

Lesson objective:

- In this lesson students investigate the structure and function of the ruminant digestive system.

Students will have the opportunity to:

- identify the organs and overall function of a the ruminant digestive system
- describe the structure of each organ in the system and relate its function to the overall function of the system
- briefly compare the digestive systems of herbivores and carnivores.

Lesson focus

The focus of this lesson is to encourage students to adapt their knowledge of what they have learned so far about the systems of organs multi-cellular organisms contain, which carrying out specialised functions, which enable them to survive and reproduce.

Setting the context

This lesson assumes students have some knowledge of the human (omnivore) digestive system.

An omnivore is an animal that eats both plants and other animals (e.g. humans, pigs and chickens).

A carnivore is an animal that only eats meat (e.g. dogs, cats).

A herbivore is an animal that only eats plants (e.g. sheep and cattle).

Monogastric animals have a stomach that has a single compartment. Humans have a monogastric stomach, as do pigs, chickens, rabbits and horses.

Ruminants are animals (such as sheep, cattle, goats and deer) that have more than one stomach and that swallows food and then brings it back up again to continue chewing it. Sheep have four stomachs (rumen, reticulum, omasum, abomasum).

Introduction

Explain to students that in this lesson they will be investigating the ruminant digestive system.

Start the lesson by establishing students' current level of understanding of the digestive systems of a range of animals. Ask questions such as:

- What is an omnivore/carnivore/herbivore?
- To which of the above groups do the following

animals fit — human, horse, dog, sheep, cat, pig?

- What do the terms 'monogastric' and 'ruminant' mean?
- To which of the above groups do the following animals fit — human, horse, dog, sheep, cat, pig?
- How many stomachs do humans/horses/dogs/sheep/cats/pigs have?

Body of lesson

1. Provide each student with a copy of (or online access to) the following LEARN ABOUT WOOL factsheets:
 - [Sheep – types of sheep](#)
 - [Sheep the wool producers](#)
 - [Wool production in Australia](#)
 - [The woolgrower](#)
2. Divide students into small groups (3–4 students). Distribute packs of coloured modelling clay, toothpicks and sticky notes to each group. Using the information provided on the factsheets and other sources (such as the internet), students are to work together to build a scale model of a ruminant digestive system, complete with correctly-labeled parts (using the toothpicks and sticky notes).
3. Provide students with the following list and ask them to ensure each item of the list is included in their model.
 - mouth
 - oesophagus
 - rumen
 - reticulum
 - omasum
 - abomasum
 - intestine
 - anus
4. Explain to students that at the end of the lesson each student needs to be prepared to explain the function of at least one part of their ruminant digestive system model.

Conclusion

When students have finished, select a group to share their model with the class and explain the structure and function of the ruminant digestive system.

Ask the students questions such as:

In Australia, sheep are domestic animals managed for food and fibre production — what are main sources of feed for sheep?

- Why do you think sheep only have front teeth on their bottom jaw?
- Why do sheep chew their ‘cud’?
- What role do microbes play in the ruminant digestive process?
- What is methane and where is it produced in the ruminant digestive process?
- What do sheep producers need to consider when managing their pastures to look after both the animals and the environment?
- What does the term ‘stocking rate’ mean?
- Why are stocking rates important on sheep farms?

Encourage students to consider both the animal’s needs and the environment when answering this question.

Note: The LEARN ABOUT WOOL factsheets listed as resources for this lesson and the background information provided will provide all the information you need to help students answer these questions.

Links to the Australian curriculum:

- Multi-cellular organisms contain systems of organs carrying out specialised functions that enable them to survive and reproduce ([ACSSU150](#))
- People use science understanding and skills in their occupations and these have influenced the development of practices in areas of human activity ([ACSHE136](#))
- Communicate ideas, findings and evidence based solutions to problems using scientific language, and representations, using digital technologies as appropriate ([AC SIS148](#))

Extension activity

Allocate students to small groups and ask them to develop an infographic to explain the key differences between ruminant and monogastric (e.g. human) digestive systems.

Encourage students to include a balance of graphics, text and tables and charts into their infographics.

You might like to get your students to present and explain their infographics to another class — get the class to vote on the most engaging, informative and easy-to-understand infographic.

Note: Infographics are a visual representation of data. When students create infographics, they are using information, visual, and technology literacies.

Some questions to ask students to help them reflect on specific infographics:

- Why is this infographic useful to me?
- What is the purpose of the visuals (charts, maps, drawings, etc) in this document?
- Is the text important for me to understand this infographic? Why?
- How can I evaluate this infographic? What does it do well? Where could it be improved?
- What information am I learning thanks to this infographic?
- Is this infographic helping me learn? How? Why?

Allow your students to spend some time investigating different forms of infographics. [The Daily Infographic](#) is a site dedicated to curating the most interesting infographics available on the web.

There is a variety of freely-available tools to create infographics online, such as [Canva](#). Most online infographic tools provide templates students can use for their own purposes. Students can adapt available infographic templates and add their own content, images, designs, etc.

The following article from EducationHQ Australia provides more information on using infographics in the classroom: <http://au.educationhq.com/news/33589/using-infographics-in-class/> (Accessed 23 July 2017)