CARIBBEAN EXAMINATIONS COUNCIL

REPORT ON CANDIDATES' WORK IN THE SECONDARY EDUCATION CERTIFICATE EXAMINATION

MAY/JUNE 2008

AGRICULTURAL SCIENCE
SINGLE AWARD AND DOUBLE AWARD

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GENERAL PROFICIENCY EXAMINATION

JUNE 2008

The Structure of the Examination

The Agricultural Science syllabuses, Single Award and Double Award, were revised effective for examination from June 2008. The extensive revision led to the re-organization of the content as follows (for both Single and Double Award):

A – The Business of Farming
B – Crop Production
C – Animal Production

The Double Award syllabus includes two additional units of work:

D – Horticulture
E – Animal Husbandry

The emphasis of the revised syllabuses is on the business of agriculture. Hence, for the Single Awards, the Options (Crop Science and Animal Science) have been removed. Students are expected to acquire competencies in both crop and animal production, and to apply the concepts learnt in A (the Business of Farming) to the practical business of crop and animal production.

The examination consisted of two external papers for Single Award. Paper 01 consisted of 60 Multiple Choice items, 20 each from A, B and C of the syllabus. These content units are also the Profile for the Agricultural Science syllabus. Paper 02 consisted of six structured questions, two from each Profile, and three essay questions, one from each Profile. The structured questions were worth four marks each, and the essay questions were worth 12 marks each. All questions were compulsory.

Paper 03 was the School-Based Assessment worth 80 marks. This consisted of two cost analyses, one each on Crop Production and Animal Production, and ten practical skills based on field work.

The contribution of these papers to the overall examination was as follows:

Paper 01 – 30 %
Paper 02 – 30 %
Paper 03 – 40 %

The Double Award consisted of Paper 01 and Paper 02, common papers for the Double Award and Single Award, and Paper 03, an essay paper based on Section D and E of the syllabus. Paper 03 consisted of two essay questions on D and two essay questions on E. each worth 15 marks. All questions were compulsory. Paper 04 was the School-Based Assessments worth 120 marks. It consisted of three cost analysis, ten practical skills and a research project.

The contribution of these papers to the overall Double Award examination was as follows:

Paper 01 – 20%
Paper 02 – 20%
Paper 03 – 20%
Paper 04 – 40%

GENERAL COMMENTS

A total of 7,630 candidates were entered for the examination, 6,006 for Single Award, and 1,624 for Double Award.

Candidate overall performance was good. Approximately 84% of the candidates achieved acceptable grades, Grade I to III for Single Award, and 84% for Double Award. Performance on Paper 01 declined slightly for the Single Award, and improved slightly for the Double Award. Performance on Paper 02 for the Single Award was modest. Performance on Paper 02 for the Double Award was better than for the Single Award. The Double Award candidates also had acceptable performance on Paper 03, the essay paper.

DETAILED COMMENTS

PAPER 01 – Multiple Choice

This paper consisted of 60 Multiple Choice items distributed over the three units in the core of the syllabus as follows:

Business of Agriculture	20
Crops and Soils	20
Animals Science	20

Table 1 shows the number of questions per unit, the difficulty index, mean and standard deviation (SD) for candidates for the Single and Double Awards.

Performance of Candidates in the Multiple Choice Paper by Units

UNITS	Number of Question	Difficulty Index	
		Single Award	Double Award
Business of Agriculture	20	.64	.65
Crops and Soils	20	.62	.64
Animal Science	20	.52	.55
TOTAL	**60**	**.52**	**.55**
OTHER PARAMETERS – Paper 01			
MEAN		38.24	40.18
STD. DEV		8.39	8.71
MEAN %		63.73	66.97
MODE		43	44
RANGE		10-57	8-58

The Single Award candidates experienced difficulties with the following topics:

- The role of Extension Services in agriculture
- Record keeping
- Interest as the cost of using money borrowed from a bank
- Rotavating as the final operation is seed bed preparation
- Soil amendment required for soil of pH 5.0
- Genetic cross
- Orientation of a poultry pen

The Double Award candidates experienced difficulties with the following topics:

- The role of Extension Services in agriculture
- Record keeping
- Interest as the cost of using money borrowed from a bank
- Rotavating as the final operation in seed bed preparation

PAPER 02 – Structured Essay Questions

Section A consists of six questions, each worth four marks.

Question 1

	Mean	Mode	s.d.
Single Award	1.17	1	1.01
Double Award	1.50	1	1.12

This question tested candidates' knowledge on concepts specific to food safety. This topic was being tested for the first time since it is new to the syllabus. However, increased emphasis on food safety internationally makes the topic very relevant.

Generally, the responses were poor with a great number of candidates failing to attempt various parts of the question.

Part (a) (i) tested candidates' familiarity with the concept 'HACCP', Hazard Analysis Critical Control Point. The responses were generally poor.

Part (a) (ii) required candidates to identify and list benefits of HACCP to agriculture. Despite the general unfamiliarity with the concept, many candidates correctly stated one benefit. It is recognized that some of the benefits of HACCP to agriculture overlap with recommended practices in export agriculture. Many candidates were able to draw on the previous knowledge.

Part (b) required candidates to advise on principles of HACCP a farmer can adopt to get his/her produce to acceptable export standards. Generally, the responses to this part of the question were poor and many candidates did not attempt this question altogether. Candidates should have written: a hazard analysis, determine critical points, establish control limits, monitoring procedures, connective actions, verification procedures.

Question 2

	Mean	Mode	s.d.
Single Award	1.55	1	1.12
Double Award	1.85	2	1.12

This was an agricultural economics question that tested:

- candidates' knowledge of the factors of production
- candidates' knowledge of the concept 'capital'
- candidates' ability to use their knowledge of the previously mentioned concept and apply that knowledge to solve problems of profitability on a farm.

Parts (a) and (b) required candidates to state a factor of production and to name one type of capital. Generally, the responses to these parts of the question were excellent. One observation of note, however, is that quite a few candidates incorrectly stated 'marketing' as a factor of production.

Part (c) of the question required candidates to use their knowledge and understanding of the concept 'capital' and explain how that capital can be used to improve farm profitability. The responses to this part of the question generally lacked depth. Many candidates simply listed uses of capital such as purchase of inputs, rather than explain that by expanding the farm, total output will be increased at lower unit cost, thereby improving profitability.

The concept 'economies of scale' which was expected to serve as a stimulus to lead candidates to the correct responses, apparently was not a familiar concept.

Question 3

	Mean	Mode	s.d.
Single Award	0.87	0	0.87
Double Award	0.99	1	0.92

Part (a) of this question tested candidates' knowledge of the inorganic composition of a typical soil. Candidates were required to:

- name the smallest inorganic component of soil and
- name one other inorganic component of soil.

The responses to this part of the question were mixed, in that while candidates were generally unable to correctly name the smallest inorganic component of soil, most candidates correctly named one other inorganic of soil.

Part (b) presented candidates with a two-column table with information on the composition of a typical sample of soil. The percentage composition was given in the left-hand column with the corresponding particle size in millimeters in the right-hand column. Candidates were required to study the information provided in the table and then:

- name the soil type, and
- suggest one method of managing the soil to improve productivity.

Many candidates were unable to name the soil type showing unfamiliarity with particle sizes in soils. Most candidates correctly named one method of managing the soil. However, many candidates were unable to discuss an acceptable reason for using the method to improve productivity of the soil. When assessed as a complete question the responses were considered to be barely satisfactory.

Question 4

	Mean	Mode	s.d.
Single Award	1.26	1	1.09
Double Award	1.42	1	1.17

Part (a) of the question presented candidates with a diagram showing the cross-section of the stem of a monocotyledon. Two structures on the diagram were labeled, A and B and candidates were required to identify and name the labelled structures. The responses to this part of the question were generally good.

Part (b) presented two scenarios. Scenario one dealt with the importance of sunlight to the process of photosynthesis in plants. Scenario two related to the simple test for starch in plants. Candidates were required to read, internalize and interpret the information provided in each scenario and then answer two questions. The first question asked candidates to provide a reason for placing the plant in a dark cupboard. The responses to this part of the question were generally good. The second question required candidates to state the expected results of the test for starch on the leaves. This question required candidates to apply their knowledge and understanding of the starch test to answer a question related to a specific circumstance. The responses to this part of the question were generally poor.

Question 5

	Mean	Mode	s.d.
Single Award	1.99	2	1.11
Double Award	2.37	2	1.12

This question was specific to the egg, requiring candidates to:

- name one component of the egg
- state the function of the named component, and
- explain the effect of any named shell defect on the shelf life of eggs.

The responses to this question were generally good. It was quite evident from the quality of responses that not only was the topic fully explored in classrooms across the region, but students generally grasped the concepts and had a sufficient functional understanding of most related material.

In Part (a), almost all candidates correctly named one component of the egg. However, quite a number of candidates struggled to provide a correct function of the named component.

The responses to Part (b) of the question, shell defects, were generally good.

Question 6

	Mean	Mode	s.d.
Single Award	2.67	3	1.15
Double Award	3.07	4	1.04

This question was directly related to aquaculture in the Caribbean. It was a three-part question with Part (a) (i) and (ii) being recall type question and Part (b) testing application of knowledge to a particular farm situation.

Part (a) (i) required candidates to name one species of freshwater fish reared in the Caribbean. The accuracy of the responses to this question was generally mixed. Many candidates correctly named a freshwater species. However, many other candidates confused freshwater species with salt water species, thereby providing incorrect responses.

Part (a) (ii) required candidates to name one method used to harvest fish in aquaculture. Generally candidates provided correct responses.

Part (b) provided a scenario explaining how the water from the pond of an aquaculture unit was drying up and fish yields were negatively impacted. Candidates were required to apply their

understanding of water supply to an aquaculture unit to advise that farmer on steps to correct the problem. The responses to this part of the question were generally good.

Question 7

	Mean	Mode	s.d.
Single Award	4.79	6	2.95
Double Award	6.09	7	2.99

Part (a) of the question required candidates to define and explain the following concepts; 'gross farm income', 'gross margin' and 'net profit'. Most candidates achieved the majority of marks allotted in this part of the question. However, it should be noted that most definitions and/or explanations lacked accuracy. For example, many candidates defined 'income', instead of 'gross farm income' and 'profit' instead of 'net profit'. Of the three concepts tested, candidates generally had difficulty defining 'gross margin'. Many candidates also did not convey an understanding that the terms 'gross' and 'total' are synonyms and this fact impacted the accuracy of definitions. Gross margin = gross income – variable cost.

In Part (b) candidates were provided a two-column table. The left-hand column listed some farm activities, input items and items of expenditure while the right-hand column listed each corresponding cash value. In Part (i) of the question, candidates were required to categorize each items listed on the table under the correct headings: 'fixed cost', 'variable costs', 'farm income'. The responses to this part of the question were generally excellent. However, a very common mistake saw candidates categorizing 'Farm Managers' 'salary' as 'farm income' rather than a cost to the farm business.
In Part (ii), candidates were required to use the information provided in the table to calculate gross farm income and net farm income. The responses to this part of the question were generally poor. The mistakes alluded to earlier were responsible for the incorrect responses in this part. However a very worrying reality was the prevalence of very simple mistakes in computation.

Question 8

	Mean	Mode	s.d.
Single Award	2.97	1	2.44
Double Award	3.67	3	2.76

This question required candidates to do the following:

- explain the concepts 'mixed farming' and 'mixed cropping'
- list some advantages of monoculture
- provide reasons to support intercropping papaya with pumpkin
- discuss methods of organic farming making specific reference to its contribution to soil fertility.

When considered as a complete question the responses were barely satisfactory. Some important general observations were:

1. Candidates entered for the Double Award generally performed better than candidates entered for the Single Award.

2. Candidates showing a propensity to express themselves scored better that candidates with a low propensity for good expression.

3. Candidates who scored poorly generally lacked the knowledge to correctly treat with the specific demands of the question.

Comments specific to candidates' responses were:

In Part (a), the weaker candidates were unable to correctly define mixed farming. Some common incorrect responses were:

- rearing a variety of animals
- planting a variety of crops
- mixing a variety of soil
- different farmers utilizing the same farm.

In Part (b) of the question, many candidates listed advantages and not disadvantages. This indicated that candidates did not read the question properly. Many candidates also listed one disadvantage instead of two, this again suggested that candidates did not read the question properly or in this specific case were just unable to list two disadvantages.

The responses to Part (c) of this question were generally poor. Most candidates indicated that papaya and pumpkin belong to the same family, and one crop adds nutrients which the other crop will take up. Such responses were indicative of a lack of understanding of the agronomy of the crop, a deficiency that seemed to be endemic to the region.

The responses to Part (d) of the question were mixed. Many candidates provided responses that were correct. However, many candidates provided incorrect responses. Additionally, rather than answer the question asked, many incorrect respondents discussed benefits of organic farming.

Question 9

	Mean	Mode	s.d.
Single Award	5.73	6	2.75
Double Award	6.50	8	2.68

Part (a) required candidates to provide a reason for using litter in broiler production and to name two materials suitable for use as litter material in poultry pens. The responses to this part of the question were generally good and they covered the range of responses listed in the mark scheme.

In Part (b), candidates were presented a situation in which chick in a broiler unit showed signs of listlessness and their faeces contained streaks of blood. Candidates were required to conduct a situational analysis to determine the following:

- a name of the disease affecting the chicks
- one other symptom of the named disease
- treatment for the disease
- measures to be taken to avoid a reoccurrence of the disease.

A general evaluation of the responses to this part of the question revealed;

1. Most candidates were unable to name the disease although they were given the symptoms of the disease in the situation described; candidates were also unable to name one other symptom of the disease.

2. Most candidates were unable to correctly explain a method of treating the chicks to overcome the disease.

3. Most candidates correctly suggested at least one measure that can be used to avoid a reoccurrence of the disease, many correctly suggested at least two measures, while only a few correctly suggested three measures.

Part (c) of the question was specific to rabbits. A situation was presented in which the eventual end was the death of rabbits. Candidates were expected to explain a possible cause of death. The responses to this part of the question were generally very poor. Candidates seem to be confused by/did not understand that situation described in the question.

PAPER 03 – Essay Type Questions (Double Awards Only)

General Comments

This Paper consisted of four essay type questions, two from Section D – Horticulture, and two from Section E – Animal Husbandry.

Question 1

	Mean	Mode	s.d.
Horticulture	5.06	4	2.86

This question was divided into two parts. Part (a) tested candidates' knowledge of growing citrus and orchard cultivation. Specifically the question demanded candidates to:

- name the method of propagating citrus
- name one method of applying fertilizer to citrus trees being grown in an orchard
- identify and name the causative organism of Tristeza disease, which affects citrus
- briefly explain how the Tristeza disease is spread from tree to tree
- name one symptom of Tristeza disease.

Part (b) was related to the golden apple plant. The question tested candidates' ability to compare and contrast, evaluate and explain, and discuss. Specifically the question demanded candidates to:

- compare the miniature golden tree to the traditional tree
- discuss the benefits of using the miniature golden apple for commercial production.

Generally, overall performance in the question was poor. In Part (a) (i), the responses were generally mixed, while quite a few candidates correctly stated budding as the method by which citrus is propagated, just as many candidates incorrectly stated grafting. This suggested that while candidates were acquainted with the processes 'budding' and 'grafting', they were uncertain with respect to which plants are budded and which are grafted.

Part (a) (ii) was the best answered part of this question. Most candidates correctly named an appropriate method of applying fertilizer to citrus trees.

The responses to Part (a) (iii) and (iv) were generally very poor. Some common incorrect responses to Part (iii) were organisms, bees, slugs, nematodes and fungus. Some common incorrect responses to Part (iv) were wind, vectors, animals and trees planted too close. Generally, candidates did not know that the organism which causes Tristeza disease is a virus and that the virus is carried by the citrus aphid which spread disease from tree to tree.

The responses to Part (b) of the question were extremely poor generally. Many candidates were not acquainted with the golden apple tree and the use of neither the scientific nor the common name in the question was helpful to candidates. Candidates were also not acquainted with some terms used in the question, particularly 'determinate type' and 'indeterminate type'.

Question 2

	Mean	Mode	s.d.
Horticulture	7.16	8	3.01

This question was specific to grasses. However, there was a shift in the specific content tested. Usually a question on grasses tests grass species used as forage. However, this question tested species used for lawn, a very encouraging development since the ago-tourism linkage is introduced at the CSEC level.

The specific content tested by this question was:

- characteristics of grasses suitable to establishing lawns
- lawn grass species adaptable to the dry and wet conditions of the Caribbean
- quality characteristics of a good lawn grass
- problems specific to lawn grass management and suggestions for correcting such problems.

Part (a) (i) of the question asked candidates to list three desirable characteristics of grasses one should consider when establishing a lawn. The responses were generally weak. Candidates were uncomfortable with the concept 'characteristics of grasses' and rather provided responses which spoke to conditions necessary for growth of the grass. Some very popular incorrect responses included:

- leaves must be green and beautiful
- leaves must not be dry, and
- grass must be pleasant to look at.

Candidates' responses should have included: easy to propagate, easy to establish, ability to withstand mowing, tolerant to climate conditions, tolerant to pests and diseases, low compact growth habit, fine leaf texture.

The responses to Part (a) (ii) were extremely poor generally. Candidates seemed not acquainted with grass species used for lawn development and as such most named species used for forage/pasture development. Some very popular incorrect responses therefore include Para grass, Bamboo grass, Tanner grass and Nut grass, rather than correct responses like Savannah grass and Bermuda grass.

Part (b) provided candidates with a drawing of an unhealthy lawn. Candidates were required to study the drawing and:

- identify and name two problems with the lawn, and
- suggest two possible causes of each named problem and explain how each problem can be corrected.

Generally the responses to Part (b) were good. The drawing was very clear and most candidates correctly named two problems of the lawn as seen on the drawing. Candidates also used their knowledge of management of grass species for pasture and provided correct responses to this question.

Overall, the responses were satisfactory with quite a majority of candidates scoring fifty percent or more of the marks allocated for this question.

Question 3

	Mean	Mode	s.d.
Horticulture	6.01	4	2.86

The focus of this question was the dairy industry and the dairy cow. Part (a) simply asked candidates to explain why is milk a perishable product. The responses to this question were generally poor. Quite surprisingly most candidates were not familiar with the concept 'perishability' and actually interpreted the question as asking them to describe the nutritional qualities of milk. Some very common incorrect responses, therefore, included:

- milk is rich in proteins and calcium
- milk is necessary for the development of strong bones and teeth, and
- milk is good for human consumption,

A good response should have been that milk contains bacteria which multiply rapidly at room temperature and cause spoilage.

Part (a) (ii) of the question requested candidates to name two processes other than pasteurization by which milk can be preserved. The responses to this part of the question were generally excellent. Most candidates correctly named at least one process.

In Part (a) (iii), candidates were asked to describe the process of pasteurization. Many candidates described the process correctly. However, many candidates described pasteurization as a drying process rather than a heating and cooling process. Some candidates who were clearly not acquainted with the process described pasteurization as milking the cow in the pasture.

Part (b) described a situation in which while milking, the farmer observed drops of milk with streaks of blood on the floor, and the farmer's milk production was also low. Candidates were required to read the situation described, analyze it and then discuss five management practices the farmer can implement to solve the problems described.

The responses to this part of the question were generally good. Candidates understood the situation described and most discussed at least three management practices. The most popular practices discusses were:

- general sanitation (washing hands, hind quarter to the cow and udder before milking)
- use of the strip cup test for mastitis
- feed animals during milking to keep cow quiet and enhance milk letdown.

Question 4

	Mean	Mode	s.d.
Animal Husbandry	7.59	9	3.13

Part (a) of the question required students to state a recommended method of impregnating sows rather than using a boar, and to give an advantage of the method named. Part (b) dealt with upgrading a piggery through cross-breeding with a local sow and two exotic breeds. Part (c) concentrated on management practices to improve the weaning percentage of a ten sow unit, and Part (d) introduced another new section of the syllabus, the use of biogas and renewable resources.

Part (a) of the question was very well done with almost all candidates recognizing that artificial insemination was a recommended method, and a few mentioned embryo transfer. Most of them stated a correct advantage of the method used.

In Part (b), many realized that in upgrading, the female is usually the scrub or local breed and the male is the exotic or imported breed.

Part (c) was problematic for many candidates since they did not relate the stem of the question to the response. The fact that weaning weights were small, 20% of his piglets died and there was a scouring problem should have pointed to a management problem. The responses were barely adequate, for candidates who recognized the problems just stated that there were management problems without identifying any specific practice.

Part (d) was poorly done, as students have not fully grasped the environmental and reusable resources concepts. A few mentioned the conversion of the faeces to biogas, and using energy efficient devises on the farm, but some included increasing the selling price of this stock, sell stock from the farm to reduce transport cost, and using a fireside for cooking as alternatives.

RECOMMENDATIONS TO TEACHERS

Based on its assessment of the candidates' performance during the 2008 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. Teacher should venture outside the standard textbooks, and relate examples cited with everyday situation 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 relevant notes. **It is important for Teachers to conduct pre-field trip activities, to outline specific objectives, and to brief the host of the ability of the class and the reason for the field trip. Postmortems should also be held after a field trip, and misconceptions cleared up immediately.**

6. Teachers should encourage personnel form Regional and International Agricultural Organisations/Agencies to visit 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 regional (for example, CARDI) and international (for example, CTA-Spore) 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, urban and peri-unban farming, organic farming are new ares to the syllabus.

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. Continuous efforts should continue to 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 term needs to be addressed, and more attention should be paid to the correct spelling of these terms.

5. Students should also be encouraged to improve their expressive ability and language skills, as although providing correct responses at times, their expressions are poor.

6. **Teachers are encouraged to follow the guidelines as outlined in the new syllabus – page 40 – with respect to students' preparation of farm records. These MUST show evidence of: "single entry accounting", "budgeting exercises", "production project" and "records for the use in making predictions and decisions".**

7. **Candidates entered for the Double Award should be exposed to the format for the research project (new syllabus pgs. 42 and 43) as early as possible in the course so that it could be internalized by the time the project is undertaken.**