2ND SEM. 2008/2009

UNIVERSITY OF SWAZILAND

FINAL EXAMINATION PAPER

PROGRAMME: B. Sc. ANIMAL SCIENCE II

COURSE CODE: APH 202

TITLE OF PAPER: ANIMAL BREEDING

TIME ALLOWED: TWO (2) HOURS

INSTRUCTIONS: ANSWER ANY 4 QUESTIONS.

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QUESTION 1

a. The following variances were calculated for two traits in a herd of pigs.

Trait	V_P	V_G	V_A
Back fat	30.6	12.2	8.44
Body length	52.4	26.4	11.7

i. Calculate broad-sense and narrow-sense heritabilities for each trait in this herd. **(5 Marks)**

ii. Which of the two traits will respond best to selection by a breeder? Why? **(5 Marks)**

b. About 7 per cent of men are colour-blind in consequence of a sex-linked recessive gene. Assuming Hardy-Weinberg equilibrium, what proportion of women are expected to be:

i. Carriers? **(3 Marks)**

ii. Colour-blind? **(3 Marks)**

iii. In what proportion of marriages are both husband and wife expected to be colour-blind? **(4 Marks)**

c. In a population of 100 Shorthorn cattle there are 30 red and 28 roan cattle, while the rest have white coat colour. Using symbols of your choice to denote alleles that control coat colour in Shorthorn cattle, calculate the allelic frequencies in this population. **(5 Marks)**

QUESTION 2

a. Mean milk yield in a certain dairy cattle population is 9 kg/day. Heifers selected to be dams for the next generation have mean milk yield of 12 kg/day, and the young bulls selected through a progeny testing program to be sires have a mean milk yield of 25 kg/day. If heritability of milk yield is 35%, and the generation interval in this population is 7 years. What is the rate of genetic gain per year? **(5 Marks)**

b. Discuss ways in which a breeder can improve the rate of genetic gain in his breeding program. **(15 Marks)**

c. Three allelic variants A, B, and C, of the red blood cell acid phosphatase enzyme were found in a sample of 178 people. All genotypes are distinguishable by electrophoresis, and the frequencies in the sample were:

Genotype	**AA**	**AB**	**BB**	**AC**	**BC**	**CC**
Frequency (%)	9.6	48.3	34.3	2.8	5.0	0.0

i. What are the gene frequencies in the sample? **(3 Marks)**

ii. Why were no CC individuals found? **(2 Marks)**

QUESTION 3

a. Explain the possible effects of inbreeding on genetic and phenotypic properties of a population. Outline any benefits to livestock improvement that can be realised from inbreeding mating strategies. **(15 Marks)**

b. With the aid of appropriate examples, explain the following selection methods:

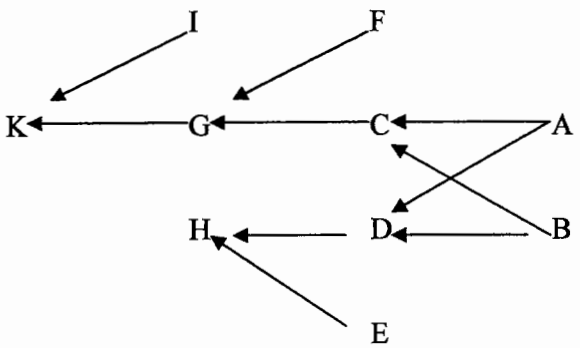
i. Independent culling method

ii. Index selection (total score) method **(10 Marks)**

QUESTION 4

a. Distinguish between positive assortative mating and negative assortative mating and discuss how these two mating systems affect the stability of gene and genotype frequencies of populations. **(10 Marks)**

b. The figure below shows common relationships among animals A – K using arrow pedigrees.



Calculate the additive genetic relationships between the following animals:

i. C and D

ii. A and G

iii. A and K

iv. C and H

v. G and H **(10 Marks)**

c. With the aid of appropriate examples, define and distinguish between line crossing and line breeding. **(5 Marks)**

QUESTION 5

Discuss the use of individual performance and sib performance as sources of information for selection in livestock improvement programs. **(25 Marks)**