LESSON 17: FISH CARE

TEACHER GUIDE

BACKGROUND INFORMATION

- The amount of fish food needed to feed a tank full of fish is determined by timing how long the fish take to consume ALL of the food they are given. The fish should require no more than five minutes to eat everything given to them. Fish should optimally be given this amount of food two to three times daily.
- Feeding fish often, but relatively little in each sitting, mimics their natural routine. Fish are generally foragers. They eat what they can when they can, which tends to be small amounts of food several times a day. Fishes' bodies are designed to deal with this sort of feeding.
- Food that is not consumed within five minutes will likely not be eaten. This food will remain in the tank and decompose, ultimately polluting the water and becoming a danger to the fish.
- Overfeeding the fish can lead to a number of tank symptoms. Cloudy water can occur due to the decomposition of the food. There can be an outburst of algae growth due to the excess nitrates and phosphates in the water from the rotting food. Furthermore, the additional nitrates serve as food to bacteria, consequently increasing the number of bacteria. These bacteria also use up oxygen, removing it from the water and making it harder for the fish to breathe.
- Adult fish eat up to 1% of their body weight each day. Baby fish (larval and fry fish) eat up to 7% of their body weight each day.

- The aquaponics fish tank does not need to be cleaned. The plants clean the tank by "eating" the fish feces that dirties the water.
- Even though the tank does not have to be cleaned, new water will still need to be added occasionally due to evaporation. It is better to add water more frequently, and add less at a time, than to wait awhile and add a lot of water. Water from a tap or hose likely contains chlorine, which is not healthy for the fish. The water will cycle and become safe for the fish with time, but it is best if there are small amounts of water needing to go through this process. Additionally, if the water level is allowed to substantially drop, there will be significantly less space for the fish to swim around in, which can contribute to fish stress and, accordingly, poor health.
- Fish stress is a big contributor to health problems. Stress can weaken the fishes' body, and, as such, it becomes more difficult to ward off disease and infection, and heal from wounds.
- Major fish stressors include: significant changes in their environment, issues with their water (such as unfitting temperature, dirty water and inapt pH levels), too many fish in one tank, a lack of space, being caught or handled too much, too little oxygen dissolved in the water and poor diet.
- Fish like a stable environment.
- Fish will likely give clues if there are issues with the care they are given. Pay attention to the fish, if they seem sick, that could be a good indication of a problem. Signs of a problem include: reduced movement, lack of an appetite, and taking an unusually long time to recover from an ailment.

LESSON OBJECTIVES

- To recognize that fish, as well as other animals, are living beings and deserve proper care.
- To understand how to properly feed fish.
- To understand what happens when fish are overfed.
- To understand that the best way to care for fish, as well as other animals, is to attempt to mimic their natural habitat.
- To practice working with percentages.
- To understand why water should be added in small doses to the fish tank.
- To understand that fish can get stressed, and that that stress can be detrimental to their health.
- To recognize some common fish stressors.
- To understand that the best environment for fish is a stable one

LESSON MATERIALS

- A scratch sheet of paper and a writing utensil for each student.
- Optional: calculators for the "activity break".
- A copy of the worksheet for each group of students (found at the end of this teacher section).

ACTIVITY SAMPLE ANSWER GUIDE:

1. If the water is very murky, the fish may be receiving more food than they can eat in one sitting. If this happens, the food will remain in the tank and decompose, making the water clouded.
2. If a lot of water was added to the tank from a hose, this probably means a lot of **cold** water was just added to the tank. This would likely make the water in the tank much colder than the fish can comfortably exist in, making them move more slowly from stress as well as cold.
3. If the fish are hiding when people come by, this may mean the sight of people makes them stressed. This can be from over-handling of the fish. The fish may be touched or caught too much.
4. If the fish eat everything they are given very quickly, this probably means they are very hungry! They are not being fed enough at each sitting.
5. If 60 new fish were just added to a classroom aquaponics tank, this would most likely result in overcrowding. Overcrowding is a fish stressor, which could lead to the fish losing their appetites.

ASSESSMENT ANSWER KEY

1) It should take the fish no more than five minutes to finish all of the food they have been fed. (B)
2) Overfeeding is dangerous to fishes' health because they are unable to finish all of the food they have been given. The excess food decomposes and becomes a pollutant in the water.

3) Fish should be fed two to three times each day. (C)
4) The aquaponics fish tank does not need to be cleaned. (B)
5) It is best to add water to the aquaponics fish tank often because then the change to the fishes' environment at any one time is minimal. Plus, allowing the water level to severely drop decreases the amount of space the fish have to swim around in, resulting in stress to the fish.
6) Things that could make a fish stressed include:
    - Water that is at the wrong temperature.
    - Not having enough space to swim around.
    - Being touched too much.
    - Being caught too much.
    - Water that has decomposing food in it.
    - Big changes in their environments.

STUDENT GUIDE – HOW DO WE KEEP OUR FISH HAPPY & HEALTHY?

VOCABULARY

Determine – to decide.

Decompose – to rot.

Pollute – to make dirty.

Forage – to find food.

Stable – constant and unchanging.

Condition – how something appears, the shape it is in. If something is broken, it is in a bad condition.

Mimic – to copy.

Murky – unclear.

LECTURE AND DISCUSSION

- Fish are living creatures, just like us. They deserve to be well cared for.
- First of all, fish need food. But, how much food is the right amount of food?
- Ask the class: how do we know how much food to feed our fish?
    - The amount of food fish need depends on the type and number of fish.
    - The best way to determine how much food to feed the fish is to do an experiment. All of the food that is fed to the fish should be eaten in five minutes or less. If all the food is gone in much less time than that, the fish might need more food, if there is left over food after five minutes, the fish are being fed too much.
- Over-feeding fish is actually a very common mistake, and it is dangerous to the fish.
- Ask the class: why is over feeding the fish dangerous?
    - Any food that is left after five minutes of feeding will probably never get eaten. This food decomposes in the tank and pollutes the water. This pollution is dangerous for the fish to live in.
    - Ask the class: would you want to live in decomposing material?
- It is best to feed the fish two to three times each day. But, never feed them more than they can eat in five minutes.
- Ask the class: how do you think fish in the wild generally eat? Give the students these options... do fish: A. Eat large meals often. B. Eat large meals rarely. C. Eat small meals often.
    - The answer is C! Fish are generally foragers. They eat when they can, and they usually do not find large quantities of food at one time.
- Fun fact: an adult fish will eat up to 1% of their body weight each day. A baby fish will eat up to 7% of their body weight each day!

- Activity break! Have the students calculate how much food they would eat a day if they were an adult fish. Next, have them calculate how much they would eat if they were a baby fish.
    - If a student does not know their own weight, have them approximate it. Or, have a weight that all students who do not know their own weight should use (such as 75 pounds).
    - Example: A student is 70 pounds. To find 1% of that weight multiply 70 by 0.01. This means that if that 70 pound student were an adult fish, they would eat 0.7 pounds each day. To find 7% of their weight, multiply 70 by 0.07. This means that if that 70 pound student were a baby fish, they would eat 4.9 pounds each day!
    - You may wish to do an example on the board with the method you personally use to teach percentages before beginning this activity.
- The second big topic in fish care is cleaning the tank.
- Ask the class: do we need to clean our aquaponics fish tank?
    - No! The plants clean the tank for us. Cleaning the aquaponics fish tank would get rid of all of the plant food.
- Home aquariums have to be cleaned, and their owners have to worry about how to do that properly.
- With the aquaponics tank, the only part of concern is adding water.
- Ask the class: is the water you add to the fish tank the same as the water that is already there?
    - The water in the tank is not the same as the added water. It has different stuff in it!
- Since adding water changes the environment the fish live in, it is best to only add small amounts of water at a time, so the fish do not get overwhelmed by the change.

- It is better to add water as soon as the water level starts to get low.
- It is a bad idea to wait until the water level is very low to add water, because then you will have to add a lot of water at one time. Plus, if the water level is low, then the fish have less room to swim around in!
- Third, fish can get stressed, just like people can. A stressed fish is an unhealthy fish.
- Ask the class: what might make a person stressed? Some examples include:
    - Their jobs
    - School
    - Traffic
    - Not enough sleep
    - Not getting along with their friends
- Ask the class: what might make the fish in our tank stressed? Some examples include:
    - Water that is at the wrong temperature.
    - Not having enough space to swim around.
    - Too many fish in one tank.
    - Being touched too much.
    - Being caught too much.
    - Water that has decomposing food in it.
    - Big changes in their environments.
- To keep the fish healthy, it is best to try to keep a stable environment for them.
- Finally, pay attention to the fish. If they stop eating, have trouble recovering from wounds or diseases or do not move very much, that might mean something is wrong! If something seems to be wrong, pay closer attention to how much they are being fed, and the condition of their tank.

ACTIVITY

- Long-term: The students should take the ideas of this lesson into account when they are caring for the fish. For instance, they should time the fishes' meal time and ensure that there is no food left after five minutes have elapsed.
- Short-term: Divide the students into groups of 2-5.
- Give each group a work sheet, and each student a writing utensil.
- Have the students discuss, and take turns filling in, possible scenarios for the issues listed on the worksheet (provided at the end of the teacher section of this lesson).
- Student responses should be 1-3 sentences each.
- Once each group has completed their worksheets, have the students take turns sharing their answers with the rest of the class.

Name_____ Date_____

ACTIVITY WORKSHEET – LESSON 17

What might be going wrong in these situations?

1. The water is very murky.

2. A lot of water was just added to the tank from a hose, and now the fish are moving very slowly.

3. The fish hide whenever people come near the tank.

4. The fish eat all of the food they are given within fifteen seconds of being fed.

5. 60 new fish were just added to the tank, and now the fish are eating much less than they used to.

CONCLUSION

- Ask the class: how do we know if we are feeding the fish the right amount of food?
    - If the fish eat everything they are given within five minutes it is a good amount of food.
- Too much food can pollute the water and be dangerous for the fish.
- Fish should be fed two to three times a day.
- Feeding the fish a small amount, several times a day, mimics how the fish eat in the wild.
- Ask the class: why do we not have to clean our fish tank?
    - Cleaning the fish tank would get rid of the material that the plants use as food. The plants clean the fish tank!
- Ask the class: is it best to fill the tank with new water often, or is it best to wait until the water is very low to re-fill it?
    - It is best to fill the tank often. This way, the fish are not exposed to a lot of new water that is unlike their water. Also, if the water gets too low, it reduces the amount of space the fish have to swim around in.
- Stress is unhealthy for fish.
- Ask the class: what can make fish stressed?
- The most important fish stressors for students to remember are:
    - Low water levels.
    - Being touched too much.
    - Being caught too much.
    - Water that has decomposing food in it.
- Fish are happy when their environment is stable!
- Remind the class to pay attention to the fish. If the fish seem sick, it might mean something is wrong.

EXTENSION

- *Social Studies* – the topic of fish care is a lead into animal morality. A discussion on the proper way to treat all animals would go well with this lesson.

- *Math* – the "activity break" provides an opportunity to practice working with percentages. This presents a chance to continue practicing this skill. The difficulty of the problems could be increased as well.

- *Science* – the idea of only changing small portions of tank water at a time comes from the topic of water chemistry. There is bacteria in the fish water, and likely chlorine in the tap water. This topic could be further examined with a discussion of what the two waters are comprised of, namely the tap water that is used in everyday life.

Name_____ Date_____

ASSESSMENT 17 – FISH CARE

1) How long should it take the fish to finish ALL of the food they have been fed? (Circle one)
   A. No more than 1 minute.
   B. No more than 5 minutes.
   C. No more than 10 minutes.
   D. No more than 1 hour.
   E. The amount of time does not matter.

2) Why is over-feeding dangerous to the fishes' health? (In your own words)

3) How many times a day should the fish be fed? (Circle one)
   A. Never, the fish in the aquaponics system do not need to be fed.
   B. Once
   C. Two to Three times
   D. Four times.

4) Does the aquaponics fish tank need to be cleaned? (Circle one)
   A. Yes
   B. No

5) Why is it best to add water to the aquaponics fish tank often, instead of waiting until the water level is very low? (In your own words)

6) List three things that could make a fish stressed.