

Chapter 7

Eggs

Did you know a hen can lay 250 to 300 eggs a year? That’s a lot of eggs! In the United States, chicken eggs are the most popular, but you can eat duck eggs, goose eggs, ostrich eggs and more. In this chapter, we will focus on chicken eggs.

Chicken eggs are an excellent source of protein, vitamins and minerals. However, a microorganism called Salmonella can infect eggs and make you sick. Thoroughly cooking eggs makes them safe to eat because cooking kills Salmonella. To stop foodborne illness, be sure everyone washes their hands after touching raw eggs and that no one eats raw eggs.

Enjoy your adventures with excellent eggs!

Hands-On Lessons:

Egg-ceptional Eggs	60
Egg Facts	61
Fantastic Foams	62
Peaks, Peaks, Peaks	63
Egg-citing Egg Foams	64

Answer Keys:

Egg-ceptional Eggs	65
Fantastic Foams	65
Proficiency Questions	66

Virtual Lessons:

(See *Virtual FoodMASTER CD*)

Klutzy Coagulation

Hard Boiled Eggs

Gel-icious

Delicious Gel-icious

Egg-ceptional Eggs

Summary

Students will explore the parts of an egg by observing a cracked raw egg and by measuring the weight, circumference and height of various parts of a boiled egg.

Objectives

1. Students will be able to list several parts of an egg.
2. Students will complete egg fact tables.
3. Students will make pictorial representations of the parts of an egg.
4. Students will practice measurement skills using appropriate units for weight, circumference and height.

Academic Content Standards

MATH

Measurement Standard

Understanding measurable attributes of objects and the units, systems, and processes of measurement.

Expectation:

- Understand such attributes as length, area, weight, volume and, size of angle and select the appropriate type of unit for measuring each attribute.
- Understand the need for measuring and standard units and become familiar with standard units in the customary and metric systems.

Apply appropriate techniques, tools, and formulas to determine measurements.

Expectation:

- Select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles.

SCIENCE

Science as Inquiry: Content Standard A
Develop abilities necessary to do scientific inquiry.

Expectation:

- Employ simple equipment and tools to gather data and extend the senses.

Physical Science: Content Standard B

Properties of objects and materials.

Expectation:

- Objects have many observable properties, including size, weight, shape, color, temperature, and the ability to react with other substances. Those properties can be measured using tools, such as rulers, balances, and thermometers.

Life Science: Content Standard C

The characteristics of organisms.

Expectation:

- Each plant or animal has different structures that serve different functions in growth, survival, and reproduction. For example, humans have distinct body structures for walking, holding, seeing, and talking.

Science in Personal and Social Perspectives: Content Standard F

Personal health.

Expectation:

- Safety and security are basic needs of humans. Safety involves freedom from danger, risk, or injury. Security involves feelings of confidence and lack of anxiety and fear. Student understandings include following safety rules for home and school, preventing abuse and neglect, avoiding injury, knowing whom to ask for help, and when and how to say no.

SCIENTIFIC INQUIRY:

Egg Facts

Materials

For the teacher: 1 plate or bowl, 1 table knife, 1 paper towel, 1 egg, 1 hard boiled egg.

For each group: 3 plates or bowls, 2-4 hand lenses, colored pencils, 1-2 rulers, 1 food scale, 1-2 tape measures or five-inch strings, paper towels, 1 raw pasteurized shell egg, 1 hard boiled egg.

Procedure

1. Read *Egg-ceptional Eggs* and complete the Doodle Bugs.
2. Demonstrate how to crack a raw egg: Hold the egg over a plate. Gently tap the side of the egg shell with a table knife to crack the shell. Use both hands to gently pull the two sides of the shell apart. Pour the egg onto the plate. Discard the egg shell and wash your hands.
3. Demonstrate how to peel the shell off a boiled egg: Use the dull end of your knife to tap the wider end of the egg shell. Make several small cracks in the egg shell. Use your fingers to peel the shell off the egg white (this can also be done under cool water). Place shell pieces on a paper towel and throw away.
4. Instruct your students to read the *Scientific Inquiry: Egg Facts* directions, study the egg diagram, gather supplies and begin the activity. Remind students to record their findings in the appropriate chart and to record units of measurement, when appropriate.
5. Review the use of measuring tapes and scales. Students will place a plate or bowl on the scale, zero the scale and then add their egg, egg white or egg yolk. Zeroing the scale makes the weight of the plate/bowl disappear.
6. A teacher or other adult should break one raw egg for each group to study. Be sure to dispose of the egg when the group is done with their observation.
7. Review the parts of the egg and what the class learned about each part.

Teacher Tips:

- Be sure to take caution with raw eggs. Salmonella, a bacterium that causes foodborne illness, may be on the outside shell or inside the egg. For extra safety, use eggs pasteurized in their shells. Continue to encourage your students to practice good egg safety by washing their hands.
- In place of tape measures, students may mark their egg's circumference on a piece of string and then measure the length using a ruler.
- While measuring the hard boiled egg yolk's circumference, your students will need to be very gentle to keep the egg yolk from crumbling.
- Eggs used in this activity should not be eaten. If desired, you may provide boiled eggs for your students to eat at the end of the lab, after they have washed their hands and work areas.
- Discussion: Different kinds of chickens lay different colored eggs. Most stores sell white and brown eggs, but chickens lay green and blue eggs too. The color of the shell doesn't change the flavor or nutritional goodness of the egg.
- Extension: Discuss physical and chemical changes. Breaking the shell is a physical change, but boiling is a chemical change.
- Extension: Explore the porous shell by storing boiled eggs next to onions. As the porous egg shells let air inside, the eggs will begin to smell like onions.

Fantastic Foams

Summary

Students will compare raw egg whites to egg white foams, while preparing Meringue Cookies. Students will make a hypothesis relating to egg white and egg yolk foams and will test the hypothesis.

Objectives

1. Students will make egg white foams.
2. Students will be able to identify egg white soft peaks and stiff peaks.
3. Students will measure ingredients accurately.
4. Students will complete a Venn diagram comparing raw egg whites and egg foams.
5. Students will make and test a hypothesis.
6. Students will measure time accurately.

Academic Content Standards

MATH

Measurement Standard

Apply appropriate techniques, tools, and formulas to determine measurements.

Expectation:

- Select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles.

Data Analysis and Probability Standard

Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.

Expectation:

- Collect data using observations, surveys, and experiments.
- Represent data using tables and graphs such as line plots, bar graphs, and line graphs.

SCIENCE

Science as Inquiry: Content Standard A

Develop abilities necessary to do scientific inquiry.

Expectation:

- Plan and conduct a simple investigation.
- Use data to construct reasonable explanations.

Physical Science: Content Standard B

Properties of objects and materials.

Expectation:

- Objects have many observable properties, including size, weight, shape, color, temperature, and the ability to react with other substances. Those properties can be measured using tools, such as rulers, balances, and thermometers.

SCIENTIFIC INQUIRY:

Peaks, Peaks, Peaks

Materials

For the teacher: Toaster oven, 1-2 toaster oven cookie sheets, 1 egg separator, 1 mixing bowl, 1 table knife, 1 small bowl, 1 set measuring spoons, 1 set dry measuring cups, 1 hand mixer, oven mitts, hot pad holders, spatula, cooking spray, 3 eggs, 1/8 teaspoon cream of tartar, 1/2 teaspoon vanilla extract, 2/3 cup sugar, 1 tablespoon unsweetened cocoa powder, 1/3 cup semisweet chocolate chips.

For each student: 1 napkin.

Procedure

1. Read *Fantastic Foams* and complete the Doodle Bugs.
2. Follow *Scientific Inquiry: Peaks, Peaks, Peaks* directions to make meringue cookies.
3. Demonstrate how to separate egg whites from yolks:
 - Place the egg separator over the mixing bowl. (A helper may hold the egg separator.)
 - Gently tap the side of the egg shell with a knife to crack the shell.
 - Use both hands to gently pull the two sides of the shell apart.
 - Pour the egg into the egg separator. The egg white will fall into the bowl and the yolk will stay in the egg separator and be discarded.
4. Allow your students to take turns beating the egg whites, adding ingredients and dropping teaspoonfuls of meringue onto cookie sheets.
5. While beating the egg whites, ask your students to make observations about visible changes (size, color, state of matter). Be sure to point out soft and stiff peaks.
6. Instruct students to complete the Venn diagram.
7. While the cookies are baking, complete *While You Wait: Egg-citing Egg Foams*.
8. When the cookies are done, an adult should use oven mitts to remove the cookie sheets from the oven. Place cookie sheets on the hot pad holders.
9. Let the cookies cool. Remove the cookies from the tray with a spatula and place on napkins.
10. Serve one cookie to each student. Students will answer taste test questions.

Teacher Tips:

- Recruiting an extra adult to assist with lab management, setup and/or cleanup will help this activity to run smoothly.
- Remember to take extra caution when using the oven or toaster oven. Discuss the dangers of touching the oven.
- Be aware of any students with egg allergies. Students with egg allergies should not eat egg whites and may be given an alternate snack.
- Be sure to take caution with raw eggs. Salmonella, a bacterium that causes foodborne illness, may be on the outside shell or inside the egg. Reduce risks by following good food safety practices, including hand washing. To further reduce risks, buy raw pasteurized shell eggs.
- Instruct students to keep beaters inside the bowl. Beaters should never be turned on unless they are inside a bowl.
- Be sure the sugar is added gradually. Adding too much sugar at one time will flatten the egg whites.
- Extension: Beat egg whites to soft peaks, stiff peaks and the overbeaten stage to compare the many stages of egg white foams.

WHILE YOU WAIT: **Egg-citing Egg Foams**

Materials

For the teacher: 1 egg separator, 2 mixing bowls (small or medium), 1 table knife, 1-2 hand mixers, 1-2 liquid measuring cups, 2 eggs.

Procedure

1. Instruct your students to make a hypothesis before you begin beating the egg whites and yolks.
2. Allow students to assist with beating the egg whites and yolks and measuring the volume of the foams.
3. Instruct students to record times and volumes on their workbook pages.
4. Discuss the difference between the egg foams. Remind students that egg whites are mainly protein and yolks contain both protein and fat. The protein makes the egg foams strong. Whereas, fat prevents foaming.

Teacher Tips:

- Be sure to take caution with raw eggs. Salmonella, a bacterium that causes foodborne illness, may be on the outside shell or inside the egg. Reduce risks by following good food safety practices including hand washing. To further reduce risks, buy raw pasteurized shell eggs.
- Instruct students to keep beaters inside the bowl. Beaters should never be turned on unless they are inside a bowl.
- Beat egg whites first and then egg yolks. If you beat egg yolks first, be sure to clean beaters before beating egg whites. Any egg yolk contamination will decrease the foaminess of the egg whites.
- Extension: Beat egg whites with varying amounts of egg yolk included (none, 1 drop, 1 teaspoon and 1 yolk) and compare the volume of the egg white foams.

Answer Keys

Egg-ceptional Eggs

Doodle Bugs

Underline: **These parts include an outer membrane, inner membrane, white, vitelline membrane, yolk and chalazae.**

Draw: **An egg with tiny holes.**

Circle: **The egg yolk**

SCIENTIFIC INQUIRY:

Egg Facts

Whole egg: **White; oval**

Egg white: **Clear; liquid blob**

Egg yolk: **Bright yellow; sphere**

Chalazae: **White; string like shape**

Whole egg: **2.3 ounces; 5 inches around; 2 1/2 inches tall**

Egg white: **1.5 ounces**

Egg yolk: **0.75 ounces, 3 inches around**

Can you see the chalazae of the boiled egg? **No**

Tell one way the egg white changed after it was boiled. **The egg white changed from a liquid to a solid after it was boiled. Or. The boiled egg white is white, instead of clear.**

Tell one way the egg yolk changed after it was boiled. **The egg yolk changed from a liquid to a solid after it was boiled. Or. The boiled yolk is pale yellow, instead of bright yellow.**

Fantastic Foams

Doodle Bugs

Circle: **Puffy omelets, fluffy pancakes and foam candies and cookies**

Box: **Medium stiff peaks will stand up with just their tips falling over. Or. They will be smooth and a shiny white.**

Fill-in the blank: **Because egg yolks keep egg whites from turning into foam.**

SCIENTIFIC INQUIRY:

Peaks, Peaks, Peaks

Unbeaten circle: **Small, flat, blob, liquid, clear**

Stiff peaks circle: **Big, tall, fluffy, foamy, white**

Overlap Unbeaten and Stiff peaks: **Egg white, source of protein, low in fat**

My cookie tastes: **Answers will vary. Examples:** *Good, sweet*

My cookie looks: **Answers will vary. Examples:** *Fluffy, light, crunchy, golden*

My cookie feels like: **Answers will vary. Examples:** *A crunchy cloud, chewy cotton candy in my mouth, a toasted marshmallow*

Answer Keys (continued)

WHILE YOU WAIT:

Egg-citing Egg Foams

My Guess/Hypothesis:	Egg whites or Egg Yolks
Starting and Ending Times:	Answers will vary.
Volume of egg whites:	1 1/4 cups
Volume of egg yolks:	1/4 cup
Hypothesis Correct:	Yes, if egg whites. No, if egg yolks.

Proficiency Questions (Workbook)

1. **a** 2. **a** 3. **b** 4. **d**

Proficiency Questions (Virtual CD)

1. **c** 2. **d** 3. **c** 4. **b**