

EGGS

Contrary to popular opinion, there is no law that says one must have eggs or cereal or pancakes or pastries for breakfast and must not have shrimp curry or chili or spaghetti and meatballs. Although most of us would think these last suggestions rather strange for the morning meal, there is probably no food that someone, somewhere, does not enjoy for breakfast. No doubt many Japanese, who have soybean soup, sour pickles, and rice for their first meal of the day, think Western breakfast habits are strange.

However, the egg remains a favorite breakfast food, even as we become more adventurous and explore ethnic cuisines. For such apparently simple items, eggs are used in many ways in the kitchen and require special study. We examine not only the usual breakfast preparation but other egg dishes as well, such as soufflés and custards.

Understanding Eggs

Composition

A whole egg consists primarily of a yolk, a white, and a shell. In addition, it contains a membrane that lines the shell and forms an air cell at the large end, and two white strands called chalazae that hold the yolk centered. Figure 24.1 is a cross-sectional diagram that shows the location of these features.

1. The *yolk* is high in both fat and protein, and it contains iron and several vitamins. Its color ranges from light to dark yellow, depending on the diet of the chicken.
2. The *white* is primarily albumin protein, which is clear and soluble when raw but white and firm when coagulated. The white also contains sulfur.
The white has two parts: a thick portion that surrounds the yolk, and a thinner, more liquid portion outside of this.
3. The *shell* is not the perfect package, in spite of what you may have heard. Not only is it fragile but it is also porous, allowing odors and flavors to be absorbed by the egg and allowing the egg to lose moisture even if unbroken.

BROWN EGGS

Many consumers like to buy brown-shelled eggs, even pay more for them, because they think they are more nutritious, more flavorful, or somehow more natural. In fact, shell color is determined by the breed of the hen and has no relation to the flavor, purity, or nutritional value of the egg.

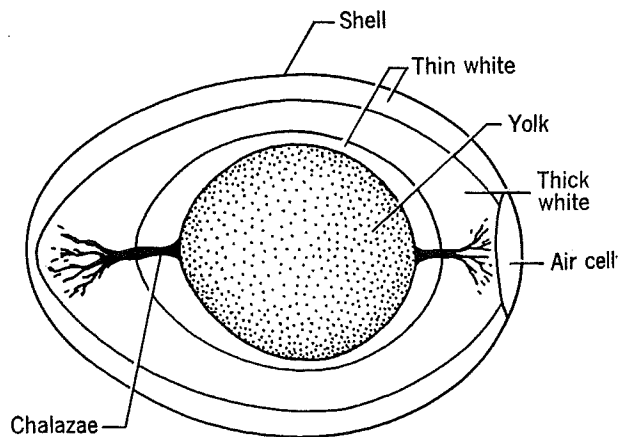


Figure 24.1 The parts of an egg. The diagram shows, in simplified form, the location of the parts of an unbroken egg, as described in the text.

Grades and Quality

GRADES

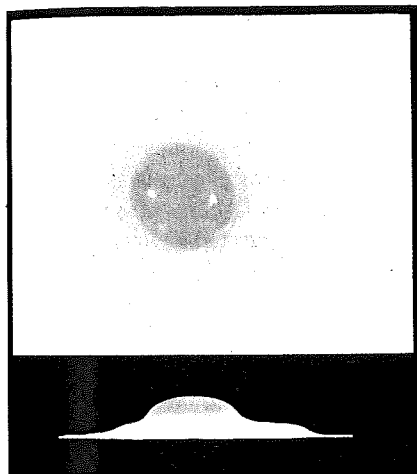
In the United States, eggs are graded for quality by the USDA. The three grades are AA, A, and B.

The best grade (AA) has a firm yolk and white that stand up high when broken onto a flat surface and do not spread over a large area. In the shell, the yolk is well centered, and the air sac is small.

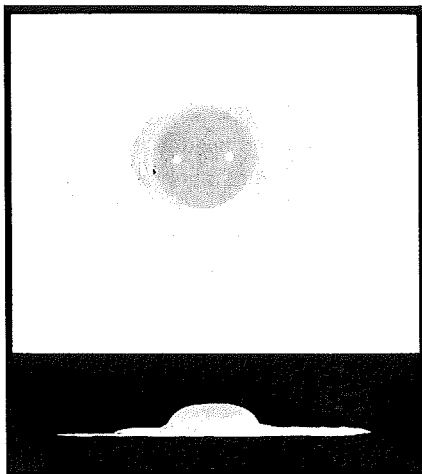
As eggs age, they lose density. The thin part of the white becomes larger, and the egg spreads over a larger area when broken. Also, the air sac becomes larger as the egg loses moisture through the shell. Figure 24.2 shows the differences among grades AA, A, and B.

Figure 24.2 Egg grades.

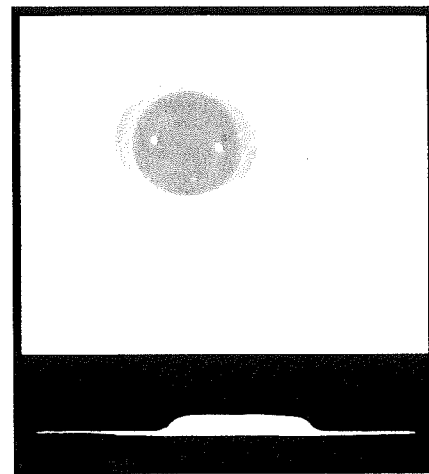
Courtesy of the USDA.



(a) Grade AA.



(b) Grade A.



(c) Grade B eggs, as seen from the top and side. Note how the white and yolk lose thickness and spread more in the lower grades.

MAINTAINING QUALITY

Proper storage is essential for maintaining quality. Eggs keep for weeks if held at 36°F (2°C) but lose quality quickly if held at room temperature. In fact, they can lose a full grade in one day at warm kitchen temperatures. There's no point in paying for Grade AA eggs if they are Grade B by the time you use them.

Store eggs away from foods that might pass on undesirable flavors or odors.

GRADES AND USE

One glance at Figure 24.2 will show you why Grade AA is the best to use for fried or poached eggs. Lower grades spread too much to produce a high-quality product.

For hard-cooked eggs, use either Grade A eggs or Grade AA eggs that have been held a few days in the refrigerator. Very fresh eggs are difficult to peel when cooked in the shell.

Grade B eggs are suitable for use in baking. If you are certain they have developed no strong flavors, they may be used for scrambled eggs, where the firmness of the whole egg is less important.

Size

Eggs are also graded by size. Table 24.1 gives the minimum weight per dozen (including shell) according to size category. Note that each size differs from the next by 3 ounces or 85 grams.

Most food-service operations use large eggs, and recipes in most books are based on this size.

Table 24.1
Egg Size Classifications

SIZE	MINIMUM WEIGHT PER DOZEN	
	U.S.	METRIC
Jumbo	30 oz	850 g
Extra-large	27 oz	765 g
Large	24 oz	680 g
Medium	21 oz	595 g
Small	18 oz	510 g
Peewee	15 oz	425 g

Market Forms

1. Fresh eggs or shell eggs.

These are most often used for breakfast cookery and are the main subject of this section.

2. Frozen eggs.

- Whole eggs
- Whites
- Yolks
- Whole eggs with extra yolks

Frozen eggs are usually made from high-quality fresh eggs and are excellent for use in scrambled eggs, omelets, French toast, and in baking. They are pasteurized and are usually purchased in 30-pound (13.6-kg) cans. These take at least two days to thaw at refrigerator temperatures.

3. Dried eggs.

- Whole eggs
- Yolks
- Whites

Dried eggs are used primarily for baking. They are not suggested for use in breakfast cookery.

Unlike most dehydrated products, dried eggs are not shelf-stable and must be kept refrigerated or frozen, tightly sealed.

SANITATION

In recent years, cases of salmonella food poisoning have been caused by raw or undercooked eggs. As a result, cooks have been made more aware of egg-related sanitation concerns. Pasteurized egg products are used in more operations. For a more detailed discussion of eggs and food safety, see Appendix 5, page 1058.

Egg Substitutes

Egg yolks, in addition to being high in fat, are also high in cholesterol. Efforts to reduce cholesterol in the diet have led to the development of commercial egg substitutes. These are of two types:

1. Egg substitutes that can be used to make such dishes as scrambled eggs, omelets, and custards are made of pasteurized egg whites with the addition of a blend of ingredients to substitute for the yolks, such as vegetable oil, milk solids, vegetable gums, salt, emulsifiers, and vitamin additives. They are sold in bulk liquid form, usually frozen, and can be substituted, ounce for ounce, for whole liquid eggs in most egg preparations.
2. Eggless egg substitutes contain no egg product. They are made of flours or other starches, plus vegetable gums and stabilizers, and, sometimes, soy protein. They are intended for use in baked goods only and are not suitable for use in breakfast egg preparations or custards. If they contain no milk products (read ingredient lists on individual products), they may be used in vegan diets.

General Cooking Principles

The most important rule of egg cookery is simple: *Avoid high temperatures and long cooking times.* In other words, do not overcook. This should be a familiar rule by now.

Overcooking produces tough eggs, causes discoloration, and affects flavor.

COAGULATION

Eggs are largely protein, so the principle of coagulation (p. 65) is important to consider.

Eggs coagulate at the following temperatures:

Whole eggs, beaten	about 156°F (69°C)
Whites	140°–149°F (60°–65°C)
Yolks	144°–158°F (62°–70°C)
Custard (whole eggs plus liquid)	175°–185°F (79°–85°C)

Note that whites coagulate or cook before yolks do. This is why it is possible to cook eggs with firm whites but soft yolks.

Note also that when eggs are mixed with a liquid, they become firm at a higher temperature. However, 185°F (85°C) is still much lower than the temperature of a sauté pan or skillet over high heat. As the temperature of coagulation is reached, the eggs change from semiliquid to solid, and they become opaque. If their temperature continues to rise, they become even firmer. *An overcooked egg is tough and rubbery.* Low temperatures produce the best-cooked eggs.

If egg-liquid mixtures such as custards and scrambled eggs are overcooked, the egg solids separate from the liquids, or *curdle*. This is often seen as tough, watery scrambled eggs.

SULFUR

The familiar green ring you often see in hard-cooked eggs is caused by cooking at high temperatures or cooking too long. The same green color appears in scrambled eggs that are overcooked or held too long in the steam table.

This ring results when the sulfur in the egg whites reacts with the iron in the yolk to form iron sulfide, a compound that has a green color and a strong odor and flavor. The best way to avoid green eggs is to use *low temperatures and short cooking and holding times*.

FOAMS

Whipped egg whites are used to give lightness and rising power to soufflés, puffy omelets, cakes, some pancakes and waffles, and other products. The following guidelines will help you handle beaten egg whites properly (see Figure 24.3).

1. Fat inhibits foaming.

When separating eggs, be careful not to get any yolk in the whites. Yolks contain fats. Use very clean equipment when beating whites.

2. Mild acids help foaming.

A small amount of lemon juice or cream of tartar gives more volume and stability to beaten egg whites. Use about 2 teaspoons cream of tartar per pound of egg whites (20 mL per kg).

3. Egg whites foam better at room temperature.

Remove them from the cooler 1 hour before beating.

4. Do not overbeat.

Beaten egg whites should look moist and shiny. Overbeaten eggs look dry and curdled and have lost much of their ability to raise soufflés and cakes.

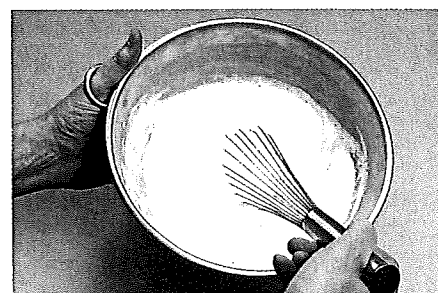
5. Sugar makes foams more stable.

When making sweet puffed omelets and dessert soufflés, add some of the sugar to the partially beaten whites and continue to beat to proper stiffness. (This will take longer than when no sugar is added.) The soufflé will be more stable before and after baking.

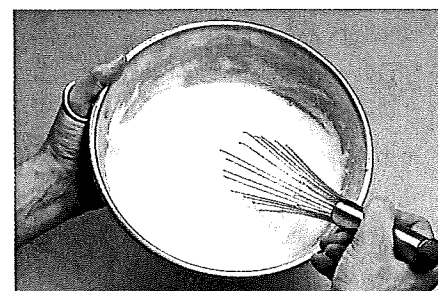
KEY POINTS TO REVIEW

- What are the three components of a whole shell egg? Describe each of these components.
- How are eggs graded for size and quality? What are the grades?
- How should egg products be stored?
- What are five guidelines to keep in mind when whipping egg white foams?

Figure 24.3 Whipping egg whites.



(a) The whites are just beginning to whip into a foam.



(b) The whites have reached the soft-peak stage.



(c) The whites have reached the firm-peak stage. Note the smooth texture. Whipping beyond this stage will cause the foam to break.

Cooking Eggs

Simmering in the Shell

The term *hard-boiled egg* is not a good one to use because eggs should be simmered instead of boiled.

Eggs may be simmered in water to the soft-, medium-, or hard-cooked stage according to the following methods.

Procedures for Simmering Eggs in the Shell

Method 1

1. Collect equipment and food items.
2. Bring eggs to room temperature by (a) removing them from the cooler 1 hour before cooking, or (b) placing them in warm water for 5 minutes and draining. Cold eggs are more likely to crack when placed in boiling water.
3. Place eggs in boiling water and return the water to a simmer.
4. Simmer, do not boil, for the required time:

Soft-cooked	3 to 4 minutes
Medium-cooked	5 to 7 minutes
Hard-cooked	12 to 13 minutes

Exact cooking time depends on temperature of eggs, size of eggs, and amount of water used.
5. Drain immediately and cool under cold running water to stop the cooking. Cool just a few seconds if eggs are to be served hot. Cool further if they are to be held for later use.
6. To peel, crack the shell and pull it away, starting at the large end (where the air sac is located). For easier peeling, peel while still warm, and hold under running water to help loosen shell. Very fresh eggs are hard to peel. Eggs for cooking in the shell should be several days old.

Method 2

1. Collect equipment and food items.
2. Place eggs in saucepan and cover with cold water.
3. Bring water to a boil.
4. Reduce heat and simmer for the required time:

Soft-cooked	1 minute
Medium-cooked	3 to 5 minutes
Hard-cooked	8 to 9 minutes

Method 3; for Hard-Cooked Eggs Only

Proceed as in Method 2, but remove pan from heat and cover as soon as it comes to a boil. Let stand off heat 20 minutes.

Poaching

The principles of cooking eggs in the shell are applicable to poached eggs. The only difference between the two items is the shell.

This difference, of course, complicates the cooking process, as emphasized in the following procedure. The object is to keep the eggs egg-shaped—that is, in a round, compact mass rather than spread all over the pan.

STANDARDS OF QUALITY FOR POACHED EGGS

1. Bright, shiny appearance.
2. Compact, round shape, not spread or flattened.
3. Firm but tender whites; warm, liquid yolks.