AGRICULTURE

Paper 5038/02
Coursework

Key messages

Centres need to allocate sufficient time to deliver the practical aspect of the syllabus to ensure practical and investigative skills have been taught and developed before candidates start producing their coursework.

Centres should ensure that work is original to individual candidates and that candidates are offered a wide range of exercises covering different syllabus sections and that investigation topics are equally varied.

General comments

This year almost all centres submitted coursework that was accurately marked and many were well-annotated to support the marks awarded by the centre. Most candidates produced well-presented, interesting coursework, supported with an appropriate range of practical exercises. Many candidates demonstrated excellent practical skills and used a good scientific approach when producing their investigative projects. The strongest candidates produced portfolios where they fully addressed the marking criteria and used extensive, well-annotated photographic evidence. Many candidates discussed the outcomes of their investigations and practical exercises in detail and made good use of their data and evidence, linking their outcomes to the agricultural practice and the related science theory. In the best portfolios candidates fully discussed their findings and explained them in a way which did not assume the readers of the portfolio were familiar with the subject topics.

A number of centres submitted video clips or used a range of annotated photographs, these were generally presented in a suitable way. Producing coursework in this way can greatly enhance the overall learning experience of candidates and improves the understanding of the related syllabus theory content. It can also motivate weaker candidates.

A few centres did not adhere to the marking criteria for coursework and failed to submit adequate evidence for the practical exercises, yet in some cases awarded almost full marks. The evidence offered tended to be superficial and did not provide sufficient information to support the marks awarded by the centre.

Comments on specific marking criteria

Practical Exercises

Centres appear to have carried out an appropriate range of practical exercises and most candidates demonstrated a high standard of performance in carrying out these tasks. The practical skills were also clearly seen in the candidate investigations.

Some candidates produced detailed diaries recorded throughout the course and these were supported by critical reflections incorporating annotated photographs and video clips. Many submissions included short video clips and annotated commentary or additional word documents in support of the video clips. PowerPoint presentations with critical task reflection also proved popular and were effective in allowing candidates to illustrate and explain each exercise.

Candidates who offered four simple skills should be aware that practical exercises need to have sufficient demand to access the full range of marks. Simple tasks, such as clearing ground or digging a plot, may not be suitable unless linked to the identification of problems and resolution of the problems encountered in

sufficient detail. Tasks should allow candidates to fully demonstrate their skill ability and sometimes needed to be made more demanding. Centres also need to choose exercises which make best use of their local situation.

Practical Investigation

1 The selection of relevant questions (hypothesis) for the investigation

Most candidates produced a hypothesis. However, they were often not fully developed, justified or explained. Candidates needed to relate their hypothesis to their research. The stronger candidates had collected a good range of supporting background information, used this to support the formation of their hypothesis and then used the underlying agricultural principals and related scientific knowledge. Candidates needed to fully discuss the research and reasons for arriving at their chosen hypothesis.

2 The planning of the investigation and the principles on which it is based

Planning was the weakest area in most submissions and many candidates needed to link their plan to their hypothesis more clearly. The plan needed to be clearly explained to enable the reader to replicate the investigation in a scientific way. It needed to incorporate the necessary steps required to carry out the investigation and the resources required, including the time scale needed for the investigation. Some of the strongest candidates referred to their background research and hypothesis and used this to develop a suitable plan for carrying out their investigation. Where amendments to the plan were required stronger candidates included a justification for the change.

Some candidates had been able to gain access to livestock or land to carry out their individual practical investigation which added strength to their work.

3 The handling of evidence

The data collected was often quite simple and only just sufficient to produce an appropriate analysis of the results. Meaningful data required a minimum of five results taken throughout the process. Weaker coursework simply produced a bar chat of final crop yield which was insufficient to access the full range of marks. In stronger coursework the results were recorded in detail and candidates had indicated any specific procedures which were used to make the collection of data accurate, taking care to use an appropriate and reliable sample size. Problems encountered were indicated and discussed in the conclusion.

Presentation of the data was often simplistic but stronger candidates incorporated more than one method of expressing the outcome of their investigation. In some coursework, tables and charts needed to be clearly labelled using appropriate units. Graphs needed to be annotated to ensure the reader could understand what was being shown. Stronger candidates annotated their graphs and charts to identify anomalies or relevant points of interest, e.g. environmental events beyond their control, and this allowed then to consider these areas in interpreting the data.

4 The ability to make deductions from the evidence or the data acquired

The strongest candidates fully explained the reason for their results and their conclusions related to the data and outcomes of the investigation. Candidates needed to draw conclusions and explain and discuss their results and outcomes. Many candidates saw experimental error or natural events beyond their control as spoiling or limiting their ability to draw conclusions and evaluate their results appropriately. Candidates should be encouraged to show and explain the importance of events beyond their control, and link these to the conclusions that can be drawn from such events. It is important that candidates identify and explain how errors may have occurred and how they impacted on their ability to draw a firm conclusion.

5 The ability to recognise limitations of the investigation

In this area candidates often made simplistic comments without an explanation. Many candidates failed to explain how future amendments or alterations could possibly overcome the problems which they encountered but made general statements which were not explained sufficiently to meet the marking criteria. The reasons why events were limitations and how amendments to procedures might improve the outcome should have been clearly stated.

6 Description of investigation, presentation, layout and originality (candidate's own work)

Most centres marked this section accurately and in general the investigations were well presented across the full ability range of the candidates. Candidates should be encouraged to present their work using appropriate sub-headings, and to make full use of diagrams and charts which are explained and annotated, referenced and linked to the discussion in producing deductions and conclusions.

Where some of the evidence for a practical exercise skill tasks is taken from candidates' investigations this should be clearly identifiable within the investigations and an additional sheet put into the exercise activities folder to identify any specific page numbers where this work can be found.

AGRICULTURE

Paper 5038/11
Paper 11

Key messages

Candidates should be reminded to check that they have given an answer for each question in ***Section A***.

Candidates should note the mark allocations in ***Section B*** to guide them as to how much to write for each question part.

General comments

Candidates' responses to the questions were generally very good. ***Section B*** required longer answers involving extended writing and there were many excellent accounts. These showed a high level of knowledge and a good command of English.

The paper also tested data response. Able candidates dealt effectively with these questions and almost all other candidates also attempted them. The majority of candidates responded well to questions asking them to 'suggest' and gave appropriate responses with many carefully considered answers.

There was no evidence to suggest that candidates did not have enough time to complete the paper.

In ***Section B***, the most popular choices were **Questions 10**, **12** and **14** with the remaining two questions equally popular.

Comments on specific questions

Section A

Question 1

(a) (i) This question was answered well by the majority of candidates. An issue for weak candidates was to state that the function of the screen was to prevent water entry.

(ii) This question was answered correctly by the majority of candidates.

(iii) The majority of candidates correctly identified that smaller particles would not pass through the second filter layer.

(iv) Some candidates identified the characteristics of clay without linking this to clay not allowing water to pass through.

(v) This question was well answered by the majority of candidates, who demonstrated good knowledge of the anti-bacterial action of chlorine.

(b) This question was well answered by the majority of candidates with many good explanations given.

Question 2

(a) This question was answered well by the majority of candidates, who identified both forest clearance, e.g. tree cutting, stumping and burning as well as ground preparation techniques, e.g. ploughing and harrowing.

(b) The majority of candidates correctly identified soil erosion and nutrient leaching as potential soil problems.

(c) This question was answered well by stronger candidates who were able to give a detailed and well developed explanation of their suggested methods to resolve the soil problems identified previously.

Question 3

(a) Good answers were seen from the majority of candidates and a range of possible root crop products were given. A few candidates identified non-root crops.

(b) This question was well answered by the majority of candidates. Some weaker candidates described the harvesting process rather than storage of the already harvested crop in the final row.

Question 4

(a) Most candidates answered well and identified genetics and feeding as key factors in the growth rate of sheep.

(b) Stronger candidates were able to give good explanations here. Weaker candidates tended not to describe the selection of the desired characteristics clearly.

(c) (i) This question was well answered by most candidates, many of whom stated that colostrum would provide nutrients, antibodies and passive immunity.

(ii) This question was well answered by stronger candidates. There was confusion in some responses and some vague answers were given.

Question 5

(a) (i) This question was well answered by the majority of candidates. Some very weak candidates incorrectly identified the bladder as a testicle or attempted to locate a uterus on the diagram of the male.

(ii) Almost all candidates answered this question correctly.

(b) (i) This question was well answered by almost all candidates.

(ii) This question was well answered the majority of candidates.

(c) This question was well answered by stronger candidates, many of whom correctly cited fusion and zygote formation. The strongest candidates gained full credit, most commonly by describing the formation of a diploid zygote. Few candidates described the sperm head entering the egg, the sperm losing its tail and the egg surface becoming impermeable.

(d) This question was well answered by the majority of candidates with some well described reasons for the infertility of either male or female animals given regularly.

Question 6

(a) (i) This question was well answered by stronger candidates, who correctly divided total crop yield by crop area. The strongest candidates gave the correct unit.

(ii) Stronger candidates correctly identified the farm. Fewer were able to give a supporting reason.

(b) This question was well answered by the majority of candidates. The most frequently seen responses described seed, soil, air and water methods of spreading.

Question 7

(a) This question was well answered by stronger candidates. Some weaker candidates incorrectly calculated total costs, completed a profit calculation but did not show the resulting loss as a negative value.

(b) Most candidates answered correctly identified two examples.

(c) Many candidates correctly identified vaccination, good hygiene, overall health checks and disease control as ways of reducing livestock deaths.

Question 8

(a) While stronger candidates answered well, some weaker candidates did not state the definition clearly.

(b) (i) This question was only answered well by stronger candidates. Some weaker candidates did not have a full understanding of parent and offspring genotypes, gametes or the expected ratios arising from crosses.

(ii) This question was usually answered correctly.

(c) This question was well answered by almost all candidates. A wide range of advantages and disadvantages were provided. Within these, the most common advantage was being able to defend against predators and the most frequently seen disadvantage was the potential for injury.

Question 9

(a) (i) This question was only well answered by the strongest candidates, who identified the extensive system through calculation and provided an explanation.

(ii) Stronger candidates were able to describe pasture improvement techniques. Some weaker candidates mentioned changing herd size.

(b) Most candidates provided a good answer to this question. However, weaker candidates tended to state that zero grazing meant no grazing, without reference to food transportation or animals being kept off a pasture.

(c) This question was well answered by the majority of candidates. The most frequently seen answers were livestock disease, soil erosion and pasture destruction.

Section B

Question 10

(a) The meaning of the term maintenance ration was generally well understood.

(b) Differences between the structures of the ruminant and the non-ruminant digestive systems were often effectively described.

(c) The roles of different parts of the non-ruminant digestive system were generally well explained. Some candidates incorrectly named a ruminant animal and explained the roles of parts of the ruminant digestive system instead.

Question 11

(a) Many candidates showed a very good understanding of the nitrogen cycle. This was occasionally effectively demonstrated using a labelled diagram. The most common issue was to confuse nitrogen fixation with nitrification.

(b) The strongest candidates were able to clearly describe the impact of compound fertilisers on soil fertility. A few candidates discussed the potential negative impact of the overuse of compound fertilisers, e.g. soil acidity and/or reduced microbial activity.

(c) The effect of legumes on soil fertility and structure was often very well explained. Overall, the impact of organic fertilisers was less well understood, although the very best candidates effectively explained their impact in improving soil structure.

Question 12

(a) This question was very well answered by the majority of candidates.

(b) Most candidates gave good answers to this question. Overall candidates provided more detailed descriptions of cultural methods of pest control than of biological pest control, where the precise nature of the predator/prey relationship was sometimes not well described.

(c) This question was well answered by the majority of candidates. Many excellent explanations demonstrated a thorough understanding of the possible positive attributes of GM crops.

Question 13

(a) Only the very strongest candidates answered this question well. Weaker responses gave some vague concepts, which were often not well developed.

(b) The use of pipe systems and a range of containers, e.g. water bowls and troughs to deliver water to livestock was effectively described by the majority of candidates. Only the strongest candidates offered further detail regarding raising the tank, joining pipes or controlling water flow with taps.

(c) This question was well answered by the majority of candidates. Many answers explained disease spread, some increased costs and waste management issues.

Question 14

(a) Although many candidates answered correctly, some incorrectly described pesticide being applied in order to damage the crop and confused the ingestion of a systemic pesticide with its absorption by plants.

(b) This question was well answered by the majority of candidates.

(c) This question was well answered by the majority of candidates. The most common problems were to suggest that biological methods were simply ‘low cost’, without qualification and that they require no skill.

AGRICULTURE

Paper 5038/12
Paper 12

Key messages

Candidates should be reminded to check carefully that they have attempted to answer all ***Section A*** questions.

Candidates should be discouraged from re-writing the question as part of their response to ***Section B*** as this wastes time and gains no credit.

General comments

Candidates' responses to the questions were generally good. There was no evidence to suggest that candidates did not have sufficient time to answer all questions.

Strong candidates were generally able to deal with the unfamiliar data in data response questions.

In 'suggest' questions stronger candidates gave well thought out suggestions while weaker candidates tended to struggle.

In ***Section B*** there were many excellent accounts which showed a high level of knowledge and a good command of English. Some answers were detailed and well organised with high-quality responses seen to **Questions 10** and **11** in particular. Some candidates did not follow instructions and attempted to answer all five questions in this section.

Comments on specific questions

Question 1

(a) (i) This question was well answered by the majority of candidates. Durability was often referenced.

(ii) The majority of candidates correctly identified the insulating properties, relatively low cost and/or availability of thatch as reasons for its use.

(iii) This question was well answered by stronger candidates. Weaker candidates showed confusion over the properties of an earth floor.

(b) This question was well answered by the majority of candidates.

(c) This question was well answered in part by the majority of candidates who identified that a concrete floor would be easier to clean than earth. The strongest candidates provided a more detailed explanation.

Question 2

(a) (i) Only the strongest candidates submitted a fully correct calculation. Many candidates correctly identified the mass gain and the number of days but then did not correctly carry out the division to calculate the mass gain per day. Others did not give the correct units.

(ii) The majority of candidates offered good examples of additional production records, such as those based on health, fertility and feeding.

(b) This question was well answered by stronger candidates. Weaker candidates confused lactation with weaning.

Question 3

(a) (i) This question proved challenging for many candidates with few candidates offering a correctly named fungal plant disease.

(ii) This question was well answered by the majority of candidates.

(b) Many candidates correctly stated the use of fungicide and explained the elimination of fungal disease agents. Cultural control methods, such as crop rotation and field hygiene, were often stated, although these were generally less well explained in terms of reducing disease persistence and transfer.

Question 4

(a) (i) This question was well answered by stronger candidates who marked a correct location.

(ii) This question was well answered by the majority of candidates.

(iii) This question was well answered by almost all candidates with many suitable suggestions made.

(b) This question was well answered by the large majority of candidates. The most common error was to reverse the actions of mother and offspring shortly after birth.

(c) This question was well answered by stronger candidates, who identified that the calf would have difficulty breathing. Fewer candidates successfully linked this to the calf being stuck or crushed.

Question 5

(a) (i) This question was well answered by almost all candidates. Weaker candidates confused larva and pupa.

(ii) This question was well answered by almost all candidates. Some weaker candidates did not link their responses to eating and could not suggest a reason.

(b) (i) This question was well answered by stronger candidates. Weaker candidates often incorrectly named biting and chewing pests but some went on to correctly describe the damage caused by piercing and sucking crop pests, e.g. loss of sap, wilting and disease transfer.

(ii) This question was well answered by stronger candidates who described the use of pesticides, cultural or biological control measures.

Question 6

(a) This question was well answered by stronger candidates who often gave three benefits.

(b) This question was well answered by the strongest candidates only. Weaker candidates may have benefited from showing their working.

(c) (i) This question was well answered by the majority of candidates with considerations of the cost of production, storage costs and nutrient density frequently given.

(ii) This question was very well answered by the majority of candidates.

(d) Only the very strongest candidates offered two correct answers. Some candidates described aspects of the ruminant digestive system rather than identifying advantages compared to the non-ruminant digestive system.

Question 7

(a) (i) This question was well answered by stronger candidates. Weaker candidates listed single alleles for parent and offspring genotypes and incorrectly identified phenotypes from offspring genotypes.

(ii) This question was well answered by the majority of candidates who gave succinct definitions.

(b) This question was well answered by the majority of candidates.

(c) This question was well answered by stronger candidates. Weaker candidates sometimes confused artificial selection with artificial insemination and did not explain the process of choosing best varieties and then crossing for improved offspring.

Question 8

(a) (i) This question was very well answered by the majority of candidates.

(ii) This question was very well answered by the majority of candidates, who identified the range where most nutrients were available without issue.

(b) (i) This question was very well answered by the majority of candidates, most described liming.

(ii) This question was very well answered by the majority of candidates.

(iii) This question was very well answered by the many candidates who showed careful reading of the question.

Question 9

(a) Many candidates correctly described the lack of soil, the use of water as a growing medium and provision of mineral nutrient solution.

(b) (i) Some very good answers were seen from candidates who correctly described a range of benefits of hydroponic systems.

(ii) This question was very well answered by the majority of candidates. Common disadvantages were the ease of disease spread, system costs and the use of additional water.

Question 10

(a) This question was well answered by stronger candidates with correct descriptions of the movement of the food produced by photosynthesis from leaves to other parts of plants including storage organs. A small number of candidates suggested that translocation meant moving a plant from one place to another.

(b) This question was well answered with many candidates gaining full credit.

(c) Many candidates gave detailed answers gaining full credit for explaining osmosis, the transfer of dissolved nutrients, active transport and the role of root hairs.

Question 11

(a) This question was very well answered by many candidates.

(b) Many candidates answered this question well and gave clear descriptions of air, vectors, food, water and a range of other means of disease spread in addition to the ways in which such spread could be reduced or stopped.

(c) This question was very well answered by many candidates. A wide range of health, economic and management problems were successfully explained.

Question 12

(a) This question was well answered overall by many candidates.

(b) Many candidates gave strong answers. Weaker responses showed confusion about the nature of pollination in maize.

(c) This question was well answered overall by many candidates who explained differences such as asexual reproduction resulting in offspring identical to their parent, the absence of pollination and lack of fertilisation and sexual reproduction involving the fusion of male and female gametes.

Question 13

(a) This question was very well answered overall by the majority of candidates, many of whom described ground preparation, the creation of a seedbed, irrigation, fertilisation and/or harvesting.

(b) Candidates identified a wide range of weed species and the large majority correctly described harmful effects such as competition of light, space, nutrients and water. Fewer candidates described methods of weed spread such as water, wind, animal and insect vectors.

(c) This question was well answered overall by many candidates, who identified a wide range of cultural, chemical and also, occasionally, biological weed control methods.

Question 14

(a) Many candidates described properties such as particle size, water retention, drainage and workability.

(b) This question was well answered by many candidates. There were clear descriptions of a range of methods to improve soil structure.

(c) Only the strongest candidates correctly explained why soil temperature affects plant growth. The strongest responses discussed water availability and/or stress, the need of some plants for specific temperatures for germination or growth and the impact on enzyme-catalysed reactions.