THE RAW FOOD CONTAMINATION PROBLEM:
The cook is the hazard controller.

There will be a Person In Charge of food safety on duty at all times, who will:

1. Know the hazards in the food being prepared.
2. Enforce policies and procedures to prevent illness and control the hazards.
3. Assure that food preparers and servers are trained.
4. Direct kitchen operations and conduct self-inspections to assure that safe food procedures are followed.
SAFE FOOD
The cook is the hazard controller

- The cook must prevent, eliminate, or reduce the hazards in a portion of food so that the chemical, physical, and biological hazards are not likely to make the consumer ill.

- Any food, raw or ready-to-eat, can cause illness, injury, or death if not correctly handled.

- Toxins and poisons, to include allergens, cause vomiting, diarrhea, and anaphylactic shock in a couple of minutes to 4 hours after eating the food.

- The infectious microorganisms cause illness in more than 6 hours (36 hours to 2 weeks after the meal is common).

- 76,000,000 people in the U.S. are made ill each year, because hazards are not adequately controlled by the farmer or cook. 5,000 die.
HOW DO YOU KNOW
IF FOOD IS HAZARDOUS OR SAFE?
You control the process.

Food Spoilage Microorganisms
Do not cause illness.
Change the flavor, odor, and appearance of food.
Inhibit growth of pathogens.

Food Process Microorganisms
They "spoil" / ferment the food. Do not cause illness
Used in the production of food products (e.g., vinegar, bread, sauerkraut, cheese).

Food Pathogenic Microorganisms
Cause illness.
Often do not change the flavor, odor, and appearance of food to indicate that the food is hazardous.
If in doubt about how food was handled after cooking, throw it out.
HAZARD ANALYSIS-----------------------HA

Biological, chemical, and physical hazards will always be present:
To be significant, they must be at a level to cause illness and injury.

They are carried into the operation by:
- Employees and guests
- Food
- Water and air
- Insects, rodents, birds

CRITICAL CONTROL POINTS----------CCP

Prevent, eliminate, reduce significant hazard to a safe level.

- Person In Charge has absolute command and control of safety and written Policies, Procedures, and Standards
- Food preparers are trained and coached
- Adequate supply of material and time
- Adequate facilities and equipment
- Safety-assured recipe procedures
- Personal hygiene
# CHEMICAL HAZARDS AND CONTROLS

## Insecticides, pesticides, pest control poisons, sanitizers, food additives in excess

<table>
<thead>
<tr>
<th>Hazards</th>
<th>Controls</th>
</tr>
</thead>
</table>
| - Insecticides and pesticides as used by farmer  
- Pest control poisons incorrectly applied  
- Sanitizers and cleaning chemicals used in excess or mixed  
- Allergens  
- Food additives not used carefully | - Pest control poisons applied by a pest control operator  
- Double wash fruits and vegetables  
- Separate chemicals; only authorized employees can hand the concentrated chemical  
- Measure additives carefully (e.g., MSG, Yellow #5, nitrate in cured foods)  
- Use chemicals and sanitizers as directed  
- Consumer information available concerning presence of allergens |
FOOD ADVERSE REACTIONS

Food intolerances
- Fat
- Milk
- Gluten

Food allergies
- Milk / dairy
- Legumes, peanuts
- Crustacea (shrimp, lobster, crab)
- Mollusks (snails, clams, squid)
- Fish (bass, flounder, cod)
- Soybeans
- Corn
- Egg
- Wheat
- Tree nuts (almonds, walnuts, pecans)

Control
- Listen to the concerns of the guest.
- Check the recipes and labels of ingredients used in the recipe.
- Do not substitute recipe ingredients.
- Use clean utensils. Never use the same utensil for different foods in kitchen or serving.
- Make sure food contact surfaces are clean to avoid cross-contamination.
- Label dishes being served
PHYSICAL HAZARDS: PREVENT, ELIMINATE

- Hot food and beverages
- Hair, jewelry, ring settings, nail polish
- Bandages, chewing gum, cigarette ashes
- Beards, mustaches
- Coins, pencils, buttons, pockets, nametags
- Chipped drinking glasses, coffee pots, enameled pans, dishes, cups, food trays, glass containers

- Peppercorns, bay leaves, nut shells, raisin stems, fruit pits, pieces of wood and metal, stones, bones
- Worms, insects, dirt
- Metal can chips, staples nails, paper and cardboard, plastic wrap
- Rat droppings, flies, cockroaches
# BIOLOGICAL HAZARDS AND CONTROLS

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Hazard</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parasites</td>
<td><em>Trichina</em> spp., <em>Anisakis</em>, beef tapeworm, <em>Toxoplasma gondii</em>. Live within animals and fish (in muscle, intestinal tract); 1 to 10 cause illness.</td>
<td>Reduced to a safe level by cooking to 145°F, 15 seconds. Killed by freezing, -4°F, 7 days.</td>
</tr>
<tr>
<td>Viruses</td>
<td>Noroviruses, hepatitis A, rotavirus. Source is human feces and vomit.</td>
<td>Double wash fingertips after using the toilet.</td>
</tr>
<tr>
<td>Bacteria</td>
<td><strong>Vegetative bacteria:</strong> <em>Salmonella</em>, <em>E. coli</em>, <em>Vibrio</em>, <em>Shigella</em>, <em>Streptococcus</em>, etc. <strong>Spores:</strong> <em>Clostridium perfringens</em>, <em>Bacillus cereus</em>, <em>Clostridium botulinum</em> in hot food survive pasteurization as spores (dried hibernating vegetative cells).</td>
<td>Reduce to a safe level with pasteurization 100,000 to 1; 145°F, 3 minutes; 150°F, 1 minute; 155°F, 15 seconds OR Double wash fruits and vegetables (100-to-1 reduction). Hold ≥135°F / &gt;130°F roasts to prevent outgrowth. Cool 135 to 41°F, 6 hours &lt;1 gallon / &lt;2 inches deep). Cold hold 41°F.</td>
</tr>
</tbody>
</table>
PERSONAL HYGIENE

Call PIC and stay home when you have:

- Vomiting
- Diarrhea
- Jaundice
- Sore throat / Fever

Control

- Wash fingertips with nail brush
- Wear clean clothes
- Use hair restraint
- Do not cough on food
- Use gloves only to protect hands
DOUBLE HAND WASHING WITH NAIL BRUSH

Hazard: Feces on fingertips after wiping with toilet paper
Process: To double wash fingertips and hands to reduce fecal pathogens 1,000,000 to 1
Materials: Water 2 gallons / minute, 75 to 110ºF; soap; paper towel; fingernail brush

STANDARDS AND OPERATING PROCEDURE

First wash.
Put 1 tsp. soap to the fingernail brush.
With water at 2 gallons per minute, brush and lather, particularly fingertips and fingernails and dilute pathogens for a 1,000-to-1 reduction.

Second wash.
Put fingernail brush down. Put another 1 tsp. soap on hands.
Lather with friction. Rinse and further dilute pathogens for 100-to-1 reduction.
Dry hands using paper towel for a 10-to-1 reduction.

Total: 1,000,000-to-1 reduction of fecal pathogens.
**WHAT ARE YOUR HAZARDOUS INGREDIENTS?**
(It is assumed that chemical and physical hazards have been taken care of)

<table>
<thead>
<tr>
<th>Foods that the supplier made safe, are pasteurized, acidified (pH &lt;4.6), or too dry (water activity &lt;0.92) for vegetative cell growth</th>
<th>Raw ingredients that the cook makes safe; pasteurizes (150°F, 1 minute), and prevents spore germination (temperature &gt;135°F; cool to 41°F, 6 hours; hold 41°F, 7 days)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pasteurized (USDA fully cooked):</strong> Sausage links, lunch meat, hot dogs, ham, turkey breast, roast beef, polish sausage, BBQ pork, liquid eggs; milk, yogurt, cheese, ice cream, pudding</td>
<td><strong>Protein:</strong> Hot cereal, waffles, pancakes, French toast shell eggs, spices and herbs</td>
</tr>
<tr>
<td><strong>Grown safe (not cooked):</strong> Bananas, celery, carrots, cucumbers, peppers, lettuce, cabbage</td>
<td><strong>Grilled / oven:</strong> meatloaf, meatballs, Swiss steak, chicken, pork, fish, lasagna, pizza, beef stew, chili beef, tacos, shepherd's pie, macaroni and cheese</td>
</tr>
<tr>
<td><strong>Acid:</strong> Fruit, fruit juice, applesauce, cottage cheese, salad dressings, pickles, soda pop</td>
<td><strong>Starch:</strong> Rice, potatoes, noodles</td>
</tr>
<tr>
<td><strong>Dry:</strong> Syrup, jam and jelly, dry cereal, bread, muffins, crackers, pastries, peanut butter, potato chips</td>
<td><strong>Soups and sauces:</strong> Vegetable, mushroom, brown gravy</td>
</tr>
<tr>
<td><strong>Inadequate nutrients for growth:</strong> Coffee, tea</td>
<td><strong>Salads:</strong> egg, tuna, potato</td>
</tr>
</tbody>
</table>
RECEIVING DRY FOOD STORAGE

**Hazard:**
Pathogens can get into damaged containers. Cleaning chemicals can accidentally be picked and added to a recipe.

**Control:**
- When receiving staples, always put the new in back of the shelf and old in the front so that the oldest food is used first.
- Inspect each container. If cans are damaged or bulged, do not use; throw out. If a box or plastic bag has any cut or hole, do not use.
- Store chemicals separate from food on a bottom shelf.
- All food must be stored 6 inches above the floor.
RECEIVING REFRIGERATOR STORAGE

Hazard:
Pathogens can grow in potentially hazardous food if the temperature is not 41°F or colder.

Control:
• When receiving refrigerated food, it must be at 41°F or colder.
• Commercial food, when opened, must be used in 7 days.
• Store ready-to-eat food above raw food to prevent cross-contamination.
RAW FOOD CROSS-CONTAMINATION ON CUTTING BOARDS AND HANDS

Hazard:
Raw food bacteria on a cutting board or hands can be transferred to ready-to-eat food prepared on the same cutting board if not cleaned.

Control:
- The raw food microorganisms on a cutting board must be washed off before ready-to-eat food is prepared on the cutting.
- Take cutting boards and knives to the pot sink or dish machine. While flushing water over the cutting board take a brush and scrub the bacteria loose so that the water flushes them away. Finish the wash-rinse-sanitize in a pot sink or dish machine. The hands will also be cleaned.
TIP-MEASURING THERMOMETERS

- Do not use the bimetallic coil thermometer, because it measures from the tip up 2 1/2 inches.
- Use a digital thermometer, because it measures temperature at the tip in a few seconds.

Measure temperature by flipping the food and then, pushing the tip through the food. The thermometer reads the top hot surface. Then, as you push, the temperature goes down as the tip gets closer to the center, then gets hot after you go through the center.
## FOOD PROCESS MICROBIOLOGICAL HAZARDS AND CONTROLS

<table>
<thead>
<tr>
<th>Process Steps</th>
<th>Food Hazards</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Raw meat, fish, and poultry</strong></td>
<td>Vegetative pathogens, <em>E. coli</em>, <em>Salmonella</em>, etc. The spore cannot multiply because of competitive spoilage microorganisms and temperature.</td>
<td>Double wash fruits and vegetables with friction for 100-to-1 vegetative reduction. Store at 41°F, no time limit. Cooking makes raw food safe.</td>
</tr>
<tr>
<td><strong>Pasteurize</strong></td>
<td>Vegetative pathogens, <em>E. coli</em>, <em>Salmonella</em>, etc. cause food infections leading to vomiting, diarrhea, and sometimes, death.</td>
<td>Reduce <em>E. coli</em>, <em>Salmonella</em>, etc. 100,000 to 1.</td>
</tr>
<tr>
<td><strong>Serve</strong></td>
<td>Spores can germinate and multiply and cause vomiting, diarrhea, and sometimes, death.</td>
<td>Hold &gt;135°F / 130°F.</td>
</tr>
<tr>
<td><strong>Cool-Cold Hold</strong></td>
<td>Spores can germinate and multiply and cause vomiting, diarrhea, and sometimes, death.</td>
<td>Cool 135 to 41°F, 6 hours. Cold hold 41°F, ≤7 days. Mix cold recipes (salads) with cold ingredients.</td>
</tr>
<tr>
<td><strong>Reheat</strong></td>
<td>During storage, Food might have been cross-contaminated with vegetative pathogens.</td>
<td>Kill bacterial vegetative cells such as <em>E. coli</em>, and <em>Salmonella</em> by reheating to 165°F for 15 seconds.</td>
</tr>
</tbody>
</table>
SERVING LINE
HOT AND COLD FOOD

Hazard:
Keep above 130°F / 135°F; otherwise, the spores can multiply and cause illness. (Note, for customer satisfaction, entrees must be at 150°F or above, and soup and hot beverages such as coffee at 170°F. Cold food must be at 41°F.)

Control:
• Keep food at or above 150°F and covered to assure customer satisfaction. Cold food on the line should be at 41°F or colder.
• Check all food with a tip-sensitive digital thermometer at the beginning of and during service to assure quality and safety.
RAPID COOLING METHODS, 6 HOURS TO 41°F (FDA)

**Blast chilling**
- 2" thick

**Thin layers**
- 3/4" and less

**Frozen**
- Water
- Stock
- CO₂

**Water and ice**
- Cubed potatoes
- Pasta, Rice
- Chicken, Turkey
- Roast beef

Pan 25% uncovered

Open shelves, 75% of heat through the bottom

≤ 35° F
1000 ft./min.

≤ 35° F
50 ft./min.

1/2
1/2
32° F
190° F

3–5 min.

35° F

Cold Water

Ice
COOLING LEFTOVERS: LEFTOVERS PANNED, 2 INCHES DEEP, ABOVE RAW FOOD

Hazard:
Spore outgrowth can occur if food cools too slowly. Raw food juice could drip into ready-to-eat food.

Control:
• Cooked food must cool to 41ºF in 6 hours to prevent the outgrowth of spores. Pan all food less than 2 inches deep or in a 1-gallon or smaller container to cool safely. Label, "Use in 7 days or less," or freeze.
• Store ready-to-eat food over raw food.
FOOD SAFETY SUMMARY

PREREQUISITES

Personal hygiene
- If I have vomiting or diarrhea, I will tell the PIC.
- I will double wash my fingertips when coming from an "unknown location" such as the toilet.
- When handling raw meat / fish / poultry, I will decontaminate my hands and food contact surface before touching RTE food.
- I do not touch my skin, face, or hair when working with food.
- Immediately after glove use, I remove the gloves and wash my hands.

Receiving
- When receiving food / opening food, any food that is damaged or spoiled will be returned to the supplier / discarded. Refrigerate food 41°F.

Storage
- Store raw food on the bottom shelves in the refrigerator and RTE food above the raw food, <41°F.
- Store chemicals completely separate from food.

Equipment
- Assure that equipment is clean before use.
- Assure that equipment is working correctly and calibrated before beginning preparation.
FOOD PROCESS HAZARD CONTROLS

- Double wash raw fruits and vegetables before using in menu items.
- During pre-preparation, remove physical hazards from food.
- During preparation, consider if any ingredient in a recipe is an allergen and if so, remember it so that customer questions can be accurately answered. If in doubt, refer allergen questions to the kitchen manager.
- Cook foods for pasteurization to:
  a. Roasts: 130°F, 112 minutes
  b. Solid steaks, chops, fish: 145°F center temperature, 15 seconds
  c. Ground meat, fish: 155°F, 15 seconds
  d. Poultry: 165°F, 15 seconds
  OR: as ordered by the individual customer.
- Hold hot food >135°F or <4 hours if time is used as a control.
- Cool panned food ≤2 inches deep or liquids in ≤1-gallon container.
- When making a cold combination such as salads, pre-cool ingredients to <50°F before mixing and avoid toxin production from *Staphylococcus aureus* on hands.
- Cold hold RTE food at 41°F food temperature, <7 days; label.
- Do not add leftovers to a fresh food.
- Reheat food to 165°F for 15 seconds in <2 hours.
SUMMARY

Food from farms will always be potentially hazardous.
Food workers will be shedding pathogens.
We cannot rely on the regulatory code and inspection to provide correct information, because regulators do not validate what they write.

The processor / retail or home cook makes the food safe by the following:

Prerequisite programs
- Control chemicals
- Control physical hazards
- Fingertip washing
- Clean food contact surfaces

HACCP controls
- Wash, 100-to-1 reduction
- Pasteurize, 100,000-to-1 reduction (i.e., 150°F for 1 minute)
- Hot hold >130°F (no spore outgrowth)
- Cool 2 inches deep or 1-gallon container (no spore outgrowth)
- Cold hold <41°F for no increase of Bacillus cereus
- Do not add fresh food to old food
- Cook knows ingredients for persons with allergies

The foodservice manager must show due diligence.
AMC-HACCP empowers cooks to control or reduce the hazards to an acceptable level and to prepare any food if they have a validated HACCP recipe.