

**1<sup>ST</sup> SEM. 2019/2020**

**UNIVERSITY OF ESWATINI  
RE-SIT EXAMINATION PAPER**

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

**COURSE CODE:   ASC 405**

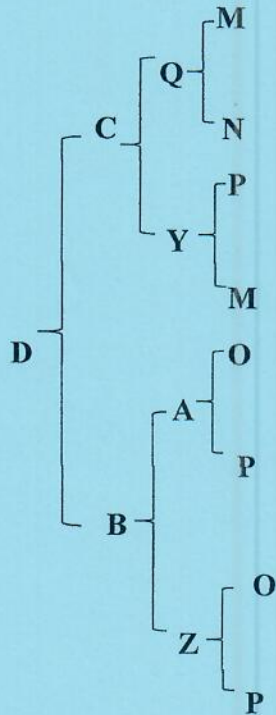
**TITLE OF PAPER: ANIMAL BREEDING**

**TIME ALLOWED: TWO (2) HOURS**

**INSTRUCTIONS:  ANSWER ANY FOUR 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. **(3 Marks)**
- (b) Define relationship coefficient **(3 Marks)**
- (c) Define inbreeding coefficient of an animal and compute the inbreeding coefficient of animal D **(7 Marks)**
- (d) Differentiate with clear examples between direct and common ancestry **(4 Marks)**
- (e) Why do animals sharing the same sire and dam show differences in their phenotype yet they both obtain genes from the same parents? **(4 marks)**
- (f) Define migration as used in modern animal breeding **(2 Marks)**
- (g) State the two basic tools that can be used in the genetic improvement of animals in the farms **(2 Mark)**

**QUESTION 2**

- (a) Define animal breeding and state its benefits **(10 Marks)**
- (b) List the methods commonly used for estimating heritability **(2 Marks)**
- (c) State when is the use of relative's records crucial in animal breeding **(3 Marks)**
- (d) State two key requisites for a migration event to have any genetic impact **(2 Marks)**

- (e) Differentiate between adaptive value and estimated breeding value. (4 Marks)
- (f) **A herd of 200 cows has allele frequency of "F"=0.20 and "f"=0.80 at the low fat locus. At the same locus, a herd of 50 cows imported into the herd has a gene frequency of F=0.50 and f=0.50.**
- (i) What is the change in "F" after the migration event? (2 Marks)
- (ii) What are the new allele frequencies after the migration event? (2 Marks)

### QUESTION 3

Assume in 2030 you are a senior animal breeder and tasked with leading a team of scientists to study the population of "Nguni" an indigenous chicken in the Lowveld region of Eswatini. The feather colour of the chickens vary from Red (dominant) to white (recessive). Assume the population is in Hardy-Weinberg equilibrium. You observed 336 red chickens and 64 white during your study.

- (a) Calculate the allelic frequencies (3 Marks)
- (b) Of the observed chickens, how many are heterozygous? (2 Marks)

You make another trip to the Lowveld and at this time you observe 650 animals.

- (c) How many of the 650 animals would you expect to be red, assuming the population is still in Hardy-Weinberg equilibrium? (3 Marks)
- (d) How many of these red animals are homozygous for the dominant allele? (1 Mark)
- (e) How many of these 650 chickens would you expect to be white, Assuming the population is still in Hardy-Weinberg equilibrium? (1 Mark)
- (f) As you observe the animals you count 200 white chickens and 450 red. Ensuring you use a clearly labelled table or equation by first stating both hypotheses, conduct a chi-square test to determine if your final observations are significantly different from what you expect at the 99% confidence level (8 Marks)
- (g) Is this population evolving or not? (1 Mark)
- (h) Define backcrossing (2 Marks)
- (i) Why is it not a good idea to backcross (2 Marks)
- (j) State the major disadvantage of using independent culling levels. (2 Marks)

### QUESTION 4

- (a) Using two autosomal genes inherited in a codominant fashion, illustrate the effect of any mating system on genotypic frequencies on the first and second generations. (7 Marks)
- (b) It is important to accurately describe important phenotypic features of

selected species to ensure strengthening the capacity of African countries to the conservation and sustainable utilization of African Animal Genetic Resources (AnGR). Briefly describe the following coat patterns in cattle

- i. Brindled (2 Marks)
  - ii. Dappled (2 Marks)
  - iii. Roan. (2 Marks)
- (c) State the three sources where an animal's EBV can be obtained. (3 Marks)
- (d) Define repeatability (2 Marks)
- (e) Knowledge on population diversity is very important. State the three spheres on where this knowledge can be used. (3 Marks)
- (f) Distinguish between qualitative and quantitative traits in livestock giving one examples of each. (4 Marks)

#### QUESTION 5

- (a) Tandem selection is one of the multi trait improvement methods of selection. Discuss in detail this selection method, giving examples, advantages and Disadvantages (10 Marks)
- (b) Body condition scoring (BCS) is very important before mating dairy animals. Describe BCS 3 in Friesian Holstein dairy cows. (6 Marks)
- (c) During blood collection using EDTA tubes, there are three important considerations. State them. (3 Marks)
- (d) Differentiate between breeding value and estimated breeding value (4 Marks)
- (e) Why is it not possible to establish the true breeding value of an animal? (2 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