

NOTES

CLASS 7

SCIENCE

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NUTRITION IN ANIMALS

- All the animals can be divided into three groups on the basis of their food habits. These are:
 1. **Herbivores:** Those animals which eat only plants are called herbivores. Examples are Goat, Cow, and Deer etc.
 2. **Carnivores:** Those animals which eat only other animals as food are called carnivores. Examples are Lion, Tiger, and Lizard etc.
 3. **Omnivores:** Those animals which eat both, plants and animals are called omnivores. Examples are Man, Dog and Crow etc.

Process of nutrition in animals

Holozoic nutrition: It is a process by which animals take in their food. It involves different steps namely, ingestion, digestion, absorption, assimilation and egestion. Human beings exhibit holozoic mode of nutrition involving five basic steps.

- **Ingestion:** The process of taking food into the body is called ingestion.
- **Digestion:** the process in which the food containing large, insoluble molecules is broken down into small, water soluble molecules is called digestion.
- **Absorption:** The process in which the digested food passes through the intestinal wall into blood stream is called absorption.
- **Assimilation:** The process in which the absorbed food is taken in by the body cells and used for energy, growth and repair is called assimilation.
- **Egestion:** The process in which the undigested food is removed from the body is called egestion.



Nutrition in Simple organisms

In this section we will learn about simple organisms like amoeba, paramecium, hydra, spider and frog.

Nutrition in Amoeba

- Amoeba is a microscopic organism which consists of only a single cell.
- Amoeba is mostly found in pond water.
- Figure given below shows the structure of amoeba.
Amoeba eats tiny plants and animals as food which floats in water in which it lives.
- The mode of nutrition in Amoeba is **holozoic**.
- The process of obtaining food by Amoeba is called **phagocytosis**.
- Steps involved in the nutrition of Amoeba:
 1. **Ingestion:** Amoeba ingests food by forming temporary finger-like projections called pseudopodia around it. The food is engulfed with a little surrounding water to form a food vacuole ('temporary stomach') inside the Amoeba.
 2. **Digestion:** In Amoeba, food is digested in the food vacuole by digestive enzymes which break down the food into small and soluble molecules by chemical reactions.
 3. **Absorption:** The digested simple and soluble substances pass out of food vacuole into the surrounding environment.
 4. **Assimilation:** The absorbed food materials are used to obtain energy through respiration and make the parts of Amoeba cell which leads to the growth of Amoeba.
 5. **Egestion:** The remaining undigested material is moved to the surface of the cell and thrown out of the body of Amoeba.



Nutrition in Paramecium:

- Paramecium is also a tiny unicellular animal which lives in water.
- Ingestion: Paramecium uses its hair like structures called **cilia** to sweep the food particles from water and put them into mouth.
- Ingestion is followed by other steps such as digestion, absorption, assimilation and egestion which are same as those we studied in **Amoeba**

Nutrition in Hydra

- Hydra is a simple multicellular animal.
- It has a number of tentacles around its mouth, which are used for ingestion of food.
- These tentacles entangle small aquatic animals and kill them with their stinging cells.
- After this they push them into their mouth. Now inside their body cavity digestive juices are secreted
- by the surrounding cells.
- These juices digest the food and the digested food is absorbed through the cavity walls and assimilated in the cells.

Nutrition in frog

- The frog uses its long sticky tongue to catch insects. Frogs have well developed digestion system in which the digestion of food takes place.

Nutrition in Spider

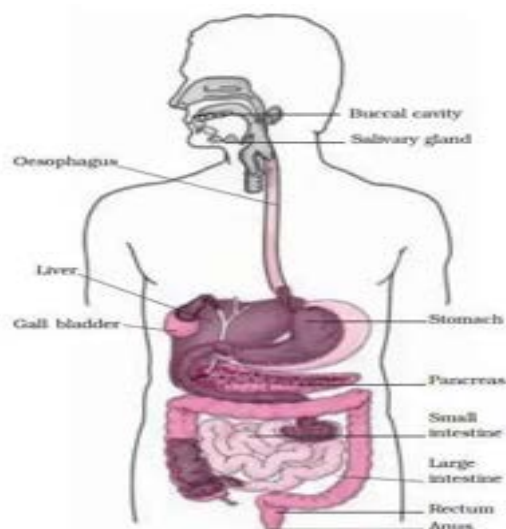
- In spiders digestion of food actually takes place outside their body.
- A spider weaves a sticky web in which small insects get stuck.
- It then injects digestive juices into the body of the insect, which digests the body part of the insects.
- The spider then sucks up the digested food.

Nutrition in Humans

- There are 5 steps involved in nutrition in animals including human beings.
- **Ingestion:** The process of taking in food by an organism is called ingestion.
- **Digestion:** Digestion is the mechanical and chemical breakdown of food into simple soluble substances.
- **Absorption:** The digested food is then taken up by the circulatory stream and carried to the cells of the body. This process is called absorption.
- **Assimilation:** The absorbed food is used by the body to generate energy and for growth.
- **Egestion:** The undigested food is a waste product, and it is removed from the body in the last stage by a process called egestion

Human Digestive system

- We take food through our mouth, digest and utilise it.
- Figure given below shows the human digestive system
- Human digestive system consists of alimentary canal and its associated human digestive system glands.



- Various organs of human digestive system in sequence are
 - Mouth (Buccal Cavity)
 - Oesophagus (food Pipe)



- Stomach
- Small intestine
- Large intestine
- Rectum
- Anus.
- The glands which are associated with human digestive system are
 - **Salivary glands**- Located in mouth or Buccal Cavity
 - **Liver**- It is the largest gland situated in the upper part of abdomen on the right side.
 - **Pancreas**- located just below the stomach

The ducts of various glands open into the alimentary canal and pour secretion of their juices into the alimentary canal.

Digestion in the mouth

- We take food through our mouth and the process of taking food into the body is called **ingestion**.
- The mouth or **buccal cavity** contains teeth, tongue and salivary glands.
- Digestion begins in the mouth when we chew the food with the help of our teeth.
- The teeth cut the food into smaller pieces, chew and grind it.

Chewing breaks down the food into smaller pieces and mixes them with saliva. This process is called **mastication**.

The salivary glands secrete watery liquid called **saliva**. Saliva is a digestive juice that helps to partially digest the starch present in the food.

- The tongue helps in mixing saliva with the food.
- **Tongue** is a muscular organ that helps you eat the food. It mixes saliva with the food during chewing and helps in swallowing it.
- We also taste food with our tongue as it has taste buds that detect different tastes of food.

Teeth

- Teeth are used for cutting, grinding and tearing the food before you swallow it.
- You have different types of teeth to do the job.
- **Milk teeth**:- A child has only 20 teeth, 10 in each jaw. These are known as milk teeth. They begin to fall at the age between 6 to 8 and then new set of teeth grows.
- **Permanent teeth**:- This set contains 32 teeth, 16 in each jaw. There are 4 incisors, 2 canines, 4 premolars and 6 molars in each jaw. As shown below in the figure:
- Your front teeth are **incisors**. They are used for biting and cutting.
- Next to incisors are **canines**. These are pointed and are used for piercing and tearing pieces of food.
- Teeth at the back of your mouth are broad with almost flat surface. These teeth crush and grind food and are called the **premolars and molars**. Molars are larger than premolars
- White substance that covers your teeth is called **enamel**.



The food pipe/ Oesophagus

- The swallowed food passes into the food pipe or **oesophagus** as shown below in the figure
- This figure shows the movement of food in food pipe which runs along the neck and chest.



- So, the oesophagus leads from your mouth to the stomach. It is made up of the muscles.
- Food is pushed down by movement of the wall of food pipe.
- This movement called **peristalsis**, takes place throughout the alimentary canal and pushes the food downwards.

Stomach

- **Stomach** is the thick walled bag present on the left side of the abdomen. It is the widest part of the alimentary canal. Oesophagus brings slightly digested food from mouth into the stomach.
- The stomach walls contain s three tubular glands in it walls which secrete gastric juice.
- The gastric juice contains three substances: Hydrochloric acid, the enzyme pepsin and mucus.
- The hydrochloric creates an acidic medium which facilitates the action of the enzyme pepsin that is the digestion of protein into simple substances.
- The acid kills many bacteria that enter along with the food.
- The mucus helps to protect the stomach wall from its own secretions of hydrochloric acid.
- The partially digested food then goes from the stomach into the small intestine.



Small intestine

- Small intestine is highly coiled and is about 7.5 m long.
- After leaving stomach food enters small intestine and last steps of digestion takes place in small intestine.
- It receives secretions from liver and pancreas and wall of small intestine also secretes juices.
- **Liver:-** Liver is the largest gland in the body and is situated in the upper part of the abdomen on the right side. It secrets bile juice that is stored in **gall bladder**

- **Pancreas:-** It is the large cream coloured gland located just below the stomach. The pancreatic juice acts on carbohydrates, fats and proteins and converts them into simple form.
- The partly digested food now reaches the lower part of the small
- The walls of the small intestine contain glands which secrete intestinal juice.
- The enzymes present in it finally convert the proteins into amino acids, complex carbohydrates into glucose and fats into fatty acids and glycerol.

Absorption:

- The small intestine is the main region for the absorption of digested food.
- The inner surface of the small intestine has numerous finger-like projections called villi which increase the surface area for rapid absorption of digested food.
- The digested food which is absorbed through the walls of the small intestine goes into our blood.

Assimilation:

- The blood carries these useful substances to each and every part of the body. The body uses these substances for its growth and maintenance. The absorption of digested food and its utilization by the body is known as assimilation.
- Glucose, which is the final product of carbohydrate digestion, is broken down with the help of oxygen into carbon dioxide and water to release energy. Amino acids are used for growth and repair of worn out cells.
- Fatty acid and glycerol are stored below the skin as energy reserves.



Egestion:

- The undigested and unabsorbed food moves into the large intestine, to a part called colon, where some amount of water and salts are absorbed from the undigested food
- The remaining undigested food that moves to the second part called rectum. Here, it is stored and removed from the body through the anus.
- The exit of this waste material is regulated by the anal sphincter.
- This process is known as egestion.

Digestion in grass eating animals (ruminants)

- Plant eating animals such as cows, deer, goats, buffaloes, camels and yaks quickly swallow their food after chewing it once.
- The swallowed food goes to a chamber called rumen. They bring back the food later into the mouth and chew it again. These animals are called ruminants and the process is called rumination.
- The stomach of ruminants consists of four compartments: rumen, reticulum, omasum and abomasum.

- The swallowed food first enters the rumen, where the microorganism begins the digestion of the food (cellulose- a complex carbohydrate).
- In the first two chambers, the rumen and the reticulum, the food is mixed with saliva and separated into layers of solid and liquid material
- Solid clump together to form the cud or bolus.
- The cud is brought back from the rumen to the mouth, where it is chewed slowly by completely mixing it with saliva and is further broken down. When the cud is chewed and swallowed again, it enters the omasum where the food is broken down further into simple compounds that enter in the abomasum.
- Hydrochloric acid and digestive juices (gastric juices) are secreted in these chambers and the food is now fully digested.
- It is then sent to the small intestine for absorption and the leftover undigested food is passed on to the large intestine from where it is excreted.
- Grass is rich in cellulose and we humans cannot digest it.

Some Important Questions-

1. Match the Following:-

Animal	Mode of Food intake
1. Infant	a. Sucking
2. Mosquito	b. Chewing
3. Housefly	c. Suckling
4. Eagle	d. Siphoning
5. Dog	e. Capturing

Ans: The following is the matched table:

Animal	Mode of Food intake
1. Infant	c. Suckling
2. Mosquito	a. Sucking
3. Housefly	d. Siphoning



4. Eagle	e. Capturing
5. Dog	b. Chewing

2. Fill in the blanks:

a) _____ is the elimination of unused parts of the food.

Ans: Egestion is the elimination of unused parts of the food.

b) The digestive system in humans consists of _____ and _____.

Ans: The digestive system in humans consists of alimentary canal and digestive glands.

c) The first set of teeth that grow during infancy and fall off between 6-8 years of age is _____.

Ans: The first set of teeth that grow during infancy and fall off between 6-8 years of age is milk teeth.

d) The working of the stomach was discovered by _____.

Ans: The working of the stomach was discovered by William Beaumont.

3. Fill in the blanks:

(a) The main steps of nutrition in humans are _____, _____, _____, _____ and _____.

(b) The largest gland in the human body is _____.

(c) The stomach releases hydrochloric acid and _____ juices which act on food.

(d) The inner wall of the small intestine has many finger-like outgrowths called _____.

(e) Amoeba digests its food in the _____.

Solution:

(a) The main steps of nutrition in humans are ingestion, digestion, absorption, assimilation and egestion.

(b) The largest gland in the human body is liver.

(c) The stomach releases hydrochloric acid and digestive juices which act on food.

(d) The inner wall of the small intestine has many finger-like outgrowths called villi.

(e) Amoeba digests its food in the food vacuole.

4. Mark 'T' if the statement is true and 'F' if it is false:

(a) Digestion of starch starts in the stomach. (T/F)

(b) The tongue helps in mixing food with saliva. (T/F)

(c) The gall bladder temporarily stores bile. (T/F)

(d) The ruminants bring back swallowed grass into their mouth and chew it for some time. (T/F)



Solution:

a) F b) T c) T d) T

5. Tick (✓) mark the correct answer in each of the following:

(a) Fat is completely digested in the

(i) stomach (ii) mouth (iii) small intestine (iv) large intestine

(b) Water from the undigested food is absorbed mainly in the

(i) stomach (ii) food pipe (iii) small intestine (iv) large intestine

Solution:

a) (iii) small intestine b) (iv) large intestine

6. Match the items of Column I with those given in Column II:

Column- I	Column- II
Food components	Product(s) of digestion
Carbohydrates	Fatty acids and glycerol
Proteins	Sugar
Fats	Amino acids

Solution:

Column- I	Column- II
Food components	Product(s) of digestion
Carbohydrates	Sugar
Proteins	Amino acids



Fats	Fatty acids and glycerol
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7. What are villi? What is their location and function?

Solution: Villi are finger-like projections or outgrowth. They are present in the small intestine of our digestive system. The villi increase the surface area for absorption of the digested food.

8. Where is the bile produced? Which component of the food does it help to digest?

Solution: Bile juice is produced in the liver, and it helps in the digestion of fats by breaking large fat globules into smaller ones.

9. Name the type of carbohydrate that can be digested by ruminants but not by humans. Give the reason also.

Solution: Cellulose is the carbohydrate that can be digested by ruminants but not by humans because humans lack cellulose enzyme required to digest the cellulose.

10. Why do we get instant energy from glucose?

Solution: Glucose is a simple sugar which is easily absorbed into the blood whereas other carbohydrates are first broken down into glucose and then absorbed; hence, glucose gives instant energy.

11. Which part of the digestive canal is involved in:

- (i) Absorption of food _____.
- (ii) Chewing of food _____.
- (iii) Killing of bacteria _____.
- (iv) Complete digestion of food _____.
- (v) Formation of faeces _____.

Solution:

i) Small intestine ii) Buccal cavity iii) Stomach iv) Small intestine v) Large Intestine

12. Write one similarity and one difference between nutrition in amoeba and human beings.

Solution: Similarity: Both amoeba and human beings follow the holozoic type of nutrition.

Difference: Humans intake food through buccal cavity. In amoeba food is ingested through pseudopodia.

13. Match the items of Column I with suitable items in Column II

Column-I	Column-II
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a) Salivary gland	(i) Bile juice secretion
b) Stomach	(ii) Storage of undigested food
c) Liver	(iii) Saliva secretion
d) Rectum	(iv) Acid release
e) Small intestine	(v) Digestion is completed
f) Large intestine	(vi) Absorption of water
	(vii) Release of faeces

Solution:

Column-I	Column-II
a) Salivary gland	(iii) Saliva secretion
b) Stomach	(iv) Acid release
c) Liver	(i) Bile juice secretion
d) Rectum	(ii) Storage of undigested food
e) Small intestine	(v) Digestion is completed
f) Large intestine	(vi) Absorption of water



Short Answer Questions-

1. Define Nutrition in animals.

Ans: Nutrition in animals is very important. Some of them are plant-eating while others are carnivores. It includes the process of food ingestion, digestion, absorption and assimilation by the cells of their body. It also includes the removal of unused portions of food.

2. Differentiate between absorption and assimilation.

Ans: The difference between absorption and assimilation is as follows:

Absorption	Assimilation
Absorption is the process of ingestion of the digested food from the alimentary canal into the bloodstream through the intestinal villi.	Assimilation is the process of ingestion of digested food and nutrients and the synthesis of new compounds from the molecules that are absorbed to perform respiration and metabolism.

3. What is the function of the large intestine in digestion?

Ans: The large intestine reabsorbs all the excess water from unabsorbed and undigested food. Thus, it helps in making the unabsorbed portion of the food as faeces and its elimination by excretion. Thus, returning most of the water to the blood can prevent excess water loss as well as eliminate unabsorbed food from the body.

4. List the different types of teeth present in humans and their functions.

Ans: The different types of teeth present in humans and their functions are:

- Incisors: Incisors or the front teeth are the eight visible teeth that are used to bite the food.
- Canines: Next to incisors are the canines that are used to tear flesh or other food items. These are very sharp and come in around nine to twelve years of age.
- Premolars: Next to canines are the premolars which are typically used for grinding and chewing food.
- Molars: Molars are replaced by the eight premolars. They serve the primary function of chewing and grinding food into small particles.

5. What is diarrhoea?

Ans: When excess water from digested food is not reabsorbed, it is passed out through the stool which is loose and watery. Passage of this watery stool frequently is called diarrhoea which is caused by a microbial infection of the alimentary canal. This can lead to severe dehydration that can be controlled by using Oral Rehydration Solutions (ORS).





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