PRIMARY + STEM

Teaching Resource

# ACTIVITY: Food Safety

## ACTIVITY OVERVIEW

While making wise food choices is an obvious component of eating well, food safety and hygiene is often overlooked because most primary school students are not involved in the process of food preparation. This activity aims to increase student awareness of food safety practices so that they know another way of staying healthy and fit. What is safe and what is not is put to the test as they apply the 'five-second rule' to a variety of lunchbox items in the very places where they lunch at school – whether that is in the classroom or on the playground. Their perceptions are then tested, as these dropped food items are grown for bacteria.

While this activity is based on the food specialisation aspect of the Design and Technologies curriculum, there are many opportunities to extend this learning into other subjects, such as Mathematics, Digital Technologies, and Science (particularly the Science Inquiry Skills).

## SYNOPSIS

While making wise food choices is an obvious component of eating well, food safety and hygiene is often overlooked because most primary school students are not involved in the process of food preparation. This activity aims to increase student awareness of food safety practices so that they know another way of staying healthy and fit. What is safe and what is not is put to the test as they apply the 'five-second rule' to a variety of lunchbox items in the very places where they lunch at school – whether that is in the classroom or on the playground. Their perceptions are then tested, as these dropped food items are grown for bacteria.

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### Foundation – Year 2

- Explore how food is selected and prepared for healthy eating (VCDSTC016)

### Year 3 – 4

- Investigate food preparation techniques used in modern or traditional societies (VCDSTC026)

### Year 5 - 6

- Investigate the role of food preparation in maintaining good health and the importance of food safety and hygiene (VCDSTC036)

## ACTIVITY, MATERIALS AND INSTRUCTIONS

### Activity

This is best carried out as a class, with results and conclusions only showing after a week or two.

### Materials for a class of 30 students

- 3 x bread slices, plain
- 3 x bread with jam
- 3 x fruit slices, moist (e.g. watermelon, tomato, cucumber)
- 3 x cooked pasta, moist
- 3 x cheese slices
- Hard surface (e.g. floor)
- Sandwich bags
- Markers
- Timer
- Gloves
- Baking paper
- Chopping board

Optional

- Worksheet (included) – Table of student responses
- Worksheet (included) – Table of results

**Watch out!**

While most bacteria collected in the environment are not harmful, they will be more hazardous once they multiply into millions of colonies. Do not keep the sealed sandwich bags for longer than necessary – one week if microbial growth appears, two weeks if necessary. Dispose of them in the bin.

## ACTIVITY

1. The teacher surveys student understanding of common food safety practices.
   What has been done to keep the food in their lunch bags safe for consumption? (E.g. using an insulated bag, using an ice block or brick, washing hands before preparing the food, using clean utensils, not eating expired foods, washing fruits and vegetables, etc.)
   Who has heard of the five-second rule? Who thinks it's safe to eat food that has fallen to the ground?

2. Cover the working surface, including the chopping board, with some clean baking paper to prevent cross-contamination between foods.

3. Begin with the plain bread. Pick one slice, with a gloved hand, and put it in a sandwich bag labelled 'Control'. The purpose of this slice is to serve as a comparison to the other two slices.

4. The teacher drops the remaining two slices of bread simultaneously onto a hard surface where students normally have lunch or snacks (e.g. classroom floor, tables, or playground).

5. Using gloved hands, the teacher picks up one slice of bread after five seconds and places it into a sandwich bag labelled 'five-seconds'.
   Repeat this process with the second slice of bread after the one-minute mark of being on the ground.

6. Ask the students to raise their hands if they think it's safe to eat either of those slices of bread.
   'Who would eat this?' Record these results in a table (Use the 'Table of Student Responses' in the Resources section)

7. Repeat these steps with the other food items.

8. Make sure each of these bags are sealed properly. Store in a warm place for one week and check for bacterial growth.
   If the results are not obvious, leave it for a second but no longer than that.

9. Look for signs of bacterial or fungal growth. Colonies of bacteria will appear as whitish or coloured bumps on the food.
   Compare the quantity of bacterial growth in each food type – one for the least, three for the most. (Use the 'Table of Results' in the Resources section).

10. Discuss findings with the class.
    Were the results as expected? What explanations do students have for the differences in the results?

## HOW TO USE THIS ACTIVITY WITH YOUR STUDENTS

### Foundation - Year 2

Students have already been taught to make healthy food choices and the importance of hand hygiene, before starting school. This activity is an opportunity to reinforce these good habits and to extend it to food safety, so that students understand why they are told to follow certain instructions.

Many students may also be helping their parent or carer in the kitchen to prepare meals. Can students identify some ways they or their parents prepare food safely and hygienically at home? What are some of the more unhygienic practices they see at home?

### Years 3/4

This activity is a good opportunity for this group of students to either learn about, or reinforce, their learning of science inquiry skills.

The experiment aspect of this lesson could be turned into a small group activity where, with teacher guidance, students design parts of the investigation. Students identify the independent variable (i.e. length of time that food has been on the ground), the dependent variable (i.e. amount of bacterial growth), and controlled variables (i.e. everything else). They make their predictions, conduct the experiment, and record their data after a week or two.

### Years 5/6

Students in this age group should be able to conduct this experiment independently. To make things interesting, groups of students could conduct similar experiments with different questions (e.g. does the type of surface that the food fall on matter? Does it matter if the bread falls buttered side down or up? Does it matter if it's cooked or uncooked food?) The methodology will be similar but the items that students choose as the independent variable will be different.

Students could also extend this learning into Mathematics by filling in the worksheets themselves and representing student responses as a percentage.

## DISCUSSION SECTION AND KEY THEMES

### KEY THEMES

### Food poisoning

It is hard to believe that there are an estimated 4.1 million food poisoning cases reported in Australia annually! These are referred to as foodborne diseases and are brought about by food that is handled improperly.

Food poisoning is caused by bacteria, such as the Campylobacter and Salmonella, and toxins produced by bacteria, as well as viruses such as rotavirus and norovirus, or even parasites.

Campylobacter is the most common cause of food poisoning in Australia and it's due to improper handling of raw chicken. On average, there are more than 230,000 reported cases of Campylobacter-related food poisonings and 55,000 cases of Salmonella-related food poisonings in Australia every year!

### Food safety at home

Food safety includes storing food safely, practicing good hygiene when handling food, and cooling and reheating food safely.

Food standards and safety | Australian Government Department of Health

- **Storing food safely**
  Tips include ensuring the storage areas are clean, dry, and cool. For foods that need to be refrigerated, make sure the temperatures are below 5˚C.

  Other tips include not storing cooked food in refrigerators for more than five days, not storing foods with raw ingredients for more than 24 hours, and not eating foods past their use-by dates.
  For more: Storing food safely (foodstandards.gov.au)

- **Practicing good hygiene**
  This includes good habits, such as washing hands properly and often; keeping hair, jewellery, and mobile phones away from the work surface; and not smoking, sneezing, and coughing over food.

  Another important aspect is not to prepare food if one is suffering from gastroenteritis or Hepatitis A, because these diseases are contagious.
  For more: Health and hygiene - advice for food handlers (foodstandards.gov.au)

- **Cooling and reheating food safely**
  It is important to cool and reheat food properly to keep the number of harmful microorganisms minimal. Food that needs to be reheated should be brought to temperatures higher than 60˚C.

  When cooling perishable food, it should be cooled to 21˚C in two hours or less and cooled even further from 21˚C to 5˚C in four hours or less. What this means is that food that is not being eaten should be stored in the refrigerator quickly, because bacteria grow best and fastest between 21˚C to 60˚C.

  Following the guidelines will impede this growth.

If food must be kept within this temperature range, it should not be for a period longer than four hours.
For more: Cooling and reheating food (foodstandards.gov.au) and Temperature control (foodstandards.gov.au)

## What do bacteria need to grow?

Moisture, a food source, and warm temperatures are needed to encourage bacterial growth. The ideal temperature will vary from bacteria to bacteria, as will the need for oxygen and the ideal pH (level of acidity).

In the activity, bacteria are most likely to grow best in the foods that are moist (e.g. cheese, cooked pasta).

## The five-second rule

Rutgers University (USA) released a paper in 2016 describing their investigation on food contamination based on contact time, food type and surface type (e.g. carpet, wood, tiled floors). The result is that, while longer contact time resulted in more bacteria being transferred onto the dropped food, depending on the type of food and nature of the surface, even a contact time of less than one second was enough to transfer bacteria!

Longer Contact Times Increase Cross-Contamination of Enterobacter aerogenes from Surfaces to Food | Applied and Environmental Microbiology (asm.org)

## QUESTIONS AND ANSWERS

### Is food poisoning really that big a deal?

Yes. Food poisoning happens when bacteria, viruses and parasites grow on food.

Symptoms include abdominal pain and cramps, diarrhoea, nausea and vomiting. It could last for several days, so it's important to drink lots of water to minimise the risk of dehydration.

Anyone can be affected by food poisoning but in certain groups, such as pregnant women, young children, older adults, and people with weakened immune systems, the symptoms can turn into severe illness.

### If eggs are covered with feathers and chicken poo, does it mean that it is fresher?

Not at all! Harmful bacteria like Salmonella and Campylobacter commonly found in chicken guts and feathers can lead to food poisoning, and dirty eggs are more likely to have more of these bacteria, no matter how fresh they are.

The best way to clean these eggs is to use an abrasive sponge to dry-clean the egg.

This method keeps the layer of natural antibacterial coating intact. Washing it with water removes this layer and encourages bacteria to grow.

The curious thing to remember about washing raw eggs with water is never soak the eggs in water, and to avoid using cold water.  With cold water, eggshells become more porous, and this can lead to the bacteria going into the egg.

### Is the hot food in my insulated container still safe to eat at lunchtime?

According to Food Standards Australia New Zealand, foods should either be stored below 5˚C or above 60˚C.

Between five to 60˚C, bacterial growth doubles every 30 minutes.

Since the hottest food packed into most insulated containers will likely fall in temperature range by lunch time, just ensure that the total time limit in this temperature range is no more than four hours.

This four-hour rule also applies to cold foods.

### Is gastro the same as food poisoning?

Gastroenteritis, commonly referred to as gastro, and food poisoning, share very similar symptoms, including diarrhoea, stomach cramps, nausea, and vomiting, so it's often difficult to tell between the two.

Food poisoning is caused by eating food contaminated by bacteria and toxins, viruses, or parasites.

A person must eat the contaminated food to get food poisoning. 'Gastro', on the other hand, is caused by viruses, such as the norovirus and rotavirus and is highly contagious. It can be transmitted via person-to-person, by contaminated objects, or contaminated foods. Babies in Australia are given the rotavirus vaccine to protect them from this virus.

A big clue to differentiate the two is to see how other family members are behaving. If everyone gets sick after eating the same food, it's food poisoning. But if people take turns over a few days to vomit and have fever, it's most likely to be gastro.

## Why do I vomit when I eat something off, and why does vomit taste so vile?

When we are suffering from food poisoning, our body helps us by expelling the offending food. The food could go up (vomit), or it could go down (diarrhoea). The reason why vomit tastes so bad is because the contents of our stomach include gastric juices. Gastric juices contain hydrochloric acid, which leaves a sour aftertaste in our mouth. Sometimes, vomit comes from an even deeper part of our gut (i.e. the upper sections of the small intestines). Vomit from here tastes very bitter because it contains bile, another chemical that our bodies make. Vomiting is certainly a very unpleasant experience, and it reminds us not to eat ill-prepared foods. Aren't our bodies just amazing??!

## Mmmm....is it safe to eat raw cookie dough?

Even though it may be a household tradition for kids to taste the dough before it goes into the oven, it is best not to. Raw eggs are not the only reason for this advice. Flour can contain bacteria that cause disease. Grain is typically not treated to kill bacteria before they are milled into flour, so any bacteria from animal wastes or soil could still be present.

Raw Dough's a Raw Deal and Could Make You Sick | FDA

## If it looks good and smells good, it should be good to eat?

Smell is not an indication of whether a food is safe to eat. There are types of bacteria that cause food poisoning that do not affect the taste, smell, and appearance of food.

## What should people do when they have food poisoning?

According to healthdirect.gov.au, most people don't need medical help for food poisoning if their symptoms are not severe and don't last long. However, people in high-risk groups, such as babies and the elderly, should see a doctor early on, to make sure that do not get dehydrated. If the symptoms last for more than a few days, it's time to see the GP. Meanwhile, it's best to drink plenty of fluids in many forms such as water, juices, soup, and fruits.

The advice is different for people who have eaten wild mushrooms. If students have eaten mushrooms they have picked, they ought to see the doctor because some wild mushrooms, like the death cap, are extremely poisonous.

Food poisoning - symptoms, causes and treatment | healthdirect

## Aren't we eating bacteria when we consume probiotics?

Absolutely! The bacteria that cause foodborne diseases are not friendly to us. However, we rely on the almost two kilograms worth of friendly bacteria (the mass of almost 100 trillion microbes) in our gut for our bodies to be happy and healthy. We call these friendly bacteria probiotics. Many people consume probiotics after they have been ill, to replenish their gut with more friendly bacteria.

We do not need to keep ingesting probiotics. What is more important is to eat fibrous foods, such as fruits and vegetables, to support the good bacteria already living in our gut. These foods are often referred to as prebiotics.

## Why do people get diarrhoea when they get food poisoning?

The presence of unfriendly microorganisms or viruses in the digestive system causes inflammation and irritation to the linings of the intestines. This makes the intestinal cells unable to absorb the nutrients properly, leading to watery stools.

A 2017 study from the Brigham and Women's Hospital (USA) has explained how diarrhoea is useful for the body. When a virus first appears in the intestines, two molecules in the intestines work together to flush the virus from the body before the infection causes too much damage. However, the danger of diarrhoea is that it can lead to dehydration, which can be serious in young children and the elderly.

The Purpose of Diarrhoea Is Way More Complicated And Important Than We'd Like (sciencealert.com)

## OUTSIDE OR SUPPLEMENTARY READING

### Food safety data

- Australia reports mixed food safety record for 2020 | Food Safety News
- Food Safety myths continued: True or false? | Safe Food

### Food poisoning

- Stomach Bug or Food Poisoning: Learn the Differences (healthline.com)
- Food poisoning | NSW Food Authority

### Good bacteria

- The good side of bacteria - Harvard Health

### How to handle batteries

- How to Store Batteries: 8 Steps (with Pictures) - wikiHow
- Battery safety 101: what you should (and shouldn't) do when using batteries (panasonic-batteries.com)
- Caution advised for using rechargeable batteries, battery chargers – Canada Safety Council

## TOPIC WORDS

- Microorganisms
- Microbes
- Bacteria
- Fungi
- Virus
- Diarrhoea
- Food safety
- Hygiene
- Handwashing
- Illness
- Food poisoning

## WORKSHEET: TABLE OF STUDENT RESPONSES: IS IT SAFE TO EAT THIS?

| Food | Control | 5-Second | 1-Minute | Total Number of Responses |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |

## WORKSHEET: TABLE OF RESULTS: BACTERIAL GROWTH ON FOOD

Compare the amount of bacterial growth (1 = least; 2=medium; 3= most)

| Food | Control | 5-Second | 1-Minute |
|---|---|---|---|
| | | | |
| | | | |
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