Physical Hazards

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Hazard Analysis

• Assure that your are dealing with safety issues.

• Physical Hazard = A physical property that may cause a food to be unsafe for consumption.

• Quality and economic issues (not involving safety) must be excluded.
What Parts of the Human Anatomy are at Risk from Physical Hazards?

- Digestive Tract
- Respiratory Tract
- Mouth and Teeth
- Extremities (Hands)
Hazards to the Digestive Tract

- Esophageal laceration
- Esophageal perforation
- Fistula formation
- Laceration or perforation of other portions of the digestive tract
  - Pharynx
  - Stomach
  - Intestine
Hazards to the Respiratory Tract

- **Choking**—occlusion of the airway
  - Children under age 3 at greatest risk
  - Common hazards are foreign objects (coins or toys) or food, *though not foreign objects in food*
  - Objects may become lodged in the upper esophagus and cause choking/asphyxiation by compression of the trachea
Hazards to the Respiratory Tract

- Aspiration—inhalation of foreign matter into the bronchial tree—may result in:
  - partial lung collapse
  - secondary infection
  - destruction of lung tissue from retained material
Hazards to the Mouth and Teeth

- Lacerations of the mouth
- Lacerations of the tongue
- Chipped teeth
- Broken fillings
- Damage to prosthetics
Other Hazards

- Lacerations on the hands occurring during food preparation
- Illness complaints
  - Nausea and vomiting
  - Diarrhea
  - Headache, fever and dizziness
  - Chest pain
Characteristics of Foreign Materials that May be Hazardous

Size of the Object

- Consumer Product Safety Commission (1995): spherical objects < 1.75 inches in diameter are dangerous to children under 3 years (choking, ingestion or aspiration)

- CPSC uses a Small Parts Test Fixture (a cylinder) to judge other non-spherical objects for choking hazard
Characteristics of Foreign Materials that May be Hazardous

Size of the Object

- FDA Health Hazard Evaluation Board conclusions in cases of foreign materials (1972-1997) found that 56% of objects 1-6 mm might pose a limited acute hazard
- For objects > 6 mm, only 2.9% were judged to present no hazard
Clinical Observations about Foreign Body Ingestion

- About 80% of foreign body (FB) ingestions occur in the pediatric age group.
- 80-90% of FBs ingested will pass spontaneously over 4-7 days.
- Estimated that 1-5% of FBs ingested will result in injury.
Clinical Observations about Foreign Body Ingestion

- Sharp objects account for about 10% of FB ingestions, but a disproportionate number of injuries
- In a review of FDA consumer complaints of foreign materials in food, the most frequently reported injury was mouth or throat laceration
- In the FDA review glass was the foreign material most frequently reported as causing illness or injury
Characteristics of Foreign that May be Hazardous Materials

Size of the Object

- FSIS in its 1995 Public Health Hazard Analysis Board on bone particles concluded:
  - bone particles < 1 cm not a safety hazard;
  - particles 1-2 cm are a low risk;
  - particles > 2 cm have the potential to be a safety hazard and may cause injury.
Characteristics of Foreign Materials that May be Hazardous

Size of the Object

- FSIS (1995): The presence of foreign material other than bone may pose a potential hazard, and each instance should be considered on a case-by-case basis, irrespective of size.
Characteristics of Foreign Materials that May be Hazardous

Size of the Object

- FDA/ORA Compliance Policy Guide
  - Criteria for direct reference seizure: Hard or sharp objects 7-25 mm and RTE
  - Criteria for recommending legal action:
    - 7-25 mm and requires additional preparation
    - < 7 mm and intended for special-risk group
    - > 25 mm in length

Concluded that any sharp pointed object equal to or greater than 7 mm would be considered a health hazard.
Analysis of Physical Hazards

The decision to include a physical hazard control in a HACCP plan may depend on:

- Past complaints from consumers
- Assessment of the plant GMP’s
- The extent of HACCP Prerequisite records and monitoring.
Consumer Complaint Monitoring System (CCMS) by FSIS

- CCMS is a passive surveillance system designed to document and track all consumer complaints that are reported to the Food Safety and Inspection Service.

- A consumer complaint is any complaint reported to FSIS that is initiated by a consumer, or on behalf of a consumer, that is related to an FSIS- inspected product.
What has CCMS found?

- **N= 1309 from 01/01/02 to 09/13/02**
- **Foreign material (FM) complaints = 331**
  - 25% of all CCMS complaints
  - injury n = 20 or 6%
  - illness n = 24 or 7%
- **5% of foreign material in food results in minor to serious injury**
  - Hamilton and Polter 1989
  - Hyman 1993
Breakdown of foreign materials (n = 331)
Glass n = 32

- 10% of foreign material complaints
- Allegedly resulted in 4 injuries (12%) and 2 illnesses (6%)
Metal \( n = 100 \)

- Represents 30\% of foreign material consumer complaints
- 5\% allegedly resulting in injury
- Lacerations to tissues of mouth, gums, and throat
- Multiple broken teeth
Plastic $n = 32$

- Represents 15% of foreign material complaints
- 4% allegedly resulted in illness, one case requiring surgical intervention
- 10% allegedly resulted in injury/choking
- Special concern is for young children
Chemicals $n = 3$

- To date, these complaints in CCMS resulted in no injury or illness
- Complainants identified through smell, taste, and sight
Other n = 147

- Consists primarily of wood, fingernails, and stones
- Represents 44% of foreign material complaints
- 4% allegedly resulted in injury (wood=lacerations, stones=dental)
- 12% allegedly resulted in illness (most not lab confirmed)
Hazard Analysis

- The HACCP Team must identify and list all physical hazards.
- Finished product
- Ingredients
- Handling procedures
- Manufacturing operations
- Storage
- Distribution
Physical Hazards

- What are some physical hazards you have found in meat or food?

- Section 7 of your book (Table 3 page 38906 Federal Register Vol. 61, No. 144)

- Chapter 7 of your FPI book

- What is the most unusual physical material you have found?
Arrow in a Beef Carcass
Physical Hazards

- Glass
- Metal
- Wood
- Stones
- Plastics
- Bone
- Bullet/BB Shot/Needles
- Jewelry (tongue studs)
Physical Hazards

- Insects
- Hair
- Rodent droppings
- Gum
- Paint flakes
- Band-aid
- Writing pens
- Carcass ID tags
- Feathers
- Gasket materials
- Arrows
- Wire clips
- String
- Plastic Straps or bags
- Knives
- Meat hooks
Eight Most Common Foods in Foreign Object Complaints

- Bakery 10.2%
- Soft drinks 8.4%
- Vegetables 8.3%
- Infant Foods 6.9%
- Fruits 6.7%
- Cereals 6.6%
- Fishery 5.3%
- Chocolate 4.8%
- Meat ???
When Conducting the Hazard Analysis Consider the Sources of Physical Hazards

- Raw Materials
- Facility
- Processing Equipment
- Employee Practices
Controls for Physical Hazards / Foreign Material

- **Plant GMP’s**
  - Employee programs (training)
  - Ingredient specifications

- **Prerequisite programs for HACCP**
  - Letters of guarantee
  - Practices to identify and record sources of physical hazards
  - Monitoring and documenting controls

- **CCP’s in the HACCP plan**
  - Last steps in the processing