials:**

1. Pencil
2. Paper
3. Calculator
4. PowerPoint handout

**Teacher Materials:**

<i>Material</i>	<i>Store</i>	<i>Estimated Cost</i>
Pencil/pen	NA	NA
Paper	Office Depot, WalMart	\$1.99 and up
Calculator	Office Depot, WalMart	\$4.99 and up
Blackboard/whiteboard	NA	NA
PowerPoint handout	NA	NA
Pictures/samples of feed from each animal (pellets, flakes, etc.)	NA	NA
Examples/pictures of larval and adult fish foods (algae, daphnia, feeds)	NA	NA
Sea salt with several gallons of dionized water	PetSmart	\$40/five gallon bucket
Brine shrimp eggs	Aquatic Ecosystems	\$3.25/pouch
Rotifer eggs-dehydrated	Aquatic Ecosystems	\$15/tube
Aquarium air pump and stone	WalMart or pet store	\$10 and up
Aquarium (a two liter bottle may also be used)	WalMart, pet store	\$20 and up
Aquarium hydrometer	Aquatic Ecosystems	\$9 and up
Incandescent light (at least 15 watts) with stand	WalMart, Target	\$5 and up
IFAS Publication SRAC publication 701 ( <b>table 5</b> from <b>handout 1</b> )	<a href="http://srac.tamu.edu/index.cfm?catid=32">http://srac.tamu.edu/index.cfm?catid=32</a>	

Fish feed may be purchased at any pet store. Rotifers may be obtained from Carolina Biological Supply or from Aquatic Ecosystems.

**Student Instructions:**

1. Using the set-up information provided from your instructor or with the rotifer cysts, set up and hatch a batch of rotifers for comparison with a typical “off-the-shelf” fish food.
2. Examine the commercially available fish food and note the differences in shape, smell, consistency and delivery method when compared to live food.

## **Teacher Instructions:**

### *Preparations:*

Begin a day ahead by starting a brine shrimp or rotifer culture. If you intend to divide this class into multiple sections, then you might begin the larval food culture a day ahead and follow up with a feeding exercise.

### **Brine Shrimp:**

Begin a day ahead and have a starter culture of rotifers ready for observation (brine shrimp might also be used if rotifers are unavailable. Many simple brine shrimp culture methods can be found on the internet. (See URL in Support Materials section hereafter.) This could be a lab activity for hands-on experience of growing brine shrimp as it is relatively simple and requires little equipment.

### **Rotifers:**

Culture of rotifers is explained in the following publication by the Southern Regional Aquaculture Center.

<http://srac.tamu.edu/index.cfm?catid=32>

This will provide a very useful focal point to use in your discussion. If you have several goldfish or other aquarium species available this is a great opportunity to demonstrate feeding live brine shrimp to small fish vs. flakes or other aquarium food.

### *Activity:*

1. Activity during explanation: Let each student examine several types of fish feed and the brine shrimp eggs and have them describe them in terms of ease of consumption.
2. Rotifer culture and feeding. See handout on rotifer culture. (**IFAS Fact....**)
3. Have several set-ups for students to begin, or at least hatch out rotifers.
4. Compare the costs/pound of several commercially made aquaculture feeds and then to a pound of "live food."

### *Post work/Clean-up:*

Brine shrimp and rotifers may be left to grow for a day or so, but the cultures will eventually starve out and need to be thrown away, or fed to fish beforehand.

### **Anticipated Results:**

1. Students will learn the differences between adult and larval fish foods.
2. Students will learn how to culture live food.

**Support Materials:**

## 1. Websites:

Brine Shrimp Culture:

<http://www.brineshrimpdirect.com/res-hatching-c169.html>

<http://www.sciencenetlinks.com/lessons.cfm?DocID=103>

Brine Shrimp handout PDF link: <http://edis.ifas.ufl.edu/FA023>

Rotifer Culture:

<http://srac.tamu.edu/index.cfm?catid=32>

[http://www.brineshrimpdirect.com/Rotifers-101-c200.html#\\_Toc213657766](http://www.brineshrimpdirect.com/Rotifers-101-c200.html#_Toc213657766)

**Explanation of Concepts:**

Observation skills

Comparison and contrast methodologies