

## COMMON QUESTIONS ABOUT EGGS

*By Jacquie Jacob and Tony Pescatore*

***Question: Since eggs contain cholesterol, should I avoid eating eggs?***

No. Eggs are an excellent source of easy to digest, high quality protein that can play an important role in the diet of most Americans. It is true that high blood cholesterol levels have been shown to aggravate heart problems, but research has also shown that the presence or absence of eggs in the diet of most Americans is not likely to increase blood cholesterol levels. Only a small minority of people cannot regulate blood cholesterol levels. These people need to avoid high-cholesterol foods.

One large egg contains about 213 milligrams (mg) of cholesterol—all of which is found in the yolk. The American Medical Association (AMA) recommends that, as long as you are healthy, you should limit your dietary cholesterol intake to less than 300 mg a day. If you have cardiovascular disease, diabetes or high LDL (or "bad") cholesterol, you should limit your dietary cholesterol intake to less than 200 mg a day. Therefore, if you eat an egg on a given day, it's important to limit or avoid other sources of cholesterol for the rest of that day.

If you like eggs but do not want the cholesterol it contains, use egg whites which do not contain cholesterol. You can also use cholesterol-free egg substitutes, which are made with egg whites. If you want to reduce cholesterol in a recipe that calls for eggs, use two egg whites or 1/4 cup cholesterol-free egg substitute in place of one whole egg.

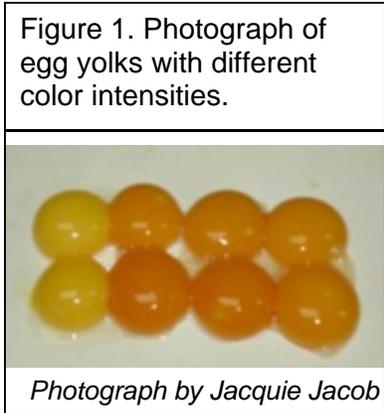
***Question: My doctor recommends that I reduce the level of saturated fats in my diet. He indicated that meat is high in saturated fats so I should limit my meat consumption. Since eggs are an animal product, are they high in saturated fats as well?***

Eggs do not contain a lot of saturated fat. Instead, the fat in eggs is primarily unsaturated and is similar to vegetable fats. Eggs contain only 11.2% total fat, mainly in the yolk. Approximately 17% of an egg's fatty acids are poly-unsaturated, 44% mono-unsaturated and only 32% saturated. Eggs are an important source of protein and can make a significant contribution to a healthy diet, including low-fat diets.

***Question: Why are egg yolks yellow?***

Yolk color depends on what the hen eats. If a hen eats plenty of yellow-orange plant pigments called xanthophylls, the pigment will be deposited in the egg yolk giving the yellow color. Hens fed diets containing yellow corn or alfalfa meal lay eggs with medium yellow yolks. Those eating wheat or barley lay eggs with lighter-colored yolks.

Feeding hens a diet with very little pigment, such as those with white rather than yellow corn, produce almost colorless yolks. In addition, it is possible to supplement a hen's diet with substances containing xanthophylls, such as marigold petals, to enhance yolk color



**Question: Does yolk color affect the nutritional value of eggs?**

As previously mentioned, yolk color varies depending on what the hens eat. Hens that have access to green plants, such as those raised on pasture, tend to produce dark yellow yolks. Yolk color will vary depending on the quality of the pastures and how much the hens eat. Since commercial laying hens are typically confined, lighter and more uniformly colored yolks are produced.

Yolk color does not affect the nutritive value or cooking characteristics. Egg yolks, regardless of shell color, are a rich source of vitamin A.

**Question: I noticed that many companies have added the statement that “eggs are an important source of lutein” on their egg cartons? What is lutein and why do I want to make sure I get enough?**

Lutein (pronounced LOO-teen) is a natural pigment found in dark green leafy vegetables such as spinach, and in various fruits and corn. Egg yolks are also an important source of lutein.

Lutein is important in the health of our eyes and skin—the only parts of our body directly exposed to the outside environment. Lutein has been linked to promoting healthy eyes through reducing the risk of macular degeneration. A diet rich in lutein may lower your risk of developing cataracts and macular degeneration. Lutein may also help prevent or slow down atherosclerosis, which is a major risk for cardiovascular disease.

Research suggests that we need a minimum of 6-10mg of lutein daily. Most Americans do not consume enough foods rich in lutein. Federal surveys report that the average American consumes only about 2 mg of lutein daily. Even if you eat a balanced diet, you need a large bowl of fresh spinach to get about 6 mg of lutein. Research has

shown that lutein from eggs is more readily absorbed into the bloodstream than lutein from other sources because of components in the egg's yolk, such as lecithin. When eggs are consumed as the source of lutein, blood lutein levels were shown to be three times greater than when consuming the same dose of lutein from other sources.

***Question: Which are better for you, brown or white shelled eggs?***

The only difference between brown and white shelled eggs is the shell color, which is controlled by genetics. If hens are fed the same diets, their eggs will contain the same nutrients, regardless of shell color. The eggs will also have the same flavor, shelf-life, and whipping/cooking characteristics.

The price of brown shelled eggs is typically higher than that for white shelled eggs. In the past, the breed of hens used in commercial flocks that produce brown shelled eggs were heavier and required more feed than those breeds used to produce white shelled eggs. As a result, it was more expensive to produce brown eggs. With today's commercial strains of brown egg layers, however, there is very little difference in the cost of production for brown versus white shelled eggs. Since people are willing to pay more for the brown shelled eggs, incorrectly believing them to be more nutritious, retailers are able to charge more.

***Question: Do chicken eggs come in any other shell color besides white or brown?***

Yes, and you can actually get green eggs to go with your ham. There is a particular breed of chicken that is native to South America—the Araucana. These chickens have no tail, tufts of feathers protruding from the sides of their face, and lay green/blue eggs. The gene that controls the green/blue shell color is a genetically dominant trait so when you mate an Araucana chicken with any other breed, the offspring (often referred to as Ameraucana or Easter Egg Hen depending on the breeds crossed) will produce eggs with colored shells. Colors have ranged from light pink, to blue, to light green.

There have been claims that the eggs from Araucana or Ameraucana hens are lower in cholesterol than eggs from the conventional breeds laying white or brown shelled eggs. In reality, however, eggs from Araucana/Ameraucana hens have more cholesterol on a per weight basis but because the eggs are smaller than conventional table eggs the overall cholesterol content per egg is lower. You would get the same reduction in cholesterol levels, however, by just using a smaller brown or white shelled egg.

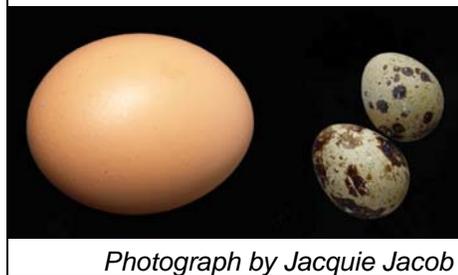
***Question: Can you eat duck eggs?***

Yes, you can eat duck eggs. In some parts of the world, such as Asia, consumers prefer duck eggs over chicken eggs. Duck eggs are a bit larger than chicken eggs and

have harder shells. They tend to be off-white whereas chicken eggs are white, green, blue, or brown. In baking and cooking, duck eggs have a better consistency, leading to a superior product. Cakes will have a richer texture and retain moisture better. When eaten on their own, such as scrambled or fried, duck eggs have a stronger flavor which people that are used to chicken eggs may not care for.

Another poultry species sometimes raised for eggs is Japanese quail. As with chickens there is a meat-type and an egg-laying type of Japanese quail. Their eggs are much smaller than chicken eggs and very hard to peel.

Figure 2. Photograph comparing a brown shelled chicken egg with two Japanese quail eggs.



Photograph by Jacquie Jacob

**Question: If I eat a chicken egg purchased at the grocery store am I eating a potential chick embryo?**

The typical eggs sold in grocery stores are produced from hens that do not have a rooster present. As a result, the eggs are not fertilized and can never have a chicken embryo develop.

Some specialty stores sell fertile eggs. If properly stored, a chick will not develop in this egg. Fertile eggs will also have the same flavor, shelf-life, and whipping/cooking characteristics as infertile eggs.

There are some ethnic groups that like to eat poultry embryos—typically from ducks. “Balut” is popular in the Philippines and is a duck egg incubated for 18 of the typical 28 day incubation period. This is right before the feathers develop and the bones are still flexible. The eggs are then boiled and eaten. It is possible to make a chicken version of balut, but it is important that the incubation period be reduced to 13-14 days since the total incubation time for chickens is only 21 days.

**Question: My hens have a rooster with them so the eggs may be fertile. Is it okay to eat them?**

As previously indicated, there is no evidence that fertile eggs are nutritionally different than infertile ones. Fertile eggs have minute remnants of the male's sperm and a small

layer of cells from the hen that could form the embryo. The proportion of these components in relation to the total egg contents is so small that it is impossible to detect chemical differences between fertile and infertile eggs.

With regards to whether or not fertile eggs can be eaten—this is basically a personal choice. Some consumers believe that since fertile eggs have the potential to produce a new life, that is a baby chicken, it is ethically wrong to eat fertile eggs. Other producers just do not like the idea of eating fertile eggs. Most consumers, however, have no problem with eating fertile eggs and are unable to detect any differences between fertile and infertile eggs.

***Question: I hard cooked some eggs the other day and when I peeled them there was a dark green color on the egg yolk. What causes that? Are they safe to eat?***

A greenish ring around hard-cooked egg yolks is typically the result of a reaction between sulfur and iron compounds in the egg. When an egg is cooking, the sulfur-containing amino acids found in the egg white (albumen) breakdown and release hydrogen sulfide. At temperatures above 158°F (70°C), hydrogen sulfide reacts with iron found in the yolk resulting in the production of iron sulfide. Iron sulfide is the greenish film that forms on the surface of the yolk. The green coating of egg yolks typically happens when eggs are overcooked or when the cooking water has a high iron content.

Although the color may look unappealing, eggs with such green rings are still wholesome and nutritious and have a normal flavor. The best ways to avoid greenish yolks are to use the proper cooking time and temperature and to rapidly cool the eggs once they are cooked.

***Question: I scrambled a large batch of eggs, but when I went to serve them they had turned a funny color. What causes that?***

Sometimes a large batch of scrambled eggs will take on a green color. Although it is not very appealing, the color change does not affect the wholesomeness of the eggs. Just as in hard-cooked eggs, the green color that develops is the result of a heat-induced chemical reaction between the iron and sulfur in the eggs. The green color occurs when you cook eggs at too high a temperature, hold them for too long a period of time, or both. To prevent the discoloration of scrambled eggs, use stainless steel equipment and a low cooking temperature, cook the eggs in small batches, and serve them as soon as possible after cooking. If it's necessary to hold scrambled eggs for a short time before serving, it helps to avoid direct heat. Place a pan of hot water between the pan of eggs and the heat source.

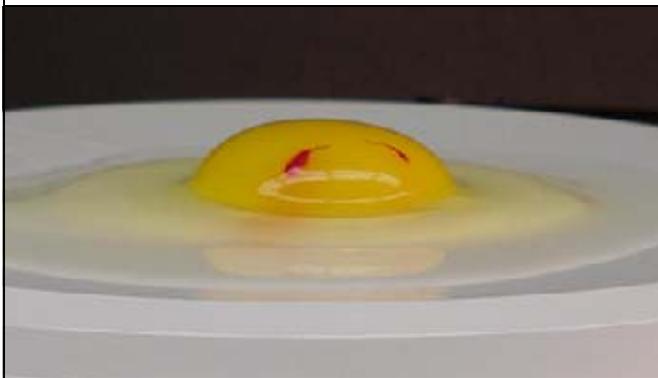
**Question: When I broke open a fresh egg from the grocery store, the egg white was green. What was wrong with it? Are such eggs safe to eat?**

Greenish color in egg whites is usually caused by high levels of riboflavin (vitamin B<sub>2</sub>), which is yellow-green. Since riboflavin is a required nutrient there is nothing wrong with greenish whites. A green or blue color occurs most frequently in fresh, high-quality eggs. The eggs are safe to eat despite the unappealing color.

**Question: Sometimes when I peel hard boiled eggs, the shell comes off easily. Other times it is hard to remove the shell. Why are some eggs harder to peel than others?**

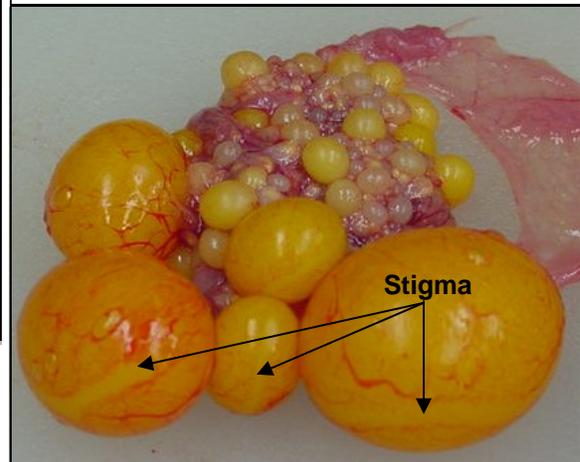
Hard-cooked eggs that do not peel easily are usually quite fresh. Eggs kept for several days before cooking lose carbon dioxide making them easier to peel. If you need to peel hard cooked eggs, the best plan is to purchase the eggs about a week in advance of when you need to peel them. Three days before 'the big day,' leave the eggs out of the refrigerator. This will make the eggs easier to peel when hard cooked.

Figure 3. Photograph of an egg with a blood spot on the yolk



Photographs by Jacquie Jacob

Figure 4. Photograph of a chicken ovary showing the location on the highly vascularized developing yolks are released (stigma) to continue down the remainder of the oviduct for assembly of the egg.



**Question: A friend told me that the stringy white pieces in eggs are sperm. Is this true? Is it safe to eat them?**

The stringy white pieces in eggs are called chalazae (singular term is chalaza). There should be two in each egg. Some consumers think the presence of chalazae in eggs is evidence that the egg is fertile and very carefully remove them. The chalazae, however, are a natural part of the egg that functions to anchor the yolk in the middle of the thick egg white. Prominent chalazae indicate high quality. They tend to disappear as

the quality of the egg drops. However, eggs with small chalazae can have high quality, too.

**Question: Can you eat eggs with blood spots?**

Eggs with a visible blood spot on the yolk, or a meat spot in the egg white, are safe to eat. The unappealing material (see Figure 1) can be removed with the tip of a knife. Blood and meat spots occasionally occur in eggs, but such eggs are typically identified in the processing facility and removed. As a result, it is very rare to see a blood or meat spot in eggs sold in grocery stores.

If you raise your own laying hens, you are more likely to find a blood or meat spot. These tiny spots are not harmful. They are caused by the rupture of a blood vessel during the formation of the egg (see Figure 2). Blood spots do NOT indicate that it is a fertile egg.

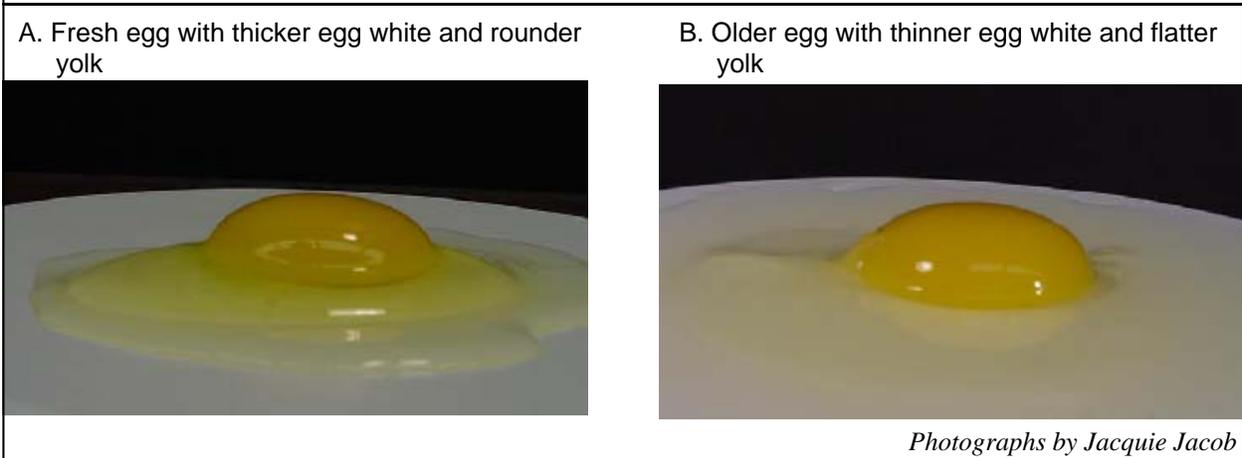
**Question: What is the best way to store eggs?**

Eggs should be stored in the refrigerator as soon as possible after they are brought back from the store (or collected from your flock). Eggs should be kept in cartons. The cartons protect the eggs from absorbing any odors that may be in your refrigerator. They also help keep the eggs fresh longer. The eggs should be stored on the middle or lower shelves where the temperature is more constant.

**Question: How long can eggs be kept in the refrigerator before they need to be thrown out?**

As an egg ages, the white becomes thinner, the yolk becomes flatter and the yolk membrane weakens (see Figure 5 below). Although these changes may affect the appearance of the eggs when fried or hard cooked (yolk stuck to the side of the shell instead of being in the center of the egg), they do not indicate spoilage and do not have

Figure 5. Photographs of a fresh and an older egg to compare the nature of the yolk and egg white.



a great effect on the nutritional quality of the egg or its functions in recipes.

Eggs stored in their carton on an appropriate shelf in the refrigerator are okay to use 4-5 weeks past the carton's 'sell buy' date. The 'sell buy' date is typically 30 days after it was packaged. It is important, however, that they be stored properly, as indicated above. For every hour that eggs are kept at room temperature, they age an entire day.

If an egg is cracked its shelf-life declines. The shell is the egg's first defense against contamination. If the egg contents are leaking through the shell, the eggs is stuck to the carton, or the egg shell is stained or dirty, it should be thrown out. A cracked, but not leaking, egg should be used as soon as possible, typically within two days. Do not use broken or cracked eggs in drinks, meringues, uncooked sauces or icings. They can be used in dishes where they will be thoroughly cooked, such as a cake, cookies or a casserole.

Hard cooked eggs should be refrigerated and should be eaten within 7 days.

**Question: How can I tell if my eggs have spoiled?**

When properly handled and stored eggs rarely spoil. Instead, if you keep eggs long enough, they are more likely to simply dry up, especially if they are stored in a frost-free refrigerator.

For eggs to spoil they must contain 'spoilage bacteria.' When stored, spoilage bacteria such as coliform and *Flavobacterium* can contaminate the egg shell. Slimy feel on egg shells can indicate bacterial growth. The most common source of the problem is *Pseudomonas* which can grow at temperatures just above refrigeration and below room temperatures. If present in large numbers, *Pseudomonas* may give eggs a sour or fruity odor and a blue-green coloring.

Although bacteria are most likely the cause of spoilage, mold growth can also occur under very humid storage temperatures or if eggs are washed in dirty water. Molds such as *Penicillium*, *Alternaria* and *Rhizopus* may be visible as spots on the shell and can penetrate the shell to reach the egg. Regardless of color, powdery spots that come off on your hand may indicate mold.

Old eggs typically float in water because of the larger air cell they have. The air cell forms as a freshly laid egg cools. As the egg ages, air enters the egg and the air cell becomes larger. If you find that an egg floats, it is best to break it into a separate bowl to check and make sure it does not have a bad odor or appearance indicating that it is rotten. Always be careful when breaking open light weight eggs—it they are rotten they will explode when broken open.

**Question: Is it safe to eat raw eggs?**

Eating raw eggs can put you at risk for Salmonella poisoning, a type of food poisoning. For eggs the Salmonella species typically involved in food poisoning is Salmonella *Enteritidis* (SE). Eggs are a perishable food and must be properly stored and cooked. Most outbreaks of Salmonella poisoning from eggs appear to be related to incorrect storage temperature and inadequate cooking.

The frequency of SE contamination in commercial eggs is low—it is estimated that one in 20,000 eggs may contain SE. The risk of food poisoning from properly stored and handled eggs is extremely low—a person who eats a raw egg every day would encounter a contaminated egg once in 55 years. The odds of any one person in the U.S. getting sick from SE in eggs is 1 in 2,240.

Special precautions, however, are needed when eggs are served to people who are particularly vulnerable to SE infections. High-risk groups include the very young, the elderly, pregnant women (because of the risk to the fetus), and people already weakened by serious illness or whose immune systems are weakened.

**Question: What are pasteurized eggs?**

Pasteurized eggs have been heated to a certain point to destroy bacteria that can cause food poisoning. As previously indicated, the main bacteria of concern is SE. Pasteurizing does not cook the eggs nor does it affect their taste and nutritional content. Pasteurized eggs are generally considered safer to use in recipes that contain raw eggs (like homemade ice-cream, eggnog, Caesar salad dressing, Hollandaise sauce, etc.)

The pasteurizing process typically results in a cloudy egg white. There are no grading standards for eggs with cloudy egg whites so you will not see a grade on the cartons as you would normally see. The cartons of pasteurized eggs are sealed (see Figure 6). Once the seal is broken the eggs are no longer considered SE free.

Figure 6. Photographs of a commercially available pasteurized egg product.



*Photographs by Jacquie Jacob*

**Question: How can you tell if an egg is raw or hard-cooked without cracking it open?**

One way to tell is to place the egg on its side and spin it with your fingers. A hard-cooked egg will spin smoothly and rapidly. A raw egg will wobble and spin slowly because the liquid center will prevent the egg from building up the momentum needed to keep the egg spinning.