Objectives

• Compare/contrast safety, toxicity, & hazards
• Compare/contrast types of food-borne illnesses
• Discuss 4 ways to minimize risk of food-borne illness
• Explain bioaccumulation
• Discuss potential sources of environmental contamination of food, focusing on dioxins, methyl mercury, & pesticides
• Recall various natural food toxicants & their sources

Objectives

• Explain how the method of food processing may effect pesticide residue levels in food
• Discuss the requirements that must be met for a food to be “organic”
• Identify pros & cons of organic food use
• Recall various antimicrobial agents used in food processing
• Compare/contrast other intentional food additives
• Compare/contrast unintentional additives

Food safety definitions

• Safety
• Toxicity
• Hazard
• Role of FDA
Food Safety

Food-borne Illnesses

- Pathogenic microbes
  - Salmonella
  - Hepatitis A
  - E. coli O157:H7

- Food intoxications
  - Botulism
  - Exotoxin

Honey can carry botulism toxin

Escherichia coli O157:H7

http://www.jfha.or.jp/saakin/shashin/o157.html

Most cases of food-borne illness occur in the home
Temperature & microbial control

Temperature range for cooking low-acid foods (like spams):
A pressure-canner is required to reach these temperatures.

Temperature range for destroying bacteria (but not their spores), parasitic worms, and protozoa.

Temperature range for storing thoroughly cooked food, prevent growth of bacteria but doesn't necessarily destroy them.

DANGER ZONE
Bacteria grow quickly do not store within this temperature range for more than 1 to 2 hours.

Recommended refrigeration temperature; all some bacteria can grow.

Freezing bacteria can't grow, but many will survive; growth can resume on defrosting.

Toxins in the food chain

Plant-eating fish, consume large amounts of plankton accumulates in higher concentrations.

Carnivorous fish accumulate toxins in even higher concentrations.

Plankton-eating fish, consume large amounts of plankton often become contaminated with toxic chemicals.

Incidental additives: environmental contaminants

- lead
- dioxins
- mercury

Drinking water

Acid rain

Landfills

Solid waste & sludge

Pesticides

Water

Industrial process

Liquid emissions
Incidental additives: pesticides

- Milling grain has no effect on residues.
- Pickling, canning reduces pesticide by washing & dilution.
- Washing lettuce & tomatoes reduces pesticide residues.
- Drying corn to make cattle feed concentrates pesticide residues, which are further concentrated in beef (particularly in fat).
- Washing, peeling reduces residue but using oil for deep frying concentrates residues.

Organic foods

- No synthetic…
  - pesticides
  - fertilizers
- USDA certified farm &/or processing operation
- No irradiation
- No antibiotics
- No Genetically Modified Organisms

Organic foods: Pros & Cons

- **Pro**
  - Higher in nutrients?
  - ↓ pesticide risk
- **Con**
  - Manure runoff
  - Elitist?
Types of substances: natural toxicants

- goitrogens
- cyanogens
- solanine
- aflatoxins
- ciguatera

Intentional additives

- "Generally Recognized As Safe"

Intentional additives: antimicrobial agents

- Salt, sugar
- Potassium sorbate
- Sorbic acid
- Sodium benzoate
- Calcium (or sodium) propionate
- Nitrates, nitrates
Intentional additives: other stuff

- Antioxidants
  - Vitamins C, E
  - sulfites
  - BHA
  - BHT
- Artificial colors, flavors
- Nutrient additives

Unintentional additives

- Antibiotics
- Ionophores
- Hormones
- Microwave packaging

Irradiation

- kill pathogens
- kill insects
- reduce spoilage
- inhibit sprouting
- delay ripening