

Cooking High Protein Foods



DAIRY PRODUCTS

EGGS

Review of Functions



- Form protein gels
- Texturize
- Emulsify
- Form foams
- Develop gluten



High-Protein Foods



- Damaged by cooking temperatures that are too high or cooking for too long
 - Rapid denaturation of protein when heated
 - ✦ *Review*
 - Denaturation : Any change of the shape of protein without breaking peptide bonds
 - Protein molecules tend to shrink and lose water
 - Too much heat = dry, rubbery, tough products

DAIRY PRODUCTS



DAIRY PRODUCTS



Milk Proteins

- Casein
 - Will not coagulate unless high concentrations of salt or acids are present
- Whey Protein
 - Formal names: Lactalbumin and lactoglobulin
 - Coagulated by heat and responsible for film on bottom and sides of containers of heated milk

Problems with Preparing Dairy Products



- **Scorching:**

- Proteins clumps formed by the heat sink and burn to the bottom of the pan
- Whey proteins coagulate at 66°C (150°F)

- ✦ **Prevention:**

- Constant stirring
 - Keeps whey proteins from sinking to the bottom
- Cook at lower temperatures
- Cooking milk-based products in a double boiler
 - Keeps temperature of the product lower than if it were a pan in direct contact with the heat source



Problems with Preparing Dairy Products



- **Curdling:**
 - Occurs when acid causes the casein molecules in milk to unfold and stick together



Tomato Soup Experiment

Note: You can access this experiment on the Food Science page on www.lamoehr.com under the Protein Unit's, "Other Options."

You can do this experiment with 2 or more variations for extra credit- just let me know and I can give you what options would be best for comparison ☺

EGG PRODUCTS



EGG- Composition/Nutrition



- **Whole Eggs**

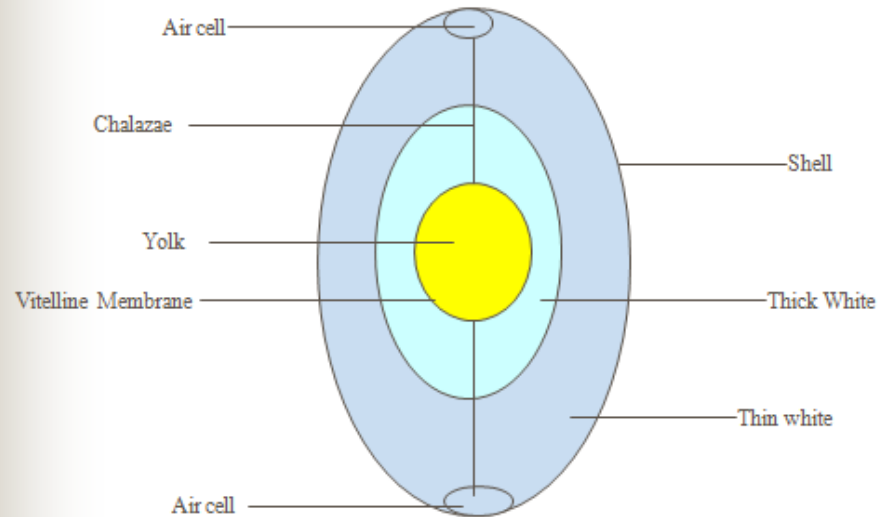
- 75% water
- 12% protein
- 10% fat
- 1% carbohydrate
- 1% minerals

- **Egg White**

- 88% water, 4g protein, 0g fat, trace minerals

- **Egg Yolk**

- 49% water, 3g protein, 5g fat



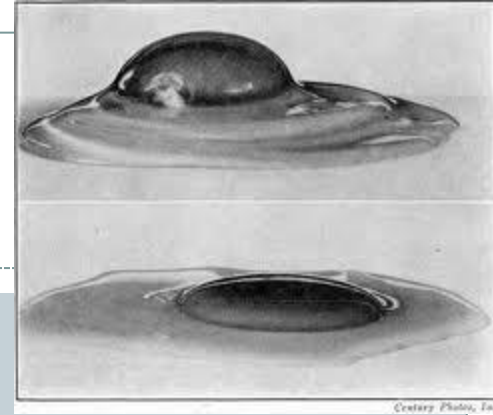
Basic parts of the egg

Deterioration of Eggs



- **Loss of CO₂ through the eggshell**
 - As CO₂ moves through the shell, the pH changes from neutral to basic, causing proteins to break apart
- **Part of water moving into egg yolk**
 - Stretches and weakens the membrane surrounding the yolk
 - Makes separating yolks from albumen more difficult
 - More difficult to turn a fried egg without breaking the yolk

Signs of Deteriorated Eggs



- When broken on to a plate, the yolk is flat
- Amount of thin white increases, and thick white decreases
- Air cells become larger
- When candled, yolks are not in the center of the egg
- Prevention:
 - Egg producers apply special spray to reduce loss of CO₂ and moisture
 - Lengthens shelf life

Review: Eggs in Food Preparation



- Eggs coagulate in heat and can be used to thicken products or for gel formation.
- Eggs coagulate at about 140 degrees F.
- Egg foams can be produced from beating the egg whites into a foam, greater foam formation with increased thick whites.
- Eggs can function as emulsifiers.
 - Lecithin, an emulsifier, is found in eggs.

EGGS- Other important factors



- **Albumen is easily denatured by heat**
 - If eggs are heated at high temperatures or for long periods, coagulation will be more extensive = firm, tough egg
- **Best practice:**
 - Low temp OR
 - Short cooking time
 - Egg whites will coagulate while remaining soft and tender

Egg Substitutes



- Egg substitutes contain no egg yolk.
- Egg substitutes are 80% egg white.
- Various ingredients are used to create yolk like properties in egg substitutes:
 - ✦ Corn oil and nonfat dry milk
 - ✦ Soy protein isolate
 - ✦ Soybean oil
 - ✦ Egg white solids calcium caseinate

