



UNIVERSITY OF ESWATINI

1ST SEM, 2020/2021

RE-SIT EXAMINATION PAPER

PROGRAMMES: BSc. ANIMAL SCIENCE YEAR 4 AND 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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QUESTION 1

- (a) Outline the problems associated with selecting animals on the basis of its:
 - i. Phenotype (5 Marks)
 - ii. Composite genetic value (5 Marks)

- (b) Given that the herd average 305-day lactation yield of milk is 8 500 kg. If a cow in this herd produces 5 900 kg of milk per lactation and assuming heritability for milk yield of 0.35:
 - i. Calculate and interpret the breeding value for the animal for milk yield. (5 Marks)
 - ii. Calculate and interpret the accuracy of prediction of this breeding value (3 Marks)
 - iii. What are the implications of the accuracy value calculated in (b)ii above. (2 Marks)

QUESTION 2

- (a) Using appropriate illustrations and examples, distinguish between directional selection and stabilising selection in livestock (9 Marks)

- (b) Describe how each of the following factors influence the annual response to selection (genetic gain per year) in livestock:
 - i. Generation interval (2 Marks)
 - ii. Heritability estimate (2 Marks)
 - iii. Selection intensity (2 Marks)
 - iv. Phenotypic standard deviation (2 Marks)

- (c) Critically compare progeny testing and performance testing in terms of appropriateness for use in dairy cattle breeding (8 Marks)

QUESTION 3

- (a) Stepwise selection is adopted at the initial stages of setting-up a breeding programme. In such instances, the process starts right from selecting animals from an unrecorded population. Outline the stages involved in this stepwise selection. (13 Marks)

- (b) Future dams are selected in a population of dairy cows on the basis of their

own milk yield. The population mean yield is 5 500 kg of milk and 60% of the cows need to be selected. The phenotypic standard deviation is 500kg and the heritability 0.25. The average age of the cows when the next generation of breeding animals are born is 4.5 years. Given that the selection intensity is 0.644, calculate: -

- i. The mean milk yield for the selected group (6 Marks)
- ii. Annual selection effect (genetic gain) achieved by this selection and its interpretation. (6 Marks)

QUESTION 4

- (a) Using an appropriate illustration, describe the various components of a breeding programme. (20 Marks)
- (b) What have been the impediments to the implementation of livestock breeding programmes among smallholder communities in Eswatini? (5 Marks)

QUESTION 5

- (a) Marker Assisted Selection (MAS) begins with locating genetic markers associated with the genes of interest and then carrying out either MAS or genomic selection (GS). The success of MAS depends on the extent of the relationship between the marker and the genes of interest. Describe the relationship between these and the implications on selection when there is:
 - i. Linkage disequilibrium (4 Marks)
 - ii. Linkage equilibrium (4 Marks)
 - iii. Direct markers (4 Marks)
- (b) Outline the relative advantages of MAS and GS over traditional selection using quantitative genetics. (8 Marks)
- (c) Describe the necessary requirements for successful application of MAS. (5 Marks)