



THE QUEEN'S AWARDS  
FOR ENTERPRISE  
2016



# Food Safety

## HANDBOOK

*Richard A. Sprenger*



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# Food Safety HANDBOOK

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The images below highlight important information about **your responsibility** as a food handler and **what the law says** about this. Make sure you read and understand these sections as you go through the book.



**YOUR responsibility**



**what the LAW says**

## GLOSSARY

Important terms used throughout this book have been highlighted in **bold red** text. A definition of each term can be found in the glossary at the end of the book.





## Introduction to food safety

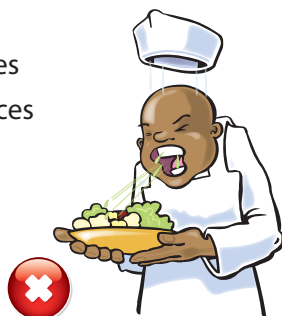
**Food poisoning** usually occurs within one to 36 hours of eating contaminated or poisonous food. Symptoms normally last from one to seven days and include one or more of the following: **abdominal pain, diarrhoea, vomiting, feeling sick, fever, dehydration** and **collapse**. Every day thousands of people in the UK suffer from food poisoning. Many of these will be very ill and some of them will die. Those most at **risk** include the very young, the elderly, persons who are already ill or recovering, and pregnant women and their unborn babies.

The main reasons for food poisoning are negligence, ignorance, poor management, a poor food safety culture and a failure to implement good practices. Effective instruction and training will prevent food poisoning if the good practices food handlers are taught are implemented in the workplace.

This book provides food handlers with the information to control **food safety** hazards. If this knowledge is applied in your food business you should not be responsible for causing a food poisoning outbreak.

### The MAIN FAULTS contributing to food poisoning outbreaks include:

- ✘ preparing food too far in advance and storing at room temperature
- ✘ cooling food too slowly
- ✘ not reheating food to high enough temperatures
- ✘ buying food from unreliable suppliers and sources
- ✘ undercooking
- ✘ not thawing food thoroughly
- ✘ cross-contamination
- ✘ eating contaminated raw food
- ✘ storing hot food below 63°C
- ✘ unhygienic and infected food handlers



**Food handlers are potentially the most serious hazard in a food business**

## Hazards

A **hazard** is the potential to cause harm to the consumer and the main hazards are:

- ✘ **(Micro)biological**, such as **bacteria**, **viruses**, moulds and parasites, e.g. tapeworms
- ✘ **Physical**, such as glass, screws, stones and hair
- ✘ **Chemical**, such as pesticides and cleaning chemicals
- ✘ **Allergenic**, such as peanuts, tree nuts, sesame seeds, eggs and milk



**ALLERGENIC HAZARDS**

## Understanding food hygiene/safety

**Food hygiene** is more than just cleanliness: it also includes all practices involved in:

- ✔ Obtaining food from a reliable, approved source
- ✔ Protecting food from risk of **contamination**
- ✔ Preventing any bacteria present from multiplying to high numbers
- ✔ Destroying any harmful bacteria in the food by thorough cooking or processing
- ✔ Throwing away unfit or contaminated food



**Dispose of any deliveries of food products contaminated by pests**

## The cost of poor food hygiene/safety:

- ❌ Food poisoning outbreaks and sometimes death
- ❌ Food contamination and customer complaints
- ❌ Brand damage and loss of trade
- ❌ Pest infestations
- ❌ Wasted food due to spoilage
- ❌ The closure of food premises by local authority action
- ❌ Fines and costs of legal action taken
- ❌ Civil action taken by food poisoning sufferers
- ❌ Lower profits



If businesses lose money, employees may lose overtime, bonuses or even their jobs. It is therefore in the best interests of everyone to observe the highest standards of food hygiene.

## The benefits of good food hygiene/safety:

- ✅ Satisfied customers, a good reputation, increased business and brand protection
- ✅ Compliance with food safety law
- ✅ Less food wastage and increased shelf life of food
- ✅ Good working conditions, higher staff morale and lower staff turnover, which increases productivity
- ✅ Higher profits



HIGHER STAFF  
MORALE

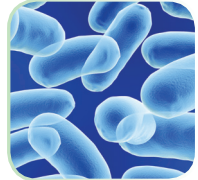


## Microbiological hazards (bacteria)



Microbiological hazards include the:

- **contamination** of food by bacteria, **viruses** and moulds
- multiplication of bacteria within food
- survival of bacteria or other **pathogens** because of inadequate cooking or processing



To control these hazards we need to understand bacteria, where to find them, how they get into food, how they multiply and how they can be destroyed.

### Bacteria

Bacteria are microscopic organisms, often referred to as germs. Most bacteria are harmless and some are essential, for example, for breaking down waste, or for manufacturing food such as cheese or yogurt.

A small number of bacteria, known as spoilage bacteria, cause food to spoil or become unfit. We do not normally eat spoilt food because it smells "off" and may be slimy and rotten.

Other bacteria, such as **food poisoning** bacteria are known as pathogens. If pathogens get into food they make people ill. Pathogens have **no** effect on the appearance, taste or smell of food and can only be detected by laboratory testing.

It is not possible to operate a food business without food poisoning bacteria being present at one time or another. It is therefore essential that we prevent them from contaminating **ready-to-eat food** and deny them the conditions, which allow them to multiply to a level where they present a risk to customers.

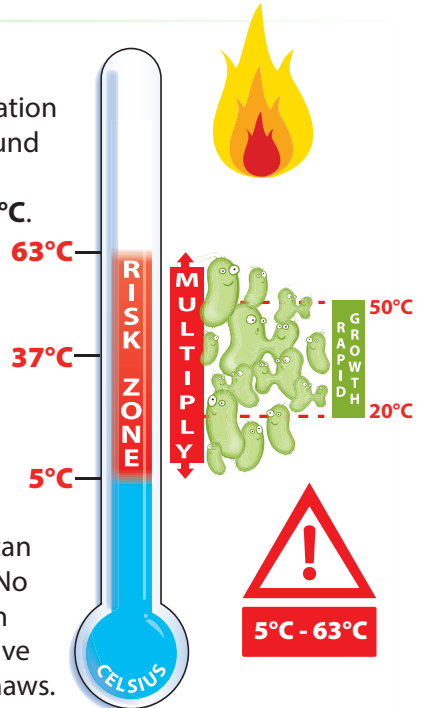
## Requirements for bacterial multiplication

Bacteria responsible for causing **food poisoning** need the following conditions to enable them to multiply and produce **toxins** (poisons). Toxins may be released in our body or in food. Some toxins cannot be destroyed by normal cooking and are very dangerous.

### → WARMTH:

The best temperature for the multiplication of most food poisoning bacteria is around 37°C (body temperature). They can multiply quickly between 20°C and 50°C. To reduce the risk of the multiplication of food poisoning bacteria and the risk of prosecution, the temperature of food should be kept below 5°C or above 63°C (the **risk zone**).

Some food poisoning bacteria will multiply rapidly in food rooms above 20°C, but most will not multiply in a refrigerator (1°C to 4°C). The few that can multiply below 5°C do so very slowly. No food poisoning bacteria can multiply in frozen food (-18°C), but many will survive and start multiplying when the food thaws.



### → FOOD AND MOISTURE:

Bacteria prefer foods which contain nutrients and moisture especially raw or cooked meat, poultry and dairy produce. Foods such as dried egg or milk powder do not provide the moisture necessary for the growth of bacteria. To help identify hazards effectively food is often categorised into the following groups:

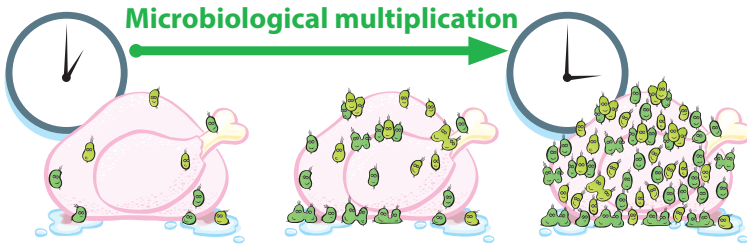


- **High-risk foods**
- **Low-risk foods**
- **Raw foods to be cooked**
- **Ready-to-eat raw foods**



## TIME:

Given the right conditions of food, moisture and warmth, some bacteria can divide into two every ten minutes. This process is known as **binary fission**. If there is sufficient time, a few bacteria can multiply to such an extent that there are enough present to cause food poisoning. It is essential that high-risk foods are not left in the **risk zone** for longer than is absolutely necessary and especially not between 20°C and 50°C.



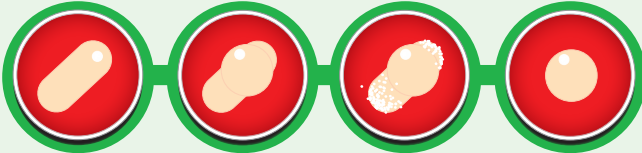
**In 2 hours 1,000 bacteria can become millions.**

Some bacteria are able to produce **spores**, which protect them against harmful conditions such as high temperatures, drying and **disinfection**. Some spores can survive boiling for up to **5 hours**. Spores are a resting phase and they do not multiply. When favourable conditions return the spore releases the bacterium, which can then start to grow and multiply. This process is known as germination.



## Bacterial spores

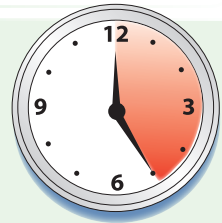
### UNSUITABLE CONDITIONS



Cell

Spore forms in cell

Cell breaks up releasing spore



### SUITABLE CONDITIONS



Spore germinates

Cell produced and multiplies

## High-risk foods

**High-risk foods** are ready-to-eat foods, which support the multiplication of harmful bacteria and include most cooked foods. These foods are usually **proteins**.

- ➔ Protect them from contamination.
- ➔ Keep refrigerated to prevent bacteria multiplying.
- ➔ Keep separate from raw foods.

Examples include:

- ➔ Cooked meat and cooked poultry
- ➔ Cooked meat products such as pâtés, gravy, stews, meat pies and stock
- ➔ Milk, cream, soft cheese, custards and dairy produce
- ➔ Eggs and products made from raw eggs, e.g. mayonnaise, desserts
- ➔ Shellfish and other seafoods especially oysters, prawns and crabs
- ➔ Cooked rice

Cooked pasta, bean sprouts, jacket potatoes, cut tomatoes and cut melons have all been implicated in food poisoning outbreaks and should be considered as high-risk foods.



High-risk foods are often involved in outbreaks of **food poisoning**. Unfortunately, contaminated food usually looks, tastes and smells completely normal and is unlikely to be detected.

Raw meat for cooking is not considered to be **high-risk food** because **food poisoning** bacteria will be destroyed by cooking.

## Low-risk foods

Bacteria cannot multiply in dry food or food containing high concentrations of sugar, salt, acid and other preservatives. These foods are known as low-risk. They include cereals, dried pasta, bread, biscuits, jam, canned food and crisps. When water is added to dried food such as milk powder it becomes high-risk and must be stored under refrigeration or used immediately.



Examples of low-risk foods

## Raw foods to be cooked

Raw foods are likely to already be contaminated with large numbers of food poisoning organisms and must be kept separate from **ready-to-eat foods**. The food poisoning organisms will be destroyed by thorough cooking.

## Ready-to-eat raw foods

Raw foods such as salads or fruit may be contaminated with bacteria and **viruses** which may cause illness even when present in very low numbers. They must always be washed in running water before eating.



(NB bean sprouts, cut melons, tomatoes, raspberries, spinach and lettuce have been involved in food poisoning outbreaks.)



Ensure ready-to-eat raw foods are washed thoroughly under running water



## Spoilage & preservation

Spoilage commences in food as soon as it is harvested, taken from the sea or slaughtered. Spoilage results from the action of bacteria, moulds, and yeasts. Poor hygiene practices, including poor temperature control, inadequate or unsuitable packaging and bad handling, result in damage and accelerate (speed up) spoilage, as does pest infestation. Unlike food contaminated with pathogens, the effects of food spoilage can be seen, felt, tasted and smelled.

### → Signs of SPOILAGE include:

- ✘ Off-odours
- ✘ Discolouration
- ✘ Slime/stickiness
- ✘ **Mould** growth
- ✘ Changes in texture, e.g. dry or spongy
- ✘ Unusual taste, e.g. sour
- ✘ The production of gas
- ✘ Blown cans or leaking packs



Packaging is very important to extend the life of preserved foods, e.g. cans, tetrapacks, bottles and pouches. Once opened, the food should be treated as fresh and stored under refrigeration. Pasteurised food, smoked food and vacuum packed meat should also be stored under refrigeration.

### **YOUR responsibility**

To learn about bacteria and how they can be controlled.

To protect food from contamination.

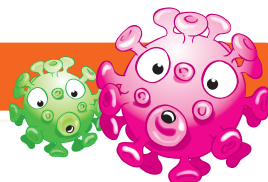
To make sure spoilt or unfit food is not sold.





## Food poisoning & its control

→ Food poisoning may be caused by:



- ✗ Bacteria or their **toxins**
- ✗ Viruses (multiply in living cells, not in food or water)
- ✗ Poisonous chemicals such as pesticides, cleaning agents and weedkillers
- ✗ Poisonous metals such as lead, copper and mercury
- ✗ Poisonous plants such as deadly nightshade and toadstools
- ✗ Poisonous fish or shellfish
- ✗ Moulds (rare)



### Chemical food poisoning

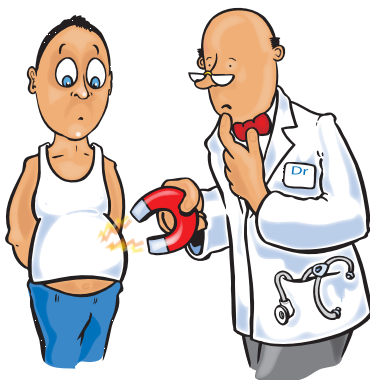
**Food poisoning** from chemicals is rare and usually accidental. It may result from poisonous chemicals being stored in unlabelled food containers, **contamination** of food by significant amounts of chemicals (insecticides or cleaning agents) or large amounts of chemical additives.



Never use sprays when there is open food about

### Metallic food poisoning

Acute metallic food poisoning is also quite rare and usually results from acid food or drink being in contact with certain metals such as copper or zinc. Symptoms, mainly vomiting and abdominal pain, usually develop within an hour.



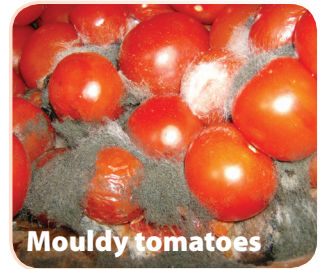
### Poisonous plants/fish

Poisonous plants rarely cause food poisoning in commercial premises. However, cases of poisoning from toadstools, tea contaminated with deadly nightshade, undercooked red kidney beans and the Japanese puffer fish have been recorded.



### Moulds (mycotoxins)

Moulds are often responsible for the spoilage of food, especially baked products and fruit, due to prolonged unsatisfactory storage. However, some moulds produce mycotoxins which cause illness and sometimes death. Fortunately, this is rare. Foods involved include nuts, figs and apple juice.



## IMPORTANT FOOD POISONING ORGANISM

BACTERIA	SOURCES	ONSET PERIOD	Typical Symptoms & Duration of Illness
<i>Salmonella</i>	Raw meat, raw milk, raw eggs, raw poultry, fruit and salads, carriers (intestines), pets, rodents, terrapins, flies, sewage/water.	Usually <b>12</b> to <b>36</b> hours	Abdominal pain, diarrhoea, vomiting and fever ( <b>1</b> to <b>7</b> days).
<i>Clostridium perfringens</i>	Animal and human excreta, soil (on vegetables), dust and raw meat.	Usually <b>8</b> to <b>12</b> hours	Abdominal pain, diarrhoea, vomiting is rare ( <b>12</b> to <b>48</b> hours).
<i>Staphylococcus aureus</i>	Human nose, mouth, skin, boils and cuts. Raw milk from cows or goats.	<b>1</b> to <b>7</b> hours	Abdominal pain, mainly vomiting, some diarrhoea, low temperatures ( <b>6</b> to <b>24</b> hours).



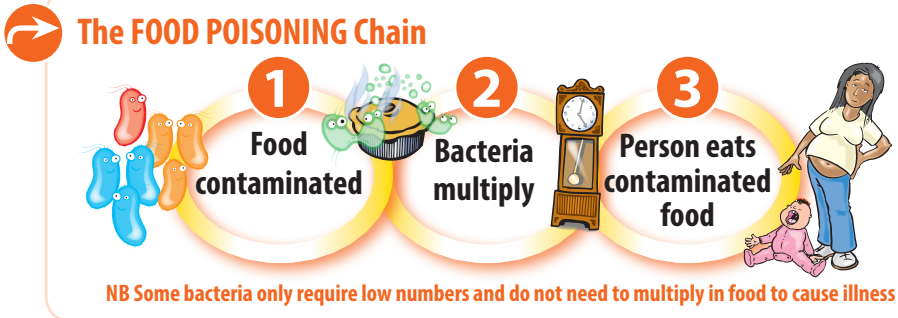
## IMPORTANT FOOD POISONING ORGANISMS *continued*

BACTERIA	SOURCES	ONSET PERIOD	Typical Symptoms & Duration of Illness
<i>Clostridium botulinum</i>	Soil, fish, meat and vegetables.	Usually <b>12 to 36</b> hours	Difficulties in swallowing, talking and breathing, double vision and paralysis of the cranial nerves. Fatalities are common and <b>the recovery of survivors may take several months.</b>
<i>Bacillus cereus</i> (i) <i>Toxin in food</i>	Cereals, especially rice, dust and soil.	<b>1 to 6</b> hours	Vomiting, abdominal pain and some diarrhoea ( <b>12 to 24</b> hours).
(ii) <i>Toxin in intestine</i>	As above.	<b>6 to 24</b> hours	Abdominal pain, diarrhoea and some vomiting ( <b>1 to 2</b> days).
* <i>Campylobacter</i> (most common cause of diarrhoea from bacteria)	Raw poultry/meat/milk, farm animals, pets, birds, sewage and untreated water.	<b>2 to 5</b> days	Diarrhoea (often bloody), abdominal pain, nausea and fever.
* <i>E. coli O157</i> (often fatal for the elderly and young children)	Intestines of people and animals, sewage and untreated water.	Usually <b>3 to 4</b> days	Nausea, diarrhoea, often bloody and abdominal cramps. Kidney failure, especially children.
* <i>Listeria</i> (multiplies in refrigerated foods, even below 3°C)	Soil, sewage, water, vegetation, people, animals and birds.	<b>1 to 70</b> days	Flu-like symptoms. Vomiting, diarrhoea and fever. Miscarriage in pregnant women.
* <i>Norovirus</i> (only multiplies in the body)	Ill people, the environment and sewage. (Airborne and person-to-person)	Usually <b>24 to 48</b> hours	Vomiting (projectile), diarrhoea, abdominal pain and fever.
* <i>Typhoid</i>	Carriers, sewage/manure and water.	Usually <b>8 to 14</b> days	Fever, nausea, headache, rose spots on trunk, slow pulse, anorexia, constipation and sometimes diarrhoea (severe).

\*These organisms are also known as foodborne diseases.

## The control of food poisoning

Food poisoning rarely occurs because of a single isolated mistake. Food poisoning results from management failing to identify hazards and/or failing to control these hazards. The food poisoning chain consists of three links:



Controlling these hazards breaks the chain and prevents food poisoning.

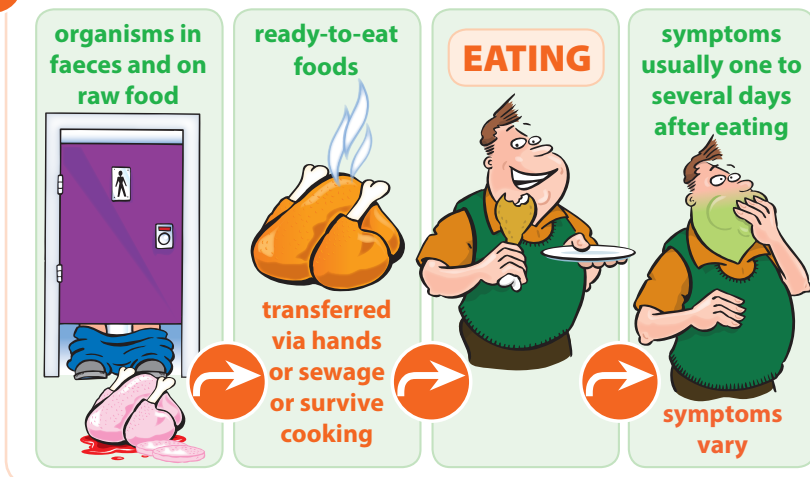
### Prevent contamination by:

- ✔ Purchasing food from approved suppliers.
- ✔ Effective instruction, supervision and training of food handlers.
- ✔ High standards of personal hygiene and good hygiene practices (keep food covered and minimise handling) and the provision of adequate, suitable facilities for personal hygiene.
- ✔ Separation of raw and **ready-to-eat food** at all stages of delivery, storage, preparation, serving and distribution.
- ✔ Effective **cleaning** and **disinfection**.
- ✔ Well-designed and constructed food premises and food rooms.
- ✔ Effective pest control.
- ✔ Effective storage and disposal of waste and unfit food.
- ✔ Well-designed and proper use of suitable equipment/utensils.
- ✔ Ensure food handlers who are unwell or suffering from food poisoning are excluded from food handling duties until they have fully recovered.



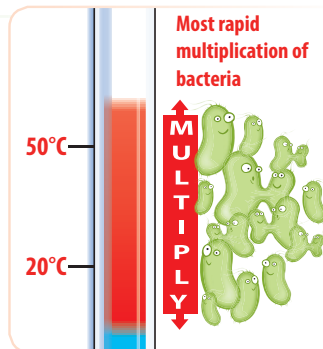
**AVOID HANDLING FOOD**

## The FAECAL-ORAL Route



### Prevent bacteria within food from multiplying by:

- ✓ Storing food below 5°C, e.g. in a refrigerator, or keeping food above 63°C, e.g. in a hot cabinet.
- ✓ Ensuring that during preparation food is at room temperature for as short a time as possible.
- ✓ Cooling food as quickly as possible.
- ✓ Good stock rotation.
- ✓ Not allowing dried foods to absorb moisture.
- ✓ Using suitable preservatives such as salt, sugar or vinegar (acid).



### Prevent customers eating contaminated food by:

- ✓ Disposing of all contaminated, spoiled, unfit or out-of-date food.
- ✓ Ensuring foods such as pâté, soft cheese and oysters are not served to **vulnerable (risk) groups**, such as pregnant women, and that honey is not served to babies under 1 year old.

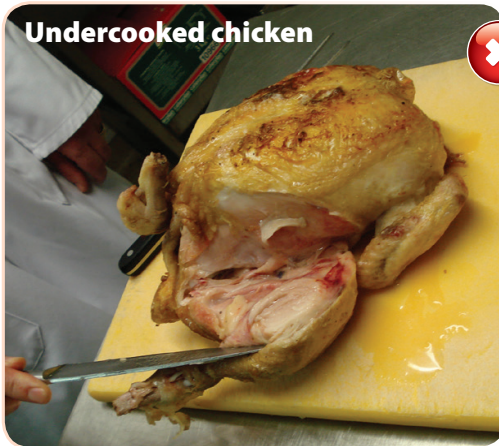
- ✔ Removing bacteria from ready-to-eat raw food such as salad, by thorough washing.
- ✔ Destroying bacteria in raw food by:
  - thorough cooking
  - heat processing
  - **sterilisation** or canning



**NB Bacteria can also be destroyed by irradiating food, for example spices, and using chemicals, e.g. chlorination of water.**

A combination of a suitable temperature and sufficient time is always required to destroy bacteria. Cooking temperatures of at least 75°C should normally be achieved at the centre of food to ensure safety. Foods such as stews should be boiled at temperatures approaching 100°C.

**DO NOT** rely on colour to make sure food is cooked properly. Use a thermometer.



## YOUR responsibility

- To know the symptoms of food poisoning.
- To learn about food poisoning and its control.
- Not to handle food if you suspect you have food poisoning.





## Contamination hazards & controls

Food may be contaminated before or during delivery or may become contaminated as a result of poor hygiene practices.

**Microbiological hazards (micro-organisms including: bacteria; viruses; parasites, moulds and yeasts):**

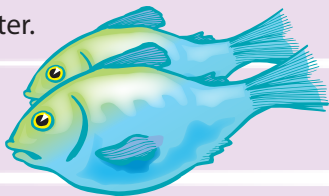
➤ **Bacterial contamination** - usually occurs within food premises because of ignorance, poor hygiene practices, inadequate space, poor design or because of food handlers taking short cuts.



**Bad food preparation areas**

➤ **Viral contamination** - may involve an infected person, polluted irrigation water used on salad vegetables or oysters grown in sewage-contaminated water.

➤ **Parasites** - found in raw meat or fish. (They grow in the live animal or fish.)



➤ **Moulds and yeasts** - are primarily responsible for spoilage.

To control microbiological hazards effectively it is important to know what brings **pathogens**, especially food poisoning bacteria, into food premises. These are known as **sources** of food poisoning bacteria.

## Sources of food poisoning bacteria include:

➔ **People:** People commonly harbour food poisoning bacteria in the nose, mouth, intestine, cuts and on the skin. Food may be contaminated by the hands, sneezing or coughing, or by sewage-contaminated water.



PEOPLE

➔ **Water:** Only drinking water should be used in food businesses.



➔ **Raw food:** Raw food often contains large numbers of food poisoning bacteria, especially red meat, poultry, raw milk, raw eggs, bean sprouts and shellfish such as oysters. Raw food should always be kept separate from ready-to-eat food. The liquid from thawing foods, especially frozen poultry, must not be allowed to contaminate wiping cloths, ready-to-eat food or equipment used for ready-to-eat food.



➔ **Pests (including insects & rodents):** There are a number of pests known to transmit food poisoning bacteria. This may be from their bodies, droppings, by eating food and by cross-contamination, e.g. from objects contaminated with urine to ready-to-eat food. Food-contact surfaces which may have been contaminated by pests must be disinfected before use. Food suspected of being contaminated must be destroyed.



➔ **Soil:** Soil harbours harmful bacteria, and care must be taken when bringing vegetables into food rooms. Paper towels or separate, colour-coded, clean cloths should be used for cleaning raw and ready-to-eat food surfaces.

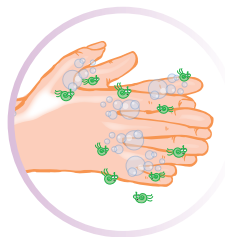
➔ **Dust:** There are always large numbers of bacteria in dust and floating about in the air. Open food should always be removed or covered when **cleaning** is carried out, especially dusting and sweeping.

➔ **Waste & unfit food:** Care must be taken to avoid contamination of food from waste.



### Vehicles and routes of bacterial contamination

Sometimes, harmful bacteria pass directly from the source to ready-to-eat food, but, as bacteria are usually static and the sources may not be in direct contact with food, the bacteria rely on other things to transfer them to food. These things are known as vehicles and the main ones are:



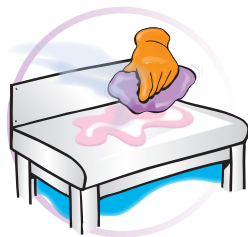
HANDS



CLOTHS & EQUIPMENT



HAND-CONTACT SURFACES



FOOD-CONTACT SURFACES

**Cross-contamination** is the transfer of the bacteria from a source (often raw food) to ready-to-eat food by either direct or indirect means.

➔ **DIRECT** - for example, raw meat touches cooked meat, or where a raw food drips onto ready-to-eat food (for example, blood from raw meat dripping onto cooked meat due to incorrect storage in a refrigerator).

➔ **INDIRECT** - for example, when a food handler prepares cooked meat after handling raw meat without washing their hands or when the same surface is used for both raw food and ready-to-eat food without cleaning and disinfecting between uses.



## SOURCES, VEHICLES AND ROUTES OF CONTAMINATION

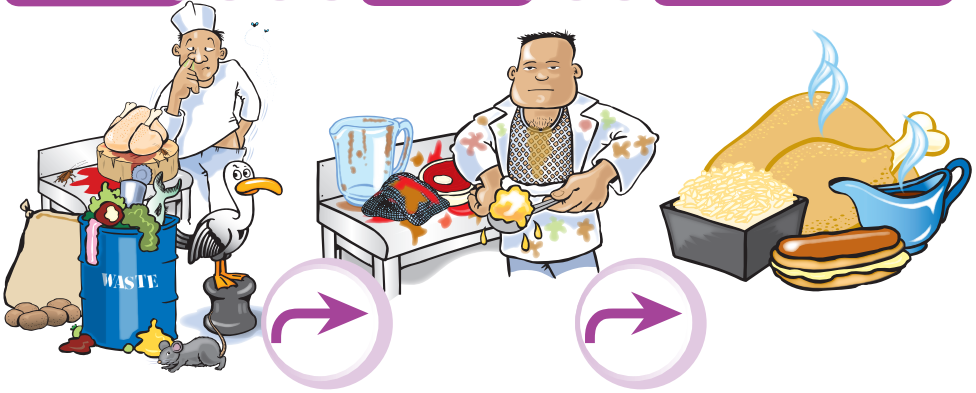
SOURCES



VEHICLES



READY-TO-EAT FOOD



### Control of cross-contamination

- ✔ Effective instruction, supervision and training of food handlers
- ✔ Separation of raw and ready-to-eat food (colour-coding)
- ✔ Effective cleaning and disinfection
- ✔ Use of disposable paper cloths or colour-coded cloths
- ✔ Not using washbasins for washing food or equipment





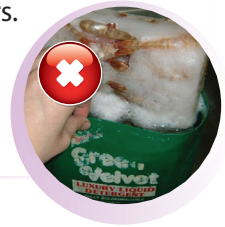
## Chemical hazards and controls

Deliveries of food may be contaminated with chemicals such as pesticides and weed-killers. Food may be contaminated in food rooms because of poor cleaning or pest control practices.

- ➔ Approved suppliers should always be used.
- ➔ Cleaning chemicals should be delivered separately or completely segregated from food.
- ➔ A lockable area is recommended for chemical storage, separate from food.
- ➔ **Cleaning** and pest control must never expose food to **risk of contamination**, for example, spraying near food.
- ➔ Cleaning chemicals must never be transferred to unmarked bottles, or food containers.
- ➔ Food should never be stored in old chemical containers.
- ➔ Only food-grade packaging should be used.
- ➔ Chemicals must always be used in accordance with the manufacturers' instructions.



Frozen prawns stored in an old chemical container



## Allergenic hazards and controls

**Allergens** are substances, usually protein, which cause the body's immune system to respond. In severe cases this may result in an anaphylactic shock and even death. Symptoms may include:

- ➔ Swelling of the throat and mouth
- ➔ Asthma
- ➔ Sudden feeling of weakness (fall in blood pressure)
- ➔ Nettle-rash
- ➔ Flushing of the skin
- ➔ Difficulty in swallowing or speaking
- ➔ Abdominal pain, feeling sick and/or vomiting
- ➔ Collapse





Foods which commonly contain **allergens** and which must be identified as allergens in food labels are:

- |                             |            |                   |
|-----------------------------|------------|-------------------|
| ➔ Celery                    | ➔ Fish     | ➔ Nuts            |
| ➔ Cereals containing gluten | ➔ Lupin    | ➔ Peanuts         |
| ➔ Crustaceans               | ➔ Milk     | ➔ Sesame seeds    |
| ➔ Eggs                      | ➔ Molluscs | ➔ Soya            |
|                             | ➔ Mustard  | ➔ Sulphur dioxide |

(nb. it is also necessary to identify products made from these foods)

### Staff action in the event of a customer suffering from anaphylactic shock

All staff must be aware of the procedures. The customer should not be moved and an ambulance should be called using the emergency number. The customer should be asked if they have a pre-loaded adrenaline injection kit and be encouraged to use it.

### Allergen CONTROL MEASURES for businesses

#### ➔ COMMUNICATION:

Clear menu descriptions/labelling

**Effective staff training**

Having information and knowledge of ingredients in all foods so that customers are given accurate information about their food

Listen to customer requirements carefully and provide accurate information to the person preparing the food.

#### ➔ CONTAMINATION:

Use approved suppliers.

**All products must be suitably packaged.**

Segregate foods prepared for people at risk; use separate preparation areas, utensils, cooking equipment/oil and cloths.

**Discard or clearly label contaminated products.**

#### ➔ CLEANING:

Effective handwashing 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.

## YOUR responsibility

To learn about hazards and how they can be controlled.

To observe all Company rules.

To protect food from contamination.





## Food handlers & personal hygiene

Most people carry some type of **food poisoning** organism at one time or another, especially when they have diarrhoea and/or vomiting. Food handlers have a moral and legal responsibility to observe high standards of personal hygiene to ensure that they do not contaminate food.



Because our body temperature is 37°C, it is ideal for the growth of most food poisoning pathogens, either in the intestines or on our skin. Food handlers should keep themselves clean and a daily shower is recommended. Food handlers are potentially the most serious **hazard** in a food business. Bad practices of food handlers may result in the **contamination** of **high-risk food** with food poisoning organisms or physical contaminants.

### Hands

As the hands are in direct contact with food, they are the most common vehicle for transferring food poisoning bacteria. Hands must be kept clean at all times. The correct handwashing procedure is essential to prevent contaminating food. A non-hand operated warm water spray is preferred. The hands should be wet and sufficient liquid soap applied to ensure a good lather. The fingertips, between the fingers, the thumbs, the hands, and the wrists should all receive attention. Where necessary, e.g. after visiting the toilet, a clean, soft-bristled nailbrush should be used to brush and lather the fingertips and clean under the fingernails, (the nailbrush must be kept clean). The hands should be rinsed thoroughly in warm running water (30°C to 40°C) to remove all the lather, bacteria and dirt. Efficient drying of the hands with clean disposable paper towels is essential and will reduce the number of bacteria remaining. A paper towel may be used to turn off taps. Reusable towels should not be used.



Food handlers must wash their hands regularly throughout the working day and especially:



### CRITICAL

After visiting the toilet

On entering the food room, after a break and before handling food

After cleaning up animals' faeces (stray cats or guard dog) or handling boxes, or waste contaminated by bird droppings

After putting on or changing a dressing

After dealing with an ill customer or a baby's nappy

After handling raw food, including eggs, and before handling ready-to-eat food

### IMPORTANT

After combing or touching the hair, face, nose, mouth or ears

After handling waste food or rubbish

After cleaning, or handling dirty cloths, crockery, etc

After handling external packaging, flowers or money



### what the LAW says

Washbasins must be provided with hot and cold water, soap and drying facilities.



Fingernails may harbour bacteria and should be kept short and clean. Nail varnish and false fingernails may contaminate food and should not be used. Food handlers should avoid actions such as biting their nails and licking fingers.

### The nose, mouth and ears

Up to 40 per cent of adults carry harmful bacteria in the nose and mouth. Coughs and sneezes carry droplet infection for a considerable distance and persons with bad colds should not handle open food. Staff should turn away from food and cough or sneeze into the upper arm or shoulder. Disposable

single-use paper tissues are preferable to handkerchiefs. The hands must always be washed after using a tissue or handkerchief. Picking or scratching the nose is not acceptable. Sleeves should never be used for wiping the nose. As the mouth is likely to harbour germs, food handlers should not eat sweets, chew gum, taste food with a finger or an unwashed spoon, or blow into glasses to polish them. Spitting is not allowed.



### Clean cuts, sores and spots

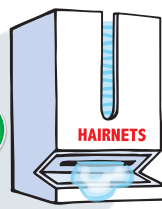
Cuts, spots and sores provide an ideal place for bacterial multiplication. To prevent **contamination**, these lesions should be completely covered by waterproof dressings, preferably coloured blue to aid detection if they fall off. Cuts on fingers may need the extra protection of waterproof fingerstalls.

### Jewellery and perfume

Food handlers should not wear earrings, watches, jewelled rings or brooches, as they harbour dirt and bacteria. Furthermore, stones and small pieces of metal may end up in the food. Food handlers should not wear strong-smelling perfume or aftershave, as it may taint foods.

### The hair

Hair is constantly falling out and, along with dandruff, can result in contamination of food. The scalp often contains harmful bacteria and must be shampooed regularly. To prevent hair getting into food, long hair should be tied back and suitable head covering and/or hairnets worn by all food handlers.



Head covering should always be put on before other protective clothing. Combing of hair and adjustments to head covering should only take place in cloakrooms and should not be carried out whilst wearing protective clothing, as hairs may end up on the shoulders and then in the product.

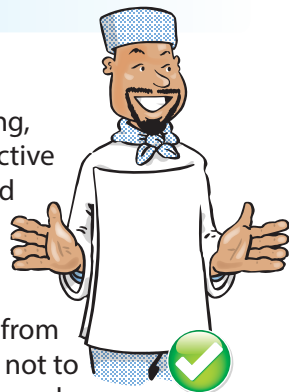
### Smoking

If food handlers smoke at break time, they should change out of protective clothing before leaving the building as clothing may become contaminated. In addition, smoking can result in microbiological (from hand to mouth contact when smoking) and physical contamination (from cigarette ends and ash). It also encourages coughing and may result in droplet infection.

## Protective clothing

Food handlers must wear clean and washable over-clothing, preferably light-coloured without external pockets. Protective garments should be appropriate for the work being carried out and should completely cover ordinary clothing.

Sleeves of jumpers and shirts must not protrude and, if short-sleeved overalls are worn, only clean forearms must be visible. Protective clothing is worn to protect the food from **risk of contamination** (microbiological and physical) and not to keep our own clothes clean. Dust, pet hairs, woollen fibres and pathogens are just a few of the contaminants carried on ordinary clothing.



Protective clothing should not be worn outside the food premises, e.g. not used to travel to and from work and not worn during lunchtime sporting activities. Outdoor clothing and personal effects must not be brought into food rooms unless stored in suitable lockers. Protective clothing should not be hung in toilets. Hands should not be wiped on protective clothing, especially after handling raw meat or poultry. Protective clothing should be removed when visiting the toilet. This is particularly important for food handlers involved with preparing **ready-to-eat food**.

## General health and reporting of illness

Food handlers should be in good health. Food handlers suffering from diarrhoea, vomiting or a foodborne illness must not handle food. They must notify their supervisor who must exclude them from any work which would expose food to risks from **pathogens**. They should not return to work until symptoms have been absent for at least 48 hours and they have finished taking any medication. Food handlers who have consumed a meal known to have caused **food poisoning** or live in the same household as a confirmed case or have suffered from diarrhoea or vomiting whilst abroad should also report to the supervisor, who will probably require them to visit the doctor. The doctor should be advised if a patient is a **food handler**. Food handlers with skin infections, infected cuts, boils, heavy colds and ear or eye discharge must also be excluded and should not resume food handling duties without clearance. Even a boil on the leg may result in a **hazard** if, for example, a dressing is changed and hands are not washed properly.



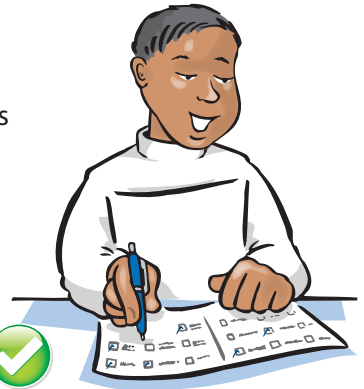
## Hygiene training

All food handlers must be aware of the hygiene hazards associated with their job and the controls necessary to ensure the safety of food produced.

A training programme should be implemented to ensure the competency (skill and knowledge) of all food handlers to produce **safe food**.

Programmes should include induction training before new staff handle food, Level 1 training for low-risk food handlers and Level 2 training of **high-risk food** handlers within 3 months.

The knowledge gained on courses must be implemented to comply with the law. Continuous refresher training is also recommended to ensure staff keep up to date and continue to follow good hygiene practices.



## what the LAW says

**Food handlers must have high standards of personal cleanliness and wear suitable protective clothing.**

**Food handlers with a foodborne disease, or with infected wounds, skin infections, sores or diarrhoea must not handle food and must report to their supervisor (food business operator) any symptoms or illness.**

**Food handlers must be supervised and instructed and/or trained in food hygiene matters commensurate with their work activity.**

## YOUR responsibility

**To keep yourself, your protective clothing and your hands clean.**

**To cover cuts with waterproof blue plasters.**

**To report food poisoning symptoms or skin infections to your supervisor before handling food.**

**To report to your supervisor if there is no soap, hot water or drying facility.**

**To successfully complete and implement your food safety training.**

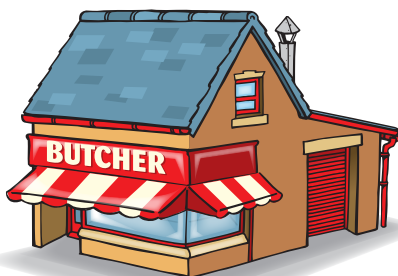




## Food premises & equipment

### Design of food premises

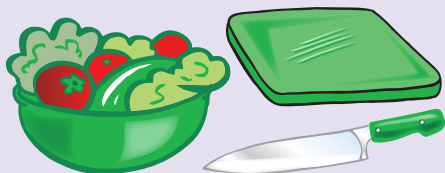
The satisfactory design and maintenance of food premises is essential to avoid hazards of **contamination** and the multiplication of bacteria. The food preparation and storage areas must be large enough to site all equipment, enable the effective separation of raw and ready-to-eat food and permit satisfactory workflows for food, food handlers, dirty pots, pans, equipment and waste. Premises must be kept clean and in good repair and condition.



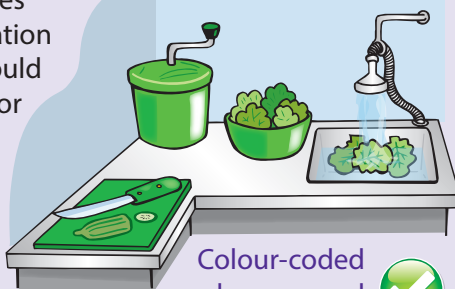
Raw food preparation areas and high-risk preparation areas should be provided with separate equipment and have separate facilities for securing handwashing, and washing equipment and utensils. The following design principles should be followed:



→ **Cross-contamination** should be eliminated; clean and dirty processes and raw and high-risk food preparation must be separated. Work areas should be colour-coded. A separate area for de-boxing should be provided.



SALAD PREPARATION ONLY



Colour-coded workspaces and equipment.



→ **Workflow** should be linear and progress in a uniform direction from raw material to finished product.

→ **Suitable and sufficient facilities** for personal hygiene, **cleaning** and disinfecting equipment, and washing food must be provided, together with adequate supplies of hot and cold water. Washbasins should be positioned close to workstations and at the entrance of large food rooms. They should not be used for washing food or equipment to avoid **cross-contamination**.



→ **Adequate refrigeration** to cater for peak demand is essential to avoid the multiplication of bacteria.

→ **Adequate cooking and cooling** facilities must be provided. Flexible gas pipes should be used to allow movement of equipment for cleaning.

→ **Insects, rodents and birds** must be denied access and harbourage.

→ **Suitable staff facilities** must be provided including toilets, separated from food rooms by ventilated spaces.



→ **Adequate drainage** capable of removing peak loads quickly without flooding must be provided.

→ **Air conditioning** will ensure reasonable working conditions and reduce temperatures, condensation and humidity. Steam- and heat-producing appliances require suitable hoods.

→ **High standards of lighting** are necessary to enable cleaning and to provide safe and satisfactory working conditions.

→ **Premises must** be capable of being thoroughly cleaned and disinfected.

→ **All food premises** must have a satisfactory supply of drinking water. Wall, floor and ceiling surfaces should be hard-wearing, waterproof, non-flaking, without crevices and easy to clean. Ceilings and walls should be light coloured to show up dirt.

## The storage and disposal of waste

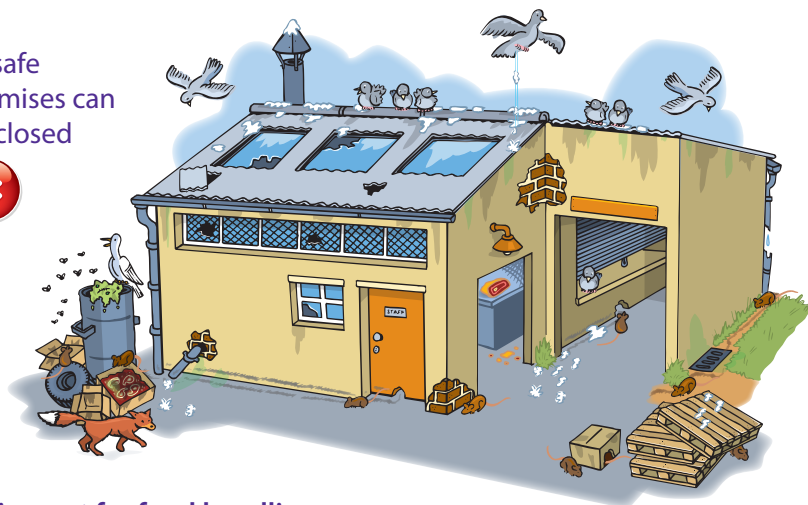
Suitable containers should be provided, for the disposal of waste food and debris. Disposable polythene sacks in sack holders, or bins, with foot-operated lids are preferred internally.



Food waste containers used internally must be emptied regularly throughout the day and always at the end of the day. Polythene sacks should be tied securely when full and placed in the external waste receptacle. After emptying, reusable containers must be thoroughly cleaned before being brought back into the food room. Containers used for storage of food waste should not be reused for the storing of food.

All outside waste areas must be kept clean and tidy so as not to attract rodents, birds and insects. Waste bins must have tight-fitting lids and should never overflow. They should be waterproof and hard-wearing. Waste containers must be emptied as frequently as necessary and the rubbish area must be hosed down regularly. After emptying, waste receptacles should be rinsed out. Hands should be washed after handling waste.

Unsafe premises can be closed



## Equipment for food handling

All equipment, working surfaces and other utensils in food premises should be designed and constructed to minimise harbourage of soil, bacteria or pests, and to enable them to be thoroughly cleaned and disinfected. Surfaces in contact with food should be smooth, waterproof, non-toxic, non-flaking,

non-rusting, hard-wearing and kept clean. Cracked, chipped, broken and worn equipment should not be used. Stainless steel is appropriate for most equipment. Soft wooden surfaces should not be used, as they are absorbent, incapable of being cleaned and disinfected and may splinter. Cutting boards and handles of knives and brushes may be made from polypropylene or another suitable material. The use of different colours to ensure equipment used for raw food is not used for cooked food is recommended. It is essential that separate equipment such as slicers, vacuum packers and mincers, is provided for raw and ready-to-eat foods.



Equipment should be mobile to facilitate its removal for cleaning. This is particularly important if sited close to walls. Equipment guards must be capable of being thoroughly cleaned.



## what the LAW says

### FOOD PREMISES MUST:

- Be kept clean and in good repair/condition
- Have a satisfactory design, layout and construction
- Have adequate washing facilities and drinking water
- Have satisfactory lighting, ventilation and drainage
- Have suitable temperature controlled conditions

### IN ADDITION:

- Waste must not be allowed to accumulate in food rooms.
- Waste must be deposited in closeable containers.

### EQUIPMENT MUST:

- Be kept clean and in good condition
- Enable thorough cleaning and disinfection
- Be installed to allow cleaning of the surrounding area
- Minimise the risk of contamination

## YOUR responsibility

To report defective, dirty or unsuitable equipment or surfaces to your supervisor.





## Food pests & control



A **food pest** is an animal or insect which lives on, or eats our food. Pests contaminate food and are destructive, or a nuisance. Food pests are a source of **food poisoning**.

Pests may contaminate food with hair, fur, droppings, eggs and dead bodies. Flies vomit on food during feeding and may have just left a pile of rubbish or animal faeces before visiting your food premises. Rats and cockroaches live in sewers and amongst rubbish and accumulations of rotting debris.

Food premises attract pests because they provide food, warmth, harbourage and moisture (condensation). Raw materials, including packaging, may bring pests into the premises. The common pests found in the food industry include:



**RODENTS:** rats and mice  
(e.g. house mouse, brown rat, black rat)



**INSECTS:** flies, wasps, moths, cockroaches, psocids (booklice), silverfish, stored product insects and ants.



**BIRDS/ANIMALS:** mainly pigeons, sparrows and starlings; occasional problems from stray cats or pet animals.



## Reasons for control:

- ➔ To prevent the spread of disease
- ➔ To prevent the **contamination** and wastage of food
- ➔ To prevent damage (fires caused by gnawing electric cables or flooding caused by gnawing of pipes)
- ➔ To prevent loss of custom and profit
- ➔ To avoid losing staff who will not wish to work in infested premises
- ➔ To comply with the law and to avoid being fined or closed



“Mice gnawed through your electrics? Look what they did to my hose!”

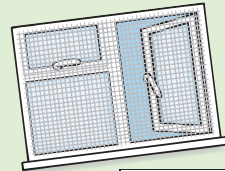
## General pest control

Pests need security, shelter and food. Denial of these will prevent their survival and is the first line of defence against possible infestations. These environmental controls may be considered as:



### ➔ DENIAL OF ACCESS

by care in design, maintenance and proofing of buildings. Doors and windows should be kept closed or screened with fine, cleansable mesh screens (often known as **fly screens**). Doorways can be protected with **hanging plastic strips or air curtains** and the bottom of wooden doors should be protected with metal plates. Access holes and other openings should be sealed.



### ➔ KICK PLATES & PROOFING OF DOORS & WINDOWS



### ➔ DENIAL OF FOOD AND HARBOURAGE

by good housekeeping.

To reduce the **risk** of infestation it is important to prevent breeding and deny the lone invader the conditions it likes and in particular to ensure that:

- ➔ Premises and rubbish areas are kept in a clean and tidy condition.
- ➔ Food on display or awaiting preparation is always kept covered.
- ➔ You clear-and-clean-as-you-go and remove spillages promptly.
- ➔ Food is stored off the floor and clear of walls to allow regular inspection. Stock is checked regularly and damaged or contaminated stock removed and destroyed.
- ➔ Food is stored in pest-proof containers and lids are always replaced.
- ➔ All deliveries of raw materials, packaging and laundry are checked to ensure they are free from pests.
- ➔ Drains are kept clean and in good condition. Taps are well maintained (i.e. no drips) and gullies have tight-fitting metal covers.
- ➔ Vegetation and other hiding places around the food premises are removed.

### Surveys

Regular surveys of food premises must be carried out to ensure that they are pest-free. In particular, food storage rooms, behind equipment, dark, undisturbed and waste storage areas should be examined.



### ➔ SIGNS OF RODENT INFESTATION

Live or dead bodies. Droppings, holes and runs. Footprints/tail marks in dust. Chewed paper or food, gnawing damage. Nests/fur/smell. Bait takes. Scratching sounds, e.g. in roof space. Rat smears (black marks, e.g. on walls).



**Rat damage**

Regular surveys  
are essential

## ➔ SIGNS OF INSECT INFESTATION

Live or dead bodies. Larvae/pupae. Eggs and egg cases. Smell (cockroaches). Piles of 'dust'. Holes in food. Webbing (moths).



Moth webbing

Cockroach trap



## what the LAW says

Food premises must have good hygiene practices, including pest control.



## Physical and chemical control

Although very important, environmental control may not be entirely successful and eradication must be achieved by using physical or chemical control methods. Physical control methods are usually preferred as the pest is caught, either dead or alive, and is not able to die in food, equipment or in some difficult to reach place. Examples of physical control include ultra-violet, electric fly killers and rodent traps. Sometimes poisons have to be used. Care must always be taken when using poisons to ensure there is no risk of contaminating food. Food and small utensils must always be removed when using sprays, and the premises and fixed equipment must be thoroughly cleaned after use. Infestations of food premises should be dealt with immediately and managers should seek assistance from an approved pest control operator.

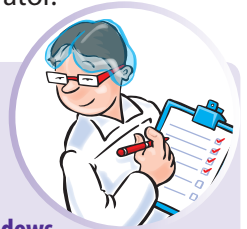


## YOUR responsibility

To learn about food pests and how you can help to control them.

To report signs of pest infestation to your supervisor.

To report maintenance defects such as holes in walls and broken windows.





## Cleaning & disinfection



Soiling of surfaces and equipment is unavoidable in food businesses. It is essential that waste is not allowed to build up to levels which expose food to **risk** of contamination. Effective **cleaning** and **disinfection** will remove microbiological hazards. Chemical hazards from incorrect use or storage of chemicals, and physical hazards from defective cleaning equipment must be prevented.

➔ **CLEANING:** a process of removing food residues, dirt and grease. The chemical used for cleaning is known as a **detergent**.

➔ **DISINFECTION:** the process of reducing micro-organisms to a safe level. The chemical used is a disinfectant.

➔ **SANITISER:** a detergent and disinfectant combined.

The reasons for cleaning are to:

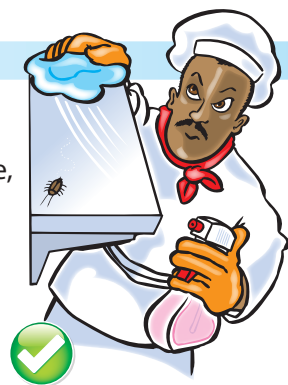
- ➔ remove matter on which bacteria would grow, thus reducing the risk of **food contamination**, food poisoning and spoilage
- ➔ allow disinfection of specific equipment and surfaces
- ➔ remove materials which would encourage pest infestations
- ➔ reduce the risk of physical contamination
- ➔ remove dirt and grease and ensure a pleasant and safe working environment
- ➔ promote a good image to customers
- ➔ comply with the law



## Energy in cleaning

Cleaning involves the application of energy to a surface, to remove dirt and grease. Energy is applied as:

- **PHYSICAL**, e.g. scrubbing
- **HEAT**, e.g. hot water
- **CHEMICAL**, e.g. detergent



A clean surface is one which is free of dirt, grease and food residues. After cleaning, hot water at 82°C or chemical disinfectants are used to destroy bacteria that remain. However, chemical disinfectants need time to work and an appropriate **contact time** is essential.

## Cleaning schedules

To be effective, **cleaning** must be planned, organised and implemented in all areas of food premises. Cleaning schedules should be followed.

## Safe cleaning

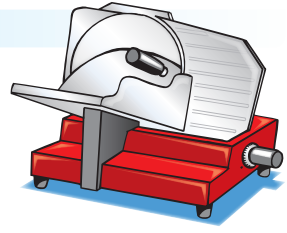
Separate, colour-coded cloths and equipment are recommended for raw and high-risk areas. Suitable protective clothing must be worn and the chemical manufacturers' instructions must always be followed. Always read the label before using the chemical. Mixing of chemicals may produce dangerous gases and/or explosion. Open food must not be exposed to **risk of contamination** during cleaning. Chemicals must always be stored separately from food, preferably in locked chemical cupboards or stores. They should never be emptied into unmarked or food containers, especially bottles. To be effective, and avoid taint, chemicals must be diluted correctly. Rinsing with clean water may be required. Before cleaning electrical equipment, switch off at the mains and isolate.

After use, the cleaning equipment itself must be cleaned and dried. Brushes and mops should be stored off the floor in non-food rooms or cupboards. Cleaning equipment used in toilets must not be used in food rooms.

## → CLEAR-AND-CLEAN-AS-YOU-GO

Keep work areas clean and tidy. Don't let waste food and dirty equipment build up. Remove spillages and waste packaging immediately.





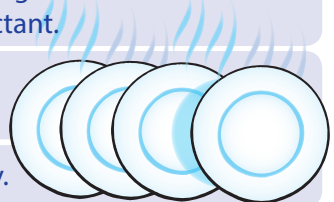
## What to disinfect

Although food rooms and equipment need to be regularly cleaned, not everything requires disinfecting. Food-contact and hand-contact surfaces and equipment, such as food containers, chopping boards, preparation surfaces, slicing machines, utensils, switches, touchpoints, handles on drawers and refrigerators, will need **cleaning** and disinfecting several times throughout the day. Equipment used for raw food must be disinfected before using for ready-to-eat food, although it is preferable to use separate equipment.

Cleaning equipment such as brushes, cloths, buckets and sinks will also need to be cleaned and disinfected throughout the day, although disposable cloths or paper is recommended.

Walls, floors, drains and equipment legs require regular and thorough cleaning and degreasing but, as they do not touch food, are unlikely to require disinfection unless there is a **risk** from Listeria (some factories). Ovens and similar devices, which use high temperatures to destroy bacteria, do not require **disinfection**, but the door handles may. Floors in preparation areas may be cleaned daily and floors in dry storage areas weekly (provided spillages are removed immediately). Cleaning and disinfection may consist of six basic stages. These are as follows:

- 1 PRE-CLEAN:** removing loose soil by sweeping, wiping or pre-rinsing (a disposable paper towel may be used).
- 2 MAIN CLEAN:** loosening of the surface grease and dirt using hot water and a detergent. A brush or cloth will probably be used.
- 3 RINSE:** removal of loose dirt and detergent using clean hot water.
- 4 DISINFECTION:** destroying micro-organisms using heat or sufficient contact time with an approved chemical disinfectant.
- 5 FINAL RINSE:** removal of disinfectant using clean hot water (this is often unnecessary).
- 6 DRYING:** preferably naturally by evaporating dry.



## The cleaning procedure

Dirty or cooled water must be changed as frequently as necessary. If air-drying is not possible, single-use paper towels or a clean, dry cloth should be used.

### Sanitising a work surface

- 1 PRE-CLEAN:** removing food scraps and waste.
- 2 MAIN-CLEAN:** using a clean cloth, hot water and a **sanitiser** in a clean bucket (never place a bucket on a work surface). Alternatively it may be possible to use a hand-spray. Allow sufficient contact time.
- 3 RINSE:** if recommended by the sanitiser manufacturer. Rinsing will require clean, hot water (If a bucket or cloth are used they must be clean).
- 4 DRYING:** air-dry or use a disposable paper towel.



Suitable gloves should be worn when using hot water and/or chemicals.

### Double-sink washing

Where mechanical dishwashers are not available, the following is recommended:

- ➔ Remove any heavy or loose soil by scraping and rinsing in cold/warm water.
- ➔ Place articles in the first sink in a hot **detergent** solution, scrub with a nylon brush and/or wipe with a clean cloth to loosen dirt residues. Rubber gloves will be required. Cool or dirty water should be replaced.
- ➔ Re-immerses in the first sink to wash off loosened dirt.
- ➔ Place articles in the second sink to rinse off chemical residues.
- ➔ Leave for 30 seconds at 82°C to achieve **disinfection** (alternatively a chemical disinfectant may be used at a lower temperature, as per manufacturers' guidelines).
- ➔ Remove the articles, allow to drain and air-dry on a clean, disinfected surface. After drying, store in a clean place free from **contamination**.

## Dishwashers

Dishwashers are commonly used for **cleaning** and disinfecting. The wash cycle operates at around 60°C and the rinse cycle between 82°C and 88°C. The manufacturers' instructions must be followed and the right chemicals must be used. The sprayer arm jets must be clear of obstruction and the machine must be correctly stacked. Soiled utensils should be washed as soon as possible and clean utensils should be allowed to air-dry.



## YOUR responsibility

To know how to use all cleaning chemicals properly and safely.

To clear-and-clean-as-you-go.

To report to your supervisor if you are running short of cleaning materials or chemicals.



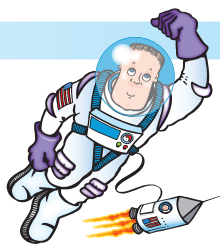
## what the LAW says

Food premises are to be kept clean.

All food contact equipment to be cleaned and, where necessary, disinfected as frequently as necessary.



## HACCP from purchase to service



**HACCP** is a food safety management system which identifies and controls hazards at **critical control points** so minimising the **risk** of food poisoning or illness or food complaints and ensuring safer food.

**Food safety management systems** should be documented and records maintained proportional to the size of the business. Records are important to demonstrate the system is being implemented and managed effectively. Records could include HACCP documentation, specifications, deliveries, staff training, temperature monitoring, pest control, sampling, customer complaints and **cleaning** schedules. The system should be reviewed annually, if there are any changes or if something goes wrong.



### what the LAW says

All food business operators must implement a food safety management system based on the following principles of HACCP (hazard analysis critical control point).

## 7 HACCP Principles

- ➔ 1 Identify the **hazards** (what could go wrong) and the control measures to prevent things going wrong.
  - ➔ 2 Identify the **critical control points (CCPs)** - those steps in the preparation or production of food which must be controlled as they are critical to food safety.
  - ➔ 3 Establish **critical limits** for control measures at each CCP, for example, cooking food to a core temperature of 75°C.
  - ➔ 4 **Monitor** (check) the **control measures** at each CCP to ensure the process is under control i.e. prevent problems occurring.
  - ➔ 5 Establish **corrective actions** that need to be taken if critical limits are breached i.e. when something goes wrong.
  - ➔ 6 Establish procedures for **verification** i.e. prove that the HACCP system is working.
  - ➔ 7 Establish **documentation** and records for the HACCP system.
- ➔ Review the system if there are any changes.





## The purchase, receipt and storage of food

### Choosing a supplier

It is essential to purchase food from approved suppliers who have demonstrated a commitment to high standards of **food hygiene**.

### Controls to minimise hazards from supplies/suppliers

Select the least hazardous materials/ingredients, e.g. pasteurised egg and ready-prepared vegetables. Specify the standard and quality of product required including the delivery temperature. Branded products are usually preferable.

### Delivery and unloading of food

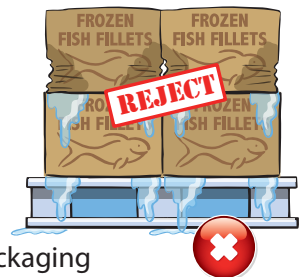
The main hazards associated with deliveries are contaminated food (microbiological, physical, chemical or allergenic) and the multiplication of bacteria as a result of prolonged delays after unloading and before refrigeration. Unsatisfactory delivery vehicles or drivers may indicate unsatisfactory deliveries. **High-risk food** should be delivered below 5°C, frozen food at -18°C.

#### Controls:

- All food should be inspected before placing in storage.
- Deliveries should be checked for freshness, temperature, colour, odour, **contamination**, infestations and satisfactory packaging and labelling.

#### → REJECT:

- Contaminated food from unapproved sources
- Perishable food above 8°C
- Frozen food which is not solid (thawing)
- Food with evidence of pest activity
- Food which is not covered or with damaged packaging
- Food which is out of date



**The supervisor and the supplier should usually be notified.**

As far as practicable, external packaging should not be brought into food preparation areas. A separate de-boxing area is recommended. Unloading should be completed as quickly as possible. Food should not become

contaminated when delivered. Records of deliveries should be retained to enable traceability in the event of **food poisoning** or a food complaint.

### Safe food storage

Correct storage is essential to the hygienic operation of any food business. Failure to ensure satisfactory storage conditions may result in allergenic, physical, chemical and microbiological contamination; multiplication of bacteria, **mould**, spoilt food, discolouration, staleness and pest infestation.

### Dry food stores

Rooms used for the storage of dried and canned foods should be suitable for this purpose, vermin-proof and kept clean and tidy. Hazards encountered include dirty shelving, pest infestations, damaged and leaking cartons, rusty cans, out-of-date stock, soil from vegetables and chemical **contamination**.

#### *Controls:*

- Keep stores dry, cool, well-lit and well-ventilated.
- Deliveries should be checked for freshness, temperature, colour, odour, contamination and satisfactory packaging and labelling, any substitutions should be noted and ingredients checked for additional allergens.
- Care with de-boxing/opening sacks will avoid physical contamination from paper, plastic or string.
- Food should be stored away from the walls and pipes affected by condensation and on suitable shelves such as stainless steel racks, or in mobile rodent-proof bins.
- Spillages should be cleared away promptly.
- If possible, fruit and vegetables should be stored separately from other food. Fruit should be examined regularly as **mould** spreads rapidly.
- Vegetables heavily contaminated with soil should be stored below other foods, for example fruit or lettuce on the vegetable rack.
- Potatoes should be stored in the dark to prevent sprouting or turning green.
- A separate store should be used for storing cleaning chemicals.
- Blown, badly dented, seam-damaged, holed or rusty cans should be disposed of.
- Staff should be trained to store food correctly, to remove spillages, to rotate stock and to recognise signs of pests and unfit food.

- Store allergens carefully, use dedicated containers specifically for allergens, keep powder on lower shelves, ensure labels are legible and inform managers if you think an allergen may have accidentally spilt onto other foods.

## Chilled storage

High-risk and perishable foods should be stored under refrigeration to prevent most pathogenic bacteria from multiplying and to slow down the rate of spoilage.

Refrigerators and freezers should be sited in well-ventilated areas away from heat sources, such as ovens and the rays of the sun.

## Operating temperatures and monitoring

Refrigerators usually operate between 1°C to 4°C. The display temperature should be checked every time the fridge is used. It should be recorded at least twice a day. The actual food temperature should be checked and recorded at least weekly and whenever the display temperature is unsatisfactory. Temporary rises in display temperatures will occur if doors are left open or a large quantity of food/drink at room temperature is loaded into the fridge, for example, bottles of soft drinks. Food temperatures must not rise above 8°C.

### Effective Chilled Storage

#### HIGH-RISK FOOD

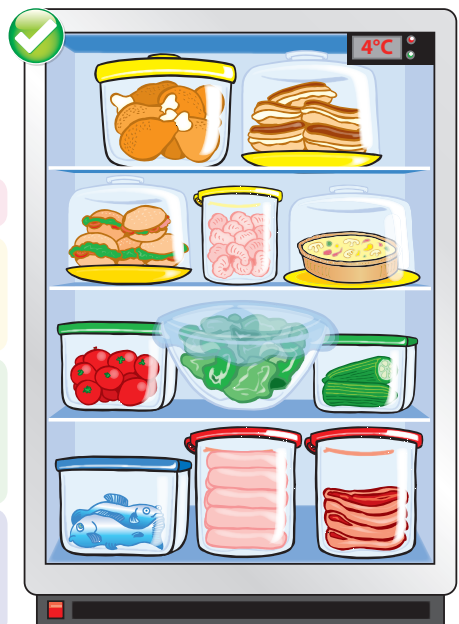
for example: cooked meat and cooked poultry

#### READY-TO-EAT RAW FOOD

for example: bean sprouts, cut melons, tomatoes, raspberries, spinach and lettuce

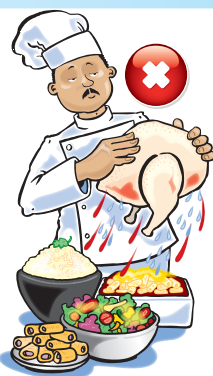
#### RAW FOOD FOR COOKING

for example: uncooked sausages, uncooked meat and uncooked poultry



## Contamination and covering of food

Raw food must always be kept apart from **high-risk food** to prevent **contamination** of high-risk food with **food poisoning** bacteria. Separate refrigerators are preferred, however if stored in the same unit, the raw food must always be placed at the bottom to avoid contaminating the high-risk food. Food should be covered to prevent drying out, **cross-contamination** and absorption of odour. Care should be taken to protect foods such as lettuce, tomatoes and cucumbers from blood dripping onto them.



## Packing and stock rotation

Refrigerators must not be overloaded and food should never be placed in front of cooling units. Space should be left between products for air circulation. Only perishable foods should be stored in the refrigerator. This includes vacuum packs and pasteurised cans of meat. **Stock rotation** is essential to avoid spoilage. New stock should be placed behind existing stock to facilitate stock rotation.



## Open cans of food

Opened and part-used cans of food, especially acid food such as fruit, fruit juice or tomatoes, must not be left in the can as this may result in chemical contamination. The unused contents should be emptied into a suitable container (such as a lidded plastic bowl) covered and placed in the refrigerator.

## Defrosting and cleaning

Defrosting and **cleaning** should be carried out in accordance with the manufacturer's instructions. Most units defrost automatically and should be cleaned and disinfected at least weekly. Food should be placed in another refrigerator whilst the cleaning is being carried out.

## Staff training

All food handlers must receive instruction on the correct use of the refrigerator especially in relation to contamination and temperature control. They should be told not to keep the door open for longer than necessary.

### *Corrective action:*

- If the fridge temperature remains too high this may be a result of overloading e.g. completely blocking a shelf or because the thermostat is too high. Inform your supervisor immediately. If the problem can't be solved, an engineer should be brought in. Food should be placed in an alternative fridge, unless it has been above 8°C for more than 4 hours, in which case it should be destroyed.



### **Freezers and frozen food**

Commercial freezers should operate at  $-18^{\circ}\text{C}$  or slightly below. At this temperature there will be no bacterial multiplication. However, spores and pathogens will survive and if the temperature rises above  $-10^{\circ}\text{C}$ , spoilage organisms, especially moulds and yeast, begin to cause problems.

### *Controls, monitoring and corrective action:*

- The temperature and packaging of deliveries of frozen food should be checked before unloading. The temperature may be measured between the packs of food.
- The food should be transferred to the freezer as quickly as possible.
- If deliveries are not frozen solid they should be rejected and management advised.
- New stock should always be placed below or behind existing food.
- Food must not be stored above the freezer load line and must not be kept for longer than recommended by the manufacturer, as the quality gradually deteriorates.
- Suitable packaging is essential to avoid freezer burn (dehydration).
- Raw food and **high-risk food** should be separated.
- When frozen raw food has started to thaw, complete the thawing process and cook immediately.

## **YOUR responsibility**

Report high temperatures, contamination risks, faulty door seals and out-of-date food to your supervisor.



## Thawing (defrosting) of frozen food

Most food taken from a freezer can be cooked immediately, but poultry and large joints should be completely thawed before cooking. The manufacturers' instructions should always be followed. The thawing of raw meat/poultry must take place in an area that is entirely separate from any ready-to-eat foods to prevent its **contamination** with thawed liquid. This area must never be used for cooked food that is cooling prior to refrigeration. **High-risk food** should be thawed in a refrigerator. The thawing of **raw food** is best carried out at temperatures between 10°C and 15°C (see table below).

### Under clean, cold running water below 15°C:

There is a **high** risk of cross-contamination in multi-use sinks.  
Sanitise the sink, taps and surround after use.  
Refrigerate thawed food or cook it to at least 75°C at its core immediately.  
Do not refreeze.

### Microwave oven:

Follow manufacturers' instructions.  
Cover food appropriately.  
Thawing will be uneven.  
Check at least three parts of the food.  
Do not refreeze.  
Refrigerate thawed food or cook it to a minimum of 75°C at its core immediately.  
Sanitise the microwave oven.

### In a refrigerator:

Multi-use fridges present a **significant** risk of cross-contamination.  
Having a dedicated thawing fridge is best practice.  
Thawing time varies depending on the fridge temperature.  
Keep food covered.  
Ensure the container is deep enough to capture any juices.  
Cook food to a minimum of 75°C at its core within 24 hours of thawing.  
Do not refreeze.  
Sanitise the fridge.

### At room temperature below 21°C:

Place the covered food in a suitable container overnight at room temperature.  
Cook it in the morning to a minimum of 75°C at its core, or refrigerate for up to 24 hours, then cook it to a minimum of 75°C.  
Do not refreeze.

### → Cooling cooked foods

Use the '2 hours, 4 hours' rule.  
Cool in under 2 hours from around 60°C to below 20°C and then refrigerate it. Best practice is to cool it as quickly as possible.

## Stock rotation

Satisfactory rotation of stock to ensure older food is used first is essential to avoid spoilage, reduce the **risk** of pest infestation, and ensure that food is of good quality and safe.

### REMEMBER the rules:

## FIRST IN FIRST OUT (FIFO) FIRST EXPIRED FIRST OUT (FEFO)

New stock should always be placed at the back of the shelf, behind existing stock.



High-risk and perishable foods have a short shelf life and are usually stored under refrigeration. The food must be date-coded.

This date code must never be altered and the food must not be sold after this date. Date codes on high-risk food should be checked daily whereas weekly checks may suffice for low-risk products. The shelf life always depends on having satisfactory storage conditions. Special storage requirements should be included on the label, for example, keep below 3°C. Date-expired food should be disposed of.

### Food preparation

The main hazards likely to occur during preparation are **cross-contamination** and the multiplication of bacteria. The observance of good hygiene practices during food preparation is essential to prevent **food poisoning**. Raw food and **ready-to-eat food** should be prepared in different areas with separate, clean equipment. Raw vegetables should be washed thoroughly in a separate sink, which is not used for washing utensils etc. and is positioned to avoid cross-contamination of ready-to-eat food or clean utensils/equipment. Disposable paper wiping cloths are preferred. To help prevent allergenic contamination recipes should be followed and, where possible, non-allergenic dishes should be made before those containing allergens.



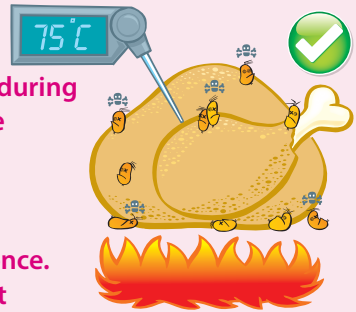
The handling of food should be minimised and food must not be left in a warm, humid atmosphere. The minimum amount of food should be prepared and then returned to refrigeration.

### Cooking/reheating

Inadequate cooking or reheating enables pathogenic bacteria to survive and is a serious **hazard**. Microbiological contamination is also possible, for example, repeat tasting with a dirty spoon. Physical **contamination** could occur, e.g. from flaking paint or insects, if uncovered cooking pans are used. Chemical contamination may result from cooking acid food, such as fruit, in pans made of copper or aluminium. Some **food poisoning** bacteria produce **toxins** which will withstand boiling for over 30 minutes and others produce **spores** which survive temperatures above 100°C. So, although cooking destroys most harmful bacteria, food should be eaten immediately or cooled rapidly to prevent problems with spores.

### Controls:

- The centre, or coldest part, of the food should achieve 75°C (or 70°C for 2 minutes) during cooking to destroy pathogens and make the food safe to eat. A similar temperature is satisfactory for reheating, although a temperature of 82°C is required in Scotland.
- Food should never be reheated more than once.
- The base of pans should not exceed the heat source and stews and sauces should be stirred frequently.
- Pans should be covered when not stirring, to avoid physical contamination.
- Only a clean, disinfected spoon should be used for tasting and food handlers require training on the hazards and controls associated with cooking.



### Monitoring

The temperature at the centre or thickest part of the cooked food, (**core temperature**), should be checked with a clean, disinfected probe thermometer (avoid fat and gristle). The probe must not touch bone or the surface of the container as this will give a false reading. Colour and texture change may be indicators that food has been cooked properly but they are not reliable. Juices running clear and the absence of blood are also used to confirm that chicken has been cooked.

### Corrective action:

- If the cooked food has not achieved 75°C, cooking should be continued until this temperature is reached.
- If the oven is thought to be faulty the supervisor should be informed and the engineer called in.

### Microwave cooking

Microwave ovens are a safe and effective method of cooking and heating food, provided that manufacturers' instructions are followed. The destruction of **food poisoning** organisms is based on a combination of high temperatures and sufficient time and it is essential to know the power (wattage) of the oven

and to allow adequate time to achieve the temperatures to ensure the safety of the food. Food should usually be heated throughout to at least 75°C and this should be checked in several places, using a probe thermometer, to guard against the possibility of cold spots. Stirring of liquids may be required and standing time may also be necessary on completion of cooking. Domestic microwave ovens are unsuitable for commercial operations.

### Hot holding

Food which is kept hot before serving should be maintained above 63°C to prevent the germination of **spores** and the multiplication of bacteria. Stews and sauces should be stirred regularly. **Contamination** will be prevented and temperature maintained if containers are covered.

### Cooling

The hazards associated with cooling include the multiplication of food poisoning bacteria not destroyed during cooking, the production of toxins, the germination of spores and the contamination of food by micro-organisms, physical contaminants or chemicals.



#### Controls:

- Food should be cooled as quickly as possible after cooking.
- Cooling trials, using a disinfected probe thermometer, will help to determine the most effective way of cooling food.
- A blast chiller can be used to cool most foods from 60°C to below 5°C in 90 minutes. However, large quantities of food or joints of meat may not cool in this time, even in a blast chiller.
- Cooling times can be reduced by minimising the size of joints. A maximum weight of 2.25 kg is recommended.
- Food may be cooled in a ventilated cool room from 60°C to room temperature (around 20°C) in less than 2 hours and then placed in a walk in chiller to complete the cooling.
- Ice baths or fans may be used to speed up cooling.
- Stews and sauces can be poured into clean, disinfected, shallow containers.

- Rice, pasta, vegetables and potatoes can be cooled using cold running drinkable water.
- Bagged joints can be sprayed with cold water.

Hot food should not be placed into a refrigerator if this would cause the temperature of food already being stored to rise above 5°C. It may also encourage condensation. However, once food has cooled for 2 hours, it may be placed in a large walk-in chiller, if the air temperature of the chiller is unaffected and there is no **risk** of contamination. If joints are sliced after cooking, it is essential that knives are thoroughly cleaned and disinfected and contamination from food handlers is not introduced.

During cooling, food should be covered and kept completely separate from raw food. As soon as food has been cooled it should be stored below 5°C.

### Service

The hazards associated with serving food include the multiplication of **food poisoning** bacteria because of prolonged periods at room temperature and contamination from food handlers, equipment and utensils. Self-service of open food and buffets also present many potential hazards from customers, which are difficult to control.



### Controls:

- Refrigerated buffets and display units are recommended. However, where these are not provided, the minimum amount of food should be displayed. Foods should not be topped up.
- All food equipment and utensils used for service must be maintained in good condition and effectively cleaned and disinfected. Serving utensils should be longer than the food container, if practicable.
- Food placed on tables, such as bread rolls, must not be re-used.
- All plates and utensils must be clean and dry, and those parts likely to come into contact with **high-risk food** should not be handled. Cutlery and cups should be held by the handles. Condiments should be kept in clean containers, covered where necessary.

- Customers should not be allowed to handle open food. Food should be pre-wrapped and covered or protected with sneeze screens.
- Raw food and ready-to-eat food must be kept entirely separate, with separate serving counters, utensils and equipment and different food handlers.
- Slicing machines are a major potential **hazard** and the blade should be cleaned and disinfected throughout the day. If practicable, meat should be sliced in batches and the slicer cleaned and disinfected for different types of meat.
- Food handlers should always wear suitable protective clothing, and hands should be thoroughly washed before service and after handling money.

### Using digital probe thermometers (taking temperatures)

The use of accurate tip-sensitive thermometers is the best way to check the temperature of cold or hot food. Probes must be cleaned and disinfected before and after use. Probes should always be cleaned before using disinfecting wipes and a **contact time** of 30 seconds is recommended. Alternatively, hot water above 82°C may be used to disinfect the probe.

To ensure probes are accurate, they should be validated (calibrated) weekly/monthly or if dropped. Validation involves using melting ice when the temperature should read 0°C, and boiling water when the temperature should read 100°C. An error of up to plus or minus 1°C is acceptable.

## YOUR responsibility

To learn about hazards, controls and monitoring procedures associated with your job, from delivery to service.

To report hazards or monitoring problems to your supervisor.



## what the LAW says

Chilled food must be stored at or below 8°C and hot food must be stored at or above 63°C.

Food with an expired use-by-date must not be sold.



## Food safety law & enforcement

The law is a complex subject and it is often difficult to keep up to date. However, ignorance of the law is not a defence in the event of prosecution. All food handlers should make a special effort to understand how the law affects their business and themselves.



This book contains only very brief details of some of the legislation and more information can be obtained from websites such as [www.food.gov.uk](http://www.food.gov.uk) or your local environmental health department.



### FOOD SAFETY LEGISLATION

The food business operator is responsible for ensuring that the food business complies with the law. They must register the business with their Local Authority at least 28 days before opening and they must have a food safety management system based on the principles of HACCP in place.

#### Enforcement/penalties

Offences are punishable, on conviction, by a fine of up to £5,000 for each offence. In serious cases a sentence of up to two years' imprisonment and unlimited fines may be imposed.

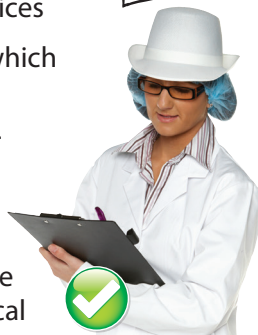
#### Due diligence

**Due diligence** is the principal defence under food safety legislation and enables a defendant to be acquitted of an offence if they prove that they 'took all reasonable precautions and exercised all due diligence to avoid committing the offence'. Taking reasonable precautions involves setting up a system of procedures and controls, having regard to the likely hazards and risks. Due diligence requires the systems to be operated properly. Written records are strongly recommended and are needed for traceability. Compliance with industry guides to good practice will also assist a due-diligence defence.

## The enforcement of food safety legislation

Local authorities (food authorities) and the Food Standards Agency are responsible for protecting public health and ensuring that food businesses comply with food safety legislation. Authorised officers are appointed by local authorities to enforce the legislation in their area. These include environmental health practitioners/officers and trading standards officers. Environmental health practitioners/officers may be authorised to:

- ➔ Enter food premises at any reasonable time to carry out duties under the food safety legislation (*Twenty four hours' notice must be given to domestic premises.*)
- ➔ Provide guidance, advice and training
- ➔ Investigate **food poisoning** and food complaints
- ➔ Send informal letters, including recommendations regarding good hygiene practice
- ➔ Serve notices such as hygiene improvement notices
- ➔ Close food premises and stop unsafe practices which are an imminent **risk** to public health
- ➔ Seize (take away) or detain unsafe (unfit) food or articles or records to use as evidence
- ➔ Take photographs and samples
- ➔ Instigate legal proceedings via the solicitor of the food authority or, in Scotland, the procurator fiscal



Failure to cooperate may result in an offence of obstruction. Trading standards officers are concerned with food standards, including composition, labelling, weight/volume and adulteration. In Scotland and some other local authorities, these matters are dealt with by environmental health officers.

## The Food Standards Agency (FSA) - [www.food.gov.uk](http://www.food.gov.uk)

The FSA was established on 1st April 2000 to protect the public from risks associated with the consumption of food. The Agency provides advice on food safety and ensures effective **monitoring** and enforcement. The FSA's headquarters is in London but there are national offices in NI and Wales. Food Standards Scotland has replaced the FSA in Scotland.

# 1

## APPENDIX 1: Glossary



**Aerobic** - Using oxygen.

**Allergen** - Any substance, usually a protein, which causes an allergy.

**Allergy** - A reaction to food or food additives, which may involve the respiratory system, the gastrointestinal tract, the skin or the central nervous system. In severe cases this may result in an anaphylactic shock.

**Ambient** - The temperature of the surroundings/room temperature.

**Anaerobic** - Using little or no oxygen.

**Bactericide** - A substance which destroys bacteria.

**Binary fission** - A type of reproduction where the organism divides into two.



**Carrier** - A person who harbours, and may transmit, pathogenic organisms without showing signs of illness.

**Cleaning** - The process of removing soil, food residues, dirt, grease and other objectionable matter.

**Contact time** - The time needed by a chemical, such as a disinfectant, to work properly.

**Contamination** - The presence or introduction of something harmful or objectionable in food.

**Control measures** - Actions required to prevent or eliminate a food safety hazard.

**Convalescent carrier** - A person who has recovered from an illness but still harbours and excretes the organism.

**Corrective action** - The action to be taken when something goes wrong.

**Core temperature** - The temperature found at the centre or the thickest part of a piece of food.

**Critical control point** - A step in the process where control is essential to prevent or eliminate a food safety hazard.

**Critical limit** - A monitored criterion which separates the acceptable from the unacceptable.

**Cross-contamination** - The transfer of bacteria from contaminated source (often raw food), to ready-to-eat foods.

**Dehydrate** - To remove water.

**Detergent** - A chemical used to remove grease, dirt and food particles.

**Disinfection** - The reduction of micro-organisms to a level that is safe.

**Due diligence** - A legal defence that involves taking all reasonable precautions and doing everything reasonably practicable to prevent an offence occurring.

**Duration of an illness** - The time that an illness lasts i.e. for symptoms to disappear.

**Food handler** - Any person in a food business who handles food, drink or ice.

**Food hygiene/safety** - The measures and conditions necessary to control hazards and to ensure food is safe to eat.

**Food pest** - An animal which lives in or on our food. It contaminates the food and is destructive or troublesome.

**Food poisoning** - Any disease of an infectious or toxic nature that is caused by the consumption of food or water. This includes all food and waterborne illnesses regardless of the signs or symptoms.



**Food safety management system** - The policies, procedures and documentation that ensure the food sold by a food business is safe to eat and free from contaminants.

**Gastroenteritis** - An inflammation of the stomach and intestinal tract that normally results in diarrhoea.



**HACCP - Hazard analysis critical control point** - a food safety management system which identifies and controls hazards which are important for food safety.



**Hazard** - Something in food with the potential to cause harm to the consumer.

**Healthy carrier** - A person who has never displayed symptoms but harbours and excretes a pathogenic organism which can cause illness in others.

**High-risk food** - Ready-to-eat foods, which support the multiplication of harmful bacteria and include most cooked foods.

**Incubation period** - The period between eating contaminated food and the first (onset period) signs of illness.

**Monitoring** - Observations of control measures to confirm the process is under control, e.g. measuring the temperature of food in a refrigerator.

**Mould** - A microscopic plant (fungus) that may appear as woolly patches on food.

**Nausea** - Feeling sick.

**Optimum** - Best.

**Pasteurisation** - A heat process used to reduce the number of micro-organisms to a safe level. Pasteurised food must be stored under refrigeration.

**Pathogen** - A disease-producing organism.

**pH** - An index used as a measure of acidity/alkalinity.

**Prerequisite programmes** - The good hygiene practices that a food business must have in place before implementing HACCP.

**Preservation** - The treatment of food to stop spoilage and prevent the multiplication of pathogens that would make the food unfit.

**Ready-to-eat foods** - Foods that are to be eaten without any treatment to destroy any pathogens within them. They include all high-risk foods, fruit, salad, cakes and bread.

**Review** - Checking the whole of the HACCP system to ensure it remains safe and effective.

**Risk** - The likelihood of a hazard occurring in food.

**Risk zone of bacterial growth** - The temperature range within which the multiplication of most food poisoning bacteria is possible. Most rapid multiplication occurs between 20°C and 50°C.

**Safe food** - Food which is free of contaminants and will not cause illness, harm or injury.

**Sanitiser** - A chemical used for cleaning and disinfecting surfaces and equipment.

**Spore** - A phase of bacteria protecting them against harmful conditions such as high temperatures and disinfectants.

**Source** - The origin of a pathogen for example the chicken on the farm, or the thing that brought the pathogen into the premises, for example the egg.

**Sterilisation** - A process that destroys all living organisms, spores and toxins, e.g. to produce sterilised milk.

**Stock rotation** - A control system which ensures that older stock is used first.

**Toxin** - A poison produced by pathogens.

**Verification** - The checks and tests made to ensure the HACCP system is effective.

**Vulnerable (risk) groups** -

Those groups of people most at risk of getting severe illness or dying from food poisoning.



**Virus** - A microscopic pathogen that multiplies in the living cells of people and animals.















**Water activity (a<sub>w</sub>)** -

A measure of the available water in food.



# 2 APPENDIX 2: Allergens

Text content taken from FSA *Allergen information for loose foods June 2014*  
<http://www.food.gov.uk/sites/default/files/multimedia/pdfs/publication/loosefoodsleaflet.pdf>

<p><b>CELERY</b></p> 	<p>This includes celery stalks, leaves and seeds and celeriac. It is often found in celery salt, salads, some meat products, soups and stock cubes.</p>
<p><b>CEREALS CONTAINING GLUTEN</b></p> 	<p>These include wheat (such as spelt and Khorasan wheat/Kamut), rye, barley and oats. They are often found in foods containing flour, such as some baking powders, batter, breadcrumbs, bread, cakes, couscous, meat products, pasta, pastry, sauces, soups and foods dusted with flour. The cereal will need to be declared. However, it is up to you if you want to declare the presence of gluten with this.</p>
<p><b>CRUSTACEANS</b></p> 	<p>These include crabs, lobster, prawns and scampi. They are often found in shrimp paste used in Thai curries or salads.</p>
<p><b>EGGS</b></p> 	<p>These are often found in cakes, some meat products, mayonnaise, mousses, pasta, quiche, sauces and foods brushed or glazed with egg.</p>
<p><b>FISH</b></p> 	<p>This is often found in some fish sauces, pizzas, relishes, salad dressings, stock cubes and in Worcestershire sauce.</p>
<p><b>LUPIN</b></p> 	<p>This includes lupin seeds and flour, and can be found in some types of bread, pastries and pasta.</p>
<p><b>MILK</b></p> 	<p>This is found in butter, cheese, cream, milk powders and yoghurt. It is often used in foods glazed with milk, powdered soups and sauces.</p>
<p><b>MOLLUSCS</b></p> 	<p>These include mussels, land snails, squid and whelks. They are often found in oyster sauce or as an ingredient in fish stews.</p>
<p><b>MUSTARD</b></p> 	<p>This includes liquid mustard, mustard powder and mustard seeds. It is often found in breads, curries, marinades, meat products, salad dressing, sauces and soups.</p>
<p><b>NUTS</b></p> 	<p>These include almonds, hazelnuts, walnuts, cashews, pecan nuts, Brazil nuts, pistachio nuts, macadamia or Queensland nuts. They can be found in breads, biscuits, crackers, desserts, ice cream, marzipan (almond paste), nut oils and sauces. Ground, crushed or flaked almonds are often used in Asian dishes such as curries or stir fries.</p>
<p><b>PEANUTS</b></p> 	<p>These can be found in biscuits, cakes, curries, desserts and sauces such as satay. They are also found in groundnut oil and peanut flour.</p>
<p><b>SESAME SEEDS</b></p> 	<p>These can be found in bread, breadsticks, houmous, sesame oil and tahini (sesame paste).</p>
<p><b>SOYA</b></p> 	<p>This can be found in beancurd, edamame beans, miso paste, textured soya protein, soya flour or tofu. It is often used in some desserts, ice cream, meat products, sauces and vegetarian products.</p>
<p><b>SULPHUR DIOXIDE</b></p> 	<p>This is often used as a preservative in dried fruit, meat products, soft drinks and vegetables as well as in wine and beer.</p>



# the Highfield germometer

