

THE UNIVERSITY OF MELBOURNE

SEMESTER 1 ASSESSMENT 2005

DEPARTMENT OF VETERINARY SCIENCE

250-307 ANIMAL HEALTH AND MANAGEMENT 3

Pass and Honours

Exam Duration: 2 Hours

Reading Time: 15 Minutes

Number of Pages: 4

Authorised Materials: A scientific non-programmable calculator is permitted (checks will be made). No additional materials other than writing instruments, erasers and pencil sharpeners.

Instructions to Students: Student's Enrolment Number must be shown on all examination script books.
Please use a separate book for each question.
Question Number(s) should be clearly marked.

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SEMESTER 1 EXAMINATION 2005

250-307 ANIMAL HEALTH AND MANAGEMENT 3

Pass and Honours

Time allowed: 2 hours

All questions are to be answered

All questions are of equal value

Parts within questions are of equal value unless otherwise stated

PLEASE USE A SEPARATE BOOK FOR EACH QUESTION

- Q1.** Your client has recently purchased a stud flock of medium wool Merino sheep. The flock has 500 breeding ewes, 10 rams and a weaning percentage of 80%. Each year, all ewes are measured for fleece weight, and their breeding objective is to increase fleece weight. Their ewes have their first lamb when they are 2 years of age and their last when they are 6 years of age. Their rams have their first progeny when they are 2 years of age and their last when they are 3 years of age. The heritability of fleece weight is 0.4 and the phenotypic standard deviation for fleece weight is 0.70 kg.

They feel that breeding their sheep by artificial insemination will increase their rate of genetic gain.

A table showing the relationship between proportion of animals selected and selection intensity is given below.

Proportion Selected (%)	Selection Intensity	Proportion Selected (%)	Selection Intensity
0.01	3.96	10	1.76
0.05	3.55	15	1.55
0.1	3.37	20	1.40
0.50	2.89	30	1.16
1	2.67	40	0.97
2	2.42	50	0.80
3	2.27	60	0.53
4	2.15	70	0.34
5	2.06	80	0.20

- a) If they use natural mating, what is the annual rate of genetic progress you would expect them to achieve in this flock? Show and explain your workings, using the information provided above, and assuming no mortalities in the flock. **(70% of mark)**
- b) Would using artificial insemination or embryo transfer increase the rate of genetic gain in this flock? Explain your answer. **(30% of mark)**

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Q2. A cattle company in Australia currently spends about \$7,000 annually on veterinary fees associated with pregnancy diagnosis of their cattle. It has been suggested that the company could avoid this cost if, after appropriate training, an existing company staff member were to diagnose pregnancy in cattle using an ultrasound machine. The company estimates that an ultrasound machine would cost about \$13,000 to purchase, have a life span of about 6 years and have a salvage value of \$1,000 at that time. The company also believes that it could appropriately train an existing staff member for \$2,000 and, after training, the accuracy of pregnancy diagnosis using the ultrasound would be similar to the accuracy of a veterinarian.

- a) Using the company assumptions, and any other estimates you think are necessary, construct a partial budget and estimate the percentage return to additional capital that the company would obtain from the purchase of an ultrasound machine for pregnancy diagnosis of their cattle. **(70% of mark)**
- b) Do you think it is economically rational for the company to purchase the ultrasound machine? Explain your answer. **(30% of mark)**

Q3. a) The following are the records for a 6-month period at a large zoo in which aspergillosis in birds has been a particular problem.

Class of Bird	Total Number of birds as of 1/1/2004	Total Number of birds as of 30/6/2004	Number of cases of aspergillosis 1/1/2004 to 30/6/2004
Parrots	110	90	3
Raptors	65	55	3
Water birds	89	91	9
Total	264	236	15

Using the information above, estimate the incidence rate of aspergillosis for each class of birds during the period and the relative risk of each class of bird becoming a case of aspergillosis. Show your calculations.

(50% of mark)

- b) A test for bovine Johne's disease has a sensitivity of 0.4 and a specificity of 0.95. Estimate the positive predictive value and the negative predictive value of this test if it were used in a region where the prevalence of bovine Johne's disease was 10%. Show your workings.

(50% of mark)

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Q4. A client of your veterinary practice has recently purchased a large farm near Ballarat in western Victoria. The farm has an average rainfall of 700 mm with a growing season from mid April to mid December. The farm is on arable, flat ground and pastures are predominately composed of annual ryegrass and subterranean clover, with patches of capeweed in most paddocks. The pastures have had sporadic applications of phosphorus fertiliser, with the last application occurring three years ago. Four hundred steers with an average weight of 250 kg were also purchased to run on the property. It is intended that the steers will be sold to feedlots once they reach about 420 kg bodyweight.

a) What area of land do you think will be required to run the steer enterprise on this farm in its current state? Show your calculations.

(40% of mark)

b) What advice would you give to the client to improve the carrying capacity of this farm? Your advice should include information to reduce the capeweed infestation and also provide an indication of the expected stocking rate capacity of the farm in its improved state.

(60% of mark)

END OF EXAM