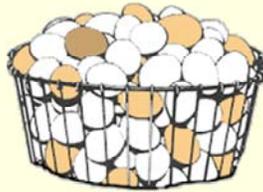


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# The EGG and I

Presented by:  
Kentucky Egg Council  
&  
US Poultry & Egg Association

## Time to Leave the Nest

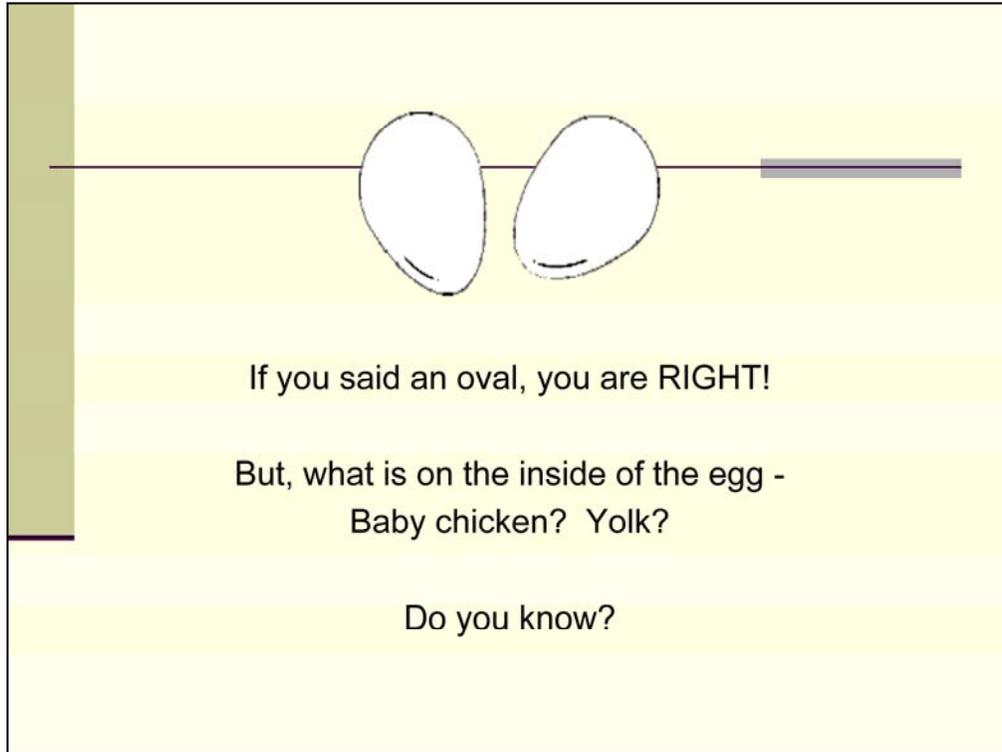


- The average hen lays 257 eggs a year
- It requires 24 to 26 hours to make and lay one egg

- The hens that lays eggs are called “laying hens.”
- After the hen lays the egg she will wait 15 to 30 minutes and then she will start all over.
- The incubation period is 21-day gestation period from the lay until the hatch.

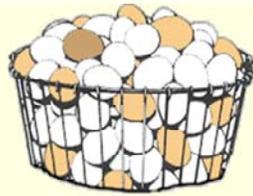
Look at items around you, what  
shape is an egg?





The next few slides will answer all of these questions and more. Let's start with the outside – the shell.

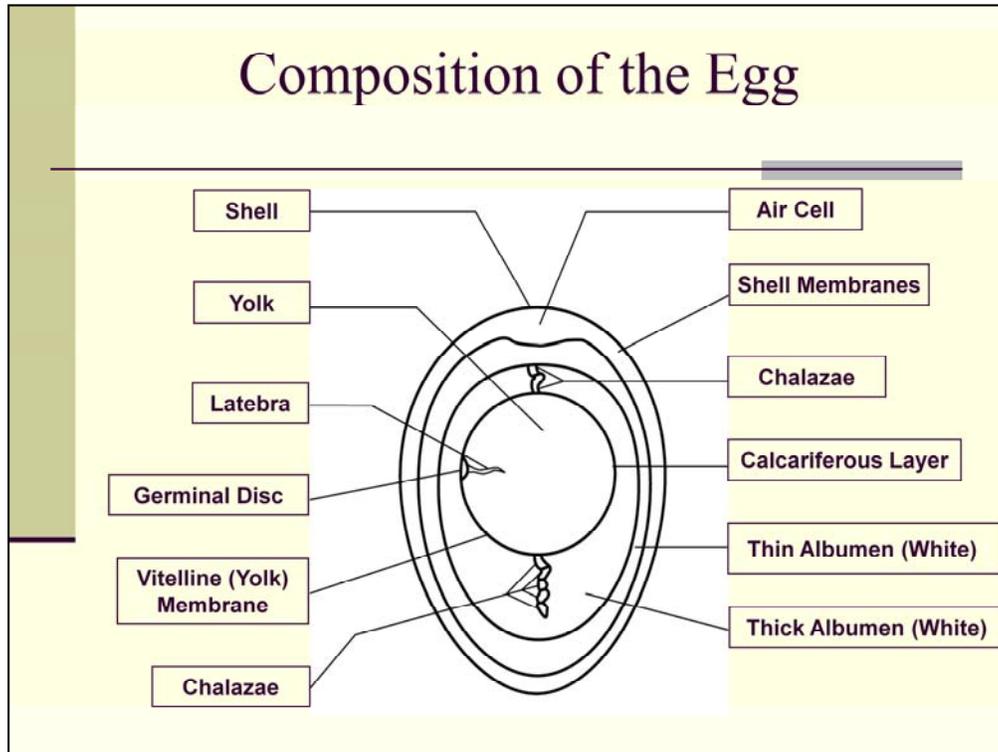
## Shell Color



- Can either be white or brown.
- The breed of the hen determines the outside shell color.
- Has no effect on quality, cooking properties or nutritive value.

We need to start at the outer most part of the egg and work our way in. What colors can the shell of an egg be? The shell can either be white or brown. Does anyone know what determines the shell color? The breed of the hen determines the shell color. The shell color has no effect on quality, cooking properties or nutritive value.

# Composition of the Egg



## Shell

- Outer covering of egg, composed largely of calcium carbonate
- May be white or brown depending on breed of chicken
- Color does not effect egg quality, cooking characteristics, nutritive value or shell thickness

## Yolk

- Yellow portion of egg
- Color varies with feed of the hen, but doesn't indicate nutritive content
- Major source of egg vitamins, minerals and fat

## Germinal Disc

- This is where the fertilization of the egg occurs.
- The eggs you buy in the grocery store have never been a baby chicken because the egg has never been fertilized. The reasoning behind this is the commercial operations do not have roosters in the laying house to fertilize the egg.

## Vitelline (Yolk) Membrane

- Clear seal which holds egg yolk contents

## Chalazae

- Twisted, cordlike strands of egg white
- Anchor yolk in center of egg
- Prominent chalazae indicate freshness

## Air Cell

- Packet of air formed at large end of egg
- Caused by contraction of the contents during cooling after laying
- Increases in size as egg ages

## Shell Membranes

- Two membranes – inner and outer shell membranes – surround the albumen
- Provide protective barrier against bacterial penetration
- Air cell forms between these two membranes

## Thin Albumen (White)

- Nearest to the shell
- Spreads around thick white of high-quality egg

## Thick Albumen (White)

- Major source of egg riboflavin and protein
- Stands higher and spreads less in higher-grade eggs
- Thins and becomes indistinguishable from thin white in lower-grade eggs

## Egg Quality



Grade AA



Grade A



Grade B

What are the three grades of eggs? The grades are Grade AA, Grade A, and Grade B. What determines the Grades of eggs? The stance of the yolk determines the grades of eggs (go to next slides for more explanation). Grade AA and Grade A are found in grocery stores and Grade B are sent to breaking plants to become pasteurized products or dried products. Nutritionally speaking is there a difference in the three grades of eggs? NO, nutritionally they contain all the same vitamins and minerals.



## GRADE AA

- Egg will stand up tall. The yolk is firm and the area covered by the white is small. There is a large proportion of thick white to thin white.

The shell must be unbroken and clean with a smooth texture and a normal oval shape.

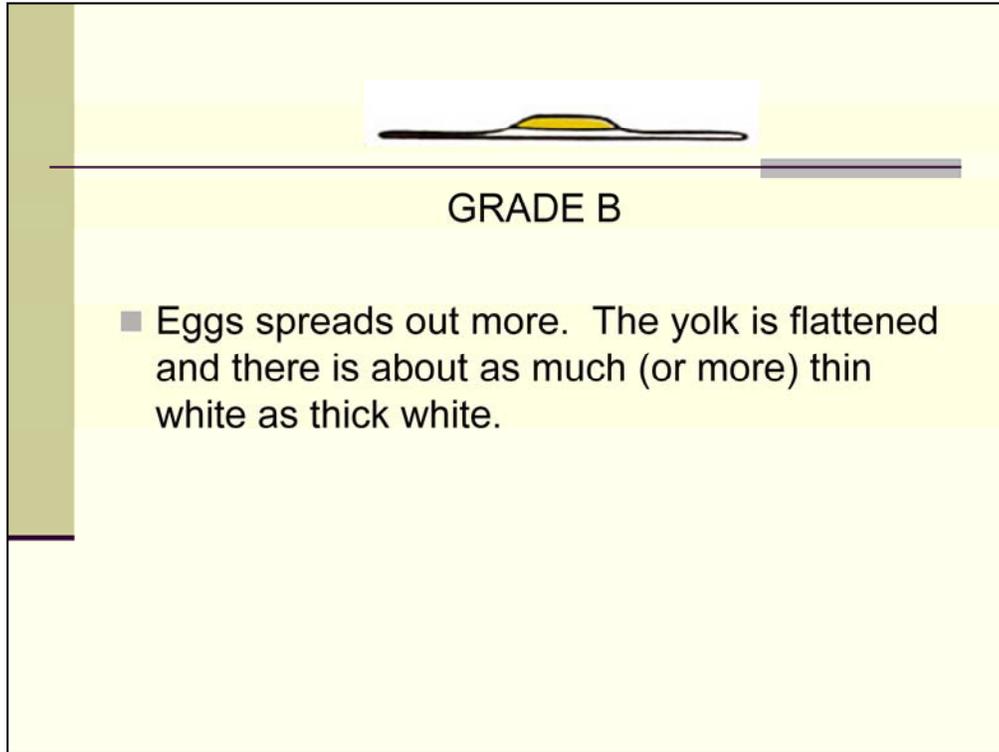


GRADE A

- Egg covers a relatively small area. The yolk is round and upstanding. The thick white is large in proportion to the thin white and stands fairly well around the egg.

The image shows a diagram of a Grade A egg. At the top, there is a simple illustration of an egg with a yellow yolk and a white egg white. Below the illustration, the text 'GRADE A' is centered. Underneath that, there is a bulleted list with one item describing the characteristics of a Grade A egg: 'Egg covers a relatively small area. The yolk is round and upstanding. The thick white is large in proportion to the thin white and stands fairly well around the egg.'

Has an unbroken, clean shell with a smooth texture and practically a normal oval shape.



The shell must be unbroken and clean, but it might be slightly stained or have an irregular shape with bumps, ridges, thin spots or rough areas.



Sizes are classified according to minimum net weight expressed in ounces per dozen.

Several factors influence the size of an egg.

- The major factor is the age of the hen. As the hen ages, her eggs increase in size.
- The breed of hen from which the egg comes is a second factor.
- Weight of the bird is another. Pullets significantly underweight at sexual maturity will produce small eggs.
- Environmental factors that lower egg weights are heat, stress, overcrowding and poor nutrition.

Most recipes will call for the large egg weighing 24 oz. per dozen. Therefore if a dozen large eggs weigh 24oz., how much does one large egg weigh? 2 oz.

# Egg Nutrition

## VITAMINS

Vitamin A  
 Vitamin B1, B2  
 Vitamin D  
 Riboflavin  
 Nicotinic Acid  
 Niacin  
 Pantothenic Acid  
 Folic Acid  
 Biotin  
 Pyridoxine  
 Chlorine  
 Inositol  
 Vitamin E  
 Vitamin K  
 Linolenic Acid  
 Linoleic Acid  
 Arachidonic Acid

## MINERALS

Calcium  
 Phosphorus  
 Iron  
 Iodine  
 Sodium  
 Potassium  
 Chloride  
 Magnesium  
 Fluorine  
 Copper  
 Sulfur  
 Manganese  
 Zinc



## BIOLOGICAL VALUE OF PROTEIN QUALITY

Human Milk	95
Eggs	94
Milk	90
Liver	77
Beef	76
Potatoes	67
Corn	60

Eggs contain all vitamins and all minerals except one Vitamin; what is it? Vitamin C. Eggs contain the highest quality protein and are often used as a standard to measure protein in other foods. The only thing that has more protein quality is Human Milk. Eggs also contain the ideal balance of the essential amino acids the body cannot manufacture.

## Egg White Composition

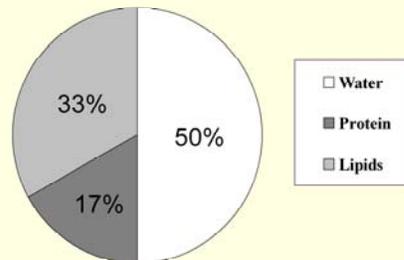
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- Mostly Water
- Approximately 10% protein
- Contains only a trace of fat
- A good source of riboflavin
- Contains most of the protein, niacin, riboflavin, choline, magnesium, potassium, sodium and sulfur found in an egg
- Contains carbohydrates

# Egg Yolk Composition

- Approximately 50% water, 17% protein and 33% lipids
- Minerals: iron, phosphorus, calcium, manganese, iodine, copper, and zinc
- Vitamins A and D, B12, E, biotin, choline, folic acid, inositol, pantothenic acid, pyridoxine and thiamin
- Xanthophylls: main yellow pigment

EGG YOLK COMPOSITION



## Eggs May Be Used To . . .

Thicken	Sauces, Puddings, Cream Fillings, Soft and Baked Custards
Leavening	Sponge Cakes, Butter Cakes, Quick Breads, Soufflés, Puffy Omelets
Coating	Breaded Meats, Vegetables, Croquettes, Breads, Rolls, Cakes and Cookies
Binding	Croquettes, Meat Fish and Egg Loaves, Vegetable Casseroles
Emulsifying	Cream Puffs, Mayonnaise, and Salad Dressing
Clarifying	Soup Stocks
Garnishing	Canapés, Soup, Salads, Dessert and Main Dishes
Retarding/ Crystallization	Certain Cake Icings, Candies and Ice Cream

In today's society individuals are trying to loose weight and they are cutting different foods out of their diets. Eggs are one food you cannot cut out of your diet because of the many uses it has in the kitchen. Eggs add color, flavor, and richness to many dishes.

## Eggs Add Flavor and Color

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- Eggs contain fats which carry and meld flavors in food products
- Eggs add flavor and enhance other flavors
- Egg yolks impart rich color and are used to fortify whole egg blends for a deeper color in baked products
- The pleasing color of eggs is a sign of excellent quality in baked products

## Can you think of 101 ways to prepare eggs?

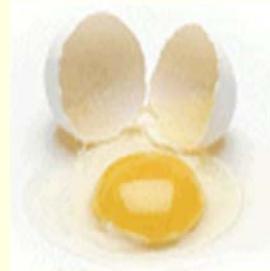
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Have you ever seen a chef's hat? It's called a *toque*. A toque is white, stands up tall and has 101 pleats. Chefs say that the pleats stand for 101 ways you can cook an egg.



## Major Methods of Egg Preparation

- Fried
- Scrambled
- Hard Cooked
- Poached
- Baked
- Omelets



What are the different ways that we can cook eggs? Let's see if we can name them all.

# Basic Principle of Egg Cooking

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## WHAT

Use a moderate to low temperature with exact timing.



## WHY

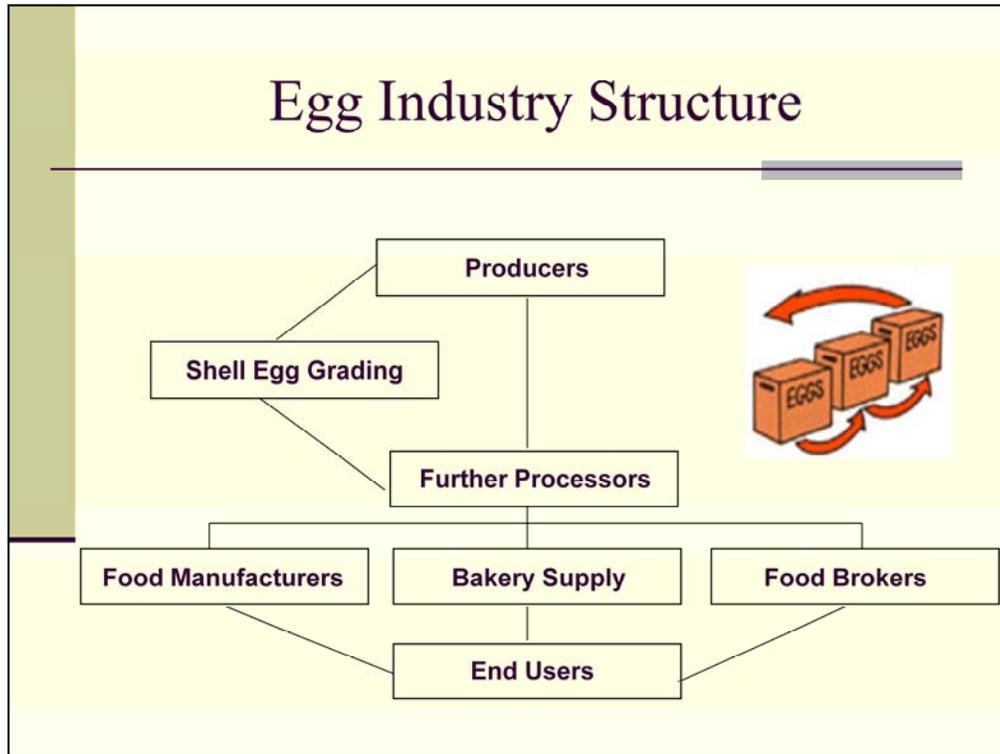
When eggs are cooked at too high a temperature or for too long at a low temperature, egg whites shrink and become tough or rubbery - - yolks toughen and their surface may turn gray-green.

## Egg Safety

- *Salmonella* Enteritidis (SE) has been found inside a very small number of eggs: about 1 out of every 20,000 eggs (.005%)
- SE will not grow at temperatures below 40°F and is destroyed when heated to 160°F during thorough cooking, or in acid media with a pH lower than 4.0
- Pasteurization was federally mandated in 1966 to protect against *Salmonella* organisms, at highest possible safe temperatures:

Whole Eggs:	140°F	3-5 minutes
Whites:	143°F	4 minutes
	125 °F	3.5 minutes with addition of hydrogen peroxide
- The main concern is exterior *Salmonella* contamination; care must be taken to limit contact between shell exterior and the egg

# Egg Industry Structure



The USA produces 250 million eggs per year.

## 10 Steps on the Journey From Hen to Home

It takes a hen about 24 to 26 hours to form and lay an egg

Step 1: Laying



Step 2: Collecting



**Laying** – In a controlled environment hens get a lot of water, eat a healthful diet of specially mixed grains, and then lays the egg.

**Collecting** – At today's egg farms, eggs drop automatically from the hens' cages to a conveyor belt or are mechanically collected from special nests.

## Journey from Hen to Home

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Step 3: Washing

Step 4: Oiling



**Washing** – Collected eggs are carefully washed and sanitized.

**Oiling** – Washed eggs are sometimes lightly coated with an edible, invisible oil to seal shell pores. This slows down aging and helps prevent bacteria from entering the eggs through the shells.

## Journey from Hen to Home

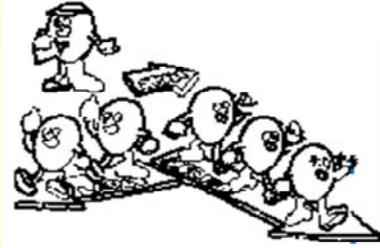
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Step 5:  
Candling and Grading

**Candling/Grading** – Eggs pass over an intense light and are rotated mechanically so a candler, or grader, can examine the contents without cracking the shells. The candler checks the condition of the shells, whites and yolks. Eggs that do not meet grade requirements are removed. Eggs that pass the candling test are graded AA, A, and B. The grading is determined by the interior and the exterior of the egg.

## Journey from Hen to Home



Step 6: Sizing



Step 7: Packing

**Sizing** – Graded eggs are weighed to determine their size. Eggs of a similar weight are combined to make up a carton that has a specific minimum weight per dozen. Egg size standards are established by the US Department of Agriculture (USDA).

**Packing** – To minimize breakage and maintain quality, eggs are packed in specially designed cartons marked with their grade and size. The USDA sets the standards and egg packers **MUST** meet those standards.

## Journey from Hen to Home

Step 8: Cooling

Step 9 : Shipping

Step 10: Selling



**Cooling** – Packaged eggs are placed in a cooling room at a temperature of 45°F. This lowers the eggs' inside temperature, which helps maintain quality.

**Shipping** – Cooked eggs are shipped in refrigerated trucks and delivered to individual stores or supermarket-chain warehouses. It takes only a few days from the time eggs are laid until they reach these outlets.

**Selling** – Stores and warehouses keep eggs under refrigeration to maintain quality.

## Journey from Hen to Home

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- Bring your eggs home and store them in their ORIGINAL carton on an inside refrigerator shelf.
- Cook eggs within 4 to 5 weeks of the Julian Date (pack date) or 3 to 4 weeks of buying them.
- Use hard-cooked eggs within 1 week of cooking.

