

Nutrition In Animals 2

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INTRODUCTION

All animals depend directly and indirectly upon the food made by plants. All animals, including human beings must collect appropriate variety of food and nutrients. The chemical substances present in the food are called nutrients. The various use of the nutrients by an organism for harvesting energy, body building substances for growth and development and providing protection from diseases is called nutrition.

Living organisms obtain nutrition in two ways, autotrophic or heterotrophic. Most plants and unicellular algae make their own food through photosynthesis. This is called autotrophic nutrition.

Animals do not make their own food. They obtain nutrition by feeding on plants or other animals. This type of nutrition is called heterotrophic nutrition.

Different Ways of Taking Food



Feeding habits among different animals

Just as different animals eat different kinds of food, the manner in which it is consumed also differs. Bees, butterflies, and humming birds suck nectar from flowers, snakes, swallow their food and birds eat with their beaks. Mammals have teeth, which help in biting and chewing their

food. Some animals like the whales, ducks and flamingoes strain the food from the water. These animals are called filter feeders.

How does Food Provide Nutrition?

The food we eat contains complex substances like carbohydrates, proteins and fats. These complex substances cannot be used by the body unless they are converted into simple substances. The process through which the body converts useful substances in the food into simple substances is known as digestions.



Foods rich in carbohydrates



Foods rich in proteins



Foods rich in fats

During digestion the large and insoluble molecules of food are broken down into small water soluble molecules. These small molecules are then utilized by the body to meet its energy requirements to grow and to repair the injured and worn out parts.

How does Digestion take Place?

The act of eating food is known as ingestion. This is the first step in obtaining nutrition. The next step involves breaking down of food particles into simpler substances. This is a chemical process and is known as digestion. It is carried out with the help of certain chemicals called enzymes. They are produced and secreted by the various organs of the digestive tract. All enzymes are proteins. They break down carbohydrates, proteins and fats into smaller molecules.

Digestion of Carbohydrates and Proteins

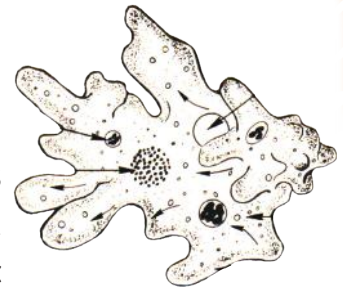
Food grains like wheat, maize and rice contain carbohydrate called starch. A starch molecule is made up of several hundred glucose molecules linked together. It is a very large molecule and therefore, the body cannot use it. During digestion, certain enzymes break down starch into glucose molecules. The glucose molecules are small and the body uses it to obtain energy.

Similarly proteins present in food like pulses, milk, meat and fish are complex molecules. Each protein molecule is made up of many small amino acid molecules. During digestion, certain enzymes break down proteins into amino acid. The body uses amino acids to grow and repair injured tissue.

The absorption of digested food and its incorporation into the body as known is assimilation. The undigested and unwanted material from the food is excreted out of the body.

Process of Nutrition in Amoeba

Amoeba proteus lives on the bottom of shallow lakes and ponds. It feeds on microscopic organisms such as smaller protozoa and algae. The ingestion of food takes place through the body surface of the amoeba. Prey is enclosed in a food vacuole by the action of pseudopodia flowing around the food item. An enzyme called lysosomes which contains hydrolytic enzyme is recreated in the food vacuole.



The process of nutrition in amoeba

The products of digestion are absorbed into the cytoplasm and undigested remains are discharged at the surface of amoeba.

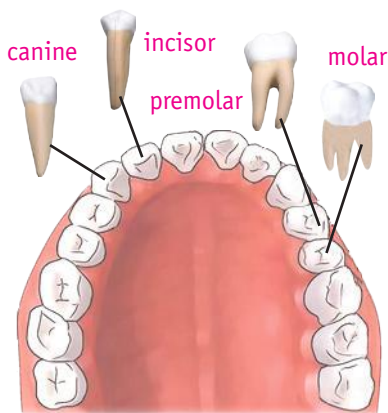
MOUTH AND TEETH

Herbivores such as deer, giraffe, camel and cattle have specialized jaws and teeth that help in digestion. Their molars have broad surfaces for grinding grass and leaves into small pieces.

They have no upper incisors or canines. There is a large space between the incisors and molars to allow the tongue to mix food thoroughly with saliva. Carnivores have a strong jaws for capturing and tearing prey. They have incisors for biting long canines for seizing prey and a pair of specialized premolars and molars called carnassials for slicing up the flesh into chunks.



Observe the incisors and canines of a cat



Permanent teeth

In human being as in other animals the teeth help in breaking food into small pieces by cutting and chewing and make it digestible.

An adult human, can have a maximum of 32 teeth. Most people have 8 incisors, 4 canines, 8 premolars and 8 molars.

Teeth grow out of the jaw bones. They are present at birth but

cannot be seen. The jaw bones are covered by pink coloured gums.

Do You Know ?

Blue whale, the largest animal on the earth, does not have any teeth. It eats only microscopic plants and animals. In contrast, the mosquito has 47 teeth!

TYPES OF TEETH

Our teeth are not of the same kind. We have four types of teeth.

Incisors or Cutting Teeth

The front four teeth on each jaw are flat and have a sharp edge. They are used to bite and cut food into small pieces.



Incisor

Canines or Tearing Teeth

On the both sides of the incisors, on each jaw, is a sharp pointed tooth called the canine. Canines are used to tear food.



Canine



Premolars or Grinding Teeth

These are broad and flat teeth. They grind food and convert it into fine pieces. There are two premolars, next to each canine.

Premolar

Molars Teeth

The remaining teeth in the jaw are also broad and flat. The last 2 or 3 teeth on both sides of each jaw are the molars. These teeth are also used to crush and grind food.



Molar

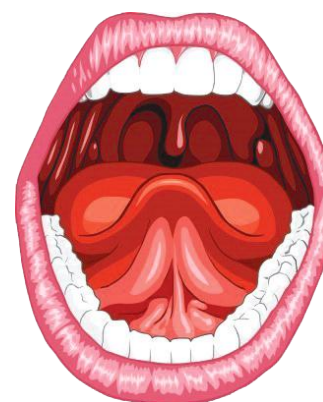
DIGESTION IN HUMANS

Digestion of food is a slow process and it takes a few hours to complete. Several organs of the body work to digest the food we eat. All the organs that work to digest food form the digestive system. The mouth, the oesophagus, stomach, liver, pancreas, small intestine, large intestine are organs of the human digestive system.

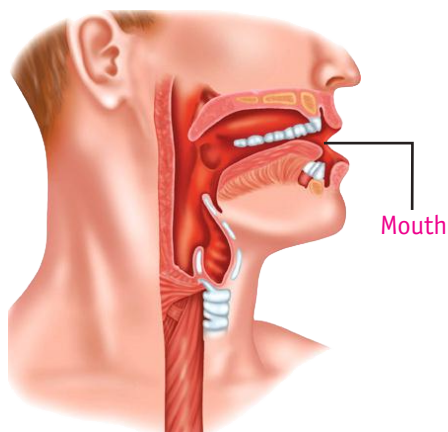
The Mouth

Digestion of carbohydrates begins in the mouth. The teeth chop and grind the food breaking it into small pieces. The smell of the food causes the salivary glands to secrete saliva, a digestive juice. It binds the food thus enabling the tongue to mould the food into a ball for swallowing, saliva contains the digestive enzyme, amylase, which breaks down some carbohydrates into sugar.

The tongue is a fleshy muscular organ attached towards the back of the cavity of the mouth. It can be moved in all directions. The tongue besides helping us to talk, also helps in mixing saliva with the food while chewing.



Mouth



Oesophagus

The Oesophagus

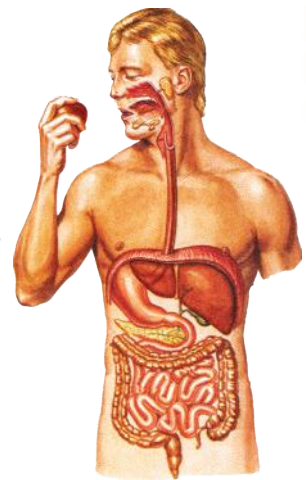
The oesophagus is a muscular tube connecting the throat to the stomach. When food passes into the oesophagus, the opening of the windpipe is closed. Food is pushed into the stomach by the muscular movement of the oesophagus.

The Stomach

Stomach is like a bag organ made up of muscles. The walls of the stomach are lined with a membrane called mucosa.

The mucosa secretes mucus which protects the lining of the stomach. Food is churned and made into a paste. The glands present in the stomach walls secrete gastric juices. Gastric juices contains enzymes and hydrochloric acid. The hydrochloric acid in the stomach destroy bacteria and acidifies the food. The gastric juices contain the enzyme pepsin.

Pepsin starts the digestion of proteins. The action of the enzymes and hydrochloric acid and the churning changes food into a liquid called chyme. The chyme leaves the stomach and enters the small intestine.



Stomach

The Intestine

The intestine is divided into two parts. The part connected to the stomach is a long and narrow coiled tube called the small intestine. The end part of the intestine is thicker and short. It is called the large intestine.



Intestine

Small Intestine

Digestion of food begins in mouth and ends in the small intestine. The small intestine is made up of three parts the duodenum, the jejunum and ileum. As the chyme enters the duodenum, several intestinal juices are released. These juices stimulate the gall bladder and pancreas to release special digestive juices bile and pancreatic juice.

Bile juice helps in the digestion of fats. The pancreatic juice helps in the digestion of carbohydrates and proteins. The carbohydrates are broken down into sugar, the proteins into amino acids and fats into fatty acids and glycerol.

Large Intestine

After all the useful nutrients from the digested food are absorbed by the small intestine, the remaining material passes into the large intestine. Most of the water and minerals present in the undigested food are absorbed by the large intestine. The remaining part is thrown out of the body through the anus in the form of stools.

Human beings cannot digest plant material made up of cellulose, a type of carbohydrates. While eating normally food does not enter the windpipe. This is the reason why we cannot breathe and swallow at the same time. During swallowing, a flap-like organ closes the entry of the windpipe. As a result, food passes only through the food pipe.

How do Grass Eating Animals Digest Food ?

Animals such as cow, deer, sheep, goat, buffalo, camels and yaks can digest grass and leaves because they have a specialized digestive system. These animals have a four chambered stomach. The first chamber is called the rumen.

Animals like the deer, cow, giraffe and goat eat quickly and store large amounts of grass in the rumen. Where it softens. The rumen contains millions of microbes. A large amount of saliva is also secreted in the rumen.

The chewed food passes into the rumen where the microbes begin to break down the food. The animal now regurgitates or brings the contents of the rumen back into the mouth several times to chew it. This material is now called cud. The additional chewing breaks down the cellulose content further. The regurgitation and chewing of cud is called rumination and the animal that does it is called a ruminant.

From the rumen the food passes through two other chambers before it reaches the fourth chamber. The hydrochloric acid and gastric juices, secreted in the chamber digest the proteins. The food can take as much as 80 hours to pass through the digestive system of a ruminant.



Digestive system in ruminants

Do You Know ?

A cow makes 40,000 to 60,000 jaw movements per day, while it keeps on chewing and rechewing.

Know the Keywords :

Nutrition : The process of obtaining food and its utilization in the body.

Filter feeders : Animals which strain their food from the water.

Chyme : Turning of food into liquid of enzymes and acids.

Heterotrophs : All animals which do not make their own food and depend on ready food.

Ruminant : Animal that regurgitates and masticates its food after swallowing.

Point to Remember

- Most plants and unicellular algae make their own food through photosynthesis is called autotrophic nutrition.
- Animals obtain nutrition by feeding on plants or other animals. This type of nutrition is called heterotrophic nutrition.
- Food grains like wheat, maize and rice contain carbohydrate called starch.
- The oesophagus is a muscular tube connecting the throat to the stomach.
- The regurgitation and chewing of cud is called rumination and the animal that does it is called a ruminant.

EXERCISE TIME

A. Answer the following questions :

1. Describe the two types of nutrition.
2. What is digestion ? How does it take place ?
3. How many types of teeth do we have ? Explain them.
4. How are proteins in our food digested ?
5. Explain the working of small intestine.
6. What is known as ruminant?

B. Fill in the blanks :

1. Bile helps in the digestion of _____.
2. The intake of digested food and its incorporation into the body is known as _____.
3. An organism obtains energy from _____.
4. The _____ is a bag like organ made up of muscles.
5. Bile juice is secreted by _____.

C. Tick (✓) the correct option :

1. The process by which organisms obtain substances necessary for their growth and maintenance is called :
(i) assimilation (ii) nutrition (iii) ingestion
2. Pancreatic juice is secreted in the :
(i) stomach (ii) small intestine (iii) large intestine
3. Saliva contains a digestive enzyme called :
(i) bile (ii) pepsin (iii) amylase
4. The acid in the stomach that destroys the bacteria in the food is :
(i) hydrochloric acid (ii) nitric acid (iii) sulphuric acid



Creative Work

- With the help of some clay you can make your own model of digestive system.
- Make organs such as liver, stomach, pancreas, large intestine. You can also use some rubber tube.