

# *Food Contamination and Spoilage*

**Food Safety: Managing with the HACCP System**  
**Second Edition**  
**(245TXT or 245CIN)**

# Competencies for *Food Contamination and Spoilage*

1. Distinguish between pathogens and spoilage organisms, and list four types of microorganisms responsible for most food contamination.
2. Explain the four factors affecting bacterial reproduction.
3. Explain why the temperature danger zone (TDZ) is important to food safety.
4. Briefly describe food infections and intoxications.
5. Explain how to prevent cross-contamination.
6. List common chemical poisons, foodborne physical hazards, and major allergens, and briefly describe control measures.
7. Describe personal health and hygiene practices necessary in a food establishment.

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# Competencies for *Food Contamination and Spoilage*

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8. Describe the steps that managers should take when handling a foodborne illness complaint.
9. Identify the common causes of food spoilage in a food establishment.
10. Define the three ranges of low-temperature food preservation and describe low-temperature food preservation techniques and their benefits.
11. Describe high-temperature food preservation techniques and their benefits.
12. Describe dehydration, chemical, and radiation food preservation techniques and their benefits.

# Microorganisms Causing Most Food Contamination

- Bacteria
- Parasitic worms
- Fungi
- Viruses

# Factors Affecting Bacterial Reproduction

- Moisture
- Oxygen
- pH
- Time and temperature

# *Salmonella spp.*

## **Food Sources**

Meat, poultry, egg products, fish, chocolate, raw salads, seed sprouts, raw vegetables, raw milk

## **Symptoms**

Abdominal pain, diarrhea, fever, chills, vomiting, dehydration, headache, prostration

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# *Salmonella spp.*

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## **Incubation Time**

5 to 72 hours; usually 12 to 48 hours

## **Controls**

Cook thoroughly.

Chill rapidly.

Enforce good personal hygiene rules.

Prevent cross-contamination.

# *Shigella spp.*

## **Food Sources**

Moist mixed foods, liquids, contaminated produce

## **Symptoms**

Abdominal pain, diarrhea, fever, chills, blood in feces, nausea, dehydration, prostration



# *Shigella spp.*

*(continued)*

## **Incubation Time**

Usually less than 4 days

## **Controls**

Chill and heat foods rapidly.

Enforce good personal hygiene rules.

Control flies.

Prepare foods safely.

# *Vibrio spp.*

## **Food Sources**

Raw seafood, sushi, saltwater fish, shellfish,

Fish products, salty foods, cucumbers, sea water

## **Symptoms**

Abdominal cramps, diarrhea, nausea, vomiting,  
mild fever, chills, headache, prostration

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# *Vibrio spp.*

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## **Incubation Time**

Usually 10 to 20 hours

## **Controls**

Use proper cooking and chilling procedures.

Separate raw from cooked foods.

Do not use sea water to rinse food.

Obtain food from approved sources.

# *Escherichia coli*

## **Food Sources**

Any food exposed to sewage-contaminated water; cheese, shellfish, watercress; raw seed sprouts, milk, unpasteurized juice; ground beef

## **Symptoms**

Similar to Shigellosis—abdominal pain, diarrhea, fever, chills, blood in feces, nausea, dehydration, prostration

# *Escherichia coli*

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## **Incubation Time**

About 11 hours

## **Controls**

Chill and heat foods rapidly.

Enforce good personal hygiene rules.

Control flies.

Prepare foods safely.

# *Listeria monocytogenes*

## **Food Sources**

Coleslaw, fresh soft cheeses, chickens, dry sausages, contaminated meats, smoked seafood, deli meats and salads

## **Symptoms**

Headache, vomiting, other flu-like symptoms

In pregnant women and people with compromised immune systems: more severe symptoms, possible death

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# *Listeria monocytogenes*

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## **Incubation Time**

4 days to 3 weeks

## **Controls**

Pasteurize or heat-process foods.

Avoid re-contaminating foods.

Refrigerate or freeze all dairy products.

Use proper equipment cleaning and food safety procedures.

# *Yersinia enterocolitia*

## **Food Sources**

Contaminated raw pork or beef, drinking water, milk products, tofu

## **Symptoms**

Children: digestive upset, severe abdominal pain resembling acute appendicitis

Adults: acute abdominal disorders, diarrhea, fever, arthritis

Both groups: skin and eye infections

*(continued)*



# *Yersinia enterocolitica*

*(continued)*

## **Incubation Time**

3 to 7 days

## **Controls**

Pasteurize or heat-process foods.

Enforce good personal hygiene rules.

Sanitize equipment and utensils.

Always purchase foods from approved sources.

# *Campylobacter jejuni*

## **Food Sources**

Raw or inadequately cooked or processed foods of animal origin; unchlorinated water

## **Symptoms**

Diarrhea, abdominal pain, fever, a vague unhealthy feeling

Less frequent: nausea, headache, urinary tract infection, reactive arthritis

*(continued)*

# *Campylobacter jejuni*

*(continued)*

## **Incubation Time**

1 to 7 days or longer

## **Controls**

Cook food thoroughly.

Handle food properly.

Dry or freeze foods.

Add acids.

# Preventing Cross-Contamination

- Separate raw animal foods during storing, preparing, holding, and display from raw ready-to-eat food and cooked ready-to-eat food.
- Separate types of raw animal foods.
- Clean and sanitize equipment and utensils.
- Store food in packages, covered containers, wrappers.

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# Preventing Cross-Contamination

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- Clean hermetically sealed food containers of visible soil.
- Protect food containers that are received packaged together in a case or overwrap from cuts.
- Store damaged, spoiled, or recalled food separately.
- Separate fruits and vegetables before they are washed.

# Frequent and Proper Handwashing Procedures

**Rinse** under clean, running warm water.

**Apply** cleaning compound in recommended amount.

**Rub hands** together vigorously for 10-15 seconds while:

**Paying close attention** to areas under fingernails.

**Creating friction** on surfaces of hands, arms, fingers.

**Rinse thoroughly** with clean, running warm water.

**Immediately, dry** thoroughly, using:

**Individual disposable** towels, or

**Continuous towel system**, or

**Heated hand-dryer.**

# Handling a Foodborne Illness Complaint

1. One person responsible for the investigation.
2. Listen to complaint.
3. Get the facts.
4. Evaluate complaint.
5. Notify health officials if complaint appears valid.
6. Isolate suspected food.

# Handling a Foodborne Illness Complaint

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7. Cooperate with health officials.
8. Take corrective action.
9. Close the complaint with the guest.
10. Index complaint.
11. Follow up.



# Common Causes of Food Spoilage

- Improper storage temperatures
- Incorrect storage times
- Improper ventilation
- Failure to separate foods
- Excessive delays between receiving and storing
- Inadequate food safety standards

# Low-Temperature Food Preservation

- Chilled storage: 50°F (10°C) to 59°F (15°C)
- Refrigerated storage: 32°F (0°C) to 41°F (5°C)
- Freezer storage: 0°F (−18°C) or below

# Pasteurization

High-temperature food preservation:

Food product heated to 145°F (63°C)  
for 30 minutes, or

To 161°F (72°C) for 15 seconds,  
then immediately cooled to 50°F (10°C) or less.

# Sterilization

Kills virtually all microorganisms and their spores. Once food is batch-sterilized, or individually sterilized, must be stored in a hermetically sealed container, like a can, glass bottle, jar, or flexible plastic container.