



1ST SEM. 2019/2020

**UNIVERSITY OF ESWATINI
FINAL EXAMINATION PAPER**

**PROGRAMME: BSc ANIMAL SCIENCE
BSc ANIMAL SCIENCE (DAIRY OPTION)**

COURSE CODE: ASC 405

TITLE OF PAPER: ANIMAL BREEDING

TIME ALLOWED: TWO (2) HOURS

INSTRUCTIONS: ANSWER ANY FOUR (4) QUESTIONS

**DO NOT OPEN THIS PAPER UNTIL PERMISSION HAS BEEN GRANTED BY THE
CHIEF INVIGILATOR**

Question 1



- (a) Draw the pedigree into an arrow diagram. (5 Marks)
- (b) What is the most important practical use of relationships in animal breeding? (3 Marks)
- (c) Of the two broad types of relationships in animals, state and define clearly the type of relationship that exist between I and S (3 Marks)
- (d) Why does an inbred animal produce descendants that are more closely related to him and to each other than they would be if it was a non-inbred? (3 Marks)
- (e) Calculate the relationship coefficient (R_{zj}) between Z and J (11 Marks)

Question 2

- (a) State the Hardy_Weinberg law. (2 Marks)
- (b) Dr. Gophie Ester Chiedza carried out a study on albumin types of goats. She found out that there were two types of albumin, one migrated fast and the other slowly on agarose gel. She reported her study on 106 goat serum samples. FF were homozygous for fast albumin allele, SS, homozygous for slow albumin allele and FS were heterozygous at the albumin locus.
- (i) Calculate the allelic frequencies (2 Marks)
- (ii) Using the Chi-square table at the back, perform fully, a Chi square test for goodness of fit to find whether the population of goats is at equilibrium

- at the albumin locus using 99% confidence level. **Page 3 of 4**
(8 Marks)
- (c) In the past animal breeding objectives were simpler yet they have become complex. Discuss this statement in detail. **(3 Marks)**
- (d) You are tasked to collect avian blood using FTA data basing paper for DNA analysis. Discuss in detail the procedure and state the five important precautions to consider. **(10 Marks)**

Question 3

- (a) The mean weaning weight for a Brahman bull of 250kg is crossed with an Angus with mean weaning weight of 230kg to produce a crossbred with a mean weaning weight of 260kg.
- i. What is the breed name for the cross? **(1 Mark)**
 - ii. The named crossbred will exhibit heterosis. Define what heterosis is and state the two theories underlying heterosis. **(4 Marks)**
 - iii. State the formula for calculating heterosis and calculate heterosis in the crossbred named in (i) **(5 Marks)**
- (b) After graduating in 2020 you are employed at UNESWA (a category A government parastatal) as a beef manager. You are tasked to re-establish the beef herd to produce quality beef for export in a 1000 ha farm. You are given as a grant an outside farm herd of mixed (bulls and cows) Bonsmara, Brahman, Nguni and Jersey breeds, only once (at the inception or start) and never will you be allowed to buy outside stock. Use only 2 breeds and state how you will lead the breeding program in the farm for the next 9 years to produce quality beef for export. Ignore knowledge on animal welfare, nutrition and health in the discussion. **(12 Marks)**
- (c) Give two reasons why beef producers would consider crossbreeding rather than traditional straight breeding programs in their operations **(3 Marks)**

Question 4

- (a) Progeny testing for recessive genes is important to select best breeders. Discuss in detail the mating of male to his daughters as a progeny test for recessive genes. **(9 Marks)**
- (b) Suggest two reasons that might make offsprings of a group of selected parents have lower phenotypic average than the parent's average. **(4 Marks)**
- (c) Livestock selection is very important in animal breeding, state the primary goal for selecting livestock. **(3 Marks)**
- (d) As the number of generations of selection increase, the rate of genetic progress declines dramatically, why? **(3 Marks)**
- (e) Discuss briefly, the main public concerns on animal genetic engineering **(6 Marks)**

Question 5

Table 1 below presents 205 day lactation records from Mahhelane dairy farm.

Copy and complete table 1 into your answer book, then answer the question below it.

Table 1: Lactation records from Mahhelane dairy farm

Cow ear Tag	205 day yield (kg)	EBV
220	2800	
320	2755	
340	3300	
390	1800	
401	3000	
411	2005	
412	1800	
413	3000	
414	2550	
416	1650	

- (a) Calculate the EBV for each animal in the herd and write it in the empty space. The working must be clearly shown. **(5 Marks)**
- (b) Select 6 best cows for breeding in the next season and list their ID's. **(3 Marks)**
- (c) Calculate the selection differential and selection response if heritability (h^2) for 205 day lactation yield is 0.35. **(5 Marks)**
- (d) What is the expected mean 205 day yield of progeny from the selected parental animals? **(2 Marks)**
- (e) State and discuss in detail the selection method used in (b) **(6 Marks)**
- (f) Differentiate narrow sense (h^2) from broad sense heritability (H^2) **(4 Marks)**

DF	$\alpha=0.10$	$\alpha=0.05$	$\alpha=0.025$	$\alpha=0.010$	$\alpha=0.005$
1	2.70554	3.84146	5.02389	6.63490	7.87944
2	4.60517	5.99147	7.37776	9.21034	10.5966
3	6.25139	7.81473	9.34840	11.3449	12.8381
4	7.77944	9.48773	11.1433	13.2767	14.8602
5	9.23635	11.0705	12.8325	15.0863	16.7496
6	10.6446	12.5916	14.4494	16.8119	18.5476
7	12.0170	14.0671	16.0128	18.4753	20.2777
8	13.3616	15.5073	17.5346	20.0902	21.9550
9	14.6837	16.9190	19.0228	21.6660	23.5893
10	15.9871	18.3070	20.4831	23.2093	25.1882