1ST SEMESTER FINAL EXAMINATION 2012

UNIVERSITY OF SWAZILAND

FINAL EXAMINATION PAPER

PROGRAMME: BSc. ANIMAL SCIENCE III
BSc. ANIMAL SCIENCE DAIRY OPTION III

COURSE CODE: AS 301

TITLE OF PAPER: ANIMAL BREEDING

TIME ALLOWED: TWO (2) HOURS

INSTRUCTIONS: ANSWER <u>ANY FOUR</u> QUESTIONS

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

1.

$$q_1 = m(q_1 - q_0) + q_0$$

i)   ii)   iii)

a) Explain each of the labeled terms in the equation above. (6)

b) Draw an arrow diagram to illustrate half sib and full sib relationships. What would be the inbreeding coefficient of progeny from a mating between half sibs? (6)

c) On a commercial cattle ranch which livestock class would you expect to be in greater numbers, half sibs or full sibs? Explain why this should be the case. (6)

d) Mr. Clever Knowitall says: "Bulls do not produce milk so there is no need to consider bulls when trying to increase herd milk production, moreover, it is practically impossible to select bulls for milk production since they do not produce milk" Briefly comment on Mr. Knowitall's statement. (7)

2.

a) List <u>two</u> basic tools that can be used in genetic improvement of livestock? (4)

b) List <u>six</u> assumptions of the Hardy-Weinberg law. (12)

c) In mice coat colour is controlled by genes at a single locus with (C) producing a grayish coat colour known as agouti and (c) producing albino mice which have a white coat colour. Due to their coat colour albino mice are not camouflaged from predators resulting in a majority of them being killed by predators before reaching reproductive age. A researcher reports that in a colony of mice 4 out of 1600 adult mice are albinos.

   i). What is the frequency of "C" in adult mice in this colony? (3)

   ii). What percentage of mice in the colony is expected to be heterozygous? (3)

   iii). Would you expect this colony of mice to be in Hardy-Weinberg equilibrium? Give justification for your answer (No calculation required). (3)

3.

   i). Draw and fully label a diagram illustrating the concepts of selection differential and selection response. (16)

   ii). Farmer Dlamini runs a 100 sow unit. As part of his herd management policy he replaces 10% of the sow herd every year. If 150 gilts are available as potential replacement stock, what would be the selection intensity? (4)

   iii). Assume that due to disease outbreak farmer Dlamini (in question 3 iv) losses a lot of sows and hence must replace more animals than usual yet the number of gilts available as replacement stock is less than in previous years. Do you think this will have an impact on selection response? Briefly explain. (5)

4. The records below were extracted from Deluca Brahman Cattle Breeding Ranch located in the Lowveld Big Bend, Swaziland.

Sire identity	Dam identity	Calf identity	Sex of the calf	Date of birth date/month/year	Birth weight (kg)
Goliyadi	F1	F2	Female	3/8/2005	24
Goliyadi	F1	F3	Female	18/12/2005	22
Hero	F2	F44	Female	11/4/2010	20
Hero	F3	DX5	Male	30/6/2010	25
DX5	F44	ARROW	Male	5/4/2012	27

i.   Use information from this record to draw an arrow diagram. (8)
ii.   What is the relationship covariance between F1 and F44? (2)
iii.   What is the relationship covariance between F44 and DX5? (8)
iv.   List ALL possible pairs of animals which are not related in this pedigree. (3)
v.   Comment on the mating of F44 and DX5 to produce Arrow. (4)

5.

i).   Briefly discuss the following:
       a) Independent culling levels (6)
       b) B.V. (4)
       c) Negative assortative mating (6)
       d) Compare and contrast positive assortative mating and inbreeding (6)
       e) When is an animal defined as being inbred? (3)