Getting Started: Product Focus

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Assistant Professor/Extension and Outreach Specialist Food Safety
Session Overview

• Food Safety Focus Points with Processing
• Food Defense/ Traceability
• Specific Processing Concerns: Canning, Acid foods, Acidified foods, Light processing
FOOD SAFETY FOCUS POINTS WITH PROCESSING
Identification of Critical Control Points (worse case scenario)

- Unintentional and Intentional Hazards
- Evaluate every step and ingredient in process (beyond biological)
  - Source of Ingredients and Supplies
  - Processing
  - Environmental Influences

**Biological, Chemical, Physical, Allergen**
Source of Ingredients and Supplies

• Food and non-food type ingredient
  – Domestic
    • Self, Local, Distributor, Direct
  – Foreign
    • 3rd party distributor, Direct
• Packaging
  – 1st use or recycle
  – All of the above
Processing

• Equipment
  – Sensitivity
  – Age or reliability
  – New or Used

• Control Measures
  – Temperature/time, pH, Water activity
  – Ingredients
Environmental Influences

• Personnel
  – Training
  – Direct contact/Hygiene
• Facilities (Types)
  – Manufacturing/Kitchen/Barn
  – Animal Control: Domestic/Wild/Pest
• Visitors
  – Business vs. Home
FOOD DEFENSE/TRACEABILITY
Food Defense: FDA

• FDA benefits:
  – By having a Food Defense Plan, you will contribute to a safer and more secure food supply. You will also protect public health, your employees and your livelihood
  – May also reduce risk of unsafe product and economic loss, reduce theft, reduce the need for additional regulation on food defense, and reduce company liability
Food Defense: Areas

• Intentional Contamination
  – Physical Security
  – Shipping/Receiving/Storage Security
  – Ingredients/Water/Ice Security
  – Chemical Security
  – Employee Security
  – Mail Handling Security
Traceability

• Size of company is NOT an excuse
• Ability to recover ALL product if a problem occurs
• Requires
  – Investment of money and time
  – Development of a Plan
  – Record keeping
  – Testing
SPECIFIC PROCESSING CONCERNS
What Microorganisms Need to Grow

- Acronym – FAT TOM
  - F – Food
  - A – Acidity
  - T – Temperature
  - T – Time
  - O – Oxygen
  - M – Moisture
Light Processing

• Considered a Food Processing Plant
  – Requires a license
• Cutting into edible portions of produce
• Freezing of produce
• Washing and repackaging of produce as ready to eat items
Light Processing: Why the concern?

• Breaking the natural barrier between environment and the fruit (internalization)
• Most pathogens are not killed by freezing
• ↑ Chemical and physical hazards increase
• ↑ Potential to cross contamination
• ↑ Likelihood of a foodborne outbreak
Light Processing: What can I do?

• Sanitation
  – Personnel Hygiene
  – Equipment (knife, blade, sink)

• Washing
  – Use water slightly warmer (10F) than the temperature of the produce (internalization)
  – Contamination by wash water (spread)
Low Acid Foods/Acidified Foods

- Must be a commercial food manufacturer
- Acid Food: Food that have a natural pH of 4.6 or below
- Low-acid Food: Foods, other than alcoholic beverages, with a finished equilibrium pH greater than 4.6 and a water activity greater than 0.85
- Acidified Food: low acid food to which acid(s) or acid food(s) are added
# Examples: Acid, Low Acid, Acidified

<table>
<thead>
<tr>
<th>Food</th>
<th>pH</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most fruits</td>
<td>Equal or less than 4.6</td>
<td>Naturally acid</td>
</tr>
<tr>
<td>Most peaches</td>
<td>Greater than 4.6</td>
<td>Low Acid</td>
</tr>
<tr>
<td>Most apples</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Most tomatoes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Most orange juices</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Red Meat, Seafood, Poultry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fresh fish, Milk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canned green beans</td>
<td>Equal or less than 4.6</td>
<td>Acidified</td>
</tr>
<tr>
<td>Bread</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fresh Ham</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Most protein foods</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Most vegetables and starch based foods</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pickled foods</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Food Microbiology Control Manuel, FDA, 1998
# Example: Water Activity

<table>
<thead>
<tr>
<th>Food</th>
<th>Moisture Level</th>
<th>Water Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh Salmon, apples, milk,</td>
<td>Moist Foods</td>
<td>Above 0.85</td>
</tr>
<tr>
<td>bread</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flour, jams, molasses, dried</td>
<td>Intermediate-moisture</td>
<td>Between 0.60-0.85</td>
</tr>
<tr>
<td>fruit</td>
<td>foods</td>
<td></td>
</tr>
<tr>
<td>Dried noodles, crackers</td>
<td>Low Moisture Foods</td>
<td>Below 0.60</td>
</tr>
</tbody>
</table>

Water activity: measure of the free moisture in a product

Source: Food Microbiology Control Manuel, FDA, 1998
## General Example

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Equilibrium pH of finished product</th>
<th>Water activity</th>
<th>Classification</th>
<th>Need to register and fill process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product contains only naturally acid ingredients*</td>
<td>Equal of less than 4.6</td>
<td>Of any value</td>
<td>Acid</td>
<td>No</td>
</tr>
<tr>
<td>Product contain any low-acid ingredients*</td>
<td>Equal of less than 4.6</td>
<td>Of any value</td>
<td>Acidified</td>
<td>Yes</td>
</tr>
<tr>
<td>Regardless of product ingredients</td>
<td>Greater than 4.6</td>
<td>Greater than 0.85</td>
<td>Low-Acid</td>
<td>Yes</td>
</tr>
</tbody>
</table>

* Addition of small amounts of low-acid foods can change interpretation

Source: Clemson Extension, 2000
Process Focus: Why the concern?

• July 2012: 3 Oregonians hospitalized with botulism after eating home canned foods
• October 2003: Utah, 1 died in home canned vegetables/ tomato juice
• March 1977: 59 ill from improperly home-canned jalapeno peppers
Botulism Example

1. If a low-acid food, such as green beans, is canned improperly (not canned under pressure or improperly canned using a pressure canner)

2. *C. botulinum* bacteria and other bacteria present will be destroyed by the boiling of water and food
   - But the *C. botulinum* spores will not be destroyed
3. The canning process will remove the oxygen from the jar, creating a low-oxygen environment – Allow the spores to grow into active bacteria

4. Jars are stored at room temperature – Spores can germinate and produce the toxin
   • The toxin is sensitive to heat and can be destroyed if the food in question is boiled for 10 minutes (longer at high altitudes)
Canning Guides for Home Canning

- **Preserve the Taste of Summer** is an Iowa State University Extension and Outreach program that includes both online lessons and hands-on workshops
  [http://www.extension.iastate.edu/families/preserve-taste-summer](http://www.extension.iastate.edu/families/preserve-taste-summer)

- Other reputable resources on home food preservation include:
  - National Center for Home Food Preservation [http://nchfp.uga.edu/](http://nchfp.uga.edu/)
  - So Easy to Preserve [http://setp.uga.edu/](http://setp.uga.edu/)
  - Ball [http://www.homecanning.com/usa/](http://www.homecanning.com/usa/)
Canning

• Canning Controls
  – growth of undesirable microorganisms—bacteria, molds, and yeasts,
  – activity of food enzymes,
  – reactions with oxygen, and
  – moisture loss
Canning General

• General
  – carefully selecting and washing fresh food,
  – peeling some fresh foods,
  – hot packing many foods,
  – adding acids (lemon juice or vinegar) to some foods,
  – using acceptable jars and self-sealing lids,
  – processing jars in a boiling-water or pressure canner for the correct period of time
Jams and Jellies

• Every recipe is unique
• Title 21 PART 150--Fruit Butters, Jellies, Preserves, and Related Products - FDA
  – The is the U.S. standard of identity for fruit butters, jellies, preserves, and related products
  – Title 21 of the Code of Federal Regulations Section 150
Jam and Jellies, cont.

- **Fruit**
  - Source, Selection and Ripeness are critical
- **Pectin**
  - Substance that causes the fruit to gel
  - Natural pectin or commercial available
- **Acid**
  - Needed for gel formation and flavor
  - Ripeness matter
- **Sugar**
  - Preservation for the product and prevents microbial growth
Groups

<table>
<thead>
<tr>
<th>Group I: If not overripe, have enough natural pectin and acid for gel formation with only added sugar</th>
<th>Group II: Low in natural acid or pectin, and may need addition of either acid or pectin</th>
<th>Always needs added acid, pectin, or both</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Apples, sour</td>
<td>• Apples, ripe</td>
<td>• Apricots</td>
</tr>
<tr>
<td>• Blackberries, sour</td>
<td>• Blackberries, ripe</td>
<td>• Blueberries</td>
</tr>
<tr>
<td>• Crabapples</td>
<td>• Cherries, sour</td>
<td>• Figs</td>
</tr>
<tr>
<td>• Cranberries</td>
<td>• Chokecherries</td>
<td>• Grapes (western concord)</td>
</tr>
<tr>
<td>• Currants</td>
<td>• Elderberries</td>
<td>• Guaves</td>
</tr>
<tr>
<td>• Gooseberries</td>
<td>• Grapefruit</td>
<td>• Peaches</td>
</tr>
<tr>
<td>• Grapes (eastern concord)</td>
<td>• Grape Juice, bottled (eastern concord)</td>
<td>• Pears</td>
</tr>
<tr>
<td>• Lemons</td>
<td>• Grapes (California)</td>
<td>• Plums (italian)</td>
</tr>
<tr>
<td>• Loganberries</td>
<td>• Loquats</td>
<td>• Raspberries</td>
</tr>
<tr>
<td>• Plums (not Italian)</td>
<td>• Oranges</td>
<td>• Strawberries</td>
</tr>
<tr>
<td>• Quinces</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Salsa

• Combination of low-acid foods and acid foods
  – Onions, peppers with tomatoes
• Use vinegar that is at least 5% acetic acid or use bottled lemon or lime juice
• Use research-tested recipes carefully
• Same principle of canning applies
Recap

• Food Safety Focus Points with Processing
• Food Defense/ Traceability
• Specific Processing Concerns: Canning, Acid foods, Acidified foods, Light processing
Questions

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