MACHAKOS UNIVERSITY

University Examinations for 2020/2021 Academic Year

SCHOOL OF AGRICULTURE AND NATURAL RESOURCES MANAGEMENT

DEPARTMENT OF AGRICULTURAL EDUCATION AND EXTENSION

FIRST SEMESTER EXAMINATION FOR BACHELOR IN AGRICULTURAL EDUCATION AND EXTENSION

ANS 241: QUANTITATIVE GENETICS AND ANIMAL BREEDING

Date: **Time:**

Instructions QUESTION ONE and any two questions in section B

QUESTION ONE

a) Distinguish between
   i.   Homozygote and heterozygote individuals for a particular trait **(2 marks)**
   ii.   Dominant alleles and recessive alleles **(2marks)**

b) Explain **TWO** possible outcomes of mating a donkey and a horse **(4mks)**

c) The Kenya Agriculture and Livestock Research Organisation 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 **(2marks)**

d) Explain **TWO** reasons why artificial insemination may not be a choice breeding method for cattle among pastoralists in semi-arid areas in Kenya **(4marks)**

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 **2mks**
   ii.   Population **(2mks)**

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 **(4mks)**

SECTION B.
Answer any TWO questions

QUESTION TWO
a) Explain **FIVE** factors that may influence gene and genotypic frequencies of particular traits in a population **(10mks)**

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 **(10mks)**

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

QUESTION FOUR
   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 **(10mks)**

QUESTION FIVE
   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   **(2mks)**

   ii.   Calculate the variance in weaning weights for the calves   (**4mks**)
   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   (**4mks**)

   a) Explain **FIVE** advantages of the Guernsey breed of dairy cattle **(10 marks)**