1st SEM. 2014/2015

UNIVERSITY OF SWAZILAND

FINAL EXAMINATION PAPER

PROGRAMMES: B.Sc. ANIMAL SCIENCE III
B.Sc. ANIMAL SCIENCE (DAIRY OPTION) III

COURSE CODE: AS 301

TITLE OF PAPER: ANIMAL BREEDING

TIME ALLOWED: TWO (2) HOURS

INSTRUCTIONS: ANSWER ANY FOUR QUESTIONS

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QUESTION 1

(a) Draw and label a sketch/diagram to illustrate selection response and selection differential. **(12 Marks)**

(b) A pig breeder has 60 gilts with a mean back fat thickness of 10mm. He selects 20 gilts with a back fat thickness of 6mm for breeding. Progeny from unselected parents had a mean back fat thickness equal to that of the unselected generation (10mm). If heritability for back fat thickness is 0.3 answer the following questions:

      i). What is the selection differential? **(4 Marks)**

      ii). What is the expected selection response? **(4 Marks)**

      iii). What is the expected back fat thickness of progeny from the selected parents? **(5 Marks)**

QUESTION 2

A).

Table 1 below is an extract from breeding records kept by Mrs B.Z. Makhubu a goat breeder.

Sire identity	Sire breed BxS=Boer Swazi cross	Dam identity	Dam breed S=Swazi	Progeny Information		
				Identification number	Date of birth (DDMMYY)	Sex M=male F=Female
MX77	Boer	F4	SI	F26	01-02-2010	F
MX77	Boer	F16	SI	F28	03-02-2010	F
M9	Boer	F26	BxS	M44	06-03-2012	M
M44	BxS	F28	BxS	M50	11-11-2013	M

NOTE: $F_{MX77} = 0.25$ (This information was provided by the breeder who sold this buck to Mrs Makhubu)

    i) Convert the record into an arrow diagram. **(4 Marks)**

    ii) What is the relation covariance between M44 and M50? **(5 Marks)**

    iii) What is the relationship covariance between M44 and F28? **(5 Marks)**

    iv) What is the inbreeding coefficient of M50? **(2 Marks)**

    v) What is the relationship coefficient between M44 and M50? **(4 Marks)**

B). Explain why it is generally not advisable to breed closely related animals. **(5 Marks)**

QUESTION 3

a) What are the <u>two</u> factors which determine the magnitude of a change in gene frequency associated with a single migration event? **(4 Marks)**

b) What are half sibs and full sibs? Which of these two are the most common in the livestock production business? **(4 Marks)**

c) Present a sketch showing two animals that are related through both direct ancestry and common ancestry. **(4 Marks)**

d) State <u>five</u> assumption of the Hardy-Weinberg equilibrium law. **(5 Marks)**

e) A study carried out in one SADC country reported that on average 6 out of 160 (six out of one hundred and sixty) goats suffer from clubfoot, a genetic disease caused by a recessive allele (f) and affected goats have some difficulty in walking.

   i). Calculate the frequency of the recessive allele (f) and dominant allele (F) in the goat population in that country. **(2 Marks)**

   ii). What percentage of the goat population would be expected to be phenotypically normal but carry the clubfoot allele? **(2 Marks)**

   iii). Would you expect the goat population in that country to be in Hardy Weinberg equilibrium at the locus responsible for clubfoot? Briefly justify your answer. **(4 Marks)**

QUESTION 4

i) List then discuss systematic processes that can change gene frequency. **(10 Marks)**

ii) Define the following terms: **(15 Marks)**
   - a) Common ancestor.
   - b) Inbred animal.
   - c) Relationship coefficient.
   - d) BV.
   - e) EBV.

QUESTION 5

i) Table1 below presents 205 lactation records from a small scale dairy farmer, Mr. Mverick Lomdzala of farm 33 Siteki. Copy Table 1 into your answer book then answer the question below it.

Table 1 Lactation records from a small scale dairy farm

Cow Ear Tag	205 day yield (Kg)	EBV
220	2800	
320	2755	
340	3300	
390	1800	
401	3000	
411	2005	
412	1800	
413	3000	
414	2550	
416	1650	

a) Calculate the EBV for each animal in the herd and write it in the appropriate space. **(10 Marks)**
b) Select six cows for breeding in the next season. List the ID's of the selected animals. **(3 Marks)**
c) Calculate the selection differential. **(2 Marks)**
d) If the heritability (h^2) for 205 day lactation yield is 0.35, what is the expected selection response? **(5 Marks)**
e) What is the expected mean 205 day yield of progeny from the selected animals? **(5 Marks)**