

Screen 1



Food contamination

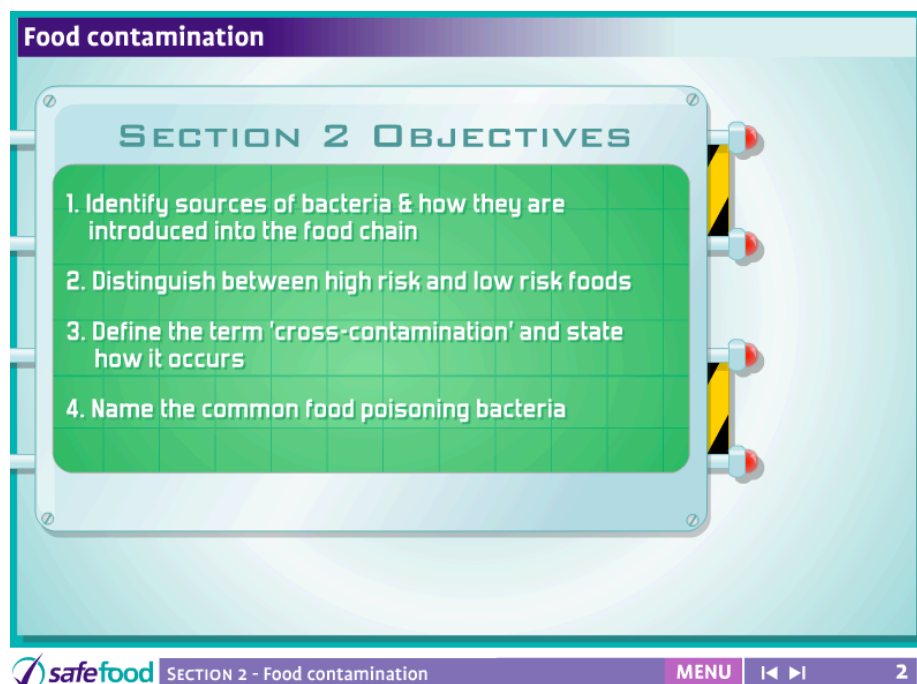
Screen description

This screen shows bacteria just about to move from raw meat to a ready-to-eat food (cream gateau). This is known as cross contamination.

Teacher

Use this screen to start a discussion on the different ways bacteria could be transferred between food in the kitchen.

Screen 2



Food contamination

Screen description






















This screen lists the objectives of the chapter

1. Identify sources of bacteria and how they are introduced into the food chain
2. Distinguish between high risk and low risk foods
3. Define the term 'cross-contamination' and state how it occurs
4. Name the common food poisoning bacteria.

Teacher

This section is about learning how to prevent food from being contaminated.

Screen 3

Common sources of micro-organisms			
Source	Types of micro-organisms		
ANIMALS			 <i>E. coli</i>
POULTRY			 <i>Salmonella</i>
VEGETABLES			 <i>Clostridium perfringens</i>
SHELLFISH			 <i>VIRUSES</i>
MILK			 <i>TB</i>
WATER			 <i>E. coli</i>
HANDS			 <i>Staphylococcus aureus</i>



SECTION 2 - Food contamination

MENU

◀ ▶

3

Food and types of organisms

Screen description

The screen shows how our food sources are also the main source of pathogens (harmful micro-organisms).

Teacher

Emphasise that we need to prepare our food very carefully as it can often be contaminated with pathogenic bacteria.

The term 'pathogen' must be defined. Ask the students to highlight the definition in their student notes.

A pathogen is any bacterium that causes disease or harm.

Source	Types of Microorganisms
Animals	<i>E . coli</i>
Poultry	<i>Salmonella</i>
Vegetables	<i>Clostridium perfringens</i>
Shellfish	Viruses
Milk	<i>TB</i>
Water	<i>E . coli</i>
Hands	<i>Staphylococcus aureus</i>

Bacteria live on foods we eat such as meat, poultry and fish and can also be found in raw milk, water and on raw vegetables.

Interactive Exercise

Ask: How do bacteria get into our food chain?

Animals

Animals carry bacteria on their skins or hides and in their intestines. These bacteria such as *Salmonella*, *E. coli* or *Clostridium perfringens* are pathogenic and can cause illness. The transfer of bacteria from the hide or the intestine can occur during the slaughtering process. When cattle are slaughtered, their hide is removed. If great care is not taken, any faecal matter on the hide can come into contact with the flesh.

During evisceration, i.e. the removal of the offal, the stomach or intestines may burst, releasing bacteria which can come into contact with flesh. This flesh is the raw meat which is prepared for human consumption. All raw meat delivered to retail premises may be heavily contaminated with bacteria.

Poultry

Where chickens or turkeys are eviscerated by the same machine or knife this can result in the transfer of bacteria such as *Campylobacter* and *Salmonella* from one infected bird to several others. Proper disinfection of equipment is therefore vital.

Salmonella can also be present in animals such as ducks, cattle, pigs and sheep. The feeding of infected foodstuffs to poultry can result in large numbers of chickens and their eggs carrying food poisoning bacteria. It is therefore essential to ensure eggs are thoroughly cooked.

Vegetables

Raw vegetables carry bacteria from the soil, such as *Clostridium perfringens*. Soil can naturally contain these bacteria or it may be contaminated for instance by spreading slurry or farmyard manure. Bacteria can also be introduced onto fruit and vegetables by pests, such as rodents urinating onto fruit and vegetables (Weils disease).

It is therefore essential to keep fruit and vegetables separate from other foods. They also require thorough washing before use as many of these are eaten raw.

Fruit and vegetables may also be subjected to chemical contamination – pesticides, herbicides,

fungicides etc. Thorough washing will help to reduce the level of chemical contamination.

Shellfish

Shellfish such as mussels, oysters, clams, scallops, etc. are filter feeders. They operate a bi-valve system, whereby water is taken in through one valve, filtered it through their flesh and then discharged through the second valve. This method of feeding can often result in bacteria and viruses accumulating in the flesh of the shellfish rather than being discharged back into the water.

The fact that shellfish are often eaten raw or lightly cooked makes them a common source of food poisoning. It is essential that shellfish are reared in clean waters and properly treated before use.

The two main methods of treatment are depuration and UV treatment. Depuration involves placing the live shellfish in fresh salty water so that the bacteria in their bodies will filter back into the water. UV treatment involves placing live shellfish in water tanks with ultra violet lights.

Milk

Milk is a highly nutritious food for pathogenic bacteria. Raw milk (cow's) often contains bacteria from the cow such as *E. coli* or even *TB* or *Brucellosis*. It is illegal to sell raw milk in Ireland. Pasteurised milk must be used in food preparation.

Pasteurisation is a heat process used to reduce the numbers of micro-organisms in food to a safe level. The milk is heated to a high temperature (72°C for 15 seconds) and then cooled rapidly. Pasteurisation is also used for other food products such as cream, liquid egg and yoghurts.

Water

Raw water contains bacteria. Most water supplies are sourced from rivers and lakes which can be contaminated by run-off from land, sewage and slurry. Water must be properly treated to remove pathogenic bacteria if it is to be used for human consumption and food preparation.

Water treatment involves:

1. Sedimentation: allows solids to settle
2. Filtration: removes smaller remaining particles
3. Chlorination or UV treatment are used to kill pathogenic bacteria

There are two supplies of water in a food premises:

1. Rising mains water. This is potable (wholesome/ drinking) water which comes directly from the

treatment plant to the cold tap in the kitchen. It is this water that must be used in all food preparation, ice making, drinking etc.

2. Storage tank water. This is water which goes first to a storage tank, usually in the attic, before use. This water is not suitable for drinking purposes. It is only used for wash hand basins, toilets and showers.

Water can act as a vehicle to transmit diseases such as *E. coli*, Weil's disease and hepatitis. Water used in food preparation, including the manufacture of ice, must be potable.

Bacteria in our intestines

Other bacteria can be helpful, for example bacteria in our intestines help the digestion of food. These bacteria are naturally present.

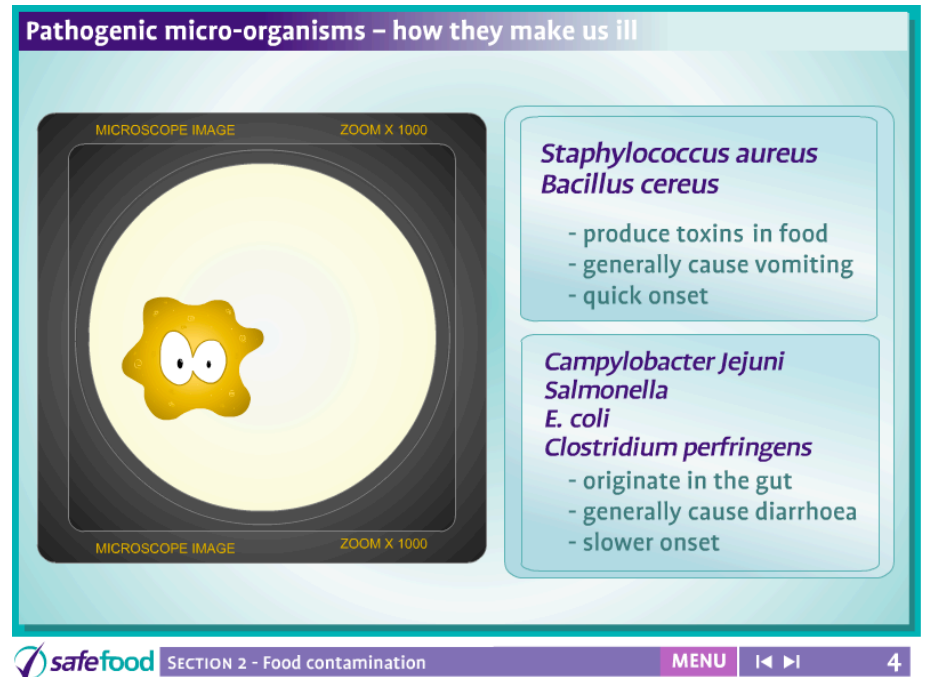
FOOD POISONING

Pathogenic Bacteria	Source	Typical Symptoms	Average onset time
<i>Salmonella</i>	Raw poultry, eggs, raw meat, milk, animals (including pets), insects and sewage	Abdominal pain, diarrhoea, vomiting, fever	12 - 36 hrs
<i>Staphylococcus aureus</i>	Human body - especially skin, nose, cuts and boils - and raw milk	Abdominal pain, abdominal cramps, vomiting, low temperature	1 - 6 hrs
<i>Clostridium perfringens</i>	Animal and human excreta, soil, dust, insects and raw meat	Abdominal pain, diarrhoea	12 - 18 hrs
<i>Clostridium botulinum</i> (botulism)	Soil, raw fish and meat, vegetables, smoked fish, canned fish or corned beef, hazelnut purée	Difficulties in breathing and swallowing, paralysis	12 - 36 hrs
<i>Bacillus cereus</i>	Cereals (especially rice), soil and dust	Abdominal pain, diarrhoea, vomiting	1 - 5 hrs or 8 -16 hrs depending on the form of the food poisoning

FOOD-BORNE DISEASES

<i>Campylobacter jejuni</i>	Raw poultry, raw meat, milk and animals (including pets)	Diarrhoea often bloody, abdominal pain, nausea, fever	48 - 60 hrs
<i>Escherichia coli</i> (E.coli 0157)	Human and animal gut, sewage, water, raw meat	Abdominal pain, diarrhoea, vomiting, kidney damage or failure	12 - 24 hrs or longer
<i>Listeria</i>	Soft cheese, cheese made from unpasteurised milk, salad vegetables and pâté	Flu-like symptoms	1 - 70 days
<i>Shigella</i> (Bacillary Dysentery)	Water, milk, salad vegetables	Diarrhoea sometimes bloody, fever, abdominal pain, vomiting	1 -7 days
Norovirus	Gut, sewage - contaminated water	Causes infectious gastroenteritis, vomiting, diarrhoea, abdominal pain and headaches	24-48 hours after ingestion

Screen 4



Pathogenic Micro-organisms – how they make us ill

Screen Description

The screen shows a microscope slide containing a micro-organism.

Teacher

Explain the points on the slide to the students

Pathogenic Micro-organisms – how they make us ill:

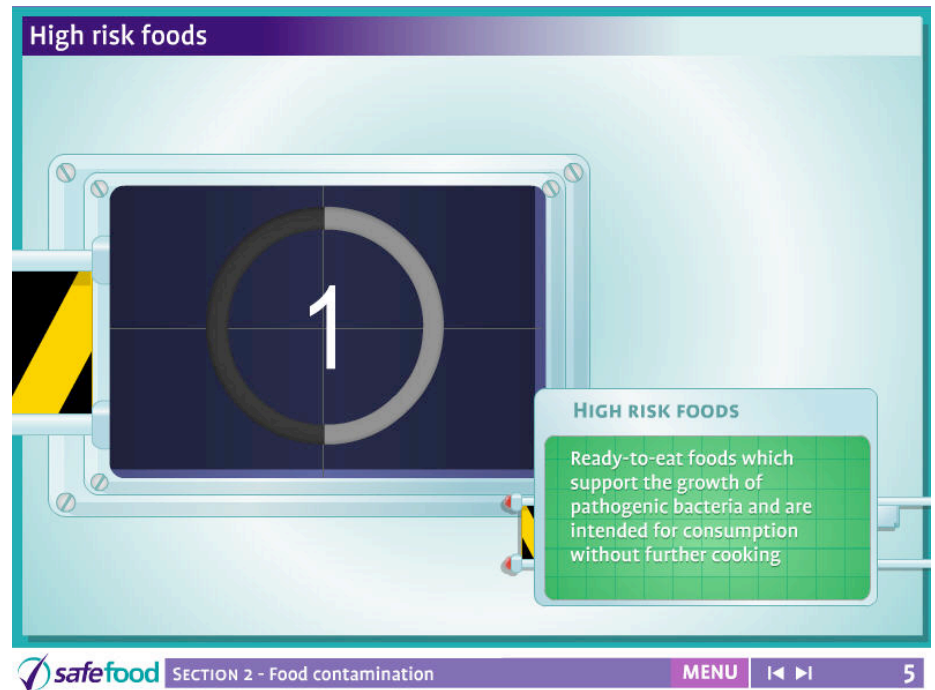
Staphylococcus aureus, Bacillus cereus

- Produce toxin in food
- Generally cause vomiting
- Quick onset

Campylobacter jejuni, Salmonella, E. coli, Clostridium perfringens

- Originate in the gut
- Generally cause diarrhoea
- Slower onset

Screen 5



High risk foods

Screen description

This screen shows an animation of a police line-up where high-risk foods are highlighted.

Teacher

Explain what are high risk foods

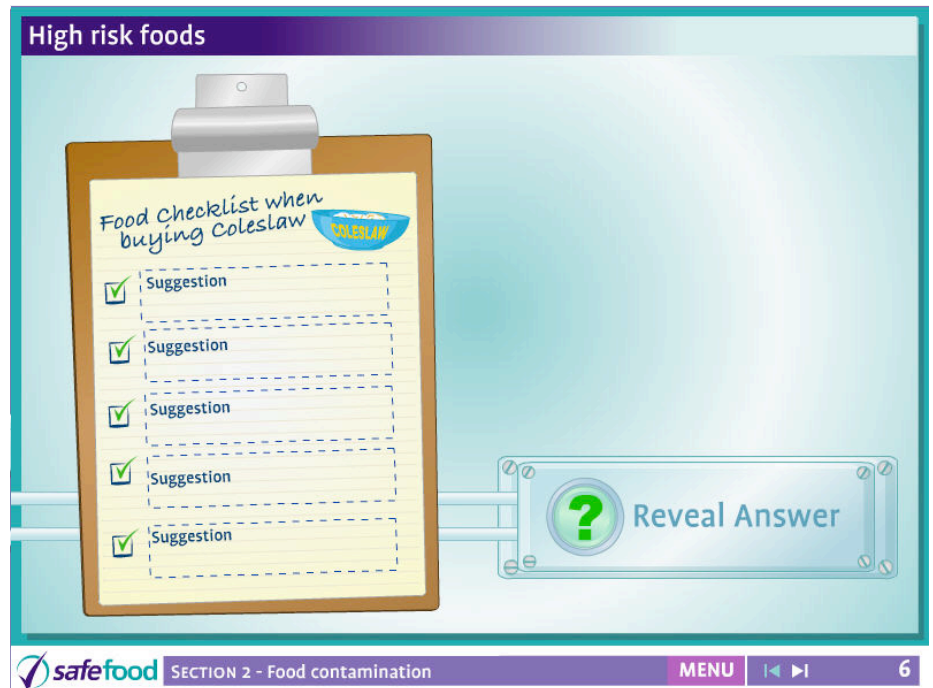
Emphasize that people need to be very careful if they are eating a high-risk food and in some situations they should avoid high-risk food.

These are ready-to-eat foods which can support the growth of pathogenic bacteria and are intended for consumption without further processing or cooking. These foods are usually high in protein and moisture and require refrigerated storage.

Examples of high risk food:

1. Cooked meat and poultry
2. Cooked meat products including gravy, stock, meat pies
3. Sausage rolls & chicken nuggets
4. Milk, cream, custards and dairy produce, custard slices & cream cakes
5. Cooked eggs and products made from eggs mayonnaise, meringue or home-made ice-cream
6. Shellfish and other seafood, prawn cocktail & smoked salmon
7. Cooked rice, rice pudding or egg fried rice
8. Ready to eat salads, coleslaw or potato salad etc.

screen 6



Exercise

Screen description

This screen presents a blank check list for buying coleslaw. The students are invited to suggest answers.

Teacher

You can type the suggested answers into the boxes. When you have entered the students' suggestions click the 'reveal answers' button and a definitive list will be revealed.

7

Screen



Exercise

Screen description

This screen presents a blank check list for buying fish. The students are invited to suggest answers.

Teacher

You can type the suggested answers into the boxes. When you're ready to move on, click the '?' button and the definitive list will be revealed.

Screen 8



Low risk foods

Screen description

This screen shows a list of low risk foods, and asks the question why they are low risk.

Teacher

Ask the students why these foods are considered low risk. When you're ready to move on click the '?' button and the answers will be revealed.

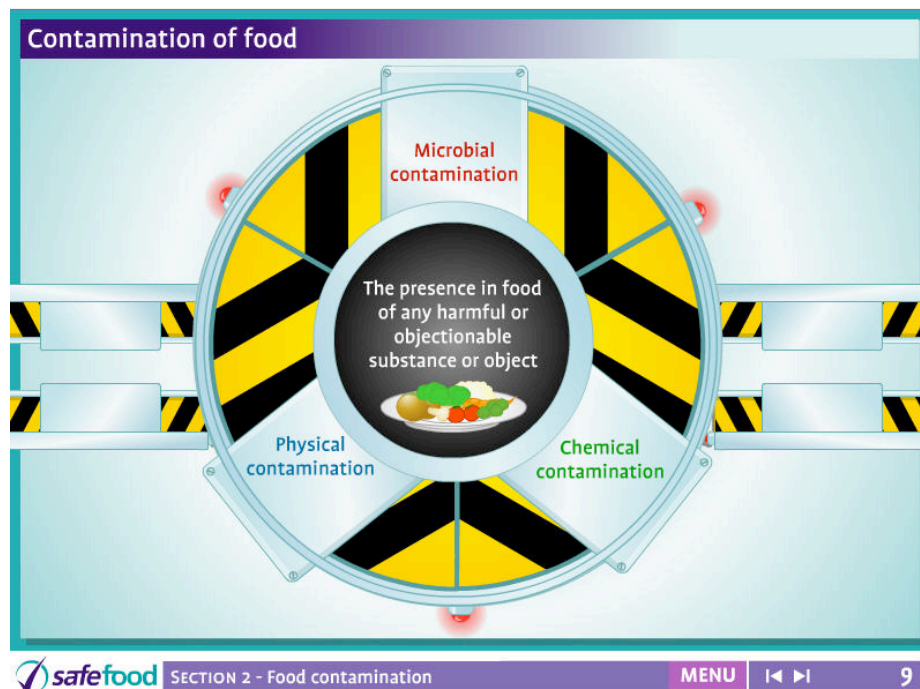
Bacteria do not like low risk foods. The bacteria cannot grow on low risk foods because the optimum conditions (food, moisture, temperature and time) are generally not right for growth. For example, they may contain too much sugar, vinegar, salt or acid. For this reason these foods are considered relatively safe foods.

Examples include:

1. Acid fruits - there is too much acid in the fruit and bacteria will not grow - e.g. oranges, lemons
2. Vegetables in vinegar - the vinegar acts as a preservative - e.g. pickled onions
3. Jams and preserves - the sugar acts as a preservative
4. Salted or smoked meats – the bacteria cannot survive in the salty environment.
5. Bread does not contain high moisture levels and therefore is not favourable for bacterial growth

Remember a food which looks and tastes normal may contain food poisoning bacteria.

Screen 9



Contamination of food

Screen description

Screen shows three types of contaminants.

Teacher

Indicate that the three main ways in which food can be contaminated are:

1. Microbial contamination (includes bacteria, moulds and viruses)
2. Physical contamination
3. Chemical contamination

Microbial contamination

Mould often occurs if food is stored at the wrong temperature, at high humidity or beyond its recommended shelf-life. Viruses may be brought into food premises on raw foods such as shellfish which have been bought from an unapproved source.

Bacterial contamination is the most significant in terms of microbial food poisoning and food-borne illnesses.

Contamination

Definition: *The presence in food of any harmful or objectionable substance or object.*

Screen 10



Bacterial contamination of food

Screen description

The screen shows animations of different bacterial contamination of food.

Teacher

Use the on-screen buttons to view the different animations.

Ask the students for examples of direct and indirect contamination.

As bacteria have no legs or wings, they rely on other things to transfer them to food. These things are known as vehicles. Examples of vehicles include: hands, knives, cloths, equipment, food-contact surfaces.

Bacterial cross-contamination may be defined as: “the transfer of harmful / pathogenic bacteria from one item / food / surface / person to food.”

Direct cross-contamination

This occurs in food when there is direct contact between the source of the bacteria and food.

Examples include:

- Raw meat stored above or in contact with cooked meat
- Raw chicken stored above or in contact with coleslaw
- Food handler sneezing/coughing onto food

Indirect cross-contamination

This occurs when harmful bacteria are transferred from the source to the food via a vehicle.

Examples include:

- Using the same knife/chopping board to slice raw meat and then cooked meat without washing it and disinfecting it between tasks
- Using the same cloth to wash down the raw food preparation area and then the cooked food preparation area
- Touching food after blowing your nose, without first washing your hands

Screen 11

Suggest ways to prevent cross contamination

PREVENTION MEASURES

- Store raw and cooked meat separately
- Keep raw meat on the bottom shelf of the fridge
- Use a different chopping board and knife for raw and cooked food
- Always cover foods that are stored in the fridge.

STUDENT NAME:

SUGGESTION:

safe food SECTION 2 - Food contamination **MENU** **11**

Ways to prevent cross contamination

Screen description

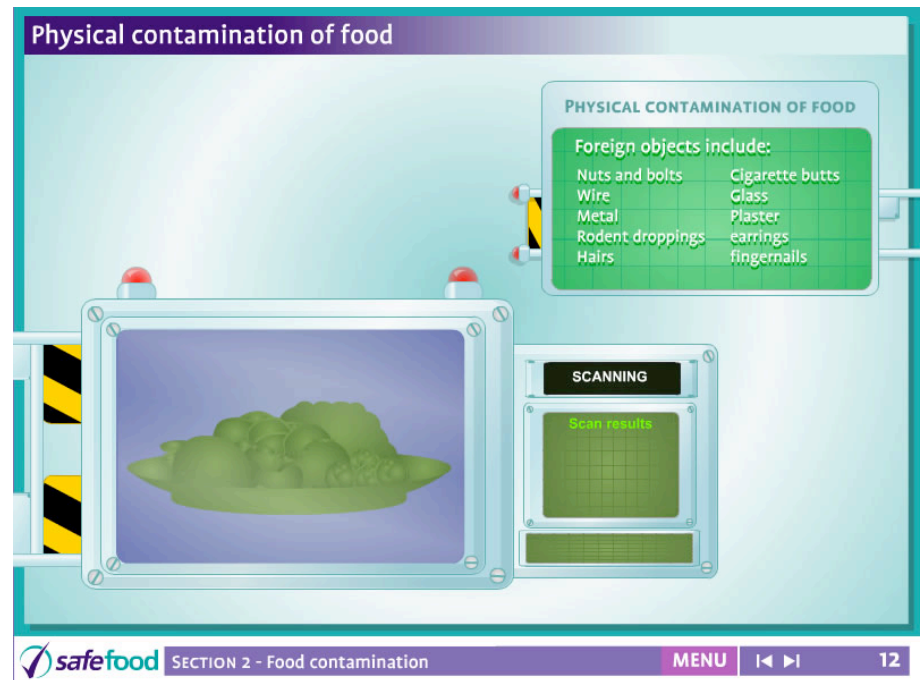
This is an interactive screen that displays the students' suggestions before the definitive answers are revealed.

Teacher

Type in the student's first name in the top box, and the suggestion on the lower box. Click 'submit' and the suggestion and name appears from the side.

When you're ready to move on click the 'show answer' button to reveal the definitive answers.

Screen 12



Physical contamination

Screen description

The screen shows animations of different physical contamination of food.

Teacher

Class discussion

Some physical contamination can in turn cause bacterial contamination (rodent droppings, hairs, plasters, cigarette butts and fingernails - all of animal origin)

Ask what is the most important thing to do to prevent physical contamination of food.

The students should suggest covering the food.

Food can be contaminated physically by foreign objects. Foreign objects can be brought into the premises with raw materials or introduced during storage, preparation, service or display. Foreign objects which are commonly associated with food complaints include:

- Nuts, bolts, wire, metal

- Cardboard, plastic, string
- Rodent droppings, hairs
- Cigarette butts, glass, flaking paint
- Plasters, earrings, fingernails

Screen 13



Physical contamination of food

Screen description

This screen shows some shocking newspaper headlines about physical contamination of food.

Teacher

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

Screen 14



Chemical contamination of food

Screen description

The screen shows animations of different instances of chemical contamination of food.

Teacher

Ask the students if they have ever heard of any situation where food or water were contaminated with chemicals.

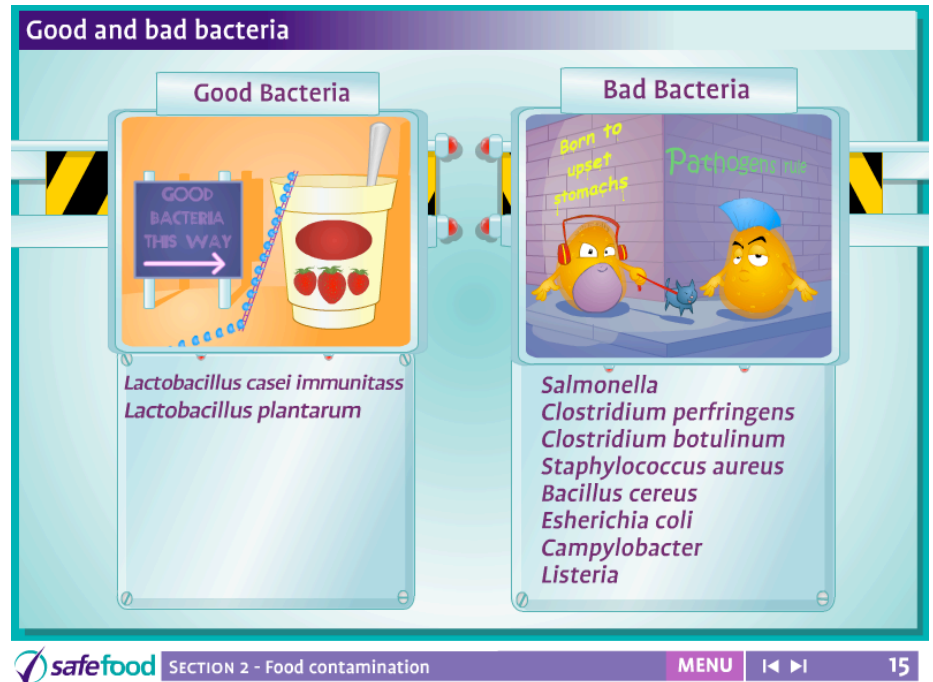
After listening to the students mention the film Erin Brockovich. Ask the students to verbally recount the effects of chemical contamination as shown in the film.

Undesirable chemicals can enter foodstuffs during:

- Growth – e.g. veterinary drugs, fertilisers, pesticides and environmental contaminants e.g. lead
- Processing – e.g. oils and lubricants, cleaning chemicals

- Transport – e.g. as a result of spillage or leaks
- Sale – e.g. cleaning chemicals

Screen 15



Good and bad bacteria

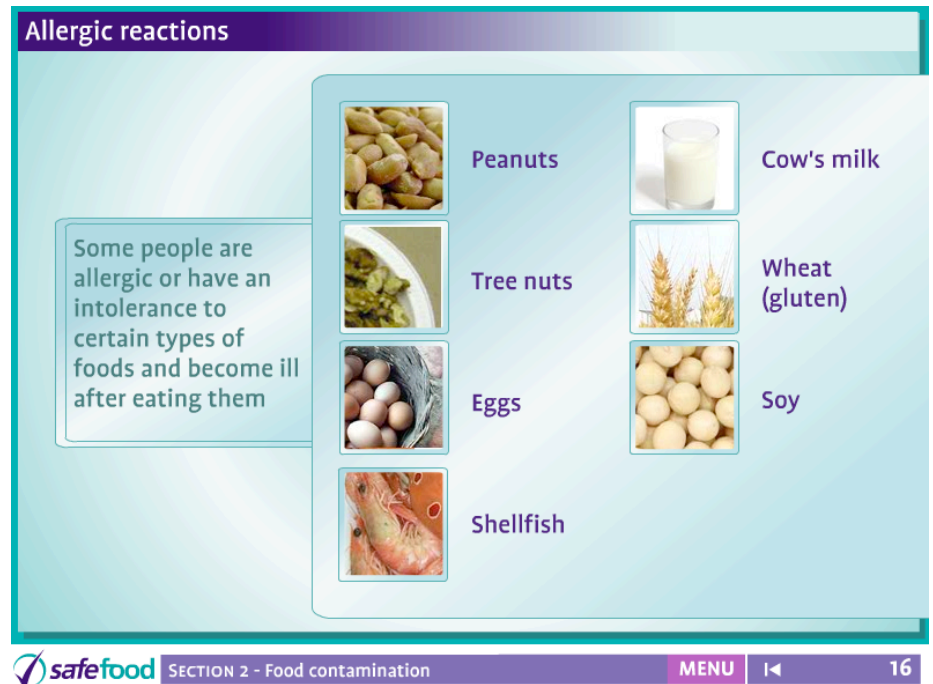
Screen description

This screen shows pathogenic, bad or harmful bacteria and good bacteria.

Teacher

The students should practice repeating the pronunciation of the names of the bacteria. Ask different pupils to read out the list. Examples of food where the bacteria would possibly be found should be given e.g. *Salmonella* could be found in poultry.

Screen 16



Allergies

Screen Description

The screen shows foods that some people are allergic or have an intolerance to.

Teacher;

Ask the students to suggest some food products that might contain these ingredients.

Allergies

Some people are allergic or have an intolerance to certain types of foods and become ill after eating them

These foods include

- Peanuts
- Tree nuts
- Eggs
- Shellfish

- Cow's milk
- Wheat (gluten)
- Soy

Allergic reactions include tingling around the mouth swelling around nose, mouth and throat, difficulty breathing, rashes, vomiting, diarrhoea and cramps. Severe anaphylactic reactions can also occur that cause the blood pressure to drop dangerously low. Without treatment the individual can die within minutes.

As a food handler, you must be careful not to inadvertently contaminate food that is supposed to be free from allergens.

You must also be careful to give the right information about ingredients to customers who ask.