Food Preservation and Safety

Students Worksheets

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INTRODUCTION

The activities for the *Unit 1: Preservation and Food Safety* are to be found in this document. The activities 1 to 8 belong to the first lesson: *Preservation*. Activities 9 to 12 belong to Lesson 2: *Safety and Packing*.

Each activity can have several parts ranging from a lower level of thinking to higher level of thinking. Some sort of scaffolding for all the activities is provided and is to be found in the document *Teaching notes*.

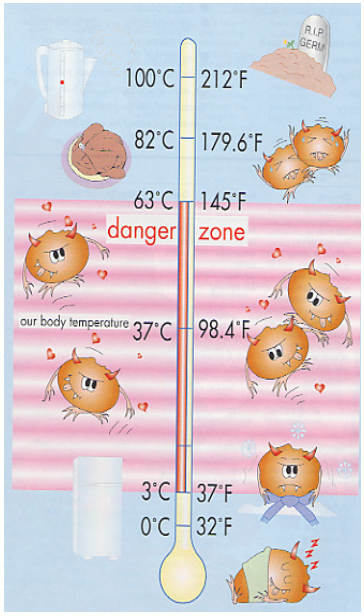
Several types of scaffolding are to be found: activities, definitions, tables with grammar structures among them. Since scaffolding should be used only when necessary, in some activities scaffolding may not be necessary because students have already been helped in a similar way in a previous activity.

Unit 1: Food preservation and food safety

Lesson 1: Preservation

ACTIVITY 1: THE GERMOMETER Timing 30 min.

Look at the germometer and answer the questions below:



1. What temperature does bacteria like the best?
2. What happens to bacteria at 63ºC?
3. What happens to bacteria in a refrigerator?
4. What happens when bacteria are put into boiling water?
5. Why is the temperature range between 5ºC and 63ºC known as the Danger Zone?
6. What are the similarities and the differences between 0ºC and 100ºC?
7. Have you ever had food poisoning? How did you get it?
8. How do you think it could have been prevented?

ACTIVITY 2: THE NECESSARY CONDITIONS FOR THE GROWTH OF MICROBES Timing 45 min.

As soon as food is picked (harvested) or slaughtered it will begin to deteriorate as the microorganisms that cause food spoilage begin to attack.

What conditions do microbes need in order to make our food go 'off' or 'bad'?

In pairs carry out the following experiment to be able to answer this question.

Materials:

- dry, uncooked rice
- cooked (boiled and drained) rice
- cotton wool
- refrigerator
- sticky labels
- test tubes or boiling tubes

Method

1. Label four tubes A - D.
2. Place some uncooked rice in tube A.
3. Place some cooked rice in tubes B, C and D.
4. Place enough cooking oil in tube D to just cover the rice.
5. Put a cotton wool bung in each tube.
6. Put tube C in a refrigerator.
7. Leave the other tubes at room temperature.
8. Check the tubes after 1 week and 2 weeks.

Results

Look for the growth of mould in the tubes. Decide what the conditions were like in each tube during the experiment. Fill in the table below:

	conditions in the tube	appearance after 1 week	appearance after 2 weeks
uncooked rice	no water, warm, air present	rice looks same	rice looks the same
cooked rice alone	water present, warm, air present		
cooked rice in refrigerator	water present, cold, air present		
cooked rice with oil	water present, warm, layer of oil stops air reaching rice		

Prepare a scientific report:

1. What conditions are needed for microorganisms to grow?

2. What are the two systems that avoided microbe growth?

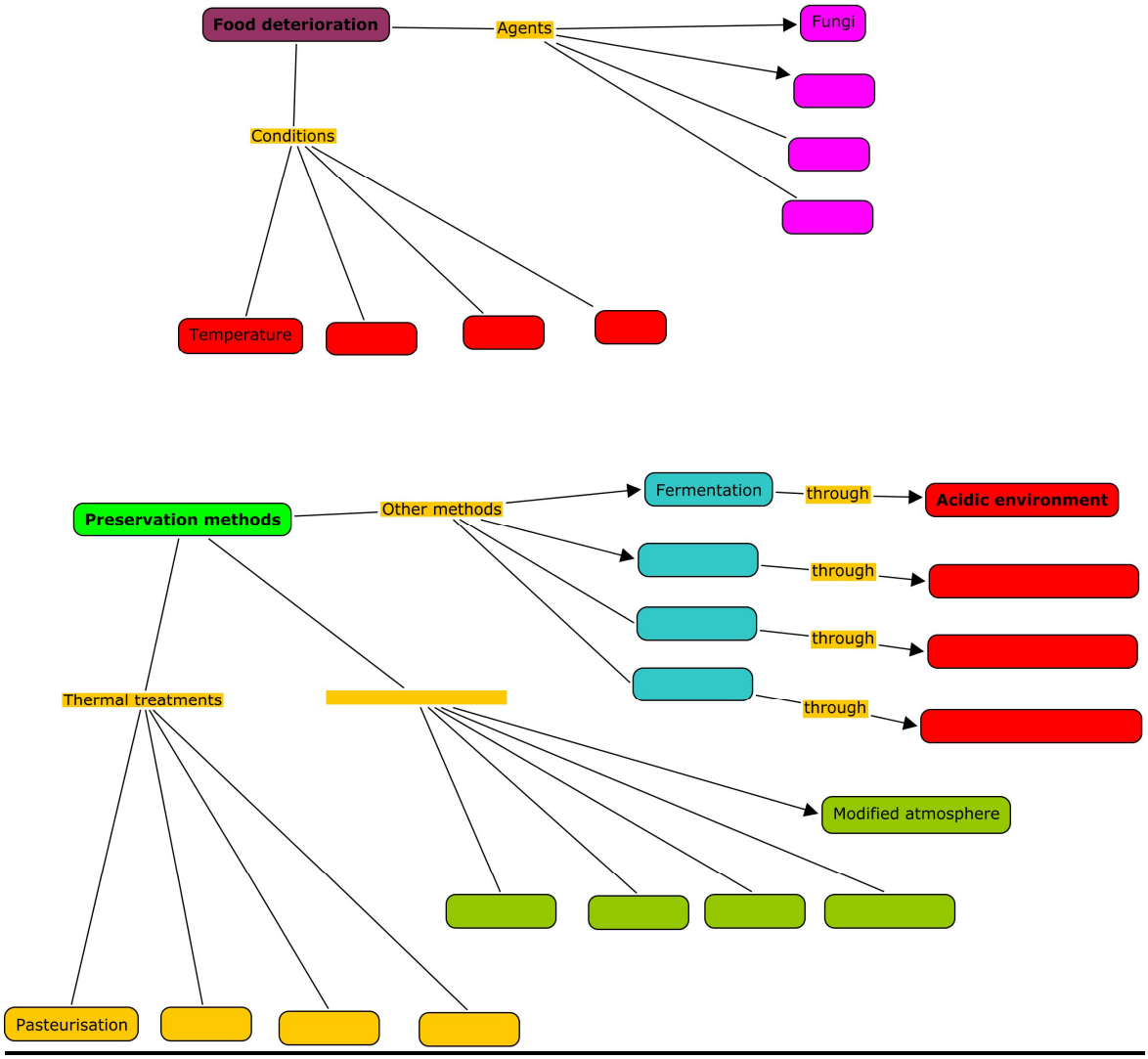
3. If mould has grown in any of the tubes, where has the mould come from?

4. Which system is the most efficient at preventing mould growth?

5. If you were to sell cooked packed rice, would you use these preservation systems or can you think of any other preservation system that might be more suitable? Explain why you have chosen that preservation system.

ACTIVITY 3: METHODS OF FOOD PRESERVATION 1 Timing 20 min

You are asked to complete the mind map below. You are provided with a list of words, some of which you have to use.



Possible words to use:

Unpalatable, toxins, dioxide sulphur, irradiation, freezing, smoking, sugar, mould, blanching, no thermal treatments, rotten, radioactive rays, substances of smoke, UHT, enzymes, irradiation, salt, vinegar, sterilisation, cooking, pickling.

ACTIVITY 4: METHODS OF FOOD PRESERVATION 2 Timing 30 min

The table below shows on the first column a list of preservation methods.

- In the second column match the statements you find under the table with the preservation methods of the first column.
- In the third column give examples for each method

Preservation method	How does it work?	Examples
Acidulation		
Fermentation		
Refrigeration		
Freezing		
Jellying		
Canning and bottling		
Smoking		
Dehydration		
UHT		
Curing		
Pickling		
Jam		
Gas or vacuum packing		
Chemical preservatives		
Irradiation		

Match these statements against food preservation methods.

a) slows down reactions
b) salt is added which makes the liquid environment very concentrated
c) substances such as sulphur dioxide and sodium benzoate interfere with microbial growth
d) it becomes sour because the pH is very low
e) destroys enzymes and most of the microorganisms
f) adds sugar which makes the liquid environment very concentrated
g) removes water completely; makes the food a solid
h) some microorganisms can change the food composition; undesirable microorganisms cannot grow in it
i) adds (usually) vinegar; makes the environment too acidic for enzymes and bacteria
j) rays from a radioactive source are passed through food
k) slows down reactions considerably; 'removes' water by turning it into a solid so that it cannot be used
l) material that solidifies to form a gel
m) removes and excludes oxygen to inhibit the growth of microorganisms
n) food is exposed to the gases of the combustion of wood and other elements
o) it is required high temperature for a short period of time

ACTIVITY 5: JAM MAKING Timing 3h (F)



Instructions:

Read carefully **all the instructions** before beginning to work

1. In groups of three you have to prepare peach jam. To do so you have to make sure you have all the ingredients and materials and follow the next fifteen steps you have in the PART 1: jam making instructions.
2. Once the jam is ready with your peers write up the project in PART 2.
3. Now it is time to make your product appealing and informative. Design a label for your jam jar following the instructions you will find in PART 3.

PART 1: (Timing 1h)

Ingredients and equipment:

- Apricots, Peaches, Plums or Nectarines : 500g
- Lemon juice: 100ml.
- Water : 50 ml
- Sugar: 300g of granulated (table) sugar.
- Pectin
- Jar grabber
- 1 large pot.
- Large spoons and ladles
- 1 large pot (to sterilize the jars after filling)
- Ball jars
- Lids
- Rings
- Bottle canner

Jam making instructions

1. **Picking the Apricots**

Choose the riper ones.

2. **Fruit quantity**

The number of pieces depends on their size. There should be around 500g of fruits

3. **Washing the jars and lids**

Wash the jars properly and sterilise the lids (put in boiling water for 5min).

4. **Washing and sorting the fruit**

Wash the fruit and remove leaves, stems or mouldy parts.
Drain off the water.

5. **Peeling the peaches**

Do it carefully using a peeler or a knife.

6. **Cutting up the peaches**

Some varieties can be cut in half and the stones removed.
If not possible cut them into small parts.

7. **Preventing the fruit from darkening**

Put the peaches into bowls filled with water. Sprinkle 1/4 cup lemon juice.
Then stir the peaches to make sure all the surfaces have been coated.

8. **Measuring out the sweetener**

Depending upon which type of jam you're making (sugar, low sugar, no-sugar) you will need to use a different amount of sugar and type of pectin.

Type of jam	Type of pectin to buy	Sweetener
regular	no-sugar or regular	300g of sugar
low sugar	no-sugar	100g of sugar
natural	no-sugar	200 ml fruit juice (grape, peach, apple or mixed)

9. Mixing the dry pectin with about 1/4 cup of sugar or other sweetener

10. Mixing the Apricots with the pectin and cook to a full boil

Stir the pectin into the peaches and put the mix in a big pot on the stove over medium to high heat (stir often enough to prevent burning).
It should take about 5 to 10 minutes to get it to a full boil.

11. Adding the remaining sugar and bring to a boil

When the berry-pectin mix has reached a full boil, add the rest of the sugar and then bring it back to a boil and boil hard for 1 minute.

12. Testing for "jell" (thickness)

Keep a metal tablespoon sitting in a glass of ice water, then take a half spoonful of the mix and let it cool to room temperature on the spoon.
If it thickens up to the appropriate consistency, the jam is ready.
If not, mix in a little more pectin and bring it to a boil again for 1 minute.

13. Filling the jars and put the lid and rings on

Fill them to within 2 cm of the top, wipe any spilled jam off the top, seal the lid and tighten the ring around them.
Then put them into the boiling water canner.

14. Processing the jars in the boiling water bath

Keep the jars covered with at least 5cm of water. Keep the water boiling. In general, boil them for 5 minutes.

15. Removing and cool the jars

The jam can last up to 12 months but it is advisable to consume it within 8 months.

PART 2: PROJECT (Timing 1h)

1. **Definition of the project**
   a) Name of the project: you choose the name of your project.
   b) Members of the team
   c) Give the aims of your project. Be clear and precise. What do you expect to achieve?
   d) Explain how this preservation method works. Can you think about any other alternative method?
2. **Ingredients and equipment:** Give the list of all the ingredients you have used and the necessary equipment.
3. **Procedure:** Explain step by step how you have proceeded to achieve your final result. Do it chronologically. You can use pictures or drawings.
4. **Economical study:** Calculate all the costs of making your jam.
5. **Presentation:** prepare a presentation explaining your project to the rest of the class.

PART 3: Label Designing (Timing 1h)

You are asked to design a label to stick on the jam jars. It has to show all the following information:

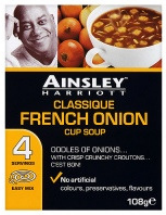
- Name of the brand
- Name of the food
- List of the ingredients
- Instructions for use
- Storage instructions
- Nutritional composition
- BEST BEFORE or USE BY dates
- Two examples of labels are provided for you. You can also search some supermarket web sites so you can learn more about layouts of labels.

ACTIVITY 6: INVESTIGATING PRESERVATION METHODS

Timing 40 min

Instructions:

- Look at the following preserved foods. Find out which preservation system has been used and write approximately the shelf life of each product.
- Probably you will need a close up shot for several products. Visit www.tesco.co.uk and you will find all the information you need.
- Once you have filled in the table answer the questions you will find after the table.

	**Product 1:** _____ **Method:** _____ **Shelf life:** _____		**Product 2:** Skimmed milk **Method:** Sterilisation **Shelf life:** 1 year
	**Product 3 :** _____ **Method:** _____ **Shelf life:** _____		**Product 4:** _____ **Method:** _____ **Shelf life:** _____
	**Product 5:** _____ **Method:** _____ **Shelf life:** _____		**Product 6:** _____ **Method:** _____ **Shelf life:** _____
	**Product 7:** _____ **Method:** _____ **Shelf life:** _____		**Product 8:** _____ **Method:** _____ **Shelf life:** _____
	**Product 9:** _____ **Method:** _____ **Shelf life:** _____		**Product 10:** _____ **Method:** _____ **Shelf life:** _____

	**Product 11:** _____ **Method:** _____ **Shelf life:** _____		**Product 12:** _____ **Method:** _____ **Shelf life:** _____
	**Product 12:** _____ **Method:** _____ **Shelf life:** _____		**Product 13:** _____ **Method:** _____ **Shelf life:** _____
	**Product 13:** _____ **Method:** _____ **Shelf life:** _____		**Product 14:** _____ **Method:** _____ **Shelf life:** _____
	**Product 17:** _____ **Method:** _____ **Shelf life:** _____		**Product 18:** _____ **Method:** _____ **Shelf life:** _____
	**Product 19:** _____ **Method:** _____ **Shelf life:** _____		**Product 20:** _____ **Method:** _____ **Shelf life:** _____

1. At what temperature should chilled food be stored in a supermarket? And frozen food?

2. Why does sterilised milk last longer than UHT milk?

3. Why do you think that the manufacturer “pickles” the onions instead of boiling them?

4. "Ready to eat sandwiches" and salads have a shelf life of only one day. If you wanted to extend their shelf life, what would you need to do?

5. What type of additives contains the 15 first foods in the table? Fill in the next table with your findings. The first 4 foods have been done for you.

Food	**Type of Additive**	**Name of the additive**	**Effect**
1 UHT milk	No Preservatives		
2 Sterilised milk	No Preservatives		
3 Probiotic yogurt	Stabiliser (E400)	Pectina	Food is thicker
4 Smoked fish	Colouring	Curcumin	Improves appearance

ACTIVITY 7: FINDING MISTAKES Timing 30min

Read the following text.

Then find the false sentences which are after the text and rewrite them properly.

HISTORY OF FERMENTATION AND ITS BENEFITS

The earliest uses of fermentation were most likely to create alcoholic beverages such as wine and beer.

These beverages may have been created as far back as 7,000 BC in parts of the Middle East.

The fermentation of foods such as milk and various vegetables probably happened sometime a few thousand years later, in both the Middle East and China.

While the general principle of fermentation is the same in all of these drinks and foods, the precise methods of achieving it, and the end results, differ.

Since fruits ferment naturally, fermentation precedes human history. Since ancient times, however, humans have been controlling the fermentation process.

The earliest evidence of winemaking dates from eight thousand years ago, in Georgia, in the Caucasus area.

There is strong evidence that people were fermenting beverages in Babylon circa 5000 BC ancient Egypt circa 3150 BC.

There is also evidence of leavened bread in ancient Egypt circa 1500 BC and of milk fermentation in Babylon circa 3000 BC.

French chemist Louis Pasteur was the first known zymologist, when in 1854 he connected yeast to fermentation. Pasteur originally defined fermentation as "respiration without air".

The benefits of fermented products include:

- The fermentation creates the probiotics, which increases the quantity, availability, digestibility and assimilation of nutrients in our body.
- Fermented products aids in preventing and reducing a variety of diseases including certain forms of heart disease and cancers.
- Fermented products fight off infections.
- Fermented products are a great source of amino acids, vitamins, and minerals.
- Detoxify and preserve.

The first use of fermentation was dates 7000 BC to produce yogurt. T/F

A:

Firstly fermentation of milk and vegetables took place in China and later was exported to the Middle East. T/F

A:

Fermentation is not a natural process; therefore it was invented by man. T/F

A:

Bread fermentation goes as far as 5000 BC in the ancient Egypt. T/F

A:

One of the benefits of fermented food is that neutralises “bad” bacteria. T/F

A:

People who eat kefir are less liable to suffer heart attacks because their levels of cholesterol are lower. T/F

A:

Among the benefits of fermented products is that people eat them can live longer and feel healthier. T/F

A:

ACTIVITY 8: SAUERKRAUT MAKING Timing 2 hours



Instructions:

Read carefully **all the instructions** before beginning to work

1. In groups of three you have to prepare SAUERKRAUT. To do this you have to make sure you have all the ingredients and materials. Then follow the next fifteen steps you have in the PART 1: sauerkraut making instructions.
2. Once the sauerkraut is ready with your peers write down the project in PART 2.

PART 1: Sauerkraut making Timing 1h

Ingredients and equipment:

- 1 Fresh Medium Cabbage, 1/2Kg (red or green)
- 2 Tablespoons Pickling Salt (No iodine because it will kill the bacteria)
- Distilled Water
- 1 Large bowl
- 1 Glass jar
- 1 Pounder
- 1 Plastic follower
- Dishtowel
- A weight

Instructions

1. **Removing leaves**

Remove the outer leaves of the cabbage and set them aside.

2. **Cutting the head into quarters**

Cut the head into quarters and remove the cores. Then, slice the cabbage thinly.

3. **Placing the cut cabbage in the bowl**

Place the cut cabbage in the bowl, adding salt as you go so that the salt is layered with the cabbage.

4. Pounding the cabbage

Pound the cabbage with your pounder to bruise the cabbage and draw out the juice. Pound the cabbage until it becomes somewhat translucent and there is plenty of cabbage juice at the bottom of the bowl.

5. Adding salt

Add up to 3 tablespoons /teaspoons of salt while pounding.

6. Placing the cabbage into a glass jar.

Place the cabbage into a glass jar and put the outer cabbage leaves on top. Now place your follower on top of that and a weight on top of it all. I used a plastic lid as a follower, and a jar with some rocks in it for a weight. Just use what you can find. If the jar is not full of liquid add brine after 24 hours.

7. Cover the jar

Cover the jar or crock with a dishtowel and let it sit at room temperature for a day.

8. Adding brine

After 24 hours, if there is not enough brine to cover the cabbage by 2 cm make a brine solution. You can make a brine solution by dissolving 1 tablespoon of salt in 1 quart of boiling water and pour over the cabbage.

9. Replacing the cabbage leaves

Replace the cabbage leaves, follower, weight and dishtowel and let sit another 2 to 6 days.

10. Tasting

Taste it every few days and refrigerate it when it is as sour as you like it. This will stop the fermentation process.

The sauerkraut will last for months in your refrigerator.

PART 2: Prepare a scientific report (Timing 1h)

1. Give the list of all the ingredients you have used and the necessary equipment.

2. Explain step by step how you have proceeded to achieve your final result. Do it chronologically.

3. What changes have occurred with the cabbage to get the sauerkraut?

4. Can you think about any other method to preserve cabbage?

5. Why do you think that the cabbage inside the jar has to be covered with brine?

6. In which countries is sauerkraut more popular? Look it up on www.wikipedia.org

7. What are the benefits of sauerkraut? You can visit http://www.sauerkraut.com/benefits.htm http://www.healingcrow.com/ferfun/ferfun.html

Lesson 2: Safety and packing

ACTIVITY 9: FOOD POISONING Timing 30min

1. Look at the following pictures and spot the mistakes that should not be made to avoid food poisoning.
2. Write the mistakes down on the following table and explain what should be done to avoid food poisoning.
3. Explain what could happen if the mistakes are not corrected.

1		2	
3		4	

	What is wrong?	What should be done?	Why?
1			
2			
3			
4			

ACTIVITY 10: A RECIPE FOR DISASTER Timing 1h

Instructions:

Our class wants to organize a party to celebrate the end of the course. Four peers are in charge of buying the food for lunch for the rest of the class. They meet and discuss how they will organise the event.
Work in groups of three. Listen to them and work out their food safety mistakes, underline them and explain what should be done.
(Audio file available in *Supplementary materials*)

James: Are we ready to start the meeting?

Anne: Yes! I think everyone is here!

Liz: Joy has not come! She's a cold and is coughing all the time! But don't worry, nothing will keep her away from helping us tomorrow!

James: If she comes tomorrow, that'll be fine! Now, we can do without her. By the way Gylles, how are you and Rene getting on with the shopping?

Gylles: Well, I know we are on a tight budget for this event. I'm a good shopper and I can spot the bargains. I managed to buy a lot of food by choosing the dented and slightly damaged canned foods.

Rene: Yes, and I saved money by buying the eggs at half price because some of the shells were cracked. It doesn't matter about the shells because we're going to make mayonnaise from the eggs.

Gylles: I also bought some foods that were just out of date and so were cheaper. I checked them. They looked fine.

James: All sounds good to me! Anne haven't you finalised the menu yet?

Anne: We're almost there. We're definitely having those cooked chicken pieces. They always go down well. Because the kitchen is so small and we only have one oven, I'm going to cook the chicken, sausage rolls, quiches, etc. first

thing in the morning and put them out of everyone's way on that top shelf above the door.

Liz: Yes, space is a bit of a problem. We'll have to place the dirty dishes next to the crockery, cutlery and the fruit that's waiting to go out with the puddings.

James: How are the puddings coming along then?

Anne: That's quite easy. All of them are going to be cold and they're going to stay in the big fridge. There's only just enough room. The day after the buffet lunch, someone else is organising a barbecue. I've told them they can put their meat, etc. on the top two shelves in the fridge after they've done their shopping today. That leaves all the lower part of the fridge for our desserts.

James: Good! It sounds like it's a recipe for a really enjoyable day. Well done everyone!!

They have done wrong	This is why
Joy is ill and will help	She can transmit bacteria to the food

ACTIVITY 11: CHECKING FOOD SAFETY AT HOME Timing 1h

While your parents are preparing dinner you are going to play safety inspector and check all the safety rules you have learned in this lesson. Check as many rules you can think of.

Fill in the table the rules that are not followed and write what should be done to correct it.

Once you have done all the checking write a letter to your parents telling them what the safety ensures they should correct.

A model of table and two examples of answers are done for you.

Rule	Correct
Correct food storage in the fridge	**Yes** ☐ **No** ☐ **Correction:**
Correct thawing	**Yes** ☐ **No** ☐ **Correction:**
	Yes ☐ **No** ☐ **Correction:**
	Yes ☐ **No** ☐

	Correction:
	Yes ☐ **No** ☐ **Correction:**
	Yes ☐ **No** ☐ **Correction:**
	Yes ☐ **No** ☐ **Correction:**

ACTIVITY 12: INVESTIGATING ON FOOD POISONING Timing 1h

Instructions

Working in pairs read the information sheet, "Food poisoning" then answer the following questions.

Food poisoning

Year	1968	1970	1975	1984	1985	1986	1987	1988
Number of cases	7.100	8.600	11.900	15.500	20.000	22.000	30.000	41.000

The 1998 outbreak statistics

January

130 people had paratyphoid food poisoning after eating contaminated lamb curry at a celebration in Birmingham

March

74 people developed salmonella food poisoning after eating peperami sticks

May

85 people in the House of Lords developed salmonella food poisoning after eating mayonnaise from contaminated raw eggs

July

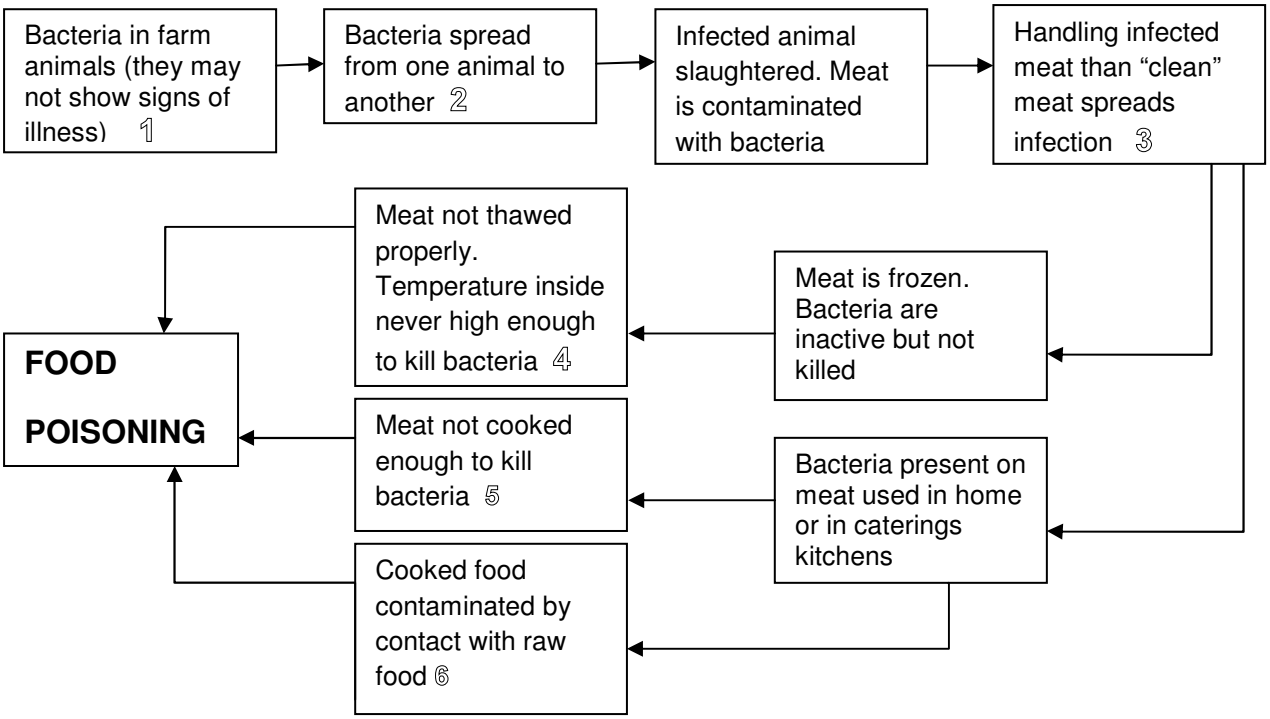
38 people in three Birmingham hospitals developed salmonella

September

97 British tourists were taken ill with food poisoning on their way home to Liverpool from the Costa Brava (Spain)

Some facts about food poisoning:

- ✓ The main sources are chicken and other meat, raw or undercooked eggs, milk, cream, shellfish and rice. Of the 20.000 cases reported in the first part of 1998, 11.000 were caused by chicken or eggs. The consumption of chicken has doubled over the past twenty years.
- ✓ Salmonella is responsible for about 60% of all cases.
- ✓ Frozen chickens are often not properly thawed. This means that when they are cooked the inside does not reach a high enough temperature to kill bacteria.
- ✓ Most bacteria, with the exception of listeria, are killed by a temperature of 70ºC. Bacteria growth is slowed by low temperatures. They thrive in warmth.
- ✓ Farm animals are often reared intensively. It means they come into close contact, and the chances of spreading diseases are high.
- ✓ Many people buy in bulk because of the advances in freezing and canning.
- ✓ More chilled food is available, as well as food which only needs heat up.


Bacteria in farm animals (they may not show signs of illness) 1
Bacteria spread from one animal to another 2
Infected animal slaughtered. Meat is contaminated with bacteria
Handling infected meat than "clean" meat spreads infection 3
Meat not thawed properly. Temperature inside never high enough to kill bacteria 4
Meat is frozen. Bacteria are inactive but not killed
FOOD POISONING
Meat not cooked enough to kill bacteria 5
Bacteria present on meat used in home or in caterings kitchens
Cooked food contaminated by contact with raw food 6

1. Draw a graph to show the increase in food poisoning over the past twenty years. How would you describe the rate of increase?

2. Why do you think approximately one case of food poisoning in a hundred is reported?

3. What are the reasons for the increase in food poisoning over the past 20 years?

4. Which bacteria are responsible for food poisoning? How do they infect humans? Record your findings in the chart below

Bacteria	Method of infection

5. Why is it important to thaw frozen chickens thoroughly?

6. Why must raw and cooked meat be kept totally separated?

7. Why is it important to cool food quickly, and reheat it into high temperature?

8. What rules would you give to a new worker in a kitchen to avoid spreading contamination?

9. Why should thawed food not be re-frozen?

10. How is listeria different from other organisms which cause food poisoning?

11. Look at the diagram “spreading infection”. What do you think should be done to cut down risks of food poisoning at each point labelled 1-6. Record your answers at the food of this page.

Point in the cycle	Action to stop infection	Person responsible for the action