



**FACULTY OF NATURAL RESOURCES MANAGEMENT AND
AGRICULTURE**

DEPARTMENT OF ANIMAL PRODUCTION AND HEALTH

BACHELOR OF SCIENCE HONORS DEGREE IN ANIMAL SCIENCE

ANIMAL FEED PRODUCTION (LAS 4201)

Semester 2, Examination

June 2026

Time Allowed : 3 hours
Special requirement : Calculator

Instructions to Candidates:

1. This paper consists of six questions, answer **ALL** questions in **Section A** and **ANY TWO** in **Section B**.
2. Marks for each question are shown in brackets. Where a question has subdivisions, the marks for each subdivision are given.
3. Illustrate your answer, where applicable, with large clearly labelled diagrams.

MARK ALLOCATION PER SECTION	MARKS
SECTION A	60
SECTION B	40
TOTAL ATTAINABLE MARKS	100

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SECTION A: ANSWER ALL QUESTIONS IN THIS SECTION

QUESTION 1

a) Give two examples under each of the following categories of animal feedstuffs:

(i) Forage feeds. [2]

(ii) Concentrate feeds. [2]

(iii) By-product feeds. [2]

(iv) Industrial feed products. [2]

b) Explain the role of roughages and concentrates in the diets of livestock and how they influence rumen function and milk production in dairy cows. [8]

QUESTION 2

a) Mineral and vitamin deficiencies are common in livestock production. Discuss four major mineral deficiencies and two vitamin deficiencies, highlighting their clinical signs and effects on productivity in monogastric livestock. [12]

b) Explain the management strategies to prevent or correct the deficiencies mentioned in 2(a) above within a commercial livestock feeding program. [6]

QUESTION 3

You are tasked with formulating a starter ration for weaner beef cattle with an average weight of 150 kg, using the following ingredients: The ration must include molasses at 5% and soybean meal at 15% of the total formulation.

Ingredient	% CP	ME (MJ/kg DM)
Maize meal	8	13
Soybean meal	40	12
Wheat bran	15	10
Molasses	5	12

a) Calculate a 2-tonne ration containing 18% CP. Show all workings and the percentage inclusion of each ingredient. [12]

- b) Calculate the Dry Matter Metabolisable Energy content of the ration you formulated in 3 a) above. [4]
- c) Describe how you would process the ingredients to produce a uniform ration suitable for feedlot consumption. [4]
- d) Outline three nutritional or metabolic disorders associated with poor feed formulation and explain their causes. [6]

SECTION B: ANSWER ANY TWO QUESTIONS IN THIS SECTION

QUESTION 4

- a) Discuss the factors influencing the energy requirements of livestock, highlighting differences between maintenance, growth, and lactation. [10]
- b) Explain why nutrient partitioning affects feed formulation strategies in high-producing dairy cows versus finishing beef cattle. [10]

QUESTION 5

- a) Describe how mechanical, thermal, and chemical feed processing techniques impact the nutrient availability and digestibility of feedstuffs for ruminants. [12]
- b) Discuss two antinutritional factors commonly found in monogastric livestock feedstuffs, their effects on animal performance, and suggest practical strategies for minimising their impacts. [8]

QUESTION 6

- a) Feed additives are widely used in animal production. Discuss four types of feed additives, outlining their functions and benefits in livestock production. [12]
- b) Describe the challenges and ethical considerations associated with using genetically modified feedstuffs and bioengineered feed additives in livestock production. [8]