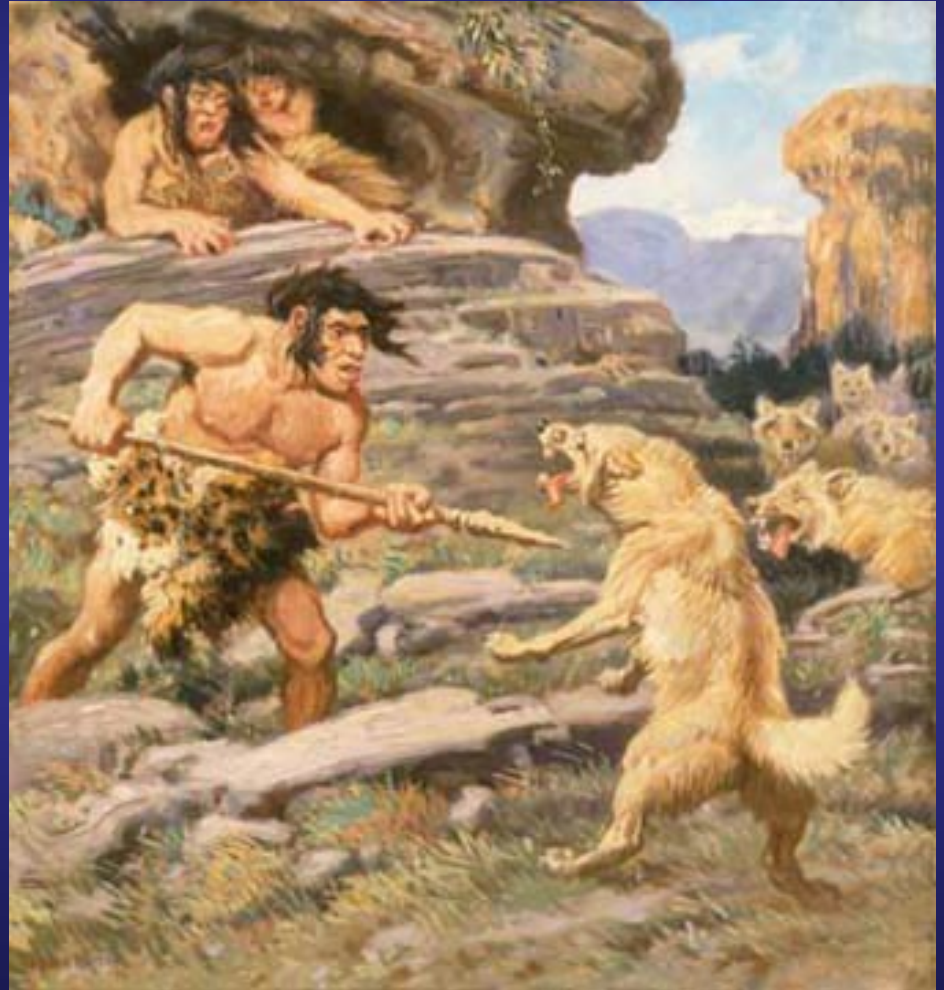


packaging

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% O₂, 20% CO₂
 - 0.4% CO, 99.6% CO₂

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?