

CARIBBEAN EXAMINATIONS COUNCIL

**REPORT ON CANDIDATES' WORK IN THE
SECONDARY EDUCATION CERTIFICATE EXAMINATION
JUNE 2004**

**AGRICULTURAL SCIENCE
(SINGLE AWARD)**

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**AGRICULTURAL SCIENCE
(SINGLE AWARD)
GENERAL PROFICIENCY EXAMINATIONS
JUNE 2004**

GENERAL COMMENTS

The Caribbean Examinations Council offered Agricultural Science (Single Award) General Proficiency Examination for the twelfth year in 2004. The rationale for this offering in the area of agriculture is to make agricultural education available to a larger group of the secondary school population than is presently catered for by the Double Award. This increased exposure is desirable for improving attitudes to agriculture, promoting agriculture as a business, encouraging larger numbers of school leavers to enter fields related to agricultural endeavours, and for sustainability in selected agricultural commodities in the CARICOM region.

The examination is conducted with the assumption that there is compulsory exposure to the subject during the first three years of secondary education and a careful and systematic study of the requirements of the syllabus during the fourth and fifth years.

The 2004 examination was designed to provide a comprehensive test of candidates' knowledge and skills in all dimensions of the syllabus.

Specifically, the examination intended to test candidates'

- (a) knowledge and understanding of the content of the syllabus
- (b) grasp of fundamentals of Agricultural Science
- (c) ability to make precise links between Agricultural Science theory and practice
- (d) ability to perform a selected range of general agricultural skills from the core and the chosen option
- (e) ability to communicate knowledge and understanding in the approach to answering the questions and solving problems.

Candidates can choose from two options: Option A - Crops and Soils (C&S), Option B - Animal Science (AS). Candidates choose an option at the beginning of the first year and complete the SBA component for that option during the two years. They are examined on the core of the syllabus and write an essay paper based on the previously chosen option.

This year, 4 590 candidates were entered for the examination. Two thousand five hundred and twenty-five candidates chose the Crops and Soils Option, and 2 065 candidates opted for Animal Science.

The Examining Committee is satisfied that the objectives of the examination were satisfactorily met and that the results reflect a valid discrimination among candidates, on the basis of their abilities to deal with the content of the syllabus.

Form of the Examination

The examination comprised three written papers as described briefly below and a School Based Assessment (SBA) component.

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| (a) Paper 01 | Sixty Multiple Choice items under the Knowledge and Comprehension Profile dimension and based on objectives on the core of the syllabus. |
| (b) Paper 02 | Ten compulsory structured questions based on the objectives in the core of the syllabus under the two profile dimensions – Knowledge and Comprehension and Use of Knowledge. |
| (c) Paper 03 | Four essay-type questions set on each option: candidates were required to answer three questions from the option chosen. These were also tested under the Knowledge and Comprehension and Use of Knowledge profiles. |
| (d) School Based Assessment | Candidates were assessed on a number of skill objectives, preparation of a Farm Diary and compilation of Farm Records. |

SPECIFIC COMMENTS

PAPER 01

This paper consisted of 60 multiple-choice items distributed over the five units in the core of the syllabus.

Candidates opting for the Animal Science Option performed better than the candidates opting for Crops and Soils Option, mainly through a superior performance in Unit 5, Introduction to Animal Science. Candidates performed best in the Introduction to Crops and Soils Option, and poorly in the Agricultural Mechanization Unit.

Over 80 per cent of the candidates of both options had correct responses to 18 per cent of the items. These items were spread across all five units. Candidates seemed to be comfortable with the role and function of regional agricultural institutions, farm budgeting and marketing concepts. Questions on erosion, the identification of NPK fertilizers and weed control were adequately answered. In the Animal Science Unit, most candidates understood the theory involved in the slaughtering of broilers and debeaking young chicks.

In both options, the majority of candidates had difficulties with items relating to the tools used for cleaning a knapsack sprayer, signs of potassium deficiency in plants and the misuse of antibiotics in animal feeds. Less than 40 per cent of candidates gave correct responses to those items.

Overall, the performance in this paper could be considered very good.

PAPER 02

Question 1

This question required candidates to identify major constraints to agricultural development in the Caribbean, and discuss the main features of commercial and mixed farming.

Most candidates correctly identified major constraints to agricultural development. A few, however, gave minor local problems, and others misunderstood the question and listed international institutions rather than constraints as requested. In Part (b), many candidates correctly identified products and practices of large scale farming. In the case of mixed farming, however, many candidates confused mixed farming with mixed cropping and gave very good responses for mixed cropping. Few distinguished between the two and gave the correct response.

Question 2

This question tested the candidates' knowledge of the major marketing information one needs to obtain before embarking on a vegetable enterprise. In Part (b) of the question, candidates' knowledge of the 'Law of Supply and Demand' was tested when examining the yield and price of a farmer's tomato crop over a three year period.

Many candidates correctly identified at least three areas of information. Some candidates incorrectly listed strategies for selling produce, for example, sell to wholesalers or supermarkets at a higher price, or agronomic practices involved in the growing of vegetables. In Part (b), it was evident that many candidates understood the concept of supply and demand, and could apply it successfully.

Question 3

This question required candidates to identify the two main types of costs associated with budgeting on a farm, and to give an example of each. They were then required to explain how farm income is calculated, and to calculate net farm income from a given example.

Most candidates correctly named fixed and variable costs as the two types of costs associated with the farm, and gave correct examples. Some, however, gave examples as the types of costs, and types of costs as examples. Others incorrectly gave definitions for both types of costs and examples.

With respect to the concept, net farm income, candidates generally had difficulty theoretically explaining how it is calculated. However, most provided the correct answer to the calculation.

Question 4

The objective of this question was to assess candidates' knowledge of farm machinery and equipment through testing their competence in selecting appropriate implements for specific farming activities. They were then required to explain the uses and importance of farm machinery for specific operations.

This question was fairly well done. Of the four farming activities for which candidates were required to choose the most appropriate piece of equipment, most candidates correctly chose at least two. Many candidates selected the cutlass for planting seeds, and although this may be true on small farms, candidates should be made aware of the use of seeders on commercial farms. Candidates also were not familiar with the plough and rotavator being used in primary and secondary tillage, respectively. The second part of the question was not well done, as candidates limited themselves to the tools and implements named in the examples, and thus were restricted in their responses.

Question 5

This question tested candidates' knowledge of vegetables that are sown directly in the field, and the major requirements necessary for the germination of vegetables. Candidates were also required to use their knowledge of vegetable production to solve a problem in the germination of vegetables.

Most of the candidates correctly identified the crops and the requirements for germination. A few, however listed incorrect requirements, for example, manure, soil nutrients, shade and rainfall. Part (c) tested candidates' knowledge of the problems associated with broadcasting certain vegetable seeds that are normally planted in nurseries. Responses were fair, as numerous candidates could not deduce that when seeds are broadcasted there would be competition for nutrients, water, light and root space. These candidates concentrated on a lack of cultural practices as the major deterrent for poor growth and survival.

Question 6

Candidates' knowledge of soil properties and their understanding of soil management practices were required in this question. In Part (a) candidates were asked to name a soil type from its description and list two properties of the named soil. In Part (b) candidates were asked to discuss farming practices when growing crops on soil with the properties listed in Part (a).

Most candidates knew the soil type, and knew its properties. Some candidates did not give the correct name of the soil, but knew the properties. In Part (b), almost all of the candidates knew the farming practices to adopt when cultivating on a clay soil. The most popular responses were the need for adequate drainage, addition of pen manure and an appropriate irrigation system.

Question 7

This question tested candidates' knowledge of the different methods of weed control. In the second part, they were required to explain the adverse effects of exceeding recommended levels of insecticide.

Both parts of the question were well done, with candidates familiar with the methods of weed control, and it was heartening to see many of them listing biological control methods. A few were completely incorrect, listing the use of insecticides and fungicides as methods of weed control. In Part (b), most candidates correctly stated and explained the adverse effects of exceeding the recommended levels of insecticide. Encouraging responses included insects developing immunity, accumulation of residue on the crop, destruction of the environment/ecosystem and injury/adverse effect to the farmer/consumer/animals. Some candidates were not too clear on the distinction between insecticide, weedicide and fungicide and used them interchangeably in both sections of the question.

Question 8

This question tested candidates' knowledge of the links between agriculture and forestry. Candidates were asked to state the detrimental effects of indiscriminately clearing forested land, and to explain the functions of the forest in soil and water conservation.

Candidates' responses were very good, suggesting that both teachers and students are cognizant of this topical subject. Positive responses to Part (a) included destruction of the habitat for wild animals, pollution, exposure to wind and water erosion and destruction of useful soil organisms. In Part (b), candidates also showed an appreciation of the topic, with responses including providing cover thereby reducing the likelihood of erosion, improving the organic matter content of the soil, and reducing water loss through evaporation.

Question 9

Candidates were given a list of various classes of animals, and were required to identify different breeds of livestock commonly reared in the Caribbean. In Part (b), they were asked to identify suitable dairy breeds to be used in a cross-breeding programme in the Caribbean, and to discuss the benefits of cross-breeding.

The response was good as most candidates were able to correctly identify at least two breeds. However, there was slight confusion between the identification of goat and sheep breeds, with many candidates listing the Barbados Black Belly, which is the most identifiable breed of sheep in the Caribbean, as a goat. Candidates had problems with Part (b), as a number of them named beef breeds, and a few listed other species of livestock as cattle. Finally, many candidates provided responses that showed strong linkages between life sciences and agriculture, using terms like heterosis, heterozygous and pedigree; however, they were completely out of context.

Question 10

This question tested the candidates' knowledge of the care and management of broilers. Candidates were first required to list practices, and then to describe, with reasons, one of the practices named.

The responses in Part (a) were very good, as many candidates knew most practices involved in broiler rearing, probably from practical experience. Part (b) proved to be more difficult, as some candidates repeated practices, whereas others defined the terms, for example, many candidates defined debeaking without giving reasons for debeaking, and others stated how to spread litter rather than why litter was used.

PAPER 03

OPTION A - Crops and Soils

Question 1

In Part (a) of this question, candidates were asked to list four methods which may be used in the vegetative propagation of crops, and to list three advantages of propagating plants by using these methods. The second part tested candidates' appreciation of problems associated with the management of disease resistant varieties of corn that can lead to low yields. Candidates were also asked to state reasons why a farmer would choose to sell corn to a local market rather than a foreign market.

Generally, the question was not well answered. In Part (a), almost all candidates listed at least two correct methods. However, many of them incorrectly named bulbs, corms and rhizomes as methods. Many candidates were also confused about benefits, some even stating that higher yields are a result of having more than one fruit on the same tree. Generally Part (b) was well answered, as many candidates recognised the need for an adequate fertilizer regime and soil fertility for a high yield. Some, however, incorrectly listed praedial larceny, climatic conditions and bad land preparation as reasons.

Question 2

In this question candidates were presented with an incomplete table listing four crops, and they were required to complete the table by naming the botanical part of the crop harvested, and the type of planting material used. They were also asked to list three harvesting or post harvesting activities that must be followed for two of the crops. In the second part of the question, they were required to discuss three methods to control weeds in rice or sugar cane, and precautions necessary for the safe use and storage of weedicides/herbicides.

The question was well answered. Many candidates were able to correctly identify the parts harvested, and planting material used. Candidates, however, responded poorly to harvesting/post-harvesting activities, many of them discussing management practices associated with the growth of the crop, for example, fertilizing and irrigating techniques.

The second part of the question was well answered, as candidates were familiar with weed control measures, and it was gratifying to see that most candidates fully understood the environmental concerns when disposing of agricultural chemicals.

Question 3

The ways in which water is lost from the soil, and measures to conserve moisture were the main focus of Part (a) of this question. In Part (b) candidates were asked to advise on benefits of using water conservation practices on a vegetable farm.

The question was reasonably well done with a mean of 52 per cent. Part (a) was reasonably well done, as many candidates were able to correctly identify ways in which water is lost from the soil. Candidates included answers such as drainage and uptake by plants. Responses to Part (b) were disappointing, especially after the promising answers in Part (a). It was assumed that the concept of water conservation was well understood, but only a few candidates ably responded by applying the concept to a specific situation in this section.

Question 4

Candidates were required to list common pests and diseases of the crops presented, and to state the time to maturity of those crops. In Part (b), candidates were required to discuss the establishment, management, harvesting and post harvesting practices when cultivating banana/plantain. Finally, two symptoms of nematode infestation of banana/plantain were to be described.

The question was not well answered by the candidates. Part (a) was poorly done as only a few candidates were able to identify the pests and diseases of the crops presented. Very few candidates knew the time to maturity of the crops, cocoa and maize/corn. In Part (b), some candidates exhibited extensive practical and theoretical knowledge of banana/plantain production. However, many candidates were not aware of the procedures involved in the establishment/management of the crops and had even more difficulty when discussing harvesting/post-harvesting techniques. Many candidates were aware of symptoms of nematode infestation, but a few incorrectly discussed normal senescence as a symptom of nematode infestation.

OPTION B - Animal Science

Question 1

The general objectives of this question were to test candidates' knowledge of the signs of heat in cattle and to identify major diseases in different breeds of animals and list control measures. Candidates were then required to discuss advantages and disadvantages of artificial insemination in farm animals, and the steps to follow in the castration of pigs.

Candidate performance on this question was very good. Part (a), which dealt with the signs of heat in cattle, was very well done by most candidates. The range of responses indicated that the topic was taught extensively in Caribbean schools. A few candidates were not clear about specific signs of heat in cattle, and confused them with signs of heat in other farm animals with which they were familiar, for example, pigs or rabbits. Part (b) was poorly done, as candidates were not familiar with major diseases and their control measures in the following farm animals: sheep, poultry, cattle and pigs. Many candidates listed the same diseases with different control measures for all classes, or the same control measures with different diseases. Additionally, candidates' competence in the spelling of agricultural terms was poor. Some terms that were consistently spelt incorrectly were scours, pox, brucellosis and Mareks. In Part (c), candidates were familiar with the artificial insemination process in farm animals, and gave practical examples of advantages and disadvantages. In Part (d), the steps in the castration of pigs were adequately listed, with candidates describing castration of young animals, and adult animals, and both surgical and non-surgical methods.

Question 2

Candidates were required in this question to name raw materials used in the formulation of rations for livestock, and list three broad groups of nutrients that should be included in livestock rations. The second part of the question needed candidates to name and describe three types of grazing systems.

Candidate performance on this question was poor. In the first part of the question, candidates had problems grasping the concepts of grazing systems, raw materials, nutrient groups and balanced ration. This part of the question proved to be very difficult for most candidates. In Parts (c) and (d) of the question, many candidates correctly identified two grazing systems. Most, however, had incorrect responses for the third system including answers such as overgrazing, semi-intensive grazing, and extensive grazing.

Question 3

The general objectives of this question were to test candidates' knowledge and competence of the practice of aquaculture, the uses and importance of quarantine with respect to the importation of animals and the guiding principles with respect to the housing of sheep.

This question was very well done. Many candidates correctly defined aquaculture, and listed the management practices required. A few, however, listed management practices applicable to all classes of livestock, and not specific to aquaculture. In Parts (c) and (d), many candidates were able to discuss the importance of quarantine

measures. Some did not understand the concept of quarantine, incorrectly stating that quarantine was used to treat animals or to acclimatize animals being imported. Additionally some candidates were not able to differentiate between quarantine as used at points of entry to a country, and quarantine as a means of isolating sick animals from the rest of the herd. In Part (d), candidates knew the requirements for building pens for sheep.

Question 4

This was an applied question that required candidates to first name the class of livestock that graze the two types of forages provided in a diagram. They were then asked to name the family of plants to which each forage belongs and give one example of each. In Part (b) candidates were expected to explain suitable management practices in the care and management of an orphaned calf.

Candidate performance was very good. Most candidates were able to correctly identify the class of livestock; in addition candidates displayed a wide knowledge of forage/fodder plants grown in the Caribbean, with some of them supplying correctly spelt botanical names. A few, however, had problems with the concepts, class of livestock and family of plants, giving common names of animals, and terms such as monocotyledons and dicotyledons were used.

Part (b) of this question, which required candidates to explain management practices in the care and management of orphaned calves, was very well done. The responses provided suggested that the topic was widely taught in schools across the Caribbean, and that most learners generally understood the concepts. Many responses also showed a good understanding of the practical principles involved, suggesting that students were exposed to the topic either through practical work or field trips.

SCHOOL-BASED ASSESSMENT

The School-Based Assessment for Agricultural Science, (SA) is worth twenty-five per cent of the total marks for the subject. The candidates' performance is assessed on the basis of practical skills assessed at their school/centre and presentation of practical notebooks that should contain a continuous record of the candidates' day-to-day practical activities and samples of at least six farm records. The records should reflect economic analysis of data generated from the day-to-day activities or other relevant data, production records, predictive or decision-making records.

This year 2004, CXC relied on the original marking of the teachers in the schools, and on SBA moderators. The latter did the practical assessment in the field, and remarked a stratified sample of the candidates' Farm Records and Practical Notebooks. The moderated results were submitted directly to CXC by a specified date.

Books from selected schools in selected territories where there were new moderators were examined by CXC's examiners and remarked. There were differences between the marks of Teachers and Moderators, and those of CXC's markers signifying that Moderators need training to bring them up to the standard expected by CXC.

The performance of candidates in this component of the examination could be considered very good.

RECOMMENDATIONS TO TEACHERS

Based on its assessment of the candidates' performance during the 2004 Examination, the Examining Committee wishes to make the following recommendations to teachers preparing candidates for future examinations.

General Recommendations

1. In preparing students for the examination, teachers should ensure that the **range of topics** outlined in the syllabus is dealt with adequately.
2. Teachers should constantly seek to provide opportunities for exposing students to practical exercises and demonstrations to enhance their abilities to make appropriate links between theory and practical agriculture.
3. Teachers should venture outside the standard text-books, and relate examples cited with everyday situations to assist in forging the links referred to in (2) above, especially with regard to new objectives in the syllabus.
4. Teachers should encourage students to **read questions carefully and follow all directions** before answering them, and to try to be direct in their answers.
5. Teachers should encourage students to be observant on field trips and take notes. Post-mortems should also be held after a field trip, and misconceptions cleared up immediately.
6. Teachers should encourage personnel from Regional and International Agricultural Organizations/Agencies to visit their schools and interact with their students to broaden their horizons.
7. Teachers should grasp the opportunity to obtain as many free agricultural publications as possible from both local and international institutions for use in the classroom.
8. Teachers are reminded of the new additions to the syllabus, and should expose students through mechanisms mentioned above, for example, Global Warming, Gender Issues, Biodiversity.

Specific Recommendations

1. Teachers should concentrate on teaching the objectives as outlined in the syllabus. There is, however, the need to amplify the content around objectives to avoid limiting students' knowledge and understanding of essential content.
2. Efforts should be made to improve the communication skills of students. Candidates' performance was limited in many cases by their inability to adequately express themselves.
3. Ample opportunities must be afforded students to practise answering essay-type questions, to provide them with the opportunity for problem-solving, to enhance their skills of expression and to make use of knowledge to adequately interpret data.
4. Teachers are encouraged to teach students widely accepted technical terms, and not rely solely on terms of local origin. The use of agricultural rather than colloquial terms needs to be addressed, and more attention should be paid to the correct spelling of these terms.
5. It is recommended that workshops be held for new moderators so that moderation would be standardized throughout the region.
6. Teachers are encouraged to follow the guidelines as outlined in the syllabus, page 32, with respect to students' preparation of farm records. These **MUST show evidence of: single entry accounting, budgeting exercises, production projects and records for use in making predictions and decisions.**