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Support Pack | Grade 12

CAPS

Module 1 Units 1 – 3

Agricultural Sciences

Animal nutrition and digestion

This support pack for the **Animal nutrition and digestion** module in the **Agricultural Sciences Grade 12 CAPS curriculum** provides valuable revision activities. All activities have the answers provided. Learners can work through these individually at home or these could form the basis of a catch-up class or online lesson. You have permission to print or photocopy this document or distribute it electronically via email or WhatsApp.

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Module 1 – Animal nutrition and digestion

Unit 1 Animal nutrition

Short questions

1. Various possible answers are provided for the following questions. Write only the correct letter (A–D) next to the question number.

1.1 The stomach compartment of the ruminant animal that corresponds to the glandular stomach of the pig is the …….

A abomasum
B omasum
C rumen
D reticulum

1.2 The ……. has finger-like protrusions called papillae that act as heating rods for temperature control.

A omasum
B abomasum
C small intestine
D rumen

1.3 The true glandular stomach of a fowl in which enzymatic and hydrochloric acid digestion of food takes place is known as the ……. .

A ventriculus
B proventriculus
C gizzard
D gullet

1.4 Which ONE of the following regions does not form part of the stomach of the pig?

A cardiac
B fundic
C gastric
D pyloric

1.5 The ……. of the stomach of the cow is sometimes referred to as the 'hardware stomach' as this is the chamber where foreign objects such as wire are lodged.

A rumen
B reticulum
C omasum
D abomasum

5 × 2 (10)

2. Supply ONE word/term for each of the following descriptions. Write only the word/term next to the question number.

2.1 Structures in the wall of the small intestine that increase the absorption surface
2.2 The structure in the fowl that is a common opening for the digestive and urogenital systems
2.3 The chamber of the stomach of a fowl where food is ground down to prepare it for digestion
2.4 The regurgitated bolus that is transported back to the mouth by means of retro-peristalsis
2.5 The connection between the stomach and small intestine of the pig

5 × 2 (10)

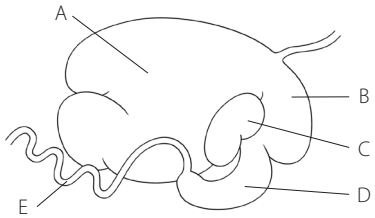
3. Match the description in column B with the word/term in column A.

Column A		Column B	
3.1	Rumen and reticulum	A	Compound stomach
3.2	Abomasum	B	Forestomachs of the ruminant
3.3	Rumen, reticulum, omasum and abomasum	C	Secretion of gastric juice in the stomach of the ruminant
3.4	Rumen, reticulum and omasum	D	Food passes through the cardiac sphincter into this compartment of the ruminant stomach
3.5	Rumen	E	Digestion of cellulose by micro-organisms in the stomach of the ruminant

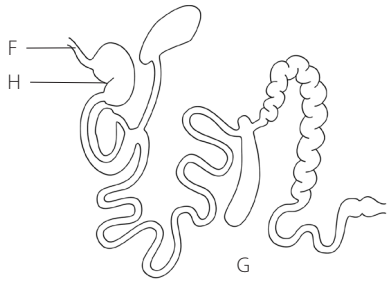
5 × 2 (10)

Longer questions

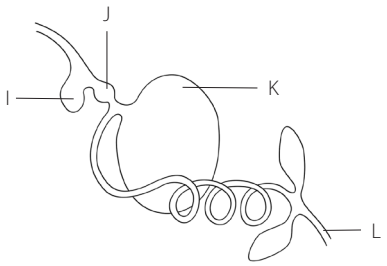
4. Study the illustrations below and then answer the questions that follow.



Farm animal A



Farm animal B



Farm animal C

4.1 Which of the diagrams represents the stomach of a ruminant animal? (1)

4.2 Supply reasons for your answer in question 4.1. Write down the letters from the diagram that show structure/s that are unique to a ruminant and biological terms for the relevant structure/s. (7)

4.3 Identify the diagram of an animal that has an organ in the alimentary canal that normally contains small stones. Write down the letter and the name of this organ. (3)

4.4 What is the function of the stones in the organ named in 4.3? (1)

4.5 Name the three parts of the organ of the alimentary canal of farm animal A that follows after the stomach. (3)

4.6 Write down the letter that represents the stomach of farm animal B. Indicate the type of stomach as well as the different parts of the stomach. (6)

4.7 Write down the letter that represents the stomach of farm animal C. Indicate the two parts of the stomach of farm animal C. (3)

4.8 Indicate the name of the tube that connects the mouth with the stomach of the pig. Briefly explain how this tube prevents food from re-entering from the stomach. (3)

4.9 Tabulate the following information with regard to the ducts opening in the small intestine of farm animal A.

Ducts	Part of small intestine	Secretions of the ducts	Functions of secretions	Organ of secretion

(12)

4.10 Name TWO glands that open into the first part of the small intestine of farm animal A. (2)

Unit 2 Digestion in non-ruminants

Short questions

1. Various possible answers are provided for the following questions. Write only the correct letter (A–D) next to the question number.

1.1 The part of the alimentary canal of a fowl that will ensure mechanical digestion of food is the ……. .

A crop
B proventriculus
C ventriculus
D cloaca

1.2 ……. secrete mucus in the duodenum that protects the duodenum from the acidic chyme.

A Duodenal glands
B Brunner glands
C Parotid glands
D Glands of Lieberkühn

1.3 The ……. is responsible for the grinding of food by means of small stones found in it.

A crop
B ventriculus
C proventriculus
D caecum

1.4 Secretion of a digestive juice that contains an enzyme, amylase, secreted in the small intestine is associated with the ……., which is an accessory organ of the alimentary canal.

A liver
B salivary gland
C pancreas
D intestinal gland

1.5 The part of the alimentary canal of the pig that is most suited for absorption is the ……. .

A small intestine
B large intestine
C pyloric stomach region
D fundic stomach region

5 × 2 (10)

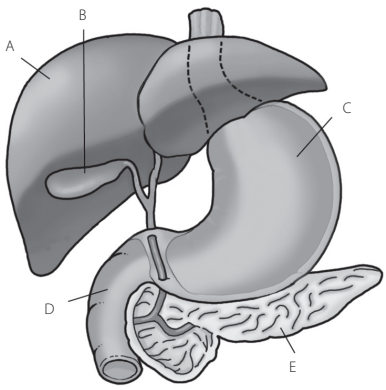
2. Supply ONE word/term for each of the following descriptions. Write only the word/term next to the question number.

2.1 The enzyme needed for fat digestion
2.2 A digestive gland in the alimentary canal that secretes both digestive juice and hormones
2.3 A liquid produced by the liver and released into the small intestine to assist in the digestion of lipids
2.4 The hormone that controls the secretion of pancreatic juice
2.5 The pH of the juice secreted by the exocrine part of the accessory digestive gland located between the stomach and the small intestine of farm animals

5 × 2 (10)

Longer questions

3. Study the illustration below and then answer the questions that follow.



3.1 Identify the type of digestive organs represented in the illustration. (1)

3.2 Write down the letter and name of the exocrine gland that is located above the stomach of the non-ruminant. (2)

3.3 Identify the substance secreted into the small intestine by the gland mentioned in question 3.2. (1)

3.4 Name FIVE functions of the substance mentioned in question 3.3. (5)

3.5 Write down the letter and name of the gland in which the substance mentioned in question 3.3 is stored and state whether this is an exocrine or endocrine gland. (3)

3.6 Write down the letter and name of the gland that is located between the stomach and the small intestine. (2)
3.7 Name THREE enzymes secreted by the exocrine part of the gland labelled E as well as their digestive functions. (6)
3.8 Name TWO hormones secreted by the endocrine part of the gland labelled E. (2)
3.9 Identify the term used to describe the clusters of cells that are scattered throughout the endocrine part of the gland labelled E. (1)
3.10 Identify TWO glands located in the organ labelled D. (2)

Unit 3 Digestion in ruminants

Short questions

1. Various possible answers are provided for the following questions. Write only the correct letter (A–D) next to the question number.

1.1 Beneficial micro-organisms in the rumen of cattle are ……. .
- **A** bacteria and viruses
- **B** protozoa and bacteria
- **C** fungi and bacteria
- **D** protozoa and fungi

1.2 The end products of digestion that are absorbed in the rumen of ruminants are ……. .
- **A** sugars
- **B** amino acids
- **C** volatile fatty acids
- **D** fats

1.3 A possible nitrogen source that active microbes in the rumen can utilise for growth is ……. .
- **A** sugars
- **B** fats
- **C** volatile fatty acids
- **D** amino acids

1.4 One of the gases produced during the digestion of cellulose is ……. .
- **A** nitrogen
- **B** methane
- **C** water vapour
- **D** oxygen

1.5 The rumen micro-organisms digest cellulose to produce the following volatile fatty acids:
- **A** acetic acid, butyric acid and carbonic acid
- **B** propionic acid, acetic acid and butyric acid
- **C** propionic acid, butyric acid and methane
- **D** butyric acid, acetic acid and hydrochloric acid

5 × 2 (10)

2. Supply ONE word/term for each of the following descriptions. Write only the word/term next to the question number.

2.1 The part of the small intestine into which bile, that plays an important role in the digestion of fat, is released
2.2 The substance in gastric juice responsible for creating a favourable pH medium for enzymes in the stomach of farm animals
2.3 The stomach in the young suckling ruminant of which the proper functioning is essential
2.4 The process used to ensure that urea is utilised by the rumen microbes
2.5 The regurgitated bolus that is transported back to the mouth by means of retro-peristalsis

5 × 2 (10)

3. Match the description in column B with the word/term in column A.

Column A		Column B	
3.1	Active absorption	A	The compartment of the stomach of the cow in which micro-organisms hydrolyse proteins to form peptides, amino acids and ammonia
3.2	Abomasum	B	Normally underdeveloped in young suckling animals
3.3	Reticulo-rumen	C	The compartment of the stomach of a cow where enzymatic digestion takes place
3.4	Rumen, reticulum and omasum	D	Farm animals with this type of stomach can be supplemented with non-protein nitrogen substances
3.5	Compound stomach	E	A process that requires energy for the absorption of nutrients into the animal body

5 × 2 (10)

Longer questions

4. Food particles are mechanically digested in the mouth of the ruminant and swallowed. They then move towards the stomach for further digestion.

4.1 Supply the specific term for the food that passes through the long tube towards the stomach after mechanical digestion in the mouth. (1)
4.2 Identify the tube that is responsible for this special movement of food. (1)
4.3 Name the process whereby the food moves downwards in this tube. (1)
4.4 Name the enzyme that is found in the swallowed food. (1)
4.5 Describe the mechanical change created by the enzyme mentioned in 4.4. (2)
4.6 Name the three parts that constitute the forestomachs of ruminant animals. (3)
4.7 Briefly explain how the stomach of a young suckling ruminant animal differs from that of an adult animal. (3)
4.8 Supply reasons for your answer in question 4.7. (3)
4.9 State FIVE ideal conditions required for microbial activity in the ruminant stomach. (5)
4.10 Name FOUR functions of micro-organisms in the digestive system of ruminants. (4)
4.11 Enzymatic digestion of feed occurs in the true stomach of a ruminant. Supply a reason to support this statement. (1)
4.12 Name the part in the digestive system of a fowl that is adapted to perform the same function as the true stomach of a ruminant. (1)

Memorandum

Unit 1

Short questions

1.1	A	**1.2**	D	**1.3**	B	**1.4**	C	**1.5**	B (10)
2.1	Villi	**2.2**	Cloaca/Vent	**2.3**	Ventriculus	**2.4**	Cud	**2.5**	Pyloric sphincter (10)
3.1	E	**3.2**	C	**3.3**	A	**3.4**	B	**3.5**	D (10)

Longer questions

4.1 Diagram A (1)
4.2 Stomach of ruminant:

- Four different compartments in stomach/complex stomach
- Very long intestine
- Very large/enlarged caecum
- A – Rumen

- B – Reticulum
- C – Omasum
- D – Abomasum (7)

4.3 Diagram C
I – Crop (3)

4.4 Grinding of food into fine particles (1)

4.5 Duodenum, jejunum and ileum (3)

4.6 H – Monogastric/single-chambered stomach
- Oesophageal region
- Cardiac region
- Fundic region
- Pyloric region (6)

4.7 K – Proventriculus and ventriculus/gizzard (3)

4.8 Oesophagus. The cardiac sphincter between the oesophagus and stomach contracts to prevent food from re-entering the oesophagus. (3)

4.9

Ducts	Part of small intestine	Secretions of the ducts	Functions of secretions	Organ of secretion
Bile	Duodenum	Bile salts	Digestion of fats	Liver
Pancreatic	Duodenum	Digestive enzymes Bicarbonates	Digestion of fats, carbohydrates and proteins Neutralises acid from the stomach	Pancreas

(12)

4.10 Duodenal glands, glands of Lieberkühn (2)

Unit 2

Short questions

1.1	C	**1.2**	B	**1.3**	B	**1.4**	C	**1.5**	A (10)
2.1	Lipase	**2.2**	Pancreas	**2.3**	Bile	**2.4**	Secretin	**2.5**	Alkaline (pH > 7) (10)

Longer questions

3.1 Accessory digestive organs (1)

3.2 A – Liver (2)

3.3 Bile (1)

3.4 Functions of bile (any five):
- Digestion, emulsification and absorption of fats
- Absorption of fat-soluble vitamins A, D, E and K
- Improving absorption of fatty acids and glycerol
- Neutralising acidic pH of gastric juice/Creating alkaline medium for functioning of intestinal enzymes
- Antiseptic/Counteracting putrefaction in the alimentary canal
- Neutralising chyme from the stomach
- Lubricating alimentary canal
- Enhancing peristalsis (5)

3.5 B – Gall bladder. Exocrine gland (3)

3.6 E – Pancreas (2)

3.7 Trypsin – proteins to peptides
Amylase – carbohydrates to maltose, dextrin and glucose
Lipase – fats to fatty acids and glycerol (6)

3.8 Insulin and glucagon (2)
3.9 Islets of Langerhans (1)
3.10 Glands of Lieberkuhn and Brunner's glands (2)

Unit 3

Short questions

1.1	B	**1.2**	C	**1.3**	D	**1.4**	B	**1.5**	B (10)
2.1	Duodenum	**2.2**	Hydrochloric acid			**2.3**	Abomasum		
2.4	Hydrolysis	**2.5**	Cud						(10)
3.1	E	**3.2**	C	**3.3**	A	**3.4**	B	**3.5**	C (10)

Longer questions

4.1 Bolus (1)
4.2 Oesophagus/Gullet (1)
4.3 Peristalsis (1)
4.4 Ptyalin/Salivary amylase (1)
4.5 Starches/Polysaccharides are broken down/converted/changed to maltose. (2)
4.6 Reticulum/Honeycomb/Net stomach, Rumen, Omasum (3)
4.7 Difference between stomachs of young suckling ruminant and adult ruminant:
- Forestomachs/Rumen, reticulum and omasum are underdeveloped.
- Young suckling animal feeds on milk that moves straight to the abomasum through the oesophageal groove.
- Only the abomasum is functional in young suckling animals. (3)

4.8 Reasons for differences between stomachs of suckling and adult ruminants:
- Young suckling animals feed on milk that moves straight to the abomasum through the oesophageal groove.
- There is no need for rumination and fermentation at the suckling stage.
- Young suckling animals do not ingest crude fibre. (3)

4.9 Ideal conditions for microbial activity (any five):
- Suitable temperature (38–42 °C)
- Sufficient mineral nutrients (phosphorus, cobalt, sodium)
- Sufficient nitrogen
- Easily digestible carbohydrates
- Slightly acid medium (pH 5,5–6,5)
- Moisture
- Anaerobic conditions/oxygen-free environment
- Regular intake of food/nutrients
- Removal of waste products (5)

4.10 Functions of micro-organisms in the digestive system of ruminants:
- Digestion of cellulose/crude fibre into volatile fatty acids and gases
- Synthesis of amino acids from any nitrogenous substances
- Hydrolysis of proteins from the feed to form amino acids
- Synthesis of vitamins K and B-complex (4)

4.11 Reason for enzymatic digestion in stomach (any one):
- Secretion of digestive/gastric juice
- Secretion of enzymes responsible for enzymatic digestion (1)

4.12 Proventriculus/glandular stomach (1)