

YEAR 8 Science

NAME : _____

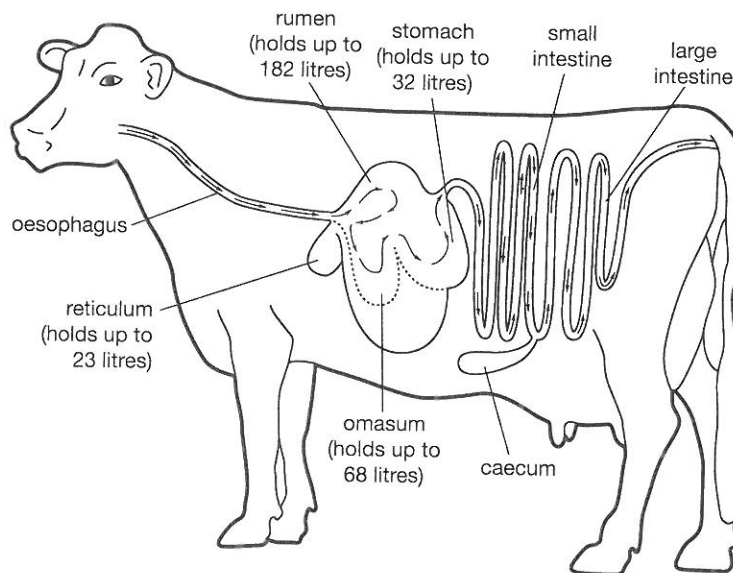
FORM : _____

Science inquiry

Verbal/Linguistic

Digestive system of a cow

The stomach, small intestine and large intestine of cows are similar to those found in dogs and human. Cows are herbivores, which means that they only eat plant material. Plant cell walls are very difficult to digest. To help the digestive process, cows have three extra parts to their digestive systems between the oesophagus and the stomach. These are the rumen, reticulum and omasum. The parts of the digestive system of a cow are shown in the diagram below.

**Rumen**

Cows graze, taking the food into their rumen. The can store large amounts of food in the rumen. The rumen also contains micro-organisms that digest the fibre in the plant material.

After eating, the cow rests and ruminates. Rumination involves bringing back the chewed plant material from the rumen into the mouth. In the mouth, it is chewed again and mixed with saliva. We call this 'chewing the cud'. Cows can produce up to 100 litres of saliva every day.

Because they go through the process of rumination, cows and other animals that chew the cud are known as ruminants.

Gases such as carbon dioxide and methane are produced as the bacteria digest the food in the rumen. Cows belch frequently to get rid of the gas.

Reticulum and omasum

When the plant material is partly digested, it is pushed along into the reticulum. Like the rumen, the reticulum is a large muscular sack containing micro-organisms. The muscular walls continually contract and relax, churning the partly digested food.

The food is then pushed along further to the omasum and the stomach.

Stomach and beyond

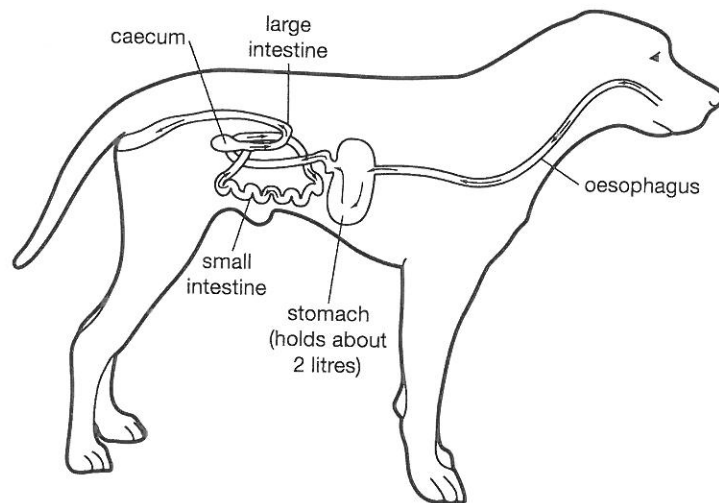
In the stomach, the micro-organisms from the rumen are digested before the stomach contents pass into the small intestine. In the small intestine, the nutrients are absorbed into the bloodstream just as in the human digestive system.

The remaining contents of the small intestine then pass into the caecum. In the caecum are bacteria that further digest any remaining plant material.

The large intestine is the last part of the digestive system. There, water is reabsorbed just as it is in the human digestive system.

Digestive system of a dog

Dogs are carnivores. They have a simple digestive system that is adapted to meals of meat. The digestive system of a carnivore is the shortest of all types of animals. It is basically a long tube with a single bulge (the stomach) near the beginning. The parts of the digestive system of a dog are shown in the diagram below.



In the mouth, the teeth tear and crush the food. Although saliva is produced, it is not involved in digestion. It just helps lubricate the food so that it can be swallowed easily.

The dog's stomach is very small. It can only hold about 2 litres of food, which is all the food that a dog can eat at one time. Carnivores do not need a lot of food because meat and fat have high concentrations of nutrients.

In the dog's stomach, concentrated hydrochloric acid dissolves the food. Any food that cannot be dissolved, such as raw plant material and bone, either passes through or is vomited out.

Up to this point, the food has been digested mechanically. Chemical digestion does not start until the food passes into the small intestine. In the small intestine, the food is digested and enters the bloodstream.

Carnivores cannot digest plant cell walls. Plant material joins other undigested material and passes from the small intestine into the large intestine past the caecum. The caecum in carnivores does not have a function. In the large intestine, water is reabsorbed from the wastes and solid faeces is produced.

1 **Name** in order the parts of the cow digestive system through which food passes.

2 **Explain** what happens to the cow's food in the rumen.

3 **Explain** why dogs and other carnivores are able to survive without a rumen.

4 (a) **Describe** what is happening when cows 'chew the cud'.

(b) **Explain** how chewing the cud is of benefit to the cow.

5 **Explain** why a dog only has a small stomach.

6 **Compare** the function of the stomach in a cow and a dog.

7 Miniature cows are a special breed of cows that may not be much larger than some large dogs. Yet their digestive system is longer and can hold a much larger volume of food.

Propose why a dog and a miniature cow of the same size do not have digestive systems the same size.
