

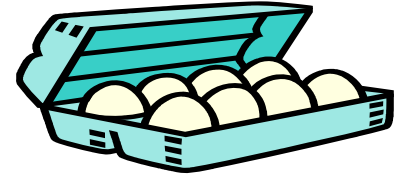
“Eggs...They Really Are Incredible” Leader Guide

Lesson Objectives:

- Understand the health benefits of eggs as part of the varied diet
- Learn safe egg handling, storage and use
- Learn the function of eggs in food products

Teacher Materials and Supplies:

- Leader Guide: “Eggs...They Really Are Incredible”
- Egg Nutrition Chart
- Egg Trivia Cards (questions and answers)
- The Parts of an Egg (poster, transparency) Picture
- Two Eggs – one fresh and the other at least two weeks old.
- Selected egg recipes to prepare at the lesson or before the lesson



Member Handouts:

- Eggs...They Really are Incredible
- Eggs...They Really are Incredible Lesson Evaluation and Informed Consent Letter

Before the lesson:

- Cut out egg trivia cards.
- Collect several different brands of egg cartons (including specialty eggs) available in your area.
- Prepare an egg dish for participants to taste such as quiche or custard (optional).
- Make a poster showing egg sizes and weights (p. 3)
- Make a price chart for eggs available in your area:

Brand	Grade	Size	Price
Western Family	A	Extra large	\$2.49

1. Introduction

Eggs are described as being “incredible”. They are a vital ingredient in many recipes, provide many essential nutrients and are an economical source of protein. One large egg has about 70 calories. In addition, eggs can be prepared in a variety of ways. This lesson focuses on chicken eggs.

In the “Eggs...They Really Are Incredible” lesson, the following will be covered:

- Understand the health benefits of eggs as part of the varied diet
- Learn safe egg handling, storage and use
- Learn the function of eggs in food products

Activity: Choose one of these activities or develop your own

1. Ask participants to share one way they use eggs in their daily diet:

Examples: fried, scrambled, poached, cooked in the shell, omelets, quiches, custards, soufflés, meringues, cake, sauces and deviled eggs.

2. Have members share a favorite memory about eggs.

2. Egg Nutrients

Eggs provide protein, vitamin A, riboflavin, and other vitamins and minerals.

Review the nutritional contributions of the egg by using the Egg Nutrition Chart. Include the following point in the discussion:

In a diet consisting of 2000 calories a day, a large egg would:

- Contribute less than 4% of the total daily calorie intake
- Be a good source of protein, riboflavin, Vitamin A, Vitamin B-12, and iron.
- Contain all essential amino acids in proportions which are close to matching the amounts that humans need.
- Contribute choline (recently recognized as an essential nutrient for fetal brain development and important for nerve tissue development - which helps prevent birth defects) as well as lutein - a nutrient that is part of the carotenoid family (like beta-carotene in carrots) that contributes to eye health and helps to prevent common causes of age-related blindness.
- Contain a high level of cholesterol – 213 milligrams in the yolk of one large egg.

The American Heart Association recommends consuming no more than 300 mg of dietary cholesterol daily. Research is being conducted to see if dietary cholesterol raises the level of cholesterol in the blood. Dietary fat appears to have a more significant effect on raising blood cholesterol levels.

People with high serum cholesterol levels who are sensitive to dietary cholesterol may need to strictly limit their egg yolk consumption. **All individuals need to follow the advice of their health care provider.**

3. Egg Facts

Eggs may seem like an incredibly simple food, yet they are also incredibly complex. The structure of the egg is fascinating because it is composed of several distinct parts.

Activity: Use the Egg Chart and/or an egg to review the parts of the egg with the group.

Activity: Because eggs are complex, some commonly held ideas may not actually be true. Use the Egg Trivia cards to share information about eggs. Have each participant (or group of participants) select an Egg Trivia card. Take turns reading the card and then giving the answer. Expand upon the answer using the Egg Trivia answer sheet and information from parts 4 and 5 below. Or divide the group into two teams, have prizes for the winning team.

4. Egg Safety, Quality, Size, and Storage

Freshness (Quality, size, carton labeling)

Freshness

An egg one week old, held under ideal conditions, could be fresher than an egg left at room temperature for one day. Factors affecting freshness of an egg are: 1) date when it was laid; 2) temperature at which it is held (ideal is 40°F or below) 3) humidity at which it is held (ideal is 70 to 80%) 4) Handling (proper handling requires eggs to be gathered, washed and oiled within a few hours of being laid.)

Grades

Three grades of eggs are available: AA, A & B. The AA and A grades are available at stores. B quality is used in commercial baking. The grade is determined by the interior quality of the eggs, the appearance and the condition of the egg shell.

AA- whites are thick and firm, yolks are high, round and free from defect, clean unbroken shells

A- whites are reasonably firm, yolks are high and round

B- whites are thinner and yolks may be wider and flatter

Activity – Show an AA egg and an A grade egg and compare differences.

Sizes of Eggs:

Size tells you the minimum required net weight per dozen eggs. It does not refer to the dimensions of an egg or how big it looks. Most published recipes are based on large-size eggs.

Activity-Show the different sizes of eggs available in your area and have or make a poster/chart showing these Sizes/Weights:

Size or Weight Class	Minimum net weight per dozen
Jumbo	30 ounces
Extra Large	27 ounces
Large	24 ounces
Medium	21 ounces
Small	18 ounces
Peewee	15 ounces

Chart: courtesy of USDA FSI fact sheet on Shell Eggs from Farm to Table; March 2007

Storage and Dating of Carton

Refrigerate fresh eggs in their original cartons. They can be stored up to about 4 to 5 weeks beyond the pack date without significant quality loss. Place them in the coldest part of the refrigerator, not in the door. Don't wash the eggs. Washing removes the protective mineral oil coating and increases the potential for bacteria on the shell to enter the egg.

Refrigeration slows the loss of quality. The longer the eggs are stored, the quality changes:

- the yolk absorbs water from the white
- moisture and carbon dioxide in the white evaporate through the pores, allowing more air to penetrate the shell. As a result, the air cell becomes larger
- the white becomes thinner losing some of its thickening and leavening powers

According to USDA, "many eggs reach stores only a few days after they are laid. A USDA grade shield on egg cartons indicates they came from a USDA-inspected plant and must display the "pack date" (the day the eggs were washed, graded and placed in the carton). The number is a three-digit code that represents the consecutive date of the year starting with January 1 as 001 and ending with December 31 as 365. This site helps consumers determine the pack date: <http://www.ams.usda.gov/poultry/consumer/InterpretPackDate.htm> Plants not under USDA inspection are governed by the state laws where the eggs are packed and/or sold.

***Activity:** Take two eggs, one that is fresh and one that is older. Break each egg onto a flat plate. Have participants evaluate the eggs and identify the different parts. Is there a visual difference in the two eggs? Show various egg cartons with the dates. Ask participants to share the information found on the egg carton.*

Food Safety

Eggs are perishable and must be handled with care. The major food safety concern is Salmonella bacteria, which cause food borne illness. Salmonella may be found on the outside of the egg shell since the egg exits the hen's body through the same passage as feces are excreted. To counter this possibility, eggs are washed and sanitized at the processing plant. Salmonella can also be found inside the uncracked, whole egg. Contamination of eggs may be due to bacteria within the hen's ovary or oviduct before the shell forms around the yolk and white. The chances of a raw egg being infected this way is 1 in 200,000.

It is important to handle eggs as if bacteria are present since you cannot tell by just looking at the egg. *Refer participants to the list of food safety tips in their handout.*

5. Specialty eggs

In an effort to reach a wider consumer base, producers market a variety of specialty eggs. Due to higher production cost, the consumer will pay extra for these additional features.

***Activity:** Collect different egg cartons and/or eggs that represent specialty eggs. If you are not able to collect the egg carton, go to your local grocery store and compare prices for specialty eggs. While talking about the specialty egg, discuss the value versus cost. Remember there is no right or wrong answer to this question.*

Nutritionally Enhanced

The nutrient content of the egg can only be changed by altering the feed of the hen. *Refer participants to the descriptions of eggs that are lower fat and cholesterol and higher in omega-3 eggs and lutein in their handout.*

Other Specialty Eggs

Refer participants to descriptions of other types of specialty eggs in their handouts: organic, vegetarian, pasteurized, fertile, and eggs from free-range, and cage-free chickens.

6. Cooking with Eggs

Egg protein changes when heated, beaten or mixed with other ingredients. Understanding the changes can help you understand the role of eggs in food preparation.

Heating Eggs

Remember eggs are high in protein, and heat affects protein. When an egg is heated, the protein molecules bond together causing the egg to coagulate and thicken. Egg whites begin to coagulate at about 140°F, and are no longer able to flow near 149°F. Coagulation of the yolk begins near 149° F and the yolk no longer flows when the temperature nears 158° F.

Remember two basic rules when cooking eggs:

- Do not use excessive heat; medium to low is the ideal temperature
- Do not prolong the cooking period

If eggs are cooked at too high a temperature for too long, the egg protein becomes tough and rubbery. When eggs are cooked too long the liquid is cooked out and curdling or weeping occurs.

When boiled eggs are cooked too long, a green-grayish ring forms around the yolk. The ring is caused by sulfur and iron compounds naturally reacting at the surface of the yolk. It's due to overcooking or a high amount of iron in the water. While the color change is harmless, it can be prevented by proper cooking and quickly cooling the hard cooked eggs.

Refer participants to their handout for the recommended method for hard cooking eggs:

Scrambled eggs may also turn a greenish shade, especially if cooked in large batches. This color change is also a chemical reaction, resulting from the formation of ferrous sulfide from the iron in the yolks and the sulfur in the whites. The color change occurs when eggs are cooked in an iron skillet, or cooked at too high a temperature, held too long, or both.

Refer participants to their handout for tips on microwaving eggs.

Beating Eggs

When egg whites are beaten, they incorporate countless air cells, increasing the volume six to eight times. During the beating, protein molecules surround the air bubbles and coagulation starts. When the foam is heated, the air bubbles expand and the protein further coagulates and stabilizes the foam.

Refer participants to tips for making good quality foams in their handouts.

Mixing with Others Ingredients

Egg yolks are used as emulsifiers, which keeps oil and water from separating. When the egg protein is mixed thoroughly with oil and water, one part of the protein sticks to the water and another part will stick to the oil. The egg yolk will stabilize the two mixtures. Mayonnaise is an example.

Eggs also serve as a binder and thickener. Whole raw eggs add moisture to a mixture and hold the ingredients together. As the food is heated, the egg protein coagulates and binds and/or thickens the food product. For example, eggs bind meat loaf and thicken a custard.

Eggs also leaven (muffins, cakes) and coat (breads, cookies).

7. Conclusion

Eggs really are incredible! They are versatile, economical, and nutritionally dense and taste good.

Close the lesson by demonstrating how eggs can be used in our daily diets. Choose one of the following activities:

- Ask participants to share their favorite egg recipe*
- Let participants taste an egg dish that you have prepared (such as quiche or custard).*
- Demonstrate making Alaskan frittatas, omelets, or an item of your choice.*

8. The Last Word

Refer participants to the list of web sites in their handout for additional information and recipe ideas.

Ask participants to please evaluate the lesson. Ask them to read the consent form (which they may keep). Return completed evaluation forms to your county Extension office

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<p>Egg Trivia 1</p> <p>The average laying hen lays about how many eggs a year?</p> <p>A. 352 B. 12 C. 257</p> <p>How long does it take to lay a single egg?</p> <p>A. 12 hours B. 24-26 hours C. 10 minutes</p>	<p>Egg Trivia 2</p> <p>The color of an egg shell is determined by:</p> <p>A. What the bird is fed</p> <p>B. Breed characteristics</p> <p>C. Age of the bird</p>	<p>Egg Trivia 3</p> <p>Are brown eggs more nutritious than white eggs?</p> <p>A. Yes B. No</p> <p>Are the bluish-green eggs from Araucuna chickens more nutritious than white or brown eggs?</p> <p>A. Yes B. No</p>	<p>Egg Trivia 4</p> <p>Blood spots in eggs are caused by:</p> <p>A. Eggs being fertilized</p> <p>B. A break in the shell</p> <p>C. Rupture of a blood vessel in the yolk</p>
<p>Egg Trivia 5</p> <p>The ropey strand found in the egg white is:</p> <p>A. An anchor for the yolk</p> <p>B. The start of an embryo</p> <p>C. An imperfection in the egg</p>	<p>Egg Trivia 6</p> <p>The yolk color depends upon:</p> <p>A. Breed of chicken</p> <p>B. Diet of the chicken</p> <p>C. If chicken has been caged or not</p>	<p>Egg Trivia 7</p> <p>Grade AA eggs are more nutritious than Grade B eggs?</p> <p>A. Yes B. No</p>	<p>Egg Trivia 8</p> <p>The size of the egg produced depends on:</p> <p>A. Age of hen B. Breed of the chicken C. Weight of the bird D. Environmental factors like heat, stress and overcrowding.</p>

<p>Egg Trivia 9</p> <p>The white of an older egg is less cloudy than a fresh egg?</p> <p>A. Yes</p> <p>B. No</p>	<p>Egg Trivia 10</p> <p>Double yoked eggs are caused by:</p> <p>A. Young hens</p> <p>B. Too old hens</p> <p>C. Genetics</p>	<p>Egg Trivia 11</p> <p>The best place to store eggs in the refrigerator is:</p> <p>A. In door, in the egg holder</p> <p>B. In the coldest part of the refrigerator</p> <p>C. In a bowl on the top shelf</p>	<p>Egg Trivia 12</p> <p>How long should eggs be stored in the refrigerator?</p> <p>A. 1 week</p> <p>B. 4 to 5 weeks</p> <p>C. 1 year</p>
<p>Egg Trivia 13</p> <p>How long should hard cooked eggs be kept in the refrigerator?</p> <p>A. 2 days</p> <p>B. 1 week</p> <p>C. 1 month</p>	<p>Egg Trivia 14</p> <p>Does the egg size (such a large, medium or small) relate to the grade?</p> <p>A. Yes</p> <p>B. No</p>	<p>Egg Trivia 15</p> <p>The fresher the egg, the harder the hard cooked egg is to peel?</p> <p>A. Yes</p> <p>B. No</p>	

Egg Trivia Answers

Egg Trivia 1:

The average laying hen lays about 257 eggs per year.

The actual time it takes for a hen to make an egg and lay it is 24-26 hours. Then the hen rests about 30 minutes or so before starting to make another egg. In addition to resting about ½ hour, some hens rest every 3 to 5 days and other rest every 10 days, but then others hardly rest at all. The average hen lays about 5 eggs a week.

Egg Trivia 2:

Egg color is the characteristic of the breed of the chicken producing the egg. The egg color or pigment is secreted and applied to the final layer of the egg shell by the hen. Generally the color of the chickens earlobe is an accurately predicts the color of the egg the hen will produce. Hens with white earlobes produce white eggs, while hens with red earlobes produce brown eggs.

Egg Trivia 3:

Brown eggs are not more nutritious than white eggs. Bluish-green eggs from Araucuna chickens are not more nutritious than white or brown eggs.

Egg color does not affect the nutritional value of the egg. Both white and brown eggs have the same nutritional value. The claim that Araucuna eggs have less cholesterol has not been proven.

Egg Trivia 4:

Blood spots are caused by the rupture of a blood vessel on the yolk surface during the formation of the egg or by a similar accident in the wall of the oviduct. Less than 1% of all eggs produced have a blood spot.

Egg Trivia 5:

The ropey strand found in the egg white anchors the yolk in place. It is neither an imperfection nor the beginning of an embryo. It is called chalaza. The more prominent it is, the fresher the egg is.

Egg Trivia 6:

The yolk color depends on the diet of the hen. The more of the yellow-orange plant pigment she eats, the darker the color of the yolk.

Egg Trivia 7:

Grade AA eggs are not more nutritious than Grade B eggs. Grading of eggs is not related to nutrition. There is no difference in nutritional value between the different grades. Grades are based on USDA standards for both internal and external quality.

Egg Trivia 8:

All of the answers are correct: Age of hen , Breed of the chicken , Weight of the bird, and Environmental factors like heat, stress and overcrowding. One of the major factors is the age of the hen. As the hen ages, her eggs increase in size. But all the variables can affect the size of the egg.

Egg Trivia 9:

The white of an older eggs I cloudier than a fresh egg. The cloudy appearance comes from carbon dioxide in the white. As the egg ages, the carbon dioxide escapes, consequently the white of the older egg is more transparent than that of the fresher egg.

Egg Trivia 10:

All of the answers are correct. Double yoked eggs are caused by: Young hens, Too old hens, and Genetics. However, the cause is often a young hen whose egg production cycles are not yet completely synchronized. But they can also come from hens that are old enough to produce extra large eggs. Plus genetics can also be a factor.

Egg Trivia 11:

Raw eggs should be stored in the coldest part of the refrigerator in their original egg carton. They should be stored away from any meat that might drip juices or any raw produce that might touch the eggs.

Egg Trivia 12:

Raw eggs maintain their freshness for about 4 to 5 weeks after purchase, if kept in the refrigerator continuously.

Egg Trivia 13:

A hard cooked egg can safely be refrigerated for up to one week.

Egg Trivia 14:

There is no relationship between grade and size. Grade is based on the USDA standards for both internal and external quality. Size is determined by weight of the egg, for example large eggs are 24 ounces and small are 18 ounces.

Egg Trivia 15:

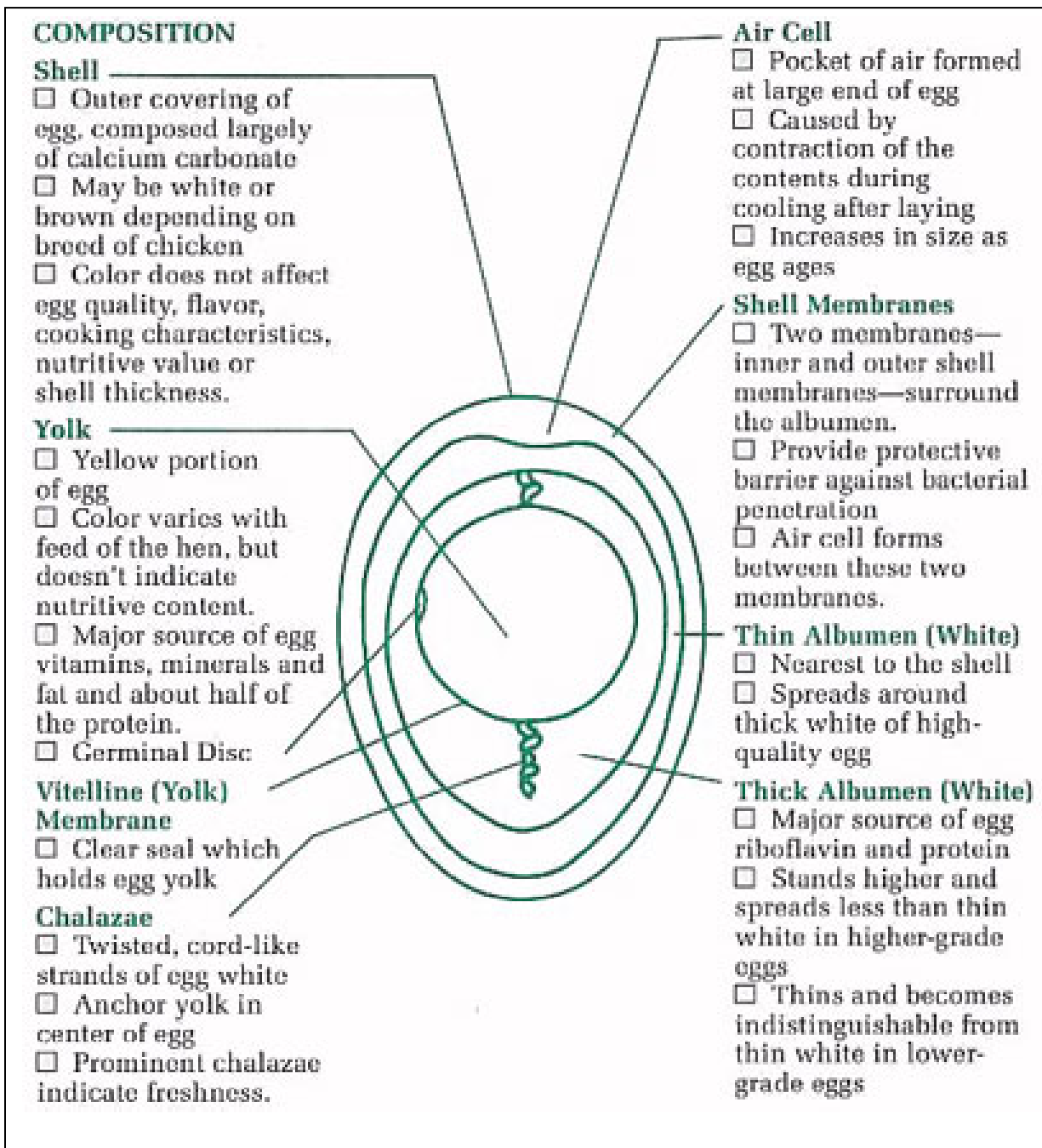
Yes, the fresher the egg, the more difficult it is to peel after hard cooking. That's because the air egg cell, found at the large end of the shell between the shell membranes, increases in size the longer the raw egg is stored. As the content of the egg contracts and the air cell enlarges, the shell becomes easier to peel.

Nutrient Content of a Large Egg

Nutrient (unit)	Whole Egg	Egg White	Egg Yolk
Calories (kcal)	72	17	55
Protein (g)	6.29	3.60	2.70
Carbohydrate (g)	0.39	0.21	0.61
Total fat (g)	4.97	0.06	4.51
Polyunsaturated fat (g)	0.682	0	0.715
Monounsaturated fat (g)	1.905	0	1.995
Saturated fat (g)	1.55	0	1.624
Cholesterol (mg)	212	0	210
Choline (mg)	125.5	-	-
Lutein & Zeaxanthin (mcg)	166	0	186
Vitamin A (IU)	244	0	245
Vitamin D (IU)	18	0	18
Vitamin E (mg)	0.48	0	0.44
Vitamin B6 (mg)	0.071	0.002	0.059
Vitamin B12 (mcg)	0.65	0.03	0.33
Folate (mcg)	24	1	25
Thiamin (mg)	0.035	0.001	0.03
Riboflavin (mg)	0.239	0.145	0.09
Calcium (mg)	26	2	22
Sodium (mg)	70	55	8
Potassium (mg)	67	54	19
Phosphorus (mg)	96	5	66
Magnesium (mg)	6	4	1
Iron (mg)	0.92	0.03	0.46
Zinc (mg)	0.56	0.01	0.39

Source: USDA National Nutrient Database for Standard Reference

Parts of the Egg



Source: American Egg Board, printed with permission, October 2007