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

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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

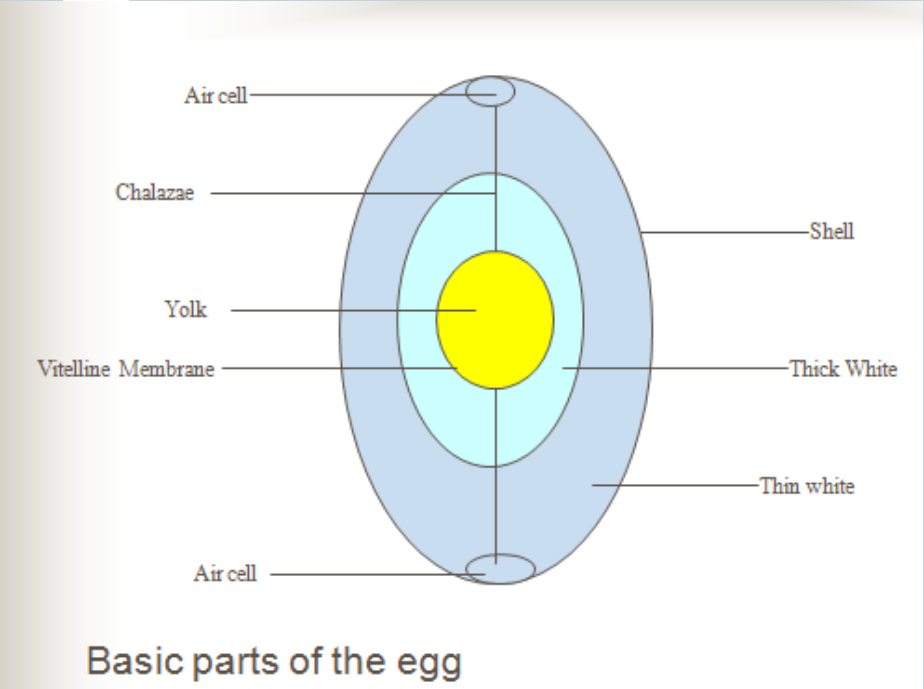
Note: You can access this experiment on the Food Science page on www.lamoehr.com under the Protein Unit's, "Other Options."

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



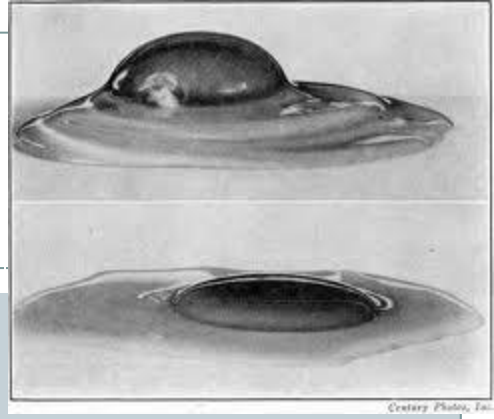
Basic parts of the egg

- Egg White
  - 88% water, 4g protein, 0g fat, trace minerals
- Egg Yolk
  - 49% water, 3g protein, 5g fat

Deterioration of Eggs

- Loss of CO_2 through the eggshell
  - As CO_2 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 CO_2 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