

AGRICULTURE

Paper 5038/12
Theory

Key messages

Candidates should note the marks available for questions and read carefully to ensure their response matches the requirements of the question.

Weaker candidates should avoid repeating the question. Instead, they should use the time to demonstrate what they know and can do.

General comments

There were some very good responses to the questions. Candidates demonstrated that they had sufficient time to complete the paper.

There were some strong **Section B** responses. Strong candidate responses were often detailed and well organised, demonstrating both good levels of theoretical knowledge and the application of this knowledge.

Generally, when providing a response, weaker candidates could not develop their points fully and sometimes simply stated them regardless of the command word. Sometimes weak candidates resorted to repeating the question asked.

Comments on specific questions

Section A

Question 1

- (a) The question required candidates to identify possible benefits and problems of biological pest control. Some weaker candidates confused this area with other syllabus topics. Most candidates answered well.
- (b) Candidates were required to suggest ways to improve crop yield. Overall, this was answered well and responses generally showed good application of appropriate knowledge.
- (c) This was answered well by stronger candidates, who clearly explained how contact pesticides control pests. Weaker candidates sometimes explained the mode of action of a different type of chemical.

Question 2

- (a) This question required candidates to state steps in selective breeding in a correct order. Some weaker candidates simply listed a range of potentially useful breeding outcomes. Some very weak candidates could not develop their response sufficiently beyond the question wording.
- (b) Most candidates were able to suggest a desirable crop characteristic and explained how this could increase farm profits well. This often showed good application of appropriate knowledge to farm economics.

Question 3

- (a) The majority of candidates could draw and label at least one of these parts on the diagram. Stronger candidates were able to apply their knowledge fully for all four parts. Weaker candidates sometimes confused the connections between components in the diagram.
- (b)(i) Stronger candidates could usually state clearly where this should be deposited during artificial insemination.
- (ii) Generally, this question was answered well. Most candidates were able to suggest a reason why pregnancy may not result from artificial insemination.
- (c) Stronger candidates could apply their knowledge well and explained how the nutritional requirements of a female mammalian farm animal will change during pregnancy.

Question 4

- (a) Stronger candidates were usually able to state what is meant by an allele in particular. Generally, weaker candidates did not have secure knowledge of this area.
- (b)(i) Weaker candidates did not seem to have a secure understanding of genetic diagrams. Many candidates could show two heterozygous parents. Some candidates did not use the letters requested.
- (ii) Generally, this question was answered well. Most candidates were able to describe at least one way to reduce this. Weaker candidates were sometimes very vague in their responses which were not always well focused on the question.

Question 5

- (a)(i) Many candidates were able to correctly state what is meant by a soil pan. Some weaker candidates confused this topic with other syllabus areas.
- (ii) Stronger candidates could apply their knowledge well and generally described two farming practices that could lead to the formation of a soil pan.
- (iii) Most candidates made relevant points about how a soil pan could reduce crop yields.
- (b) This was generally not answered well by weaker candidates. The stronger candidates generally seemed to apply their knowledge well to the photograph and explained well.

Question 6

- (a)(i) Generally, this question was answered well by the stronger candidates, who were often able to give an example of each type of pest.
- (ii) Most candidates accurately described suitable possible damage caused by each type of pest. Some weaker candidates repeated their answers and so could not be awarded full credit.
- (b) Most candidates gained at least partial credit here. Stronger candidates often demonstrated a secure understanding of a practical example of biological control.

Question 7

- (a)(i) Generally this question was answered well by stronger candidates, who linked digestive organs with their main function. Some weaker candidates did not provide a sufficiently clear response.
- (ii) The stronger candidates performed well on this question.
- (b) Most candidates gained at least partial credit here for giving one way that the ruminant digestive system is more efficient than the non-ruminant digestive system. However, generally, only the stronger candidates included clear and relevant explanation of this.

- (c) Generally, only stronger candidates were able to suggest one appropriate way to reduce feeding costs in a zero-grazing system. Some weaker candidates may have confused zero grazing with other syllabus areas.

Question 8

- (a) This was a well-answered question. Most candidates were able to state at least some signs of good health in farm animals.
- (b) Candidates generally made good suggestions about how these methods control disease. Weaker candidates sometimes struggled to offer a suggestion for good hygiene.
- (c) Most candidates were able to suggest a way that diseased animals could reduce the profit made from farm products.

Question 9

- (a) (i) Some weaker candidates were not able to select or use the data to determine the average mass of protein for this breed. Many other candidates were successful.
- (ii) Most candidates were able to calculate the difference in average mass of milk produced. Generally, candidates who used the working space were successful.
- (b) (i) Stronger candidates seemed to draw on some practical experience as well as data interpretation to offer a wide range of creditworthy suggestions.
- (ii) Stronger candidates could suggest at least some ways in which milk yield could be increased. Weaker candidates generally could not apply their knowledge to make suitable suggestions in relation to milk yield.

Section B

Question 10

- (a) Many candidates demonstrated a reasonable understanding of organic farming.
- (b) Responses to this question were mixed. Most candidates knew of some potential disadvantages of an organic farming system. Stronger candidates were able to discuss these disadvantages. Generally, weaker candidates demonstrated only a limited ability to make suitable explanations.
- (c) Candidates usually demonstrated a good knowledge of possible benefits of growing genetically modified (GM) crops for farm profits. Stronger candidates could usually explain these benefits well.

Question 11

- (a) Most candidates demonstrated good understanding of the different ways that weeds reduce crop growth. Some weaker candidates tended to repeat the same point.
- (b) Candidates were required to discuss how weeds can be controlled in an organic farming system. Many candidates provided an impressive range of methods and usually demonstrated good understanding of at least some of these.
- (c) Candidates were required to explain how to store and use different types of farm chemical safely. Many candidates provided a range of safe use descriptions. However, in the responses of weaker candidates, these were not always explained appropriately in relation to types of farm chemical.

Question 12

- (a) Most candidates were able to apply their knowledge of a clay soil having a higher water-holding capacity than a sandy soil. Stronger candidates were able to describe other benefits to crop growth.

- (b) Methods to provide nitrogen to plants were generally not well understood by weaker candidates. Stronger candidates could usually apply a broad knowledge base and described a variety of, often both organic and inorganic, ways to supply the nitrogen.
- (c) Most candidates were able to suggest some points about how plants take in mineral nutrients. Stronger candidates applied a depth of understanding to a range of relevant areas to explain how these are taken in.

Question 13

- (a) Many candidates could describe three sources of water. Some weaker candidates could not describe different sources.
- (b) The way water can be supplied over a distance to farm buildings was generally understood well by stronger candidates. Responses of these candidates often included the use of tanks, pipes and pumps and explained the purposes of the various features clearly.
- (c) Many candidates could give at least some relevant points linking clean water and good health in animals. Some responses by weaker candidates were left insufficiently developed for full credit to be awarded.

Question 14

- (a) The majority of candidates knew at least some relevant points about the features of suitable housing for large animals. Stronger candidate responses often seemed well planned and linked the building design well to the question context.
- (b) Benefits of zero grazing were generally less well understood by weaker candidates. Stronger candidates could apply a broad knowledge base and often made suitable links, for example, to relevant aspects of animal safety and health.
- (c) Most candidates usually showed a suitable depth of understanding of farm record keeping. The importance of these records could usually be suggested.

AGRICULTURE

Paper 5038/02
Coursework

Key messages

It is recommended that the coursework be incorporated into the teaching scheme of work. Centres should consider the local environmental factors when planning the delivery of the coursework. This approach enables the practical work to enhance the understanding of agriculture in practice and incorporates the related science and economic awareness.

Coursework activities should be considered carefully to ensure that candidates can show what they know and can do.

General comments

The majority of centres submitted candidates work promptly and organised candidates' evidence well. Work was of a good standard and presented in a range of interesting and creative formats.

Photographic and video evidence was often valuable in supporting the practical exercises and in the production of candidates' investigations. Evidence must be supplied to support marks awarded. Evidence should be related to individual candidates and should lead to a discussion of how any difficulties or problems were managed or adapted to allow a positive outcome wherever possible. Photographic evidence was often annotated or referred to in text to explain tasks being demonstrated. Comments related to factors encountered were also often seen. At some centres, video evidence could have included more candidate commentaries to evidence knowledge of tasks undertaken.

Use of photographic and video evidence was sometimes excellent and incorporated live audio discussion and/or high-quality annotation of photographic evidence of work being performed was used. The strongest examples included constructive, critical reflections of the tasks being performed. Stronger candidates related their experience to agricultural science. Some centres carried out some of the practical exercises through the investigation focus. If possible, it is advised candidates should be encouraged to take part in many different varieties of practical exercise.

In a few cases, insufficient depth of work led to the need for some large adjustments. The majority of adjustments made were small. This was due to trends at individual centres, the reasons for which are detailed in individual centre reports.

Comments on specific areas

Practical Exercises

Many centres carried out a wide range of practical exercises. When considering practical exercises, it is important that stronger candidates can access an appropriate level of demand, and this should be considered in selection. This provides opportunity for candidates to think critically about the task they are undertaking and suggest improvements to their methods.

Assessors should show how marks have been awarded, for example, they could annotate candidates' work to identify achievement. This could be added to a candidate record card or directly onto candidates' work.

Practical exercise evidence relating to crop production often involved plot preparation, planting, weeding, and harvesting. Some centres included skills such as soil testing for pH or soil composition.

When carrying out a skill/task in a practical exercise, it is important that high marks are only awarded for work where candidates use tools and equipment fully correctly and they demonstrate that they are using an awareness of good health and safety practices. A few videos and photographs showed multiple candidates using tools and carrying out tasks. When submitting evidence in this format, the materials should be individual.

Some centres awarded marks very generously. Centres should use the marking criteria carefully and ensure they differentiate performance, only awarding full marks for excellent performances. Effective description and annotation was carried out this year by some centres.

Practical Investigation

The range and diversity of topics investigated was generally very good and the quality of presentation often enabled candidates to demonstrate their creativity. Work of a higher standard was often detailed and fully discussed and explained. Stronger candidates incorporated research into their plans, cross-referencing this with their findings and then made full use of the data collected to produce well-reasoned deductions based on the relevant science and agricultural practice. Referencing of research should identify the book and author or full web address and date accessed.

The selection of relevant questions (hypothesis) for the investigation

The majority of candidates produced a hypothesis and some also included an alternative hypothesis. Candidates should relate their hypothesis to their own research and evidence it in a way which demonstrates their understanding of the investigation. Where candidates develop the same hypothesis, this should be annotated to show whether it is original or devised as a group, and marks awarded accordingly.

Centres should annotate candidates' work to indicate the amount of support given to candidates in developing their hypothesis to demonstrate its originality. Only fully independent selection and the formation of an appropriately challenging hypothesis should be awarded full credit.

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

Methods were generally well researched, with a good proportion of candidates incorporating a good range of background information. Where candidates accessed additional sources, most of these were included in a bibliography or next to the information.

Equipment and methods stated were usually clear and indicated an understanding of the processes needed to prepare ground for planting along with test factors that affect the growth of a crop or animal. The time required to carry out methods was omitted in several cases and this needs to be considered when planning some investigations.

The strongest candidates referred to their background research and their hypothesis and used this to develop a suitable plan for carrying out their investigation. Where amendments to the plan were required, these candidates explained and justified the modifications to the plan in appropriate detail.

The handling of evidence

Many candidates collected a good range of data to support their findings. Many candidates often included measurements of growth of a crop or animal over a period of several weeks. This enables a trend to be seen in data. In some cases, the data collected was quite limited and only just sufficient to produce a basic analysis of results. If candidates are to produce meaningful data, they need to have taken a comprehensive range of results throughout the investigation. Simply producing a bar chart of final crop yield is unlikely to be sufficient. Stronger candidates usually investigated different factors on a crop or livestock. These candidates could link their processed data from a number of sources to identify patterns or trends. This often included additional data, such as volume of water used to water the plants each day/week to consider control variables that may affect the validity of their investigations.

Presentation of the data was generally good. However, this was sometimes presented in a simplistic way with little or no explanation. In many cases, clear headings on tables and axis descriptions or units on graphs were not used well. Stronger candidates usually incorporated more than one method of analysing their data, showing how it affected the outcome of their investigation. These candidates provided tables and charts which were usually clearly labelled using appropriate units with a clear, sufficiently detailed heading. Useful

graphs were annotated to ensure the reader could understand what was being shown. Stronger candidates often identified any anomalies clearly and referenced them for further discussion.

Results of investigations need to be recorded in detail and with appropriate precision. Candidates needed to indicate any specific procedures which were used to collect accurate data, taking care to use appropriate and reliable sample sizes.

Stronger candidates discussed local modifications to procedures which might be needed to cope with their local environmental situations, such as water shortages or erosion of soil, and clearly identified the precautions required to ensure results were as accurate as possible.

The ability to make deductions from the evidence or data acquired

In some cases, this was carried out well, focusing on the trends in data acquired and also the scientific reasons for why the trends may have been evident. Stronger candidates also recommended further investigative procedures to check and extend the investigation to ensure repeatability.

Generally, this was an area which would have benefited from more focus, as some candidates only focused on the initial trend and were unable to produce valid deductions from their own evidence. Candidates need to be encouraged to do more than simply state the results they have obtained. The strongest candidates fully explained the reason(s) for their results and their conclusions related to the data and outcomes of their investigation. Weaker candidates sometimes needed to draw conclusions and explain and discuss their results and outcomes in more detail, taking care to use background research and to link this to their own findings.

The ability to recognise limitations of the investigation

Most candidates addressed this area in some way and attempted to demonstrate a clear understanding of this skill by explaining the limitations of their investigations. Many candidates stated limitations only but the strongest candidates took care to fully explain how future amendments or alterations to their procedure could possibly overcome the problems which they had encountered, incorporating scientific agricultural understanding as to how their investigation was affected. However, some candidates made general statements which were not explained sufficiently to meet the marking criteria.

Description of investigation, presentation, layout, and originality

In the strongest submissions, candidates used appropriate sub-headings and made full use of diagrams and charts. The investigations were fully explained, annotated, referenced and linked to the discussions and outcomes obtained in the production of deductions and conclusions.

Annotated photographs greatly improved many reports making it easier to see and understand the work undertaken and these showed the outcomes which candidates had achieved. This year a lot of candidates' work was supported with annotated photographs which were clearly identified using headings and were referred to, discussed and explained in detail. Where group photographs are used candidates should identify themselves and say how the photo is relevant to their investigation.