THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY
NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

CANDIDATES' ITEM RESPONSE ANALYSIS REPORT ON THE ADVANCED CERTIFICATE OF SECONDARY EDUCATION EXAMINATION (ACSEE), 2021

AGRICULTURE

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134 AGRICULTURE

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FOREWORD

This report aims at providing feedback to education stakeholders on the performance of the candidates on the 2021 Advanced Certificate of Secondary Education Examination (ACSEE) in the Agriculture subject. The report focuses on the analysis of candidates' responses to the examination questions. The ACSEE is a summative evaluation of the students' learning at the end of instructional time.

Statistics indicate the performance of the candidates in this year's examination is good in which 95.16 per cent of the candidates passed. Among them, few (5.38%) candidates attained high pass grades (B and C) while the majority (94.62%) scored low pass grades (D, E and S). A total of 20 topics were examined in the theory papers and 3 subject fields were examined in the practical paper. The candidates had good performance on nine topics. The candidates performed averagely on two fields and six topics. Nonetheless, they had weak performance on five topics, namely Fundamentals of International Trade, Farm Planning, Workshop Technology, Farm Structures and Crop Pests.

The candidates' responses revealed that the few candidates who scored high grades had adequate knowledge and skills in the subject matter tested in the examination. This enabled them to meet the demands of the questions. In contrast, the majority of the candidates who scored low grades had inadequate knowledge and practical skills in the topics examined. Thus, they could not fulfil the requirements of the questions.

The Council expects that stakeholders in education will take proper measures in improving candidates' performance in future examinations.

The National Examination Council expresses its gratitude to all who contributed in the preparation of this report.

Dr Charles E. Msonde
EXECUTIVE SECRETARY

1.0 INTRODUCTION

This report presents the performance of candidates who sat for the ACSEE 2021 in the Agriculture subject. The examination was set according to the 2019 examination format, which is based on the 2009 Agriculture syllabus.

The examination consisted of three papers; 134/1 Agriculture 1 and 134/2 Agriculture 2 were theory papers, and 134/3 Agriculture 3 was a practical paper. Agriculture 1 and Agriculture 2 consisted of ten questions each. All questions carried 10 marks, making a total of 100 marks in each paper. Agriculture 3 consisted of three questions. Question one carried 20 marks and the other two questions carried 15 marks each, making a total of 50 marks. The candidates were required to answer all questions in all examination papers.

The candidates who sat for this year's Agriculture examination were 724 from 22 examination centres. Statistics show that 688 (95.16%) candidates passed and 35 (4.84%) failed the examination. This performance has decreased by 3.57 per cent when compared to the performance in 2020 where 98.73 per cent of the candidates passed. Table 1 presents the performance of the candidates by grades in Agriculture ACSEE 2021.

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Table 1: Candidates' Performance by Grades in ACSEE 2021

Year	Grades							% Pass	% Fail	Sat	With held
	A	B	C	D	E	S	F				
2020	0	8	96	258	234	24	8	98.73	1.27	628	0
2021	0	3	34	267	327	57	35	95.16	4.84	724	1

Source: NECTA Statistics Book, ACSEE, 2021, pg 6

The analysis of candidates' performance on each question was done so as to determine the candidates' strengths and weaknesses in responding to the examination questions. The analysis highlights the requirements of each question, the general performance of the candidates on each question, the candidates' responses and possible reasons for their performance. Extracts representing samples of candidates' responses in each question are included to illustrate the cases presented. The performance is considered as weak, average or good if the percentage of candidates' ranges from 0-34, 35-59 and 60-100 per cent, respectively.

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2.0 THE ANALYSIS OF THE CANDIDATES' PERFORMANCE ON EACH QUESTION

2.1 134/1- Agriculture 1

2.1.1 Question 1: Farm Power

The candidates were required to account for five disadvantages of using human power in the farm and five factors affecting human working capacity. The question tested candidates' understanding of human power as a source of power in the farm.

The question was attempted by 723 (99.9%) candidates. Among them, 64 (8.9%) candidates scored from 0.0 to 3.0 marks, 235 (32.5%) from 3.5 to 5.5 marks and 424 (58.6%) from 6.0 to 10 marks. Figure 1 illustrates these scores.

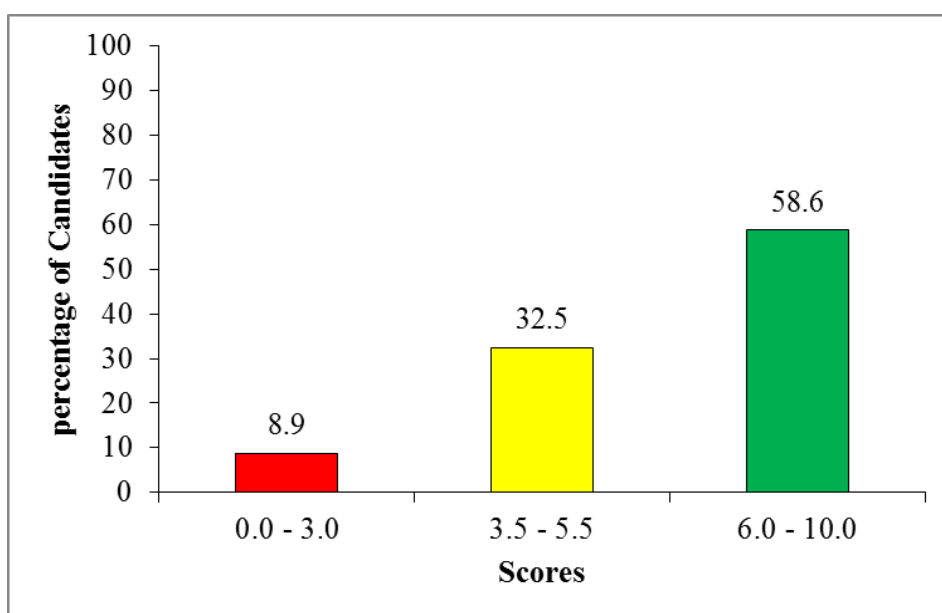**Figure 1:** *Distribution of Candidates' Scores on Question 1*

Figure 1 shows that 91.1 per cent of the candidates scored from 3.5 to 10 marks, and only 8.9 per cent scored from 0.0 to 3.0 marks. Hence the data indicate good performance on the question.

The data indicate that 58.6 per cent of the candidates who attempted the question attained good performance. These candidates provided the correct

responses on the disadvantages of using human power in the farm such as *time consuming, low efficiency, human exhaustion*. It is also had to estimate accurately the amount of work input. Besides, humans are affected by the weather. Furthermore, they accounted correctly for the factors affecting human working capacity, weather condition, age, diseases and gender. This shows that the candidates had adequate knowledge of human power as a source of power for farming. Extract 1.1 represents a sample of the correct responses to the question.

1.	The Following are the disadvantage of Using a human as a Main source of power.	
	i) Human they tired With short period of time compaired to other like oxen!	
	ii) Human they are less efficient; This Means their works are low efficient compaired to other	
	iii) The Health can affect the power Source. because When animal is sick can not do any work.	
	iv) Using Not applicable in large farming as human are Used in small agriculture only!	
	v) Use of Human is Wastage of time because they work Very slowly.	
	The Following are the factors affecting Human working capacity.	
	i) Sex (either Male or female>. Male have ability to carry Materials which very dense/weight	
	ii) Health of a Human Sick ~~animal have~~ human has low efficiency of work. but healthy has high efficiency of work.	
	iii) Type of Food. The types of Food eaten by human also determine the capacity of work to be done,	

iv) Age of Human. Adult have higher effuency in Works than age above 50yrs they are low efficient.		
v) climatic Conditional factor. Example: during sun and early in Morning How they work is differ.		

Extract 1.1 is the correct response to the question 1.

In Extract 1.1, the candidate provided the correct responses to all parts of the question.

It was also observed that 32.5 per cent of the candidates attempted the question averagely. These candidates correctly accounted for some disadvantages of using human power in farming but failed to exhaust all the correct points on the factors affecting human working capacity.

In contrast, 8.9 per cent of the candidates demonstrated weak performance. Some of the candidates provided incorrect responses on the disadvantages of using human power as a source of power in the farm; such factors included *skilled labour a needs high amount of salary, high risks such as theft, leads to poor quality of production, it is difficult to supervise labour in the farm* and *can lead to injury*. On the other hands examples of the incorrect responses provided on the factors affecting human working capacity were *the use of poor tools, topography, soil texture, lack of skilled labour and farm size*.

It was also observed that, in responding to this question, some candidates mixed up the disadvantages of using human power and factors affecting human working capacity. This indicates that the candidates were not knowledgeable about human power as a source of power in the farm. Extract 1.2 is an example of the incorrect responses to the question.

01. **Human power;** This is the power generated by human in the farm activities. Also Agriculture is a business and most farmers in Tanzania use human as a source of power in the farm resulting into the crop production. The following are the disadvantage of using human power in the farm.

It need many labours; This means that human power need Many labours by how when we cultivated the farm - they need Many labour than other sources of power so human power need Many people to complete the task on the farm so this it's the disaduantage of human power on the farmer.

Does not simply work; When we use - human power they can not simply work than other source of power so it's the dis- aduantage that shows the human power in the farm resulting into the crop production for consumption only.

It does not consume time; It means that human power does'nt consume time on the conducting their task like when cultivating they use long time than other so human power does not consume time than other sources like tractor, Animal and other so this is the one of the disaduantage.

It is cheap; This means that human power it is cheap on their business of doing agriculture process so they show it

01. are skilled labour so if the lack or poor skilled labour the human working capacity is low or is poor

poor soil fertility; This means that If the soil fertility is poor the human if can produce the production on the farm they get the much product on the farm because the poor soil fertility they affected on their soil or land so this is the factors affecting the human working capacity on farm

poor transport and communication; It's mean that when the human produce their production on the farm and in the country the poor transport and communication like Road, Railway this means that is factors that affect the human working capacity on agricultural business on the farm.

Generally; All of those are disadvantage of using human power and also the factor affecting the human working capacity so they can be explained above - the issue of human power on the farm.

Extract 1.2 is a sample of the incorrect responses to question 1.

In Extract 1.2, the candidate provided incorrect responses to the whole question, indicating inadequate knowledge about human power as a source of power in the farm.

2.1.2 Question 2: Workshop Technology and Farm Structures

The question had parts (a) and (b). The candidates were required to (a) briefly explain the functions of the five plumbing tools to be used for connecting pipes in a network of irrigation system and (b) advise the farmer on how to construct a suitable structure to confine the animal for dehorning.

The question examined the candidates' knowledge of pipe tools and their skills in constructing a structure to confine the animal for dehorning.

The question was attempted by 711 (98.2%) candidates. Among them, 659 (92.7%) candidates scored from 0.0 to 3.0 marks; 46 (6.5%) from 3.5 to 5.5 marks and 6 (0.8%) from 6.0 to 8.0 marks. Figure 2 presents the candidates' scores on the question.
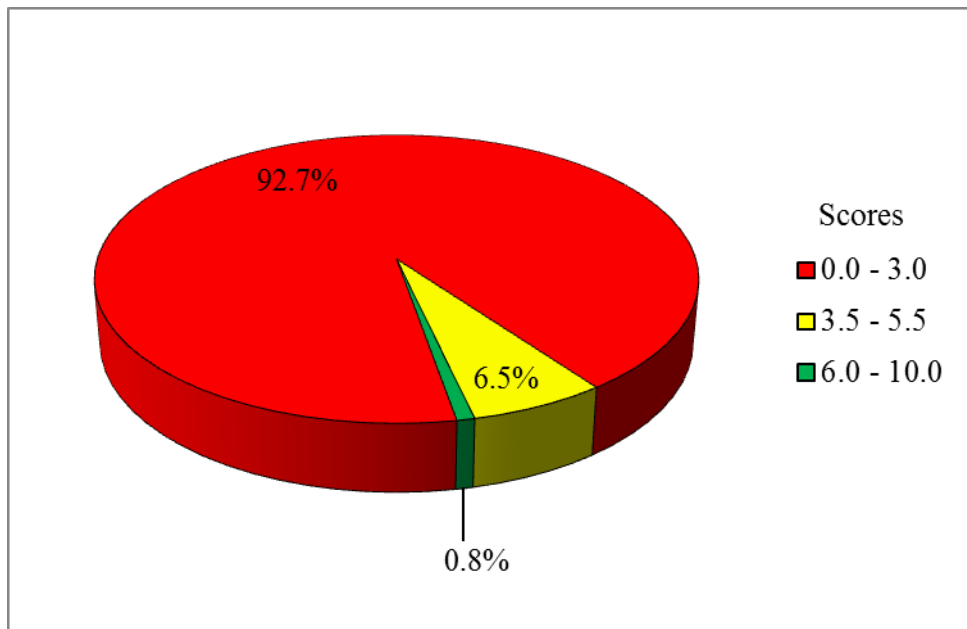
Figure 2: *Distribution of Candidates' Scores on Question 2*

As shown in Figure 2, the general performance on the question was weak since the majority of the candidates (92.7%) scored from 0.0 to 3.0 marks and only 7.3 per cent scored from 3.5 to 8.0 marks.

Statistical analysis revealed that 56.2 per cent of the candidates scored zero. Most of the candidates provided incorrect responses to both parts of the question, and a few just copied the question. In part (a), they explained the functions of the pipe fittings such as *union, tee, elbow, coupling* and *valves* instead of the functions of pipe tools like the pipe cutter, pipe die, pipe wrench and pipe learner. This implies that the candidates lacked knowledge of pipe tools and their functions. Besides, they failed to advise farmers on how to construct a crush suitable to confine animals for dehorning in part

(b). Instead of describing how to construct a crush, that is measuring the dimension required, digging holes for posts, fixing frames and sliding bars and scrapping off the vegetation from the floor, most candidates provided features which were not meant for the crush. Examples of incorrect responses given were *the structure should be well ventilated, unit should be free from water contamination, a rope for catching animal in the head or neck for proper dehorning, a roof should be available for stopping rainfall and sunlight and a constructed should be narrow such that animal cannot be able to turn.* Other incorrect responses were *should have drop gate, should have holding yard, should be rectangular* and *should have bars for fixing animals*. This implies that the candidates lacked knowledge and skills in constructing a crush.

In contrast, the candidates who had average performance (6.5%) responded correctly on the functions of the plumbing tools demanded in part (a). In part (b), most of them provided features that a crush should contain instead of describing how it should be constructed. Extract 2.1 is a sample of the incorrect responses to the question.

02.	Function of the plumbing tools.	
	(i) Elbow; This is on of the tools used in plumbing which is used to change the water direction either from right to left.	
	(ii) Tee ; Is the tool or branching it help to distribute water from the source to different direction it also can referes as branching tool.	
	(iii) Nipple ; Is one of the plumbing tools used to join the pipes in the straight line by connecting or joining them.	
	(iv) End knob ; Is the tool used in plumbing for covering one side of the pipe inorder to allow maement of water in just one direction.	

Cont;02 (b) During the process of dehorning the farmer should constr- of a suitable structure for the purpose of handling animal which is crush.		
- Construction of crush for holding animals.		
Material used; for the construction are;- woods, nails, roof material, food trophs, and water trophs. Those the presence of those materials will help the farmer to construct a crush for holding an animal.		
(a) Material to be used for construction shad be ensured that are present in the farm		
(ii) Crush should not be constructed away from the cattle house.		
(iii) Crush should be well covered on top by roof to prevent rain, sunlight.		
(iv) Once the animal is already in the crush should be tied with rope.		

Extract 2.1 is a sample of the incorrect responses to question 2.

In Extract 2.1, the candidate explained the functions of pipe fitting instead of the functions of pipe tools in part (a). In part (b), he/she named materials for constructing a crush and outlined the features for a crush instead of describing how it is constructed.

However, the analysis indicates that a few candidates (0.8%) who attempted the question had good performance. Most of them responded correctly to both parts of the question. In part (a), they identified the pipe tools and explained their functions. Similarly, the candidates described how to construct a crush in part (b). Extract 2.2 shows a sample of relatively correct responses to the question.

02. (a) Plumbing tools to be used in connection of pipes for irrigation system (i) Pipe cutter — This is an instrument with a blade used for cutting pipes of different size at different length.		

(ii) Pipe wrench — Is an metallic instrument used in plumbing for opening/losing and closing/tightening nuts on pipes.
— It is adjustible to allow different nuts to fit.

(iii) Stock and die machine
— Is a machine made of metallic and non metallic parts connected together.
— It is used to make threads on the pipe before fittings is done.

(iv) Pipes — Can be metallic or plastic pipes used as a hollow structure for water passage
— Also there is a horse pipe bothe of these have a hollow structure for allowing water to pass through.

02. Procedures for construction of structure for confining animal for dehorning.

After considering size of animals, size of structure and site to allocate the structure do the following:
(i) A farmer should choose suitable site to allocate. The site should be marked in two side with equal length.

(ii) Dig the marked points with hole, atleast three (3) holes on each side of the marked area

(iii) Take poles or larger logs and put in the hole then bury and compact the base with stone or bricks to make it firm.

(iv) start hummering the timbers on each side of three post or pole leaving small space from down to the top.

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	(v) In the head side leave a small space	
for confining head while one side	
leave as entrance. Make a strong	
door to put in the entrance side	
Turn the structure is ready for use and	
is called Crush	

Extract 2.2 is a sample of correct responses to question 2

In Extract 2.2, the candidate described well how one can construct a crush in part (b), In part (a) he/she missed two points, *pipe* which is not a tool and *pipe rearner* which was not written.

2.1.3 Question 3: Farm Mechanisation and Machinery and Introduction to Irrigation

The question consisted of two parts: (a) and (b). In part (a), the candidates were required to point out six problems of using machines in agriculture that are associated with farmers and, in part (b), give four conditions which favour the use of sprinkler irrigation over surface irrigation. The question tested the candidates' knowledge of problems of mechanisation and the methods of irrigation.

The question was attempted by 722 (99.7%) candidates whereby 302 (41.8%) scored from 0 to 3 marks; 286 (39.6%) scored from 3.5 to 5.5 marks; and 134 (18.6%) scored from 6 to 9 marks. The general performance of the candidates in the question was average. Figure 3 summarises the candidates' scores to the question.
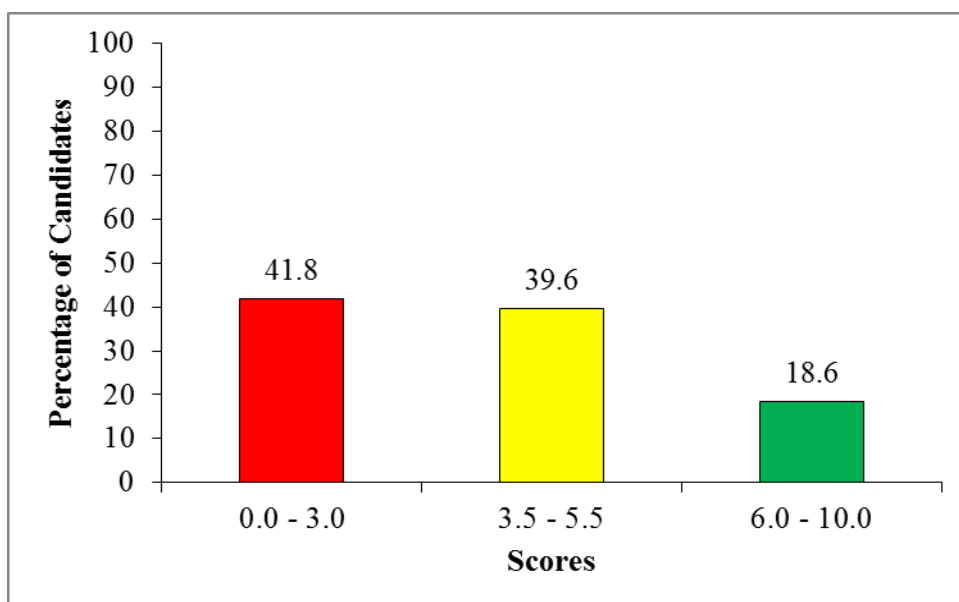
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Figure 3: *Distribution of Candidates' Scores on Question 3*

Figure 3 indicates that 58.2 per cent of the candidates scored from 3.5 to 9.0 marks, whereas 41.8 per cent scored from 0.0 to 3.0 marks. Thus, the general performance of the candidates on this question was average.

Among the candidates who attempted this question, 18.6 per cent had good performance. The analysis shows that, in part (a), the candidates correctly described the problems of using machines in agriculture, which are associated with farmers. Their responses were such as *agronomic practices, pattern of agriculture and lack of training in operating machineries, fragmented farm holdings* and *relatively poor agricultural extension services*. In addition, the candidates gave conditions which favour the use of sprinkler irrigation over surface irrigation in part (b). The conditions were such as *pervious soil, steep slope land, small irrigation channels* and *shallow soil land*. This shows that the candidates had adequate knowledge of the conditions which favour the use of different irrigation methods. An example of the correct responses in part (b) is illustrated in Extract 3.1.

Q3b)	(i) The soil must be too erosive compare to surface Irrigation.	
	(ii) The soil must be pervious or impervious over surface Irrigation.	i
	(iii) The depth of the soil is shallow over surface Irrigation	
	(iv) The topograph must not be uniform.	

Extract 3.1 is a sample of the correct responses to question 3(b).

In Extract 3.1, the candidate correctly gave the conditions which favour the use of sprinkler irrigation over surface irrigation.

However, 39.6 per cent of the candidates who had average performance on this question did not exhaust all the problems of using machines, which are associated with farmers in part (a). In part (b), these candidates gave out one to two conditions which favour the use of sprinkler irrigation over surface irrigation. They had insufficient knowledge of different methods of irrigation.

Conversely, 41.8 per cent of the candidates who attempted the question had weak performance. Some of the candidates (3.0%) failed to attempt any part of the question. In part (a), the candidates failed to point out the problems of using machines that are associated with farmers. Some of the candidates pointed out problems of mechanisation like *high initial cost, high maintenance cost, and problems of availability of spare parts and wear and tear,* which are not associated with farmers. Other candidates incorrectly wrote things associated with agricultural materials, such as *the machines may create injury to the farmer and workers, agricultural machines like tractor are fixed in nature and the machines does not always last longer.* This shows that the candidates lacked knowledge about the problems of mechanisation. Likewise, the candidates failed to give the conditions which favour the use of sprinkler irrigation over surface irrigation in part (b). They provided incorrect responses such as *good management, availability of enough capital, nature of crop grown, the climate of the area* and *large area* were given by the candidates. The

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candidates were not conversant with the methods of irrigation. Extract 3.2 shows one of the incorrect responses to the question.

3a	Machine Is the any tools or equipment whcen used to simplify their work. For example of machine are ~~moee~~ mouen, Tractors. Harvesting machine
	Problems of using machine in Agriculture
	(i) Machine It can cause the loss of ~~biodiversity~~ biodiversity or cause death of micno-organism. - This was true because some of the living organism live under the land or Soil. for example Earth worm.
	(ii) Machine It can cause the Soil eroseen or land degradation - for example Tractors are moder n tools when the furmer use It can cause the Soil erosen to take place.
3a	(iii) Machine It can destroy the Soil Structure - This ocour when the farmer Use tractor It can destroy the Particles of the Soil
	(iv) Machine It can destroy the ~~PH~~ PH of the soil - When we use tractor It can mix the acidic and Base to the Soil due to that Its difficult to determine the PH of the Soil

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(v) Machine It can destroy the Soil texture	
— When we use machine It can destruct the diameter to the Soil	
	'
(vi) Machine It can cause the environmental pollution for example Air Pollution.	
3b Conditions which favour the Use of sprincler Irrigation over Surface Irrigation.	
(i) Types of crop growing	
(u) Topograph	
(uy Types of Soil	
(u) Climatic conditions	

Extract 3.2 is a sample of the incorrect responses to question 3.

In Extract 3.2, the candidate responded to both parts of the question incorrectly. For example, in part (a) the candidate tried to explain the effects of using machines instead of the problems of mechanisation that are associated with farmers.

2.1.4 Question 4: Introduction to Soil Science

In this question, the candidates were required to suggest five farming practices that can be used by the farmer to improve soil structure for crop production. The question tested candidates' knowledge and skills of improving soil structure.

The question was attempted by 722 (99.7%) candidates. Among them, 22 (3%) scored from 0.0 to 3.0 marks; 118 (16.4%) from 3.5 to 5.5 marks; and 555 (80.6%) from 6.0 to 10 marks. Figure 4 summarises the candidates' scores on the question.
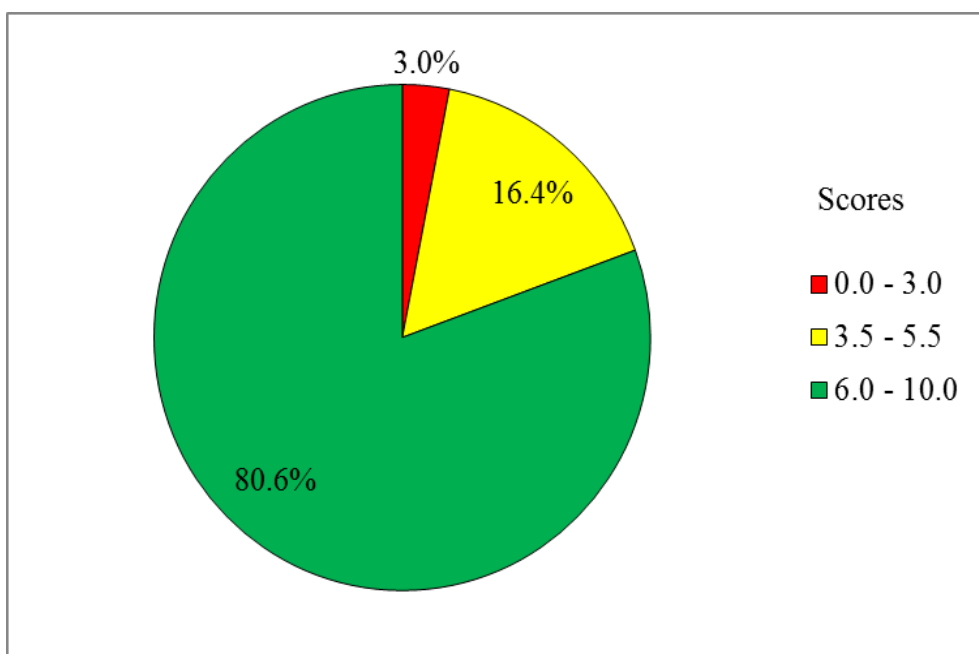
Figure 4: *Distribution of Candidates' Scores on Question 4*

According to Figure 4, the majority of the candidates (97%) scored from 3.5 to 10 marks, whereby 3 per cent from 0.0 to 3.0 marks. The data shows that the general performance of the candidates on the question was good.

The candidates (80.6%) who had good performance correctly suggested farming practices that can be used by the farmer to improve soil structure for crop production. The farming practices suggested were *mulching, minimum tillage, use of crop cover, addition of organic matter* and *crop rotation*. Extract 4.1 is a sample of the correct responses to the question.

04	Farming practices that Improve soil structure for crop production includes the following:	
	i. Tillage.	
	This involves opening of the compact soil by cutting of the soil clods of big size. So it improve the soil structure and allow aeration and roots penetration hence create better environment for plant growth resulting to good crop production.	
	ii. Mulching.	
	This is the covering of mulching material such as grasses on the surface of the soil leading to decomposition of such grasses forming organic matter in the soil that facilitate plant growth hence good crop production and improvement of soil structure.	
	iii. Addition of Organic Manure.	
	By adding organic manure soil structure can be improved since it adds organic matter in the soil increasing porespaces in the soil for aeration and good root penetration resulting to proper plant growth and better crop production.	
	iv. Crop rotation.	
	This is the situation of growing different crops on the same piece of land seasonally. This can also improve soil structure since it includes fallow period that allow the land (soil) to regain nutrient resulting to improvement of soil structure and crop production.	
	v) Use of cover crops.	
	These crops can improve soil structure and crop	
04	production since they act as manure or soil nutrients when covered by the soil improving the soil structure and crop production.	

Extract 4.1 is a sample of the correct responses to question 4.

It was observed that 16.4 per cent of the candidates attempted the question and performed averagely. These candidates identified the farming practices

that can be used to improve soil structure for crop production but failed to explain some of the practices in more detail.

In contrast, the candidates who had weak performance (3%) failed to suggest the farming practices that can be used to improve soil structure for crop production. For instance, some of them suggested causes of land degradation such as *burning, overgrazing, mining* and *human activities* while others provided responses which did not address the demand of the question. Examples of such responses were *ridging, contouring, terrace, agroforestry* and *bush fallowing*. The responses signify that the candidates lacked knowledge of and skills in farming practices that can be used to improve soil structure for crop production. Extract 4.2 is illustrative.

i)	It help to Increase water holding capacity of the soil	
iii)	It help to Increase the availability of some Plant nutrient	
iv)	Help to cause from the uptake of water through plant roots	
v)	Increase soil temperature,	

Extract 4.2 is a sample of the incorrect responses to question 4.

In Extract 4.2, the candidate outlined the characteristic features of the soil with a good structure instead of explaining farming practices that can be used to improve soil structure for crop production.

2.1.5 Question 5: Introduction to Soil Science

In this question, the candidates were required to examine one characteristic and two management implications of the following soil colours (a) black (b) white (c) red (d) brown and (e) grey. The question examined candidates' knowledge about soil colours and their properties.

The question was attempted by 708 (97.8%) candidates. Among them, 691 (97.6%) scored from 0.0 to 3.0 marks and 17 (2.4%) from 3.5 to 5.0, which were the maximum marks. Figure 5 illustrates the distribution of candidates' scores on the question.
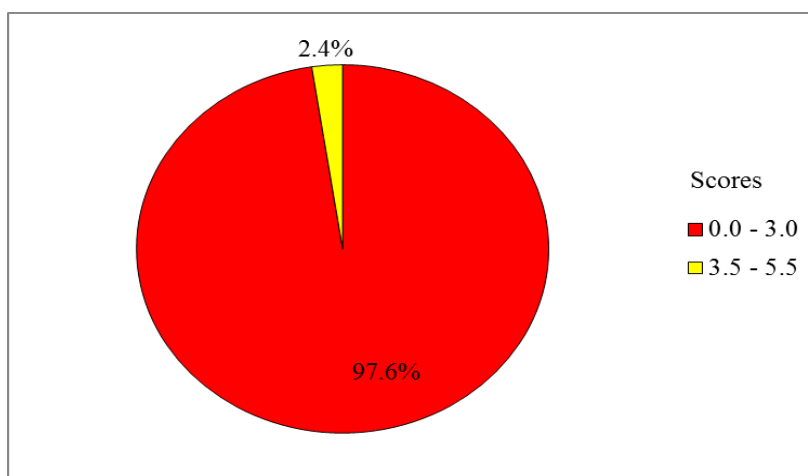

Figure 5: *Distribution of Candidates' Scores on Question 5*

Figure 5 indicates that most of the candidates (97.6%) scored from 0.0 to 3.0 marks while a few candidates (2.4%) scored from 3.5 to 5.0 marks. This shows that the general performance on the question was weak.

Those who had weak performance constituted 97.6 per cent of the candidates. They failed to examine the characteristics and management implications of the named soil colours. They outlined incorrect characteristics for the colours and gave management practices for those soil colours instead of their management implications. An example of the responses on the characteristics of soil colours were *(a) black have high temperature absorption (b) white contain saline (c) red alkaline in nature (d) brown less nutritive (e) grey have high limestone.* The candidate also incorrectly gave management implications of the soil colours as follows: *(a) black -add organic matter and measure pH (b) white-add lime and manure (c) red-add quartz and calcite (d) brown-add lime material and apply organic fertilizer (e) grey-add organic matter and industrial fertilizer.* Such incorrect responses are attributed to candidates' inadequate knowledge and skills in distinguishing soil colours and their associated properties. The characteristics and management implications of some soil colours named were black soils are often associated with high level of organic matter having water lodging or drainage problems and low pH. Red soil indicates good drainage in which there is high phosphorus fixation and low plant available water. Extract 5 is an example of the incorrect responses to the question.

05.	@ Black.	
	Characteristic of black soil.	
	- It has ability to absorb heat from the Sun.	
	Managements of black soil.	
	- Addition of mulching material on the soil surface to control heat absorption.	
	- Through irrigation process so as to cool the soil.	

	(b) White:		
	Characteristic of white soil.		
	− Poor nutrient content for agriculture activities.		
	Managements of the soil		
	− Addition of manure in the soil to add nutrients in the soil.		
	− Addition of organic matter to supply soil nutrients.		
05.	(c) Red:		
	Characteristic of the soil.		
	⇒ It is acidic soil.		
	Managements of the soil acidic		
	− Through addition of lime material in the soil which help to control acidic condition of the soil.		
	⇒ Through intensification process to make a soil suitable for acidic crop production.		
	(d) Brown:		
	Characteristic of the soil:		
	− It is an alkaline soil.		
	Managements of the soil.		
	⇒ Cropping of non-acidic plants in the soil to maintain the condition of the soil.		
	⇒ Control application of Industrial fertilizers may lead to acidic soil condition.		
	e) Grey:		
	Characteristic of the soil.		
	⇒ It is the neutral soil.		
	.		
	Management of the soil.		
	− Addition of organic matter.		
	− Addition cropping covers in the soil		

Extract 5 is a sample of the incorrect responses to question 5.

In Extract 5, the candidate provided incorrect responses to the whole question.

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Nevertheless, no one candidate had good performance on this question. Statistics depict that 2.4 per cent of the candidates who attempted the question had average performance. Most of the candidates correctly gave the characteristics of the named soil colours but failed to examine their management implications. This shows that the candidates had insufficient knowledge of soil colours and their properties.

2.1.6 Question 6: Introduction to Soil Chemistry

The candidates were required to analyse five ways in which the level of nutrients can decline in the soil. The question examined the candidates' knowledge about the ways in which the soil loses its fertility.

The question was attempted by 723 (99.9%) candidates. Among them, 77 (10.7%) scored from 0.0 to 3.0 marks; 207 (28.6%) from 3.5 to 5.5 marks; and 439 (60.7%) from 6.0 to 10 marks. Figure 6 shows the distribution of the candidates' scores.
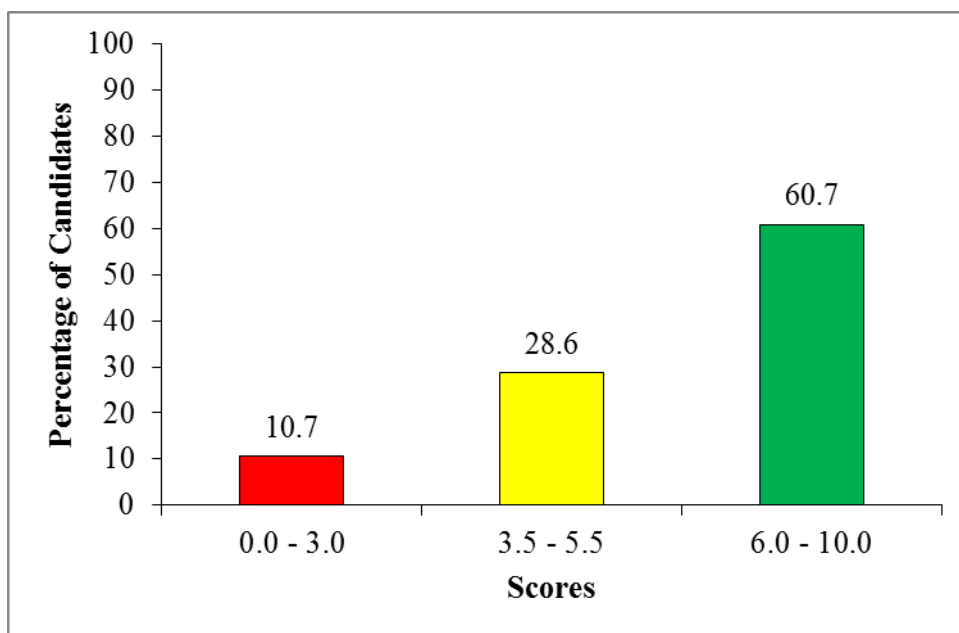
Figure 6: *Distribution of Candidates' Scores on Question 6*

Figure 6 shows that 89 per cent of the candidates scored from 3.5 to 10 marks and 10.7 per cent from 0.0 to 3.0 marks. The general performance of the candidates on this question was good.

Most of the candidates (60.75%) who performed well on this question, correctly analysed the ways in which the level of nutrients can decline in the soil. They gave responses such as *leaching, soil erosion, flooding,* and *burning of vegetation*. This shows that the candidates were knowledgeable about the ways in which the soil loses its fertility. Extract 6.1 is an example of the correct responses to the question.

6	Ways through which level of Nutrients can be declined in the soil.	✓
	i) Soil erosion, Refers to the removal of top layer of the soil. When top layer of the soil is removed Nutrients are lost removed also. This reduces the level of Nutrients in the soil. Most erosion is done through rainfall or Splash Gully and Rill erosion.	
	ii) Burning of vegetation, Continous Burning of vegetation cause Burning of Nutrients Available in the soil. Burning Also affects Microbial Activities in the soil Where Microorganisms add soil Nutrient Burning of Vegetations cause loss of soil Nutrients.	
	iii) Water logging - Some Nutrients in the soil Accumulate in the normal condition of the soil. When water Accumulate in the soil Nutrients in the Soil become unavailable for plants growth. Water logging causes unavailability of some plant Nutrients.	
	iv) Leaching - Refers to downward infiltration penetration of Nutrients in the soil. Leaching Causes washing away of soil Nutrients. leaching causes removal of dissolved Nutrients into the soil. leaching causes loss of of valuable soil Nutrients in may encourage Acidification.	
	v) Harvesting of Crops - Most of Soil Nutrients are released used by crop plants as the source of food and Energy. When Crops are harvested the Nutrients Absorbed remain no longer on the soil. Harvesting of crops also cause the soil more prone to erosion agents.	
	vi) Weeds - Weeds Absorb considerable Amount of Nutrients in the soil when they are removed from the soil they are also removed with the Nutrients they Absorbed from the soil. This cause Nutrients decline	

Extract 6.1 is a sample of the correct responses to the question 6.

In Extract 6.1, the candidate wrote correct points on the ways in which the level of nutrient declines in the soil.

In contrast, 10.7 per cent of the candidates had weak performance while some of the candidates explained human activities that cause soil erosion like *deforestation, overgrazing, burning of the vegetation, mining* and

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cultivation along steep slopes instead of ways that decline level of nutrients in the soil. Others wrote inappropriate responses about the soil and weather. One candidate wrote *illuviation, eluviation* and *weathering process,* which are inappropriate. Extract 6.2 is an example of the incorrect responses to the question.

6.	Use of fertilizer; this means the application In the farm It Improve the fertility of the Soul and it Influence the use fertilizer to the farm to Increase productivity and Improvement of fertility to the Soil.
	green manuring. This means the use of manure through the decomposition of Soil organic matter of animal through feaces and som of the material which can be done
	Cover crops, this means the fertility of the Soil can be Improved to the Surface of the ground through the process of Covering the Soil with plant vegetation In the Soil
	Mulching material; this crop that is grown In place and can be found but remains In the soul.
	Generally, this means the Soil fertility It Increase the productivity of Plant and fast growth of crop plant

Extract 6.2 is a sample of the incorrect responses to question 6.

In Extract 6.2, the candidate analysed ways in which nutrients in the soil can be maintained instead of ways for the decline of soil nutrients.

2.1.7 Question 7: Introduction to Soil Chemistry

The candidates were required to justify the statement that functions and deficiency symptoms of mineral elements in plants are directly related, using magnesium and calcium as examples. The question tested the candidates' understanding of the functions and deficiency symptoms of mineral elements in plants.

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The question was attempted by 710 (98.1%) candidates where 599 (84.4%) scored from 0.0 to 3.0 marks, 93 (13.1%) from 3.5 to 5.5 marks and 18 (2.5%) from 6.0 to 8.5 marks. The highest score for the question was 8.5 marks. Figure 7 presents the candidates' scores on the question.
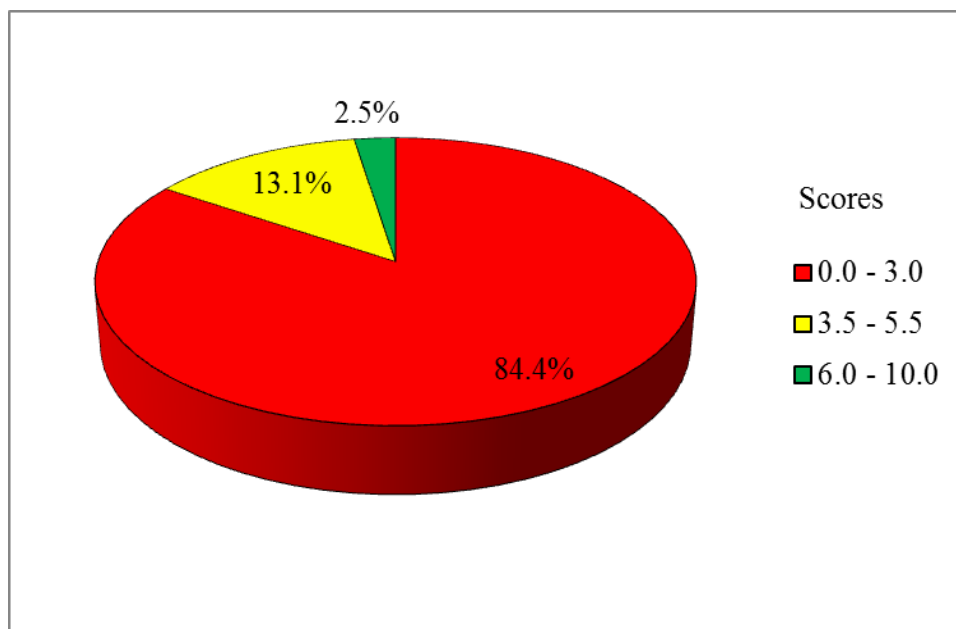

Figure 7: *Distribution of Candidates Scores on Question 7*

Figure 7 indicates that most of the candidates (84.4%) scored from 0.0 to 3.0 marks, and 15.6 per cent from 3.5 to 8.5 marks. Thus, the general performance of the candidates on the question was weak.

Data show that the 84.4 per cent of the candidates who attempted this question had weak performance. The analysis of their responses shows that they showed incompetence in the content of the subject matter, namely the functions of mineral elements and their deficiency symptoms. Thus, they failed to show the direct relationship between functions and deficiency symptoms of magnesium and calcium. Some of the incorrect responses provided were functions of magnesium: - *it improve soil structure, it lead to high nutritive value and it influence soil aeration;* deficiency symptoms of magnesium: *general plant weakness and the soil may cause dispersal of soil particles;* Functions of calcium: *it provides energy, it maintains plant from being infected and it help to neutralize the acidic soil;* and deficiency

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symptoms of calcium: *leaves turn red in colour, it lead to leaf falling and decay of the plant*. However, the candidates were supposed to respond, for example, one of the functions of magnesium is that it is the component of chlorophyll; thus its deficiency results into the leaves turning pale yellow. Calcium is responsible for normal cell division; hence, its deficiency leads to terminal buds of shoots and apical tips of roots fail to develop. Therefore growth of plants stops. Extract 7.1 is one of the incorrect responses to the question.

7 i. The following are the function of mi
neral elements in plants, especial Magn
esium and calcium such as :-

ii. They are constituents of chlo
rophyll in plants :. Through the presence
of calcium and Magnesium enable to
maintain and provide the chlorophyll col
our in the plant.

ii. They are constituents of R
NA and DNA (Nucleic acid) :. Through
the Magnesium and calcium enables
the Nucleic acid with the plant
to be maintained and promoted

iii. They are constituents of Hor
mones, Enzymes, Coenzymes and proteins.
Through the Magnesium and calcium
enables to promoted the and contain
the constituents of proteins, enzymes and
others in the soil.

iv. They help the closing and op
ening of stomata!! Through the pre
nce of Magnesium and calcium ena
bles the plant to close and open.

v. They help in Vegetative gro
with and used to activate enzymes!.
Through the Magnesium and calcium
enables to activate the enzyme in plant.

7. vii. They help in fruit forma
tion ! Through the presence of Magne
sium and calcium enable the plant
in the formation of fruits.

viii. They helps the plant
to adapt and grow in the acidic soil
through the presence of Magnesium and
calcium.

ii. The following are the deficiency
symptoms of Magnesium and
calcium such as: -

i. Stunted growth.
ii. Die and kill of the pl
ant
iii. Plants fail to open and
close stomata.
iv. Plants fail to form the
v. Colour.

Extract 7.1 is a sample of the incorrect responses to question 7.

In Extract 7.1, the candidate incorrectly stated the functions and deficiency symptoms of magnesium and calcium.

Statistics also indicate that 13.1 per cent of the candidates who attempted the question had average performance. The candidates provided some of the correct responses for the functions and deficiency symptoms of magnesium

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and calcium symptoms, but they failed to show the relationship between the functions and deficiency symptoms.

On the other hand, 25.5 per cent of the candidates did the question well. These candidates correctly provided the functions and deficiency symptoms of magnesium and calcium; though a few failed to show the direct relationship between the two. Extract 7.2 illustrates a sample of the correct responses to the question.

7	• ☒ · Magnesium.	
	Functions of Magnesium.	
	(i) Regulate the production of carbohydrates by the plants	
	(ii) Facilitate normal cell division.	
	(iii) Regulate the uptake of other soil nutrients	
	Deficiency symptoms of Magnesium.	
	(i) The veins of the old leaves remain green while the area between veins become Chlorotic.	
	(ii) The leaves Turn brownwish colour.	
	• Calcium.	
	Functions of calcium.	
	(i) They are the component of cell walls	
	(ii) Neutralize the organic acids	
	(iii) Strengthen the straw	
	(iv) Promote normal cell division.	
	(v) Influence uptake of Potassium ions.	
	- Deficiency symptoms.	
	(i) Chlorosis	
	(ii) Stunted growth and weaken straw.	

Extract 7.2 is a sample of relatively good responses to question 7.

In Extract 7.2, the candidate provided the correct responses about the functions and deficiency symptoms of the named mineral elements, though he/she failed to show the direct relationship between the functions and deficiency symptoms of the two mineral elements.

2.1.8 Question 8: Introduction to Agricultural Prices

The question comprised parts (a) and (b). The candidates were required to (a) explain how the biological nature of agricultural production influences change in the prices of agricultural goods by giving two points and (b) give three positive effects and three negative effects of controlling the prices of agricultural goods. The question tested the candidates' understanding of the causes of price fluctuations and the effects of price stabilisation on agricultural goods.

The question was attempted by 715 (98.8%) candidates of which 415 (58%) scored from 0.0 to 3.0 marks; 168 (23.5%) from 3.5 to 5.5 marks; and 132 (18.5%) from 6.0 to 8.5 marks. Data shows that the performance of the candidates on the question was average.

The candidates who had good performance on this question were 18.5 per cent. These candidates gave correct responses to almost both parts of the question. In part (a), they explained correctly how the biological nature of agricultural production influences change in the prices of agricultural goods. The candidates explained how environmental factors and the incubation period of agricultural goods influence change in the prices of goods. Similarly, in part (b) they gave positive and negative effects of controlling the price of agricultural goods. The correct responses were positive effects which include *removal of price uncertainty, a fair price for producers and having reserves during times of famine when price control involves storage of food. Negative effects include; it may be bad for consumers if the price of goods tends to rise when wages remain at the same level, where input prices are controlled and set at high level which may lead to high production cost* and *may lead to wastage and dumping of agricultural commodities*. These responses show that the candidates were knowledgeable about the causes of price fluctuations and the effects of controlling prices of agricultural goods. Extract 8.1 depicts a sample of the correct responses to question 8 (b).

(b) positive effects of controlling price of agricultural goods

© Since during controlling price involve storage of agricultural product (food crops) it ensure continous availability of food even in dry season.

ⓘ It encourage the farmer to increase production due to the fair price which is not below below equilibrium price

ⓘ It help to control price uncertainity caused by price fluctuation.

negative effect of controlling price of agricultural goods.
© It may encourage development of black market when the price is set below the equilibrium price

(ii) It may be bad to consumer since the price of the commodity may be high but wages remain in the same level.

(iii) It may lead to the wastage and dumping of agricultural goods (especially perishable one) since when the price is high people will not buy hence it will damage.

Extract 8.1 is a sample of the correct responses to question 8 (b).

Data analysis also indicated that 23.5 per cent of the candidates had average performance. In part (a), these candidates did not know that the biological nature of agricultural production involves environmental factors and the incubation period of such goods. Thus, they failed to explain how the biological nature of agricultural production influences change in the prices of goods. However, the candidates mostly provided correct responses on the positive and negative effects of controlling prices of agricultural goods in part (b).

On the contrary, 58 per cent of the candidates who attempted the question had weak performance. These candidates responded incorrectly to almost all parts

of the question. In part (a), they failed to explain how the biological nature of agricultural production influences change in the prices of agricultural goods. The candidates were not familiar with what is meant by the biological nature of agricultural production, hence they provided incorrect responses such as *fluctuation of currency exchange, perishability of the product, seasonal availability of the product and some agricultural products are bulk to transport.*

Likewise, they failed to give the effects of controlling prices of agricultural goods. They gave incorrect responses for positive effects like *it increase government revenue, it help to increase development, it help to obtain the required amount of money which is related to the production of farm.* Moreover, some of them provided incorrect responses for negative effects such as *change in taste of consumer, it lead to unprofitable to the farmer, it a source of illegal market* and *it lead to uncertainty in the market.* Such responses indicate that the candidates had insufficient knowledge about the topic. Extract 8.2 is one of the incorrect responses to the question.

8 (b)

Positive effects of controlling price of agricultural products.
(i) It helps to protect producers and consumers from exploitation.

(ii) It helps to control production in the perticular area to avoid the fall of agricultural price due to production of large amount of food.

(iii) It helps to protect Producers / farmers from strong competition.

(iv) It stimulate the social and economic development in the perticular area.

Negative effects of controlling price of agricultural products.
(i) Lead to fluctuation of agricultural prices since there is large products of certain crops in the farm with high demand in the previous year as explain by cobweb theorem.

(ii) It leads to high demand of a certain products in that year due to reduction of the cultivating such crop as the result of price in the last period of time before the present day.

(iii) It leads to clasess between farmers themselves.

Extract 8.2 is a sample of the incorrect responses to question 8.

In Extract 8.2, the candidate incorrectly responded to both parts of the question.

2.1.9 Question 9: Fundamental of International Trade and Farm Planning

The question had parts (a) and (b). The candidates were required to (a) account for the four importance of foreign reserve as it is used in international trade and (b) give reasons on why the following factors are considered when drawing a farm plan (i) environmental factor (ii) farmer's objectives and preference (iii) availability and costs of input and (iv)

security. The question tested the candidates' understanding of the importance of foreign reserves and factors to consider when planning for a farm.

The question was attempted by 719 (99.3%) candidates whereby 562 (78.2%) scored from 0.0 to 3.0 marks, 147 (20.4%) from 3.5 to 5.5 marks and 10 (1.4%) from 6.0 to 9.0 marks. No candidate scored all the 10 marks allocated to this question. Figure 8 summarises the candidates' scores on the question.
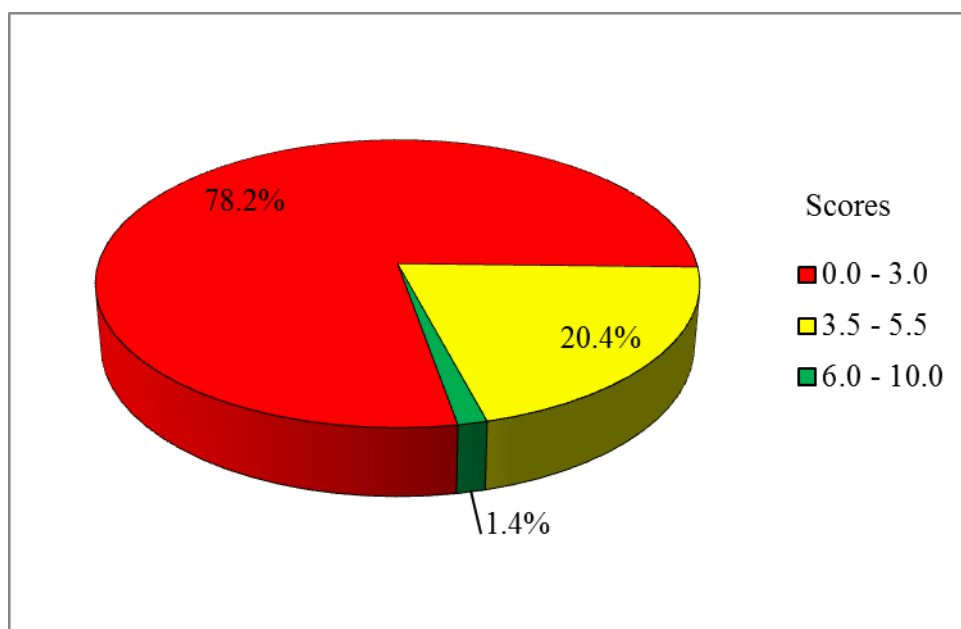

Figure 8: *Distribution of Candidates' Scores on Question 9*

The analysis of data indicated that 78.2 per cent of the candidates who attempted the question had weak performance. In part (a), the candidates failed to account for the importance of foreign reserves as they are used in international trade. The candidates provided responses which did not reflect foreign reserves, indicating that they were not knowledgeable about the meaning of foreign reserves and their importance. They were supposed to know that foreign reserves refer to the total value of accumulated reserves in the form of gold or dollar held by a country, and they have the following importance: facilitate smooth exchange of currencies. In a country which imports more than exports, foreign reserves correct the deficit in the balance

of payment and stabilize the foreign exchange rate to provide a more favourable economic environment for the progress of the country. Besides, strong reserves attract many people from foreign countries to invest in the country. Some candidates provided incorrect responses like *improvement of transport and communication infrastructure, stabilize price for primary products, increase government revenue* and *improve the market condition*. Other candidates outlined the importance of international trade instead of that for foreign reserves by giving responses such as *to increase the foreign currency, to provide government interest, it helps the exchanges of goods between the country and it brings cooperation between one country and another country.* These responses imply that the candidates did not know the concept of foreign reserves.

In part (b), they failed to explain the given factors to be considered when drawing a farm plan. The required explanation were such as environmental factors determine specific enterprises to be established on the farm, farmer's objectives and preference are to be considered since farmer's interest act as a motivation, availability and costs of inputs are important to be known since the farmer embarks on an enterprise where inputs are affordable and easily available. Security should also be considered since some enterprises are to be established near the farm house. The candidates gave incorrect responses such as (i) environmental factor-*they help farmer to know where to produce* (ii) farmers objectives and preference-*it deals with how to produce* (iii) availability and costs of inputs-*input availability need to be known to estimate cost of transportation* and (iv) security-*security may lead to increase the cost of production in agricultural activities.* This signifies that the candidate had inadequate knowledge of the factors to be considered when drawing a farm plan. Extract 9.1 is a sample of the incorrect responses to the question.

9. Foreign reserve: Is the process in which the country tends to conserve the products or things or goods that are obtained from the foreigners during a certain period of times. The following are the importances of foreign reserves.

It provide Employment opportunity: Through foreign reserve people can get different tasks or activities that can promote them or facilitate them to improve their living standard in a way that they can be able to support their own life and families.

It provide Social Services to it members: In the way that people are benefits in one way to another through this system of foreign policy by giving them all services that are needed for them to support their lives. example Education Service, hospital Service or health care and water supply.

It provide protection to the people or members: foreign reserve protect the member and all things that are owned by them in order to perform different activities during a certain period of time and promote peace and order to it member or workers in the reserve that they have owned and through that more development can be archived.

9 (w) It encourage trade activities: through foreign reserve different people can interact one another in order to exchange different materials and resources that one or another have no during that time and is in need of them. So through that pot foreign reserve people can obtain what they need during certain time

(b)	(i) Enviromental farmers	
	(i) Enviromental factors: A farmer has to consider the enviroment of the place. Since is the one that guide him or her to choose the mohod that can be used in the farm plan either hot enviroment or Cold enviroment.	
	(ii) Farmers objective and preference: In order for a farmer to draw well farm plan has to be able that the mohod used is suitable and prefered by the farmers during a cotain period of time.	
	(iii) Availability and Cost of inputs: Farm plan consider if the mohods used is available and if its available how does it Cost this are ha hing farmers need to know when drawing farm plans.	
	(iv) Security: In the other hand farmers has to have enough — Security on his farm for the. Suitable and best mohods that needs to used in drawing or formulating a farm plan.	

Extract 9.1 is a sample of the incorrect responses to question 9.

In Extract 9.1, the candidate incorrectly attempted both parts of the question, indicating insufficient knowledge about foreign reserves and factors to be considered when drawing a farm plan.

Statistics also showed that 20.4 per cent of the candidates who attempted the question had average performance. These candidates, provided partially correct responses to part (a). In part (b), most of them failed to give reasons for the environmental factors and the availability and costs of inputs to be considered when planning for a farm. Likewise, most of them failed to explain why farmers' objectives, preference and security are to be considered.

Nevertheless, a few candidates (1.4%) had good performance on the question. They gave correct responses to both parts of the question. They correctly accounted for the importance of foreign reserves and gave reasons

as to why the named factors are to be considered when drawing a farm plan in part (a) and part (b) respectively; however, some did not explain in detail the factors in part (b). This justifies that the candidates had adequate knowledge of the importance of foreign reserves and factors to be considered when planning for the farm. Extract 9.2 is a sample of the correct responses to the question.

09.	(a) Foreign reserve is important as it is used in international trade as follows :
	i/ It can be used to revive the economy of a country when the country is in deficit.
	ii/ Foreign reserves improves the economy of a country because it is a part of national asset
	iii/ Foreign reserve can be used to produce income to a country through foreign investment. This helps stabilise the country economically
	iv/ Foreign reserves can be used to pay back loans ~~for four~~ to external debtors, world bank or IMFs
	(b) i/ Environmental factor is to be considered when drawing farm plan because, environmental factors such as topography, soil pH, soil mineral composition, temperature, humidity, rainfall and other affect the productivity in both positive and negative manners. Failure to do so, the production plan will draw the farmer to incur loss.
	ii/ Farmer's objectives and preferences are considered when drawing a farm plan because, the farmer is the one to decide the kind of project to be done in a particular area. So, his objectives are the one to guide the performance of such a project. For example, a farmer needs to establish poultry project, this is what he prefers and his objectives are to produce both meat and eggs in large amount.
	iii/ Availability and cost of inputs; Inputs such as feeds, chemicals, fertilizers must have to be considered their costs and availability. This is necessary so as to produce goods with a minimum initial cost and higher profit.

09.	(b) iii/ Inputs may be available but have higher costs, this will force farmer to diversify the production otherwise, he will be in a great danger of incur a cost loss.	
	iv/ Security; Security is also to be considered during farm planning because the farmer needs to produce securely his farm produce, stores them or sells them without being stolen. If security is poor in his locality, the farmer is tempted to hire a service of security (watchman) so that his produce and products are safely stored.	

Extract 9.2 is a sample of the correct responses to question 9

In Extract 9.2, the candidate correctly responded to part (a) of the question. In part (b), the candidate explained correctly why the factors are to be considered when planning for the farm, except for the environmental factors.

2.1.10 Question 10: Production Economics

In this question, the candidates were required to examine five ways that can be used by the management to improve labour productivity in the farm. The question assessed the candidates' understanding of the ways of improving labour productivity.

The question was attempted by 715 (98.8%) candidates in which 257 (35.9%) scored from 0.0 to 3.0 marks; 212 (29.7%) from 3.5 to 5.5 marks and 246 (34.4%) from 6.0 to 10 marks. Figure 9 indicates the candidates' scores on the question.
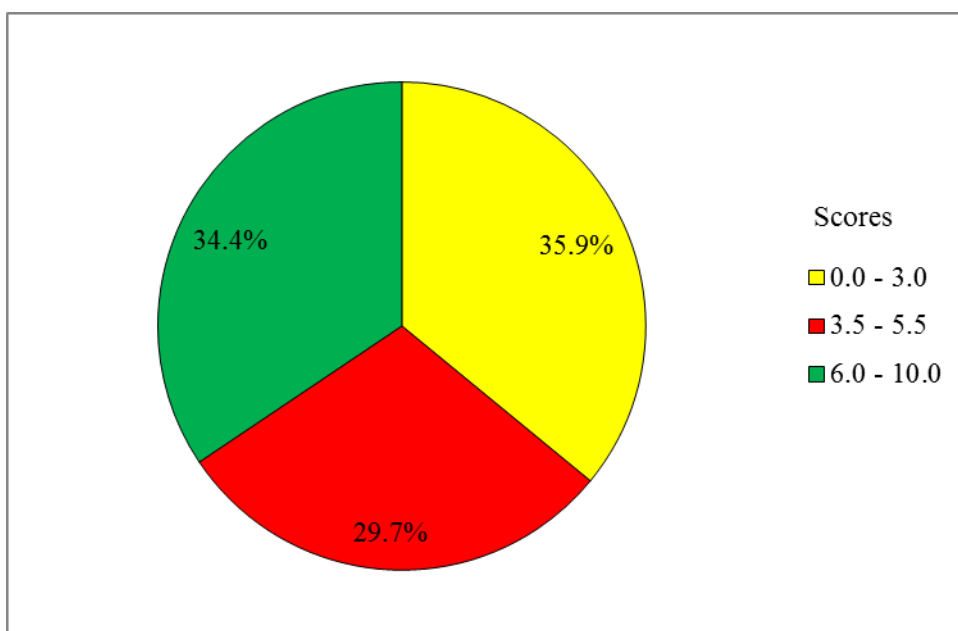.

Figure 9: *Distribution of Candidates' Scores on Question 10*

Figure 9 shows that 64.1 per cent of the candidates attained good performance of 3.5 to 10 marks, whereas 35.9 per cent scored from 0.0 to 3.0 marks.

The analysis shows that 34.4 per cent of the candidates who attempted the question performed well. They examined ways that can be used by management to improve labour productivity in a farm. They provided correct responses such as *giving incentives, supervision, increase in physical capital/farm mechanisation, increase in human capital/education* and *training of labour force*. Extract 10.1 is an example of the correct responses to the question.

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| 10 | iii/ Labour specialization or assigning specific works.
— This makes each labourer know his duty and time of completing his task and order of another task.

iv/ Mechanization
— It involves use of machines, implements by the labour, this increase the output per labour.
example labour using tractor and another using his hands in weeding operations are different in outputs.

v/ Provision of good working environments, means of transport, health or medical facilities
— These makes the labour to produce high out and increasing timely working. | |

<p align="center">Extract 10.1 is a sample of the correct responses to question 10</p>

Furthermore, it was noted that 29.7 per cent of the candidates attained average performance. They partially examined ways of improving labour productivity; they did not exhaust all the points demanded and so provided only a few points.

Conversely, 35.9 per cent of the candidates attained weak performance. Most of them provided incorrect responses about the ways in which management can use to improve labour productivity in the farm. Examples of such incorrect responses are *having first aid kit, reducing working time, keeping records. Farm planning and calculating profit and loss*. Such responses indicate that the candidates had inadequate knowledge about how to improve labour productivity. Extract 10.2 is sample of the incorrect responses to the question.

10.	Ways that can be used by management to improve labour productivity in the farm are:-	
	(i) Biodiversitification	
	This is the process whereby the production is twice at the same period of time for example when a farmer cultivated maize at the same time he/she kept the cattle.	
	(ii) Keeping farm records	
	The farm records helps to know the progression on the productivity from the start to where the production is at such time (a period of time) when the level of production is attained.	
	(iii) To avoid reduce risky and uncertainity	
	The farmer / manager have to avoid and escape the risky and uncertainity when producing which may lead to the low productivity and loss.	
	(iv) Farm planning	
	The manager has to plan for the productivity done in the farm in such a way that the management is of higher productivity all the time.	

Extract 10.2 is a sample of the incorrect responses to question 10.

In Extract 10.2, the candidate provided incorrect responses to the question.

2.2 034/2- Agriculture 2
2.2.1 Question 1: Crop Pest

In this question, the candidates were required to briefly describe five adaptive features of the pest (grasshopper) in relation to its mode of feeding. The question examined candidates' knowledge of adaptive features in relation to the modes of feeding in insects pests mouth parts.

The question was attempted by 724 (100%) candidates of whom 706 (97.5%) scored from 0.0 to 3.0 marks; 17 (2.4%) from 3.5 to 5.5 marks and 1 (0.1) scored 6 marks. Figure 10 summarises the candidates' scores on the question.
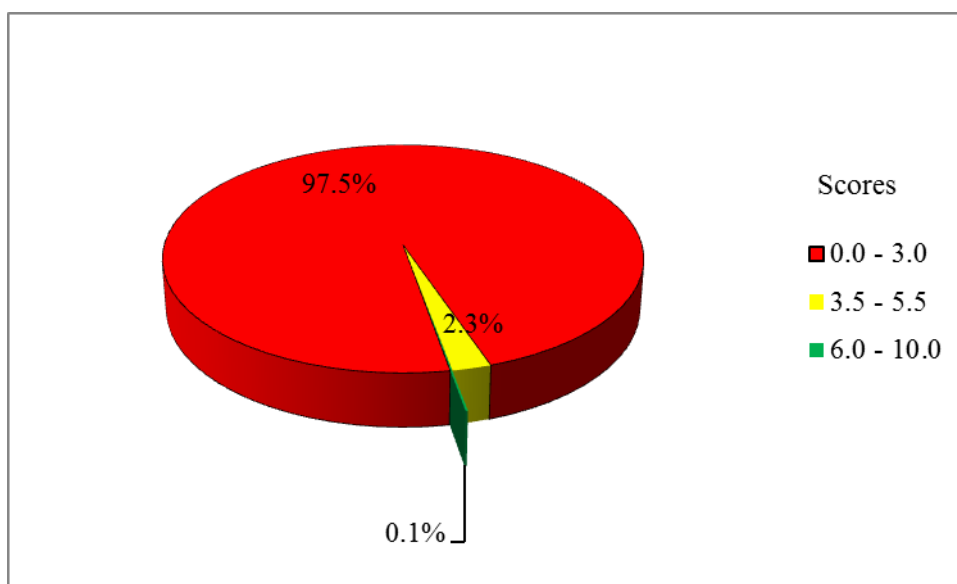
Figure 10: *Distribution of Candidates'Score on Question 1*

Figure 10 shows that 97.5 per cent of the candidates scored from 0.0 to 3.0 marks while 2.5 per cent from 3.5 to 6.0 marks. The general performance of the candidates on the question was weak.

The candidates (97.5%) who attained poor performance failed to identify the mode of feeding (biting and chewing) in a grasshopper. Hence, they could not identify and describe the adaptive features of its mouth parts, which are labrum, labrum-epipharynx, mandibles, labium and maxilla. Most of the responses provided by the candidates reflected the body parts of grasshoppers such as *eyes, head, thorax, abdomen* and *legs*. Other incorrect responses given by the candidates were *it is small in size hence can camuflage and can use to damage on the leaves of the plant, it has high rate of reproduction hence can attack and cause damage to many crop plants, it is haemorphrodite hence increase chance of survive and it can camuoflage hence escape from predators*. Such responses show that the candidates had inadequate knowledge of the adaptive features of the grasshopper regarding its mode of feeding. Extract 11.1 is one of the incorrect responses to the question.

1. Adaptive features of the pest in relation to its mode of feeding.

(i) Have mouth parts, which is adaptive to its functions of destructing and consuming juice from the plants such as piercing and sucking.

(ii) Have wings
- Due to the presence of wings moves from one place to another place for destructing the crop plants in different area.

(iii) They have legs both fore and back legs, that increase the ability of its to attach and causing destruction to crop plants.

(iv) They are small in size
- This increase continuous destructing the crop plants, due to the fact that its rate of respiration is higher due to its smaller size hence causing maximum destruction.

(v) They have short and high reproduction potential, this increase in number causes total increase in destruction of the crop plants in the field, due to increase number of organisms.

Extract 11.1 is a sample of candidates' incorrect responses to question 1.

However, statistics revealed that 2.4 per cent of the candidates who attempted the question attained average performance. The candidates identified some of the insects' mouth parts and partially described their adaptations.

In contrast, only one candidate (0.1%) attained good performance; the candidate scored 6 marks. He/she identified correctly most of the insect's

mouth parts but failed to describe well their adaptive features. Extract 11.2 is a sample of the relatively more appropriate responses to the question.

1 (i) Grasshopper have a pair of mandible
  ▷ pair of mandible allow to eats
  the plant leaves since have the
  ability to to cut the leaves In small
  piece and eat.
  ▷ pair of mandible allow the Grasshopper
  to such the plant leaves through
  pair of mandible

(ii) Grasshopper have labrum In the mouth.
  - Thus facilitate easy swallowing
  of the plant leaves because the
  labrum Is very sharp so It
  Is easy to eat and swallow.
  well the plant leaves.

(iii) Grasshopper posses labium In the
  mouth part.
  - Grasshopper have got labium which
  allow to eat the plant leaves due.
  to Its sharpness hence cut well the
  leaves of the plant by Using
  labium teeth.

(iv) Grasshopper have pair of maxilliary
  teeth.
  - Through the use of pair of
  maxilliary teeth Grasshopper are
  well adapted to eat the plant

	leaves by using the pair of	
	maxilliary teeth.	
Y.	They have pair of Incasicor In the	
	mouth.	
	> Enable them to eats and Cut well	
	the plant leaves due to the	
	presence of sharp pair of Inci sior	
	that allow them to eat the plant	
	leaves and later Causing Serious	
	damage to the Crop plants due to	
	eating of plant leaves.	

Extract 11.2 is a sample of candidates' relative most appropriate responses to question 1.

In Extract 11.2, the candidate correctly described most of the mouth parts, although he/she partially described them. For instance, the candidate missed one part (incisor).

2.2.2 Question 2: Plant Diseases

The question was divided into parts (a), (b) and (c). The question stated "*Phytophthora infestans* is a pathogenic fungus causing late blight disease in potatoes." From this statement, the candidates were required to (a) explain how to identify the disease in the field (b) briefly explain how the disease is spread in potatoes and (c) account on seven control measures of the disease in the field. The question tested the candidates' knowledge of and skills in controlling plant diseases.

The question was attempted by 723 (99.9%) candidates. Among them, 108 (14.9%) scored from 0.0 to 3.0 marks; 421 (58.2%) from 3.5 to 5.5 marks; and 195 (26.9%) from 6.0 to 8.5 marks. Figure 11 illustrates the candidates' scores to the question.
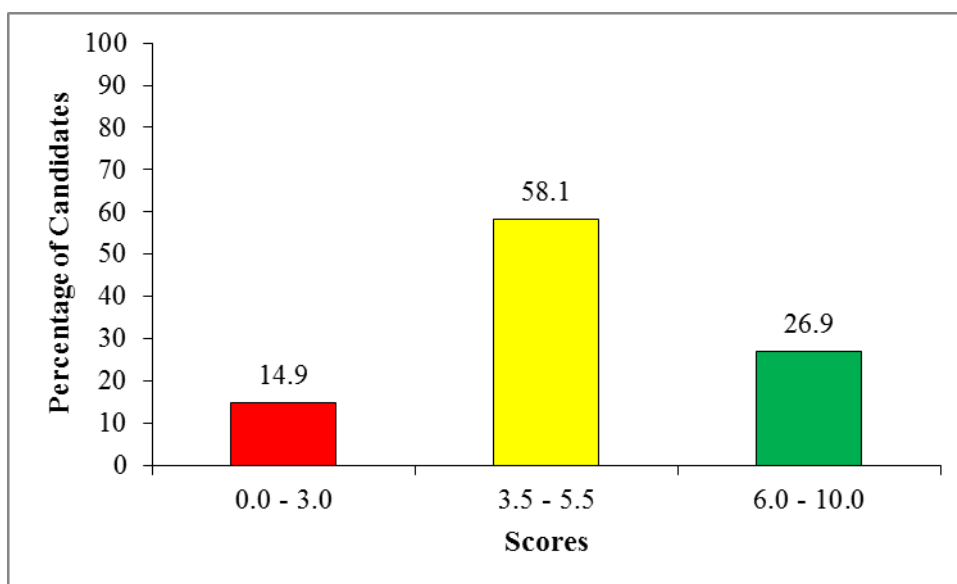
Figure 11: *Distribution of Candidates' Scores on Question 2*

Figure 11 shows that most of the candidates (85.1%) scored from 3.5 to 8.5 marks which is good performance. Only 14.9 per cent scored from 0.0 to 3.0 marks.

The candidates (26.9%) who performed well gave symptoms to identify the disease in the field in part (a). They explained how the disease spreads in potatoes in part (b) and accounted for the control measures of the disease in the field in part (c). Examples of such correct responses were (a) *the disease can be identified by the presence of small, light to dark green circular to irregular shaped water soaked spores on lower leaves,*and *presence of dry patches on leaves and tubers*; (b) *the disease can be spread by the spores carried by wind and water to healthy plants*; and (c) *the disease can be contolled by growing resistant varieties, crop rotation, use of clean plant material, avoiding excessive night time irrigation, infected plant materials shoud be destroyed, prophylactic spray of foliar fungicides* and *avoiding farming on infected areas*. Extract 12.1 is a sample of correct responses from one of the candidates.

2	(a)	Symptoms of late blight disease in potatoes	
		- Rotting of potato fruits/tubers	
		- water-soaked lession spots on leaves of potato plant.	
2	(b)	The disease may spread through;	
		i/ contamination with infected crop residues	
		ii/ It can spread through rain splash to other plants	
		iii/ It can spread through soil borne fungus that are found into the soil.	
2	(c) (cont') measure of the disease:		
		(i) Destruction of crop residues to avoid contamination with newly planted crop potatoes.	
		(ii) Use of fungicides, those chemicals that kill the life cycle of fungi and so reduce the extent of spreading to nop field.	
		(iii) Deep ploughing, this used to expose the fungus to extreme condition so that to destroy and avoid reproduction of fungus that can infect the potato plant.	
		(iv) Crop rotation, a method of growing different crops each year in same piece of land that help to kill the life cycle of fungus	
		(v) Use of clean planting materials to —	

2c	avoid the spread of fungus to those growing crops in a certain field.	
	(vi) Use of fungi-resistant varieties, this help to reduce the spread of fungi disease including late blight.	
	(vii) Field sanitation, this involve to avoid all conditions that can neccossiate the reproduction of fungus. Example to avoid wet condition which is excessive to crop field by drainage.	

Extract 12.1 is a sample of candidates' correct responses to question 2.

In Extract 12.1, the candidate responded correctly to part (b). In parts (a) and (c), the candidate missed one point each: *rotten of potatoes* in part (a) and *use of fungicide resistant* as a repeated response in part (c).

It was also observed in the analysis that 58.2 per cent of the candidates attained average performance. The analysis shows that most of the candidates described symptoms of the disease in part (a) but failed to explain how the disease spreads in the field in part (b). It was also observed that they did not exhaust all the control measures of the disease in part (c).

On the contrary, data analysis shows that 14.9 per cent of the candidates attained weak performance. These candidates provided incorrect responses to almost all parts of the question such as *felling of fruits, stunting growth,* and *stem becoming weak* as symptoms of identification of the disease in the field in part (a). In part (b), examples of incorrect responses for how the disease spread in the field were *spread by pathogens from one crop to another* and *spread through contact between one crop to another*. Likewise, the candidates wrongly accounted for the control measures of the disease in part (c). Responses given were such as *proper pruning, timely harvesting, proper spacing* and *early planting*. This situation signifies that the candidates had insufficient knowledge of late blight disease in potatoes. An example of the incorrect responses to the question is shown in Extract 12.2.

ii) Exclusion, this is the process used to control the disease to the field through exclusion.

iii) Resistance, this is the process used to control the disease through the resist

iv) Protection, this is the process used to control the disease through protection.

v) Radication, the diseases can control through radication in the field.

vi) Therapy, the diseases can control through radication in the field through therapy.

Extract 12.2 is a sample of candidates' incorrect responses to question 2.

In Extract 12.2, the candidate incorrectly responded to all parts of the question. In part (a), the candidate named the disease instead of giving its symptoms. In part (b), he/she named the causative agents of plant diseases instead of explaining how the disease spreads and in part (c), he/she summarised the general measures to control plant diseases instead of the late blight.

2.2.3 Question 3: Plant Diseases

The question consisted of parts (a) and (b). The candidates were required to (a) propose five cultural practices for controlling bacterial wilt diseases in the tropics and (b) examine five environmental conditions necessary for growth and development of pathogenic fungi in plants. This question examined the candidates' knowledge about and skills in controlling plant diseases and factors necessary for the occurrence of pathogenic diseases in plants (disease triangle).

The question was attempted by 723 (99. %) candidates whereas 160 (22.1%) scored from 0.0 to 3.0 marks; 361 (50%) from 3.5 to 5.5 marks; and 202 (27.9%) from 6.0 to 8.5 marks. Figure 12 shows candidates' scores on the question.
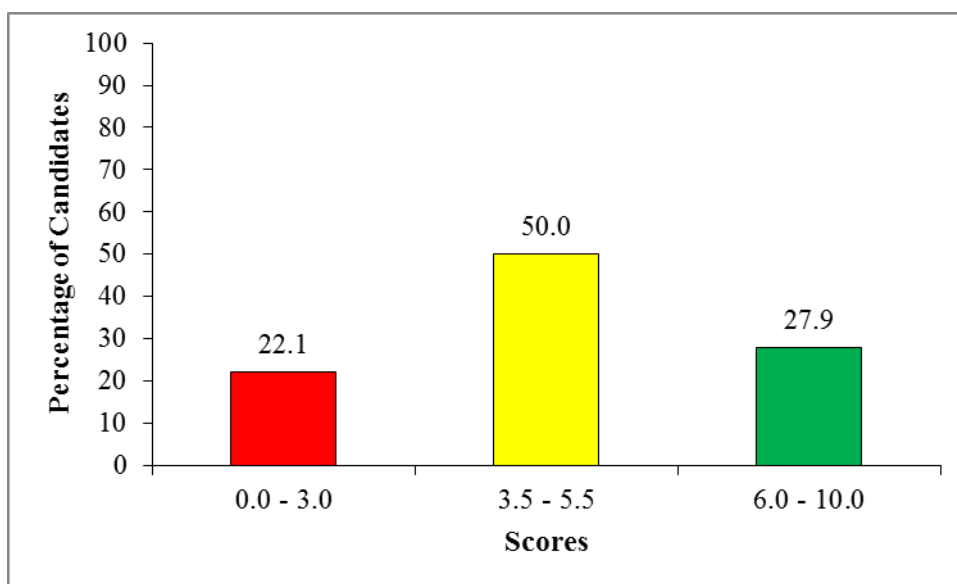
Figure 12: *Distribution of Candidates' Scores on Question 3*

Figure 12 shows that most of the candidates (77.9%) scored from 3.5 to 8.5 marks, and 22.1 per cent from 0.0 to 3.0 marks. Hence, the general performance of the candidates on the question was good.

Analysis shows that 27.9 per cent of the candidates who attempted the question attained good performance. Most of them provided correct responses to all parts of the question. In part (a), they proposed cultural practices for controlling bacterial wilt diseases in the tropics. The correct responses given include *use of resistant varieties, avoid farming on infected areas, soil amendments by using organic manure to supress the disease, intercropping, extended flooding, crop rotation, use of clean seeds* and *early planting*. These responses suggests that the candidates had adequate knowledge of bacterial wilt diseases. Similarly, in part (b), the candidates examined the environmental conditions necessary for the growth and development of pathogenic fungi in plants. Examples of such correct responses were *nutrients, light, pH, moisture* and *suitable temperature*. Their responses indicated most of them to have left pH and nutrients. Generally, the candidates had adequate knowledge of environmental factors necessary for growth and development of pathogenic fungi in plants. Extract 13.1 illustrates a correct response to the question.

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03. (a)- The following are cultural practices for controlling bacteria wilt disease in the tropics
- Through crop rotation, rotation of different kinds of crops in the farm control the disease, thus the varieties of potatoes and tomatoes must be rotated in the farm.
- Timely planting, early planting ensure that the disease are controlled off from the field and thus enable to plant a crop at a time which the disease are less active.
- The use of clean planting materials, The clean plant materials are those which are free from disease and pest and thus control the bacterial disease in the farm.
- Planting bacteria wilt resistant varieties, thus keeps the plant free from get contaminated with bacteria in the field.
- The use of certified seeds plant, certified seed are free from disease and thus not easily attacked by bacteria wilt in the farm.

(b) (i) Moisture condition, This will support the pathogen to live in such condition. For their growth and development.
(ii) ~~low~~ optimum temperature, The area where there is an optimum temperature support the growth and their development.
(iii) Light, presence of light condition support the plant growth of pathogenic fungi in plants as they enable them in provision of photosynthesis to such plants.
(iv) Alkaline soil, Soil which has neutral pH and alkaline soil support the growth and development of pathogen.
(v) Water logged condition, this also help in growth and development of pathogenic fungi in plant Example damping off in tomatoes.

Extract 13.1 is a sample of candidates' correct responses to question 3.

In Extract 13.1, most of the responses provided by the candidate were correct. The candidate only missed one point in part (a) (use of certified seeds) and two points in part (b) (alkaline soil and water logged condition).

Besides, 50 per cent performed averagely on this question. They did not propose all the required cultural control measures for bacterial wilt diseases

in part (a). In part (b), most of them examined the environmental factors necessary for growth and development of pathogenic fungi in plants partially correctly.

Conversely, 22.1 per cent of the candidates attained weak performance on this question. Most of them incorrectly attempted both parts of the question. In part (a), they failed to propose cultural practices to control bacterial wilt diseases. Some of them proposed measures to control plant diseases, other than cultural methods. Such as *chemical method by means of spraying* and *mechanical methods through uprooting the infected plant*. Other candidates had a variety of incorrect responses such as *too much irrigation, mulching, pruning, mono-cropping* and *stocking*. These responses show that the candidates were not knowledgeable about bacterial wilt diseases and their control measures.

Moreover, the candidates failed to examine the environmental condition necessary for the growth and development of pathogenic fungi in plants in part (b). Some of the candidates included *air, wind, water, rainfall* and *humidity* in their responses. None of these is an environmental factor necessary for the growth and development of pathogenic fungi. Pathogenic fungi utilize air which is within moisture. Wind is an environmental factor for spread of fungi and not for their growth and development. Fungi need moisture for germination of spores. Thus, water and rainfall will wash away spores from the plant. Humidity is the relative amount of moisture in the atmosphere: thus, it is not found in plants. Other responses provided by the candidates did not reflect environmental factors. These were *overhead irrigation, improper spacing of crops in farm, improper pruning, poor stacking method and poor supply of oxygen*. Apparently, the candidates lacked knowledge about environmental factors necessary for the growth and development of pathogenic fungi in plants. Extract 13.2 presents a sample of the incorrect responses to the question.

3. a) The following are the Cultural practices of controlling bacterial wilt disease in Tropics.

i) Application of Water and fertilizers.
The Crop plants they should be watered in order to overcome the process of wilt which is associated with the movement of Water in plant tissue and also the fertilizers should be applied.

ii) Mulching.
The crops when they start to be produced they should be covered with dry grasses so as to prevent water loses in form of vapour and hence the plant remain with their moisture and hence prevent wilting; and also it will be not necessary to be affected by bacteria.

3. a) iii) Weeding.
weeding should be done in order to remove weeds in the field which also use the water in the soil as Cultivated plant so as to provide the Conducive Condition to Crop plant to escape from wilting due to scarcity of water to them and hence prevent even the bacteria from affecting them.

iv) Stacking:-
Crop plants should be stacked so as to prevent for example tomato and hence will help also to prevent bacterial wilt.

v) Planting of legumes
Planting of legumes in the area especially Tropics is well simple they will be likely to be followed by even bacteria Compared to others which they have been in the farm and hope they will be free from bacterial wilt.

b) The following are the environmental condition necessary for growth and development of fungi in plant.
i) Excess water to plants.
ii) Absence of herbicides to plants.
iii) Presence of cutting part of the plant where Myelin may grow.
iv) Presence of open part to plant when water exceed fungi may grow well.
v) Bad farming practices may influence fungi to grow and developing in plant.

Extract 13.2 is a sample of the incorrect responses to question 3.

In Extract 13.2, the candidate incorrectly responded to both parts of the question. In part (a), the candidate mostly provided agronomic management practices for crop production whereas in part (b) he/she gave responses that did not relate to the demand of the question.

2.2.4 Question 4: Introduction to Weed Science

In this question, the candidates were required to analyse five good cultural practices that can be used to control weeds. This question tested the candidates' knowledge of and skills in controlling weed.

The question was attempted by 724 (100%) candidates: 57 (7.9%) scored from 1.5 to 3.0 marks; 218 (30.1%) from 3.5 to 5.5 marks; and 449 (62%) from 6.0 to 10 marks. Figure 13 summarises the candidates' scores on this question.
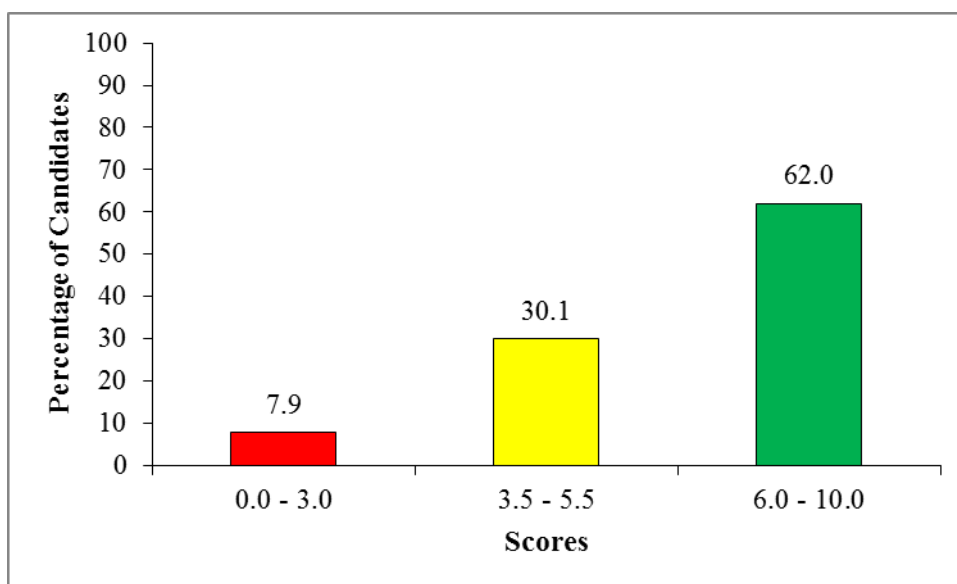
Figure 13: *Distribution of Candidates' Scores on Question 4*

Figure 13 shows that 92.1 per cent of the candidates attained a good performance by scoring from 3.5 to 10 marks, and only 7.9 per cent scored from 1.5 to 3.0 marks.

Analysis indicates that 62 per cent of the candidates who attempted the question attained good performance. These candidates correctly analysed the cultural practices that can be used to control weeds. Examples of such practices are *sowing clean seed, mulching, crop rotation, flooding, use of cover crops, field hygiene* and *planting crops using appropriate spacing*. These correct responses justify that the candidates had acquired sufficient knowledge of the cultural methods and skills in controlling weeds. .Extract 14.1 is a sample of the correct responses to the question.

4. Weed are the plants that grows in the areas that is not wanted. Weed grow in the farm without planted by human or farmers. Weed have hampul effect and benefit to human and nature. prexample source of food, medicine, decoration and hampul effect. are poisonous, harbour pests, low quality and reduce yield. The following are the cultural practices of controling weeds

Crop rotation: is the practice of growing crop in the field and rotching it for the next season. This practice help to control weed since some weed species are specific to crop plants therefore can be controlled by rotching crop for example maizecorn fingermillet are common on millet hence for controlling them crop rotation must be done.

4	Early planting / Timely planting: This is the practice of planting early in the season. It help to control weed because early at the season weed do not start to grow and reproduce rapidly so it enables crop plant to grow early without competition from weed hence manage the weed	
	Mulching: It is the practice of covering the soil by using plants residual such as straws gra sses so that to prevent the growth of weeds. Mulch ing enables to prevent the growth of the weed since it inhibit the passage of sunlight, hence prevent and control the growth of weed in the field	
	Planting safe and clean seed: The practice of planting clean seed which is free from contamina ion of weed. It help to prevent the introduction of weed to a new area since the seed planted are ensured to be safe and clean from contaminat ion of weed seed.	
	Flooding and burning: The practice of flooding the field with water to prevent the growth of weed also may be used to control the growth of weed. Also in some cases burning the weed on may be used as cultural measures to control weed although it thes some disadvantage on the land	
	Therefore the weed should be controlled in the field since it create some hamphuses and reducing the yield aswell as quality in the maerket	

Extract 14.1 is a sample candidates' correct responses to question 4.

Data analysis also shows that 30.1 per cent of the candidates performed averagely in the question. The candidates identified the cultural weed control measures, except that they did not precisely analyse such measures.

Nevertheless, 7.9 per cent of the candidates attained weak performance on the question. The candidates failed to analyse cultural weed control methods, although they named only few of such measures. Some of the candidates included even mechanical and chemical weed control methods such as *hand pulling, slashing, mowing,* and *application of herbicides,* these methods are not correct. Other candidates mixed up cultural weed control methods and

cultural insect pest control methods such as *the use of trap crops, timely harvesting,* and *use of resistant varieties*. This is indicates that the candidates lacked knowledge of cultural weed control methods. Extract 14.2 is a sample of the incorrect responses to the question.

Extract 14.2 is a sample of candidates' incorrect responses to question 4.

In Extract 14.2, the candidates provided mechanical and biological weed control methods instead of cultural methods. The candidate provided one correct point (i.e burning).

2.2.5 Question 5: Plant Breeding

The candidates were required to analyse four breeding methods to be used in self-pollinated crop species for successful crop improvement. The question assessed the candidates' knowledge of methods of plant breeding.

The question was attempted by 724 (100%) candidates. Among them, 341 (47.1%) scored from 0.0 to 3.0 marks; 205 (28.3%) from 3.5 to 5.5 marks; and 178 (24.6%) from 6.5 to 9.5 marks. Figure 14 summarises the candidates' scores on the question.
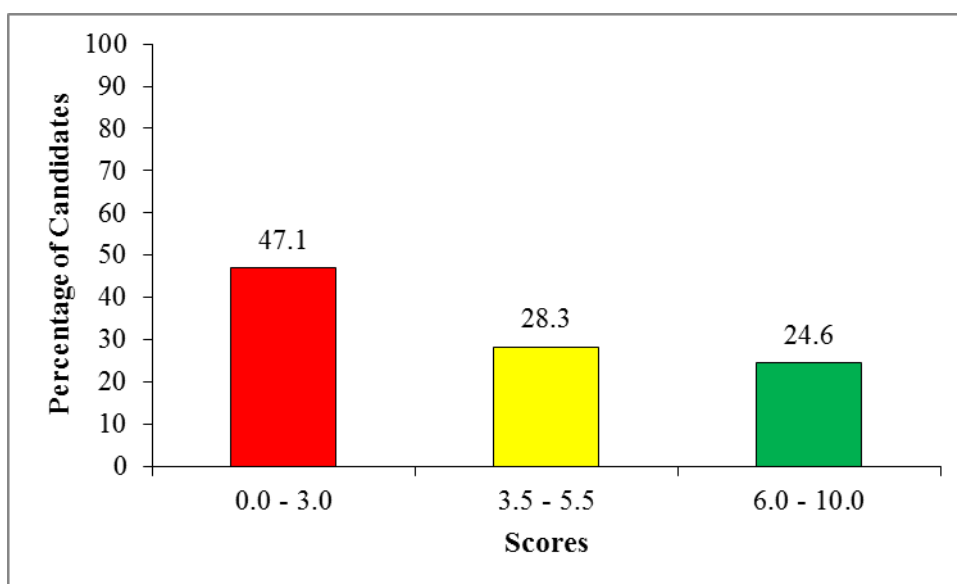
Figure 14: *Distribution of Candidates' Scores on Question 5*

Figure 14 shows that 52.9 per cent of the candidates scored from 3.5 to 9.5 marks, while 47.1 per cent from 0.0 to 3.0 marks. Generally, the performance of the candidates on the question was average.

Futhermore, 24.6 per cent of the candidates performed well. Those candidates analysed correctly the breeding methods to be used in self-pollinated crop species for successful crop improvement. Examples of such methods include *mass selection, plant introduction, pedigree method, pure line selection, hybridisation* and *hybrid varieties*. Generally, the candidates demonstrated sufficient knowledge of breeding methods in self pollinated

crop species. Extract 15.1 is an example of the correct responses to the question.

5	Methods For Preeding self Pollineted crops:	
	1. Back crossing Breeding.	
	—o this is the method of crop improvement which involve crossing of F₁ offspring with the one its parents. in self pollineting plant plays a very important role since can Rg used to fix the desirable characteristics from their parents to their off spring example higher productivity	
	Resistivity to disease and insect pest	
	2. Pedigree selection Method —o is the method of crop improvement of self pollineted plant which involve selection of desirable crop plents By Looking the performence record of the parents. this method can be used By the farmer to handle the pure Lines since the performence are kept which will be used when are required this on able maintainonce of desirable cheracteristics in self pollineted plents Like high yield, higher quehity, product and agronomic characteristics Like height & vigour size	

3. Pure Line selection method
- o this is the method of crop plan
+ improvement in which involve select
ion of individual crop plant based in
its performance from the mixed popu
lation. this method maintain derives
he features in self pollinated plants
Like performence, resistivity to diseases
since this method maintains Genetic
uniformity in plants this become ad
vantageous when the crop plant are ado
pted can result into higher produc
tivity to the farmer.

4. Plant introduction.
- o is the method of crop Improvement
in self pollinated crop plants in which
the newly plant can be introduced
to the area direct / with selection to ob
tain desirable crop plants. this method
serves as release of superior varieties
against diseases when present in ag
iven area also the introduced crop
plant can be used for scientific stud
y also can be used as ornament also
can be used in process of hybridi
sation.

Extract 15.1 is a sample of candidates' correct responses to question 5.

In Extract 15.1, the candidate correctly analysed all the breeding methods, except the pure line selection breeding method which was partially correctly analysed.

The candidates who attained average performance were 28.3 per cent. These demonstrated adequate knowledge of the breeding methods to be used in self pollinated crop species, but they failed to analyse them fully. Some of the candidates included breeding methods in cross pollinated crop species such as *mass pedigree methods, inbreeding* and *recurrent selection*.

In contrast, 47.1 per cent of the candidates attained weak performance. Most of them failed to analyse the breeding methods to be used in self pollinated crop species. Some of those candidates tried to describe the vegetative propagation methods such as *grafting, layering, budding* and *cutting*. Other candidates focused their responses on asexual reproduction, *autogamy, monoecious, bisexuality* and *allogamy*. Such responses indicate that the candidate were not knowledgeable about breeding methods for self pollinated crop species. An example of the incorrect responses to the question are illustrated in Extract 15.2.

Extract 15.2 is a sample of candidates' incorrect responses to question 5.

In Extract 15.2, the candidate did not address the requirement of the question.

2.2.6 Question 6: Environmental and Technological Challenges in Agricultural Development

The candidates were required to briefly explain five limitations experienced by farmers when practising organic farming. The question tested the candidates' knowledge of organic farming.

The question was attempted by 724 (100%) candidates of which 269 (37.2%) scored from 0.0 to 3.0 marks; 308 (42.5%) from 3.5 to 5.5 marks; and 147 (20.3%) from 6.0 to 10 marks. Figure 14 illustrates the candidates' scores on the question.
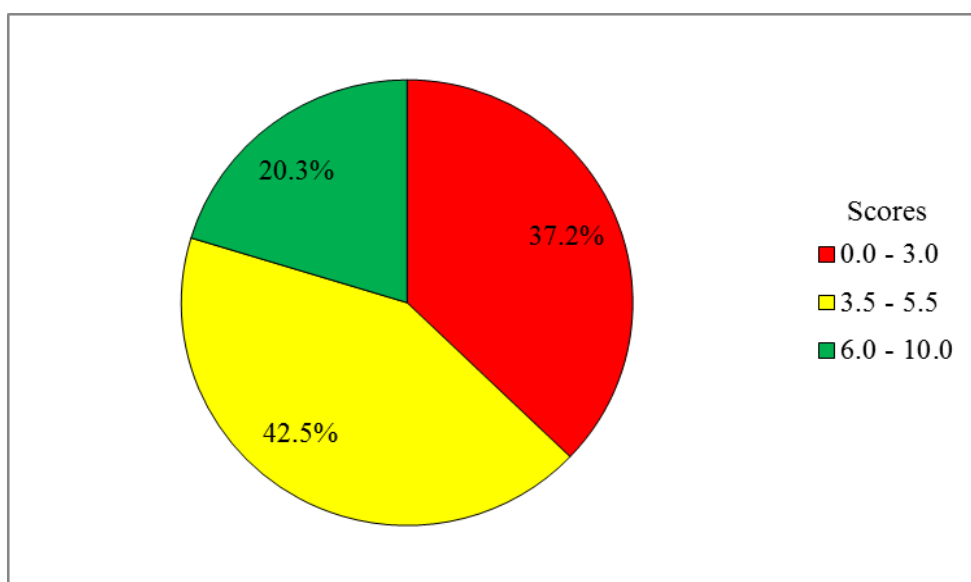
Figure 14: *Distribution of Candidates' Scores on Question 6*

Figure 14 shows that 62.8 per cent of the candidates attained good performance and scored from 3.5 to 10 marks whereas 37.2 per cent from 0.0 to 3.0 marks.

According to the data, 20.3 per cent of the candidates who attempted the question scored from 6 to 10 marks, which is good performance. They understood that organic farming does not involve the use of chemicals; thus, they gave limitations of the practice. Examples of limitations of organic farming are the inability to use genetically modified crops, need for more

skills to practice, time and labour consuming, inability to fully use precision fertilisation, limited pest and diseases control options, and dependence on animals as sources of manure. These responses imply that the candidates had adequate knowledge about organic farming. Extract 16.1 is one of the correct responses to the question.

6.	Limitations experienced by farmers when prod-
	using organic farming?
	(i) Low yields or harvests
	    Organic farming doesnot involve the use of
	any synthetic material hence involves the use
	organic manure which have very long residue
	effect hence results to relat release of nutrients
	slowly hence leads to low yields because
	it will take a long time to decompose organic
	manure and releasing or cetting free nutrients.
	ii) Pests and diseases are not effectively controlled
	    In organic farming control of pest and
	disease involves the use of other methods rather
	than chemical method, like cultural, mechanic-
	al methods in controlling pests and diseases
	which are not effectively hence pest and dis-
	eases become still a problem.
	iii) Difficult to control weeds
	    Most of weeds are tolerant to hazadous
	environment hence envolve heavy work of
	controlling weeds through mechanical metho-
	ds and cultural methods, hence weeds tends
	to exist and compete for nutrients with the
	crop plants.	

6.	(iv) It may lead to lowering quality of crops	
	This is because in organic farming no chemi-	
	cal is applied so crop plants are not prevente	
	d to predators and other organisms, so quality	
	of products is lowered foreexample production	
	of fruits because no chemical is used to make	
	crop plant safe, so Ripen fruits can easily	
	attacked by pathogens hence lower the quality	
	of products.	
	(v) Organic manure occur in bulky form so	
	- it is difficult to transport it henceit	
	involves high costs of transporting it	
	to the field for crop empcovement but	
	contain few nutrients compared to the	
	inorganic fertilizers,	

Extract 16.1 is a sample of candidates' correct responses to question 6.

In Extract 16.1, the candidate correctly provided the limitations of organic farming, signifying good understanding of the subject matter.

Furthermore, 42.5 per cent of the candidates perfomed averagely on this question that majority of them did not explain correctly all the limitations of organic farming required.

Nonetheless, 37.2 per cent of the candidates attained weak performance. The analysis of their responses indicates that most of them did not understand the meaning of organic farming. Hence, they provided irrelevant responses. Most of the candidates pointed out factors affecting crop production such as *shortage of rainfall, use of poor tools, lack of market, bad roads, poor storage facilities* and *occurrence of pests and diseases* instead of the limitations of organic farming. Other incorrect responses provided for limitations of organic farming were *deforestation, overgrazing, soil erosion, poor soil fertility* and *low soil pH*. All these responses suggest that the candidates were not knowledgeable about organic farming and its limitations. Extract 16.2 presents a sample of the incorrect responses to the question.

06 Limitations experienced by a farmers when practicing organic farming.

(a) It lead to environmental pollution.
⇒ This is due to the use of advanced machines which produce harmful smokes where it pollute the atmosphere

(b) It cause health problems to human being and other animals.
⇒ This is due to their food they consume produced by the use of chemicals which affect the health of human being.

(c) Destruction of soil structure.
⇒ This problem result due to the improper tillage method using advanced machines, where it cause loss of nutrients from the soil.

(d) It reduce the life span of human being and other organisms.
⇒ This is due to the intake of a large amount of chemical found in feeds, which affect the immune system of the animal and other organisms hence reduce life span.

(e) It lead to the loss of natural resources, example are animals, forest, shrubs, this is due to the use of advanced mashines for cutting trees,

06 (e) guns for killing animals and sometime the use of bombs chase which chace the animals away from their homes.

Extract 16.2 is a sample of candidates' incorrect responses to question 6.

In Extract 16.2, the candidates provided incorrect responses that were not related to the limitations of the practice.

2.2.7 Question 7: Livestock Reproduction, Breeding and Improvement

The candidates were required to describe the structure of five secondary reproductive organs in the cow and give the function of each. The question examined candidates' understanding of the reproductive system in the cow.

The question was attempted by 724 (100%) candidates. Among them, 197 (27.2%) scored from 0.0 to 3.0 marks; 177 (24.5%) from 3.5 to 5.5 marks; and 350 (48.3%) from 6.0 to 10 marks. Figure 16 summarizes candidates' scores on the question.
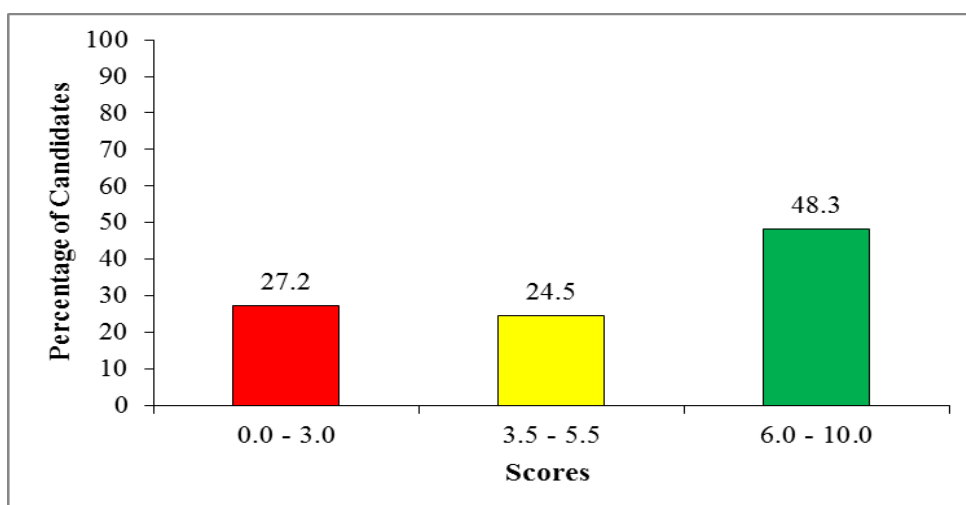
Figure 16: *Distribution of Candidates' Scores on Question 7*

Figure 16 illustrates that 72.8 per cent of the candidates scored from 3.5 to 10 marks and 27.2 per cent from 0.0 to 3.0 marks. Generally, their performance on the question was good. Among the 72.8 per cent of the candidates, 48.3 per cent scored from 6.0 to 10.

These candidates correctly described the functions of secondary resproductive organs in the cow. The organs in question were the vulva, the vagina, the uterus, the cervix and the oviduct. Extract 17.1 represents a sample of the correct responses to the question.

7	Structure of cow secondary reproduct organ has the following parts;	
	i) Vulva; This is the openning in which receive male penis for passing sperm inside the reproductive system	
	ii) Uterus; The Muscular sac which responsible for carring development of embryo to calf inside the mother womb.	
	iii) Cervix; This part during birth expand in such a way that it can allow passage of calf out from it's mother womb.	
	iv) Vagine; This part mainly responsible for receiving sperm from male penis.	
	v) Fallopian tube; This part responsible for fertilzation process to take place so that to bring zygote which develop to embryo	

Extract 17.1 is a sample of candidates' correct responses to question 7.

In addition, 24.5 per cent of the candidates attained average performance on the question. Most of these candidates, besides identifying correctly the organs in question and giving the function of each, failed to describe their structures. Some of them also included *the ovary*, which is a primary reproductive organ, in the list of the secondary reproductive organ in cow which is not correct.

In contrast, 27.2 per cent of the candidates attained weak performance on the question. Most of them failed both to describe the structure and to give the functions of the secondary reproductive organs in the cow. Many candidates failed to know that a cow is female cattle. Instead, they gave and described

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the functions of the reproductive organs in male cattle such as *the scrotum, penis, epididymis, testes* and *seminal glands*. Some of the candidates also mixed up the reproductive system and the digestive system by giving and describing parts of the digestive system in cattle like *the mouth, oesophagus, stomach, small intestine* and *large intestine*. Other incorrect responses given were *ureter, urethra, bladder* and *corpus luteum;* some of which are parts of the urinary system. This indicates that the candidates had insufficient knowledge of the secondary reproductive organs in the cow. Examples of the incorrect responses to the question are portrayed in Extract 17.2.

07.	01. Epidyidinws.	
	—ᵢ This is the structure which provide the sperm maturation. a	
	— The place were the sperm develop a flagella even though they are not able to swimm until ejaculation.	
	02. Scrotumm.	
	—ᵢ This is the sac which is used to store the testis.	
	—ₑ This sac is useful in controlling the optimum temperature within the testis.	
	ᒪThis mainbain temperature by relaxation and contraction of the scrotum when the environmental changes.	
	—During cold the testis are pulled inward and when hot. condition the testis are pull out depending on condition.	

07.	03. Testis
	This is the place where the sperm are produced within the reproductive system of the cow.
	02. Penis.
	— This is the copulatory organ which is used to release sperm when the male cow is stimulated and the sperm are ejaculated into the vagina.
	05. Seminal gland.
	This is the gland which used to produce the fluid which mix with sperm in order to ensure the transportation of sperm to the penis.
	— Also this fluid is called Seminal fluid also working in neutralizing the urine remained in the penis during urination.

Extract 17.2 is a sample of candidates' incorrect responses to question 7.

In Extract 17.2, the candidate responded incorrectly to the whole question.

2.2.8 Question 8: Introduction to Animal Nutrition

The question constituted parts (a) and (b). The candidates were required to (a) give six significance of water as a feed component in animal body and (b) examine four factors that govern the amount of water intake in animals. The question assessed the candidates' understanding of water as a feed component in animal body.

The question was attempted by 724 (100%) candidates where 51 (7%) scored from 1.0 to 3.0 marks; 231 (32%) scored from 3.5 to 5.5 marks; and 442 (61%) from 6.0 to 10 marks. Figure 17 indicates the distribution of candidates' scores on the question.

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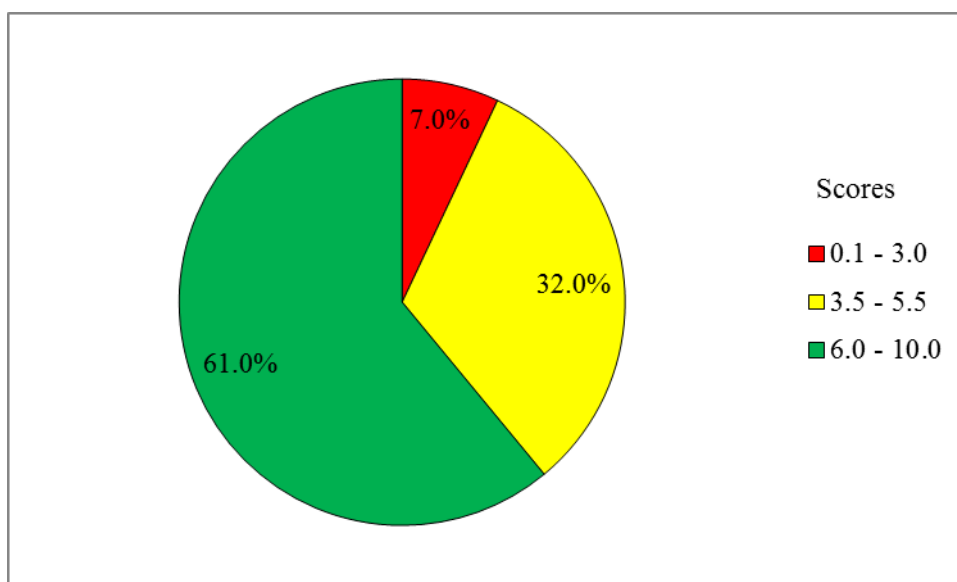
Figure 17: *Distribution of Candidates' Scores on Question 8*

Figure 17 shows that 93 per cent of the candidates attained good performance; they scored from 3.5 to 10 marks. Only 7 per cent scored from 1.0 to 3.0 marks.

Most of the candidates (61%) who attempted the question attained good performance. These candidates provided correct responses to almost all parts of the question. In part (a), they gave the significance of water in the animal body, such as *solvent in action, component of body tissue, takes part in digestion, involved in body chemical reactions, acts as a lubricant, facilitates transport of nutrients* and *regulates body temperature*.

Similarly, in part (b), the candidates examined factors that govern the amount of water intake in the animal body. The candidates gave responses such as *environmental temperature, type of feed, total dry matter consumption, level of production* and *humidity*. These responses show that the candidates had adequate knowledge of the significance of water and factors that govern the amount of water intake in the animal body. Extract 18.1 represents a sample of correct responses to the question.

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08. @ Significance of water in animal body.

(i) Provide means of cooling the body
- when an animal takes water cause cooling effect.
- Also when water is lost through vapour cause cooling effect.

(ii) Dissolve and transport nutrients.
- Most of body nutrients are dissolved in water, absorbed and transported with water in solution form.

(iii) It is important during excretion of wastes from metabolism.
- Most wastes eg nitrogenous wastes such as urea, ammonia ~~are excrete.~~ require ammount of water to be excreted.

(iv) It is a componet of living tissue
- Water is componets of blood, cytoplasm and cell sap which have vital role in body.

(v) Medium for body chemical reaction
- Chemical reactions such as hydrolysis of food is done through water.
- Also water provide good environment for the molecules to collide and reacts in proper way.

8a	(vi) Water help in cell growth and enlargement	
	— Increase in size of cell and organism as whole is stimulated by present of water	
	— Also water prevent dessication and drying of body organs such as eyes, mouth, etc	
8	(5) Factors that govern amount of water intake :	
	(i) climate / weather of the day.	
	— high temperature stimulate high water intake.	
	— Humidy or rain day hinder uptake of water by an animal.	
	(ii) Type and amount of feed given to animal.	
	— If the food has low water content ~~whea and~~ ~~salt~~ stimulate uptake of water eg Concentrate.	
	— But some food such as Saccudent have high water content, hence when feed they supply enough water, animal do not drink enough water.	
	(iii) Health condition of an animal	
	— Most sick animal are restless and take few water.	
	— while health one are active and take enough water.	

8.	(b) (iv)	Amount of work done by an animal.	
		— Most drought animal perform heavy work and loose enough water hence they drink enough water.	
		— other animal which do not perform work drink minimums.	
	(v)	Provision of salt-ful and mineral containing food.	
		— This lower water osmotic potential hence animal feel thirst more easily.	
		— This encourage water uptake than in normal feeded cow.	

Extract 18.1 is a sample of candidates' correct responses to question 8.

In Extract 18.1, the candidate answered both parts of the question correctly, indicating that they possessed adequate knowledge about water as a feed component in animals.

Moreover, statistics denote that 32 per cent of the candidates performed averagely on the question. Their responses show that most of them failed to give the significance of water in the animal body in part (a). Furthermore, in part (b), they correctly identified the factors that govern the amount of water intake in animals; though they did not fully examined the factors.

In contrast, 7 per cent of the candidates attained weak performance on the question. Most of these candidates failed to provide correct responses to almost all parts of the question. The candidates could not give the significance of water in the animal body in part (a). Most of them gave the general importance of water in animals like *water is used for washing animal trough, water is used for cleaning the house of animals, water is used for mixing livestock feeds, water is used for drinking, water helps to control external parasites* and *it facilitates the growth of pasture*.

Likewise, in part (b), the candidates failed to examine the factors which govern the amount of water intake in the animal body. Some candidates provided incorrect responses which explain the factors for water loose in the animal body like *through urination, breathing, sweating, through metabolic process* and *through defaecation*. Other candidates explained ways through which the body gains water as factors that govern amount of water intake in animals. Examples of such ways were *through drinking water* and *through eating food containing water*. Moreover, some candidates gave incorrect responses which reflect their lack of knowledge; for instance, one candidate wrote: *through injection of medicine, through vaccination, through eating contaminated feed and the availability of enzymes working in the body*. These responses show that the candidates had inadequate knowledge of water as a feed component in animals. Extract 18.2 is a sample of the incorrect responses in the question.

8(a)	Generrally, Water is very important to the animal body since facitated easily transportation of materials but when lack may result to different problems kidney failure, Gaall stones .
8(b)	Fonr ~~amount~~ ~~of water~~ ~~that governs~~ Factors that governs the amount of water intake .
(i)	Toxic substance present on water
(ii)	Water accumulated in a dams for a long time cause bad bad smell
(iii)	Overheated water
(iv)	~~Addit~~ Adidities such as salt .

Extract 18.2 is a sample of candidates' incorrect responses to question 8.

In Extract 18.2, the candidate responded incorrectly to almost both parts of the question, with the exception of part (a) where he/she scored a point on transportation of materials as significance of water in the animal body.

2.2.9 Question 9: Pasture Agronomy

The candidates were required to explain procedures to be followed by livestock keepers in establishing their own pastures. The question tested the candidates' knowledge of pasture establishment.

The question was attempted by 723 (99.9%) candidates whereby 255 (35.3%) scored from 0.0 to 3.0 marks; 255 (35.2%) from 3.5 to 5.5 marks; and 213 (29.5%) from 6.0 to 10 marks. Figure 18 illustrates the distribution of candidates' scores on the question.
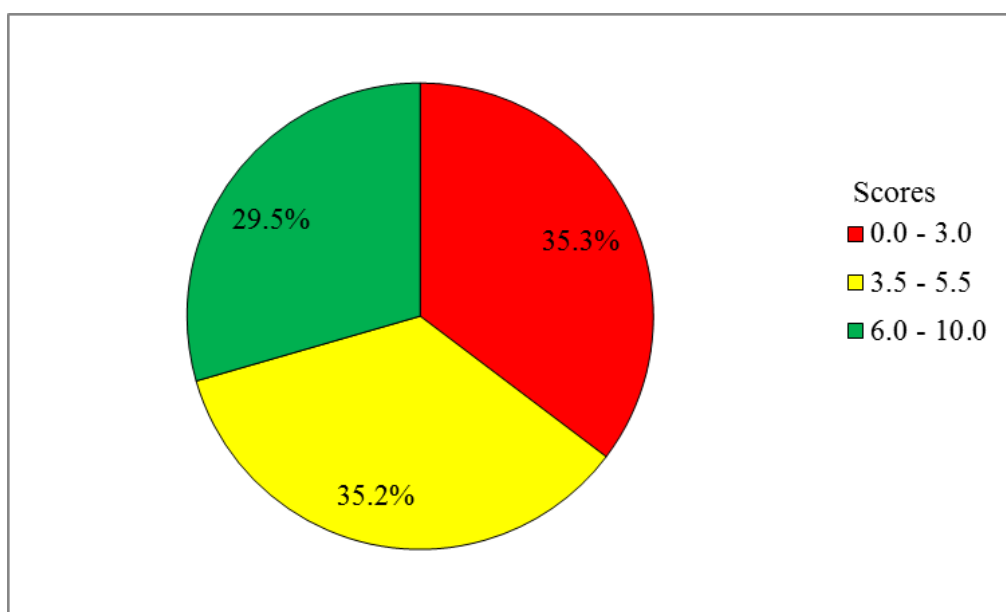
Figure 18: *Distribution of Candidates' Scores on Question 9*

Figure 18 shows that 64.7 per cent of the candidates scored from 3.5 to 10 marks, while 35.3 per cent scored from 0.0 to 3.0 marks. These data generally signify good performance of the candidates.

Among the candidates who attempted this question, 29.5 per cent attained good performance. Most of them correctly explained the procedure for establishing pastures. Some correct responses provided by the candidates were *land clearing and preparation, planting, supply of adequate soil moisture, fertilization* and *weed and pest control*, signifying sufficient knowledge of pastures establishment. Extract 19.1 is a sample of the candidates' correct responses to the question.

9 (i) Land preparation

This involve clearing the land to provide a good environment for growth and development of pasture, It involve tree cutting, tillage activities and making the soil more refinery for planting pasture.

(ii) Fertilizer application

after the land is well cleaned fertilizer such as nitrogenous fertilizer are applied befor seeding so that to facilitate growth of crop plant

(iii) Seeding

this involve planting the seeds of pasture in a Well prepared land

9 (iii) irrigation

this involve application of water in the land with pastures : so that to facilitate better growth.

(iv) Weeding

It involve removal of weeds from the pastures since they are unwanted and consume nutrient from soil leading to poor growth of pasture

(v) control of pests and disease

pastures are affected by different pests and disease therfo there fore various means of controlling pests and disease should be done in order to facilitate growth of pasture

(vi) Reseeding.

this involve seeding again the field with pasture in order to improve their growth

	(vii) Releasing animal for graze	
·	when pastures are fully developed and mature enough you can allow pastures to graze in an area	
1	(i) It has biting and chewing mouth part grasshopper has a well developed mouth that can bite and chew the leaves of plant even when they seem to be tough.	
	(ii) It has ability of digesting cellulose found in leaves	

Extract 19.1 is a sample of the candidates' correct responses to question 9.

In Extract 19.1, the candidate provided all the correct procedures needed for establishing own pastures. The candidate proved to be knowledgeable about pasture establishment.

Moreover, 35.2 per cent of the candidates performed averagely in the question. These candidates provided procedures such as *planting, weeding, pest and disease control, harvesting* and *post harvest practices*. The candidates left out land clearing and preparation, supply of appropriate moisture and fertlization, which are important practices when establishing own pastures. The candidates inluded harvesting and post harvest management practices which were not required by the question.

Conversely, 35.3 per cent of the candidates demonstrated weak performance on the question. Most of them failed to explain the procedures to be followed by livestock keepers to establish their own pastures. Instead, they explained procedures for making hay and silage. Others gave qualities of a good pasture instead of the procedures for its establishment. The candidates did not know that pastures are fodder crops; thus, like any other crops their establishment needs certain agronomic procedures. Examples of incorrect responses provided *were rotational grazing, through reducing the number of livestock, through practicing zero grazing*. These are not agronomic procedures but pastures management practices. Apparently, the candidates

were not knowledgeable about pasture establishment. Extract 19.2 is a sample of the incorrect responses to the question.

9. Pastures, these are grasses or legumes grown naturally or artificially for livestock grazing.

The following are the management of establishing the pasture.

i. Management ability to maximize the profit.
- The pastures should contain nutritive values which leach to the increase in production of animal's product example milk.

ii. The ability to utilize the ley or pasture efficiently.
- It should be palatable to the livestock.

iii. The need for favourable price for the animal product
- the presence of pasture determine the animal products price.

iv. The used of suitable seed for mixed pasture.
- The pasture should be complementary to each other example the mixture of grasses such as Rhodes grass (Chloris gayans) and the legumes such as kenya white clover.

v. The sufficient number of animal to utilize the ley or pasture.
- The presence of pasture should be maintained with the number of animals.

The following are the factors to consider when established the pasture.
i. The fertile soil status, the soil should be fertily in order to make sure that the pasture growing well.

9. P. Availability of water, the pasture should be near the source of water.

iii) The distance from the dairy cattle, the distance should be maintained to the dairy cattle.

Extract 19.2 is a sample of candidates' incorrect responses to question 9.

In Extract 19.2, the candidate provided the responses that did not relate to question 9. The candidate also stated factors to be considered when establishing pasture, the subject matter which was not demanded by the question.

2.2.10 Question 10: Introduction to Animal Health

The question comprised parts (a) and (b). The candidates were required to (a) account for six management practices that can be taken to control parasites (roundworms) from infecting the animal and (b) give eight points on how to identity an animal with high infestation of round worms. The question examined the candidates' knowledge of internal parasites in farm animals.

The question was attempted by 721 (99.6%) candidates in which 101 (14%) scored from 0.0 to 3.0 marks; 347 (48.1%) from 3.5 to 5.5 marks; and 273 (37.9%) from 6.0 to 10 marks. Figure 19 summarises the candidates' scores on the question.
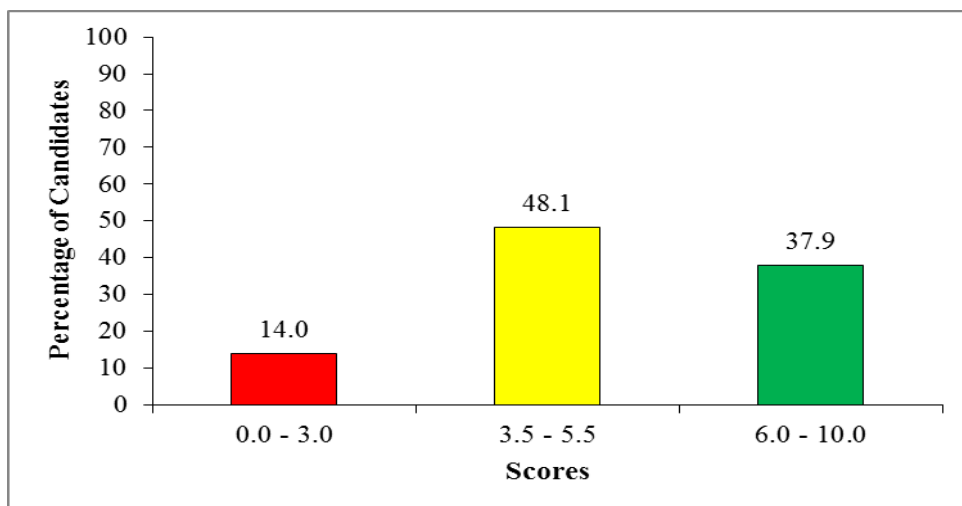

Figure 19: *Distribution of Candidates' Scores on Question 10*

Figure 19 shows that 86 per cent of the candidates scored from 3.5 to 10 marks, and 14 per cent from 0.0 to 3.0 marks. These data show that the candidates' performance on the question was good.

Data analysis indicates that 37.9 per cent of the candidates who attempted the question attained good performance. The analysis of candidates' responses shows that most of them responded correctly to both parts of the question. In part (a), they correctly accounted for the management practices that can be taken to control round worms from infecting animals. The correct responses given were like *cleanlines and disinfection of animal houses, proper disposal of manure, rotational grazing, avoid grazing on low-lying wet areas in dry seasons, drenching, separating young animals from adults* and *feeding livestock well*. In part (b), the candidates also correctly gave symptoms of an animal with high infestation of round worms by giving responses such as *decrease in yield production, anaemic condition, stunted growth, loss of appetite* and *constipation*. Extract 20.1 is a sample of the correct responses to the question.

10. a)	i) Proper disporsal of animal wastes. The farmer should ensure good disporsal of animal faeces since the parasites might be contained in the faeces.	
	ii) Deworming: The animals should be given oral chemicals to treat the parasites.	
	iii) Giving the animal clean feed. The animal should be given feed that is free from parasites	
	iv) Giving the animal nutritives feed. The animal should be given high nutritive feed to increase immune of the body against parasites	
	v) Avoid grazing the animal where there is presence of eggs of the parasite	
	vi) Fencing: The area for livestocks should be fenced to avoid spread of parasites by neighbour livestocks that are infected.	

b)	i) Reduced growth	
	ii) Poor food intake	
	iii) Decrease in weight	
	iv) Body weakness	
	v) Presence of worm in faeces	
	vi) Body skin become unhealthy	
	vii) Diarrhoea	
	viii) Increase in Stomach size	

Extract 20.1 is a sample of candidates' correct responses to question 10.

In Extract 20.1, the candidate responded correctly to both parts of the question, showing a good mastery of the subject matter.

It was also observed that 48.1 per cent of the candidates attained average performance on the question. They responded well to part (b) on the symptoms of an animal with high infestation of round worms. However, in part (a), the candidates did not exhaust all the management practices to be taken to control round worms from infecting animals.

In contrast, 14.0 per cent, of the candidates attained weak performance. Most of these candidates failed to account for the management practices that can be taken to control parasites from infecting animals in part (a). Likewise, they failed to give symptoms of an animal with infestation of round worms. Most of them provided responses which are meant for controlling livestock diseases in part (a) and general symptoms and signs for a sick animal in part (b).

The candidates did not know that round worms do not cause diseases; rather, they cause infection. Examples of incorrect responses on livestock disease control measures in part (a) were *vaccination, quarantine* and *slaughtering*. Some of the candidates also gave control measures for external parasites such as *dipping, spraying* and *hand picking* instead of control measures for internal parasites. Other incorrect responses were not specific, for instance in responding to part (a) one candidate wrote *bush clearing, ground spraying of the pasture, area which are well ventilated, feeding the animals with mineral rich feeds and avoid grazing the animals in the immature vegetation pasture*. Examples of the incorrect general

symptoms and signs of a sick animal given by the candidates in part (b) were *rise in body temperature, shivering, sudden death to animal, more prone to disease, change in urination and colour of urine, salivation, inability to stand up, fever* and *lameness of the affected animal*. Such responses signify that the candidates had insufficient knowledge of round worms as internal parasites in farm animals. A sample of the incorrect responses to the question is shown in Extract 20.2.

10 (b)	i)	The animal become restless
	ii)	The animal tend to Mount Other animal
	iii)	Tend to be noisy
	iv)	Vulva become reddish
	v)	White Mucus become discharge

Extract 20.2 is a sample of candidates' incorrect responses to question 10.

In Extract 20.2, the candidate responded incorrectly to the question. In part (a), the candidate explained livestock diseases control measures and gave signs of an animal that is on heat in part (b).

2.3   134/3 Agriculture 3

2.3.1 Question 1: Livestock Science and Production

In this question, the candidates were provided with the following specimens and materials: L_1 (Unfertile egg), L_2 (Fertile egg), carton box, 2 battery capacity torch and a dark environment. The candidates were required to perform the following procedures:
(i)   Hold specimen L_1 between the thumb and fore finger

(ii)   Using a torch, light a spotlight inside the carton box to the direction of a hole

(iii)   Candle specimen L_1 by placing it with its large end facing the hole outside the carton box

(iv)   Tilt specimen L_1 slightly to one side and rotate until you get the best view by looking through it to the light

(v)   Repeat the same procedures for specimen L_2.

The question consisted of parts (a), (b), (c), (d), (e) and (f). The candidates were then required to (a) give the aim of the experiment (b) briefly describe the process involved in the experiment (c) comment on the status of each of the specimen L_1 and L_2, giving two signs in each case to justify the status of the specimens (d) give three factors to be considered for the specimen that has passed the test not to suit the purpose of the experiment (e) briefly

explain why yolkers and quitters cannot be winner specimens in the experiment and (f) account for the five necessary conditions for artificially developing the winner specimens in the experiment. The question assessed candidates' knowledge of and skills in conducting the candling process.

The question was attempted by 724 (100%) candidates of which 409 (56.6%) scored from 0.0 to 6.5 marks; 267 (36.9%) from 7.0 to 11.5 marks; and 48 (6.6%) from 12 to 16 marks. Figure 20 summarises the candidates' scores on the question.
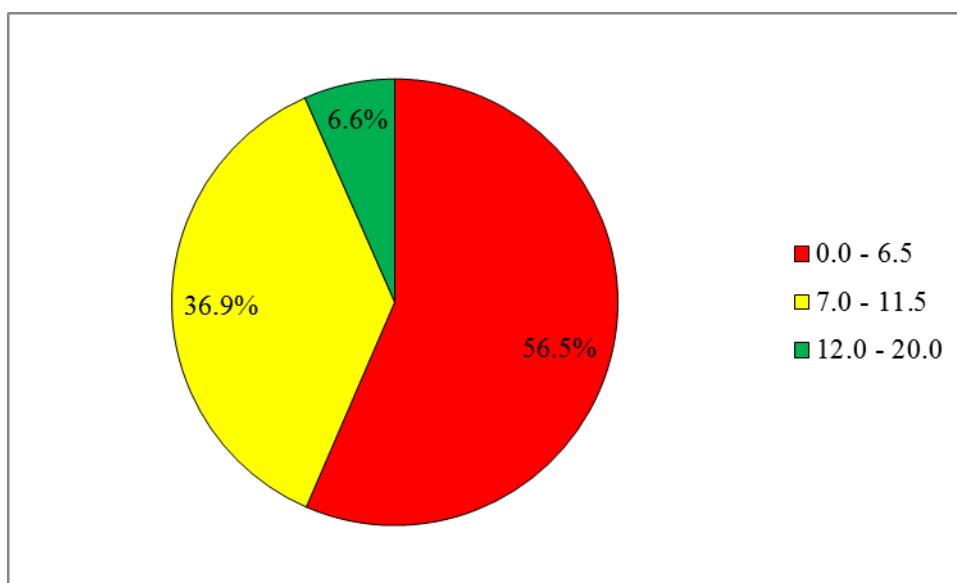
Figure 20: *Distribution of Candidates' Scores on Question 1*

Figure 20 shows that 43.5 per cent of the candidates scored from 7.0 to 16 marks, whereas 56.5 per cent from 0.0 to 6.5 marks. The general performance of the candidates on the question was average.

From the data, 6.6 per cent of the candidates who attempted the question attained good performance. Most of them correctly attempted almost all parts of the question. In part (a), these candidates gave the aim of the experiment as *testing for fertility of the eggs for incubation*; thus, they described candling process in part (b). Likewise, they provided the correct responses in part (c) on status of the specimens. The responses were *L_1 is unfertile egg since it has no vessel or blood rings and no visible dark sport as and specimen L_2 is a fertile egg as it has a network of blood vessel* and

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visible dark spot at the centre. In part (d), factors to be considered for the specimen that has passed the test not to suit the purpose are round-shaped egg, small size egg, rough, cracked-shell egg and eggs with double yolked. In part (e), a few candidates gave correct reasons as to why yolkers and quitters can not be winner specimens in the experiment. The reasons are yolkers are eggs that have never been fertilized and hence they cannot hatch into baby chicks and quitters are fertile eggs that stop developing at a certain stage during incubation; therefore, cannot be used to hatch into baby chicks. The candidates also accounted correctly for the necessary conditions for artificially developing the winner specimen in the experiment in part (f), although most of them did not account for all the conditions required. The conditions were; suitable temperature, turning of eggs, correct ratio of carbon dioxide to oxygen, ventilation and relative humidity. The candidates' correct respondents show their adequate knowledge of the candling process and skills in following the procedures for the process correctly to come up with correct experimental results. Their knowledge of the subject matter also enabled the candidates to respond well to the questions after they had got the correct experimental results. Extract 21.1 is a sample of the correct responses to the question.

(B)	L1 is un fertile egg	
	signs.	
	i) Absence of fertilised embyo here	
	the egg is unfertile.	
	(ii) Presence of blood spot showing that	
	it is unsuitable for Incubation.	
	h2	
	is fertile egg.	
	presence of signs.	
	-D. presence of fertilized embryo showing	
	that it is fertile.	
	-D Absence of any crack means that	
	that it is suitable for Incubation.	
1.	(d) o presence of Cracks on the shell of	
	an egg.	
	eggs with cracks shows that the eggs	
	are not suitable for Incubation since the	
	eggs will not develop into the chick that	
	they need to be removed and not being Incu	
	bated.	
	(ii) Absence of fertilized embryos	
	Eggs which are not fertilized are	
	not suitable for the incubation process	
	since the eggs cannot hatch into the	
	chicks since there is no embryo to	
	develop into the chick.	
	(iii) Eggs which are small and large	
	in size are not suitable for incuba	
	tion.	
	egs with weight of 57g should	
	be selected for Incubation, eggs with	
	large size or small in size are difficult	
	to incubate them since have uneven	
	distribution of heat. Thus they should not	
	be incubated.	

1. (d) presence of cracks on the shell of an egg.

Eggs with cracks shows that the eggs are not suitable for incubation since the eggs will not develop into the chick that they need to be removed and not being incubated.

(ii) Absence of fertilized embryos
Eggs which are not fertilized are not suitable for the incubation process since the eggs cannot hatch into the chicks since there is no embryo to develop into the chick.

(iii) Eggs which are small and large in size are not suitable for incubation.
Eggs with weight of 57g should be selected for incubation, eggs with large size or small in size are difficult to incubate them since have uneven distribution of heat. Thus they should not be incubated.

1(e) yolkers are the eggs which don't containing the embryo means that were not fertilized. Thus they cannot be winner since candling involves determining the eggs which are fertile and thus will become suitable for incubation. Plus yolkers are not suitable for incubation.

Quitters are the eggs which contain the fertilized embryo but it ~~fertilize~~ failed to develop and thus the embryo is dead.
The dead embryo cannot hatch into the chick when incubated.
Therefore the quitters will not be winner since the embryo is dead and will not develop into the chick hence are eliminated.

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(f)	Temperature of the incubator should optimum 38°c. The temperature of the incubator should be at average of 38°c. High temperature can cause dessication of the embryo while the low temperature will cause the embryo to grow slow.	
	Humidity of incobator should be mantained at relative of 86%. proper humidity condition promotes the proper growth of the embryo.	
1(f)	Lower humidity will cause the embryo to dessicate and thus fails to grow.	
	→ Ventilation of incubator should be well ventilated. The proper ventilation ensures the circulation of oxygen which is needed by the developing embryo.	
	• Eggs should be turned regularly. The eggs are turned after a certain interval of time this will ensure the even distribution of heat to the growing embryo, turn the eggs after 6 hours.	
	→ Maintain the hygiene of the incubator so as to prevent the introduction of pathogen that otherwise will cause the infection to the growing embryo.	

Extract 21.1 is a sample of candidates' correct responses to question 1.

In Extract 21.1, the candidate responded correctly in almost all parts of the question, except in parts (c), (d) and (f) where he/she missed one point in each case.

Moreover, 36.9 per cent of the candidates attained average performance on the question. Analysis indicated that the candidates responded well to some parts of the question. The candidates did not perform well on parts (e) and (f) due to their partial knowledge of the subject matter.

Nevertheless, 56.5 per cent of the candidates attained weak performance on the question. Most of them attempted incorrectly almost all parts of the question. They provided incorrect responses such as *to investigate the egg, to test the egg* and *to look inside the egg for fertilization* as the aim of experiment in part (a). Consequently, they failed to describe the process in the experiment in part (b).

In part (c), most of the candidates mixed up the status of specimen L_1 and L_2. For example, the candidates identified specimen L_1 as fertile egg instead of an unfertile one. They identified specimen L_2 as an unfertile egg instead of fertile egg. This resulted into obtaining incorrect signs in each specimen. Other candidates failed to give signs in each specimen by giving responses like L_1 - *smooth shell* and *round disc* likewise in specimen L_2: - *has clean shell, contain no blood stain* and *has clean albumin*. In part (d), the candidates also could not give factors to be considered for the specimen that had passed the test not to suit the purpose of the experiment. Examples of the responses given were *the colour of an egg, the thickness of the egg shell, the age of the egg* and *it is not fertilized.*

Furthermore, in part (e), the candidates could not give reasons why yolkers and quitters cannot be winner specimens in the experiment. The candidates generalised reasons such as *no formation of embryo, both are not fertile, they have low body temperature, they have low level of calcium* and *they are not dark spotted.* In part (f), some of the incorrect responses provided by the candidates for the necessary conditions for artificially developing the winner specimens in the experiment were make *proper nesting, hygiene and sanitation, provided good amount of mineral, presence of water, presence of dark place* and *cork must be present.* These incorrect responses suggest that the candidates lacked skills on candling process. Thus, they failed to follow the experimental procedures to come up with the correct results. Their inadequate knowledge of the subject matter also hindered

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them from responding correctly to the question items. Extract 21.2 shows an example of the incorrect responses to the question.

		use only
1(a)	The aim of experiment is TO identify egg candling.	
(b).	The process involved in the experiment is → fertile → unfertile where in the experiment the specimen L1 the process occur is fertile egg and in specimen L2 process occur is unfertile egg.	
c)	The signs observed in specimen L1 (i) They are fertile egg (ii) They are not transparent. The signs observed in specimen L2 (i) They are unfertile egg. (ii) They are transparent.	
d)	(i) Incubation (ii) Egg candling. (iii) Egg testing.	
e).	Yolkers and quitters can not be winner specimens in the experiments Because they are used to identify to show the fertile egg and unfertile egg. So are not winner specimens.	
1 f)	i) Air space ii) Chalanzae iii) Inner membrane iv) Outer membrane v) Shell.	

Extract 21.2 is a sample of candidates' incorrect responses to question 1.

In Extract 21.2, the candidate provided incorrect responses to all parts of the question. The candidate lacked knowledge of the candling process and skills in candling eggs.

2.3.2 Question 2: Soil Science

In this question the candidates were provided with the following specimens and materials: S_1 (Acidic soil), S_2 (Alkaline soil), pH colour chart, pH colour indicator/dye, barium sulphate powder, test tubes, test tube rack, corks, dropper, spatula, beaker, distilled water, weighing balance and a wall clock. The candidates were required to perform the following procedures and answer the questions that followed:

(i)   Measure about 5g for each of specimen S_1 and specimen S_2.

(ii)   Put the measured specimen S_1 and specimen S_2 into separate test tubes

(iii)   Using spatula, add barium sulphate powder and mix it well with both specimen S_1 and specimen S_2

(iv)   Add distilled water and few drops of pH colour indicator/ dyer to the mixture of both specimen S_1 and specimen S_2.

(v)   Cork the test tubes and shake the mixture vigorously to ensure thorough mixing.

(vi)   Allow the content to stand for 45 minutes.

(vii)   Observed the clear area formed in the middle of the test tubes.

(viii) Match the colour of the solution with that of colour chat and record the pH value.

This question comprised of parts (a), (b), (c), (d), (e) and (f). The candidates were required to (a) give the values and names of the pH range in each of the specimen S_1 and S_2, (b) assess the significance of conducting the experimental test in crop production, (c) suggest one common crop in Tanzania suitable to be grown in the soil sample of specimen S_1 with regard to its pH value (d), give reason why the barium sulphate powder was added to the specimens during the experiment, (e) give comments and advice to farmers who want to grow maize in the soil of specimen S_2 and (f) briefly explain three importance of advice given in

part (e). The question tested candidates' knowledge and skills of analysing soil properties.

The question was attempted by 724 (100%) candidates. Among them, 445 (61.5% scored from 0.0 to 5.0 marks; 211 (29.1%) from 5.5 to 8.5 marks and 68 (9.4%) from 9.0 to 13 marks. Figure 21 summarises the candidates' scores on the question.
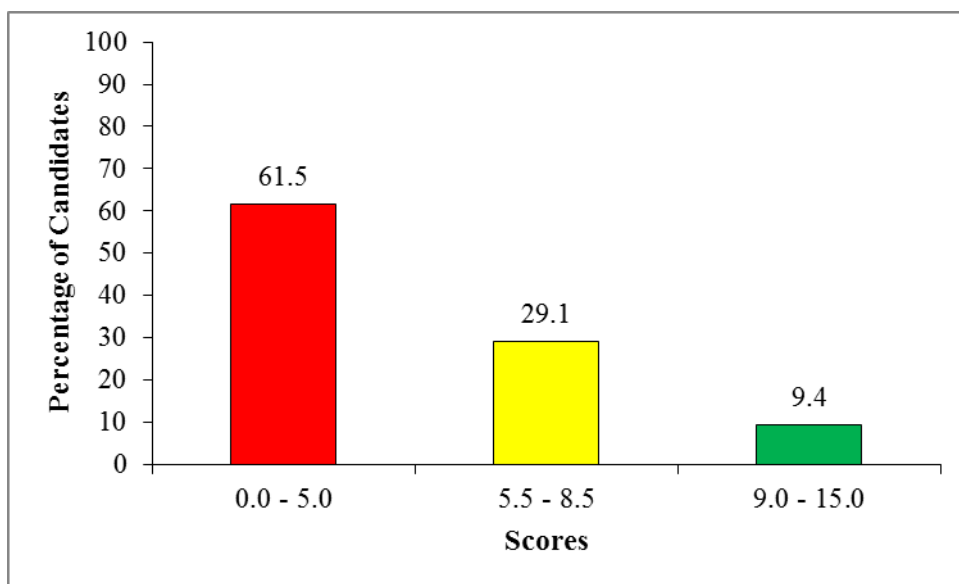
Figure 21: *Distribution of Candidates' Scores on Question 2*

According to Figure 21, 38.5 per cent of the candidates scored from 5.5 to 13 marks, and 61.5 per cent from 0.0 to 5.0 marks. Thus, the performance of the candidates on the question was average.

Only 9.4 per cent of the candidates who attempted the question performed well. The majority of the candidates attempted well all parts of the question. They gave correct pH values and their ranges for specimen S_1 and S_2 in part (a), *as follows; S_1(acidic soil): 3.5 -4 very strong acid, 4 -5 strong acid, 5- 6 moderate acidic and 6- 6.9 slight acidic and S_2 (alkaline soil):7.1 -8 slightly alkaline, 8-9 moderate alkaline and 9-10 strong alkaline* and *10-11 very strong alkaline*. In part (b), the candidates assessed correctly the significance of conducting the test in crop production as *it determines the types of crops to be grown, the type of amendment to be done,* and *the type of fertilizer to be added*. Examples of the correct responses for common

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crop in Tanzania suitable to be grown in soil of specimen S_1 (acidic soil) in part (c) were very strong acid-Tea, strong acid-Maize, Sorghum, Millet and Coffee, moderate acidity-Cow pea, Cotton, Groundnuts and Wheat, slightly acidic-Beans and Cabbage. Likewise, in part (d), the candidates gave the reason why barium sulphate powder was added to the specimens during the experiment. The reason was that it precipitates out any particles. The candidates also gave appropriate comments and advice to farmers who want to grow maize in soils of specimen S_2 in part (e). The responses were that S_2 is an alkaline soil. Hence, it can not be used to grow maize, which is favoured by acidic conditions. For farmers to grow maize in soils of specimen S_2, they should acidify the soil to create acidic conditions before growing the crop. In contrast, in part (f), most candidates failed to explain the importance of the advice given in part (e). The candidates gave the importance like *controls some crop diseases, increases availability of manganese, copper and chlorine* and *favours acidic tolerant crops.* It was observed that the candidates had adequate practical skills in determining soil pH using the pH colour indicator method. The correct responses provided to the question items indicate that the candidates were knowledgeable about soil pH. Extract 22.1 represents a sample of correct responses to the question.

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2 (c) Suitable crop is tea

(d) Barium sulphate was added inorder to separate soil particles to each other

(e) • Specimen B₂ is basic soil which can not be vary suitable for planting maize hence the soil require slightly intervention by gypsum (CaSO₄) inorder to have a neutral soil

• B₂ So which is basic soil can be maintained and being intervened by the gypsum which is CaSO₄ for this reason the pH of the soil can be lowered upto 7 or 6.8 – 7.2 which is the good condition for maize plant

(f) • There will be increase in uptake of minerals like Aluminum, Manganese and Iron which are very suitable for maize growth.

• There will be active activities of microorganism because of neutral condition of the soil

• There will be reduction element like Mg, Molybdenum Zn from within the toxic level in of the soil to less toxic

Extract 22.1 is a sample of candidates' relative good responses to question 2.

In Extract 22.1, the candidate attempted most parts of the question correctly, except parts (c), (e) and (f). In part (c), the candidate named one crop to be grown in very acidic soil only, whereas in parts (c) and (f), he/she missed a few correct points.

Statistics showed that 29.1 per cent of the candidates attained average performance on the question. Most of the candidates showed a good mastery of the pH colour indicator method in determining soil pH. Some provided correct responses to most parts of the question. However, they had difficulties in attempting parts (c) and (f) of the question.

Conversely, 61.5 per cent of the candidates attained weak performance on the question. Their responses show that most of them gave incorrect

responses to almost all parts of the question. In part (a), they failed to give the value and names of the pH range in each of specimen S_1 and S_2. For example, the candidates gave pH values for specimen S_1 as either *1, 2* or *3* and specimen S_2 as either *7, 12, 13* or *14*.

In part (b), the candidates failed to assess the significance of conducting the experimental test in producing crops. Some of the candidates stated the aim of the experiment instead of the significance of conducting the experimental test in producing crops. Other examples of the incorrect responses to the question were *it increase crop yield, enable to know how much the soil is affected by acidity and basicity and enable to identify the nutrients which are found in the soil*. Their failure to respond correctly in part (a) affected their responses in part (c); accordingly they failed to suggest one common crop in Tanzania suitable to be grown in the soil sample of specimen S_1 with regard to its pH value. The candidates named different types of crops without arranging them into different pH ranges. They named crops such as *paddy, beans maize* and *sorghum*.

Moreover, in part (d), the candidates gave the incorrect reasons why the barium sulphate powder was added to the specimen during experiment such as *it act as a neutralizing material in the soil, it help to remove toxicity of sodium present in the soil and provide the suitable condition for soil test*. Moreover, in part (e), their comments and advice to farmers who want to grow maize in the soil of specimen S_2 were *the farmer should add basic compound in the soil in order to neutralise the acidic soil which is favourable for maize production, avoid use of industrial fertilizer, addition of organic matter to the soil* and *apply crop rotation*. In part (f), they failed to explain the importance of the advice they had given in part (e). Such incorrect responses were *it help to neutralize acidic soil, it improve the soil structure, it increase the plant density and it improve water penetration into the soil*. Failure to arrive at the correct experimental results signifies that the candidates had insufficient skills in determining soil pH by the pH colour indicator method. The candidates also lacked knowledge of the subject matter. Hence, they provided incorrect responses to the question items. Extract 22.2 is an example of the incorrect responses to the question.

2a) Specimen	Value	Name of the pH range
L_1	2	strong acidic soil.
L_2	3	moderate acidic soil.

b) The significance of conducting the experimental test in crop production is to determine the the soil pH or pH of the soil.

c) Banana is the one common crop in Tanzania suitable to be grown in soil sample of specimen S_1 with regard to its pH value 2.

d) Barium sulphate powder was added to the specimens during the experiment in order to increase the rate of chemical reaction between the specimens and water to form solution.

e) Since the soil more acidic the farmer should add basic compound in the soil in order to neutralize the acidic soil which is favourable for maize production of the soil specimen S_2.

f) The following are importance of adding basic compounds in the soil.
i) It help to neutralize the acidic soil
ii) It help to improve the soil structure.
iii) It increases the plant density and improving water penetration into the soil.

Extract 22.2 is a sample of candidates' incorrect responses to question 2.

In Extract 22.2, the candidate gave incorrect pH values in the experiment; consequently, he/she failed to respond correctly to other question items since they relied on the experiment done. The candidate lacked skills in determining soil pH by the pH colour indicator method.

2.3.3 Question 3: Crop Science and Production

The question was divided into parts (a), (b), (c), (d), (e) and (f). In this question, the candidates were provided with specimen C (Tomato plant affected by late blight) as a sample brought to the plant clinic by a farmer. The candidates were required to carefully examine the specimen as plant pathologists and inform the farmer on the following: (a) name of the disease affecting specimen C (b) causative agent of the disease by its common and scientific names (c) three modes of transmission of the disease (d) three observable symptoms that exhibit the presence of the disease (e) one measure that can be employed to restore the health of the infected plant and (f) six points to suggest ways to maintain health of the plant against the disease. The question tested candidates' knowledge of and skills in controlling plant diseases.

The question was attempted by 724 (100%) candidates whereas 48 (6.6%) scored from 2 to 5 marks, 324 (44.8%) from 5.5 to 8.5 marks and 352(48.6%) from 9 to 13.5 marks. Figure 22 represents the candidates' scores on the question.
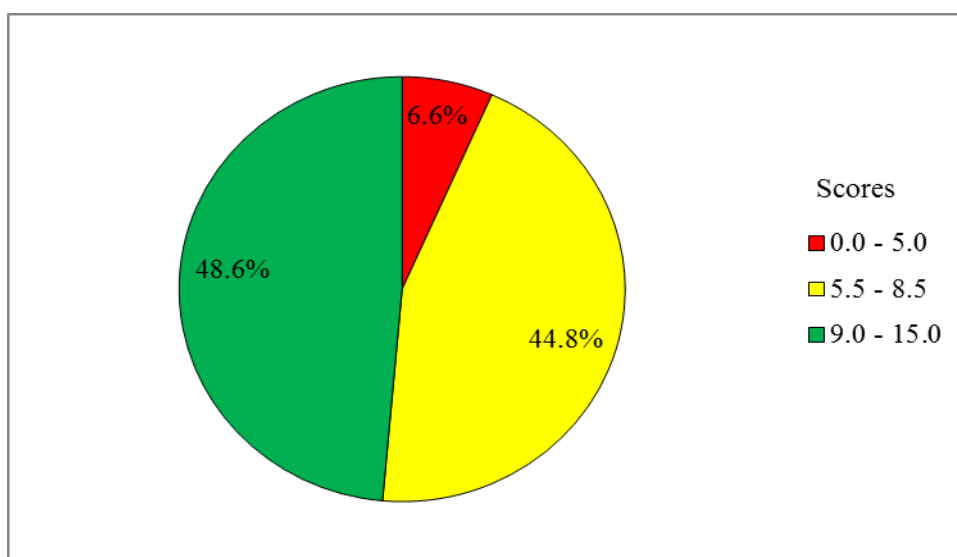

Figure 22: *Distribution of Candidates' Scores on Question 3*

Figure 22 illustrates that 93.4 per cent of the candidates scored from 5.5 to 13.5 marks and 6.6 per cent from 2.0 to 5.0 marks. Their performance on the question was good.

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Statistics indicate that 48.6 per cent of the candidates who attempted the question attained good performance. In nearly all parts of the question the candidates responses were correct. In part (a), they correctly named the disease affecting specimen C as tomato late blight. In part (b), they also gave the common and scientific names of the causative agent of the disease affecting specimen C. The common name is fungus while its scientifc name is *Phytophthora infestans*. The candidates partially correctly explained the modes of transmission of the disease in part (c). Such modes are from *infected tubers, infected transplants or seeds,wind or rain drop splash* and *rotten fruits*. Furthermore, they correctly pointed out observable symptoms that exhibit the presence of the disease as *rotten fruits with circular greasy lesion, irregularly shaped and water soaked lesion on young leaves at the top part of plant* and *withering and drying of leaves* in part (d). In part (e), the candidate prescribed correctly measure to be employed to restore the health of the infected plant as *use of appropriate fungicide*. The correct suggestions for maintenance of health of the plants against the disease given by the candidates in part (f) were *plant resistant variety, removal of volunteers, proper spacing, water early in the morning, avoid overhead irrigation, destruction of tomato debris* and *crop rotation*. Their correct identification of the disease showed good observational skills by the candidates. Besides, the candidates' adequate knowledge of the tomato late blight disease enabled them to provide correct responses to the rest of the question parts. A sample of the correct responses to the question is portrayed in Extract 23.1.

03.	a)	Late blight of tomatoes	
	b)	Fungi	
		Scientific name: <u>Phytophthora</u> <u>infestan</u>	
	c)	<u>Modes of transmission</u>	
		i) planting diseased seeds or seedlings	
		ii) Water splashes during irrigation	
		iii) mechanically during cultivation	
		example using contaminated equipments	
		or by wind spores dispersal	
	d)	Observable symptoms:	
		i) Water soaked lesions on the	
		lower leaves of the tomato plant	
		ii) white mould growth surround	
		the affected areas of the	
		leaves	
		iii) Affected fruits turn brown and	
		finally die and rot.	
		iv) Irregular greenish - patches	
		of the leaves which later	
		turn brown.	
	e)	⟹ Treatment using copper	
		based fungicides or suitable	
		fungicides	

03.	f)	a)	Crops rotation with non – relant area plants.	
		b)	Correct spacing to minimize the transmission of the disease between plants.	
		c)	Ensure good soil drainage to prevent water overlogging hence minimizing the risk of spread of disease.	
		d)	Avoid overhead irrigation to prevent to prevent the fungal spores splashes with water	
		e)	Use of disease free seeds and transplants (seedlings) example by seeds treatment.	
		f)	Removal by burning or burying of infected plants and alternative hosts of the fungi causing late blight	

Extract 23.1 is a sample of candidates' relatively correct responses to question 3.

In Extract 23.1, the candidate attempted correctly almost all parts of the question, except parts (c) and (f). In part (c), the candidate gave one incorrect point (mechanical transmission), whereas in part (f), he/she gave one partially correct response (good soil drainage).

Data show that 44.8 per cent of the candidates who answered the question performed averagely. Most of them correctly addressed some parts of the question except parts (c) and (f). In part (c), most candidates failed to give the modes of transmission of the disease, whereas in part (d), they failed to suggest the ways of maintaining the health of the plant against the disease.

However, 6.6 per cent of the candidates had weak performance on the question. Most of them provided incorrect responses to almost all parts of the question. In part (a), the candidates failed to name the disease affecting the tomato plant, instead they named different diseases such as bacteria *wilt, dumping off, fungi disease and mosaic virus.*

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Likewise, they answered incorrectly part (b) on the common and scientific names of the causative agent of the disease. Examples of the incorrect responses were common name: *bacteria* and its scientific name: *Pseudomonea solace*. Other candidates gave incorrect spelling for the scientific name like*: Phytophora infenstant.* In part (c), the candidates failed to give the modes of transmission of the disease by giving responses such as *water soaked spot on the leaves, the disease or spot is carried by air and dust, on stem lesion are long dark colour* and *on leaves it has dark brown colour*. Moreover, in part (d), most candidates failed to provide observable symptoms that exhibit the presence of the disease. The responses given by the candidates included *leaf curling, yellowing of tomato fruits* and *wilting without chlorosis*. Likewise, they responded incorrectly to part (e) by giving responses such as *early planting, avoid harvesting of tomatoes during cold climate* and *growing resistance variety* as measures for restoring the health of the infected plant.

In contrast, in part (f), the candidates correctly suggested few ways of maintaining the health of the plants against the disease. An example of the incorrect responses were *mulching, deep ploughing, use of clean seed* and *use of closed season*. Some of the candidates gave chemical methods of controlling diseases such as *use of fungicides and bactericides* to maintain the health of the plant against the tomato late blight disease. Such responses imply that the candidates lacked knowledge about the tomato late blight disease. Extract 23.2 shows an example of the incorrect responses to the question.

3.   (a) ' Bacterial wilt

(b) ' Bacterial (pseudomonas Solanacearus)

c. - Vector disease ;
      - Contact
      - Insect / Birds, blue birds .

d. - foliage wilt Sudden.
      - foliage become yellow colour.
      - Discolouration
      - foliage remain green like fruit
e.   the crop rotation .

f . i Avoid physical damage. like weeping seedling &
      cultivation
   ii   Space generously
   iii well Soil drained that balance Soil PH
   iv   Insecticide chemical applied
   v   choose good Varities resistance
   vi   Wash land before planting seedling

Extract 23.2 is a sample of candidates' incorrect responses to question 3.

In Extract 23.2, the candidate responded incorrectly to almost all parts of the question except to part (f) where he/she had one correct point (use of resistant variety). The other two points (proper spacing and soil drainage) were partially correct.

3.0 PERFORMANCE OF THE CANDIDATES ON THE TOPICS AND FIELDS

The performance of the candidates on the topics examined in theory papers and fields examined in a practical paper was done to determine topics and fields in which the candidates attained good, average or weak performance. A total of 20 topics were examined in the theory papers and 3 subject fields were examined in the practical paper. Data analysis indicated that the candidates attained good performance on the field of *Crop Science and Production* (93.4%) and the topics of *Introduction to Animal Nutrition* (93%), *Introduction to Weed Science* (92.1%), *Farm Power* (91.1%), *Introduction to Animal Health* (86%), *Plant Diseases* (81.5%), *Livestock Reproduction, Breeding and Improvement* (72.8%), *Pasture Agronomy* (64.7%) and *Environmental and Technological Challenges in Agricultural Development* (62.8%). Appendix I shows the performance of the candidates on the topics and fields. The green, yellow, and red colours have been used to denote good, average and weak performance levels respectively.

Data also indicated that the candidates performed averagely on the topics of *Farm Mechanization and Machinery* and *Introduction to Irrigation* (58.2%), *Plant Breeding* (52.9%), *Introduction to Soil Chemistry* (52.45%), *Introduction to Soil Science* (49.7%) and fields of *Livestock Science and Production* (43.5%) and *Soil Science* (38.5%). Nonetheless, the candidates had weak performance on the topics of *Fundamentals of International Trade and Farm Planning* (21.8%), *Workshop Technology* and *Farm Structures* (7.3%) and *Crop Pests* (2.5%). Their weak performance on the topics is attributed to their inadequate knowledge on the subject matter and skills in fulfilling the requirements of the questions. Accordingly, the candidates provided responses that did not address the requirements of the questions asked.

A comparison was made between the performance of the candidates in ACSEE 2021 and 2020 to determine performance differences between the two consecutive years. Results indicated that performance remained good in 2021, as it was in 2020, on the topics of *Introduction to Animal Nutrition, Introduction to Animal Health, Plant Diseases, Environmental and Technological Challenges in Agricultural Development* and *Livestock*

Reproduction, Breeding and Improvement. In 2021, performance on the topics of *Pasture Agronomy* and *Introduction to Weed Science* has increased from average to good. Moreover, performance on *Farm Power* and *Production Economics* topics has increased from weak to good. The topic of *Introduction to Agricultural Prices* remained with average performance in both years. Besides, in 2021, the topics and field of *Plant Breeding, Introduction to Soil Chemistry, Introduction to Soil Science* and *Livestock Science and Production* have experienced decrease in performance from good in 2020 to average in 2021. The candidates' performance on the topic and field of *Farm Mechanization and Machinery* and *Introduction to Irrigation* and *Soil Science* has increased from weak in 2020 to average in 2021. However, performance on the topic of *Crop Pests* has decreased from good to weak. Likewise, candidates' performance on the topics of *Fundamental of International Trade* and *Farm Planning, Workshop Technology* and *Farm Structures* has decreased from average in 2020 to weak in 2021. Appendix II illustrates the comparison of candidates' performance on different topics and fields in ACSEE 2021 and 2020.

4.0 CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

The statistical analysis shows that the performance of the candidates in the ACSEE 2021 in Agriculture was good. The data showed that 95.16 per cent of the candidates who sat for the examination passed. Among them, few candidates (5.38%) scored grades B and C and the majority (94.62%) scored grades D, E and S.

The candidates who scored high marks had adequate knowledge of the concepts tested and practical skills addressing the question. This enabled them to respond correctly to the questions in the theory and practical examinations. Their practical skills helped them to follow correctly the experimental procedures and came up with correct results.

In contrast, the candidates who scored low pass marks and those who failed (4.84%) had inadequate knowledge of the concepts examined. Accordingly, they provided incorrect responses or partially correct responses. This also contributed to their failure to attempt some of the questions.

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The low marks in the practical questions are attributed to candidates' lack of practical skills that could otherwise have helped them to follow the experimental procedures and ultimately arrive at the correct results which could have helped them respond correctly to the questions.

The candidates who scored low marks also failed to fulfil the requirements of the questions. Some of them seemed not to understand the demands of some questions; thus, they responded by writing things that were not related to the question asked.

4.2 Recommendations

To improve the candidates' performance in the Agriculture subject, the following are recommended:

(a) Teachers should effectively use enabling infrastructure in the subject such as farm workshop, laboratory and demonstration farms. For example, the functions of plumbing tools in Question 2, Paper 1 from the topic of *Workshop Technology* can best be taught in the farm workshop. This is the place where demonstrations and practice are done. Demonstrations improve students' understanding of skills and enable them to pay attention and follow along with the learning process. Practice always makes perfect; students learn better by seeing and doing.

(b) Teachers should supplement classroom teaching with field work. For example, teaching about the procedures for construction of crush to confine an animal for dehorning from the topic of *Farm Structures* in Question 2, Paper 1 can be done in the field, outside the classroom. Field practice enables students to make their own observations and create opportunity for firsthand experience that encourages critical thinking, transfer potentials, positive attitudes and long term retention. Field practice also provides students with the opportunity to put their pedagogical knowledge and skills into practice.

(c) Teachers should make proper use of agriculture laboratories to enhance teaching and learning depending on the subject matter. For example, characteristics and management implications of different soil colours in

Question 5, Paper 1 from the topic of *Introduction to Soil Science* can effectively be taught in the laboratory. The same can also be applied to the adaptive features of the grasshopper in relation to its mode of feeding in Question 1, Paper 2 from the topic of *Crop Pests*. This is because practical work facilitates learning in the classroom. They also improve engagement and knowledge retention. Besides, students learn easily by doing.

(d) Teachers should regularly use teaching aids where appropriate. For example, teaching about the relationship between functions and deficiency symptoms of mineral elements in plants in Question 7, Paper 1 from the topic *Introduction to Soil Chemistry* can involve the use of actual plants suffering from deficiency symptoms of different mineral elements. Teaching aids motivate interest in the subject matter. They also illustrate the relevance of the concepts and aid in knowledge retention.

(e) Teachers should also use other participatory teaching methods such as brainstorming and group discussion. Brainstorming encourages learners to share ideas and experiences. It also focuses students' attention on a particular topic. Also adopting group discussions can improve thinking skills and help students acquire knowledge about concepts that were unfamiliar to them.

Candidates' Performance on Different Topics and Fields in ACSEE 2021

S/N	Topic/Fields	2021	
		Percentage of Candidates who scored the average of 35% and above	Comments
2.	Introduction to Animal Nutrition	93	Good
3.	Introduction to Weed Science	92.1	Good
4.	Farm Power	91.1	Good
5.	Introduction to Animal Health	86	Good
6.	Plant Diseases	81.5	Good
7.	Livestock Reproduction, Breeding and Improvement	72.8	Good
8.	Pasture Agronomy	64.7	Good
9.	Production Economics	64.1	Good
10.	Environmental and Technological Challenges in Agricultural Development	62.8	Good
11.	Farm Mechanization and Machinery and Introduction to Irrigation	58.2	Average
12.	Plant Breeding	52.9	Average
13.	Introduction to Soil Chemistry	52.45	Average
14.	Introduction to Soil Science	49.7	Average
15.	Livestock Science and Production (Paper	43.5	Average
16.	Introduction to Agricultural Prices	42	Average
17.	Soil Science(Paper three)	38.5	Average
18.	Fundamental of International Trade and	21.8	Weak
19.	Workshop Technology and Farm Structures	7.3	Weak
20.	Crop Pests	2.5	Weak

Comparison of Candidates' Performance on Different Topics and Fields in ACSEE 2021 and 2020

S/N	Topic/Fields	2021		2020	
		Percentage of Candidates who scored the average of 35% and above	Comments	Percentage of Candidates who scored the average of 35% and above	Comments
1.	Introduction to Animal Nutrition	93	Good	88.2	Good
2.	Introduction to Weed Science	92.1	Good	59.2	Average
3.	Farm Power	91.1	Good	32.7	Weak
4.	Introduction to Animal Health	86	Good	87.6	Good
5.	Plant Diseases	81.5	Good	88.1	Good
6.	Livestock Reproduction, Breeding and Improvement	72.8	Good	74.4	Good
7.	Pasture Agronomy	64.7	Good	55.9	Average
8.	Production Economics	64.1	Good	22	Weak
9.	Environmental and Technological Challenges in Agricultural Development	62.8	Good	97.9	Good
10.	Farm Mechanization and Machinery and Introduction to Irrigation	58.2	Average	33.4	Weak
11.	Plant Breeding	52.9	Average	75.3	Good
12.	Introduction to Soil Chemistry	52.45	Average	85	Good
13.	Introduction to Soil Science	49.7	Average	67	Good
14.	Livestock Science and Production	43.5	Average	74.2	Good
15.	Introduction to Agricultural Prices	42	Average	48.5	Average
16.	Soil Science(Paper three)	38.5	Average	26	Weak
17.	Fundamental of International Trade and Farm Planning	21.8	Weak	39.3	Average
18.	Workshop Technology and Farm Structures	7.3	Weak	38.7	Average
19.	Crop Pests	2.5	Weak	90.4	Good