FACULTY OF LIFE SCIENCES

DEPARTMENT OF ANIMAL SCIENCES

BACHELOR OF SCIENCE HONOURS DEGREE IN ANIMAL SCIENCE

Animal Breeding and Genetics 1 (LAS 2101)

SEMESTER 1 EXAMINATION

February 2022

Time Allowed:	**3 hours**
Total Marks:	**100**
Special Requirements:	**Calculator**
Examiner's Name:	**K. Mafunga**

Instructions to Candidates:

1. *The 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

QUESTION	MARKS
SECTION A	**60**
SECTION B	**40**
TOTAL ATTAINABLE MARKS	**100**

This paper consists of three printed pages including this one.

SECTION A: ANSWER ALL QUESTIONS IN THIS SECTION

Question 1

a. Define the following terms:

i. Hybrid vigor **[1 mark]**

ii. Linkage disequilibrium **[1 mark]**

iii. Repeatability **[1 mark]**

iv. Backcross **[1 mark]**

v. Selection index. **[1 mark]**

b. A sire's four locus genotype is **NnQqRRTt** and a dam's genotype is **NNQqRRTt**.

Considering these four loci, how many unique gametes can:

i. The sire produce? **[3 marks]**

ii. The dam produce? **[3 marks]**

iii. How many unique zygotes can be produced from the mating of the sire and dam? **[4 marks]**

c. State five advantages of heat synchronization in livestock production. **[5 marks]**

Question 2

a. Outline three ways animal breeders can employ to improve on estimates of heritability. **[6 marks]**

b. What are the uses of estimates of the following correlations:

i. Phenotypic correlations **[2 marks]**

ii. Genetic correlations **[2 marks]**

iii. Environmental correlations? **[2 marks]**

c. Write short notes on variance components. **[8 marks]**

Question 3

a. Explain why the use of genetic markers in animal breeding is becoming popular. **[6 marks]**

b. Indicate the major differences between qualitative and quantitative traits. **[4 marks]**

c. A study carried out in an African country reported that on average 6 out of 160 goats suffer from clubfoot, a genetic disease caused by a recessive allele (**f**) and affected goats have some difficulty in walking.

i. Calculate the frequency of the recessive allele and the dominant allele in the goat population in that country. **[4 marks]**

ii. What percentage of the goat population would be expected to be phenotypically normal but carry the clubfoot allele? **[6 marks]**

SECTION B. ANSWER ANY TWO QUESTIONS IN THIS SECTION

Question 4

Outline the **benefits** and **dangers** of:

i. Continuously mating closely-related animals **[10 marks]**

ii. Crossbreeding. **[10 marks]**

Question 5

a. Describe in detail the forces that influence genetic diversity. **[8 marks]**

b. Discus the importance of maintaining genetic diversity. **[12 marks]**

Question 6

Write short notes on the following, giving examples where feasible:

i. Co-dominance **[5 marks]**

ii. Sex-influenced inheritance **[5 marks]**

iii. Sex limited inheritance **[5 marks]**

iv. Incomplete dominance. [**5 marks**]

END OF QUESTION PAPER