Packaging
History of Packaging

• 5,000 years ago; man hunted, killed, ate while fresh
• 500 years ago; dried meats as a preservation
• 125 years ago; ate fresh or salted
• 100 years ago; begin to see refrigeration
History of Packaging

• Pre WWII
  – Omaha, Chicago, and Kansas City shipped via rail cars in Ice Bunkers
  – Ice Boxes in homes

• Post WWII
  – Dupont invented cellophane (1947)
  – Polyvinyl Chloride (PVC) film (1967)
  – 40 years ago started to see vacuum packaging
  – Late 1970’s Boxed Meats
  – 15 years ago started to see High Oxygen, Low Carbon Dioxide packaging (MAP)
Types of Packaging

- White Butcher Paper
- PVC (polyvinyl chloride)
- Vacuum Packaging
- MAP (Modified Atmospheric Packaging)
- Can
- Foil Retort Pouch
White Butcher Paper

- Oldest and one of the first packaging methods
- Specialty meat cases
- Very limited shelf life
- Meat not visible to consumer
- Although called “freezer paper”; not a good packaging method for freezing meat
PVC (Polyvinyl Chloride)

- Currently the most common style
- The over-wrap is oxygen permeable
- Allows the meat to bloom
- Short shelf life as the oxygen will cause lipid oxidation (rancidity)
- Clear, therefore consumers can see the product
Vacuum Packaging

• All boxed meat is shipped in a vacuum package

• All air is removed, therefore most spoilage bacteria will not survive

• No oxygen; No bloom

• Good visibility
Vacuum Packaging

• Long shelf life due to the absence of Oxygen

• After 30 to 40 days a cheesy odor will develop

• *Brochothrix thermosphacta* a bacterium that produces a cheesy smell

• Breakdown of some Sulfur containing amino acid
  – Amino acid bind together to form proteins
MAP (Modified Atmospheric Packaging)

- Most recent technology
- Commonly used in centralized cutting operations
- Packaging is designed to promote an atmosphere favorable to shelf life
MAP (Modified Atmospheric Packaging)

• Utilizes a mixture of gasses; Oxygen, Nitrogen, Carbon Dioxide, Carbon Monoxide

• Oxygen and Carbon Monoxide (CO) are used to promote meat color

• CO; legal limit 0.4% of the mixture

• CO has an extremely high affinity for Myoglobin, therefore can create a desirable color even when the meat has gone bad
MAP (Modified Atmospheric Packaging)

• Carbon Dioxide is added to limit the growth of spoilage bacteria; NOT PATHOGENIC BACTERIA

• Nitrogen is added as a filler gas

• Some common mixtures:
  – 80% O, 20% CO$_2$
  – 0.4% CO, 99.6% CO$_2$
Cans

- Not used much anymore
- Meat packed fresh and cooked in the can
- Army food (old technology)
- Spam is the most common
Foil Retort Pouch

• Fairly new technology
• AKA “flexible cans”
• Used like cans, fresh meat cooked in the air tight foil pouch
• Star Kist Tuna; most common food
• Meals Ready to Eat (MRE); military utilizes this technology
Lipid Oxidation

- Oxidation of fats (Rancidity) major cause of deterioration of quality
  - Flavor, color, texture, and nutritive value
  - Shelf Life
- Requires Oxygen
- Metals (lead, iron, copper, etc) act as catalysts
  - Hemoglobin, myoglobin, cytochromes, knives, tables, bandsaws, etc
Freezer Burn

- Evaporation of water
- Ice crystal formation on the surface of the food
- Delayed by:
  - Air tight packaging
  - Manual Defrost Freezer
- Old, painty, carboardy flavor
- Flavor issue, not a food safety issue
Questions?