

## 16.0 AGRICULTURE (443)

The year 2010 K.C.S.E Agriculture Examination consisted of three papers, **Paper 1**, **Paper 2** and **Paper 3**. The three papers tested the candidates' competence in understanding the agricultural principles, concepts and practices as stipulated in the syllabus. A wide range of knowledge and skills was tested in order to bring out the different abilities of the candidates. The format of the three papers is as follows:

- **Paper 1 (443/1):** This is a theory paper that covers **General Agriculture, Crop Production, Agriculture Economics and Soil and Water Conservation**. It has three sections, **A, B and C**, which are marked out of 30, 20 and 40 marks respectively.
- **Paper 2 (443/2):** It is also a theory paper but covers **Livestock Production, Farm Power, Farm Machinery, Farm Structures and Farm Tools and Equipment**. It has three sections, **A, B and C**, which are also marked out of 30, 20 and 40 marks respectively.
- **Paper 3 (443/3):** This is a project paper with two project questions, **Project A and B**. In 20010, Project A required candidates to **rear chicken** while B was on production of **tomato/maize/sorghum/millet**. Candidates selected and carried out only one of the two projects. The paper is scored out of 100 marks.

### 16.1 CANDIDATES' OVERALL PERFORMANCE

The table below shows the general performance of candidates in the year 2010 KCSE Agriculture Examination. Performance in the previous four years has been included for comparison.

*Table 21: Candidates overall performance in Agriculture for the last four years*

Year	Paper	Candidature	Maximum Score	Mean Score	Standard Deviation
2010	1		90	24.82	11.58
	2		90	36.07	15.07
	Overall	140,237	180	67.96	27.12
2009	1		90	33.54	15.10
	2		90	34.91	13.49
	Overall	137,217	180	77.67	29.12
2008	1		90	32.32	15.11
	2		90	25.59	11.64
	Overall	134,039	180	67.1	27.32
2007	1		90	26.94	12.04
	2		90	53.98	16.89
	Overall	121,193	180	87.34	28.00

The following observations can be made from the summary in the table:

- 16.1.1 Candidates' performance in Agriculture dropped. This is shown by the drop in the general mean scores for the two papers. **Paper 1 (443/1)** mean score dropped from **33.54** in the year 2009 to **24.82** in the year 2010. However the mean score for **Paper 2 (443/2)** improved from **34.91** in the year 2009 to **36.07** in the year 2010.
- 16.1.2 The candidates' overall performance significantly went down as shown by the subject mean score, which dropped from **77.67** in the year 2009 to **67.98** in the year 2010.
- 16.1.3 The overall standard deviation for the two papers dropped from **29.12** in the year 2009 to **27.12** in the year 2010. However the value of the standard deviation indicates that the two papers were able to discriminate candidates of different abilities.

16.1.4 The candidature increased from **137,217** in the year **2009** to **140,237** in the year **2010**. A similar trend was also observed in the years **2009, 2008, 2007** and **2006**. This is a likely indication of increasing popularity of the subject in schools.

### **Analysis of Poorly Performed Questions**

The following is the analysis of the items that were poorly performed by candidates in the year 2010 KCSE Agriculture examination. This report highlights these questions and gives the expected responses. It also offers advice to teachers on the possible methodologies to emphasise during instruction.

## **16.2 PAPER 1 (443/1)**

### **Question 3**

Give the meaning of the following terms:

- a) phosphorus fixation in loss of soil fertility

The item was developed from the content on soil fertility. It required candidates to give the meaning of fixation as a method through which soil loses fertility (phosphorus).

#### **Weaknesses**

Most candidates were unable to give the meaning of fixation as a method through which soil loses fertility.

#### **Expected responses**

Phosphorus availability to plants is lost when phosphorus ions in the soil combine with other elements to form compounds that cannot be absorbed by plants.

#### **Advice to teachers**

During instruction, teachers should emphasize and ensure that learners understand the technical terms used in agriculture.

### **Question 5**

Explain the relationship between scarcity and choice as used in agricultural economics.

The question was derived from the topic, **Agricultural Economics I (Basic Concepts and Farm Records)**. Candidates were expected to explain how scarcity relates to choice

#### **Weaknesses**

Most candidates were unable to explain how scarcity relates to choice.

#### **Expected response**

Scarcity is where production resources are limited in supply relative to demand; therefore a choice has to be made on which enterprise(s) to allocate the limited resources.

#### **Advice to teachers**

During instruction, teachers should emphasize and ensure that learners understand the technical terms and concepts used in agriculture.

### **Question 21**

On 1st January 2009, Kaburu Farm started farm operations with Ksh 30,000 cash. During the month, the farm made the following transactions. Study the transactions and prepare a cash analysis for Kaburu Farm for the month of January.

Date	Transaction	Amount (Ksh)
05/01/09	Livestock sales	80,000
08/01/09	Crop sales	50,000
15/01/09	Bought seed for planting	7,500
20/01/09	Paid K.F.A. for fertilizer	16,400
25/01/09	Bought livestock feeds	50,000
30/01/09	Paid wages for planting & weeding	56,000
31/01/09	Received cash from K.C.C. for milk delivery	120,000
31/01/09	Paid transport charges for milk delivery	9,000

### Weaknesses

Most candidates were unable to answer the question correctly.

### Expected response

Kaburu Farm Cash Analysis for January 2009

Receipts (Sales And Receipts)						Expenditure (Purchases And Expenses)				
Date	Description	Total Ksh.	Cash Ksh.	Livestock Ksh.	Crop Ksh.	Date	Description	Total Ksh.	Crops Ksh.	Livestock Ksh.
01/1/09	Cash in hand.	30,000	30,000			15/1/09	Seeds for planting	7,500	7,500	
05/1/09	Livestock sales	80,000		80,000		20/1/09	Paid KFA for fertilizer	16,400	16,400	
08/1/09	Crop sales	50,000			50,000	25/1/09	Bought livestock feeds	50,000		50,000
31/1/09	milk delivery to KCC	120,000		120,000		30/1/09	Paint wages for planting and weeding	56,000	56,000	
						31/1/09	Transport charges for milk delivery	9,000		9,000
							Closing balance/cash at hand	141,100		
	<b>TOTAL</b>	<b>280,000</b>	<b>30,000</b>	<b>200,000</b>	<b>50,000</b>			<b>280,000</b>	<b>79,900</b>	<b>59,000</b>
		<b>280,000</b>						<b>280,000</b>		

### Advice to teachers

Teachers should teach the entire syllabus. This area was tested for the first time and therefore most candidates and teachers did not expect it and may not have prepared for it.

### 16.3 PAPER 2 (443/2)

No poorly performed items were reported in this paper.

### 16.4 PAPER 3 (443/3 –PROJECT)

This is the agriculture project paper administered to provide an opportunity for the candidates to show and put into practice, the psychomotor skills acquired during the four years period in secondary school.

Candidates are tested in practical skills in the growing of a selected crop from land preparation to harvesting, rearing selected livestock to maturity or constructing a farm structure such as beehive, feed trough, rabbit hutch, compost pit/heap, among others.

The instructions are taken to schools, which then provide the required inputs for candidates to carry out the project work independently. The project takes eight months, from February to September of the given year.

In the year 2010, candidates chose between chicken rearing and production of tomato/maize/sorghum/millet. The agriculture teacher's duty was to objectively assess and evaluate each candidate's work at all the stages of project implementation.

## **16.5 GENERAL ADVICE TO TEACHERS**

- 16.5.1 The whole syllabus should be effectively covered during instruction because examination items will be sampled from the entire syllabus.
- 16.5.2 The teacher/school should acquire the relevant reference materials and assist candidates to obtain and use the recommended textbooks.
- 16.5.3 The use of textbooks by teachers should always be guided by the syllabus. The specific objectives stipulated in the syllabus should be correctly interpreted to ensure the topics in question are taught adequately and effectively.
- 16.5.4 A variety of teaching methods and resources should be utilised by teachers to ensure that the content is effectively delivered during instruction. Resource persons/guest speakers and field visits should be arranged and used in areas where the teacher and the school lack the resources to teach the topic/lesson effectively.
- 16.5.5 All the suggested practical activities in the syllabus should be carried out to prepare candidates adequately for questions that require application of psychomotor skills acquired during instruction.

**29.15 AGRICULTURE (443)**

**29.15.1 Agriculture Paper 1 (443/1)**



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**SECTION A (30 marks)**

*Answer all the questions in this section in the spaces provided.*

- 1 Give **two** disadvantages of intensive system of farming. (1 mark)
- 2 List **four** methods of farming. (2 marks)
- 3 Give the meaning of the following terms:
  - (a) nitrogen fixation into the soil; (1 mark)
  - (b) phosphorus fixation in loss of soil fertility. (1 mark)
- 4 Give **four** reasons for keeping livestock health records on the farm. (2 marks)
- 5 Explain the relationship between scarcity and choice as used in agricultural economics. (2 marks)
- 6 State **two** reasons for land fragmentation in Kenya. (1 mark)
- 7 Give **four** advantages of individual owner operator tenure system as practised in Kenya. (2 marks)
- 8 State **four** features that should be considered when choosing water pipes for use on the farm. (2 marks)
- 9 Give **four** reasons for treating water for use on the farm. (2 marks)
- 10 Name **four** statutory boards that are involved in the marketing of crop produce in Kenya. (2 marks)
- 11 State **four** marketing functions of Kenya Co-operative Creameries (K.C.C.). (2 marks)
- 12 Give **two** reasons for carrying out each of the following operations in land preparation:
  - (a) rolling; (1 mark)
  - (b) levelling. (1 mark)
- 13 Name **three** recommended practices that should be carried out when clearing the bush during land preparation. (1½ marks)
- 14 State **five** advantages of zero grazing. (2½ marks)
- 15 Give **four** factors that would determine the stage at which a crop is harvested. (2 marks)
- 16 Name **two** classes of weeds on the basis of each of the following:
  - (a) growth cycle; (1 mark)

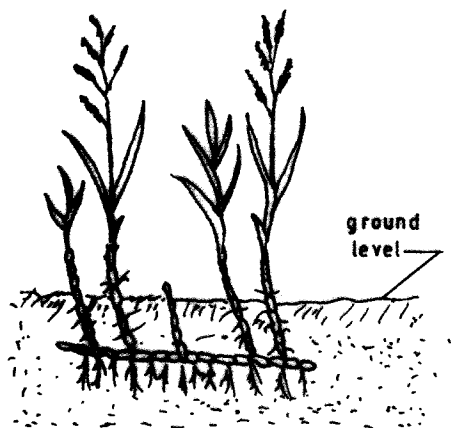
(b) plant morphology.

(1 mark)

### SECTION B (20 marks)

Answer **all** the questions in this section in the spaces provided.

- 17 Below is a diagram of a weed. Study the diagram carefully and answer the questions that follow.



- (a) Identify the weed illustrated above. (½ mark)
- (b) Why is the weed illustrated above difficult to control? (1 mark)
- (c) State **four** ways in which the weed can be controlled in a field of maize. (2 marks)

- 18 The table below shows pH values of different soil samples. Study it and answer the questions that follow.

Soil Sample	pH value
S <sub>1</sub>	3
S <sub>2</sub>	4
S <sub>3</sub>	5
S <sub>4</sub>	6
S <sub>5</sub>	7
S <sub>6</sub>	8
S <sub>7</sub>	9
S <sub>8</sub>	10

- (a) Which soil sample has the highest acidity? (½ mark)
- (b) State **two** ways in which the pH value of sample S<sub>8</sub> can be lowered. (1 mark)
- (c) Which of the above soil samples is suitable for growing tea? (½ mark)
- 19 Explain how agroforestry tree seeds should be prepared after collection in readiness for planting. (4 marks)

- 20 (a) The diagrams below represent two ways in which a crop was pruned. Study them carefully and answer the questions that follow.



- (i) Which diagram represents the correct way of pruning? (½ mark)
- (ii) Give a reason for your answer in (i) above. (1 mark)
- (b) State two ways in which pruning assists in controlling crop diseases. (1 mark)
- 21 On 1st January 2009, Kaburu Farm started farm operations with Ksh 30,000 cash. During the month, the farm made the following transactions. Study the transactions and prepare a cash analysis for Kaburu Farm for the month of January. (5 ½ marks)

Date	Transaction	Amount (Ksh)
05/01/09	Livestock sales	80,000
08/01/09	Crop sales	50,000
15/01/09	Bought seed for planting	7,500
20/01/09	Paid K.F.A. for fertilizer	16,400
25/01/09	Bought livestock feeds	50,000
30/01/09	Paid wages for planting & weeding	56,000
31/01/09	Received cash from K.C.C. for milk delivery	120,000
31/01/09	Paid transport charges for milk delivery	9,000

- 22 (a) What do the figures 18:46:10 on a fertilizer bag represent? (1½ marks)
- (b) Calculate the quantity of filler materials in the fertilizer in (a) above. (1 mark)

**SECTION C (40 marks)**

*Answer any two questions in this section in the spaces provided after question 25.*

- 23** (a) Explain **eight** factors that can encourage soil erosion. (8 marks)
- (b) Describe the seven management practices that should be carried out on a vegetable nursery after sowing seeds until the seedlings are ready for transplanting. (7 marks)
- (c) State **five** soil factors that should be considered when selecting a crop to grow in an area. (5 marks)
- 24** (a) Outline **five** ways in which high temperature affects agricultural production in Kenya. (5 marks)
- (b) (i) Explain **four** precautions that should be observed when harvesting cotton. (4 marks)
- (ii) Describe the harvesting of sugar cane. (3 marks)
- (c) Explain **eight** factors that should be considered when planning to set up a farm business. (8 marks)
- 25** (a) Explain **six** physical methods that can be used to control crop pests on the farm. (6 marks)
- (b) Describe the production of bulb onions under the following sub-headings:
- (i) field management; (4 marks)
- (ii) harvesting. (3 marks)
- (c) Explain **seven** factors that influence seed rates in crop production. (7 marks)



**SECTION A (30 marks)**

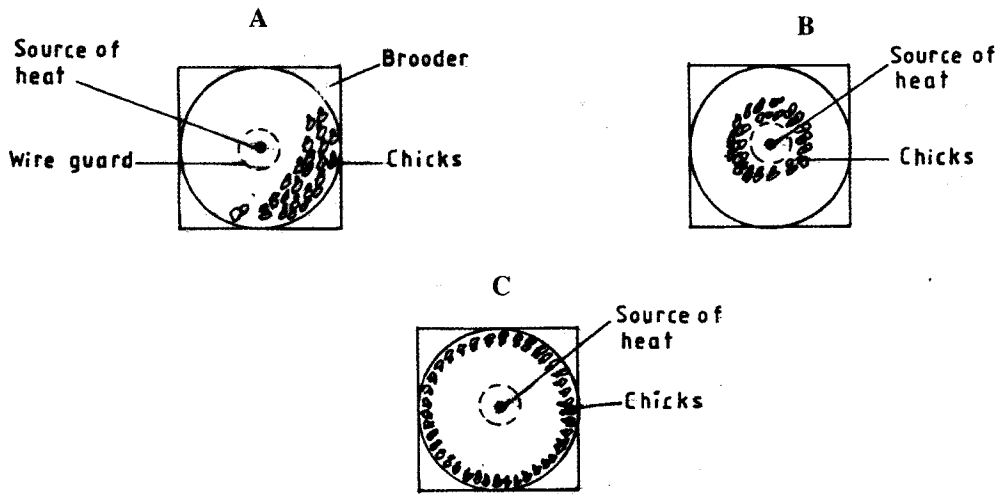
*Answer all the questions in this section in the spaces provided.*

- 1 Name the causal agent of anaplasmosis disease in cattle. (½ mark)
- 2 List **four** materials that can be used in constructing a Kenya Top Bar Hive. (2 marks)
- 3 (a) Name **two** breeds of dairy cattle that originated from the Channel Islands. (1 mark)
- (b) Give the distinguishing colour for each of the following breeds of livestock:
  - (i) chinchilla rabbit; (½ mark)
  - (ii) toggenburg goat. (½ mark)
- 4 State **four** reasons for castration in pig production. (2 marks)
- 5 State **four** characteristics of roughage livestock feeds. (2 marks)
- 6 State **two** functions of the crop in poultry digestive system. (1 mark)
- 7 State **four** roles of worker bees in a colony. (2 marks)
- 8 Give **four** reasons for controlling livestock diseases. (2 marks)
- 9 State **two** control measures for fowl pox disease in poultry. (1 mark)
- 10 State **one** function for each of the following:
  - (a) shovel; (½ mark)
  - (b) strip cup. (½ mark)
- 11 Give **three** reasons for carrying out maintenance practices on a mower. (1½ marks)
- 12 Give **three** limitations of using solar power on the farm. (1½ marks)
- 13 Why is it important to have a thermostat on a cooling system of a tractor engine? (1 mark)
- 14 Give **two** advantages of using a disc plough over a mouldboard plough in primary cultivation. (1 mark)
- 15 Name **four** tools that are used when laying concrete blocks during construction of a wall. (2 marks)
- 16 Why is it necessary to have guard rails in a farrowing pen? (1 mark)
- 17 Give **two** reasons for having a footbath in a cattle dip. (1 mark)
- 18 Distinguish between the following practices as used in livestock production:
  - (a) crutching and ringing in sheep management; (2 marks)
  - (b) cropping and harvesting in fish farming. (2 marks)
- 19 Give **three** ways in which infectious diseases can spread from one livestock to another within a farm. (1½ marks)

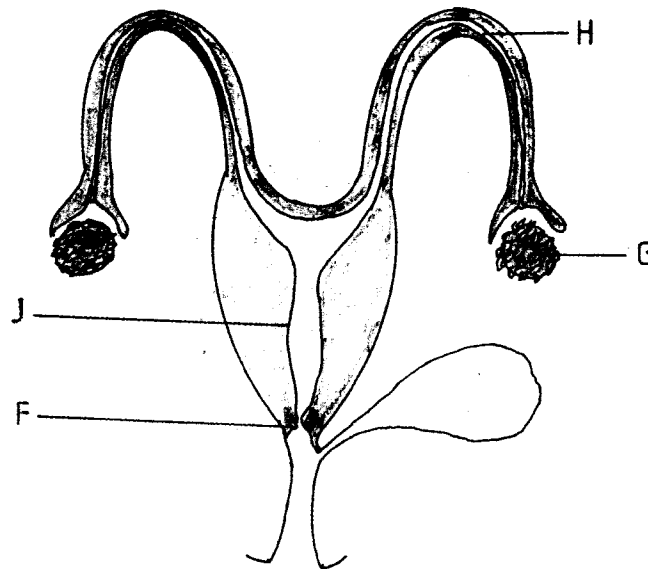
## SECTION B (20 marks)

*Answer **all** the questions in this section in the spaces provided.*

- 20** The following illustrations show the behaviour of chicks in a brooder. Study them carefully and answer the questions that follow.

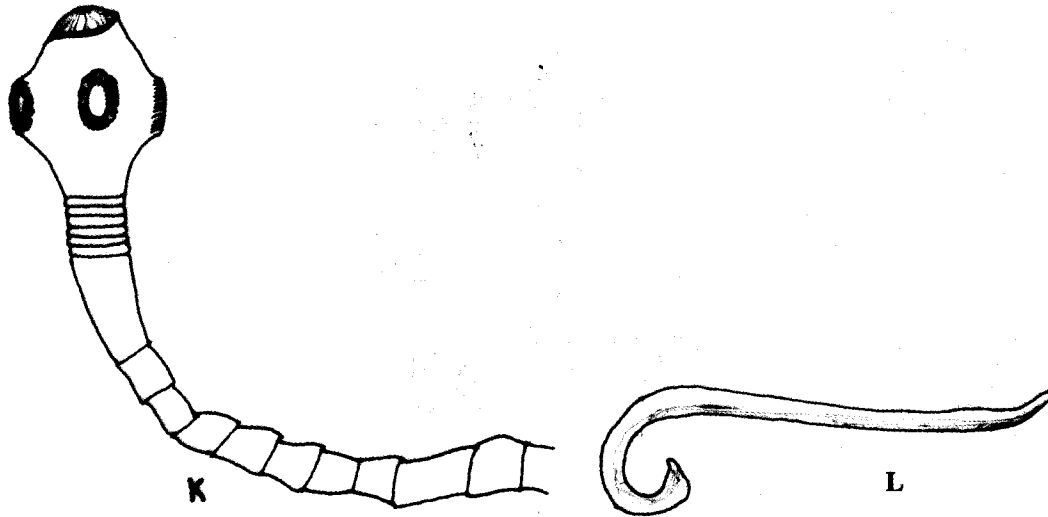


- (a) Explain the cause of behaviour observed in chicks for each of the illustrations labelled A, B and C. (3 marks)
  - (b) Give a reason for making the brooder wall round in shape. (1 mark)
- 21** The diagram below shows the reproductive system of a cow. Study it carefully and answer the questions that follow.

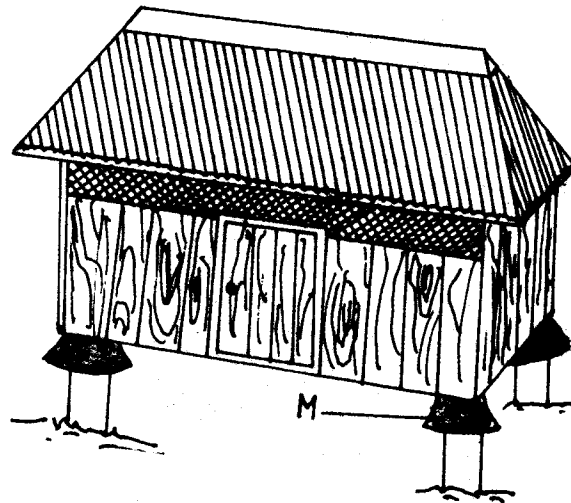


- (a) Name the parts labelled F and H.
- (b) Give **two** functions of the part labelled G. (2 marks)
- (c) Give the role of the part labelled J. (1 mark)

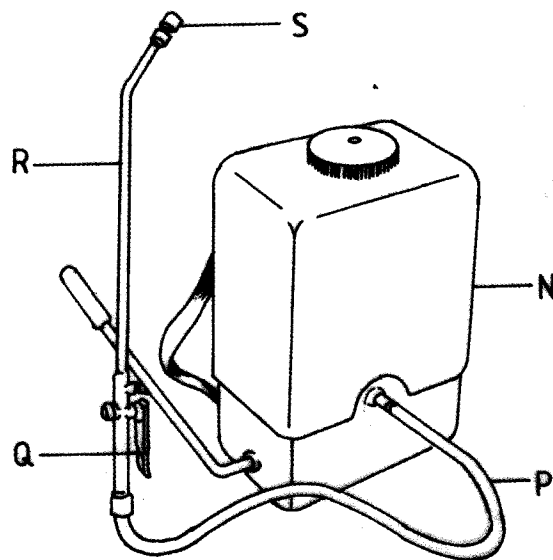
- 22 Below are diagrams of internal parasites. Study them carefully and answer the questions that follow.



- Identify the parasites labelled **K** and **L**.
  - Name the developmental stage of the parasite labelled **K** in cattle muscles. (½ mark)
  - Outline the procedure of handling a heifer when administering a liquid deworming drug to control the parasites illustrated above. (2½ marks)
- 23 Below is a diagram of a farm structure for storing grains. Study it carefully and answer the questions that follow.



- Identify the farm structure illustrated above. (½ mark)
  - State the function of the part labelled **M**. (½ mark)
  - State **two** maintenance practices that should be carried out on the farm structure illustrated above in readiness for grain storage. (1 mark)
- 24 Below is a diagram of a knapsack sprayer. Study it carefully and answer the questions that follow.



- (a) Name the parts labelled N, P, Q and R.

N .....

P .....

Q .....

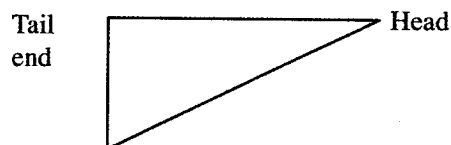
R .....

(2 marks)

- (b) State **one** function of the part labelled S.

(1 mark)

- 25 The diagram below illustrates the general shape of a cattle breed. Study it carefully and answer the questions that follow.



- (a) Identify the type of breed illustrated by the above shape. (½ mark)
- (b) Give an example of a breed in (a) above. (½ mark)
- (c) State **four** physical characteristics of the type of breed identified in (a) above. (2 marks)

**SECTION C (40 marks)**

*Answer any **two** questions from this section in the spaces provided after question 28.*

- 26** (a) Outline **five** advantages of artificial insemination in cattle management. (5 marks)
- (b) Describe **ten** signs of trypanosomiasis (Nagana) disease in livestock. (10 marks)
- (c) Explain **five** functions of water in nutrition. (5 marks)
- 27** (a) State the function of any **six** parts of a zero grazing unit in dairy farming. (6 marks)
- (b) Explain how the power transmitted from a tractor engine is made available for use on the farm under the following subheadings:
- (i) propeller shaft; (2 marks)
- (ii) power take off (P.T.O) shaft; (2 marks)
- (iii) hydraulic system. (2 marks)
- (c) Explain **eight** ways in which ticks can be controlled on a livestock farm. (8 marks)
- 28** (a) Describe **ten** physical characteristics a poultry farmer would use to identify poor layers from a flock of hens. (10 marks)
- (b) (i) Outline **three** characteristics of clean milk. (3 marks)
- (ii) Explain **seven** factors that affect milk composition in dairy farming. (7 marks)

### 30.15 AGRICULTURE (443)

#### 30.15.1 Agriculture Paper 1 (443/1)



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#### SECTION A (30 marks)

1. **Disadvantages of intensive system of farming.**
  - Requires high initial capital/ its expensive
  - Is labour intensive
  - Requires high level of management/skilled labour.

(2 x ½)(1 mark)
2. **Methods of farming**
  - Shifting cultivation
  - Nomadic pastoralism
  - Organic farming
  - Mixed farming
  - Agroforestry

4 x ½)(2 marks)
3. (a) **Nitrogen Fixation:**
  - Process in which atmospheric nitrogen is converted to nitrates for plants uptake

(1 x 1)(1 mark)

(b) **Phosphorus fixation:**
  - Process in which phosphorus combines with other elements to form compounds that cannot be absorbed by plants.

(1 x 1)(1 mark)
4. **Reasons for keeping livestock health records**
  - Help in calculation of treatment and health costs
  - Help in cutting/selecting livestock
  - Help in future treatment and control measures
  - Help determine the common diseases and parasites/prevalent diseases and parasites
  - Help to support livestock insurance claims

(4 x ½)(2 marks)
5. **Relationship between scarcity and choice**

Scarcity is where production resources are limited in supply relative to demand. Therefore a choice has to be made on which enterprise(s) to allocate the limited resources.

(2 x 1)(2 marks)
6. **Reasons for land fragmentation**
  - Buying/selling/paying debts/compensation
  - Inheritance
  - Settlement and resettlement
  - gift/donation

(2 x ½)(1 mark)
7. **Advantages of individual owner operator tenure system**
  - Easy to acquire credit
  - Land disputes are minimized
  - Long term investment is encouraged
  - Incentive to conserve and improve land
  - Easy to plan and make decisions
  - Easy to sell/lease all or part of farm

(4 x ½)(2 marks)
8. **Features for choosing water pipes**
  - Durability
  - Strength/ability to withstand pressure/thickness of the wall of pipes

- Diameter/size of the pipe
  - Workability/manoeuverability of the pipe
  - Colour of the pipes
- (4 x ½)(2 marks)
9. **Reasons for treating water**
- Remove chemical impurities
  - Kill disease causing micro-organisms
  - Remove bad smells and taste
  - Remove impurities of solid particles
- (4 x ½)(2 marks)
10. **Statutory boards**
- Kenya Sugar Board/authority
  - Kenya Tea Development Authority/Agency/Tea Board of Kenya
  - National Cereals and Produce Board
  - Coffee Board of Kenya
  - Pyrethrum Board of Kenya
  - Cotton Lint and Seed Marketing Board/Cotton Board of Kenya
  - Horticultural Crop Development Authority
  - Kenya Sisal Board
- (4 x ½)(2 marks)
11. **Marketing functions of KCC**
- Buying and assembling milk/collection of milk
  - Processing milk
  - Market research
  - Advertisement/promotion of milk/milk products
  - Strategic storage of milk/milk products
  - Distribution of milk/transportation
  - Selling milk
  - Packaging and packing
  - Risk bearing
  - Financing
  - Grading/standardization
- (4 x ½)(2 marks)
12. (a) **Rolling**
- Increases seed soil contact
  - Compacts soil/seeds to protect it against agents of erosion
  - Crushing large soil clodes
  - Levelling
- (2 x ½)(1 mark)
- (b) **Levelling**
- Ensures uniform depth of planting/uniform germination/uniform fertilizer application
  - Ensures uniform water level in paddy rice fields
  - Removing depressions that collect water leading to rotting of seeds
- (2 x ½)(1 marks)
13. **Activities in clearing land**
- Tree felling
  - Stumping/removal of stumps/destumping
  - Slashing
- (3 x ½)(1½ marks)
14. **Advantages of zero grazing**
- Requires little land
  - Quick accumulation of manure
  - Easy to control diseases and parasites
  - Less wastage of feeds
  - Has high stocking rate

- High milk yield
  - Efficient use of fodder
- (5 x ½)(2½ marks)

15. **Factors determining stage of crop harvesting**

- Intended use of the crop
- Chemical concentration of the produce/stage of maturity/change in colour
- Prevailing weather conditions
- Market demand for the produce/market price

(4 x ½)(2 marks)

16. (a) **Growth cycle**

- Annual weeds
- Biennial weeds
- Perennial weeds

(2 x ½)(1 mark)

(b) **Plant morphology**

- Broad leaved weeds
- Narrow leaved weeds

(2 x ½)(1 mark)

**SECTION B (20 marks)**

17. (a) **Weed**

- Couch grass /*Digitaria scalarum*

(1 x ½)(½ marks)

(b) **Why it is difficult to control**

- Presence of underground stems/rhizomes which are difficult to control

(1 x 1)(1 mark)

(c) **Control**

- Uprooting
- Cultivation
- Slashing
- Use of herbicides
- Mulching

(4 x ½)(2 marks)

18. (a) **Soil sample with highest acidity**

- Sample S<sub>1</sub>

(1 x ½)(½ mark)

(b) **Lowering pH**

- Application of acidic fertilizers/sulphate of ammonia/ASN/DAP/MAP
- Application of sulphur

(2 x ½)(1 mark)

(c) **Soil sample suitable for tea growing**

- S<sub>2</sub>
- S<sub>3</sub>
- S<sub>4</sub>

(1 x ½)(½ marks)

19. **Preparation of tree seeds after collection**

- Extraction to remove seeds from pods/fruits
- Drying to reduce seed moisture content
- Testing to verify seed quality
- Treatment to break dormancy/improve germination
- Seed dressing to control soil borne pests and diseases
- Seed inoculation to N-fixation in legumes
- Washing/cleaning to remove mucilage

(4 x 1)(4 marks)



20. (a) (i) **Correct pruning**  
 • B  
 (1 x ½)(½ mark)
- (ii) **Reason**  
 • Slant cut is a few centimetres above the bud/leaf  
 (1 x 1)(1 mark)
- (b) **How pruning controls diseases**  
 • Removes diseased parts  
 • Creates unfavourable conditions/environment for disease agents  
 • Facilitates penetration of chemical sprays  
 (2 x ½)(1 mark)

21. **KABURU FARM CASH ANALYSIS FOR JANUARY 2009**

RECEIPTS (SALES AND RECEIPTS)						EXPENDITURE (PURCHASES AND EXPENSES)				
Date	Description	Total Ksh.	Cash Ksh.	Live-stock Ksh.	Crop Kshs.	Date	Description	Total Ksh.	Crop Ksh.	Live-stock Kshs.
01/1/09	Cash in hand	30,000	30,000			15/1/09	Seeds for planting	7,500	7,500	
05/1/09	Livestock sales	80,000		80,000		20/1/09	Paid KFA for fertilizer	16,400	16,400	
08/1/09	Crop sales	50,000			50,000	25/1/09	Bought livestock feed	50,000		50,000
31/1/09	Cash for milk delivery	120,000		120,000		30/1/09	Paid wages for planting & weeding	56,000	56,000	
						31/1/09	Transport charges for milk delivery	9,000		9,000
	TOTAL	280,000	30,000	200,000	56,000			138,900	79,900	59,000
		280,000	-	-	-		Closing balance/ TOTAL	141,100 280,000	-	-

**Award of Marks**

- Correct labelling of expenditure and receipt columns 1 x ½ = ½ mark
- Correct entries by dates 9 x ½ = 4½ marks
- Balancing ½ = 1 mark

22. (a) **Figures 18: 46: 10 on a fertilizer bag means**  
 • 18% Nitrogen  
 • 46% phosphorus pentaoxide (P<sub>2</sub>O<sub>5</sub>)  
 • 10% potassium oxide (K<sub>2</sub>O)  
 (3 x ½)(1½ marks)
- (b) **Filler material**  
 = 100 – (18 + 46 + 10)                      ½ mark  
 = 100 – 74  
 = 26%/26 kg                                      ½ mark

(2 x ½)(1 marks)

**SECTION C (40 marks)**

23. (a) **Factors that encourage soil erosion**  
 • Lack of ground cover exposes soil to agents of soil erosion  
 • Steep slopes increase the speed of surface run-off hence erosive power of water  
 • Light/sandy soils are easily carried away by agents of soil erosion  
 • Shallow soils are easily saturated with water and carried away  
 • High rainfall intensity

- Frequent cultivation/overcultivation pulverises the soil making it easy to detach and carry away
- Overstocking leads to overgrazing which destroys ground cover exposing it to agents of erosion
- Burning of/deforestation destroys vegetation cover and exposed soil to agents of erosion
- Ploughing up and down the slope creates channels which speed up and increases the erosive capacity of water
- Cultivation of river banks destroys riparian vegetation and destroys soil structure exposing it to agents of erosion.
- Cultivating the soil when too dry destroys soil structure making it to be eroded.
- Long slope increase volume of surface run off and speed of surface of runoff hence increasing erosion.
- High amount of rainfall leads to saturation increasing runoff.

(8 x 1)(8 marks)

(b) **Management practices carried out on vegetable nursery after sowing**

- Mulching to conserve moisture
- Provide shade to minimise evapotranspiration
- Weed control to reduce competition with seedlings for nutrients, light, space, etc.
- Pest and disease control to ensure healthy and vigorously growing seedlings
- Pricking out/thinning to minimise competition a for growth elements
- Fertilizer application to supplement nutrients in the soil
- Hardening off/removing shade/reducing watering to acclimatize the seedling to conditions in the field
- Remove mulch as soon as seedlings emerge.

(7 x 1)(7 marks)

(c) **Soil factors that determine a crop grown in an area**

- Soil drainage/rate of water infiltration and percolation through the soil
- Soil structure/arrangement of soil particles or aggregates
- Soil nutrient content/variety and quantity of mineral nutrients in the soil
- Soil profile/oil depth: depth and arrangement of soil horizons in relation to the rooting system of the crop
- Soil pH/chemical properties of the soil/degree of acidity or alkalinity of the soil solution
- Soil borne pests and diseases/the prevalent pests/diseases in the soil

(5 x 1)(5 marks)

24. (a) **Effects of high temperature**

- Increases incidences of some pests/parasites and diseases
- Improves quality of certain crops e.g. citrus fruits
- Lowers quality of certain crops e.g. pyrethrum
- Increases rate of evapotranspiration in plants/wilting in plants
- Increase rate of growth for early maturity in crops
- Limits distribution of exotic livestock breeds
- Lowers production in livestock
- Influences design of farm building and structures
- Lowers labour productivity

(5 x 1)(5 marks)

(b)(i) **Precautions observed in cotton harvesting**

- gunny/Sisal bags should not be used to prevent mixing of lint and sisal fibres which causes ginning problems
- Hands should be cleaned to avoid staining of the lint
- Picking should be done when the list is dry to prevent fibres from sticking together
- Use clean containers for picking
- Use different containers for AR (safi) and BR (fifi) grades of cotton to ensure quality/separate grade A from B
- Picking should be done immediately the balls open/split to prevent staining by dust/dirt
- Avoid picking leaves and twigs to avoid contamination

(4 x 1)(4 marks)

(ii) **Sugar cane harvesting**

- Harvested at the correct age 13-22 months for plant crop/12-18 months for ratoon crop
- Take sugar cane samples for testing to determine maturity
- Cut the mature cane at the base/near the ground
- Cutting off the green tops
- Strip off leaves from the stem/burn the cane before harvesting
- Deliver the cane to the factory within 48 hours/immediately after cutting
- Use a cane harvesting machete.

(5 x ½)(3 marks)

(c) **Factors considered in farm planning**

- **Risk and uncertainties:** enterprises should be analysed to determine the risks and uncertainties involved.
- **Security:** enterprises which require more security should be near the farm house/consider provision of security.
- **Land size:** a large number of enterprises can be established on a large scale compared to a small scale farm.
- **Current trend in labour market:** to determine availability and cost of labour especially during peak period.
- **Farmers objectives and preferences:** to ensure the farmer who is the operator has a sense of ownership of the plan and brings about motivation.
- **Current market trends and prices of outputs:** to ensure consideration of enterprises with high profit returns.
- **Availability and cost of farm inputs:** to identify enterprises that are affordable and whose inputs are readily available.
- **Government policy/regulations:** to seek permission for enterprises undertaken on quota system e.g. coffee growing and avoid enterprises and farming systems prohibited by the government.
- **Environmental factors:** soil, climate and topography should be analysed to determine livestock and crop enterprises that are suitable to the local ecological conditions.
- **Communication and transport facilities:** to facilitate movement of outputs to the market and supply of inputs. Also help in conveying improved methods of farming and market trends.
- **Availability of capital:** to acquire farm inputs.
- **Possible production enterprises:** should be identified and analysed so that suitable and profitable enterprises are selected.

(8 x 1)(8 marks)

25. (a) **Physical methods of controlling crop pests**

- **Trapping/picking** and killing pests
- **Use of lethal temperature** to kill the pests
- **Flooding to suffocate** and kill the pests
- **Use of physical barriers** e.g. fences, rat guards, etc to keep the pests away from the crop/produce
- **Proper drying** to make penetration difficult
- **Use of explosives** to destroy breeding grounds and kill the pests
- **Suffocation:** carbon dioxide build up is used to suffocate pests in stores especially Cyprus bins.

(6 x 1)(6 marks)

(b)(i) **Field management of bulb onions**

- Weed control through shallow cultivation to avoid damage to the shallow onion roots
- Remove excess soil around the roots gradually to facilitate bulb expansion
- Water regularly at the early stages to ensure adequate moisture supply
- Top dress with nitrogenous fertilizer at appropriate rates
- Control pests e.g. thrips using appropriate pesticides
- Control diseases e.g. rust, mildews using appropriate method

(4 x 1)(4 marks)

(ii) **Harvesting of bulb onions**

- Is done 4-5 months after planting/when leave wither/turn brown
  - Break and bend the tops at the neck
  - Harvesting is done by lifting/pulling/digging out the crop
  - Leave the bulbs on the ground to dry for 3 days and turn frequently to ensure uniform drying
- (3 x 1)(3 marks)

(c) **Factors influencing seed rate**

- **Intended use of the crop** e.g. fodder maize required high seed rate than grain maize
- **Germination percentage** – high seed rate is required for seeds with low germination percentage
- **Method of planting**: broadcasting requires high seed rate than row planting
- **Number of seeds per hole**: two or more seeds per hole requires more seed rate than one seed per hole
- **Soil fertility**: poor/infertile soils required low seed rate because crops are widely spaced compared to fertile soils
- **Growth characteristic of the crop**: tall/tillering/indeterminate variety required low seed rate compared to short/less tillering/ determinate varieties
- **Spacing**: high seed rate is required in closer spacing than wider spacing
- **Seed purity**: impure seed/containing chaff and foreign materials will lead to high seed rate compared to pure seed.
- **Whether the crop is pure or mixed stand**: high seed rate for pure and low seed rate for mixed.

(6 x 1)(7 marks)

### 30.15.2 Agriculture Paper 2

#### SECTION A (30 marks)

1. Casual agent of anaplasmosis disease in cattle.
  - Protozoa/*anaplasma marginale*/*anaplasma spp.*(1 x ½ = ½ mark)
2. Materials used in constructing a Kenya Top Bar Hive 9K.T.B.H)
  - Timber
  - Nails
  - Plain wire
  - Iron sheets(4 x ½ = 2 marks)
3. (a) Breeds of dairy cattle that originated from the channel islands
  - Guernsey
  - Jersey(2 x ½ = 1 mark)
- (b) (i) Chinchilla rabbit
  - Grey/silvery(1 x ½ = ½ mark)
- (ii) Toggenburg
  - Brown with two white stripes running down the face(1 x ½ = ½ mark)
4. Reasons for castration
  - Prevent uncontrolled mating/inbreeding
  - Improve the quality of meat
  - Promote faster growth
  - Make them docile
  - Control breeding diseases(4 x ½ = 2 marks)
5. Characteristics of roughages
  - Bulky
  - High fibre content
  - Low nutrient content
  - Low digestibility
  - Mainly of plant origin(4 x ½ = 2 marks)
6. Functions of the crop in poultry digestive system
  - Softening/moisturizing food
  - Temporary food storage(2 x ½ = 1 mark)
7. Roles of worker bees
  - Rear and nurse the brood
  - Collect nectar to make honey
  - Make honey combs
  - Ventilate the hive
  - Protect the colony
  - Clean the hive(4 x ½ = 2 marks)
8. Reasons for controlling livestock diseases
  - Reduces spread of livestock diseases
  - Promote fast growth and early maturity
  - Make them have long productive life
  - Improve quality and safety of products
  - Improve quantity of products
  - Reduce cost of products(4 x ½ = 2 marks)
9. Control measures for fowl pox diseases in poultry
  - Observe hygiene in poultry house
  - Regular vaccination
  - Slaughter and properly dispose carcass of affected birds(2 x ½ = 1 mark)

10. (a) Shovel  
 • Mixing mortar/manure  
 • Lifting soil/manure  
 (1 x ½ = ½ mark)
- (b) Strip cup  
 • To detect mastitis infection in milk  
 (1 x ½ = ½ mark)
11. Reasons for maintenance practices  
 • For safety of the user/operator  
 • Ensure efficiency of operations  
 • Increases durability  
 • Reduces costs on repairs and replacements  
 • Avoid damage to the mower  
 (3 x ½ = 1½ marks)
12. Limitations of using solar power  
 • Solar trapping devices are expensive  
 • Power supply/trapping fluctuates depending on weather conditions  
 • Solar trapping is limited to day light  
 • Requires skilled labour to handle the devices  
 (3 x ½ = 1½ marks)
13. Importance of thermostat  
 • Prevents engine from over-heating  
 • Maintains optimum engine temperature during operation  
 (1 x 1 = 1 mark)
14. Advantages of a disc plough over a mould board plough  
 • Discs roll over obstacles  
 • Requires less draught power  
 • Requires less maintenance costs  
 • Works better on dry, hard and sticky soils  
 (2 x ½ = 1 mark)
15. Tools used when laying concrete blocks during construction of a wall  
 • Plumb bob/plumb line  
 • Mason's trowel  
 • Spirit level  
 • Wood float  
 (4 x ½ = 2 marks)
16. Importance of guard rails in a farrowing pen  
 • Prevents sow from crushing piglets  
 • Prevents sow from eating creep feeds  
 (1 x ½ = ½ mark)
17. Reasons for having a foot path in a cattle clip  
 • Clean the feet of animals  
 • Control foot rot  
 (2 x ½ = 1 mark)
18. (a) Crutching and ringing  
 • Crutching is the cutting of wool around the external reproductive organs of a female sheep to facilitate mating  
 • Ringing is the cutting of wool around the sheath of the penis in rams to facilitate mating  
 (Mark as a whole 2 marks)
- (b) Cropping and harvesting  
 • Cropping is the selective removal of fish of marketable size from the pond  
 • Harvesting is the removal of all the fish from the pond  
 (Mark as a whole 2 marks)
19. Ways in which infectious diseases can spread  
 • Through vectors  
 • Through ingestion of contaminated food and water  
 • Through contact  
 • Through inhalation of contaminated air  
 (3 x ½ = 1½ marks)

## SECTION B (20 marks)

20. (a) Causes of chicks' behaviour in the illustrations A, B and C.  
**A** - Presence of draught makes the chicks to crowd on one side of the brooder  
**B** - Cold/inadequate heat makes the chicks to crowd around the heat source  
**C** - High/excess heat makes the chicks to move away from the heat source. (3 x 1 = 3 marks)
- (b) Reasons for making brooder wall round in shape  
 • To discourage overcrowding of chicks at the corners to avoid suffocation (1 x 1 = 1 mark)
21. (a) **F** - Cervix  
**H** - Oviduct/fallopian tube (2 x ½ = 1 mark)
- (b) Functions of part labelled **G**  
 • Produces ova/female gametes  
 • Produces hormones that control ovulation cycle (2 x 1 = 2 marks)
- (c) Role of **J**  
 • Allows implantation of the zygote and development of the foetus (1 x 1 = 1 mark)
22. (a) **K** - Beef tapeworm/ *Taenia saginata*/*Taenia spp*  
**L** - Round worm/ *Ascaris lumbricoides*/ *Ascaris spp* (2 x ½ = 1 mark)
- (b) Bladder worm/ Embryo cyst/ *Cysticercus cellulosae* (1 x ½ = ½ mark)
- (c) Procedure of handling a heifer when administering a liquid deworming drug  
 • Restrain the heifer in a crush  
 • Hold it by the nostrils and lift up its head  
 • Open its mouth  
 • Release the drug into the mouth as far as possible holding down the tongue  
 • Hold it to ensure the drug is swallowed  
 (Mark until the procedure is broken 2½ marks)  
 (5 x ½ = 2½ mark)
23. (a) Granary/modern store/crib (1 x ½ = ½ mark)
- (b) Functions of **M**  
 • Prevents entry of rodents into the store (1 x ½ = ½ mark)
- (c) Maintenance practices on the structure  
 • Repair and replace worn out parts  
 • Cleaning  
 • Fumigating/dusting with appropriate pesticides (2 x ½ = 1 mark)
24. (a) **N** - Tank  
**P** - Delivery hose  
**Q** - Trigger  
**R** - Lance (4 x ½ = 2 marks)
- (b) Functions of **S**  
 • Breaks the liquid chemical into desired size of droplets (1 x 1 = 1 mark)
25. (a) Dairy breed (1 x ½ = ½ mark)
- (b) Friesian/ Jersey/ Guernsey/ Ayrshire (1 x ½ = ½ mark)

- (c) Physical characteristics of dairy cattle
- Wedge/ triangular shaped
  - Straight topline
  - Large and well developed udders and teats
  - Prominent milk veins
  - Lean bodies/ visible pinbones
  - Large stomach
  - Small head and long neck

(4 x ½ = 2 marks)

### SECTION C

26. (a) Advantages of artificial insemination
- Controls breeding diseases
  - Controls breeding/inbreeding
  - Is a quicker method of obtaining a proven bull
  - Is easy and cheap to transport semen to far areas
  - Semen from a superior bull can be used to serve many cows
  - Farmers who cannot afford to buy a superior bull can access the service at a low cost
  - Bulls that cannot serve naturally due to physical injuries/defects can be utilized.
  - Prevents injuries to cows by heavy bulls
  - Danger of injury/damage by aggressive bulls is eliminated
  - Semen can be stored for a long period even after death of the bull
  - Saves the cost of rearing a bull

(5 x 1 = 5 marks)

- (b) Signs of Trypanosomiasis (Nagana) disease in livestock
- General body weakness/dullness
  - Reduced milk production
  - Swollen lymph nodes
  - Rough coat and cracked skin where there is no hair
  - Running eyes/lachrymation which can result in blindness
  - Diarrhoea
  - Emaciation/loss of weight
  - Abortion in pregnant females
  - High fever/temperature
  - Anaemia
  - Loss of appetite
  - Swollen parts of the belly

(10 x 1 = 10 marks)

- (c) Functions of water
- Component of body cells and many body fluids e.g. blood
  - Used in biochemical reactions in the body e.g. digestion
  - Regulates body temperature through sweating and evaporation
  - Excretion of metabolic waste from the body
  - Formation of products e.g. milk, eggs, etc.
  - Makes cells turgid to maintain their shape

(5 x 1 = 5 marks)

27. (a) Use of the various parts of a zero grazing unit in dairy farming
- Milking stall – restraining cows during milking
  - Calf pen – rearing calf to weaning
  - Sleeping cubicles – provide shelter and warmth
  - Loafing area – dunging, feeding, exercise and sunning
  - Feed and water troughs – feeding and watering the animals
  - Feed preparation room – preparing feed rations and chopping fodder
  - Store – storing/keeping daily equipment

(6 x 1 = 6 marks)



- (b) How power transmitted from a tractor engine is made available for use on a farm
- (i) Propeller shaft
- Connects gear box to the differential which has wheel axles
  - Wheel axles rotate to move the tractor and push or pull trailed implements
- (2 x 1 = 2 marks)
- (ii) Power Take Off (P.T.O) shaft
- Rotates at the same speed as the crankshaft
  - Its connected to machines e.g. mowers, sprayers, shellers, etc to perform farm operation
- (2 x 1 = 2 marks)
- (iii) Hydraulic system
- Is attached to the three-point linkage
  - The three-point linkage operates (raises/lowers) the mounted implements during farm operations
- (2 x 1 = 2 marks)
- (c) Ways in which ticks can be controlled
- Burning infested pastures to kill developmental stages
  - Rotational grazing to starve and kill developmental stages
  - Hand picking and killing the ticks
  - Fencing off pasture land and farm to keep away infested animals
  - Ploughing pasture land to bury and kill developmental stages
  - Top dressing pasture using lime to kills the ticks
  - Spraying using acaricides/hand dressing
  - Biological control

(8 x ½ = 8 marks)

28.

- (a) Characteristics of a poor layer
- Combs and wattles - small/shrunken, dry scaly and pale
  - Eyes - dull and pale yellow
  - Beak - yellowish in colour
  - Abdomen - hard and full
  - Vent - round, dry and less active
  - Space between keel and Pelvic bone - small and fits only one to two fingers
  - Plumage - preened and glossy (smooth)
  - Moulting - early moulting
  - Shanks - yellowish in colour
  - Broodiness - is common

(10 x 1 = 10 marks)

- (b) (i) Clean milk
- Free from disease causing micro-organisms
  - Free from hair, dirt or dust
  - Free from bad odours and tastes
  - Chemical composition within expected standards
- (3 x 1 = 3 marks)
- (ii) Factors influencing milk composition
- Age of the animal  
Butter fat in milk becomes less as an animal grows old thus young animals produce milk with high BF than older animals
  - Breed differences  
Different breeds of cattle produce milk with different percentage composition e.g. jersey produces higher BF than Friesian.
  - Disease  
Diseases such as mastitis reduce the lactose composition in milk because bacteria attack milk sugars.
  - Physiological condition of the animals  
Sick/extremely emaciated animals register low percentage of BF/ during late pregnancy cows produce milk with low BF content.
  - Stage of lactation

The BF content in milk is highest at the middle phase of the lactation period and lowers towards end of lactation.

- Completeness of milking/time of milking

Milk drawn last from udder during milking contains high BF content/ milk produced in the morning has lower BF than milk produced in the evening.

- Season of the year

BF content increases during cold seasons

(7 x 1 = 7 marks