



MACHAKOS UNIVERSITY

University Examinations for 2020/2021 Academic Year

SCHOOL OF AGRICULTURAL SCIENCES

DEPARTMENT OF AGRICULTURAL EDUCATION AND EXTENSION

SECOND YEAR SPECIAL/ SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF SCIENCE IN AGRICULTURAL EDUCATION AND EXTENSION

ANS 241: QUANTITATIVE GENETICS AND ANIMAL BREEDING

DATE: 22/3/2021

TIME: 8.30-10.30 AM

INSTRUCTIONS:

Answer Question One and any two questions

QUESTION ONE (30 MARKS)

- a) Distinguish between
 - i. Homozygote and heterozygote individuals for a particular trait (2 marks)
 - ii. Dominant alleles and recessive alleles (2 marks)
- b) Explain **TWO** possible outcomes of mating a donkey and a horse (4 marks)
- c) The Kenya Agriculture and Livestock Research Organization have developed the 'improved *Kienyeji*' chicken breed which is a heavier meat breed. However, hens of this breed do not sit on their eggs. Explain **ONE** reason for this (2 marks)
- d) Explain **TWO** reasons why artificial insemination may not be a choice breeding method for cattle among pastoralists in semi-arid areas in Kenya (4 marks)
- e) A dairy farmer in Nyeri wants to purchase replacement heifers from Brook House dairy farm. List **FOUR** sources of information he will enquire of to get suitable heifers (4 marks)
- f) Explain the meaning of the following terminologies
 - i. Mutation (2 marks)
 - ii. Population (2 marks)
- g) Explain **TWO** causes of resemblance among littermates in a Swine family (4 marks)
- h) Explain **TWO** reasons why Cryopreservation is important in animal breeding (4 marks)

QUESTION TWO (20 MARKS)

- a) Explain **FIVE** factors that may influence gene and genotypic frequencies of particular traits in a population (10 marks)
- b) Dairy farmers in west Pokot want to improve their dairy herds but cannot afford quality bulls for breeding. Explain **FIVE** reasons why artificial insemination will be the best option for them to adopt (10 marks)

QUESTION THREE (20 MARKS)

- a) Explain **FOUR** situations where the offspring or progeny can be used as a basis for selecting parents in a cross-breeding programme (8 marks)
- b) Explain **SIX** advantages of cross breeding (12 marks)

QUESTION FOUR (20 MARKS)

- a) Explain **FIVE** constraints facing livestock breeding programs in Kenya (10 marks)
- b) Explain **FIVE** biotechnological options that can be used to improve animal breeds in the dairy sector of Kenya (10 marks)

QUESTION FIVE (20 MARKS)

- a) The data below presents weaning weights for 10 calves.

Calf	1	2	3	4	5	6	7	8	9	10
Weaning weight (kg)	204	183	193	189	173	191	208	203	198	200

- i. Calculate the mean weaning weight of the calves (2 marks)
- ii. Calculate the variance in weaning weights for the calves (4 marks)
- iii. If heritability (h^2) estimates for weaning weights trait in beef calves is 0.25. Calculate the variance that is due to additive gene action (4 marks)
- b) Explain **FIVE** advantages of the Guernsey breed of dairy cattle (10 marks)