



ACTIVITY: Poo

ACTIVITY OVERVIEW

This activity goes beyond knowing how practices such as eating a balanced diet promote and maintain good health and wellbeing, and highlights why we need to do so, from the perspective of poo. This brown mass is the seemingly unattractive end-product of the unbelievably complex workings of our digestive system. Our bodies break down food into pieces that are small enough for our cells to use. What it cannot digest, results in poo.

The quality of poo – its hardness, texture, and colour – is an indicator of the state of our health and making poo in class is a sure-fire way to convince students to increase their fibre intake.

It's an important lesson about why we need to eat well. Somewhat inappropriate in parts and rather disgusting in others. But altogether fun and definitely unforgettable!

SYNOPSIS

This activity goes beyond knowing how practices such as eating a balanced diet promote and maintain good health and wellbeing, and highlights why we need to do so, from the perspective of poo. This brown mass is the seemingly unattractive end-product of the unbelievably complex workings of our digestive system. Our bodies break down food into pieces that are small enough for our cells to use. What it cannot digest, results in poo.

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Foundation – Year 2

- Living things have a variety of external features and live in different places where their basic needs, including food, water, and shelter, are met. (VCSSU042)
- Name parts of the body and describe how their body is growing and changing. (VCHPEP058)
- Recognising how bodies grow and change over time; height (eating well)
- Identify actions that promote health, safety, and wellbeing. (VCHPEP062) (VCHPEP074)
- Grouping foods into categories such as food groups and 'always' and 'sometimes' foods (FN)

Year 3 – 4

- Living things can be grouped based on observable features and can be distinguished from non-living things. (VCSSU057)

Year 5 – 6

- Living things have structural features and adaptations that help them survive in their environment. (VCSSU074)
- Plan and practise strategies to promote health, safety, and wellbeing. (VCHPEP108)
- Investigate the role of preventive health in promoting and maintaining health, safety, and wellbeing for individuals and their communities. (VCHPEP112)

ACTIVITY, MATERIALS AND INSTRUCTIONS

Activity, Materials and Instructions

We know that food provides us with the energy and nutrients we need to get on with the day, keep healthy, and grow well. We are also told that we need to eat a balanced diet with nutritious food. But what exactly happens to the food we eat? How do we get energy and nutrients that are locked up in the food? And how does food as big as a juicy apple get into our microscopic cells to keep them alive? Through this activity, students are introduced to the amazing digestive system and the importance of fibre.

Materials

- Image of a human cell
- Image of human digestive system
- Food for the teacher, e.g. sandwich, apple
- 1 bag of multi-grain or wholewheat bread
- Sandwich bags
- 10 small cups e.g. 100–200ml
- 10 large cups e.g. 250–300ml
- Jug of water
- 10 pieces of Chux Superwipes cloth or similar
- 1 box of cocoa powder
- 1 bag of rolled oats
- 2 – 3 rolls of toilet paper
- Image of Bristol stool chart

1. Big food to feed our tiny cells: Digestion

Material

- Image of human cells
- Image of human digestive system

Theory

Like a building is made up of many bricks, human bodies are made up of many cells. For us to go about our daily activities, our cells – which number between 30 to 40 trillion – need to carry out a staggering number of functions.

And for every cell to do its job, it needs to get access to the food we eat.

The problem is that the apple we eat at snack-time is so much bigger than our cells. It's like trying to fit a large passenger airplane into a classroom! So how can this happen without destroying any part of the classroom? Since we can't make the classroom any bigger, we can cut up the plane into smaller pieces! Like the airplane, food needs to be broken down into smaller pieces too. This process is called digestion and the parts of the body involved in this process are collectively called the digestive system.

2. Digestion starts in the mouth

Material

- Food for teacher, e.g. sandwich

Theory and Instructions

- a. Teacher shows students the lovely sandwich and describes how delicious it looks.
Who is starting to salivate just by looking at this sandwich? Saliva contains water and chemicals (enzymes) we need to break it up into smaller pieces. It is produced by three pairs of salivary glands we have in our cheeks, under our tongue, and beneath our jaw.
- b. Teacher takes a big bite and starts chewing. Then show students the contents of the mouth while food is still in there!
Teeth are important to break up the food by physically tearing it apart, and the tongue helps to mix the food with the saliva (besides tasting how delicious the food is).

Whatever students see in the mouth is still way too large to enter our cells, so there's a lot more digestion to go.

3. Digestion continues in the stomach.

Digestion continues down the esophagus and into the stomach. The stomach is a muscular bag that holds the food for about four hours, while breaking down food into smaller pieces!

Students might be familiar with their stomach churning. This churning sensation is what happens throughout the rest of the digestive system to move the food along and mix it together with more chemicals (enzymes).

Materials per group

- 1 piece of multi-grain bread
- 1 sandwich bag
- 1 small cup half filled with water

Theory and Instructions

- Place the bread and water in the bag.
The sandwich bag represents the stomach and the water represents gastric juices produced by the stomach lining. Like saliva in the mouth, gastric juices contain chemicals (enzymes) to break down the food.
- Seal the bag.
Make sure that most of the air is pushed out of the bag in this process.
(Mess warning – teachers may like to double-check that the bags are sealed, as this could be messy if food escapes from a fake stomach bag.)
- Simulate the stomach churning by squeezing the contents of the bag.

Continue for at least five minutes.

At what point do students think the bread is small enough to enter the cells?

At this point, despite being in the stomach for four hours, the food is still not small enough!

4. Digestion in the small intestines.

In the intestines, food continues to be broken down until it is small enough to enter our cells. This takes place with more churning and more chemicals (enzymes).

Materials per group

- Bag from Step 3
- 1 tablespoon cocoa powder
- 1 tablespoon water
- 2 tablespoons rolled oats

Theory and Instructions

- Add 1 tablespoon cocoa powder and 1 tablespoon water into the bag.
The cocoa powder represents bile, the chemical which helps to break down fat in our food. Bile also contributes to the brown colour of our poo. The water represents the rest of the enzymes that the intestines produce.
- Add 2 tablespoons of rolled oats into the bag.
The rolled oats represent additional fibre that is consumed.
- Seal the bag (check it's totally sealed!) and mix the contents. At this point, after about three hours in the small intestines, the food is finally small enough to leave the intestines and be delivered to all the cells of our body.

5. Finally small enough!

Food that is small enough finally will leave the intestines and be transported to all our cells by blood.

Materials per group

- Bag from Step 4
- 1 Chux Superwipes cloth (or similar)
- 1 large cup
- 1 splash bucket/tray. *Note: do this activity in a splash bucket to prevent spills and mess*

Theory and Instructions

- Fashion the wipe/cloth in the cup to prepare for the next step.
The cloth represents the walls of the small intestines. Anything that is small enough is allowed to pass through the walls.
The cup represents the blood system that carries food to all parts of the body.
- Pour the contents of the bag over the wipe/cloth. Lightly squeeze it.
The brown liquid that passes through the cloth represents the food that is small enough to be delivered to our cells. All foods we eat eventually turn into small molecules like glucose, amino acids, fatty acids and glycerol.

6. Not all food can be digested.

Not all food can be digested because we do not have the chemicals (enzymes) to break it down. This undigested food makes its way to the large intestines.

Materials

- All materials from Step 5
- Toilet paper

Theory and Instructions

- Examine what is inside the cloth.
Whatever remains is too large to leave the small intestines. This undigested food moves onto the large intestines.
- Squeeze more water out of the contents of the cloth.
The longer undigested food stays in the large intestines, the more water leaves it.
What might happen if food stays in there for too long? Students may have experienced constipation with painful, dry faeces.
- Move the undigested food onto some toilet paper and fashion it into a sausage shape poo.
The shape of poo is generally long and cylindrical because that is the shape of our gut, i.e. the intestines and rectum.

7. Let's talk poo and poeing!

Materials

- Bristol Stool Chart
- Bristol Stool Chart | Faecal | Continence Foundation of Australia

When we eat a lot of food that cannot be digested, e.g. fibre, it moves along the intestines quickly, resulting in healthy poo, which takes place regularly. Healthy, ideal poo is defined as ones that are soft, well-formed, and easily passed out of the body. This could take place daily, more than once a day, or three times a week.

People who do not consume enough fibre because they do not eat enough fruits and vegetables – or eat too much processed food – are more prone to constipation. This occurs because food does not move quickly enough out of the large intestines and too much water is drawn out of it. Lack of fibre can make passing the faeces a painful and unwelcome process.

While eating a high-fibre diet full of fruits and vegetables may not seem that consequential to most people, researchers are studying how diets high in processed foods and low in fibre could lead to an increased frequency of food allergies, autoimmune diseases, and cancers like colon cancer in adulthood.

HOW TO USE THIS ACTIVITY WITH YOUR STUDENTS

Foundation to Year 2

It's never too early to communicate healthy eating messages to children. From the poo activity, students learn the importance of consuming fibre that is found in fruits and vegetables.

However, eating well also includes the rest of the food groups, in varying quantities.

As an extension, students could distinguish between 'always' foods and 'sometimes' foods in their own lunchboxes.

Guidelines from the Department of Education:

- Increase fruits and vegetables
- Reduce consumption of energy-dense, nutrient-poor food and drinks, e.g. processed foods
- Reduce salt and saturated/trans fats, e.g. processed foods

Years 3/4

Unlike plants that can make food from light, or fungi that feed on decomposing matter, members of the animal kingdom feed on other living things. This requires a digestive system, and usually results in poo.

Are all digestive systems the same? Indeed, is all poo the same? Students could compare the digestive systems (and poo!) of their favourite animals. Using their devices and the Internet, students select two or three animals to compare, e.g. human vs bird vs spider, to find at least two similarities and two differences. They record their findings in graphic organisers, e.g. Venn diagrams, tables and then present their findings to the rest of the class – either in poster form or in PowerPoint. The class votes on the animal that has the most similar digestive system to humans (or the most different).

Years 5/6

The human digestive system is not the only type that exists within the animal kingdom. It is the result of adaptations that have helped us to be successful in the places where we live. Similarly, other animals also have features in their digestive system to help them thrive in their environments.

As an extension to this activity, students could create quizzes using online platforms, e.g. Kahoots, Quizlet etc., or in a quiz-game show format, e.g. Hard Quiz. Using their devices and the Internet, students research an environment, e.g. Australian bush, tropical rainforests, desert, beach, river, ocean, rocky shores, or caves.

Students select one or two animals living in their given environment and find facts on the digestive systems (and poo!) of their chosen animals. They then formulate 10 questions to contribute to the class quiz!

DISCUSSION SECTION AND KEY THEMES

Digestion is how our bodies turn food that we eat into nutrients that we need for energy, growth, and cell repair. It's an amazing process involving many organs and complex chemical reactions.

Digestive System

It is essentially a long muscular tube that starts at the mouth and progresses to the oesophagus, stomach, small and large intestines, and terminates at the anus.

There are also associated organs like the liver and gall bladder that are associated with the system.

Peristalsis

This process describes the involuntary contracting and relaxing of the muscles in the tube which pushes food from the oesophagus to the anus. The resulting wavelike contractions of peristalsis allow the uniform mixing of food contents with the enzymes.

We feel peristalsis when we vomit (reverse peristalsis), experience diarrhoea, and when we poo. We may also be aware of it when we feel our stomachs churning.

Peristalsis is not limited to muscles of the digestive system.

Enzymes

Enzymes are biological chemicals our bodies produce to digest food. The enzymes produced by different parts of the digestive system are very specific in nature and will only work on specific food types. For example, salivary amylase will only work on starches, proteases will only work on

proteins, and lipases on fats. Enzymes speed up chemical reactions in our bodies.

End products of digestion

Only food that gets broken down into its simplest form gets sent to our cells.

Starches, fruit, and milk sugars turn into simple sugars like glucose, fructose, and galactose.

Proteins get broken into all different types of amino acids.

Fats break down into fatty acids and glycerol.

Undigested food

Fibre-rich foods remain undigested because we do not have the chemicals in our digestive system to break them down, and in a healthy and balanced diet, they make up the bulk of the stool (poo).

Bulky stools, with lots of fibre, stimulate the walls of the intestines to move. This helps to propel the food material forward and bring about regular bowel movements.

QUESTIONS AND ANSWERS

1. What is diarrhoea and why is it so gross?

Diarrhoea is a condition that describes loose or liquid poo and making them many times a day. It is often brought about by an infection, such as gastroenteritis or food poisoning, and normally clears up in a few days. Most cases of diarrhoea are mild.

Because so much water is lost in the poo, it is important to drink more water to prevent dehydration.

2. Why do we vomit? And why does it taste so bad?

Vomiting is not a pleasant experience – it is forceful and involuntary. Common reasons for vomiting include food poisoning, infection (gastroenteritis), pregnancy, and motion sickness.

It could happen when either the contents of the gut are irritating; or when the organs or nerves are more irritable than normal.

This causes the muscles in the stomach and esophagus to move in the opposite direction, bringing food out through the mouth. When it's particularly nasty, we experience projectile vomiting out of our mouths and noses (vomit exits our bodies with force).

Vomit tends to smell very off-putting and is highly acidic.

Depending on how far along the digestive tract the vomit has come from, the vomit may contain hydrochloric acid (from stomach) or bile (from the first part of the small intestines).

3. Is it possible to poo out what I just ate?

No. When we feel the need to poop right after eating, it is not the most recent bite that we pass out. The poo that is passed out could be a day or two old.

Some people feel the urge to poop immediately after a meal and this has to do with the chemicals (hormones) that our body releases when food enters the stomach. These hormones tell your large intestines to push out the existing poo to make room for more food!

4. How long does it take to completely digest a burger with the lot, and for it to come out as poo?

According to the Mayo Clinic, it can take between two to five days, depending on the individual.

It has been estimated that a typical meal stays in the stomach between four to five hours.

It then takes another two to three hours to travel through the small intestines before it enters the large intestines. Undigested food can stay in the large intestines for another 36 hours before it finally passes out of the body.

5. Why do I still see whole kernels of yellow corn in my poo?

It's gross.

Corn has an outer shell made of a substance called cellulose. We do not have the enzymes (chemicals) to digest this material, but we do have enzymes to digest the starch that is inside the corn. So, it is most likely that the yellow kernels in poo is just the outer covering of the corn. Eating corn and other high-fibre foods (which contain lots of cellulose) is a good thing because it makes for really good poo.

However, if one tends to swallow food like corn, peanuts, and beans without chewing properly, it is possible to see them again, totally intact, in poo a few days later. Now that's a gross thought.

6. There is bacteria in my intestines? That sounds scary!

From MRI scans done in 2016, it is estimated that we have about the same number of bacteria as the number of cells that make up our body! Scientists estimate this to be 38 trillion bacteria and 30 trillion human cells. But this is not scary at all.

We are only beginning to understand just how important these microorganisms are to us.

In fact, we need certain bacteria in our gut to help us digest and absorb food, help to replenish the linings of the gut by replacing damaged and dying cells with new ones, prevent invading microbes from taking over the gut, and boost our immune systems and moods.

7. Why is poo brown, no matter what we eat?

Since any natural pigment from food would have broken down as food matter as it makes its way along the digestive system, the colour of poo doesn't have anything to do with the food we eat (with the exception of beetroot and excessive use of food colouring in cooking).

Rather, it has to do with red blood cells and a chemical called bile. When old red blood cells retire, they end up in the liver and get broken down into bilirubin, a yellowish-brownish fluid. Bilirubin then gets recycled into a digestive fluid called bile, and it becomes mixed with food in the intestines to aid fat digestion. It is the presence of bile that gives poo the characteristic brown colour.

8. Farting is gross. Should I just hold it in?

Everybody passes gases, and often it's in such small quantities that we are not even aware of it ourselves. Even if you try to hold in a fart, it will eventually find its way out. The ones we are aware of, types that trumpet out of our bottoms, we do about 15 times a day.

Farts come from the air that we swallow and from the bacteria that live in our intestines, especially the large intestines (colon). These helpful bacteria help us digest food but make lots of gases in the process.

9. I love fizzy drinks. Is that why I burp so much?

We swallow air every time we eat or drink, and gases get into our digestive system. So when we gulp down a fizzy drink as well, we add a lot more gases in the form of carbon dioxide gas. When in the stomach, the food and gas separate – the air stays at the top of the stomach, while the food settles at the bottom.

Eventually, pressure from the gas forces the muscle between the stomach and the oesophagus to open, and the gases rush out (pardon me!).

10. Why do I feel hungry?

Our brain receives messages from many sensors (nerve cells) all over our body. When it receives messages that we are low on sugar in the blood and there is no food in the stomach or intestines; then the amazing brain produces special chemicals, which make us feel hungry and motivate us to find some yummy food to eat. While some people feel angry and grouchy when they are hungry, others feel sad or lightheaded!

OUTSIDE OR SUPPLEMENTARY READING

Healthy eating

Healthy Eating (education.vic.gov.au)

<https://www.education.vic.gov.au/school/teachers/health/Pages/healthyeatingadvisory.aspx>

Chart and information about the pooping process

Bristol Stool Chart | Faecal | Continence Foundation of Australia

<https://www.continence.org.au/bristol-stool-chart>

The digestive system and how it works

Your Digestive System & How it Works | NIDDK (nih.gov)

<https://www.nidk.nih.gov/health-information/digestive-diseases/digestive-system-how-it-works>

The role of bacteria in digestion

Bacteria in the Intestine, Helpful Residents or Enemies from Within? - PMC (nih.gov)

<https://www.science.org.au/curious/people-medicine/gut-bacteria>

Gut bacteria: The inside story

Gut bacteria: the inside story - Curious (science.org.au)

<https://www.science.org.au/curious/people-medicine/gut-bacteria>

TOPIC WORDS

- Food
- Energy
- Cells
- Digestion
- Chemicals
- Enzymes
- Chewing
- Churning
- Saliva
- Gastric juices
- Mouth
- Teeth
- Oesophagus/Esophagus (UK/USA)
- Stomach
- Small intestines
- Large intestines
- Rectum
- Anus
- Stool
- Faeces
- Poo
- Bile
- Farts
- Burps



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