PART 1 — PREVENTIVE CONTROL CATEGORIES

---

1. Introduction

Preventive controls are a fundamental element of a preventive food safety system. Instead of relying primarily on detecting unsafe food after it has been produced, preventive controls are designed to **identify significant hazards and establish appropriate measures to prevent, minimize, or control those hazards before they result in unsafe food**.

A preventive food safety approach begins with a simple sequence:

Identify the Hazard → Assess the Risk → Select the Appropriate Control → Monitor the Control → Take Action When Necessary → Verify Effectiveness → Maintain Records

Different hazards require different types of controls. A thermal process may be appropriate for controlling a biological hazard, while it would not necessarily be the appropriate control for an undeclared allergen. Similarly, a supplier approval program may be appropriate when a hazard is controlled before the ingredient reaches the facility.

Therefore, understanding the different **Preventive Control Categories** is essential for developing and implementing an effective food safety system.

SLIDE 1 — PREVENTIVE CONTROL CATEGORIES

1.1 What Are Preventive Controls?

A **Preventive Control** is a measure or procedure designed to prevent, minimize, or control a food safety hazard.

The fundamental idea is:

Do not wait for unsafe food to be produced. Control the hazard at the point where effective control is possible.

A preventive control should therefore be connected to a specific food safety hazard.

For example:

Hazard:

Salmonella contamination in a ready-to-eat food.

Potential Control:

A validated thermal process designed to achieve the required microbial reduction.

The control is not selected simply because "cooking is normally done."

It is selected because the process is capable of controlling the identified hazard.

1.2 Why Are There Different Categories of Preventive Controls?

Food safety hazards can originate from different sources and behave differently.

A biological hazard may require a process control.

A chemical hazard associated with an incoming ingredient may require a supply-chain control.

An allergen cross-contact hazard may require allergen controls.

A hazard associated with environmental contamination may require sanitation controls.

This means that **one control strategy cannot effectively address every hazard**.

The preventive control category should therefore reflect:

- The nature of the hazard.
- Where the hazard occurs.
- Where the hazard can be controlled.
- How the control will be implemented.
- How the control will be monitored.
- What action will be taken if the control fails.

1.3 Hazard → Control Relationship

One of the most important concepts in this module is the relationship between the **hazard** and the **control**.

Think of the relationship as:

HAZARD → RISK → CONTROL

The hazard tells us **what can make the food unsafe**.

The risk assessment helps us determine **how significant the hazard is and whether preventive control is needed**.

The control tells us **what we will do to prevent, minimize, or control that hazard**.

Example

A food manufacturer produces a cooked ready-to-eat product.

Hazard:
Pathogenic microorganisms.

Risk consideration:
The product may support the survival of pathogens if the thermal process is inadequate.

Preventive Control:
A validated cooking process.

Monitoring:
Monitor cooking time and/or temperature according to the established process parameters.

Corrective Action:
If the required parameters are not achieved, evaluate the deviation and affected product and take appropriate corrective action.

1.4 Main Preventive Control Categories

The major categories covered in this module are:

1. Process Controls

Controls applied during processing to address hazards.

2. Food Allergen Controls

Controls designed to prevent allergen cross-contact and undeclared allergens.

3. Sanitation Controls

Controls designed to prevent contamination and cross-contamination through sanitation practices.

4. Supply-Chain Controls

Controls used when a hazard is appropriately controlled before the ingredient or material reaches the receiving facility.

5. Recall Plan

A planned system for managing affected food when a hazard requires action after the product has entered distribution.

6. Other Preventive Controls

Other appropriate measures that may be necessary to control identified hazards when the above categories do not fully address the situation.

1.5 Important Principle

A food safety plan may contain **multiple preventive control categories**.

A single product may have:

- Process Controls
- Allergen Controls
- Sanitation Controls
- Supply-Chain Controls
- Recall procedures
- Other appropriate controls

The important question is not:

"Which control category do we normally use?"

The correct question is:

"Which control is appropriate for this specific hazard?"

SLIDE 2 — PROCESS CONTROLS

2.1 What Are Process Controls?

Process Controls are controls applied during processing to address identified hazards.

They are particularly important when a specific processing parameter can influence the safety of the food.

Common process parameters may include:

- **Time**
- **Temperature**
- **pH**
- **Water Activity (aw)**
- Other process parameters appropriate to the hazard and product.

The exact parameter depends on the hazard and the process.

2.2 Time and Temperature Controls

Time and temperature are among the most common process-control parameters in food manufacturing.

For example, a thermal process may require the product to reach a specific temperature and remain at or above that temperature for a specified period.

The basic concept is:

Temperature + Time → Microbial Control

However, simply having a temperature requirement does not automatically make the process effective.

The established parameters should have an appropriate scientific or technical basis, where applicable.

2.3 Example — Cooking and Salmonella

Consider a food product where **Salmonella** has been identified as a significant biological hazard.

A cooking process may be selected as the preventive control.

The control might involve:

- A defined target temperature.
- A defined minimum holding time.
- Appropriate monitoring equipment.
- Defined monitoring frequency.
- Defined acceptance criteria.
- A responsible employee.
- Corrective-action procedures for deviations.
- Verification activities.
- Appropriate records.

The logic is:

Salmonella Hazard

↓

Thermal Process

↓

Established Critical/Control Parameters

↓

Monitoring

↓

Deviation?

↓

Correction / Product Evaluation / Corrective Action as appropriate

↓

Verification

↓

Records

2.4 pH as a Process Parameter

pH can be an important factor in controlling certain microorganisms and influencing product safety.

For example, an acidified or fermented product may rely on achieving and maintaining an appropriate pH.

In such a situation, the food safety system may need to define:

- What pH is required.
- Where the measurement is taken.
- What equipment is used.
- How frequently measurements are performed.
- What constitutes an acceptable result.
- What happens when the result is outside the established criteria.

The important principle is:

A parameter becomes meaningful when it is connected to a specific food safety objective and has an appropriate basis.

2.5 Water Activity

Water activity (aw) is different from simply measuring moisture content.

Water activity describes the availability of water in a food system and can influence the ability of microorganisms to grow.

Depending on the product and hazard, control of water activity may therefore form part of a process-control strategy.

Possible applications include products where microbial growth is limited through reduced water availability.

Again, the important question is not simply:

"Do we measure aw?"

Instead:

"Why are we measuring aw, what hazard are we controlling, and what result represents acceptable control?"

2.6 What Makes a Process Control Effective?

A process control should be supported by an appropriate system that defines:

Parameter

What are we controlling?

Acceptance Criteria

What result is acceptable?

Monitoring Method

How will we measure or observe it?

Frequency

How often will monitoring occur?

Responsibility

Who performs the monitoring?

Corrective Action

What happens when the control does not meet its criteria?

Verification

How do we know the control is being implemented and functioning as intended?

Records

How do we demonstrate that the control was implemented?

2.7 Common Mistake

A common mistake is to write:

"Cooking — 75°C"

and consider the control complete.

This is not enough by itself.

A robust control system needs to address questions such as:

- Why 75°C?
- For how long?
- Where is temperature measured?
- What device is used?
- How often is it checked?
- What is the acceptable range?
- What happens if the temperature is not achieved?
- How is the equipment verified/calibrated as appropriate?
- What records are maintained?

SLIDE 3 — FOOD ALLERGEN & SANITATION CONTROLS

3.1 Food Allergen Controls

Food allergens require a dedicated control strategy because an allergen can be hazardous even when present in relatively small amounts for a sensitive consumer.

Two major issues need to be distinguished:

Allergen Cross-Contact

The unintended transfer of an allergenic substance to another food.

Undeclared Allergen

An allergen is present in the food but is not properly declared on the label.

These are related but are **not the same problem**.

3.2 Allergen Cross-Contact

Allergen cross-contact may occur through:

- Shared equipment.
- Shared utensils.
- Production lines.
- Improper cleaning.
- Employee practices.
- Rework.
- Incorrect material handling.
- Incorrect storage.
- Production sequencing.

Example

A facility produces:

1. Peanut-containing product
2. Non-peanut product

If the same equipment is used without an effective allergen-control strategy, peanut residues may remain on the equipment and contaminate the subsequent product.

The hazard is not necessarily visible.

Therefore:

Visual cleanliness alone does not automatically demonstrate allergen control.

3.3 Allergen Labeling

Another important element is ensuring that the product label accurately identifies the allergens that are present.

Potential failures include:

- Wrong label applied.
- Incorrect packaging material.
- Missing allergen declaration.
- Product packed using packaging intended for another product.

- Label change not properly controlled.

This demonstrates why allergen control is not limited to cleaning.

A complete allergen-control system may involve:

Receiving → Storage → Production → Cleaning → Changeover → Labeling → Verification

---

3.4 Sanitation Controls

Sanitation controls are used to prevent or minimize contamination associated with:

- Food-contact surfaces.
- Equipment.
- Employees.
- Environmental conditions.
- Production areas.

Sanitation is especially important where contamination can occur through the environment or through inadequate cleaning and sanitation.

3.5 Cleaning vs Sanitizing

A critical distinction:

Cleaning

Removes:

- Food residues.
- Soil.
- Grease.
- Organic material.
- Other visible contamination.

Sanitizing

Reduces microorganisms on a properly cleaned surface to an appropriate level through an appropriate method.

Therefore:

Cleaning and sanitizing are related, but they are not interchangeable.

A simplified sequence is:

Clean → Sanitize → Verify/Monitor as appropriate

3.6 Example — Environmental Contamination

Imagine a facility producing a ready-to-eat food.

An environmental pathogen may contaminate:

- Food-contact surfaces.
- Equipment.
- Drains.
- Floors.
- Other environmental areas.

An effective sanitation-control strategy may include:

- Cleaning procedures.
- Sanitizing procedures.
- Chemical concentration control.
- Contact time.
- Cleaning frequency.
- Employee responsibilities.
- Environmental monitoring where appropriate.
- Corrective actions.
- Verification.
- Records.

3.7 Cross-Contamination

Cross-contamination can occur through:

People

Hands, gloves, clothing, movement between areas.

Equipment

Shared equipment or utensils.

Materials

Raw materials contacting ready-to-eat foods.

Environment

Floors, drains, condensation, aerosols, traffic patterns.

Flow

Improper movement of people, materials, or equipment.

Therefore, sanitation controls should be considered as part of a broader contamination-control strategy.

3.8 Important Principle

Sanitation is not simply "making the facility look clean."

The objective is to control conditions that may contribute to food contamination and food safety hazards.

This is why sanitation programs should be:

- Defined.
- Implemented.
- Monitored.
- Verified.
- Documented.
- Corrected when deficiencies are identified.

SLIDE 4 — SUPPLY-CHAIN, RECALL & OTHER CONTROLS

4.1 Supply-Chain Controls

Sometimes a facility does not have the most effective control point for a particular hazard.

The hazard may be associated with an ingredient or material supplied by another company.

In such cases, **Supply-Chain Controls** may be appropriate.

The basic concept is:

Control the hazard at an appropriate point in the supply chain before the affected material is used in the final food.

4.2 Example — Supplier-Controlled Hazard

Imagine a manufacturer purchases an ingredient where a specific hazard is associated with the ingredient.

The receiving facility may establish supplier controls such as:

- Supplier approval.
- Supplier evaluation.
- Specifications.
- Certificates of Analysis where appropriate.
- Testing where appropriate.
- Supplier audits where appropriate.
- Receiving inspections.
- Lot identification.
- Supplier performance monitoring.
- Corrective actions for supplier failures.

The purpose is not simply to "trust the supplier."

Instead:

The facility should establish an appropriate system for ensuring that the hazard is adequately controlled.

4.3 Supplier Verification

Supplier approval and supplier verification are not exactly the same concept.

Supplier Approval

The decision to accept a supplier based on defined criteria.

Supplier Verification

Activities used to determine whether the supplier continues to meet the established requirements.

Possible verification activities may include:

- Reviewing supplier records.
- Reviewing Certificates of Analysis.
- Testing.
- Audits.
- Reviewing supplier performance.
- Reviewing complaints or nonconformities.
- Reviewing corrective actions.

This leads to an important principle:

Supplier approval is not a one-time event. Supplier performance should be evaluated over time.

4.4 Recall Plan

A **Recall Plan** addresses the situation where unsafe or potentially unsafe food has entered distribution and needs to be removed from the market.

The recall system should allow the organization to respond quickly and systematically.

A recall process generally requires the organization to determine:

- What product is affected?
- Which lots are affected?
- Where was the product distributed?
- Who received the product?
- What notifications are necessary?
- How will the product be removed?
- How will returned product be controlled?
- How will the recall be documented?
- How will the effectiveness of the recall be evaluated?

4.5 Recall and Traceability

Recall effectiveness depends heavily on accurate product identification and traceability.

For example:

Product → Lot Code → Production Date → Distribution Information → Customers

If the organization cannot identify affected lots accurately, it may face two major problems:

Under-recall

Some affected products remain in the market.

Over-recall

Large quantities of unaffected product are unnecessarily removed.

Therefore:

Accurate lot identification and traceability support an effective recall.

4.6 Other Preventive Controls

Not every food safety situation fits neatly into one simple category.

Depending on the hazard and process, an organization may require other appropriate preventive measures.

The principle is:

The control should be selected according to the hazard and the specific food safety risk—not according to a predetermined checklist.

4.7 When Do We Need Each Type?

A useful way to think about the categories is:

Hazard Situation	Potential Control Category
Hazard controlled through a processing parameter	Process Control
Allergen cross-contact	Food Allergen Control
Undeclared allergen	Allergen/Label Control
Environmental contamination	Sanitation Control
Hazard controlled by an ingredient supplier	Supply-Chain Control
Unsafe product already distributed	Recall Plan
Hazard requiring another appropriate preventive measure	Other Preventive Control

Important: The appropriate control depends on the actual hazard analysis and circumstances of the facility.

SLIDE 5 — CHOOSING THE RIGHT PREVENTIVE CONTROL

5.1 The Decision-Making Logic

The most important skill in this section is not memorizing the names of control categories.

It is learning how to **select the appropriate control based on the hazard**.

Use this basic decision sequence:

HAZARD → RISK → CONTROL

Step 1 — Identify the Hazard

Ask:

What can make this food unsafe?

Examples:

- Pathogen.
- Allergen.
- Chemical contaminant.
- Foreign material.
- Environmental contamination.

Step 2 — Assess the Risk

Ask:

How significant is this hazard?

Consider:

- Likelihood.
- Severity.
- Intended use of the food.
- Consumer population.

- Processing conditions.
- Existing controls.
- Scientific or technical information where appropriate.

The objective is to determine whether the hazard requires a preventive control and what level of control is appropriate.

Step 3 — Determine Where the Hazard Can Be Controlled

This is a critical question.

Ask:

Where is the most appropriate point to control this hazard?

It could be:

- During processing.
- During sanitation.
- During ingredient sourcing.
- During labeling.
- Through another preventive measure.
- Through multiple controls.

5.2 Practical Decision Examples

Example 1 — Salmonella in a Cooked Product

Hazard:

Salmonella.

Risk:

The organism may survive if the thermal process is inadequate.

Control:

Process Control.

Example:

Cooking using established time/temperature parameters.

Example 2 — Peanut Cross-Contact

Hazard:

Undeclared peanut due to cross-contact.

Risk:

Sensitive consumers may be exposed to the allergen.

Control:

Food Allergen Control.

Potential measures include:

- Production sequencing.
- Dedicated equipment where appropriate.
- Effective cleaning/changeover.
- Label control.
- Verification.

Example 3 — Ingredient-Related Hazard

Hazard:

A chemical or biological hazard associated with an incoming ingredient.

Risk:

The facility may not effectively control the hazard through its own processing.

Control:

Supply-Chain Control.

Potential measures include:

- Approved supplier.
- Supplier verification.
- Specifications.
- COA review where appropriate.
- Testing or audits where appropriate.

Example 4 — Environmental Contamination

Hazard:

Environmental pathogen.

Risk:

Contamination of a ready-to-eat food through the processing environment.

Control:

Sanitation Control.

Potential measures include:

- Cleaning.
- Sanitizing.
- Hygienic zoning.
- Personnel practices.
- Environmental monitoring where appropriate.
- Corrective actions.

5.3 A Control Can Have Multiple Supporting Elements

An important concept is that a preventive control is not always one isolated activity.

For example:

Process Control

May be supported by:

- Monitoring.
- Calibration.
- Verification.
- Corrective actions.
- Records.

Similarly:

Supply-Chain Control

May involve:

- Supplier approval.
- Specifications.
- COA review.
- Testing.
- Audits.
- Receiving controls.
- Supplier performance review.

Therefore:

A preventive control is part of a management system, not merely a single checkbox.

5.4 Practical Exercise — Choose the Control

Scenario A

A ready-to-eat product requires a validated thermal process to control a biological hazard.

Question:
Which preventive control category is most directly applicable?

Answer:
Process Control.

Scenario B

A product containing peanut is manufactured on shared equipment with a product that should not contain peanut.

Question:
What type of control should be considered?

Answer:
Food Allergen Control, including measures to prevent allergen cross-contact and ensure appropriate labeling.

Scenario C

A raw material supplier is responsible for controlling a specific hazard before the ingredient reaches the facility.

Question:
What control category may be appropriate?

Answer:
Supply-Chain Control.

Scenario D

A ready-to-eat product may become contaminated because of inadequate sanitation of food-contact surfaces.

Question:
What control category should be considered?

Answer:
Sanitation Control.

5.5 Common Mistakes When Selecting Preventive Controls

Mistake 1 — Choosing the Control Before Understanding the Hazard

Incorrect approach:

"We always use sanitation."

Better approach:

"What is the hazard, and what control is capable of controlling it?"

Mistake 2 — Treating Every Hazard as a Process Control

Not every hazard can or should be controlled through processing.

Some hazards may require:

- Allergen controls.
- Supply-chain controls.
- Sanitation controls.
- Other appropriate controls.

Mistake 3 — Assuming One Control Solves Everything

A facility may need multiple controls across the production system.

For example:

Supplier Control + Sanitation Control + Process Control + Allergen Control

may all be necessary for one product.

Mistake 4 — Selecting a Control Without Defining How It Will Be Managed

A control should not exist only as a statement in a document.

Ask:

- Who monitors it?
- How?
- How often?
- What are the acceptance criteria?
- What happens if it fails?
- How is effectiveness verified?
- What records demonstrate implementation?

5.6 The Big Picture

At the end of this section, the trainee should understand that preventive controls are **risk-based controls**.

The thinking process is:

1. What is the hazard?

↓

2. How significant is it?

↓

3. Where can it be controlled?

↓

4. What type of preventive control is appropriate?

↓

5. How will we monitor it?

↓

6. What happens if it fails?

↓

7. How will we verify it?

↓

8. What records will demonstrate that it was implemented?

KEY TAKEAWAYS — PART 1

By the end of this part, trainees should be able to:

1.

Explain what a **Preventive Control** is.

2.

Explain why different categories of preventive controls are needed.

3.

Differentiate between:

- Process Controls
- Food Allergen Controls
- Sanitation Controls
- Supply-Chain Controls
- Recall Plans
- Other Preventive Controls

4.

Explain the relationship:

Hazard → Risk → Control

5.

Identify when a process control may be appropriate.

6.

Recognize allergen cross-contact and labeling as important allergen-control considerations.

7.

Explain the role of sanitation in preventing contamination and cross-contamination.

8.

Understand when supply-chain controls may be appropriate.

9.

Understand the purpose of a recall plan when affected food has entered distribution.

10.

Select an appropriate preventive-control category based on a specific hazard.

FINAL MESSAGE

Preventive Controls are not about choosing a favorite control category.

They are about choosing the right control for the right hazard at the right point in the food system.

The starting point is always the hazard.

Hazard → Risk → Control.

Once the appropriate control has been selected, the system must then address **Monitoring, Corrective Actions, Verification, Validation where applicable, and Records**.

Remember:

Don't start with: "What control do we have?"

Start with:

"What hazard are we trying to control?"

PART 1 — QUICK KNOWLEDGE CHECK

1. What is the primary purpose of a preventive control?

A. To document production activities only
B. To prevent, minimize, or control an identified food safety hazard

C. To increase production speed
D. To replace verification

Correct Answer: B

---

2. Which control is most directly associated with controlling a biological hazard through a defined cooking process?

A. Supply-Chain Control
B. Allergen Control
C. Process Control
D. Recall Plan

Correct Answer: C

---

3. Which of the following is an example of allergen cross-contact?

A. Incorrect temperature measurement
B. Peanut residue transferred from shared equipment to a non-peanut product
C. Incorrect supplier address
D. Missing production record

Correct Answer: B

---

4. When a supplier is responsible for controlling a hazard associated with an ingredient, which control may be appropriate?

A. Supply-Chain Control
B. Recall Plan only
C. Process Control only
D. No control is required

Correct Answer: A

---

5. What is the correct basic decision-making sequence?

A. Control → Hazard → Risk
B. Monitoring → Hazard → Control
C. Hazard → Risk → Control
D. Record → Control → Hazard

Correct Answer: C

⭐ **Trainer's Closing Point**

"A strong preventive-control system does not begin with a procedure. It begins with understanding the hazard."

"Once we understand the hazard, we can determine the appropriate control, define how it will be managed, and build the monitoring, corrective-action, verification, and recordkeeping system around it."

