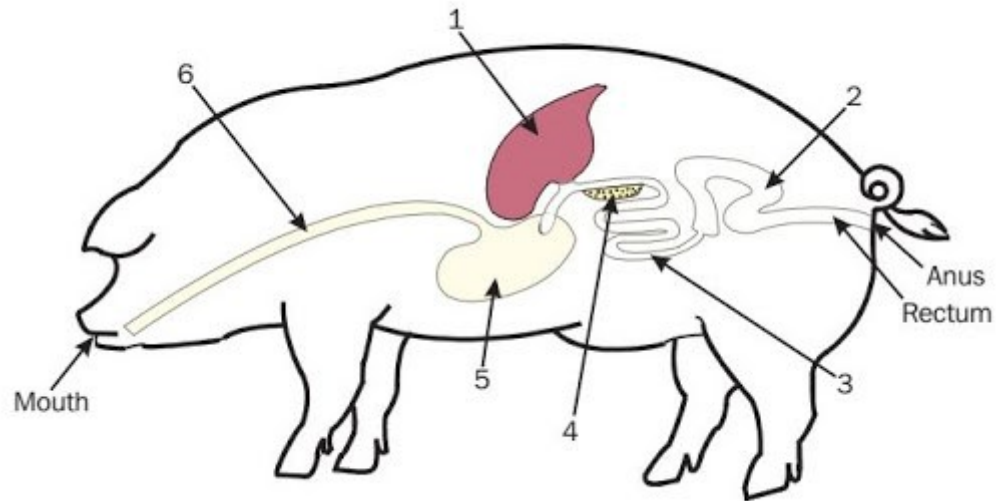


The Digestive System of a pig



DIGESTION

Digestion is the breakdown of large insoluble molecules into smaller soluble molecules which can pass through the wall of the small intestine into the blood.

Mechanical digestion involves food being ground up, for example by the teeth and by the churning movements of the alimentary canal. Chemical digestion involves large molecules being broken down into small ones, by enzymes.

Digestion begins in the **mouth**. Food is chewed which breaks it into smaller chunks (with a larger surface area), and is mixed with saliva. The saliva contains an enzyme called **amylase** which begins digestion of carbohydrate (starch) to glucose.

The food is then swallowed and pushed down the **oesophagus** to the stomach by waves of **peristalsis**. Peristalsis is the contraction and relaxation of circular and longitudinal muscles in the wall of the gut.

In the stomach the food is churned back and forth by waves of peristalsis to break the chunks of food up into a mush (large surface area), and mix it with the **gastric juice**. Gastric juice contains an enzyme called **pepsin** which begins the digestion of protein to amino acids. It also contains hydrochloric acid which kills bacteria and provides the optimum pH for this enzyme.

The food is released a little at a time into the **duodenum**, which is the first part of the small intestine. The duodenum does not make a digestive juice but has two juices poured into it. One is from the **pancreas**. This pancreatic juice contains carbohydrase, protease and **lipase**. Lipase is another enzyme which begins the breakdown of lipids (fats and oils) into fatty acids and glycerol.

The other juice is called **bile**. Bile is made by the **liver** and is stored in a bag called the **gall bladder**. This is not an enzyme but neutralises the acid that was added to food in the stomach, making alkaline pH conditions which allow the enzymes in the small intestine to work more effectively. Bile also **emulsifies** fats (makes them into smaller globules so that the fat digesting enzyme has a larger surface area of fat to work on). This speeds up digestion by lipase.

The food is now a semi liquid, and it passes into the second part of the small intestine called the **ileum**. The walls of the ileum make a juice which contains carbohydrase, protease and lipase. These enzymes complete the digestion of fats to fatty acids and glycerol, carbohydrate to glucose and protein to amino acids.

The ileum is specially adapted for absorption, (passing digested food into the blood). It is very long to allow time for digestion and absorption.

It has a very large surface area due to the presence of **villi** (finger like projections) and **microvilli**. This allows rapid diffusion of the products of digestion. The villi walls are only one cell thick, also to allow rapid diffusion from the gut to the blood. Each villus has a blood vessel and a lymph vessel to carry the food away. This maintains a diffusion gradient.

Digested carbohydrates and proteins pass into the blood vessel and digested fats pass into the lymph vessel.

All of the food which cannot be digested passes into the **large intestine**. The first part of the large intestine is the **colon** and here water is absorbed into the blood. The indigestible remains form the semi solid **faeces** which is stored in the **rectum** until being passed out of the body through the **anus**.

Digestion questions

1. Where does digestion begin?
2. What type of food is digested by the enzyme in saliva?
3. How does chewing help digestion?
4. What are the waves of contraction called that move the food to the stomach?
5. What type of food is digested in the stomach?
6. Why does the stomach contain hydrochloric acid?
7. Where do the digestive juices come from that work in the duodenum?
8. What type of food begins its' digestion in the duodenum?
9. Explain how bile helps the digestion of fats.
10. What other function does the bile have?
11. Describe the ways in which the ileum is adapted for absorption.
12. What is the function of the colon?