Trial HSC Agriculture 2012 Student number: .....

# HURLSTONE AGRICULTURAL HIGH SCHOOL

## TRIAL HIGHER SCHOOL CERTIFICATE
## AGRICULTURE
## 2012

**General Instructions:**

* Reading time – 5 minutes
* Working time – 3 hours
* Write using a black or blue pen
* Draw diagrams in pencil
* Board approved calculators may be used
* Write your student number at the top of each page

Examiners – Mr. R. M$^{c}$Gregor,
Ms. E. Blake, Mr. R. Schippers

**Total marks – 100 marks**

**SECTION I**
**Part A – 20 marks**
20 Multiple Choice questions
***Answer these questions on the Multiple Choice answer sheet***
Allow about 30 minutes for these questions
Questions 1 – 20

**Part B – 60 marks**
Questions 21 – 26
Allow about 100 minutes for these questions

**SECTION II**
**Electives – 20 marks**
Questions 27 – 29
Choose ONE elective.
***Answer your elective question in writing booklets***
Allow about 50 minutes for this question

## SECTION I
## PART A – 20 marks
**Attempt Questions 1 – 20**
**Allow about 30 minutes for this part.**
Use the multiple choice answer sheet for questions 1 – 20

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**Question 1.**
Which sentence best describes the roles of a hormone in the regulation of reproduction and behaviour in the cow or bull?

(A) High levels of oestrogen stimulates on heat behaviour and udder growth in the cow.
(B) High levels of progesterone stimulates udder growth and ovulation in the cow.
(C) Luteinising hormone stops the cow coming on heat when she is pregnant.
(D) Testosterone determines the volume of semen the bull produces and the viability of the sperm.

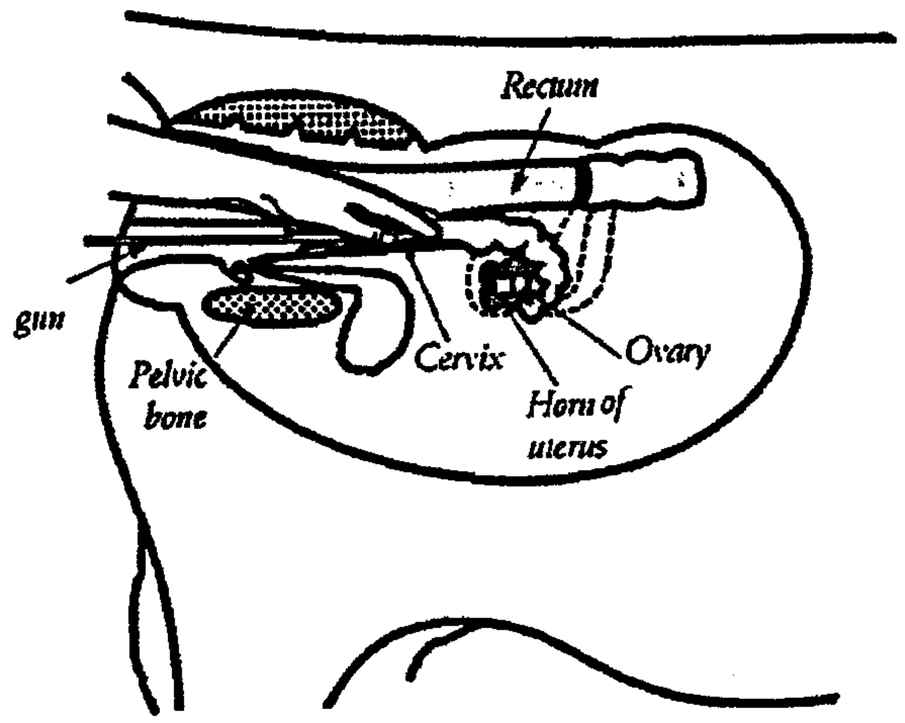
**Question 2.**
Select the correct comparison between the two breeding systems – line breeding and crossbreeding.

| | Line breeding | Crossbreeding |
|---|---|---|
| (A) | Genetic diversity in the herd increases. | Genetic diversity in the herd decreases. |
| (B) | New genes are added to the gene pool of the herd. | Genes for superior characteristics are concentrated in the herd. |
| (C) | Calves show uniformity in their characteristics and they are similar to their parents. | Calves show hybrid vigour where their performance is superior to both parents. |
| (D) | Heterozygosity is increased. | Homozygosity is increased. |

**Question 3.**
Food eaten by farm animals contains energy that is essential to the animal's health and productivity.
Choose the correct statement on food energy.

(A) Digestible Energy is Gross Energy minus the energy used by the animal for body heat.
(B) Metabolisable Energy is the energy available to the animal after the energy lost in faeces is subtracted.
(C) Net Energy is the energy used for maintenance and then for production, such as milk and meat production.
(D) Gross Energy is the Net Energy minus the energy lost in urine and methane production.

**Question 4.**
The diagram represents a breeding technique used in animal production.
Which of the following descriptions on this technique is correct?

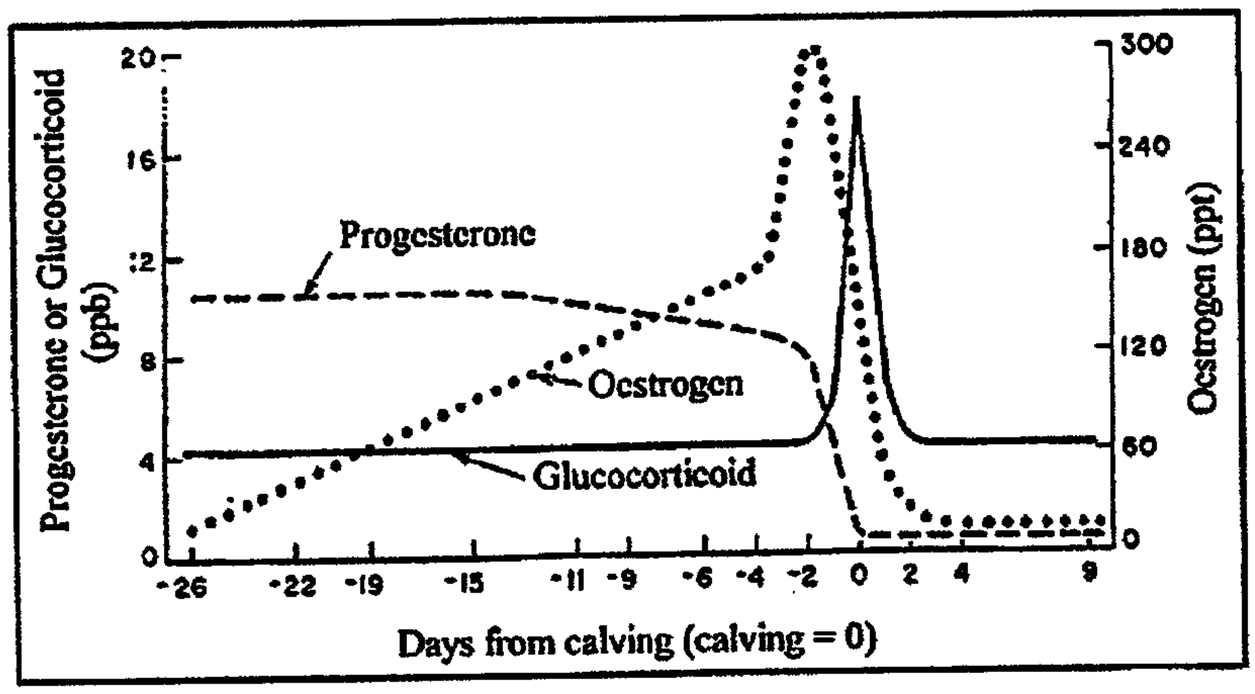



(A) This technique can fairly quickly improve the genetic make-up and so productivity of the herd.
(B) This technique is the most successful method of getting cows pregnant.
(C) This technique is the least expensive method of getting cows pregnant.
(D) This technique allows the farmer to control the twinning rate in the herd.

**Question 5.**
Flushing is a technique used to improve reproductive performance in a herd.
Flushing is defined as –

(A) boosting a cow's nutrition just before she gives birth to a calf.
(B) boosting a bull's nutrition as it approaches and reaches puberty.
(C) boosting a cow's nutrition during pregnancy especially if she is carrying twins.
(D) boosting a cow's nutrition leading up to and during the mating season.

**Question 6.**
The graph shows the blood levels of three hormones around calving time.
Glucocorticoid stimulates cellular respiration. Progesterone and oestrogen are released from the ovaries.
Which of the following statements is correct?




(A) Progesterone levels drop so that the birth sack can be easily expelled after the calf's birth.
(B) Glucocorticoid ensures that the cow has enough energy for the birth process.
(C) Oestrogen levels rise so that the cow is ready to come on heat.
(D) Progesterone levels drop to prepare the udder for milk production.

**Question 7.**
The diagrams show Australian Breeding Values (ABV's) for two Holstein Friesian dairy bulls – these are objective measurements of performance.

**BULL 1.**

*April ABV 2011*

| APR | Rel | ASI | Prot | Prot% | Milk | Fat | Fat% | Rel | Type | Mam | Rel | MS | Temp | Like | Rel | Dtrs | Herds |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 153 | 70 | 101 | 16 | 0.04 | 525 | 20 | -0.04 | 76 | 108 | 109 | 72 | 103 | 100 | 103 | 23 | 50 | 21 |

**BULL 2.**

| | |
|---|---|
| ASI | 170 |
| Milk (l) | 501 |
| Protein (kg) | 27 |
| Fat (kg) | 15 |
| Protein (%) | 0.25 |
| Fat (%) | -0.09 |
| **O/Type** | **115** |
| **Mammary** | **118** |

The farmer wants to purchase semen straws from one of these two bulls for an artificial insemination breeding program.
Which of the following conclusions is correct?

(A) Bull 1's daughters will produce milk with higher protein percentages.
(B) Bull 2's daughters will produce more milk.
(C) Bull 2's daughters will have better udder or mammary structure.
(D) Bull 1's daughters will produce milk with lower fat percentages.

**Question 8.**
A long term and effective method of preventing animal disease is –

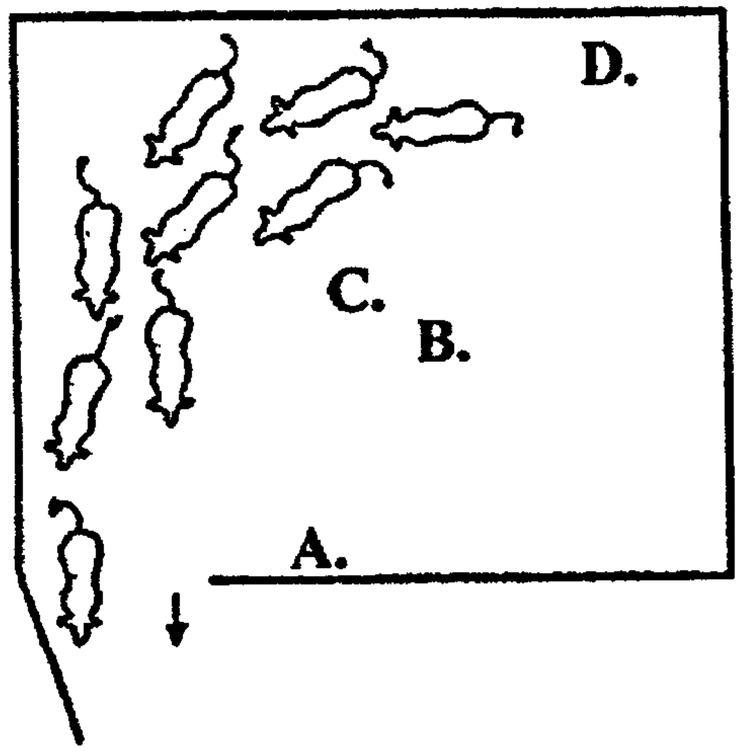
(A) drenching for internal parasitic roundworms.
(B) vaccinating for bacterial diseases.
(C) Injecting antibiotics for infection.
(D) Dipping for external parasites such as ticks.

**Question 9.**
The ruminant animal, such as the cow, has four stomachs. The stomach that is called a "true stomach" and contains enzymes and hydrochloric acid which digest protein-filled micro-organisms, is the –

(A) abomasum.
(B) omasum.
(C) reticulum.
(D) rumen.

**Question 10.**
To easily move a mob of cattle, the handler should be aware that each animal would prefer to know where the threat is coming from and that the handler does not enter their safety zone (flight zone).
From the diagram, the best position for the farmer would be –

(A) position A.
(B) position B.
(C) position C.
(D) position D.




**Question 11.**
Cation exchange capacity (CEC) is a guide for –

(A) plant nutrient deficiencies.
(B) soil fertility.
(C) fertiliser selection.
(D) soil acidity.

**Question 12.**
An appropriate technique to increase soil fertility without the application of inorganic fertilisers would be –

(A) using a green manure crop.
(B) using legumes in crop rotations.
(C) spreading organic fertilisers on paddocks.
(D) all of the above.

**Question 13.**
Which of the following describes ONLY physical characteristics of a soil?

(A) porosity, structure and texture.
(B) porosity, structure and nitrogen status.
(C) ion exchange capacity, structure and texture.
(D) ion exchange capacity, carbon status and nitrogen levels.

**Question 14.**
Microbes have an important role as decomposers. The process of decomposition is important as –

(A) it recycles finite matter and nutrients back into ecosystems.
(B) it reduces the need to purchase and use pesticides.
(C) it removes rotting inorganic matter from the ecosystem.
(D) it turns inorganic matter into organic matter which can then be recycled.

**Question 15.**
Horticulturalists often use a product called rooting powder or gel to stimulate cuttings to produce roots. The plant hormone found in this product is –

(A) abscisic acid.
(B) auxin.
(C) cytokinin.
(D) ethylene.

**Question 16.**
Net assimilation rate (NAR) measures –

(A) photosynthesis.
(B) cellular respiration.
(C) nutrient uptake by a plant.
(D) dry matter production of a plant.

**Question 17.**
Which of the following statements regarding photosynthesis is **incorrect**?

(A) Photosynthesis requires carbon dioxide and its concentration affects the rate of photosynthesis.
(B) Photosynthesis requires oxygen and its rate depends on the oxygen concentration.
(C) Photosynthesis requires water and its availability affects photosynthetic rate.
(D) Light intensity influences photosynthetic rate.

**Question 18.**
The function of *Rhizobia* bacteria in legume roots is –

(A) to increase soil nitrogen.
(B) to convert urea to nitrate ions for plant use.
(C) to convert nitrogen in soil air to ammonium ions.
(D) to make soil nitrate ions available to plants.

**Question 19.**
Which of the following is most useful to farmers when analysing the financial situation of a farm?

(A) Gross Margin.
(B) Supply trends.
(C) Gross production.
(D) Whole farm planning.

**Question 20.**
Since people have been cultivating the land in Australia, the size of the deserts has been increasing.
Which of the following would be most likely to cause marginal crop or grazing lands to become permanent deserts?

(A) The loss of nutrients to grazing animals.
(B) The loss of minerals in harvested crops.
(C) Erosion and loss of valuable topsoil.
(D) Insufficient use of organic fertilisers.

## SECTION I

**PART B – 60 marks**

**Attempt Questions 21 – 28**

**Allow about 1 hour and 45 minutes for this part.**

Answer the questions in the spaces provided. These spaces provide guidance for the expected length of response.

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**Question 21. (10 marks)**

Name ONE farm product that you have studied.

Name of farm product: .....

**(a)** Financial pressures may impact on farmers and their farming businesses.
Outline TWO of these financial pressures. (4 marks, 10 lines)

**(b)** The farm that produces your product is part of an agribusiness sector and it is supported by a variety of service businesses and government organisations.
Identify TWO of these and describe how each assists the farmer. (2 marks, 5 lines)

**(c)** The table below is part of the Dairy Express Annual Production Report on four cows from the Hurlstone dairy herd.

DAIRY EXPRESS
**ANNUAL PRODUCTION REPORT**
From 13/01/04 to 12/01/05

| Cow No. | Cow Name | Breed | Sire ID | Lactn No. | Age | Last Lactation: Calving Date | Days | Milk L | Protein Kg | Protein % | Fat Kg | Fat % | Lact C | Prodn Index: Milk | Prot | Fat | Efficiency: Calv Int | Days Dry | No. Mate | CCut >250 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1175 | ALFREDA SHEEN | AAAA | AYPARDNER | 1 | S2 | 01/05/04 | 207 | 3643 | 106 | 2.9 | 145 | 4.0 | C | 89 | 81 | 80 | | | | |
| 1156 | ZELDA SOLAX | AAAA | AYGARTH | 2 | J3 | 09/02/04 | 305 | 6832 | 209 | 3.1 | 255 | 3.7 | C | 118 | 107 | 96 | 462 | 189 | | 3 |
| 1162 | ANABEL SOLAX | AAAA | AY0420 | 2 | J3 | 22/01/04 | 305 | 5966 | 198 | 3.3 | 242 | 4.1 | C | 105 | 106 | 95 | 366 | 61 | | |
| 1163 | ANORITA SOLAX | AAAA | AY0420 | 2 | J3 | 12/04/04 | 266 | 4592 | 147 | 3.2 | 188 | 4.1 | C | 92 | 91 | 82 | 416 | 117 | | 7 |

**(i)** Identify one measure of –

Milk quantity: .....

Milk quality: ..... (1 mark)

**(ii)** Identify TWO other measures of cow performance. (do not include measurements of milk production, ie. quantity and quality) (1 mark, 2 lines)

**(iii)** Outline TWO hypothetical management decisions or changes to on farm practices that are based on specific information in the report, ie. identify the number of the cow that you are referring to (see the first column of the table). (2 marks, 6 lines)

**Question 22. (10 marks)**

**(a)** Maize (corn) is a grain crop, where the grain is harvested for human or animal consumption. The graph shows the response of maize grain yield to plant density and the amount of nitrogen fertiliser applied to the crop.

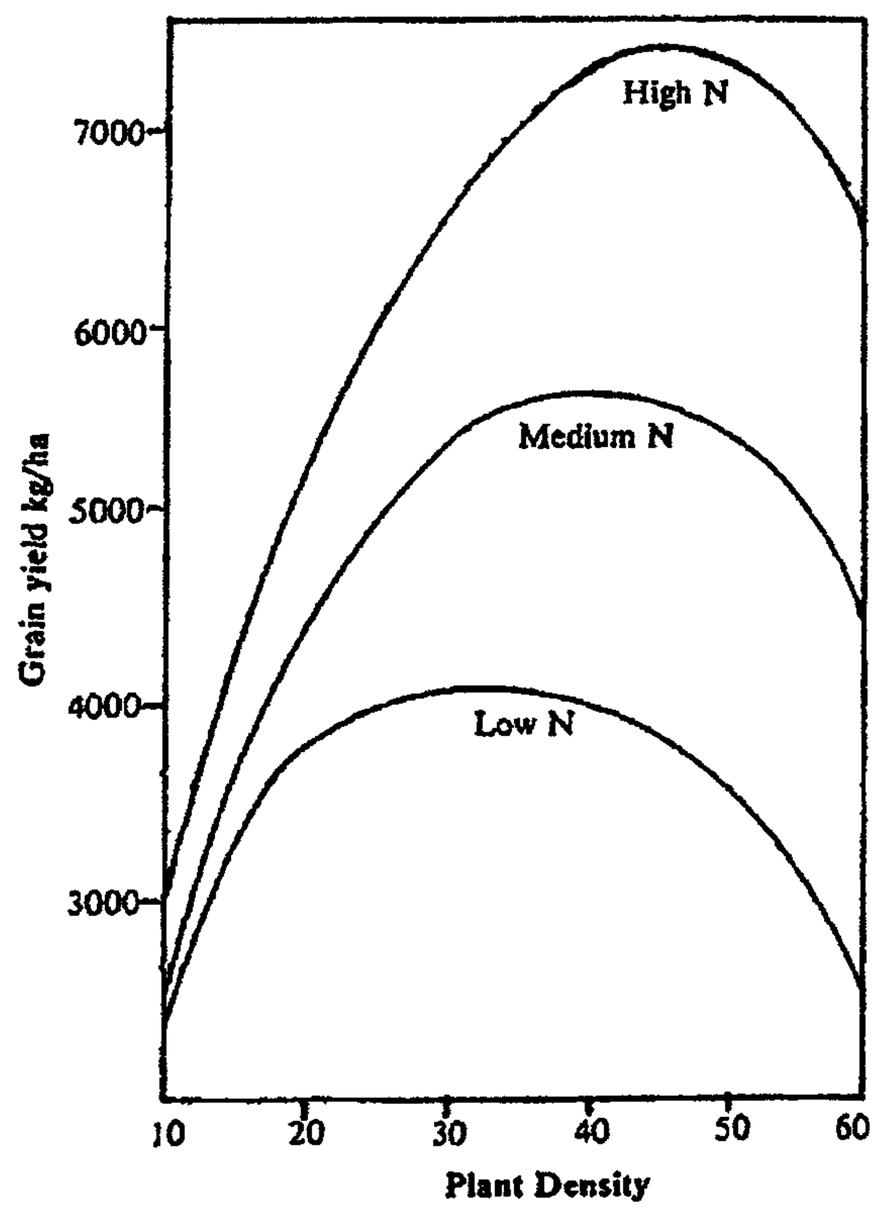



**Figure Response of grain yield in maize to density and nitrogen fertilizer.**

**(i)** With high levels of nitrogen fertiliser application, what plant density gives the highest yield? (1 mark, 1 line)

**(ii)** Identify the type of plant interference that is illustrated in the graph and describe TWO practices that the farmer could use to avoid or reduce the impact of the problem. (2 marks, 5 lines)

**(b)** Discuss the possible problems that can arise from the poor use of inorganic fertilisers and pesticides. (3 marks, 7 lines)

**(c)** Abiotic environmental factors such as light, temperature, available water, oxygen/carbon dioxide and wind can reduce or constrain plant production.

**(i)** For ONE of these factors, explain how it can limit crop or pasture growth and so production. (2 marks, 4 lines)

**(ii)** Explain how farmers can manage the environmental constraint outlined in **(i)** above. (2 marks, 5 lines)

**Question 23. (10 marks)**

**(a)** The table that follows, shows rotations involving cereal crops (such as wheat) over a three year period and the average yield of the cereal crop in year 3.

Table: A comparison of two crop rotations and their effects on cereal crop yield.

| | **Rotation 1.** | **Rotation 2.** |
|---|---|---|
| **Year 1.** | Grass pasture | Grass pasture |
| **Year 2.** | Cereal crop (eg. wheat) | Legume crop (eg. peas) |
| **Year 3.** | Cereal crop (eg. wheat) | Cereal crop (eg. wheat) |
| **Average yield of cereal crop – year 3 (T/ha)** | **2.4** | **3.8** |

**(i)** Explain why rotation 2. produced a greater yield. (2 marks, 4 lines)

**(ii)** Describe ONE way the farmer could increase the rotation 1. yield in the short term, without changing the rotation. (1 mark, 2 lines)

**(b)** During your studies you carried out a first- hand investigation to compare the pH of a variety of soils. In step form, describe the method you used to determine the pH of a soil. (3 marks, 6 lines)

**(c)** Describe the farming/agricultural practices that have POSITIVELY impacted on water quality and quantity. (4 marks, 10 lines)

**Question 24. (8 marks)**

**(a)** A Grazier decided to set up a trial to determine which hormone growth promotant (HGP) is the most effective.

The following is a description of the trial –

> 20 Hereford steers with an age varying from 12 to 13 months were used.
> 10 steers were given an oestrogen HGP that slowly released over 100 days and 10 steers were given a progesterone HGP that also slowly released over 100 days.
> All steers were on the same pasture.
> The steers were weighed before given their HGP and they were all weighed after 100 days.

The following results were obtained –

| | When weighed | Individual steer weights (kg) | Average weight (kg) | Standard deviation |
|---|---|---|---|---|
| **Oestrogen HGP** | At the start | 310, 305, 290, 295, 300, 310, 285, 315, 295, 305 | **301** | **9.7** |
| | After 100 days | 380, 370, 375, 350, 370, 385, 345, 380, 370, 375 | | |
| **Progesterone HGP** | At the start | 305, 295, 285, 290, 285, 310, 315, 290, 295, 300 | **297** | **10.3** |
| | After 100 days | 355, 345, 330, 340, 340, 360, 370, 340, 345, 350 | | |

**(i)** Calculate and place in the results table, the average and standard deviations for both groups of steers after 100 days. (2 marks)

**(ii)** What conclusions can you draw from the results obtained from the trial? (2 marks, 6 lines)

**(iii)** Describe two ways that the design of the trial could have been improved. (2 marks, 6 lines)

**(b)** Apart from the use of HGP's, describe two other practices that the farmer can use to improve the growth and development of his animals. (2 marks, 6 lines)

**Question 25. (11 marks)**

**(a)** Ruminant animals such as cows, sheep and goats rely greatly on the micro-organisms that live inside their first stomach or rumen. Explain this statement using examples. (4 marks, 12 lines)

**(b)** The two feed labels represent complete diets for broilers (meat chickens).

ANIMAL FOOD STUFF
FIELDERS
**BROILER STARTER CRUMBLES**
For Broiler Chickens from day old to four weeks old
**ANALYSIS:**

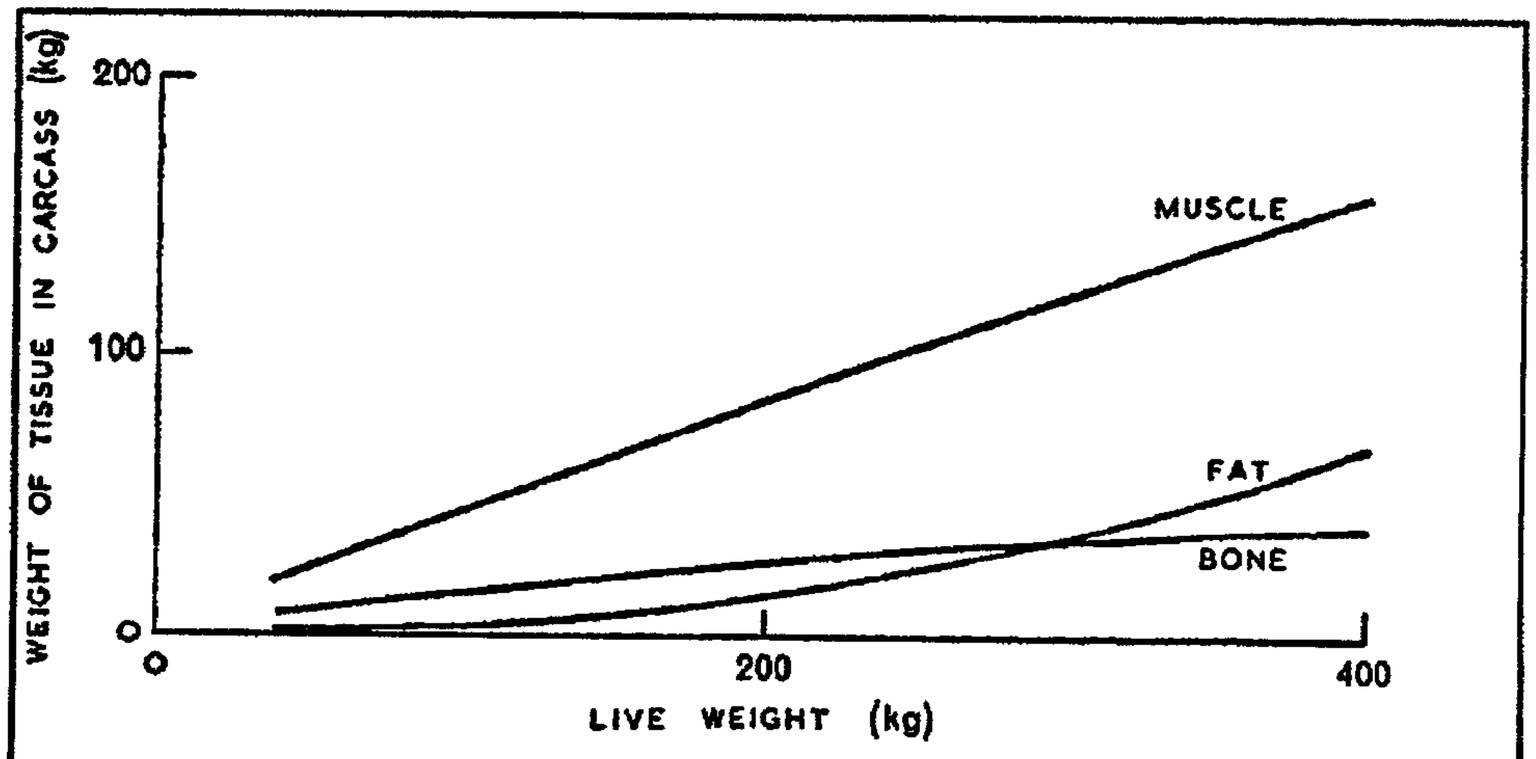
| | | | |
|---|---|---|---|
| Crude Protein Min. | 22.00% | Crude Fibre Max | 3.50% |
| Crude Fat | 3.80% | Salt | 0.50% |
| Urea Max | Nil | Fluorine Max | 0.02% |

ANIMAL FOOD STUFF
FIELDERS
**BROILER FINISHER FEED**
For Broiler Chickens from 4 to 8 Weeks of age
**ANALYSIS:**

| | | | |
|---|---|---|---|
| Crude Protein Min. | 19.0% | Crude Fibre Max | 3.50% |
| Crude Fat | 3.50% | Salt | 0.50% |
| Urea Max | Nil | Fluorine Max | 0.02% |

**(b)** Using the information shown on the two labels, justify the two feeds in relation to the energy and protein needs of the broiler chickens at 2 weeks and 8 weeks of age. (4 marks, 10 lines)

**(c)** The graph represents the development of muscle, bone and fat in a beef steer (castrated male) from birth to mature weight. A 250kg live weight steer would supply the supermarket vealer trade and a 350 kg live weight steer would be destined as a "yearling" to supermarkets.




The changes in carcass composition that occur as a steer grows from birth to mature live weight.

Compare the carcass composition of a vealer with that of a yearling. (3 marks, 8 lines)

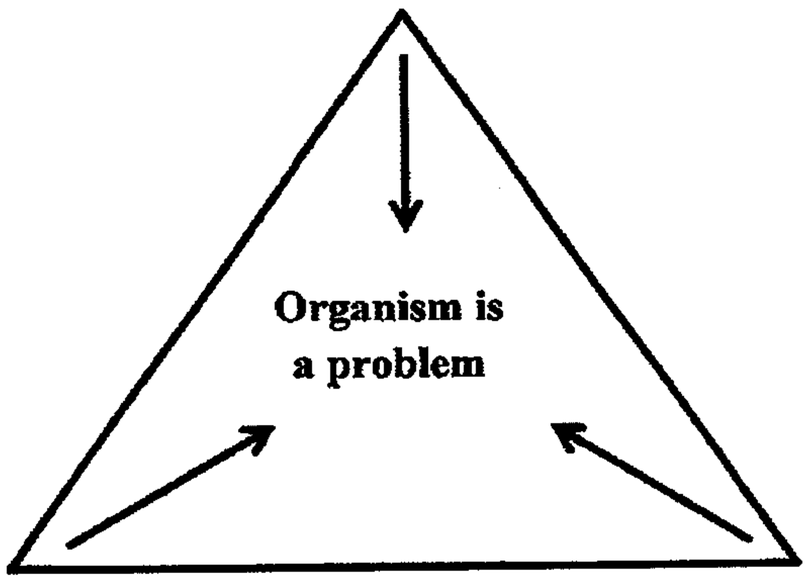
**Question 26. (11 marks)**

**(a)** For an animal disease or animal pest that you have studied –

**(i)** Identify the pest or disease and the farm animal.

.....

**(ii)** On the animal disease or pest triangle, include a description of the **susceptible host**, two **sources** of the pest of disease organism and two examples of a **favourable environment** for the pest or disease organism. (3 marks)




**(iii)** Explain why an Integrated Pest(or disease) Management program is the most effective practice to prevent and control a pest or disease. (3 marks, 8 lines)

**(b)** **Assess ONE of** – mulesing of lambs, live animal export, battery caged egg production, the use of farrowing crates in intensive piggeries - on the basis of animal welfare. (5 marks, 18 lines)

## SECTION II

**30 marks**

**Allow about 45 minutes for this section**

**Attempt ONE question from Questions 27 – 29**

Answer part (a) of the question in a writing booklet. Answer part (b) of the question in a SEPARATE writing booklet. Extra writing booklets are available.

In your answers you will be assessed on how well you –

* demonstrate knowledge and understanding relevant to the question.
* communicate ideas and information using relevant examples.
* present a logical and cohesive response.

### Question 27. – Agri-food, Fibre and Fuel Technologies (20 marks)

Answer part (a) in a writing booklet.

**(a)** **(i)** Identify a genetically modified plant that is used in agriculture or horticulture, describe the genetic modification and state one advantage that is gained from the genetically engineered plant. (3 marks)

**(ii)** During your study of this elective, you were required to analyse a Research Study on the development and/or implementation of one agricultural biotechnology product.

Outline the importance of the research and propose improvements to the research methods so that the results obtained are more relevant and useful. (5 marks)

Answer part (b) in a SEPARATE writing booklet.

**(b)** Discuss the issues related to genetically engineered (GE) or genetically modified (GM) plants and animals in agriculture. (12 marks)

**OR**

### Question 28. – Climate Challenge (20 marks)

**OR**

### Question 29. – Farming in the 21st Century (20 marks)

| | | |
|---|---|---|
| **Q26. (a) (i)** | An animal disease or pest – mastitis in the dairy cow | |
| **(ii)** | **Host** – older cow, with udder damage or poor udder structure → **Sources of bacteria** – infected cows, dung, soil, pasture, dirty milking machine → **Favourable environment for infective bacteria** – crowded dairy, wet and dung filled dairy, poorly cleaned milking machine → | 1 mark<br><br>1 mark (needed 2 sources)<br><br>1 mark (needed 2) |
| **(iii)** | **Examples** –<br>* IPM plans include many practices that fight the pest at different times during its life and so IPM maximises the chances of successful prevention and control.<br>* IPM uses many practices other than pesticides or antibiotics and so their use is less and so the disease organism or pest is less likely to develop resistance to these chemicals and they maintain their effectiveness.<br>* IPM programs mean that the farmer has to have a thorough knowledge of the targeted pest or disease organism to carry out the variety of practices and so the pest is more likely to be effectively controlled or prevented. | 3 correct and well described reasons for 3 marks.<br>Outlining the practices or restating the question – IPM is the most effective practice to prevent/control ….. " both received no marks.<br>"Environmentally friendly" or "not as costly"is not answering this question on IPM effectiveness. |
| **(b)** | Arguments for; arguments against; reasoned judgement (that doesn't mean just re-state the above arguments)<br>**Mulesing** –<br>For:<br>* Protects the sheep for the rest of its life from blowfly strike and possibly an agonising death being eaten by maggots.<br>* If carried out on lambs – they heal quickly, they bleed less and feel less pain.<br>* If carried out skilfully using clean equipment and the wound is spraying with an antiseptic, the risks of infection are avoided.<br>Against:<br>* PETA would claim it is not needed, it mutilates, it is painful.<br>* There is a risk of infection and excessive bleeding.<br>* This operation could be avoided by breeding wrinkles out of these Merino sheep.<br>Judgement:<br>* Presently mulesing is needed. It may be painful and unpleasant, however the alternative of a sheep dying from being eaten by maggots is far worse.<br>* Research is being done and alternative methods will eventually be available, eg. a spray that anaesthetises the area being cut, a protein that tightens the skin.<br>**Battery caged egg laying hens** –<br>For:<br>* Birds have free access to food and water. The food is a well balanced diet.<br>* Birds are protected from the weather as they are housed.<br>* Hens are protected from predators such as foxes.<br>* Hens will not pick up soil borne diseases including worms.<br>Against:<br>* Birds are enclosed in small wire cages and so they can't spread their wings and exercise properly.<br>* Hens can't carry out normal behaviours such as dust bathing and pecking for food.<br>* Hens can develop foot problems as they spend all of their time on wire mesh.<br>* Hens can peck each other as they are very close – either in the same cage or next to birds in the next cage.<br>Judgement:<br>* Battery caged hens are well protected and fed, however they can't carry out normal behaviours.<br>* Being in cages does reduce their lifespan and quality of life.<br>* It would be better if these hens could all be run "free range". | 5 marks – 1 for judgement; 4 marks for points for and against (had to be at least 2 points for and 2 against)<br><br>Each of the points shown have two parts to them and so would have been given 2 ticks.<br>After 10 ticks for 5 marks.<br><br>After 10 ticks for 5 marks. |

<table>
<tr>
<td>Elect<br>Q27.<br>(b)</td>
<td>Issues concerning GM plants and animals in Agriculture – some examples –<br>Positives -<br>GM animals:<br>* Taking pressure off the natural environment - AquAdvantage Salmon has had a gene for growth hormone production inserted into its DNA; its growth rate is twice that of Atlantic Salmon. This makes this GE fish very attractive for fish farming and so fishing pressure will be taken off the wild stocks of Atlantic Salmon<br>* Reducing the deaths of children in third world countries - A GM goat with the human gene for lysozyme production inserted into its DNA is being developed so that the goat milk will contain the enzyme and it can be given to children in third world countries. Lysozyme kills intestinal bacteria that cause diarrhoea and kill millions of children each year.<br>GM plants:<br>* Reducing the impact of insecticides on the wider environment, eg. fewer soil insects or beneficial insects such as bees are killed – Bt cotton has had Bacillus thuringiensis bacterium genes inserted into its DNA and so the cotton plant produced proteins that kill leaf eating Heliothus caterpillars. The farmer's use of insecticides is reduced.<br>* Improving the nutritional value of and the drought tolerance of a plant – wheat has genes inserted in it for improved protein levels and drought tolerance (hypothetical) and so this staple food can be used to improve the nutrition of peoples in third world countries and this wheat variety can be grown successfully in many more countries.<br>Negatives –<br>* Poor farmers in third world countries can't afford GM seed and so they can't use these improved crop varieties.<br>* Roundup ready crops are resistant to herbicides; if pollen from these crops spreads to weeds of the same plant family, herbicide resistant weeds may develop.<br>* The long term health consequences of consuming GM plant products has yet to surface (if there are any).<br>* GM plants produce new proteins. These proteins may be allergens that could possibly produce allergic reactions in people that eat them. etc.</td>
<td>12 marks<br><br>Needed to discuss GM animals and GM plants.<br><br>Needed 16 points for 12 marks; 14 for 11 marks; 12 for 10 marks; 10 for 9 marks; 8 for 8 marks; 6 for 7 marks; 5 for 6 marks.<br><br>Each issue needed to be correct and complete in its information.</td>
</tr>
<tr>
<td>Q25.<br>(a)</td>
<td>Rumen micro-organisms –<br>* Vitamins B and K synthesis by rumen microbes.<br>* Improve quality of protein – plant proteins are converted to microbial proteins, that would contain all the essential amino acids. The microbes are eventually digested in the abomasum, releasing this high quality protein for the animal's use.<br>* Cellulose digestion releasing fatty acids that are an energy source for the animal.<br>* Synthesis of protein from non-protein-nitrogen such as urea.</td>
<td>Four statements for 4 marks</td>
</tr>
<tr>
<td>(b)</td>
<td>For each feed, relate protein or energy (crude fat) content to chick's needs.<br>Starter crumbles –<br>* protein content is higher as chick growth and development is very rapid. →<br>* energy content is higher as it is needed for warmth and rapid G & D. →<br>Finisher feed –<br>* protein content is slightly lower as chick is still rapidly growing but at a slightly slower rate. →<br>* energy content is slightly lower as needs for warmth are less, the chick is still growing quickly, excess fat needs to be avoided. →</td>
<td><br><br>1 mark<br>1 mark<br><br><br>1 mark<br><br>1 mark</td>
</tr>
<tr>
<td>(c)</td>
<td>
<table>
<tr><td></td><td>Muscle</td><td>Fat</td><td>Bone</td></tr>
<tr><td>Vealer</td><td>60% of mature muscling</td><td>50% of mature fat cover (lean meat)</td><td>75% of mature skeletal development</td></tr>
<tr><td>Yearling</td><td>90% of mature muscling</td><td>70% of mature fat cover</td><td>90% of mature skeletal development.</td></tr>
</table>
</td>
<td>Needed to be a true comparison for 3 marks. If no true comparison, max marks possible = 2 marks<br>Muscle development – vealer vs yearling → 1 mark<br>Fat development – vealer vs yearling → 1 mark<br>Bone development – vealer vs yearling → 1 mark</td>
</tr>
</table>

**12 Agriculture – Trial HSC 2012 – marking guideline**

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| **MC Q 1. to 20.** | 1. A; 2. C; 3. C; 4. A; 5. D; 6. B; 7. C; 8. B; 9. A; 10. B; 11. B; 12. D; 13. A; 14. A; 15. B; 16. D; 17. B; 18. C; 19. A; 20. C. | 20 marks |
| **Q 21. (a)** | Name farm product – dairy cow wholemilk<br>Outline two financial pressures – two of capital investment, changing prices for produce, market/consumer demand, interest rates, meeting contract. | 2 X 2 marks |
| **(b)** | **Identify** two parts of the agribusiness sector and **describe how each assists the famer** – examples – Dairy Farmers Pty Ltd, vet, Dairy Express, NSW Food Authority, Landcare, CSIRO, etc | 2 X 1 mark (for each, identification = ½ mark; description = ½ mark |
| **(c) (i)** | One measure of –<br>Milk quantity eg. L/cow/day or L/cow/305 - 310 days<br>Milk quality eg. protein % or kg milkfat/100L milk | 2 X ½ mark |
| **(ii)** | From table, eg. calving interval, days dry, fat%, lactation period (length), SSC(Somatic Cell Count) | 2 X ½ mark<br>Must be from table |
| **(iii)** | Two examples –<br>* Improve milkfat levels by boosting quality Lucerne hay supplements or silage supplements.<br>* Cull cows for regular high SCC's; for low milk protein levels, for low milk production.<br>* Use high milkfat or high milk protein AI sires in the breeding program.<br>* Improve milk protein levels by boosting by-pass protein pellets supplements. | 2 X 1 mark |
| **Q 24. (a) (i)** | Ave wt. oestrogen 370kg , SD 12.9 or 12.3<br>Ave wt. progesterone 347.5(348), SD 11.6 or 11.01 | 4 X ½ mark |
| **(ii)** | Two conclusions (should be one on averages and one SD's) –<br>Examples –<br>* Oestrogen is more effective at increasing steer weight as the average steer weight at the end of the trial was higher for those on oestrogen.<br>* Progesterone produced a more even increase in bodyweight across the herd as was shown by the smaller standard deviation ( spread of weights either side of the mean) | 2 X 1 mark |
| **(iii)** | Trial design improvements –<br>* A group of steers given no hormone – a control<br>* Greater replication – a larger number of steers in each group.<br>* Improved standardisation – all steers should have been of one age eg. 12 months. | 2 X 1 mark |
| **(b)** | Describe two other practices to improve growth and development –<br>* Feed additives eg. molasses lick block<br>* Feed supplements eg. By-pass protein pellets, Lucerne hay, silage<br>* Selectively breed using high growth rate sires (bulls) – this could include using high growth rate AI sires. | 2 X 1 mark |

**Elective**

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| Q27. (a) (i) | One genetically modified plant is Flavr Savr tomato.<br>The process of genetic modification involves isolation of the gene responsible for softening, making a copy of it and putting the copy into the tomato DNA backwards.<br>For the last 20 years, tomatoes have been bred to withstand transport and handling. The result was firm undamaged fruit with a long shelf life but reduced flavour.<br>An advantage gained from this genetic modification/manipulation is that the softening process slows down allowing the tomato to stay on the vine longer to develop extra flavour. | 6 good points for 3 marks. |
| (ii) | During your study of this elective you were required to analyse a research study on the development and/or implementation of one agricultural biotechnology product, ie. The effectiveness of four bio-pesticides in controlling Heliothis caterpillar in lettuce crops in Victoria.<br>**The importance of the research includes –**<br>* lettuce crop losses from Heliothis caterpillars were high – 10% in the lettuce growing areas in Victoria.<br>* the Heliothis caterpillar has developed resistance to all conventional insecticides<br>**Improvements to the research methods so that the results obtained were more relevant and useful, include –**<br>* the trial should have included some conventional insecticides, so that a comparison between bio-insecticides and conventional insecticides could be made.<br>* it would have been more valid to complete the trial in the field as in-lab bio-assays are too controlled, unlike the on farm environment under which commercial lettuces are grown.<br>* some experimental design features could have been improved eg. replication – instead of five field plots per treatment, ten could have been set up and this would have made means (averages) more accurate. | Outstanding answers had over 20 points (ticks) for 5 marks |