THE UNIVERSITY OF NEW ENGLAND

EXAMINER INFORMATION FORM

UNIT NAME : **GENE 422**

PAPER TITLE: Animal Genetics and Breeding

PAPER NUMBER: **First and only**

TIME ALLOWED: **3 (THREE) hours plus fifteen minutes reading time**

IS THIS PAPER TO BE <u>WITHHELD</u> FROM THE CANDIDATES AND LIBRARY REFERENCE AFTER THE EXAMINATION ?

NO

We certify that we have checked the attached examination question paper and that it is correct in all respects. It is in order for printing.

SIGNATURE OF EXAMINER:..... DATE:

PRINT NAME: **Julius van der Werf**

EXAMINER'S UNE EXTENSION: **2092** HOME TELEPHONE: 752442

(This information is required in case any urgent queries about papers arise)

SIGNATURE OF HEAD OF DEPARTMENT or nominee:
.....

DATE: …….

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NUMBER OF PAGES IN PAPER: **3 (THREE)**

NUMBER OF QUESTIONS ON PAPER: **11 (ELEVEN)**

NUMBER OF QUESTIONS TO BE ANSWERED: **13 (ELEVEN)**

Stationery per candidate: [ ] X 6 leaf A4 books [**-1**] x 12 leaf A4 books

[**-**] x rough work books

Graph Paper : **NIL** (Number of Sheets)

Pocket calculators permitted : **YES** (Silent type)

Mathematical tables permitted: **YES**

Other aids required: **NIL**

INSTRUCTIONS FOR CANDIDATES:

TEXTBOOKS OR NOTES PERMITTED: **NO**

THE UNIVERSITY CONSIDERS IMPROPER CONDUCT IN EXAMINATIONS TO BE A SERIOUS OFFENCE. PENALTIES FOR CHEATING ARE EXCLUSION FROM THE UNIVERSITY FOR ONE YEAR AND/OR CANCELLATION OF ANY CREDIT RECEIVED IN THE EXAMINATION FOR THAT UNIT.

EXAM GENETICS 422

SECTION A
18 marks. Answer both questions, try to be brief.

1.[8 marks.]

Discuss briefly two alternative ways to define breeding objectives. Give an example and discuss how you would go about deciding what is the best approach for a particular situation.

2. [10 marks]

Animal genetic improvement comprises 3 core decisions:

a) What to breed for
b) Which animals to use
c) How to mate them

Briefly discuss the significance of each, and outline with practical examples where possible how each decision is made.

SECTION B
16 marks. Answer both questions.

1 [8 marks]

Explain the difference between a genetic map and a physical map of an organism's genome. What units of measurement are used for each type of map.

3. [8 marks]

In what situation is the positional cloning strategy utilised (as opposed to the functional or candidate cloning strategy). Explain the main limitation to using the positional cloning approach to identify (clone) a major gene affecting a quantitative trait. How can you prove that the candidate identified gene has a direct effect on the trait, rather than an effect due to linkage with another gene.

SECTION C
36 marks. Answer all four questions.

1.[8 marks]

Explain why bulls' with more accurate EBV's have more chance to be selected.

2. [8 marks]

Discuss to what extend you agree with the following statements:

"Males should have a progeny test before they are selected as sires of sires (i.e. as nucleus sires) ".

"Once progeny tested, we don't expect the EBV of a ram to change anymore in future genetic evaluations"

3.[10 marks]

When would it be useful to measure a trait that has no economic value (i.e. is not contained in the breeding objective). Discuss which parameters are critical in making such a decision.

4. [10 marks]

Show graphically why is much easier to improve two traits that are positively correlated in the same direction then changing them in opposite direction. Discuss an example. Also discuss in which circumstances the optimal selection strategy would be most sensitive to a change in economic weights.

SECTION D
30 marks. Answer all three questions

1. [10 marks] A farmer wants to buy a ram and he is told this ram has a M1M2 genotype for an M-marker. He/She askes you advice and wants to know how valuable this marker-genotype information is. What advice would you give the farmer, and what kind of information would you search for in the literature to be able to give a proper advice here.

2. [10 marks]

There are two approaches to the design and implementation of breeding programs:

1. The rules-based approach, in which a set of rules is followed.

2. The tactical approach, in which optimal mate selection sets are sought.

Contrast these two approaches referring to their power, flexibility and ease of use.

3. [10 marks] Contrast the potential value of the following technologies

a) cloning

b) oocyte pickup in combination with vitro fertilisation

for generating faster rates of gain in animal breeding operations, and for improving profit in animal production operations.