
2ND SEM. 2007/2008

# UNIVERSITY OF SWAZILAND

## SUPPLEMENTARY 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.

**THIS PAPER MAY NOT BE OPENED UNTIL THE CHIEF INVIGILATOR HAS GRANTED PERMISSION.**

## QUESTION 1

a) Achondroplasia is a disorder in cattle in which calves are born with all 4 limbs amputated near the elbow and hock joints. The condition is a result of a homozygous recessive condition which is lethal. Assume an initial frequency for the dominant allele, A, to be 0.8 and that of the recessive allele to be 0.2.

   i. What are the allelic frequencies in survivors? **(5 Marks)**

   ii. With random mating of surviving animals, what are the genotypic frequencies in the offspring? **(5 Marks)**

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

## QUESTION 2

Discuss the use of individual performance and sib performance as sources of information for animal selection. **(25 Marks)**

## QUESTION 3

a) Write short notes on response to selection. **(10 Marks)**

b) A population has an initial frequency of allele ***T*** at 0.7 and allele ***t*** at 0.3. What are the frequencies of genotypes ***TT***, ***Tt*** and ***tt*** when

   i. the inbreeding coefficient is 0.2?

   ii. the inbreeding coefficient is 0.5?

   iii. inbreeding is complete? **(10 Marks)**

c) The frequency of a recessive allele is 0.0001. What is the expected frequency of this allele after 500 generations of selection against it in the absence of mutation and migration? **(5 Marks)**

## QUESTION 4

a) In a certain population of rodents, coat colour is controlled by a completely dominant gene, *A*, which produces a dark-grey coat colour. The homozygous recessive genotype produces a white coat colour making rodents easily spotted by predators. Assuming a coefficient of selection of *s* against the white coat coloured rodents, re-draw the table below into your answer sheet, fill in the gaps and answer the questions that follow:

| | Genotypes | | | |
|---|---|---|---|---|
| | **AA** | **Aa** | **aa** | Total |
| Initial frequencies | $p^2$ | 2pq | $q^2$ | 1 |
| Coefficient of selection | --------- | -------- | --------- | |
| Relative fitness | --------- | -------- | --------- | |

**(3 Marks)**

i. Calculate the gene frequencies in the surviving population

**(6 Marks)**

ii. Calculate the genotype frequencies in offspring population

**(3 Marks)**

b) Distinguish between qualitative and quantitative traits of livestock giving two examples of each. **(8 Marks)**

c) Briefly discuss the different causes of variation in animal performance.

**(5 Marks)**

## QUESTION 5

Write short notes on the following:

i. Random genetic drift. **(5 Marks)**

ii. Assortative mating. **(5 Marks)**

iii. Inbreeding depression. **(5 Marks)**

iv. Tandem selection. **(5 Marks)**

v. Migration. **(5 Marks)**