



UNIVERSITY OF ESWATINI

1ST SEM, 2020/2021

FINAL EXAMINATION PAPER

**PROGRAMMES: BSc. ANIMAL SCIENCE YEAR 4
BSc ANIMAL SCIENCE (DAIRY OPTION) YEAR 4**

COURSE CODE: ASC405

TITLE OF PAPER: ANIMAL BREEDING

TIME ALLOWED: TWO (2) HOURS

INSTRUCTIONS: ANSWER ANY FOUR QUESTIONS

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GRANTED BY THE CHIEF INVIGILATOR**

QUESTION 1

- (a) Define, explain the characteristics of quantitative traits and present any two examples of such traits for a livestock species of your choice (9 Marks)
- (b) Present the phenotypic expression model for quantitative traits and completely decompose it into its constituents. (16 Marks)

QUESTION 2

- (a) Using the appropriate formulae, explain what you understand by the following terms:
- i. Heritability in the broad sense (3 Marks)
 - ii. Heritability in the narrow sense (3 Marks)
- (b) What are the properties of the narrow sense heritability estimate? (5 marks)
- (c) In terms of genetic improvement of livestock for traits of economic importance, what are the implications of
- i. Low heritability? (5 Marks)
 - ii. High heritability? (5 Marks)
- (d) Outline the importance of heritability in livestock improvement (4 Marks)

QUESTION 3

- (a) Explain what you understand by each of the following measures of genetic value in cattle:
- i. Predicted/estimated breeding value (2 Marks)
 - ii. Estimated transmitting ability (2 Marks)
 - iii. Producing ability (3 Marks)
 - iv. Predicted differences (2 Marks)
 - v. Estimated progeny differences (2 Marks)
- (b) You are given the following information obtained from a dairy cattle herd in Eswatini:
- i. A cow, XX, in this herd has a 305-day lactation milk yield of 9 300 kg. The 305-day lactation average for all cows this herd average 9 600 kg, additive genetic variance of 650 kg and phenotypic variance of 1 710 kg. Estimate the breeding value for cow XX. (8 Marks)
 - ii. Given that yearling weight of a heifer in this herd is 320 kg with a mean of 250kg, predict and **interpret** her breeding value for yearling weight and its accuracy if the heritability of yearling weight is 0.45 (6 Marks)

QUESTION 4

- (a) Marker assisted selection is increasingly being used in animal breeding globally.
- i. What are molecular markers? (2 Marks)

- ii. How do molecular markers differ from each other? (3 Marks)
- iii. What is marker assisted selection? (2 Marks)

- (b) Describe each of the following markers
- i. Restriction Fragment Length Polymorphisms (RFLP) (2 Marks)
 - ii. Random Amplified Polymorphic DNA (RAPDs) (2 Marks)
 - iii. Amplified Fragment Length polymorphisms (AFLPs) (2 Marks)
 - iv. Single Nucleotide Polymorphisms (SNPs) (2 Marks)
 - v. Simple Sequence Repeats (SSR) (2 Marks)

- (c) Using appropriate examples, outline the class of traits that are best improved through marker assisted selection. (8 Marks)

QUESTION 5

Using appropriate examples, outline the advantages and disadvantages of each of the following mating systems: -

- i. Crossbreeding; (5 Marks)
- ii. Inbreeding; (5 Marks)
- i. Two-breed terminal single cross (5 Marks)
- ii. Two-breed terminal backcross (5 Marks)
- iii. Three breed terminal cross breeding system (5 Marks)