



Cooking  
Methods

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## PLEASE EXPLAIN THE DIFFERENCES BETWEEN COOKING WITH EGG WHITES, EGG YOLKS, WHOLE EGGS, AND EGG SUBSTITUTES

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### Egg Whites

Depending on the size, the *albumen* (egg white) accounts for about 67% of the egg's liquid weight and contain more than half its total protein (56%) as well as the majority of the egg's niacin, riboflavin, chlorine, magnesium, potassium, sodium and sulfur. In a Large egg, the white supplies about 17 calories.

Because the egg white is composed of mostly protein and water, it *coagulates* (becomes solid) between 144 and 149°F, causing the white to cook faster than the yolk when cooked either on the range-top or in a conventional oven. If you cook with egg whites only to eliminate some of the yolks in a recipe, you'll need to watch timing carefully.

When egg white is beaten, its protein molecules unfold, stretch and join together to surround air bubbles and then coagulate to form a network. When heated, the full coagulation of the whites creates a solid structure. This ability of egg whites is called foaming. Egg whites are capable of foaming up to 6 to 8 times their original volume. Egg white foam *leavens*, or lightens, recipes, making it possible to create airy dishes such as angel food cakes, soufflés and meringues.

Egg white tends to be drying. For some recipes - crisp cream puffs, for instance - this is helpful. In other dishes - cakes, for example - the lower moisture factor may produce an unsatisfactory result. Egg white is also helpful in *retarding crystallization* (keeping crystals small) in candies, frostings, ice cream and sherbets.

### Egg Yolks

Again, depending on egg size, the yolk makes up about 33% of the egg's liquid weight and contains all of the egg's fat and slightly less than half of its protein (44%). The 5 grams of fat in a large egg yolk are about 1.6 grams saturated and 2.63 grams unsaturated - the 'good' kind of fat. The remaining fat portion of the yolk consists of cholesterol, cephalin and lecithin.

With the exception of the niacin and riboflavin, the yolk contains a higher proportion of the egg's vitamins than the white. All of the egg's choline and

vitamins A, D and E are in the yolk, egg yolks are one of the few foods naturally containing vitamin D. The yolk also contains more calcium, copper, iodine, iron, manganese and phosphorus than the white and it contains all of the egg's zinc. In a large egg, the yolk supplies about 59 calories.

Because it contains fat, an egg yolk's protein coagulates between 149 and 158°F, making the yolk slower cooking than the white when cooked either on the range-top or in a conventional oven.

Egg yolk protein also foams but, because of the yolk's fat content, egg yolk forms a thicker foam of less volume than egg white. Egg yolk leavening is important in making puff omelets, sponge cakes and soufflé bases. The fat in egg yolk also makes it a better moistening ingredient than egg white.

The yolk's lecithin is largely responsible for its emulsifying properties. *Emulsification* is what causes lemon juice or vinegar and oil to become a smooth mayonnaise, rather than separating, and is also essential in making creamy Hollandaise and Béarnaise sauces.

### Whole Eggs

Though egg whites and yolks perform separate functions that make them special, only whole eggs provide all the nutrients eggs have to offer.

Whole eggs coagulate between 144 and 158° F. In the microwave, it's easiest to cook beaten whole eggs because the mixture is *homogenous* (the same throughout) and all parts of the mixture coagulate at the same rate. In microwaving unbeaten eggs, such as fried or poached eggs, it's best to use 50% to #0 power because microwaves tend to be attracted to the fat in the yolk and cook it faster than the white. The opposite of what happens on the range-top or in the conventional oven. Using a lower microwave power allows the white to cook slowly before the yolk is overdone. Because microwaves cook so quickly, steam can build up under the yolk membrane faster than it can be released. To prevent the yolk from exploding, before cooking, it's important to prick the yolk with the tip of a knife or a wooden pick to create a vent for steam.

Whole beaten eggs also form foam, but not as much foam as either whites or yolks alone and not as thick a foam as yolks alone.

### **Egg substitutes**

Because they are based on egg whites, egg substitutes contain some of the high-quality protein of eggs as well as the white's vitamins and minerals. However, since each manufacturer's use a different formula to replace the yolk portion of the eggs, further nutrients vary from brand to brand.

Also because each brand has a different formulation, each performs somewhat differently in cooking. Common to all brands though, is that the yolk's cooking properties are lost and all those properties that contain fat retard foaming in the whites. If you find a brand with a taste that appeals to you, you may have to experiment to learn how to best use the product in cooking. Since both leavening and emulsification are important in many baked goods, egg substitutes are most difficult to use in baking.



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## COOKING TERMS

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Certain terms or phrases occur with regularity in egg recipes. Here are many of them along with an explanation.

### COOK UNTIL KNIFE INSERTED NEAR CENTER COMES OUT CLEAN

- Baked custard mixtures are done when a metal knife inserted off center comes out clean. The very center still may not be quite done, but the heat retained in the mixture will continue to cook it after removal from the oven. Cooking longer may result in curdled and/or weeping custard. Cooking a shorter period may result in thickened but not set custard.

### COOK UNTIL JUST COATS A METAL SPOON

- For stirred custard mixtures, the eggs are cooked to the proper doneness when a thin film adheres to a metal spoon dipped into the custard. This point of coating a metal spoon is 20° to 30° below boiling. Stirred custards should not boil. The finished product should be soft and thickened but not set. Stirred custards will thicken slightly after refrigeration.

### SLIGHTLY BEATEN

- Use a fork or whisk to beat eggs just until the yolks and whites are blended.

### WELL BEATEN

- Use a mixer, blender, beater or whisk to beat eggs until they are light, frothy and evenly colored.

### THICK AND LEMON-COLORED

- Beat yolks at high speed with an electric mixer until they become a pastel yellow and form ribbons when the beater is lifted or they are dropped from a spoon, about 3 to 5 minutes. Although yolks can't incorporate as much air as whites, this beating does create a foam and is important to airy concoctions such as sponge cakes.

### ADD A SMALL AMOUNT OF HOT MIXTURE TO EGGS/EGG YOLKS

- When eggs or egg yolks are added to a hot mixture all at once, they may begin to coagulate too rapidly and form lumps. So stir a small amount of the hot mixture into the yolks to warm them and then stir the warmed egg yolk mixture into the remaining hot mixture. This is called tempering.

### ROOM TEMPERATURE

- Some recipes call for eggs to be at room temperature before eggs are to be combined with a fat and sugar. Cold eggs could harden the fat in such a recipe and the batter might become curdled. This could affect the texture of the finished product. Remove eggs from the refrigerator about 30

minutes before using them or put them in a bowl of warm water while assembling other ingredients. For all other recipes, however, use eggs straight from the refrigerator.

### THE FOLLOWING COOKING TERMS APPLY SPECIFICALLY TO EGG WHITES:

#### SEPARATED

- Fat inhibits the foaming of egg whites. Since egg yolks contain fat, they are often separated from the whites and the whites beaten separately to allow them to reach their fullest possible volume. Eggs are easiest to separate when cold, but whites reach their fullest volume if allowed to stand at room temperature for about 30 minutes before beating.

Many inexpensive egg separators are available. To separate, tap the midpoint or the egg sharply against a hard surface. Holding the egg over the bowl in which you want the whites, pull the halves apart gently. Let the yolk nestle into the cup like center of the separator and the white will drop through the slots into the bowl beneath.

Drop 1 egg white at a time into a cup or a small bowl and then transfer it to the mixing bowl before another egg. This avoids the possibility of the yolk from the last egg getting into several whites. Drop the yolk into another mixing bowl if needed in the recipe or into a storage container if not.

#### ADD CREAM OF TARTER

- Egg whites beat to greater volume than most other foods including whipping cream, but the air beaten into them can be lost quite easily. A stabilizing agent such as cream of tartar is added to the whites to make the foam more stable. Lemon juice works much the same way.

#### ADD SUGAR, 1 TO 2 TABLESPOONS AT A TIME

- When making meringues and some cakes, sugar is slowly added to beaten egg whites. This serves to increase the stability of the foam. Sugar, however can retard the foaming of the whites and must be added slowly so as not to decrease the volume. Beat the whites until foamy, then slowly beat in the sugar.

#### STIFF BUT NOT DRY

- Beat whites with a mixer, beater or whisk just until they no longer slip when the bowl is tilted. (A blender or food processor will not aerate them properly.) If egg whites are under beaten, the finished product may be heavier and less puffy than desired. If egg whites are over beaten, they



may form clumps which are difficult to blend into other foods in the mixture and the finished product may lack volume.

### **STIFF PEAKS FORM**

- Stiff but not dry.

### **SOFT PEAKS OR PILES SOFTLY**

- Whites that have been beaten until high in volume but not beaten to the stiff peak stage. When beater is lifted, peaks will form and curl over slightly.

### **GENTLY FOLDED**

- When combining beaten egg whites with other heavier mixtures, handle carefully so that the air beaten into the whites is not lost. It's best to pour the heavier mixture onto the beaten egg whites. Then gradually combine the ingredients with a downward stroke into the bowl, across, up and over the mixture, using a spoon or rubber spatula. Come up through the center of the mixture about every three strokes and rotate the bowl as you are folding. Fold just until there are no streaks remaining in the mixture. Don't stir because this will force air out of the egg whites. If you have a stand mixer, put the mixing bowl on the turntable for easier turning as you fold.

### **CURDLING**

- Also known as syneresis or weeping. When egg mixtures such as custards or sauces are cooked too rapidly, the protein becomes overcoagulated and separates from the liquid leaving a mixture resembling fine curds and whey. If curdling has not progressed too far, it may sometimes be reversed by removing the mixture from the heat and stirring or beating vigorously.

To prevent syneresis or curdling, use a low temperature, stir, if appropriate for the recipe, and cool quickly by setting the pan in a bowl of ice or cold water and stirring for a few minutes.

The term curdling is usually used in connection with a stirred mixture such as custard sauce, while weeping or syneresis are more often used with reference to pie meringues or baked custard.