EGG

Use 4-H Evaluation Survey

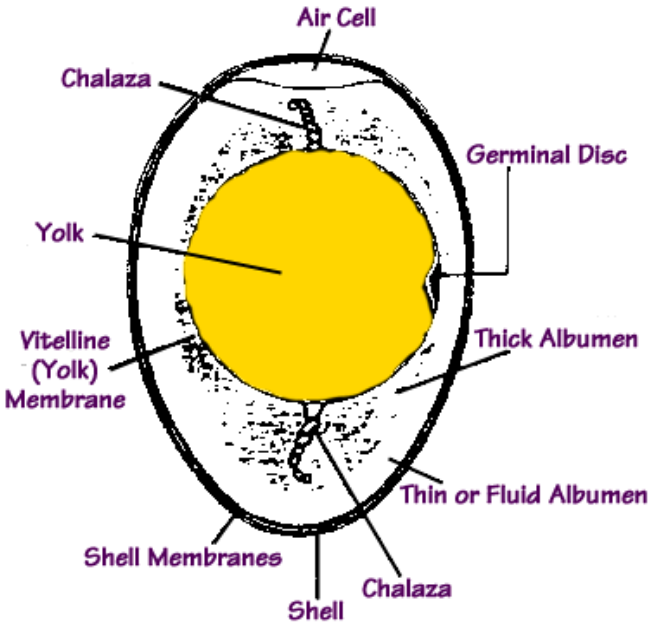
1. Display six eggs in a foam carton. Label the carton with exhibitor's name in the lower right hand corner.
2. Eggs will be shown according to the following three classes: white shell chicken eggs, brown shell chicken eggs, or all other eggs. One champion will be selected for each of the three classes.
3. A 4-H'er may exhibit 1 entry of 6 eggs per class for a total of 18 eggs (3 cartons).
4. Eggs must be produced by exhibitor's own flock.
5. Eggs will be judged on uniformity of color, uniformity of shape, weight, shell texture, and condition.

COUNTY PROJECT ONLY

What Is an Egg?

1. **The structure of an egg.**

An egg is a reproductive cell from which a new organism develops. This will occur only if the egg has been united with a male sperm cell (fertilized). A chick will hatch from a fertile egg if the egg is incubated at 100.5 degrees F for 21 days. You can tell if an egg is fertile by candling and identifying a mass or small spot in the egg. The egg will appear incandescent, and the mass will be dark.



2. **Identify the parts of the egg.**
    1. Blastoderm
    2. Yolk
    3. Albumen
    4. Inner shell membrane
    5. Outer shell membrane
    6. Air cell
    7. Shell
3. **Look at an egg.**

    Crack fresh egg into saucer and locate all the parts listed on the diagram.

4. **Draw and label the egg as it is in the dish.**

Crack and peel a hard cooked egg. Try to locate the parts found on the egg diagram. Can you find them? Why or why not?

Egg Sizing

1. Eggs, like people and chickens, come in different sizes. We'll learn the difference between a jumbo and a pee-wee egg. This will help us get the most for our egg money.

   These are the common egg sizes:

   30 oz per dozen eggs = jumbo

   27 oz per dozen eggs = extra large

   24 oz per dozen eggs = large

   21 oz per dozen eggs = medium

   18 oz per dozen eggs = small

   15 oz per dozen eggs = pee wee

2. How many eggs are there in a dozen? If we divide the weights by 12 we can calculate the weight of each individual egg.

   The 7 cent rule: When buying eggs, if the price increase for the next larger size is 7 cents or less per dozen, then the larger size is the better deal because you get more egg for your money. Example: When large eggs are 90 cents a dozen, they are only 60 cents a pound. Which size egg would cost the most in the store? The least? Why?

   Look at the egg display the next time you are at the grocery store.

Structure of the Egg

The egg is a biological structure intended by nature for reproduction. It protects and provides a complete diet for the developing embryo, and serves as the principal source of food for the first few days of the chick's life. The egg is also one of the most nutritious and versatile of human foods.

When the egg is freshly laid, the shell is completely filled. The air cell is formed by contraction of the contents during cooling and by the loss of moisture. A high-quality egg has only a small air cell.

The yolk is well-centered in the albumen and is surrounded by the vitelline membrane, which is colorless. The germinal disc, where fertilization takes place, is attached to the yolk. On opposite sides of the yolk are two, twisted, whitish cord-like objects known as chalazae. Their function is to support the yolk in the center of the albumen. Chalazae may vary in size and density, but do not affect either cooking performance or nutritional value.

A large portion of the albumen is thick. Surrounding the albumen are two shell membranes and the shell itself. The shell contains several thousand pores that permit the egg to "breathe."

Composition

An average-sized egg weighs approximately 57 grams (about 2 ounces). Of this weight, the shell constitutes 11 percent; the white, 58 percent; and the yolk, 31 percent. Normally, these proportions do not vary appreciably for small or large eggs. The percentage composition of the edible portions is:

Percent	Water	Protein	Fat	Ash
Whole egg	74	13	11	1
White	88	11	..	..
Yolk	48	17	33	1

Essential nutrients

Eggs are especially valuable as a source of protein. In fact, egg protein is used as the standard against which the quality of other food proteins is measured. One egg contains about 6 to 7 grams of protein. People of all ages need adequate protein for building and repairing body tissues.

The fat in the yolk is so finely emulsified that it is digested easily, even by infants. The ratio of unsaturated to saturated fats is about 2 to 1. This is considered very desirable. Oleic acid is the main unsaturated fat. It has no effect on blood cholesterol. Eggs contain vitamin A, the B vitamins (thiamin, riboflavin, and niacin), and vitamin D. All are necessary during childhood and adolescence for growth. Eggs also contain an abundant supply of minerals, such as iron and phosphorus, that are essential for building and maintaining strong, healthy bodies. But eggs are low in calcium (it is in the shell), and contain little or no vitamin C.

Individuals on weight-reducing programs find eggs beneficial. To lose weight, calorie intake must be reduced, while maintaining a well-balanced diet. An egg provides good nutrition and contains only about 80 calories.

Value of eggs

Food prices continue to climb, particularly for high-protein foods, and consumers are constantly searching for ways to reduce their food bill. One way is to include more eggs in the diet. Comparing protein foods on a pound-for-pound basis, eggs cost about 95 cents a pound when large eggs are selling for 64 cents a dozen. It is difficult to purchase any other high-protein food--meat or fish--for this low price.

Candling Eggs

Eggs are candled to determine the condition of the air cell, yolk, and white. Candling detects bloody whites, blood spots, or meat spots, and enables observation of germ development. Candling is done in a darkened room with the egg held before a light. The light penetrates the egg and makes it possible to observe the inside of the egg.

The candler should be set on a box or table at a convenient height (about 38 to 44 inches from the floor), so the light will not shine directly into the eyes of the operator. In candling, the egg is held in a

slanting position with the large end against the hole in the candler. The egg is grasped by the small end and, while held between the thumb and tips of the first two fingers, is turned quickly to the right or left. This moves the contents of the egg and throws the yolk nearer the shell. Because of the color of their shells, brown eggs are more difficult to candle than white eggs.

To do a reasonable job, an extensive knowledge of candling is not necessary, particularly if the eggs are all relatively fresh. One should be able to distinguish a fresh egg from a stale egg and detect such abnormalities as bloody whites, blood spots, meat spots, and cracked shells. In a fresh egg, the air space is plainly visible and moves freely. The white is thin and clear. In a stale egg, the air space is plainly visible and moves freely. The white is thin.

Most newly laid eggs are good quality. Eggs not over two or three days old, if held under good conditions, will meet the specifications for Grade A. The only eggs to be removed by candling are those with bloody whites, blood or meat spots, and cracked shells.

Candling Incubated Eggs

Incubated eggs are candled to determine whether they are fertile and, if fertile, to check the growth and development of the embryo. White eggs should be tested for fertility on the third day. Brown shelled eggs on the fifth or sixth day because it is difficult to see the embryo clearly before this time.

A small reddish area with blood vessels extending away from it will be visible in fertile eggs. This is the embryo floating around inside the egg, looking like a huge red spider. If the embryo dies, the blood draws away from the embryo and forms what is called a blood ring. All clear eggs and eggs showing blood rings or streaks should be removed from the incubator. If eggs are not candled during the early stages of incubation, it will be difficult to determine whether the egg was fertile; embryos that die early soon decompose and are not easily distinguished from rotten eggs.

Candle the eggs every few days to observe the growth and development of the embryo. Record findings.

Definitions Relating to the Avian Egg

- **Air cell** - The air space between the two shell membranes, usually at the large end of the egg, that can be plainly seen when an egg is candled.
- **Albumen** - The white of an egg, consisting of outer thin, firm, inner thin, and chalaziferous layers.
- **Avian egg** - The mass of material constituting the bird egg - the shell, shell membranes, albumen, and yolk - that is designed by nature to nourish and protect the true egg.
- **Blastoderm** - A fertilized true egg.
- **Blastodisc** - A true egg that was not fertilized.
- **Chalazae** - The two whitish cords on opposite sides of the yolk that hold the yolk in the center of the albumen and serve as a rotating axis to keep the germ cell on the top side of the yolk and next to the heat of the hen's body.
- **Cuticle** - A secretion of the uterus consisting mainly of protein that serves to partially seal the pores in the egg's shell and acts as a lubricant when the egg is laid; commonly called the bloom.
- **Egg** - The microscopic cell of the female; the true egg; the female germ cell.
- **Fertile** - An egg that is fertilized; the capability of an egg to develop into a chick.

- **Fertilization** - The act or process of making or becoming fertile; the union of a male cell with a female cell.
- **Infertile** - An egg that is not fertilized, will not hatch.
- **Shell** - The hard outer surface of an egg made up largely of calcium carbonate; the shell has pores allowing loss of carbon dioxide and moisture from the egg.
- **Shell membranes** - Two thin membranes next to the shell and surrounding the albumen and yolk; known as inner and outer shell membranes; they are one of the egg's chief defenses against bacterial invasion.
- **Sperm** - The microscopic cell of the male; the male germ cell.
- **Yolk** - The round yellow mass upon which the true egg is located and that provides nutrients for the developing embryo.

Trivia: More Than You Ever Wanted to Know

Egg Shell: The color of an eggshell depends upon the breed of hen. Hens with white ear lobes lay white eggs. Hens with red ear lobes lay brown eggs. Rhode Island Reds, New Hampshires and Plymouth Rock chickens lay brown eggs. White Leghorns and Brown Leghorns lay white eggs.

Egg White: The color of the egg white depends upon the presence of carbon dioxide. A fresh egg has a great deal of carbon dioxide, since it has not had time to escape, and the white looks very cloudy.

Egg Yolk: The color of the egg yolk depends on the hen's diet. If she eats yellow corn or alfalfa meal, the yolk is medium yellow. If she eats barley or wheat, the yolk is a lighter yellow. If she eats white corn meal, the yolk is almost colorless.

Egg Games: Egg games have their origin in many cultures. Egg hunts have long been a tradition around Easter time. An egg toss is a picnic game. Egg rolling dates back to the 1600's. Eggs are blown, pushed with the nose, or rolled down a hill. Egg tapping is done by tapping one egg against another. The egg that survives the longest wins.