

# HACCP

**A food management system which minimises the risk of food poisoning.**

## **HAZARDS**

Food Safety hazards are biological, chemical or physical (allergens are dealt with separately) contaminants with the potential to cause harm to the person who consumes the contaminated food.

Biological hazards (bacteria or their toxins, viruses, moulds and parasites) that may cause food-borne illness, such as:

1. the contamination of ready-to-eat food by sufficient numbers of pathogens to cause illness;
2. the multiplication of micro-organisms;
3. the survival of micro-organisms, for example, as a result of undercooking.

Chemical hazards include poisonous foods such as toadstools, pesticides, cleaning chemicals and excessive additives that can poison people.

Physical hazards (foreign bodies) include glass, sharp metal objects and stones that may result in cuts to the mouth, broken teeth, choking, internal injury.

Allergenic hazards, commonly found in foods such as peanuts, all other nuts, milk, eggs, fish and shellfish, yoga, wheat and cereals containing gluten, mustard/celery/celeriac.

## **What is HACCP (Hazard Analysis Critical Control Point)?**

HACCP is a food safety management system designed to control hazards at points critical to food safety.

It was developed in the early 1960s by Pillsbury and NASA (National Aeronautics Space Administration – USA) to ensure that astronauts were provided with safe food. Prior to the introduction of HACCP, little attempt was made in catering and retailing to determine which controls were the most important to reduce the risk of food poisoning.

It was rare to find food safety management systems which analysed food preparation to determine which controls early in the process were not essential because of controls later in the process which could be relied on to remove the problem before the food was consumed.

In manufacture, control relied heavily on end product testing, although this was of little practical use in most catering and retailing operations as food would be consumed before results were known. Many inspections concentrated on walls, floors and ceilings, and bad practices, but not necessarily on those point which were critical to food safety.

### **Prioritising controls**

HACCP systems prioritise controls so that resources can be concentrated at fewer points in the process – HACCP systems ensure that controls are fewer implemented at points critical to food safety.

### **Critical control point**

It contamination or multiplication of bacteria occur in e.g. raw meat, control is desirable to delay spoilage. However, if raw is to be thoroughly cooked, most food poisoning bacterial contamination or multiplication is desirable but not critical at the preparation step.

However, contamination or multiplication of food poisoning bacteria that occur in cooked meat must be prevented, as the food is to be consumed without any further treatment which would destroy bacteria. Cooking of raw meat is therefore a critical control point as is the preparation of cooked meat. The refrigeration of cooked meat and the display of high-risk food are also examples of critical control points.

HACCP can be applied to any food process or operation from preparing a sandwich to serving cooked chicken in a supermarket or to factory production of ready meals.

Many smaller business which attempt to implement HACCP will follow the following steps, a simpler form of HACCP, in an effort to comply with their legal responsibilities:

1. **Identifying** food safety hazards i.e. those things in the process that would make the food produced unsafe to eat;
2. **Controlling** these hazards especially at those points critical to food safety;
3. **Monitoring** the controls i.e. checking that controls are in place and are effective;
4. **Corrective action** i.e. the action taken when monitoring indicates that a control isn't working. This involves rectifying the problem that resulted in the control failing and often involves the destruction of the contaminated food;
5. **Documentation** i.e. recording details about the HACCP system including details of monitoring and, if necessary, corrective action taken.

**The benefits of having a HACCP system**, which is a systematic approach to identifying and controlling hazards and producing safe food, include:

- Compliance with legislation
- Useful in demonstrating due diligence
- Controls are easy to monitor and are carried out on the premises
- Proactive (all staff involved)
- Resources are targeted on critical control points
- Generates a food safety culture
- Reduces business risk
- Demonstrates management commitment
- Internationally recognized (facilitates international trade)

## **Prerequisite programmes for HACCP**

Prior to the implementation of an effective HACCP system, a business must be operating in accordance with good hygiene practice and comply with all relevant food safety legislation. Management commitment and adequate resources will also be required.

### **Prerequisite programmes include:**

- Premises and equipment well designed, constructed and maintained. Suitable facilities. Production should flow from the delivery of raw ingredients to the production of finished products, without there being a risk of cross-contamination
- Water and ice used in food production must be potable
- Staff must be trained commensurate with their work activities esp. high standards of personal hygiene (hand washing) and respect a health and exclusion policy
- Approved suppliers
- Effective planned cleaning and disinfection (cleaning schedules for monitoring purposes)
- Integrated pest management – a style of pest management based on co-operation between a food business operator and a specialist pest control company, dealing mostly with preventive measures covering three categories: environmental, physical, chemical (p.270 in ‘Managing Food Safety’)
- Effective waste management
- Thorough washing and disinfection of all ready-to-eat fruit and salad vegetables
- Stock rotation
- Labelling, traceability and recall procedures

## **Training**

Legislation requires food handlers to be supervised and instructed/trained in food hygiene matters commensurate with their work activities. This means they must be competent to produce safe food. In order to determine the training requirements for each food handler a training needs analysis should be undertaken. The training for each food handler will include training identified as necessary when implementing HACCP.

HACCP team members will require additional specific training.

Persons responsible for the development and maintenance of HACCP systems, or their relevant guides, must be adequately trained in the application of HACCP principles.

## **The law relating to HACCP**

### **Regulation EC No.852/2004 on the hygiene of foodstuffs (Article 5)**

Food business operators must implement a food safety management system based on the following principles:

1. Identify hazards/ hazard analysis
2. Identify critical control points (CCPs)
3. Establish critical limits at CCPs
4. Establish effective monitoring procedures at CCPs
5. Establish corrective actions for CCPs that are not under control

6. Establish verification procedures
7. Establish document and records commensurate with the nature and size of the food business
8. Review the system if there are any changes

### **Flexibility and HACCP**

Guidance from the EU and the Food Standards Agency (FSA) make it clear that Article 5 does not require all food businesses to implement a Codex based HACCP system. In practice, the Codex approach has not proved successful for small catering or retail businesses. In certain food businesses it is not possible to identify critical control points and good hygiene practices may be sufficient to comply with the law, for example, a newsagency selling sweets and small businesses only handling low-risk foods.

In small catering and retail businesses, food safety management systems which ensure that safe food is produced may:

- Avoid using HACCP jargon
- Use generic controls, e.g. cook to 75°C
- Use pre-validated procedures (e.g. by the FSA or the food industry)
- Combine good hygiene practice and HACCP
- Use practical skills, sensory observation and supervision instead of numerical critical limits
- Use minimal documentation
- Use exception recording, i.e. writing down important changes to, say, equipment or menu items or when something goes wrong such as food complaints/poisoning.

The Food Standards Agency have developed the following food safety management systems, all of which use the above approach to take advantage of the flexibility allowed: 'Safer food, better business' for small catering and retail businesses, 'Cooksafe' (Scottish model) and 'Safe Catering' (Northern Ireland model).

### **THE SEVEN PRINCIPLES OF HACCP**

**HACCP**, as defined by Codex Alimentarius, is a food safety management system based on the following seven principles:

1.

**Conduct a hazard analysis.** Prepare a flow diagram, identify the hazards and specify the control measures.

The HACCP team will need to draw up **flow diagrams** relating to the processes and check they accurately reflect what happens in practice.

A flow diagram is a systematic representation of the sequence of steps or operations involved with a particular food item or process, usually from purchase of raw materials to the consumer.

The **flow diagrams** need to be **validated**, i.e. confirmed that they are correct. Most flow diagrams will be written in the office and it is important to ensure the flow diagram accurately represents what happens in practice.

In catering in particular, different chefs may produce a dish in a variety of ways, which may have a significant impact on HACCP and will be represented by modified flow diagrams.

Once it has been confirmed that the flow diagram is accurate you are ready to start your hazard analysis.

Hazard analysis involves:

1. Identifying the hazards that may affect the process
2. Identifying the steps at which the hazards are likely to occur
3. Deciding which hazards are significant i.e. their elimination or reduction to acceptable levels is essential to the production of safe food
4. Determining the measures necessary to control the hazards

Poor temperature control or prolonged time at ambient temperature could result in any poisoning bacteria multiplying to large numbers. A failure to cook thoroughly could result in the survival of some food poisoning bacteria.

**Physical or chemical hazards** could occur at any stage in the process and it is unlikely that their removal will be guaranteed at a later stage.

Control measures are those actions taken to prevent, eliminate or reduce hazards to an acceptable level

1. Most physical and chemical hazards affecting catering and retailing will be removed by effective prerequisite programmes.
2. Controls may be general, for example, using approved suppliers, effective cleaning, pest management, staff vigilance and training, good design and effective maintenance.
3. Other controls can be very specific, for example, the time and temperature of cooking or the specific weight of preservatives to be added. For example, to ensure bacteria do not survive the cooking process we would specify a minimum cooking temperature of 75°C. Cooling of the unsliced carcass should be completed within 90 minutes and the turkey placed in the refrigerator. In order to control the multiplication of bacteria we require cooked turkey to be stored in the refrigerator below 5°C and ensure that it is not left at room temperature for longer than 30 minutes. We could therefore specify preparation, slicing and serving, after cooking, should not exceed 20 minutes.

Allergenic hazards and controls- Allergens are substances, usually protein, which cause body's immune system to respond. In some cases this may result in an **anaphylactic shock** and even death.

Although any food can cause a food allergy, a few are thought to be responsible for 90% of allergic reactions to food in the UK. These are known as the 'big eight':

Milk, eggs, peanuts (groundnuts), nuts (almond, hazelnut, cashew, pecan, Brazil nut, pistachio, macadamia), fish, shellfish, soya, wheat/ cereals containing gluten.

Allergen control measures for businesses:

Communication

- Clear menu descriptions/labelling

- Effective staff training
- Knowledge of ingredients
- Listen to customer requirements carefully and convey accurate information to the person preparing the food

### Contamination

- Use reputable suppliers and all products suitably packaged
- Segregation of food at all steps from storage to serving
- Separate preparation areas, utensils, cooking equipment/ oil and cloths
- Discard or clearly label contaminated products

### Cleaning

- Effective hand washing immediately before preparation
- Thorough cleaning of utensils and work surfaces immediately before preparation

Regular audits and effective supervision are important to ensure control measures are working.

2.

### **Determine the critical control points (CCPs)**

**Critical control points** in the process are those steps where control measures must be used to prevent, eliminate or reduce a hazard to an acceptable level. In the example of cooking turkey it was noted that the multiplication of food poisoning bacteria could occur if the turkey was not stored in a refrigerator. However, in the case of raw turkey, the control of pathogens, such as **salmonella**, by refrigerated storage is not critical to food safety. The turkey will be cooked and if it **is cooked thoroughly the food poisoning bacteria will be destroyed.**

However, the storage of raw turkey in a refrigerator is desirable and a requirement of good hygiene practice.

In the case of cooked turkey the multiplication of food poisoning bacteria is very serious and because it will not be subject to any treatment which would kill the bacteria before consumption it is essential that the multiplication of food poisoning bacteria be controlled. In this case, **the storage of cooked turkey in a refrigerator is critical to food safety, i.e. a critical control point.**

**Preventing the contamination of raw turkey with food poisoning bacteria is good hygiene practice. Preventing the contamination of cooked turkey with food poisoning bacteria is critical to food safety.**

A series of questions should therefore be asked at each step in the process to determine whether the step is a control point or a critical control point.

3.

### **Establish critical limits for each CCP**

Critical limits are the values of monitored actions at critical control points which separate the acceptable from the unacceptable. Quantifiable critical limits are preferred and the results obtained on site, preferably immediately, for example, temperature, time, Ph and physical parameters such as weight and size of food.

Critical limits in relation to the multiplication of food poisoning bacteria are stated as a combination of time and temperature. For example, cooked poultry must not be displayed above 8°C for more than 4 hours. In the case of survival of bacteria, cooking temperatures of a least 75°C must be achieved, usually in the deep thigh muscle.

The prevention of contamination usually involves good hygiene practices, effective cleaning and disinfection and high standards of personal hygiene. These are dealt with in the prerequisite programmes.

#### Target levels and tolerances

If a critical level is breached a significant amount of food may need to be destroyed. It is preferable to set target limits, which may enable a potential breach of a critical limit to be detected and remedied before the food becomes unfit. The difference between a critical limit and a target level is known as a **tolerance**.

For example, a critical limit for refrigerated storage of high-risk food could be 8°C for 4 hours. If this critical limit was exceeded all the food in the refrigerator may have to be destroyed. It is therefore sensible to set a target figure of 5°C. If the target limit is breached, for example, if the food is at 6°C this would allow action to be taken before the 8°C was breached and avoid the need to throw the food away. Adjustment of the thermostat may be the only action necessary to bring the process back under control.

Monitoring or checking of control measures at critical control point is essential to confirm that the process is under control and critical limits are not exceeded.

Whichever type of observation or measurement is used for monitoring it must permit rapid detection and correction.

#### **4.**

#### **Monitoring of control measures at each CCP**

##### Methods of Monitoring

Observation  
Supervision and checking records (e.g. date-loggers)  
Organoleptic (smell, touch and appearance of food)  
Checking- controls/records  
Visual inspection (of premises, vehicles or practices)  
Competency  
Measuring (time/temp/weight/pH)

##### Monitoring systems should state

WHAT the critical limits and target levels are

HOW the monitoring should be undertaken

WHERE the monitoring should be undertaken

WHEN the monitoring should be undertaken

WHO is responsible for monitoring

The frequency of monitoring must be cost effective and sufficient to ensure the hazard is controlled.

## 5.

### **Establish corrective actions**

Corrective action is the action to be taken when a critical limit is breached. Firstly, deal with any affected product and secondly, bring the critical control point and the process back under control. Procedures for corrective action should specify the action to be taken, the person responsible for taking action and who should be notified. Management usually take the decision on whether production/ sales should be stopped and when they can be restarted. A clear chain of command is required to avoid delays and ensure the correct action is taken.

There are several ways in which the product outside the critical limit can be treated, for example, the process may be continued, for example, the cooking time can be extended, the product may be destroyed or the shelf life may be reduced, for example, eat within 12 hours instead of 3 days. If a product has been released and it is discovered that a critical limit breached, for example cooked meat contaminated with glass or poisonous chemicals, it will need to be recalled. All products must therefore be clearly labelled and traceable.

## 6.

### **Establish verification procedures**

Verification involves the use of methods, procedures and tests, in addition to those used in monitoring, to determine compliance with the HACCP plan.

For example, what evidence has been obtained to prove that 75°C is a satisfactory temperature for cooking raw meat and destroying pathogens that are likely to be present in practice, small catering and retail businesses are likely to use generic critical limits which are generally accepted by the industry, the scientific community and the enforcement agencies.

Verification will usually involve auditing against the HACCP plan to ensure the correct implementation and ensuring that:

- The flow diagram remains valid, hazards are being controlled, monitoring is satisfactory and, where necessary, appropriate corrective action has been or will be taken.
- The scientific data relating to hazards and risks may be reexamined along with monitoring records,
- Random bacteriological sampling, end product testing and analysing complaints for types and trends are also verification techniques.

- Verification frequency should ensure confidence in the system to provide safe food and may require external expertise.

The HACCP plan should be reviewed periodically to ensure that it remains effective. New epidemiological information or the availability of new technology or scientific information may trigger reviews.

Reviews are required when a justified complaint is received or illness occurs.

Reviews may be required if raw materials are changed, for example:

- The use of fresh chicken instead of frozen
- Home made mayonnaise instead of bought
- The recipe changes, e.g. salt is removed
- Equipment changes, e.g. blast chiller is introduced
- Packaging or distribution changes, e.g. refrigerated transport is utilized

Reviews are useful to identify new products that have not been added to the HACCP plans. They should also be used to identify weaknesses in the system and to eliminate unnecessary or ineffective controls.

7.

### **Established documentation and record-keeping**

The amount and type of paperwork required to support HACCP systems varies considerably depending on the type and size of food business and the risks involved with the processes.

Generally, documentation and record-keeping must be proportionate to the particular size and type of business.

Documentation is useful to demonstrate that food safety is being managed and, provided records are completed accurately at the appropriate time, they are useful to support a due diligence defence if this is required in court.

Records are very useful for investigating food complaints and alleged food poisoning claims. Managers use them when auditing and enforcement officers/external auditors will wish to examine them.

Documentation includes:

The HACCP team and responsibilities  
 A floor plan  
 Approved supplier list  
 Hazard analysis including product or process description  
 Critical control point determination and flow diagram  
 Critical limit determination  
 HACCP control charts  
 Verification details  
 Monitoring records  
 Prerequisite programmes

Records include:

CCP monitoring activities  
Deviations and corrective actions  
Modifications to the HACCP system  
Audit reports  
Customer complaints  
Calibration of instrument  
Prerequisite programme monitoring activities

All monitoring records should be signed and dated by the food handler undertaking the monitoring and countersigned by the supervisor.