

Farm • Lesson 6

Eggstra Safe Eggs

Class periods required: One 30-min. class period

Supplement section: Farm PA PAS for FCS: 9.3.3 A, 9.3.3 B, 9.3.6 B, 9.3.9.

National Education Standards: FCS 8.2.1, 8.2.3, 8.2.5, 8.2.6, 9.2.1, 9.2.3, 9.2.5, 9.2.6; LA 2, 3, 035, 132, 278; MA 130; SC 5, 041.

LESSON SUMMARY

Students will learn about bacteria that can grow in eggs. They will then learn what farmers can do to keep eggs safe.

Objectives

The students will:

- Explain how farmers raise chickens in a clean environment.
- State that raw eggs can contain spoilage and pathogenic organisms.
- Explain how changes in chicken raising practices can affect food safety and animal well-being.
- Analyze how bacteria can get past an egg's defenses by completing the Fun Eggsperiment.

Materials Provided

Overheads:

1. Where Chickens Live
2. Laying Eggs
3. Structure of Eggs
4. Pathogens in Eggs
5. Role of the Farmer

Handout:

1. A Fun Eggsperiment

Teacher Information Sheets:

1. Evaluation for "A Fun Eggsperiment"
2. Evaluation of NIE newspaper activity
3. Glossary of Bolded Terms

Resources:

- Web site and hotline

Suggested Presentation Aids

- One egg for each student
- Vinegar (about 1/2 cup per student)
- One measuring cup per student
- Plastic wrap

LESSON PLAN

Introduction

- Ask the students who has ever eaten homemade ice cream, eggnog, or chocolate chip cookie dough.
- Tell them that each of these products contains raw eggs, which might contain pathogens that make people sick, with symptoms like nausea, faintness, fever, and drowsiness. The farmer is the first person in the line of defense for keeping raw eggs safe.

Lesson sequence

- **Where Chickens Live** (Overhead 1). Chickens are domestic birds. They are found mainly on farms where people take care of them in return for their eggs and meat. Chickens living on a small farm are allowed to stay outside during the day, and at night they are usually kept locked up in a chicken coop where they are protected from foxes and other nighttime predators. The coop also provides shelter from the cold and has nest boxes where the hens can lay their eggs. Large producers keep chickens in factory-like sheds, and the eggs roll out into troughs so they can be collected easily.
- (Overhead 2). The way that animals are raised can affect food safety. For example, large chicken sheds crowd the animals into cages with grated floors so that the waste is removed efficiently. This means that the animals stay cleaner, but they may be stressed by overcrowding, lack of sunlight, and strict diets. On smaller farms, the stress level is decreased, but the animals may live in dirtier environments, increasing chances that their meat will become contaminated with bacteria and that they will produce fewer eggs.
- **Laying Eggs** (Overhead 2). Hens lay eggs for most of their lives, whether or not the eggs have been fertilized by a rooster.

The eggs must be fertilized in order to contain a chick. The hens usually lay only one egg a day. In the wild, hens lay more eggs in the spring or summer, but on a modern poultry farm, under artificial light and heating, hens lay eggs continually all year round.

- **Structure of Eggs** (Overhead 3). Eggs are an example of a product that is ordinarily well protected from microorganisms. They have an outer waxy shell membrane, a shell, and an inner shell membrane. There is also an enzyme in egg white called **lysozyme** that can kill bacteria. On the other hand, the egg yolk makes a very good place for bacteria to grow, so if the bacteria can make it past the egg's defenses, there is a good chance they can reproduce.
- **Pathogens in Eggs** (Overhead 4). Freshly laid eggs are generally sterile, but in a relatively short time numerous bacteria can be found on the outside of the shell. If the air is humid or the eggs are kept in a damp area, bacteria can penetrate the shells of eggs. Pathogens of concern in eggs are *Salmonella*, *E. coli*, and *S. aureus*. Scientists report that one out of every 235,000 eggs contains *salmonella*, but in 1997, 2,205 people got sick from salmonellosis and 13 people died.
- **Role of the Farmer** (Overhead 5). Farmers can do their part to keep eggs safe by cleaning and disinfecting poultry houses, eliminating rodents and pests so that bacteria is not introduced into the environment, washing the eggs properly so their surface is clean, and refrigerating the eggs at 45°F to keep any bacteria that are already in the egg from growing.

Closure

- Lead a class discussion about the risks and benefits of large chicken production versus small farms. Ask the students the following questions:

1. To increase production, farmers have had to change their methods of raising the animals. What do you think about these changes? Which is more important: animal well-being or increased food production? What changes (if any) would you make to this system?

2. The well-being of animals depends largely on individual farmers. In some cases, small farmers may treat their animals less humanely than large farmers. How does treatment of animals on farms affect their well-being?

Suggested Learning Activities

- Eggs have natural defenses against bacteria, but the bacteria have developed ways to overcome these defenses. Pick another food and list its defenses and what bacteria can do to overcome them.
- Explain to the students that many kinds of bacteria produce acids that allows them to get into eggs. Vinegar is an acid similar to the acids produced by bacteria. To show students how bacteria can get past an egg's defenses, have them do the following experiment (Handout 1):
 1. Warm egg to room temperature. With clean hands, wash the egg with water and dry with the paper towel.
 2. Pour enough vinegar into a clean measuring cup to cover egg and then carefully place the egg into the vinegar with a spoon. Rest the spoon on top of the egg to keep it under the vinegar and cover the cup with plastic wrap. Watch to see if bubbles form on the eggshell. This means the vinegar is beginning to work to weaken the eggshell.
 3. Leave the egg in the vinegar overnight. Next class period remove the egg and carefully rinse it in water. Tap on it gently to check the hardness of the shell. The acid will have left the shell soft and weak.
- Find newspaper articles on chickens or eggs and write a summary of the main points.

Evaluation

- Evaluation of A Fun Eggsperiment (Teacher information sheet 1)
- Evaluation of NIE newspaper activity (Teacher information sheet 2)
- Quiz #6
- Examination #2 at the end of the Farm section

References

- More information about eggs can be found at the American Egg Board Web site at <http://www.aeb.org/> (American Egg Board) and from the meat and poultry hotline 1-800-535-4555

Overhead 1

Where Chickens Live

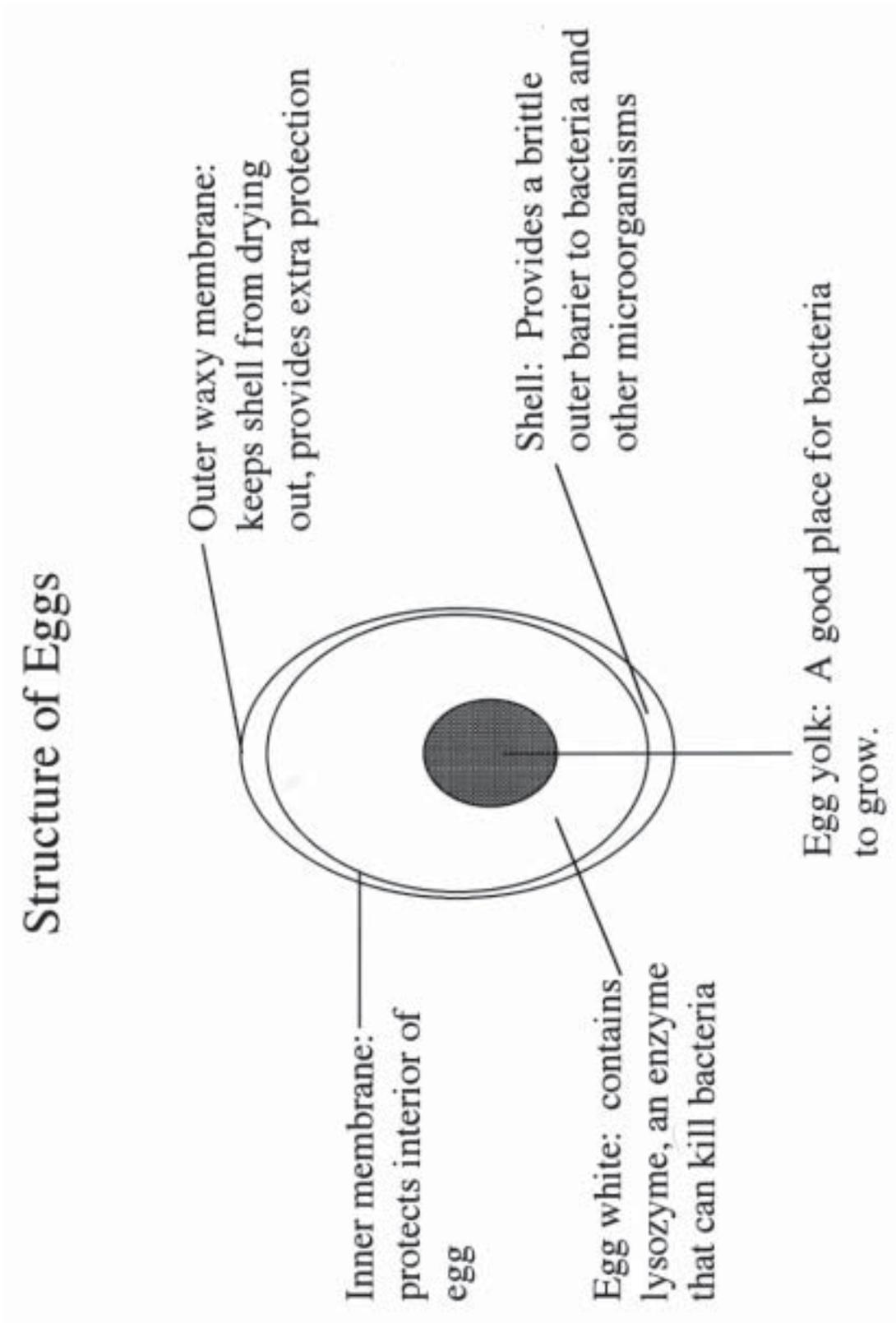


Overhead 2

Laying Eggs



Overhead 3



Overhead 4



Pathogens in Eggs

- *Salmonella*

- *E. coli*

- *S. aureus*

Overhead 5

Role of the Farmer

- Clean and disinfect poultry houses
- Eliminate rodents and pests
- Wash eggs properly
- Refrigerate eggs at 45°F



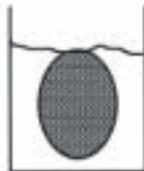
Handout 1

A Fun Eggsperiment

1. Warm egg to room temperature. With clean hands, wash the egg with water and dry with a paper towel.



2. Pour enough vinegar into a clean measuring cup to cover egg, then carefully place egg into the vinegar with a spoon. Rest the spoon on top of the egg to keep it under the vinegar and cover the cup with plastic wrap. Watch to see if bubbles form on the egg shell. This will mean the vinegar is beginning to work to weaken the egg shell.



3. Leave the egg in the vinegar overnight. Next class period, remove the egg, and carefully rinse it in water. Tap on it gently to check the hardness of the shell. The acid will have left the shell soft and weak.



Teacher Information Sheet 1

Name _____

Class/Period _____

Date _____

Evaluation for “A Fun Eggsperiment”

Grade “A Fun Eggsperiment” for the following criteria, using the grading scale of 1 - 4 with 4 being the highest and 1 the lowest score. Write comments in the boxes under each score heading.

Criteria	4	3	2	1
Directions: Read and follow each step as given in the experiment.				
Conclusion: Complete and summarizes experiment.				
Neatness: Clean, organized, and not sloppy.				
Spelling: All words spelled correctly.				
Information: Research information is correct, complete, and useful.				
Handed in on Time: Handed in on due date. A point is deducted for each day late.				

Teacher Information Sheet 2

Name _____

Class/Period _____

Date _____

Evaluation of NIE Newspaper Activity

Grade the NIE activity on the following criteria, using the 0-4 rating scale. Four is the highest rate and zero is the lowest rate. Write comments in the boxes under the rating for each criterion.

Criteria	4	3	2	1	0
Content: Information is correct, complete, and useful.					
Neatness: Clean, organized, and not sloppy.					
Spelling: All words spelled correctly.					
Handed in on time: Handed in on due date. A point is deducted for each day late.					
Time Management: Time used wisely and working on project at allotted time.					

Teacher Information Sheet 3

Glossary of Bolded Terms

Microorganisms: Tiny, single-celled organisms that can be seen only with a microscope. Examples are bacteria, yeasts, and molds, and viruses and parasites.

Pathogens: Harmful microorganisms that can make people sick.

Bacteria: Microorganisms that can be either helpful or harmful in foods.

Lysozyme: An enzyme in egg white that can kill bacteria.

Quiz 6 Key

Unit: Farm

Lesson: Eggstra Safe Eggs

Short answer: Write short answers or fill in the blank for the following questions and statements. Use complete sentences when answering questions.

1. Draw a diagram of an egg. How does each part protect against bacteria?

See diagram in the Eggstra Safe Eggs lesson plan. The outer waxy shell membrane, a shell, and an inner shell membrane provide a barrier to bacteria. Lysozyme in the egg white kills bacteria.

2. *Lysozyme* is an enzyme in the egg white that can kill bacteria.

3. Name one pathogen found in eggs.

a. *Salmonella*

b. *S. aureus*

c. *E. coli*

4. What can happen if an egg is left in a damp area or the air is humid?

Bacteria can penetrate the shells of eggs.

5. What can farmers do to keep eggs safe?

a. *Clean and disinfect poultry houses*

b. *Eliminate rodents and pests*

c. *Wash eggs properly*

d. *Refrigerate eggs at 45° F*

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