education

Department:
Education
REPUBLIC OF SOUTH AFRICA

NATIONAL
SENIOR CERTIFICATE

GRADE 12

AGRICULTURAL SCIENCES P1

NOVEMBER 2009

MARKS: 150

TIME: 2½ hours

This question paper consists of 15 pages and 1 answer sheet.

INSTRUCTIONS AND INFORMATION

1.   Answer ALL the questions.

2.   SECTION A (QUESTION 1) must be answered on the attached ANSWER SHEET.

3.   SECTION B (QUESTIONS 2 to 4) must be answered in the ANSWER BOOK.

4.   Start each question from SECTION B on a NEW page.

5.   Read ALL the questions carefully and answer only what is asked.

6.   Number the answers correctly according to the numbering system used in this question paper.

7.   Place your ANSWER SHEET for SECTION A (QUESTION 1) in your ANSWER BOOK.

8.   Write neatly and legibly.

SECTION A

QUESTION 1

1.1   Various options are provided as possible answers to the following questions. Choose the correct answer and make a cross (X) in the block (A – D) next to the question number (1.1.1 – 1.1.10) on the attached ANSWER SHEET.

Example:

| 1.1.11 | X | B | C | D |

1.1.1   The protein used as an indicator to compare the essential amino acid composition of other proteins is …

A   egg protein.
B   peanut-oilcake protein.
C   fish protein.
D   lucerne protein.

1.1.2   The end products of digestion which are absorbed in the rumen of ruminant animals are …

A   sugars.
B   fats.
C   amino acids.
D   volatile fatty acids.

1.1.3   The stomach of the ruminant animal which corresponds to the glandular stomach of the pig is the …

A   abomasum.
B   jejunum.
C   rumen.
D   reticulum.

1.1.4   Protein is an expensive component in a feed mixture. In ruminant animals the required protein value for a ration is improved by the inclusion of … to make the feed mixture more cost-effective.

A   carcass meal
B   blood meal
C   fish meal
D   urea

1.1.5   An organic sheep production system uses a dose of 200 mℓ of boiled *Acacia karoo* bark administered to keep animals in a healthy and productive condition. This practice was developed from … knowledge.

    A   indigenous
    B   contemporary
    C   European
    D   African

1.1.6   Meat forms an important product in the livestock industry. One of the following is NOT a characteristic of pale meat obtained from animals slaughtered under stressful conditions. It ...

    A   is more firm.
    B   is tough.
    C   has less mass.
    D   is of poor quality.

1.1.7   To increase production per unit area, chickens are kept in a … system.

    A   backyard
    B   deep-litter
    C   free-range
    D   battery

1.1.8   The most important equipment that a beef farmer needs in order to measure the production output of his/her animals:

    A   Castrating pliers
    B   Electronic scale
    C   Ear tag gun
    D   Neck clamp

1.1.9   Which ONE of the following characteristics is NOT obtained by cross-breeding?

    A   Greater vitality
    B   Better fertility
    C   Genetic uniformity
    D   Greater resistance to diseases

1.1.10   The hormone that is found in lucerne and clover pastures and leads to oestrus in pregnant animals is …

    A   relaxin.
    B   oxytocin.
    C   oestrogen.
    D   prolactin.   (10 x 2)   (20)

1.2　　　In the table below a description and TWO possible answers are given. Decide whether the description in COLUMN B relates to A only, B only, both A and B or NONE of the answers in COLUMN A and make a cross (X) in the block (A – D) next to the question number (1.2.1 – 1.2.5) on the attached ANSWER SHEET.

Example:

COLUMN A		COLUMN B
A:	liver	The place where bile is stored in the animal body
B:	gall bladder	

Answer:

The description refers to:			
ONLY A	ONLY B	A and B	NONE
A	B	C	D

|	COLUMN A		COLUMN B
1.2.1	A:	Oatmeal	Protein-rich concentrate
	B:	Maize meal	
1.2.2	A:	Hormones	Substances that are inserted into animals to increase their growth
	B:	Vaccines	
1.2.3	A:	Blood slides	Measurements used to determine the health status of the animal
	B:	Body temperature	
1.2.4	A:	Corpus luteum	Remain(s) until the end of pregnancy
	B:	Graafian follicles	
1.2.5	A:	Mites	The external parasites on sheep which attack the tail areas
	B:	Blowflies	

(5 x 2)　　　(10)

1.3   Give ONE term/phrase for each of the following descriptions. Write only the term/phrase next to the question number (1.3.1 – 1.3.5) on the attached ANSWER SHEET.

      1.3.1   The stomach compartment of a cow where most of the enzymatic digestion takes place

      1.3.2   The structure in the wall of the small intestine that increases the absorption surface

      1.3.3   An animal production system that is capital and labour intensive

      1.3.4   The phenomenon where the testes remain behind in the abdominal cavity

      1.3.5   A method whereby an elastic ring is used to remove an animal tail   (5 x 2)   (10)

1.4   Change the UNDERLINED WORDS in each of the following statements to make them TRUE. Write the appropriate word next to the question number (1.4.1 – 1.4.5) on the attached ANSWER SHEET.

      1.4.1   The concept nutritive ratio is used to give an indication of the <u>mineral</u> content of a feed.

      1.4.2   A feed flow program is based on the <u>temperature</u> requirements of animals in a herd and the availability and cost of feed components for optimal production.

      1.4.3   <u>Breeding</u> is crucial in reducing the effects of extreme environmental conditions on animal production.

      1.4.4   Using measured quantities of feed which are directly linked to the exact quantity needed by animals in their production stage, is part of <u>conventional</u> farming.

      1.4.5   <u>Castration</u> is the period that starts with the fertilisation of the ovum and ends with parturition (birth).   (5 x 1)   (5)
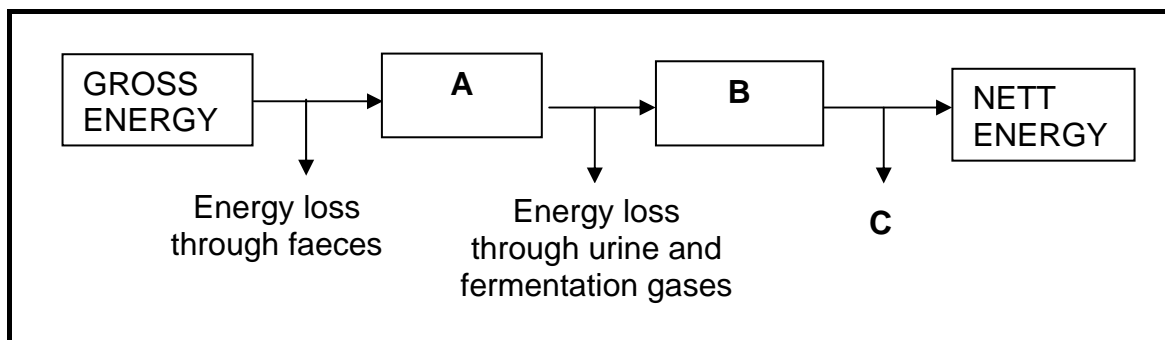
TOTAL SECTION A: 45

SECTION B

START THIS QUESTION ON A NEW PAGE.

QUESTION 2: ANIMAL NUTRITION

2.1   The diagrams below represent the differences between two ruminant animals from the same species at different ages. The digestive processes in each of the digestive systems differ.
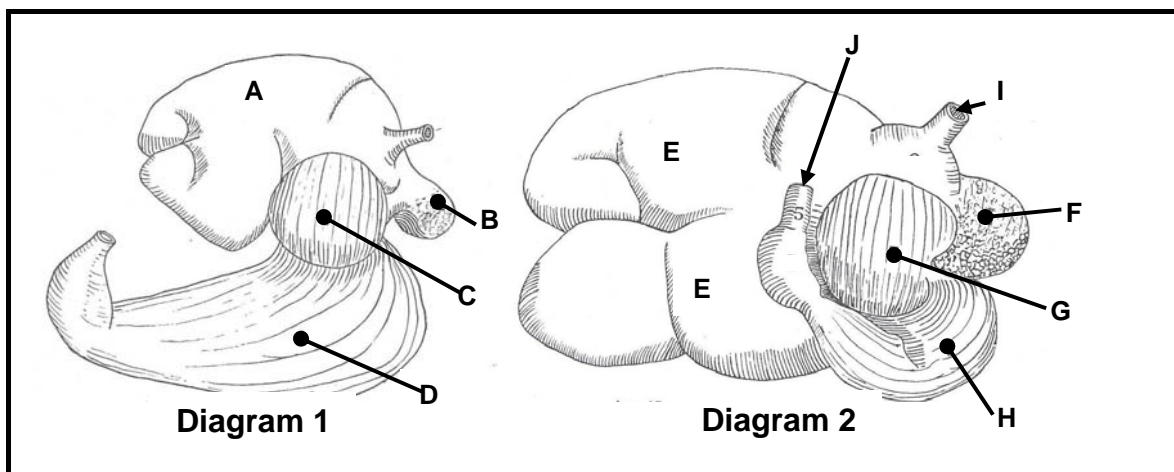
Diagram 1   **Diagram 2**

2.1.1   Identify the digestive system of the younger ruminant. Give a reason for your answer by referring to the above diagrams.   (2)

2.1.2   Tabulate the labels A to D in Diagram 1 and pair them with similar structures labelled E to H in Diagram 2 in the digestive systems indicated above.   (4)

2.1.3   Name the structures labelled I and J in Diagram 2 above.   (2)

2.1.4   From the above diagrams, indicate the part that is most suitable for the digestion of crude fibre (cellulose). Explain your answer by referring to the adaptation of this organ for the digestion of cellulose.   (4)

2.2   The schematic representation below indicates energy loss in the animal body.

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┌─────────────────────────────────────────────────────────────────────┐
│  ┌─────────┐      ┌─────────┐      ┌─────────┐      ┌─────────┐        │
│  │ GROSS   │─────▶│    A    │─────▶│    B    │─────▶│ NETT    │        │
│  │ ENERGY  │  │   └─────────┘  │   └─────────┘  │   │ ENERGY  │        │
│  └─────────┘  ▼                ▼                ▼   └─────────┘        │
│            Energy loss      Energy loss                               │
│            through faeces   through urine and       C                 │
│                             fermentation gases                        │
└─────────────────────────────────────────────────────────────────────┘
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2.2.1   Name the labels represented by A and C in the above schematic
          representation.   (2)

2.2.2   Give THREE reasons why it is important to know the nett energy
          value of a feed.   (3)

2.2.3   Explain how the nett energy value will change if the farmer
          increases the lipid or fat content of a feed.   (2)

2.2.4   Select from ruminant and monogastric animals a farm animal that
          would have the highest metabolic energy value. Explain your
          answer.   (3)

2.3   An experimental trial was conducted with sheep to determine the digestibility
        of a newly developed lucerne cultivar. During the experimental period the
        mass of feed intake was measured as well as the mass of excretion. The
        table below shows the data from this experimental trial.

FEED COMPONENT	LUCERNE FEED (%)	MANURE (%)
Moisture	8	4
Dry material	92	96

The total feed intake of a sheep was 7 kg lucerne and the mass of excreted
manure was 2 kg.

2.3.1   Feeds are classified as either roughages or concentrates.
          Roughages and concentrates are also classified as protein rich or
          protein poor. Indicate the possible classification of lucerne hay as a
          feed.   (2)

2.3.2   Calculate the co-efficient of digestibility of this experimental lucerne
          hay. Show ALL your calculations.   (4)

2.3.3   Explain the difference in protein requirement between younger sheep
          and older sheep.   (2)

2.3.4   Only lucerne hay was used as a feed to supply nutritional requirements for these sheep. Supply TWO reasons why lucerne hay would be suited for this purpose by referring to the nutritional value of lucerne hay. (2)

2.3.5   Describe THREE ways to improve the digestibility of lucerne hay. (3)

[35]

START THIS QUESTION ON A NEW PAGE.

QUESTION 3: ANIMAL PRODUCTION

3.1   You investigated the production outputs of two feedlots (Sondela Feedlot and Nkomani Feedlot).

The production output was calculated by combining the daily weight gain, days at the feedlot, carcass value and grading of the carcass.

The average feeding cost per animal was calculated as units of an index value, and the cost of their breeding and genetic improvement programmes were also calculated as such index values.

The table below represents production outputs and cost distribution (feeding and genetics) per animal calculated as index values for these two farmers.

Farm	Output/animal (index value)	Feeding cost/animal (index value for total cost)	Breeding and genetic improvement cost/animal (index value for total cost)
Sondela Feedlot	72	60	18
Nkomani Feedlot	68	75	6

3.1.1   Indicate the feedlot which operated at the highest cost. (1)

3.1.2   Determine the feedlot which operated in the most cost-efficient way. Explain your answer by referring to the given data. (3)

3.1.3   Deduce from the data the most cost-efficient way to improve the output of a feedlot. (1)

3.1.4   Name ONE environmental factor that may have an influence on the production. (1)

3.1.5   Recommend ONE possible method that could be implemented to improve the genetic potential of animals in a feedlot. (1)

3.2   Read the following scenario with regard to two dairy farmers:

Farmer A: In a rural area of the country a small-scale farmer operates a dairy enterprise with 30 cows. They are milked by hand with limited facilities. This milking is done under a tree next to the homestead.
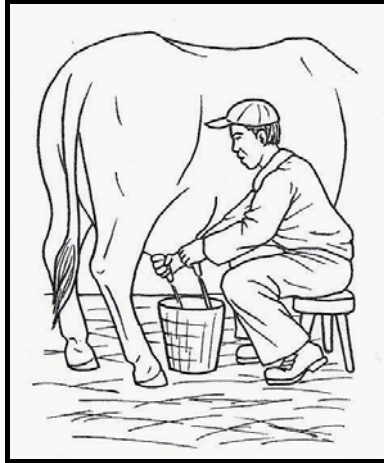
Farmer B: This farmer is one of the largest dairy producers in South Africa. The farmer owns 1 600 cows. The farm is situated close to a major metropolitan area. The housing facilities are equipped with the latest technology for environmental control such as ventilation to ensure optimum production levels.
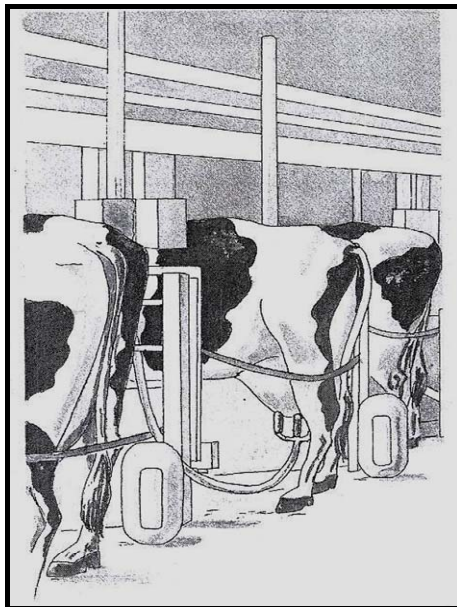
3.2.1   Explain the meaning of optimum environmental temperature as mentioned in the scenario above.   (1)

3.2.2   Predict the effect of extreme temperatures (too high temperatures and too low temperatures) on feed intake.   (2)

3.2.3   Indicate TWO possible measures that are taken by farmer B to control high temperatures in this dairy production unit.   (2)

3.3   Moving animals is a common practice in a livestock production enterprise. This is done to move animals from different grazing fields, to bring them into the handling facilities and to transport them to markets.

Indicate THREE requirements for the movement or transport of animals on public roads as required by government regulations or legislation.   (3)

3.4   A successful dairy farmer intends to change from the conventional farming system to the latest system of organic farming. This environmentally-friendly system involves lucerne pastures under irrigation and fertilisation. This farmer is presently being inspected by the consultant of the internationally recognised organic farmers' association.

3.4.1   Indicate the main reason why this farmer is being inspected by the consultant of the organic farmers' association.   (1)

3.4.2   Indicate FIVE possible requirements or criteria for organic farming that this association would inspect and monitor on this dairy farm.   (5)

3.4.3   Explain the necessity for organic farmers to register with a recognised association for organic farmers with reference to the marketing of their produce.   (2)

3.4.4   Suggest the TWO main advantages why the farmer should change from a conventional farming system to an organic farming system.   (2)

3.5   Natural grazing is the cheapest form of animal nutrition for ruminant farm animals. The graph below represents the nutritional value of a natural grazing pasture during the year in the summer rainfall area.
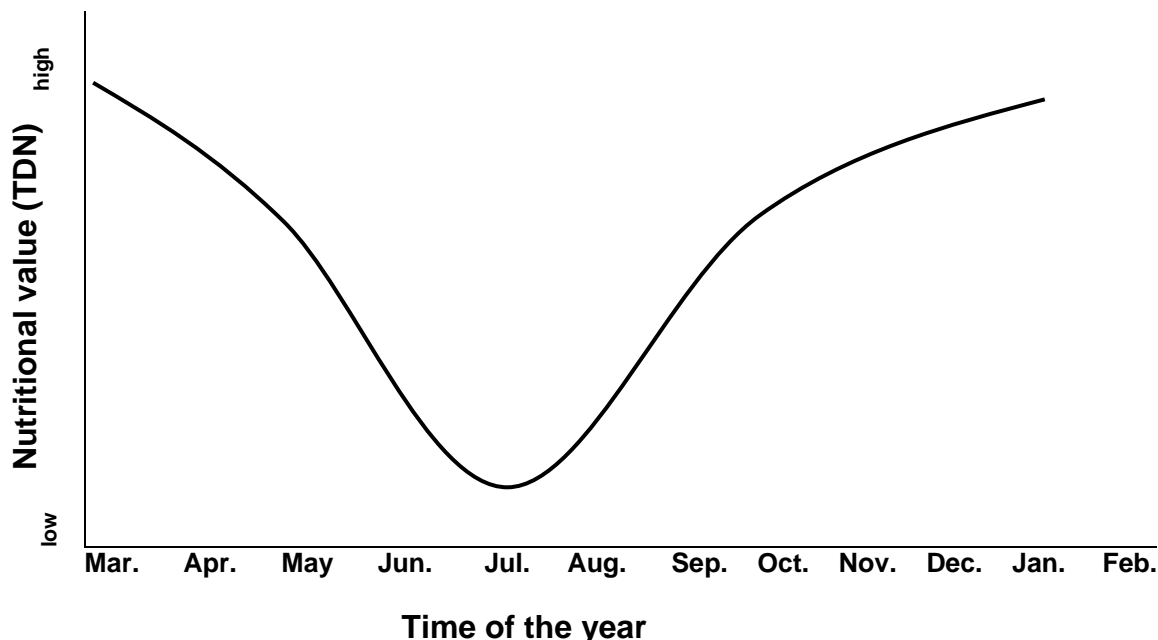
3.5.1   Name the month of the year when the grazing has its lowest nutritional value. Give TWO reasons for this by referring to climatic conditions.   (3)

3.5.2   Describe TWO observations, with regard to the condition of a grazing pasture, that a farmer would make to measure its nutritive value.   (2)

3.5.3   The farmer needs to decide when to market the bulk of the stock. Indicate the season of the year that this farmer would schedule to have an auction for the bulk of the marketable stock. Explain the main reason for your answer.   (2)

3.5.4   When will this farmer need to include mineral licks in the pasture fields?   (1)

3.5.5   Motivate your answer to QUESTION 3.5.4 by referring to the given data.   (2)

[35]

START THIS QUESTION ON A NEW PAGE.

QUESTION 4: ANIMAL REPRODUCTION, PROTECTION AND CONTROL

4.1   Animal diseases are a serious challenge to livestock production. Livestock diseases can be caused by a number of disease-carrying agents (pathogens). It is important for livestock breeders to know and control animal diseases.

        4.1.1   Explain the way ticks transmit diseases to animals.   (2)

        4.1.2   Describe THREE control measures that a farmer should adopt to restrict infectious diseases.   (3)

4.2   The development of the embryo starts with fertilisation and ends with the birth of the young. The diagrams below indicate a developed embryo and some of the processes involved in fertilisation.
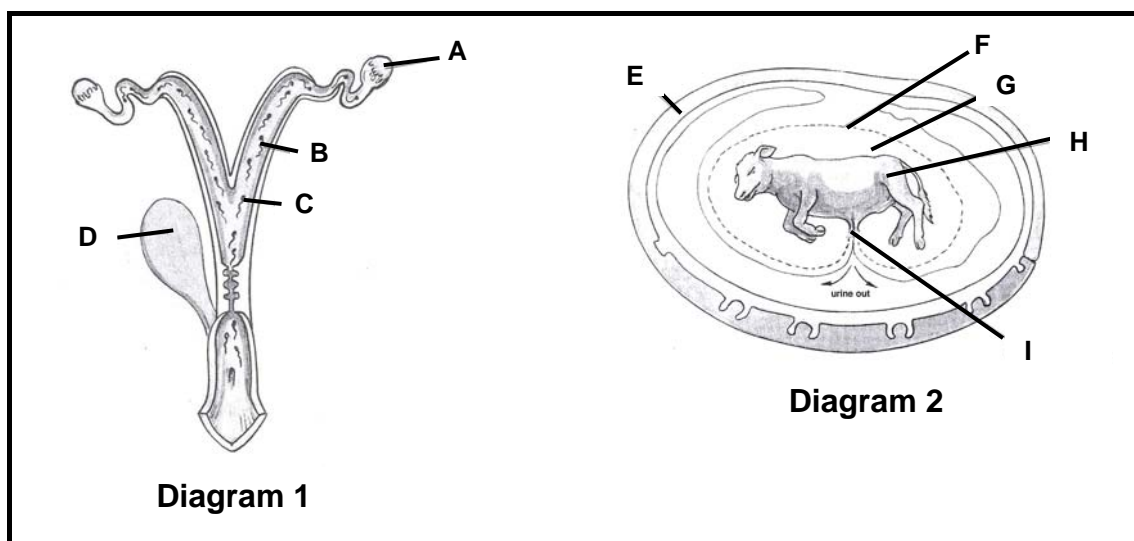
Diagram 1

Diagram 2

        4.2.1   Name the hormone responsible for the release of the ovum and also name this process.   (2)

        4.2.2   Identify the site where fertilisation occurs in Diagram 1.   (1)

        4.2.3   State TWO functions of the membranes that develop around the embryo.   (2)

        4.2.4   Pregnancy could be terminated before natural parturition (birth). Describe TWO possible causes of this situation.   (2)

   4.2.5   Name TWO visible signs that you could use to predict that a cow is about to give birth.   (2)

4.3   The diagram below illustrates the life cycle of one of the animal pests.
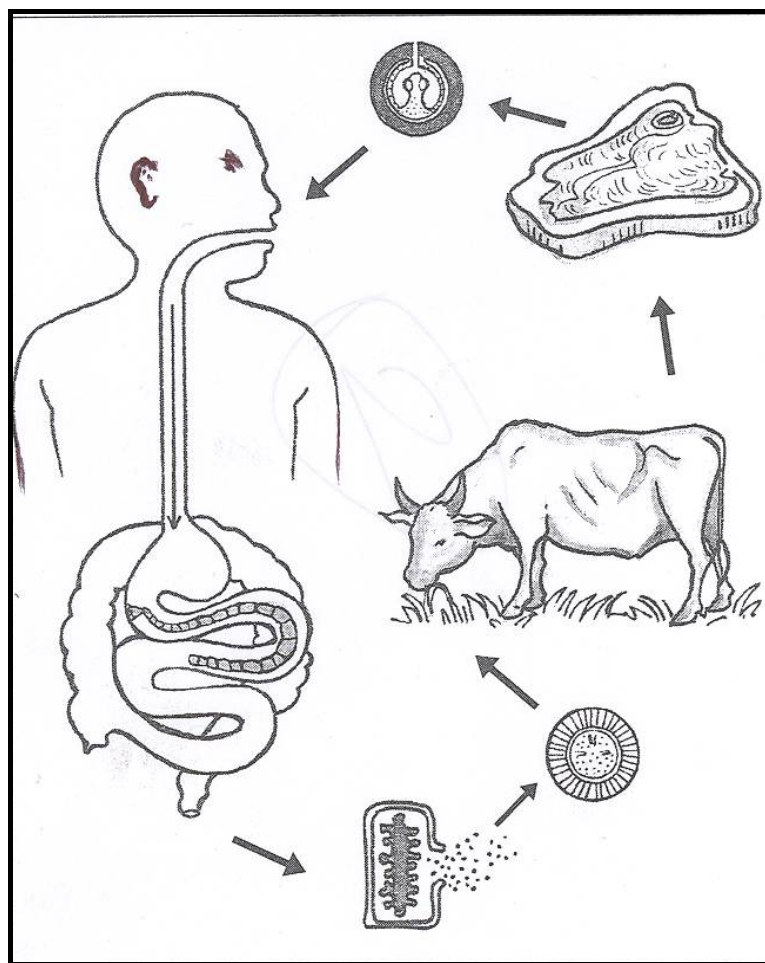
4.3.1   NameTHREE harmful effects of the animal pest shown in the above
         diagram.   (3)

4.3.2   Suggest how the animal in the above diagram gets infected by this
         animal pest.   (1)

4.3.3   Identify the TWO hosts which are required by the pest to complete its
         life cycle.   (2)

4.3.4   The pest in the above diagram has a negative effect on the health of
         human beings after consumption of such infected animal products.
         Indicate a measure that was taken by the government to ensure that
         animal products are not contaminated by this pest.   (1)

4.3.5   Suggest the most suitable chemical method of applying the remedies
         you would use to control the pest illustrated above. Give a reason for
         your answer.   (2)

4.3.6   State the specific name of the pest that is involved in this case.   (1)

4.4   The picture below depicts egg production with layers under a free-range system.
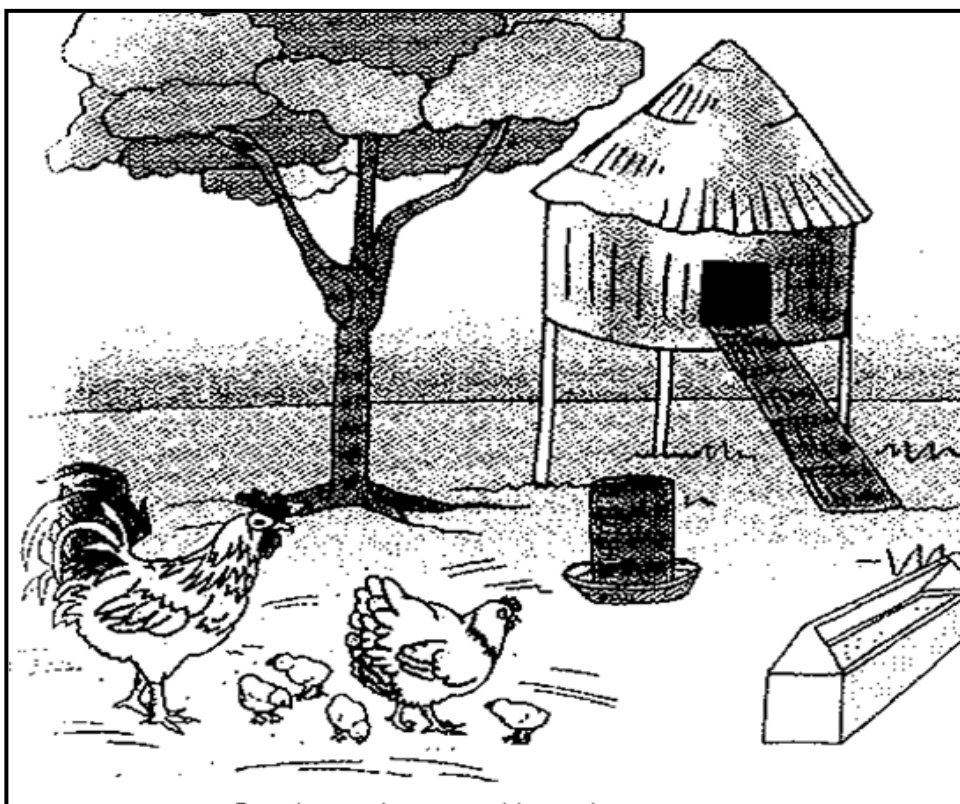
In tabular form, show THREE differences in the health- and disease-control approaches between the free-range system and the battery system (controlled agriculture environment) of chicken production.   (6)

4.5   The following are examples of vitamins associated with animal diseases:

Vitamin D; Vitamin K; Vitamin A; Vitamin B_2; Vitamin E; Vitamin B_{12}

Select the correct vitamins from the list above that are associated with each of the following deficiency diseases:

4.5.1   Curled-toe paralysis in chickens   (1)

4.5.2   Osteomalacia in adult animals   (1)

4.5.3   Night-blindness   (1)

4.5.4   Prolonged clotting of blood   (1)

4.5.5   Rickets in young animals   (1)
                                                                     [35]

TOTAL SECTION B: 105

GRAND TOTAL: 150

SECTION A

EXAMINATION NUMBER: _____

CENTRE NUMBER: _____

QUESTION 1.1

1.1.1	A	B	C	D
1.1.2	A	B	C	D
1.1.3	A	B	C	D
1.1.4	A	B	C	D
1.1.5	A	B	C	D
1.1.6	A	B	C	D
1.1.7	A	B	C	D
1.1.8	A	B	C	D
1.1.9	A	B	C	D
1.1.10	A	B	C	D

(10 x 2) (20)

QUESTION 1.3

1.3.1   _____

1.3.2   _____

1.3.3   _____

1.3.4   _____

1.3.5   _____

(5 x 2) (10)

QUESTION 1.4

1.4.1   _____

1.4.2   _____

1.4.3   _____

1.4.4   _____

1.4.5   _____

(5 x 1) (5)

QUESTION 1.2

	ONLY A	ONLY B	A and B	NONE
1.2.1	A	B	C	D
1.2.2	A	B	C	D
1.2.3	A	B	C	D
1.2.4	A	B	C	D
1.2.5	A	B	C	D

(5 x 2) (10)

TOTAL SECTION A: 45