

Eggology (Grades K-2)

Grade Level(s)

K - 2

Estimated Time

90 minutes

Purpose

Students will identify how the basic needs of a growing chick are met during egg incubation. Activities include identifying and diagramming the parts of an egg and hatching eggs in class.

Materials

Interest Approach or Motivator:

- *Facts About Chickens* PowerPoint

Activity 1:

- *Parts of an Egg* PowerPoint
- Unfertilized (grocery store) eggs, 1 per group
- Shallow containers, 1 per group
- Toothpicks, 1 per student
- *Parts of an Egg Diagram*, 1 per group
- *Parts of an Egg Activity Sheet*, 1 per student
- *Parts of an Egg Book*, 3 pages for each student

Activity 2:

- Dyed, hard-boiled eggs, 1 per group (1 cup hot water, 20 drops food coloring; allow eggs to sit in dye overnight)
- Hand lenses, 1 per group
- Raw eggs, 1 per group
- Containers of warm water, 1 per group

Activity 3:

- Incubator with fertilized eggs
- A tool for measuring air temperature
- A tool for measuring relative humidity
 - Use the *Make a Wet-Bulb Thermometer Instructions* to make your own
- *Incubation Log*

Essential Files (maps, charts, pictures, or documents)

- [Facts About Chickens PowerPoint](#)
- [Parts of an Egg PowerPoint](#)
- [Parts of an Egg Diagram](#)
- [Parts of an Egg Activity Sheet](#)
- [Parts of an Egg Book](#)
- [Make a Wet-Bulb Thermometer Instructions](#)
- [Incubation Log](#)

Vocabulary

brooding: to sit on eggs in order to hatch them

chick: a young chicken

clutch: a brood, or the group of eggs incubated together

embryo: an animal in the early stages of development

hen: female chicken

humidity: the amount of moisture in the air

incubation: the act of keeping an organism in conditions favorable for growth and development

rooster: an adult male chicken

Did you know? (Ag Facts)

- Hens lay one egg approximately every 28 hours.
- A rooster is not needed for a hen to produce eggs for eating. Roosters are only needed to produce fertile eggs for hatching.
- Chickens can lay eggs in varying colors including white, dark brown, light brown, and even shades of green. There is no nutritional difference among eggs of different shell colors.
- You can tell what color of egg a hen will lay by looking at the color of her skin on her earlobe.

Background Agricultural Connections

A chicken **embryo** needs nutrients, water, oxygen, and the proper temperature and **humidity** to develop into a healthy **chick**. An egg contains most of what a chick needs for survival while developing within the shell. Identifying the parts of a chicken egg and their functions can help students understand how a chicken embryo survives and develops. The egg's shell has more than 7,000 tiny pores that allow oxygen to pass into the egg and carbon dioxide to pass out. The inner and outer membranes, found between the eggshell and the egg white, keep bacteria from entering the egg and help to slow evaporation of moisture from the egg. The air cell, located between the inner and outer membranes at the large end of the egg, holds oxygen for the chick to breathe. The pores in the eggshell are larger and more numerous at the large end of the egg. This allows oxygen to enter the air cell easily. Just before hatching, the chick uses its egg tooth to puncture the air cell, which will provide about six hours of oxygen for the chick while it pecks its way out of the shell. The albumen (al byoo min), or the egg white, cushions the egg yolk floating within it and is the main source of protein and water for the embryo. The yolk provides food for the embryo. It is made up of fats, carbohydrates, proteins, vitamins, and minerals. The chalazae (kuh ley zee) are cords on two sides of the yolk that keep the yolk floating in the center of the albumen. Chalaza (kuh ley zuh) is the singular form. The germinal disc is the white spot on the yolk. This is where the female's genetic material is found. When the egg is fertilized, the germinal disc becomes known as the blastoderm. This is what develops into a chick during **incubation**. As the embryo develops, blood vessels attach to the yolk to access nutrition and to the inner membrane to access oxygen and release carbon dioxide.

Typically, the mother **hen** lays one egg per day until she has completed a **clutch** of about 8–13 eggs. If the eggs have been fertilized by a **rooster**, chicks may grow and develop inside given the right conditions. Once she has a full clutch, the mother hen begins **brooding**, only

leaving the nest at dawn or dusk to feed. Because the hen's body temperature is generally 105–106°F, she is able to heat the eggs to 100–101°F by sitting on them. Incubators can substitute for the warmth of a hen, but must maintain the proper temperature; the incubator should hold 99–102°F.

Maintaining the correct humidity ensures that the air cell does not become too big or too small. The drier the outside air, the faster the fluid inside the egg evaporates and the faster the air cell grows. This causes the inner membrane to dry out and stick to the chick, which prevents the chick from turning inside the shell. If the humidity is too high, the chick may drown in excess fluid after it breaks into the air cell. Humidity can be measured using a wet-bulb thermometer. Relative humidity should be 50–55% for the first 18 days and then 65% for the last 3 days. Humidity can be maintained by adding the correct amount of water to the water tray that is included in most incubators; if an incubator does not have a built-in tray, simply place a shallow pan of water in the bottom.

It is important for the eggs to be turned so that the embryo does not adhere to the wall of the egg. The hen turns the eggs by using her beak to scoop under the egg and roll it. If an incubator is not equipped with an automated egg turner, the eggs must be turned manually. Eggs should be turned at least three times a day for the first 18 days.

Interest Approach – Engagement

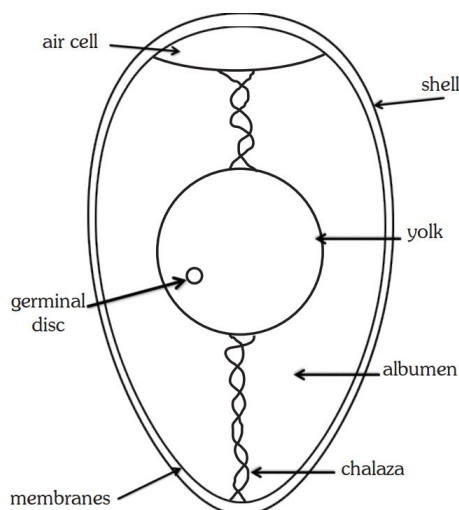
1. Use the *Facts About Chickens* PowerPoint to teach your students some basic facts about chickens and eggs to begin developing their interest and curiosity. Pictures can be projected from a computer or printed.

Procedures

Activity 1: Egg Anatomy

1. Ask students to list what animals need to survive. Discuss the fact that animals need food, water, shelter, and air.
2. Ask students if they think chicks have the same basic needs developing inside the egg

Parts of an Egg Diagram



compared to after they hatch. Tell students that chicken embryos need food, water, air, and the proper temperature and humidity to develop into a healthy chick that is ready to hatch out of the egg. Explain that it is important to know the parts of an egg and their functions in order to understand how a chicken embryo's basic needs are met inside the egg.

You can tell what color of egg a hen will lay by the color of her earlobe



3. Use the *Parts of an Egg* PowerPoint to explain the function of each part of the egg.
4. Divide students into groups. Carefully break open one unfertilized (grocery store) egg per group into a shallow container.
5. Using the *Parts of an Egg Diagram* and toothpicks, have students locate each part of the egg. You may need to use spoons to gently flip the yolk if the germinal disc is not visible.
6. Ask students to fill out the *Parts of an Egg* activity sheet by cutting and pasting each egg part where it belongs.
7. Have the students create a *Parts of an Egg Book* by cutting out each egg.
8. Cut every egg, except the back cover, apart on the crack line.
9. Match each egg part with its corresponding function. Use two brads to connect the pages to the back cover.

Activity 2: Air Transfer

1. Provide each group with a hand lens and a hard-boiled egg that has been sitting in dye (1 cup hot water, 20 drops food coloring) overnight. Ask students to look carefully at the shell of the egg. Discuss their observations. Point out the tiny pores on the eggshell. There are more than 7,000 pores on an eggshell that allow oxygen to pass into the egg and carbon dioxide to pass out.
2. Have the students compare the pores at the large end of the egg with the pores on the rest of the egg. Discuss their comparisons. The pores at the large end, where the air cell is located, are larger and more numerous than pores on other parts of the egg. This allows oxygen to enter the air cell easily. Just before hatching, the chick will puncture the air cell and use the oxygen stored there to breathe until it pecks through the shell.
3. Ask the students what they think they will see when the eggshells are peeled off the eggs. Have students peel the eggs. Ask the students to explain why there are small dots of color on the inside of the shell and the white of the egg. Explain that, like the food coloring, oxygen enters the egg through the shell's tiny pores. Point out that the dots of food coloring are larger and more numerous where the air cell is located.
4. Place a raw egg in warm water. You will see tiny air bubbles rise to the surface of the water. Air is escaping through the pores in the shell. Explain that carbon dioxide escapes the egg through the pores.

Activity 3: Charting Temperature and Humidity- Hatching Eggs in Class!

1. Obtain fertile eggs and an incubator to hatch incubate and hatch eggs in your classroom.
2. Explain to the students that maintaining the proper temperature and humidity of the incubator and turning the egg at least three times a day for the first 18 days is important to chick survival. If the temperature or humidity is too high or too low or the egg is not turned, the chick could be in danger.
3. Some incubators include automatic temperature and humidity controls, as well as automatic turners. Other incubators require temperature and humidity to be measured manually and eggs to be turned by hand. Train students on how to determine the

- incubator's temperature and humidity. If a humidity reading is not available with your incubator, see the *Make a Wet-Bulb Thermometer Instructions*.
- To help prevent problems during incubation, students will measure the temperature, relative humidity, and egg turning and record the data on their *Incubation Log*.

Concept Elaboration and Evaluation

After conducting these activities, review and summarize the following key concepts:

- Baby chickens are called *chicks*. They develop inside an egg.
- Baby chicks need food, water, air, and the proper temperature and humidity to develop properly inside the egg.
- Air passes in and out of an egg shell through tiny pores.

We welcome your feedback! Please take a minute to tell us how to make this lesson better or to give us a few gold stars!

Enriching Activities

- Use the hands-on activities in the lesson plan *From Chicken Little to Chicken Big* to explore the production of chicken and eggs for food and teach students about the life cycle and genetics of chickens.

Suggested Companion Resources

- [The Life Cycle of a Chicken](#) (Activity)
- [Chick Life Cycle](#) (Book)
- [Chickens on the Farm](#) (Book)
- [Chicks & Chickens](#) (Book)
- [Daisy Comes Home](#) (Book)
- [From Egg to Chicken](#) (Book)
- [Hatching Chicks in Room 6](#) (Book)
- [Inside An Egg](#) (Book)
- [One Egg](#) (Book)
- [One Hen: How One Small Loan Made a Big Difference](#) (Book)
- [Tillie Lays an Egg](#) (Book)
- [Zinnia and Dot](#) (Book)
- [Chicken Genetics Matching Cards](#) (Kit)
- [Countdown to Hatch](#) (Kit)
- [All About Eggs](#) (Multimedia)
- [Chick Embryology YouTube Playlist](#) (Multimedia)
- [Hatching Science: 21 Days of Discovery Video](#) (Multimedia)
- [Virtual Egg Farm Field Trips](#) (Multimedia)
- [Poultry Reader](#) (Booklets & Readers)
- [Embryology and Poultry Resources](#) (Website)
- [Hatching Science Center](#) (Website)

