Introduction to food hygiene

Screen description

This screen shows a kitchen scene with a number of hazards to food safety. As a starting point students are encouraged to look at the screen and suggest things that might be potentially hazardous.

Teacher

Hazards include

1. Open fridge
2. Raw meat on the top shelf of the fridge
3. The raw meat is not placed on a tray or plate and not covered to prevent cross contamination
4. Open window cooling food - no screen to prevent insects contaminating food
5. Cleaning product stored beside food on table
6. Dirty dishes lying around
7. Rubbish allowed to build up
8. Feeding pets from the table
Food safety – why bother?

Screen description
This screen lists the objectives of the chapter:

1. Define the terms ‘food hygiene’ and ‘food poisoning’
2. Name the different classes of microorganisms and where they are found
3. Identify the main conditions which bacteria need in order to grow
4. Explain how the growth of bacteria can be controlled

Teacher
To begin the discussion ask the students the questions below and then outline the objectives of Session 1.

1. What is food hygiene?
2. Why is there a need for food hygiene?

Food poisoning causes symptoms such as nausea, vomiting, cramps and diarrhoea. While people of all ages can contract food poisoning, young children, the elderly, people with underlying illnesses and expectant mothers are the most at risk from severe symptoms.

Government agencies and health authorities devote a lot of time and resources to the prevention of food poisoning. One of the ways in which we can all play our part in reducing the incidence of food poisoning is by using good food handling practices.

Teacher’s Note:
There were over 1600 cases of food poisoning officially reported in 2004. However, this figure is believed to be only the tip of the iceberg with many cases going unreported. safefood has funded an all-island survey to estimate the level of self-reported gastroenteritis or food poisoning incidence in the population. The survey was being carried out by telephone over a 12-month period interviewing 10,000 people north and south. This showed that 29.2% of those with acute gastroenteritis sought medical care. The results have provided a benchmark to base future on health and food safety programmes and are available at www.safefood.eu.
Food poisoning – reported cases

Screen description
The screen shows that the reported cases of food poisoning are only the tip of the iceberg.

Teacher
This screen will most likely demonstrate the findings of the safefood funded survey, discussed in the previous screen, that there are a lot more cases of food poisoning than reported.
Screen description
This screen shows the relevance of food safety by showing some shocking newspaper headlines.

Teacher
The students could be asked to relate any stories they have heard, or to bring in some of their own articles.

These articles can be viewed in full on the student section.
What is a Food Worker?

Screen description
This screen gives a definition of a food worker.

Teacher

Much of the course talks about food safety in relation to food workers. This screen is to clarify what we mean by a food worker.

Food workers have a moral and legal responsibility to ensure that they do not contaminate food.

Food Safety
The protection of consumer health and well-being by safeguarding food from anything that can cause harm.

Food worker
Food Hygiene Regulations 852/2004 applies to any person working in the food handling area and applies to all stages of production, processing or distribution of food.

Interactive exercise:

Ask:

- Are you a food worker?
- Is a kitchen porter a food worker?
- Is a bar person a food worker?
Legal Requirements of Food Workers

**Screen Description**
The screen shows a series of images, cataloging the legal requirements of a food worker.

**Teacher**
Explain to the students that food workers are required by law to adhere to certain standards and practices.

**Legal Requirements of Food Workers**

- Maintain high degree of personal cleanliness
- Keep the workplace clean
- Protect food from contamination or anything that could cause harm
- Follow good personal hygiene practices- e.g hand washing
- Wear clean clothes and if necessary wear protective clothing
- Tell your employer if you are suffering from, or are a carrier of, a food-borne disease

*It is an offence for food workers not to meet these requirements.*
Screen Description:
The screen gives information on training.

Teacher:
Ask the students why they think training is an important aspect of food safety.

Training and supervision:
- By law food workers must receive adequate supervision instruction/or training in good food hygiene for work they do
- Those responsible for HACCP should also receive adequate training

Guides to good management procedures also recommend that:
- Training certificates should be renewed every 3 years
- Training should be refreshed – this generally takes place annually
- Training records should be kept as evidence that staff have been trained properly
Hygiene may be defined as:

**Screen description**
This is an interactive screen that displays the students’ suggestions before the definitive answers are revealed.

**Teacher**
Type in the student’s first name in the top box, and the suggestion on the lower box. Click to submit, the suggestion and the name will appear from the side.

When you have entered all the students’ suggestions; click the ‘Show definition’ button to reveal the definitive answers.

**Food hygiene may be defined as:**
All the practical measures involved in keeping food safe and wholesome through all the stages of production to point of sale or consumption.

This means

1. Protecting food from
   - spoilage and harmful bacteria.
   - Foreign objects including nuts/bolts, insects, hair etc.
   - Poisons including chemicals, cleaning agents and pesticides etc.
   - Bacteria that may cause illness or cause food to go off or spoil.

2. Preventing any bacteria present in food from multiplying to an extent which would result in illness to consumers.

3. Destroying any harmful bacteria in the food by thorough cooking or processing.

4. Ensuring food is safe, sound and wholesome when it reaches the consumer.

**Interactive exercise:**
Ask the students to explain in their own words the meaning of the words *contamination* and *multiplication.*
Food Hygiene: cost and benefits

Screen description
This screen lists the costs and benefits of good and poor food hygiene.

Teacher

Ask: Why would there be any relationship between the law and food hygiene?

Answer = It is in the interest of the consumer that we minimise the risk of food poisoning as its effects are potentially very serious and costly and there needs to be a penalty for offenders.

Benefits of good food hygiene

By providing staff with a comprehensive hygiene training programme, the food business should be able to achieve the following benefits:

1. Satisfied customers
2. Good reputation and therefore increased business
3. Increased shelf life of products
4. Compliance with the law
5. Good working conditions, higher staff morale and lower staff turnover
6. Higher profits
7. Quality awards
8. Staff have increased pride in their work place and therefore increased staff morale
9. Less wastage
10. Prevention of food poisoning
Food Hygiene: cost and benefits

**Costs of poor food hygiene**

The cost of poor hygiene could include:

1. Food poisoning outbreaks, potentially resulting in serious illness or even death
2. Physical contamination and customer complaints, e.g., a hair in a sandwich, insects in food, nuts and bolts in food
3. Legal action and risk of closure
4. Pest infestation and therefore possible contamination of food
5. Wasted food due to spoilage resulting in higher running costs
6. Civil action taken by customers
7. Loss of production
8. Lower profits
9. The costs of rectifying food hygiene faults far outweigh the costs of preventing them
10. Loss of reputation
11. Possible redundancies and closure

Teacher should include, where possible, local examples covered by the media.

**Interactive exercise:**

Discuss the point that ultimately a business could close and the owner could become bankrupt. Ask the students if they know of any local examples.
What is food poisoning/food-borne illness?

Screen description
This screen shows a definition and some possible symptoms of food poisoning/food-borne illness.

Teacher

Class discussion
Using the results of the survey carried out earlier, for those who had food poisoning/food-borne illness ask the following questions

1. Has anyone in the class suffered from food poisoning/food-borne illness?

2. If so
   a) How did it affect you?
   b) Can you identify source/cause

Food Poisoning/food-borne illness
Definition: Type of illness caused by eating contaminated food.

Food poisoning/food-borne illness is a common, but frequently preventable, illness. The symptoms can range from a mild upset to life-threatening conditions requiring medical attention. The burden within the community is twofold – there is a human cost in terms of discomfort and suffering, as well as a cost to the health services for those requiring treatment.

Rigorous enforcement of food hygiene legislation is important but is not, in itself, sufficient to prevent food poisoning/food-borne illness.

For a healthy adult the probability of getting sick from contaminated food is dependent on both the type and number of harmful micro-organisms present in the food. For those who are susceptible, namely the very young, and those who are sick or pregnant, where their immune systems are less effective, lower numbers of micro-organisms may be required to cause illness.
Susceptible Groups

Screen Description
The screen shows icons representing susceptible groups.

Teacher
Explain to the students the groups who are susceptible to food poisoning and food-borne illness.

Susceptible groups
Vulnerable groups including the elderly, the very young i.e. babies and toddlers, pregnant women and individuals who are immunocompromised.
Due Diligence

Screen Description
This screen shows a definition of due diligence.

Teacher
Ask the students what they understand by ‘safeguard consumer health’.

Due Diligence
A food business must be able to demonstrate that it has done everything within its power to safeguard consumer health.
Causes of food poisoning

**Screen description**
This screen lists the causes of food poisoning.

**Teacher**

Ask the students to invent a short funny sentence using the capital letters of the words in the list.

* e.g. **Billy Vomits Constantly after Mouldy Pies**

**Causes of food poisoning:**

1. Bacteria
2. Viruses
3. Chemical contaminants including metals, insecticides and cleaning agents.
4. Natural poisons in food – toadstools, green potatoes and red kidney beans
5. Metals

Bacterial food poisoning is the most commonly recognised and will result from bacteria multiplying within the food if it is left in conditions which would support the growth of bacteria.
Spore formation & cooking

Screen Description
This screen shows how it takes very high temperatures to kill spores.

Teacher
Explain to the students the importance of spore formation in relation to the cooking, cooling and re-heating of foods.

Spore formation & cooking

Bacteria such as *Clostridium perfringens* and *Bacillus cereus* produce spores. It takes a very high (>122 °C) temperature, often in association with pressure, to kill spores – the canning industry is based upon killing *Clostridium botulinum* spores.

When the food has been cooked and re-enters the danger zone (5°C - 63°C) as it cools, spores can revert back to their normal (vegetative) state when they can multiply in the right conditions.

It is vital therefore that food is kept out of the danger zone as far as possible.

Furthermore, following cooking, foods should be cooled as rapidly as possible and placed in a refrigerator.
Microbiology

**Screen description**
This screen shows the advantages and disadvantages of various micro-organisms.

**Teacher**

The screen shows advantages and disadvantages of various micro-organisms. To begin with the advantages and disadvantages are displayed without the name of the micro-organism.

Ask the students to suggest which label belongs where, the teacher can then click and drag the label to the correct position.

Microbiology is the study of very small living cells called micro-organisms. These are minute and invisible to the naked eye. They are found everywhere apart from artificially created sterile environments or products, e.g. sterile drips.

There are five main classes of micro-organisms, namely:

1. Bacteria
2. Viruses
3. Moulds
4. Yeasts
5. Fungi

The majority of micro-organisms are harmless having no effect on humans; many are beneficial.

However, some micro-organisms are harmful and these are the ones we are mainly concerned with in the context of food hygiene.

**There are 3 types of bacteria**

- **Pathogenic:** Cause illness
- **Helpful:** Used to make beer, cheese, yoghurt
- **Spoilage:** Causes food to perish or rot
## Microbiology

<table>
<thead>
<tr>
<th>Microorganisms</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
</table>
| **Bacteria**   | - Used in the manufacture of cheese, yoghurt, vinegar  
- Helps with digestion of food  
- Used in the manufacture of medicinal drugs | Spoils food, causes food poisoning and illness |
| **Moulds**     | Used in the manufacture of cheeses, e.g. Stilton (veined types)  
Antibiotics, e.g. penicillin | Spoil food, e.g. mould growth on bread and tomatoes |
| **Yeast**      | Used in the manufacture of bread and beer | Spoil fats |
| **Fungi**      | Can be eaten, e.g. mushrooms | Can be poisonous - toadstools |
| **Viruses**    | Used in medical research | Cause illness |

Moulds and fungi do not contribute to large numbers of food poisoning cases because we can see the mould on food and throw it out and because regulations require that foods are tested for the presence of the toxic substance ‘mycotoxin’ released by moulds, and withdrawn from the food chain.

The main class of micro-organism with which we are concerned is bacteria. Some bacteria do not cause illness but can cause food spoilage, for example, the souring of milk. Bacteria that can cause illness are called pathogenic/harmful bacteria.

Bacteria that cause food poisoning do not change the colour, taste, texture or appearance of food (i.e. no warnings are given to the consumer).

It is only when we eat the food and become ill that we are aware that something was wrong with the food.
Bacteria

Screen description
This screen describes bacteria.

Teacher

Group discussion
Ask: How can we transfer bacteria to food?

Bacteria

What are they?
Tiny living organisms, commonly referred to as germs.

What size are they?
Most are about 1/1000 of a millimetre in diameter. A full-stop on a page could hold millions of bacteria.

Shape?
They may be round, rod or spiral shaped.

Where are they found?
They are found almost everywhere – on humans, animals, plants, air, water and soil.

Everything is naturally covered in a layer of bacteria. Most of these are harmless. Some, however, can be quite harmful.

Bacteria can be found in our hair, nose, ears, cuts, hands, mouth and skin, e.g., *Staphylococcus aureus*.

We also carry bacteria in our intestines such as *E.coli* and some people can carry *Salmonella*. Every time we go to the toilet we excrete some bacteria which can penetrate through toilet paper and get onto our hands. If we handle food or equipment after using the toilet and without washing our hands we can transfer bacteria onto them.
Bacteria

**Screen description**
This screen tries to portray to the students how many a million is.

**Teacher**
Bacteria are always spoken about in millions. This screen is an attempt to convey the size of such a number.
Requirements for growth

Screen description
This screen shows the six main requirements for bacterial growth.

Teacher
The middle section is a video clip of bacteria multiplying by binary fission.

Requirements for growth
Bacteria, like humans, are living organisms and therefore require certain conditions in order to grow.

These include:


Food
Bacteria, like all living things, need food to grow. They live and grow particularly well in foods that are high in protein and moisture, e.g. meat, poultry, eggs, milk, cream, sauces and dairy products. These are perishable foods and may be termed high risk foods. Bacteria are naturally present on food, and if the food is stored under favourable conditions, the bacteria will grow and multiply. If there are any food poisoning organisms present, then these may also grow to dangerous levels making the food a greater risk.

Moisture
Bacteria need moisture/water to grow. Most foods contain sufficient amounts of moisture to support the growth of bacteria. Drying of foods, e.g. packet soups, i.e., removing of moisture, prevents the growth of bacteria, but will not kill bacteria. The bacteria will be dormant and on rehydration of the food, will be reactivated. Teacher should explain terms ‘dormant’ and ‘rehydration’.

Time
Bacteria multiply very rapidly by simply splitting in two. This process is known as binary fission. They multiply if the conditions are favourable to support their growth. In the most favourable conditions bacteria can double in number every 10 - 20 minutes. Within a few hours, it is
possible for one bacterium to lead to the production of millions of cells.

**Oxygen**
Some bacteria require oxygen for growth. These are called *aerobic* bacteria. Some bacteria can grow without oxygen. these are called *anaerobic bacteria*. These can be found for example, in canned, vacuum packed foods and deep in bulk foods.

**pH**
In highly acidic or alkaline foods, bacteria growth is further controlled, e.g. pickled (acidic) or salted (alkaline) foods.

Most bacteria like a neutral pH (pH7). Some micro-organisms i.e. moulds and yeasts multiply readily in slightly acidic conditions - a pH higher then 7, around 9 or 10. These would be the micro-organisms that would attack fruit.
**Screen description**
This screen shows how four different temperature ranges affect bacterial growth.

**Teacher**
Click on the temperature buttons on the right to display the animations that show how the temperature affects bacterial growth.

Most food poisoning bacteria multiply in the temperature range 5-63°C and this is called the danger zone. Therefore food left in warm kitchens (where temperature is in the danger zone) will allow bacteria to grow and multiply much more quickly than food stored under refrigerated conditions.

The ideal temperature for the growth of bacteria is the same as our body temperature, i.e., 37°C. They are most active at this temperature and will double in number every 10 - 20 minutes. As the temperature increases or decreases, the growth rate slows down.

**THE DANGER ZONE: 5°C TO 63°C**
Remembering the danger zone

Screen description
This screen suggests a fun way to remember the danger zone numbers, using Five Gold Rings for 5, and a play on words ‘Sick Tree’ - Sixty-Three.

Teacher
It’s proved that unusual imagery can be effective in remembering facts and figures. Ask the students to suggest some of their own.
Control of bacterial growth

**Screen description**
This screen suggests controls for bacterial growth.

**Teacher**
Simple bullet point screen.

By eliminating one or more of the requirements for growth, we can control the multiplication of bacteria.

**Time**
Temperature
Moisture
Food

These factors can be controlled in foods through:

**Moisture** – The removal of moisture from food by drying

**Temperature Control** – The use of low temperature (refrigeration or freezing) or high temperature (hot holding) to restrict bacterial growth.

**Food** – Certain foods are good sources of nutrition for bacteria and are potentially susceptible to the growth of food poisoning bacteria. These are known as high risk foods.

**Time** – Properly stored food should remain in good condition during the designated shelf life.

**Oxygen**
Some bacteria require oxygen for growth. These are called **aerobic** bacteria. Some bacteria can grow without oxygen. These are called **anaerobic bacteria**. These can be found for example, in canned, vacuum packed foods and deep in bulk foods.

**pH**
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multiply readily in slightly acidic conditions - a pH higher then 7, around 9 or 10. These would be the micro-organisms that would attack fruit.
Preservation

Screen description
Screen shows information on food preservation.

Teacher
Explain points to the class.

Some common methods of preservation operate by limiting the requirements for growth. Others use treatments to kill bacteria, such as irradiation, or to prevent them growing such as chemical preservation or vacuum packing.

Bacteria, moulds and yeasts that cause spoilage need food, moisture, warmth and time to reproduce. Covering food, cleanliness, moisture levels and length of time in storage all play a part in delaying spoilage and keeping food safe to eat.

A number of preservation methods delay spoilage or kill spoilage/pathogenic organisms.

These are:

- Heat treatment - cooking, canning, bottling sterilising, pasteurising (72°C for 15 seconds) and Ultra Heat Treatment (UHT)
- Low temperature - freezing and refrigeration
- Drying (dehydration) - fish, meat, fruit, vegetable soup
- Chemical preservation - curing, salting, pickling
- Vacuum sealing/packing - meat, fish, poultry
- Smoking - fish, meat, cheese
- Irradiation - herbs and spices
Class activity

Screen description
This screen shows a sample survey card for carrying out a temperature check of various areas of the kitchen.

Teacher
Get the students to carry out the activity. Discuss their results.

Check the temperature of different areas of a kitchen where food is stored and used.

Divide the students into pairs and provide them with a thermometer and a chart to record the results.
The students should work in pairs to check the temperature in different areas of the home economics kitchen (or work individually at home). Ask the students to include a reading for the refrigerator, the freezer, the food cupboard and the general room temperature.

The students should record the results carefully, suggesting the locations where bacteria would be able to multiply.

What information does this tell us?
We need to be careful not to leave food at temperatures where bacteria could multiply.
Spores and toxins

Screen description
Screen shows the animation of bacteria producing spores and toxins.

Teacher

Bullet point screen.

Some bacteria are able to produce spores which protect them against adverse conditions such as high temperatures, allowing them to survive thorough cooking. They are also resistant to disinfectants.

Definition of spores

Spores are small round bodies with thick walls which allow bacteria to stay dormant but alive, over long periods of time e.g. during freezing, defrosting, cooking and cooling. When conditions become favourable the spores germinate and active bacteria are produced once more.

It can be said, therefore, that cooking does not eliminate the possibility of food poisoning. In order to prevent spores from germinating, and subsequent bacterial growth, food must be quickly cooled and refrigerated or kept hot.

Toxins are chemicals that can make you ill and are produced by certain types of bacteria e.g. with *Staphylococcus aureus* the toxin is produced in the food before it is eaten and this preformed toxin normally makes you ill very soon after eating the food.
Food Safety Management Systems and HACCP

Screen description
Screen shows what the letters HACCP stand for.

Teacher
This slide is an introduction to one Food Safety Management System which is HACCP. It explains the term HACCP which will be discussed further in session 8.

Food hygiene legislation requires food businesses to have a food safety management system such as HACCP or a system based on HACCP principles. Food workers have a role to play in implementing food safety management systems, for example recording temperatures, etc.

The system of Hazard Analysis and Critical Control Point (HACCP) is now widely accepted in the food sector as a quality assurance system. It is based on the identification and analysis of hazards and the establishment of controls to eliminate or reduce these hazards to a safe level.