FOOD DETERIORATION

What Makes Food Go Bad?
Food Hazard

Anything that interferes with safe food
3 Categories of Food Hazards

- **Physical** – any material foreign to food
  - Dust, dirt, hair, etc.

- **Chemical** – any chemical foreign to food
  - Cleaning solutions, Pesticides, Toxic metals

- **Biological** – viruses, fungi, microbes, insects, enzymes
  - Cause more foodborne illness (FBI) than physical or chemical hazards
  - Are more difficult to control than physical or chemical hazards
## Activity: Is It a Physical, Chemical, or Biological Food Hazard?

<table>
<thead>
<tr>
<th>Food Hazard</th>
<th>Physical</th>
<th>Chemical</th>
<th>Biological</th>
</tr>
</thead>
<tbody>
<tr>
<td>An assistant cook has an open sore on her hand.</td>
<td></td>
<td></td>
<td><strong>X</strong></td>
</tr>
<tr>
<td>Tomato soup is stored in a copper bowl.</td>
<td></td>
<td><strong>X</strong></td>
<td></td>
</tr>
<tr>
<td>A glass is used to scoop ice.</td>
<td><strong>X</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>After cutting raw chicken, the food service worker uses the same knife to slice fruit.</td>
<td></td>
<td></td>
<td><strong>X</strong></td>
</tr>
<tr>
<td>The counter cleaner is stored next to the flour on an overhead shelf.</td>
<td></td>
<td></td>
<td><strong>X</strong></td>
</tr>
</tbody>
</table>
Food Deterioration Includes:

- Changes in **ORGANOLEPTIC** quality (how something is perceived by a sensory organ)
- Nutritional Value
- Food Safety
- Aesthetic Appearance
- Color
- Texture
- Flavor

- To some degree, all foods undergo deterioration after harvest
- The role of food science is to minimize negative changes as much as possible
Shelf Life and Dating of Foods

- All foods have a time limit of their usefulness
  - Time Limit depends on:
    - Type of food
    - Storage conditions
    - Other factors
- **Shelf Life** – Time required for a food product to reach an unacceptable quality

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**Useful Life at 70°F**

<table>
<thead>
<tr>
<th>FOOD</th>
<th>Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meat</td>
<td>1 – 2</td>
</tr>
<tr>
<td>Fish</td>
<td>1 – 2</td>
</tr>
<tr>
<td>Poultry</td>
<td>1 – 2</td>
</tr>
<tr>
<td>Dried, smoked meat</td>
<td>360 +</td>
</tr>
<tr>
<td>Fruits</td>
<td>1 – 7</td>
</tr>
<tr>
<td>Dried fruit</td>
<td>360 +</td>
</tr>
<tr>
<td>Leafy vegetables</td>
<td>1 – 2</td>
</tr>
<tr>
<td>Root crops</td>
<td>7 – 20</td>
</tr>
<tr>
<td>Dried seeds</td>
<td>360 +</td>
</tr>
</tbody>
</table>
Causes of Food Deterioration

- Microorganisms such as bacteria, yeast, and molds
- Activity of food enzymes
- Infestations by insects, parasites, and rodents
- Inappropriate temps during processing and storage
- Gain or loss of moisture
- Reaction with Oxygen
- Light
- Physical stress or abuse
- Time
- Temperatures
  - High – Faster reactions
  - Cooler – Damage tissue
Use FAT TOM to remember.
Bacterial Growth

FAT TOM

- Food
- Acidity
- Temperature
- Time
- Oxygen
- Moisture
Bacterial Growth

FAT TOM

- Food or nutrients—especially foods high in protein favor bacterial growth
Bacterial Growth

FAT TOM

- **Food**
- **Acidity** - mild to low acidity favors bacterial growth (pH ~ 4.6 to 7)

Acid foods help control microbe growth.
Acidity

pH scale = 1 to 14

pH of some foods
Bacterial Growth

FAT TOM
- **Food**
- **Acidity** - low
- **Temperature** – Ideal temperature is 90-110°F.
Bacterial Growth

The “Danger Zone” is 41° to 135°F.
Bacterial Growth

**FAT TOM**
- **Food**
- **Acidity**
- **Temperature**
- **Time** — no more than 4 hours in the Danger Zone
Bacterial Growth

FAT TOM
- Food
- Acidity
- Temperature
- Time
- Oxygen - requirements vary

Facultative
Aerobic
Anaerobic
Microaerophilic
Bacterial Growth

FAT TOM

- Food
- Acidity
- Temperature
- Time
- Oxygen
- Moisture - Water activity of 0.85 or higher
Water Activity

0.3  0.4  0.5  0.6  0.7  0.8  0.9  1.0

0.4  0.85
Bacterial Growth Is Favored By

**FAT TOM**

- **Food** - especially protein foods
- **Acidity** - mild to low acidity
- **Temperature** - 41° to 135°F is *The Danger Zone*
- **Time** - more than 4 hours in *The Danger Zone*
- **Oxygen** - varies for different types of bacteria
- **Moisture** - water activity of 0.85 or higher
Vegetative Cells vs. Spores

- Vegetative cell = destroyed by heat (most by a temperature of 165°F)
- Spore = more resistant to heat (requires 240°F to destroy)
Assignment – FOOD BOURNE ILLNESSES

- Read the Food Bourne Illness Handout
  - Choose 3 illnesses and answer the following:
    - Name
    - Symptoms
    - Possible Sources
  - Explain how to properly handle food to avoid Food Bourne illnesses