University of Kentucky
College of Agriculture, Food and Environment
Cooperative Extension Service
4-H Youth Development

CHICK EMBRYOLOGY – LESSON 4

Time Needed

- 30 minutes

Skill/Grade Level

- Can be adapted for K-12 students

Core Area

- Agriculture
- Animal production

Life Skills

- Participation in group discussion
- Sharing experiences and ideas

Educational Standards

- AA-2: Participate in conversation, discussion and group presentations
- AC-1: Utilize critical-thinking skills to determine best options/outcomes

Objectives/Outcomes

- Students will study the strength of an eggshell

Introduction to Content

This lesson will review the physics of the domes and the strength the give to the eggshell.

Curriculum

The materials required for this lesson are included.

Background Information

The function of the eggshell is to protect the egg contents from mechanical and microbial attack. At the same time, the shell allows gases (carbon dioxide, oxygen and water vapor) to pass through it. The secret to hens being able to sit on their eggs without cracking them has to do with their dome-shaped ends. A dome is a three-dimensional arch, which is one of the strongest architectural forms. Eggs have a dome shape on each end although the one in the 'small end' is more pointed than the other. It is much more difficult to break an egg when the force is focused at the poles than when the pressure is added to the sides. It is extremely difficult, if not impossible, to break an egg between two hands when pressing along its long axis.

Materials Needed

- Eggs
- A piece of cardboard
- Things to stack on top of the eggs such as a group of books, cans of food, bricks or a plastic basin in which water can be added
- Bottle caps (2 per egg)

Getting Ready

Make sure you have the required materials ahead of time.

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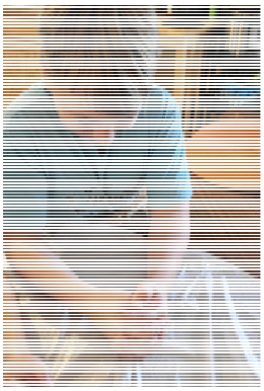
Activity 1: Trying to crush a raw egg



1. Make sure the students are wearing some protective clothing (even a plastic garbage bag will work).
2. Have the students squeeze an uncracked egg between their palms. If they are applying an evenly distributed force at the poles of an egg, it should not be possible to break the egg.
3. Have the students now squeeze the eggs along the sides. The eggs should break easily.

Activity 2: Placing a load on four eggs

1. Have each group of students put bottle caps on each end of three eggs. The bottle caps are necessary because eggs would roll without them.
2. Place four eggs in a square and make sure they have all their caps.
3. Place a piece of cardboard underneath as barrier in case the eggs break.
4. Place a glass bowl or clear plastic bin on the cardboard.
5. Fill the container with water.
6. Replace the container with books.

Share/Process/Generalize (Reflect)

Share: What did you learn?

Process: What part of the activity taught you the most?

Generalize: What was the most important thing you learned?

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Apply

Discuss other examples of domes and how they impart strength.

Extended Learning

- Have some of the students put together a presentation on the strength of an eggshell.

Civic Engagement

- Have students give a presentation to a local community group on the strength of an eggshell.

Authors

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