Uganda Martyrs University

Faculty of Agriculture

B. Agriculture II, Semester II Final Assessment: 2015/2016

Course Unit: ARE 2204 Animal Breeding and Genetics

Time: 09:30 am – 12:30 pm Date: Thursday 05th May 2016

Instructions:

i. Answer any Four questions
ii. Do not write anything on a question paper
iii. Time: Three hours

1a. After your studies at UMU, you are approached by your sub county operation wealth creation coordinator to design a goat breeding program for goat farmers in the sub county. As an animal breeder, explain the steps you would undertake to design this goat breeding program (7 marks)

1b. Differentiate between phenotypic and genetic correlation (4 marks)

1c. Distinguish the terms, heritability and repeatability as related to livestock breeding (4 marks)

1d. Grey color is recessive to white in goats. A group of 500 kids that resulted from random mating has 25 grey kids.

a. What is the estimated frequency of the grey gene? (3 marks)
b. What percent of the white kids are heterozygous? (2 marks)
c. What percent of the parent herd is heterozygous? (2 marks)
d. If you selected randomly 2 does, what is the probability both are WW? (3 marks)

2a. Define the term selection as related to animal breeding (4 marks)

2b. Discuss the factors that affect the rate of improvement of traits achieved by selection (9 marks)

2c. Examine the methods used in multiple trait selection of livestock improvement (9 marks)

2d. What is meant by the term indirect selection? (3 marks)

3a. Crossbreeding, considering either terminal or rotational crossing, synthetic breed creation or breed replacement, is often promoted as an efficient strategy to increase farmers' income through the improvement of productivity of local livestock in developing countries. Explain the term cross breeding. (5 marks)

3b. Discuss the merits and weakness of various breeding strategies used in cross breeding (10 marks)

3c. State the traits you would consider in genetic improvement of meat production (output) from cattle (5 marks)

3d. Contrast qualitative and quantitative traits in livestock genetics (5 marks)

4a. Performance recording is a necessary pre-requisite to effective decision making on breeding policy. Describe factors that must be met in the tropics for performance to be effective (8 marks)

4b. Explain reason(s) why performance recording in beef cattle is not well developed like in dairy cattle (2 marks)

4c. State five production traits that should be recorded in beef production (10 marks)

5. A farmer wishes to increase 90 day weight in sheep. Flock mean is 40 kg. The heritability is 0.35. The standard deviation is 5 pounds. The farm uses the ram for only one year (when they are one year old) and he keeps ewes for an average of 4 lambing (beginning when they are one year old). The farmer selects 15% of the ewe lambs and 3% of the ram lambs as replacements

a. What is the average selection differential in standard deviation units? (5 marks)

b. What is the average selection differential in actual units? (4 marks)

c. What is the average generation interval? (4 marks)

d. What proportion of the variation is due to additive gene effects? (4 marks)

e. What is the response per generation? (4 marks)

f. What is the response per year? (4 marks)

6. Explain the following terms as related to population genetics

a. Epistasis (5 marks)

b. Partial dominance (5 marks)

c. Over dominance (5 marks)

6d. Briefly explain 5 causes of genetic erosion in domestic animal (10 marks)

7a. Distinguish population genetics and molecular genetics (5 marks)

7b. Write short notes on the following terms related to population genetics

i. Gene frequency (4 marks)

ii. Genotypic frequency (4 marks)

iii. Phenotypic frequency (4 marks)

iv. Hardy Weinberg Equilibrium (4 marks)

7c. State four forces that change gene frequency (4 marks)

8a. Write short notes on the following terms

i. Transgenic animals (5 marks)

ii. Multiple ovulation and embryo transfer (5 marks)

iii. Cloning (5 marks)

iv. Quantitative trait loci (5 marks)

8b. Why are genetically modified organisms in livestock not developed so fast like genetically modified organisms in crops? (5 marks)