

Agri Science June 2011 Paper 2

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SECTION I

Answer ALL questions in this section.

Write your answers in the spaces provided in this booklet.

1. Mrs James gets 10 hectares of arable land for agriculture.

(a) State TWO factors of production that she must consider.

Any 2 of the following:
labor; capital; management

(2 marks)

(b) Mrs James completes a loan application form but is unsuccessful in getting the loan. Suggest TWO criteria required to obtain a loan.

Any 2 of the following:
collateral; farm proposal and budget; farm records; character references

(2 marks)

Total 4 marks

2. Caribbean agriculture is affected by many constraints (challenges). One constraint is a negative attitude towards agriculture.

(a) Name TWO OTHER constraints affecting agriculture in the Caribbean.

Any 2 of the following: access to financing; aging farm population;

Climate and topography; lack of adequate extension services;

lack of appropriate technology; predial larceny; land tenure;

lack of rural infrastructure

(2 marks)

(b) Provide TWO arguments to convince your fellow students to become involved in agriculture.

Agriculture provides a wide range of career options

Agriculture provides partial or complete food security for farmers

(2 marks)

Total 4 marks

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3. Crop rotation is often recommended to farmers because it reduces levels of pests and diseases.

(a) Briefly explain how crop rotation reduces pests and diseases.

Many crop pests and diseases thrive on specific types of crops.
Crop rotation reduces prevalence of pests and diseases by changing the type of crop grown, denying a particular pest or disease its target crop.

(2 marks)

(b) A farmer wants to grow corn, sweet potato, beans and lettuce. Complete the following crop rotation sequence which can be used for growing these crops.

(1)
Corn

(4)

Sweet potato
.....

(2)

Beans
.....

(3)

Lettuce
.....

(2 marks)

Total 4 marks



4. An agronomist conducts an experiment to study the effect of soil compaction on tuber production of yam.

(a) Name the part of the plant that is used for propagating yam.

Tuber

(1 mark)

(b) The plot of yam becomes heavily infested with weeds. State ONE effect this is likely to have on the production of yam.

Reduced tuber yield via competition for nutrients

(1 mark)

(c) Table 1 shows the results of the experiment conducted by the agronomist.

**TABLE 1:
THE EFFECT OF SOIL COMPACTION ON TUBER YIELD IN YAM**

Degree of Soil Compaction	Tuber Yield (t/ha)
Not compacted	20
Slightly compacted	15
Moderately compacted	12
Highly compacted	7

Describe the relationship between soil compaction and tuber yield, shown in Table 1.

The higher the compaction, the lower the yield

(1 mark)

(d) A farmer attempts to till a compacted soil with a garden fork but he is unsuccessful. Recommend ONE tillage implement that can be used to break up the compacted layer.

Subsoiler/chisel plough

(1 mark)

Total 4 marks

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5. A rabbit farmer needs to improve production on his rabbitry.

(a) State TWO breeding methods used in rabbit production.

Any 2 of the following: line breeding, pure breeding, upgrading and cross breeding.

(2 marks)

(b) To improve production of the next generation, the farmer decides to select rabbits showing high growth rates. Suggest TWO OTHER qualities or traits he may select.

Any 2 of the following:
healthy animals; good pedigree; good body conformation; good FCR/
dressing percentage

(2 marks)

Total 4 marks



6. (a) Figure 1 and Figure 2 show the digestive tract of a goat and a broiler bird respectively.

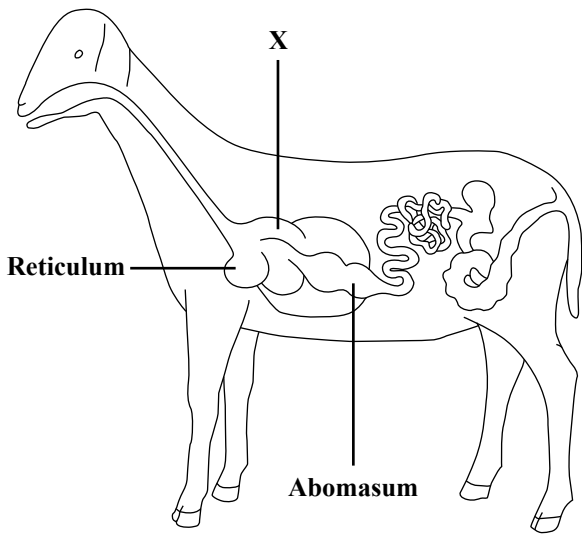


Figure 1. Digestive tract of a goat

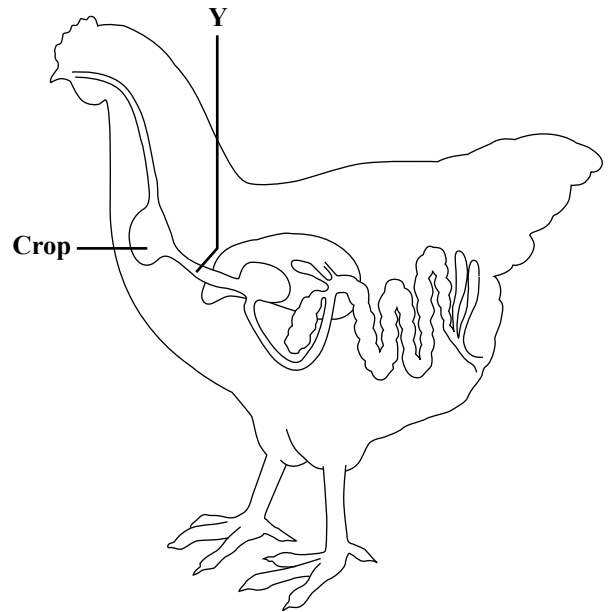


Figure 2. Digestive tract of a broiler bird

Identify the structures labelled X in Figure 1 and Y in Figure 2.

X: **Rumen**

Y:

(2 marks)

(b) A farmer digs a shallow pond on a clayey soil to rear tilapia. After filling the pond, the water almost completely drains out.

(i) Suggest the MOST likely cause of this problem.

One of the following: very porous soil; failure to compact soil before filling

(1 mark)

(ii) Recommend ONE solution to this problem.

Line the pond with polythene

(1 mark)

Total 4 marks



SECTION II

Answer ALL questions in this section.

Write your answers in the spaces provided in this booklet.

7. (a) Table 2 is an example of an incomplete breeding record of a doe. Three of the headings are missing.

TABLE 2: BREEDING RECORD OF A DOE

Date Mated	Buck Used	Date Weaned	Number of Offspring Born Alive	Number of Offspring Died	Date Doe Kindled	Number Weaned

Complete the record by inserting the following headings in the correct order in Table 2.

- Date doe kindled
- Date mated
- Date weaned

(3 marks)



- (b) Farmer Raj grows corn and rears goats. Table 3 shows the financial accounts for his mixed farm enterprise.

TABLE 3: FINANCIAL ACCOUNT

Item	Money (\$)
Goats sold	250 000
Replacement does	55 000
Housing and equipment	100 000
Farm operator salary	20 000
Cost of corn seeds	5 000
Subsidy on land preparation	10 000
Feed costs	50 000
Sale of corn	50 000
Casual labour	10 000

- (i) Using the information in Table 3, list the variable costs and the fixed costs.

<u>Variable Costs</u>	\$
Replacement does	55,000
Farm operator salary	20,000
Cost of corn seeds	5,000
Feed costs	50,000
Casual labor	10,000

<u>Fixed Costs</u>	\$
Housing and equipment	100,000

(3 marks)

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- (ii) Calculate the gross income and the net income. **Show all your working.**

Gross income

$$\begin{aligned} &\text{Goat sold + Subsidy on land preparation} \\ &= \$250,000 + \$10,000 \\ &= \$260,000 \end{aligned}$$

Net income

$$\begin{aligned} &\text{Gross income - (Total variable costs + Total fixed costs)} \\ &= \$260,000 - (\$140,000 + \$100,000) = \$20,000 \end{aligned}$$

(4 marks)

- (iii) State whether or not the farmer's business is successful. Explain your answer.

Yes, the business was successful because it made a profit.

(2 marks)

Total 12 marks



8. (a) (i) State TWO effects that the overuse of fertilisers may have on the environment.

Any 2 of the following: fertilizer burn of plants, environmental pollution, increased soil acidity

(2 marks)

- (ii) State ONE benefit of mulching.

Any 1 of the following: reduces water loss; adds nutrients to the soil; controls weeds.

(1 mark)

- (b) A farmer cultivates a leafy vegetable crop and a root crop on flat land. Compare the cultivating practices (similarities and differences) of these TWO crops under the following headings:

- (i) Land preparation
- (ii) Fertiliser application
- (iii) Harvesting and post-harvest handling

Land preparation

.....
Removing weeds and tilling the soil to a fine tilth, for both crops.

Make flat top beds for leaf crop, and ridges and furrows for root crop.
.....

Fertilizer application

.....
Adding organic matter and nitrogenous fertilizer for the leafy crop.

and in the early stages of growth for root crop.
.....

Mixed fertilizer for the root crop.
.....

Harvesting and post-harvest handling

.....
Use of a knife to cut away the head at the base for leafy crop.

Use of a fork or other digging tool for the root crop.
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(9 marks)

Total 12 marks

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9. (a) Name a meat breed for EACH of the following classes of livestock:
- (i) Pig **One following: Landrace; Large White; Duroc; Hampshire; Tamworth**
 - (ii) Goat **One following: British Alpine; Anglo-Nubian; Saanen; Toggenburg**
 - (iii) Rabbit **One following: Flemish Giant; New Zealand White; New Zealand Red; California; Chinchilla**
- (3 marks)**
- (b) An Agricultural Science student carried out an experiment over a four-week period to evaluate the performance of rabbits on a forage diet and on a concentrate diet. Table 4 shows the results of the experiment.

TABLE 4: FEEDING EXPERIMENT ON RABBITS

Week	Average Weight of Rabbit on a Forage Diet (kg)	Average Weight of Rabbit on a Concentrate Diet (kg)
1	0.4	0.4
2	0.5	0.6
3	0.9	1.2
4	1.2	1.4

- (i) On which of the diets, forage or concentrate, did the rabbits gain MORE weight?
- Concentrate**
- (1 mark)**
- (ii) Calculate the increase in average weight of the rabbits on the concentrate diet, from one week to four weeks.

$$1.4 - 0.4 = 1 \text{ kg}$$

Weight at end of week 1 - 0.4 kg

Weight at end of week 4 = 1.4 kg

Therefore weight gain from week 1 to week 4 = 1.4 - 0.4 = 1 kg

(1 mark)



- (iii) At the end of four weeks, an average of 4.2 kg of feed was consumed by each rabbit. Calculate the Feed Conversion Ratio (FCR) on the concentrate diet, using the data in Table 4 on page 12.

$$4.2 \div 1.4 = 3$$

FCR = feed consumed ÷ total weight gain

Average feed consumed after 4 weeks = 4.2 kg

Average weight after 4 weeks = 1.4 kg

The animals used 4.2 kg of feed to gain 1,4 kg of weight after 4 weeks.

Therefore FCR = 4.2 ÷ 1.4 = 3

(2 marks)

- (iv) Explain the importance of Feed Conversion Ratio in livestock production.

It informs the farmer of hoe efficient an animal is at converting feed to meat.

(2 marks)

- (c) One rabbit in the experiment showed the following signs:

- Frequent shaking of its head
- Scabs in its ear
- A foul-smelling substance oozing from the ear

Suggest the likely cause of this condition and state TWO methods for controlling it.

Cause: Mange

Control:

Massage mineral oil into the ear; clean ear with suitable antiseptic solution;

use of acaricides to kill mites tthe hat cause the condition; strict sanitation

(3 marks)

Total 12 marks

END OF TEST

