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Support Pack | Grade 12

CAPS

Module 2 Units 1 – 3

Agricultural Sciences

Animal feed

This support pack for the **Animal feed** 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 2 – Animal feed

Unit 1 Components of feed

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 is linked to a shortage of magnesium in the ration of cattle.
 - A Anaemia
 - B Osteoporosis
 - C Night blindness
 - D Hypomagnesaemia
 - 1.2 The organic compound needed for insulation of the internal organs of the animal body is identified as
 - A lipids
 - B vitamins
 - C carbohydrates
 - D proteins
 - 1.3 In farm animals bile
 - A is a colourless substance
 - B contains enzymes
 - C is an alkaline substance
 - D changes sucrose to glucose and fructose
 - 1.4 Urea is a substance that is added to a ration to supplement the protein component of the feed.
 - A nitrogenous
 - B non-nitrogenous
 - C non-protein nitrogenous
 - D protein nitrogenous
 - 1.5 Osteomalacia is caused by a deficiency of in the animal body.
 - A calcium
 - B iron
 - C copper
 - D zinc
2. Supply ONE word/term for each of the following descriptions. Write only the word/term next to the question number.
 - 2.1 An essential mineral nutrient for the synthesis of vitamin B12 by rumen micro-organisms
 - 2.2 An endocrine organ in an animal that secretes a hormone that contains iodine
 - 2.3 The chemical element supplied by urea
 - 2.4 A property of vitamins that is used to classify them into two main groups
 - 2.5 A disease linked to a shortage of selenium in the ration of calves

5 × 2 (10)

5 × 2 (10)

3. Match the disease conditions in column B with the mineral deficiencies in column A.

Column A		Column B	
3.1	Iodine	A	Wasting disease
3.2	Magnesium	B	White muscle disease
3.3	Cobalt	C	Anaemia
3.4	Selenium	D	Enlarged thyroid gland
3.5	Iron	E	Hypomagnesaemia

5 × 2 (10)

Longer questions

4. Answer the following questions on the essential components of animal feeds.
- 4.1 Name the four components of feed that are classified as organic matter. (4)
- 4.2 What is the common chemical element that is present in all organic matter? (1)
- 4.3 Which component of feed is classified as inorganic? (1)
- 4.4 Supply a reason why the feed component mentioned in question 4.3 is classified as inorganic. (1)
- 4.5 The inorganic component of feed is classified into two categories. Tabulate these two categories with TWO examples of each. (6)
- 4.6 Identify the form in which carbohydrates are stored in the liver. (1)
- 4.7 Which component of animal feed is the major source of energy for rumen micro-organisms? (1)
- 4.8 Identify the carbohydrate that is indigestible to non-ruminant animals. (1)
- 4.9 Fats and oils also supply energy for the maintenance of the animal body. Tabulate THREE differences between fats and oils. (6)
- 4.10 Name the vitamins that are soluble in fats. (4)

Unit 2 Vitamins and digestibility of feeds

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 Using a milling stone to grind cereals would improve their, making the food particles smaller.
 A palatability
 B digestibility
 C quantities
 D moisture
- 1.2 During a 20-day trial period some layers excreted 35 kg of manure with a moisture content of 55%. The dry material content of the manure is kg.
 A 1,75
 B 19,25
 C 15,75
 D 2,75
- 1.3 Vitamin keeps the mucous membranes in a healthy condition.
 A C
 B D
 C B₁₂
 D A

1.4 A feed with a high digestibility co-efficient contains

- A less fibre and less digestible nutrients
- B more fibre and less digestible nutrients
- C less fibre and more digestible nutrients
- D more fibre and more digestible nutrients

1.5 Molasses added to a ration improves the of the ration.

- A palatability
- B fibre content
- C quantity
- D temperature

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 vitamin needed for the normal absorption of calcium and phosphorus from the gastrointestinal tract

2.2 A disease linked to a shortage of vitamin B₂ in the ration of chickens

2.3 The part of ingested food that consists of carbohydrates of plant origin and is poorly digested

2.4 A substance in green plants that can be utilised to synthesise vitamin A

2.5 The part of an animal feed that includes all the constituents except water

5 × 2 (10)

3. Match the disease conditions in column B with the vitamin deficiencies in column A.

Column A		Column B	
3.1	A	A	Wasting disease
3.2	B ₂	B	Stiff lamb disease
3.3	B ₁₂	C	Dermatitis in pigs
3.4	D	D	Xerophthalmia
3.5	E	E	Osteomalacia

5 × 2 (10)

Longer questions

4 The value of an animal feed can be determined by calculating the digestibility co-efficient. A cow ingested 15 kg of hay with a moisture content of 10% and excreted 4 kg dry material in the manure.

4.1 Calculate the digestibility co-efficient of the hay. Show ALL calculations. (6)

4.2 Define the term 'digestibility of a feed'. (2)

4.3 Explain how the crude fibre content influences the digestibility of a feed. (2)

4.4 By looking at the digestibility co-efficient calculated in question 4.1, determine whether this feed is a roughage or a concentrate. Supply reasons for your answer by briefly explaining the differences between these two types of feeds. (7)

4.5 Tabulate THREE animal factors as well as THREE feed factors that influence the digestibility of animal feeds. (6)

4.6 Name FIVE methods to improve the digestibility of animal feeds. (5)

Unit 3 Quality of feed

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 Fishmeal is rich in amino acids such as

- A methionine and glycine
- B methionine and lysine
- C lysine and glycine
- D lysine and valine

- 1.2 Essential amino acids are
- A those that cannot be produced by ruminants
 - B those that can be produced by non-ruminants
 - C those that are produced by animals such as pigs
 - D those that cannot be produced by non-ruminants
- 1.3 The building blocks of are amino acids.
- A vitamins
 - B carbohydrates
 - C proteins
 - D lipids
- 1.4 All protein sources are evaluated by comparing them with
- A incomplete proteins
 - B plant proteins
 - C ideal protein
 - D non-essential amino acids
- 1.5 Which ONE of the following protein sources is an incomplete protein?
- A soya beans
 - B milk protein
 - C chicken eggs
 - D fishmeal

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 process during which certain amino acids can be produced in the animal body
- 2.2 The theoretical highest biological value of any food source
- 2.3 A measure of the quality of the protein in an animal feed
- 2.4 Proteins that contain all the essential amino acids and have high BVs
- 2.5 A group of farm animals that can synthesise their own essential amino acids

5 × 2 (10)

Longer questions

3. The data in the following table relate to the biological values (BVs) of feedstuffs derived from animal and plant origin, which are provided for the nutrition of growing pigs.

Animal feed	Biological value (BV)
Fishmeal	90
Soya beans	80
Wheat	60
Groundnuts	75
Maize	50
Meat meal	100

- 3.1 Briefly explain what is meant by 'biological value (BV) of a protein'. (3)
- 3.2 The quality of the protein in a ration plays a less important role in a ration for ruminants than it does in the ration of non-ruminant farm animals. Justify this statement. (3)
- 3.3 Name the specific type of protein that is accepted as a comparative protein. (1)
- 3.4 Evaluate the suitability of fishmeal as a protein source by referring to the answers to 3.1–3.3. (3)
- 3.5 Explain why the BV of maize is so low in comparison with fishmeal. (3)
- 3.6 Draw a bar graph to compare the biological values of proteins for the different feedstuffs provided for the growing pigs, as indicated in the table. (8)

Memorandum

Unit 1

Short questions

1.1 D	1.2 A	1.3 C	1.4 C	1.5 A	(10)
2.1 Cobalt	2.2 Thyroid gland		2.3 Nitrogen		
2.4 Solubility	2.5 White muscle disease				(10)
3.1 D	3.2 E	3.3 A	3.4 B	3.5 C	(10)

Longer questions

- 4.1 Carbohydrates, lipids (fats and oils), proteins, vitamins (4)
- 4.2 Carbon (C) (1)
- 4.3 Minerals (1)
- 4.4 Minerals do not contain the chemical element carbon (C). (1)
- 4.5 Inorganic feed components:

Essential/Macro-minerals	Non-essential/Micro-minerals/Trace elements
Any two: <ul style="list-style-type: none">• Calcium (Ca)• Phosphorous (P)• Magnesium (Mg)• Sodium (Na)• Chlorine (Cl)• Potassium (K)• Sulphur (S)	Any two: <ul style="list-style-type: none">• Iron (Fe)• Iodine (I)• Zinc (Zn)• Selenium (Se)• Copper (Cu)• Cobalt (Co)

- 4.6 Glycogen (6)
- 4.7 Carbohydrates (1)
- 4.8 Fibre (1)
- 4.9 Differences between fats and oils: (1)

Fats	Oils
<ul style="list-style-type: none">• Animal origin• Saturated• Solid at room temperature	<ul style="list-style-type: none">• Plant origin• Unsaturated• Liquid at room temperature

- 4.10 A, D, E and K (6)

Unit 2

Short questions

1.1 B	1.2 C	1.3 D	1.4 C	1.5 A	(10)
2.1 Vitamin D/Calciferol	2.2 Curled toe paralysis	2.3 Crude fibre			
2.4 Carotene	2.5 Dry matter				(10)
3.1 D	3.2 C	3.3 A	3.4 E	3.5 B	(10)

Longer questions

4.1 Hay: Moisture content = 15 kg × 10% = 1,5 kg

Dry matter (DM) content = 15 kg – 1,5 kg = 13,5 kg

$$\begin{aligned}\text{Digestibility co-efficient} &= \frac{\text{DM intake (kg)} - \text{DM excreted (kg)}}{\text{DM intake (kg)}} \times 100 \\ &= \frac{13,5 \text{ kg} - 4 \text{ kg}}{13,5 \text{ kg}} \times 100 \\ &= \frac{9,5 \text{ kg}}{13,5 \text{ kg}} \times 100 \\ &= 70,37 = 70,4\%\end{aligned}\quad (6)$$

4.2 Digestibility is the quantity of feed absorbed by the animal's body./It is the proportion of feed digested and absorbed as it passes through the gastro-intestinal tract and that is available for maintenance, growth, production and reproduction. (2)

4.3 Crude fibre is not easily digestible. The more the crude fibre content, the more difficult it is to digest the feed/ the less digestible the feed becomes. (2)

4.4 It is a concentrate.

Concentrate	Roughage
<ul style="list-style-type: none">• High percentage of digestible nutrients• Less fibre• High digestibility co-efficient	<ul style="list-style-type: none">• Lower percentage of digestible nutrients• More fibre• Lower digestibility co-efficient

(7)

4.5 Factors influencing the digestibility of animal feeds

Animal factors	Feed factors
Any three: <ul style="list-style-type: none">• Age and body mass of animal• Type of animal• Type of digestive system• Characteristics of individual animals• Quantity of feed animal consumes• Palatability of feed (affects how readily feed is accepted)• Amount of water taken in by animal• Production and reproduction• Level of feeding (higher feed level reduces digestion rate)	Any three: <ul style="list-style-type: none">• Composition of feed• Composition of ration• Growth stage of plant• Preparation of feed• Palatability of ration• Feed additive• Water intake

(6)

4.6 Methods of improving digestibility of animal feeds:

- Grinding
- Pelleting
- Boiling
- Roasting
- Crushing
- Soaking

(5)

Unit 3

Short questions

1.1 B 1.2 D 1.3 C 1.4 C 1.5 A (10)

2.1 Transamination 2.2 100% or 100

2.3 Biological value (BV) 2.4 Complete proteins/Animal proteins

2.5 Ruminants (10)

Longer questions

3.1 Biological value (BV):

- An index or measure of the quality of the protein in a feed
- Gives an indication of the amino acids in the proteins
- The efficiency with which a protein supplies an animal's nitrogen/amino acid requirement (3)

3.2 Quality of proteins in ruminants and non-ruminants:

- Ruminants can synthesise their own protein from feed protein through micro-organisms in the reticulo-rumen.
- When the micro-organisms die, the amino acids are released and the protein becomes available for the ruminants.
- Non-ruminants cannot synthesise their own essential amino acids and these must therefore be made available in their feed. (3)

3.3 Egg protein/Albumin (1)

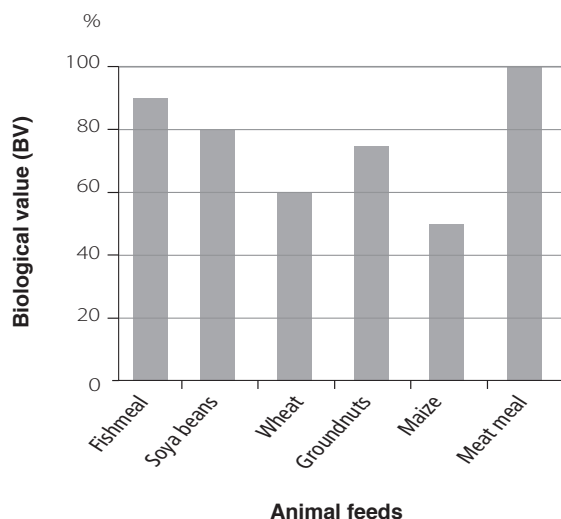
3.4 Suitability of fishmeal as a protein source:

- Fishmeal is an animal protein and has a higher biological value (BV) than plant proteins.
- The high BV (90%) of fishmeal indicates that it is a good-quality protein source.
- Animal proteins are complete proteins and contain all the essential and non-essential amino acids. (3)

3.5 BV of maize:

- Maize is a plant protein.
- The low BV of maize indicates that it is a protein of lower quality.
- Plant proteins are incomplete proteins that do not contain all the essential amino acids. (3)

3.6



(8)