



1ST SEM. 2005/2006

UNIVERSITY OF SWAZILAND

FINAL EXAMINATION PAPER

**PROGRAMME: B. Sc. AGRICULTURE YEAR IV,
APH OPTION**

COURSE CODE: APH 402

TITLE OF PAPER: LIVESTOCK BREEDING

TIME ALLOWED: TWO (2) HOURS

INSTRUCTIONS: ANSWER ANY 5 QUESTIONS.

**THIS PAPER MAY NOT BE OPENED UNTIL THE CHIEF
INVIGILATOR HAS GRANTED PERMISSION.**

QUESTION 1

Write short notes on the FIVE forces that affect stability of gene frequencies.

(20 Marks)

QUESTION 2

i. A new pig breeder, Mr. Motsa, has a herd of 30 pigs in which the frequency of the gene for swirls (abnormal hair) is 0.5. Assume one pair of genes controls swirls and the gene for normal hair is completely dominant to the gene for swirls. Mr. Motsa buys 10 breeding pigs with normal hair, selected at random, from a herd with a gene frequency of 0.1.

a. What is the frequency of the gene for swirls in the expanded herd? **(4 Marks)**

b. What is the difference in gene frequencies in the herd before and after the purchase of the breeding pigs?

(4 Marks)

c. What force is Mr. Motsa using to reduce the amount of swirls in his herd? **(2 Marks)**

ii. Explain the Hardy-Weinberg Law and outline its significance in livestock breeding. **(10 Marks)**

QUESTION 3

i. Derive the mathematical formula, which explains the effect of migration on allelic frequencies of a population. Highlight and discuss the two components of the formula that affect magnitude of change in allelic frequency. **(10 Marks)**

ii. Write short notes on response to selection. **(10 Marks)**

QUESTION 4

i. Albinism occurs with a frequency of 1×10^{-5} in a population of African-Americans. Assuming albinism to be due to a single autosomal recessive gene, and assuming the population to be in Hardy-Weinberg equilibrium:

a. What is the frequency of the albinism allele? **(4 Marks)**

b. What is the expected Hardy-Weinberg ratio of carriers to those affected?

(6 Marks)

- ii. Distinguish between the following:
 - a. Heritability and repeatability
 - b. Quantitative and qualitative traits

(10 Marks)

QUESTION 5

Write short notes on:

- a) Tandem selection.
- b) Selection differential.

(7 marks)

(13 marks)

QUESTION 6

- a). Explain recombinant DNA (rDNA) technology.
- b) Briefly discuss the potential benefits and risks of rDNA technology in livestock breeding.

(5 Marks)

(15 Marks)