

AGRICULTURE

Paper 0600/11
Theory

Key messages

- Candidates should be reminded to check carefully that they have given an answer for all **Section A** questions.
- Candidates should take note of the mark allocation for each question and plan their answers accordingly.

General comments

There were many good responses to the questions and candidates demonstrated that they had sufficient time to complete the question paper. Candidates showed their practical experience of agriculture in many cases. The examination also tested data response. Almost all candidates attempted these questions. In many cases there were responses which were detailed in **Section B**.

Comments on specific questions

Section A

Question 1

- (a) (i) This question was answered well by stronger candidates who described key features of genetic modification.
- (ii) This question was answered well by most candidates. These candidates often correctly identified at least some benefits and potential problems of genetically modified (GM) crops. Weaker candidates were often not able to express potential problems clearly.
- (b) Most candidates effectively explained another way to achieve a relevant advantage. The stronger candidates could often make more than one valid point.

Question 2

- (a) (i) This question was answered well by almost all candidates who applied their knowledge of denitrification well.
- (ii) Stronger candidates answered this question well. Some weaker candidates seemed to confuse this with other syllabus terms.
- (iii) This question was answered well by many candidates who effectively applied their knowledge of nitrogen fixation.
- (b) Many candidates suggested ways that dead organic matter improves soil structure. Some weaker candidates resorted to repetition.
- (c) (i) This question was usually answered well, with many candidates describing how the nitrogen cycle makes nitrogen available to plants effectively.

- (ii) This question was answered well by many candidates who made a variety of suitable suggestions about how nitrogen can be added by a farmer.

Question 3

- (a) (i) This question was answered very well by many candidates who described photosynthesis in detail. Some candidates decided to include an equation in their answer, these were usually accurate. Some weaker candidates confused this with other cellular processes.
- (ii) This question was answered well by many candidates. Some weaker candidates seemed to have limited knowledge of plant vascular tissues.
- (b) Many candidates correctly explained a relevant adaptation of plant roots. Precise use of terminology was a feature of many of the stronger responses.

Question 4

- (a) (i) Stronger candidates generally interpreted the diagram and information correctly, identifying the order of particles in the soil sample.
- (ii) This question was answered well by most candidates. Weaker candidates sometimes showed confusion over pH measuring methods.
- (iii) This question was answered well by many candidates with a wide range of possible sources of error suggested.
- (b) This question was answered well by stronger candidates. Weaker candidates often referred to other weathering processes instead.
- (c) Most candidates answered this well and correctly identified at least one relevant farming practice.

Question 5

- (a) (i) This question was answered well by many candidates showing an ability to carry out an appropriate percentage calculation.
- (ii) This question was answered well by almost all candidates. The most common error was to give an incorrect unit.
- (b) This question was answered well by almost all candidates. A common issue was to resort to repeating a safe storage suggestion.
- (c) Most candidates correctly identified a weed species and many described an appropriate non-chemical control method. Weaker candidates often referred to chemical weed control methods.

Question 6

- (a) Stronger candidates correctly labelled the cervix, vagina and vulva. Some candidates confused the location of the vagina and cervix. Some weaker candidates labelled the rectum as various parts.
- (b) Many candidates correctly described the functions of both the uterus and the ovary.
- (c) (i) Most candidates correctly described what is meant by artificial insemination.
- (ii) Almost all candidates suggested possible benefits of artificial insemination of farm animals.
- (d) This question was very well answered by most candidates

Question 7

- (a) Most candidates correctly identified a possible accident linked to a suitable position of the rake.

- (b)(i) This question was very well answered by most candidates. Weaker candidates did not describe a reason to use a rake. A wide variety of ways to maintain were described.
- (ii) Stronger candidates correctly and clearly identified both an advantage and a disadvantage of the tool in the diagram, compared with using a rake. Generally, for weaker responses especially, the advantages were stronger than attempted disadvantages.

Question 8

- (a) Most candidates described reasonably well how water could be supplied to the animals. Good descriptions featuring the use of pipes, pumps, tanks and/or drinkers often seemed to suggest stronger candidates had experience of practical agriculture.
- (b) Stronger candidates described the importance of a supply of water to both animals and crops. Some weaker candidates repeated the same reason.
- (c) Only the strongest candidates correctly referenced increased water pressure at the bottom of the dam. Some weaker candidates referred to flood prevention without elaboration.

Question 9

- (a) This question was correctly answered by stronger candidates. Some weaker candidates confused these terms with other genetics terms.
- (b)(i) Many candidates answered this question well. Stronger candidates correctly and clearly identified the expected ratio of offspring with crooked toes to offspring without crooked toes in their crosses. Some weaker candidates reversed the ratio without clear linking or labelling. Weaker candidates demonstrated a lack of understanding of the meaning of heterozygous parents.
- (ii) This question was correctly answered by stronger candidates who often succinctly identified the phenotype of the genotype stated.
- (iii) This question was correctly answered by most candidates, who applied their knowledge of breeding well.
- (iv) Many candidates made reasonable suggestions about why these chickens may be less likely to survive.

Section B

Question 10

- (a) Many candidates accurately described how some farmers use an enclosed grazing system. This was another question where stronger candidates seemed to demonstrate an element of practical experience or knowledge.
- (b) This question was answered very well by many candidates. Many strong candidates fully described the separation into individual areas and its typical use, often including allowing the vegetation to regenerate.
- (c) Many candidates gave detailed answers explaining both the benefits and potential problems of a zero-grazing system. Some weaker candidates referred to potential problems without any explanation.

Question 11

- (a) Most candidates answered this question very well. Many candidates accurately described effects on a crop of a relevant named pest. Some weaker candidates named a different type of pest.
- (b) This question was answered well by most candidates. Technical terms were used well and carefully by many stronger candidates in often well-constructed answers.

- (c) There were many detailed answers effectively suggesting possible problems associated with the use of farm chemicals and descriptions of how these problems can be reduced. Only stronger candidates tended to consider using correct dilutions and equipment maintenance.

Question 12

- (a) Most candidates were able to correctly describe that a farmer must report a suspected notifiable disease to relevant authorities immediately. Stronger candidates could explain why this is important in terms of disease management.
- (b) This question was answered very well by many candidates, and a large proportion seem to show well-rounded understanding of practical agriculture in their responses.
- (c) The strongest candidates gave a range of answers explaining how poor housing can cause ill-health in livestock. Some weaker candidates focused on alternative areas and may have needed to read the question more carefully.

Question 13

- (a) Stronger candidates answered this question well. Weaker candidates sometimes described what is meant by a different syllabus term.
- (b) Almost all candidates correctly described a relevant effect of the factors listed on the rate of transpiration. Humidity seemed less well understood by weaker candidates.
- (c) Generally, this question was answered well. Many candidates included good descriptions of different harmful effects on plants. Stronger candidates also suggested different ways to minimise each effect. Some weaker candidates repeated the same suggestion.

Question 14

- (a) Stronger candidates clearly described what is meant by a production ration. Some weaker candidates described a maintenance ration.
- (b) Many candidates accurately described the function of four named parts of the non-ruminant digestive system. Weaker answers sometimes lacked a function, confused it with other parts or referred to the presence of a rumen.
- (c) Stronger candidates correctly included the ability of ruminants to digest cellulose through the features and functions of their digestive system. The strongest candidates went further to clearly link explanations to relevant ruminant digestive features.

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Paper 0600/12
Theory

There were too few candidates for a meaningful report to be produced.

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| <p>Paper 0600/02 Coursework</p> |
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Key message

- The coursework should be incorporated into the teaching scheme of work. Centres should consider the local environmental factors and seasons 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.
- Photographic and video evidence enhances learning and is valuable in supporting the practical exercises and in the production of candidates' investigations. Photographic and other visual material should be annotated to explain the tasks being demonstrated and should incorporate comments related to factors encountered. This should lead to a discussion of how any difficulties or problems were managed or adapted to allow a good outcome wherever possible.

General comments

Many centres managed to submit coursework of a good standard and most centres coped well with managing the delivery of the coursework.

Many centres made full use of photographic and video evidence and often incorporated live audio discussion and/or high-quality annotation of photographic evidence of work being performed. The strongest examples included constructive, critical reflections of the tasks being performed. Stronger candidates related their experience to the relevant science and the recognised agricultural practice. Few centres offered livestock exercises this year possibly owing to the time and management commitment involved in livestock investigations.

Comments on specific marking criteria

Practical Exercises

Centres carried out a wide range of practical exercises with many offering a range which was clearly linked to the delivery of the syllabus theory content. A number of centres used laboratory exercises which were linked to, and supported individual investigations. Soil testing for pH or soil composition are key skills supporting theory work and help with many investigation topics, in particular cultivation-based investigations.

When selecting practical exercises, it is important that the exercises chosen allow stronger candidates to access the appropriate level of demand offered by the task. There were some very good video clips of candidates working and achieving excellent outcomes from their efforts.

It is helpful if centres annotate candidates work to identify achievement when candidates carry out a task. This could be added to a candidate record card or to the visual evidence.

When carrying out a skill/task in a practical exercise, it is important that high marks are only awarded for work where the candidate uses tools and equipment fully correctly and demonstrates they are using an awareness of good health and safety. A few videos and photographs showed candidates performing basic skills using tools poorly.

Some candidates used a format such as PowerPoint to present their work. Video links should not be embedded unless the linked file is carefully included. When recording their work, candidates need to explain

their practical work in sufficient detail and should assume the reader is unfamiliar with the centre and the specific subject content.

A few centres made submissions which were overmarked. Centres should use the marking criteria carefully and ensure they differentiate performance, only awarding full marks for excellent performances. Effective annotation was evident this year from some centres.

Practical Investigation

The range and diversity of topics investigated was generally very good this year and the quality of presentation was often good. Good work was often detailed and fully discussed and explained. Strong candidates incorporated research into their plans and then made full use of the data collected to produce well-reasoned deductions based on the relevant science and agricultural practice.

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

In some cases, all candidates from a centre carried out very similar investigations which suggested that centres had led decisions on the practical work. Where it is not clear how the candidate selected and researched the topic, the teacher must annotate as required to ensure the candidates' work is original.

Most candidates produced a hypothesis. However, some candidates did not fully develop or explain their findings within the context of their investigation. Candidates need to relate their hypothesis to their own research and evidence it in a way which demonstrates their understanding of the investigation.

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 appropriate challenging hypothesis should be awarded full credit.

The strongest candidates collected a good range of relevant background information and used it when preparing their plans.

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

A plan needs to be clearly explained to enable the reader to replicate the investigation in a scientific way. It should incorporate the necessary steps required to carry out the investigation, and identify the resources required including the time needed to carry out the investigation. Many candidates planned effectively.

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.

3. The handling of evidence

The data collected was sometimes 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 insufficient to access higher marks.

Presentation of the data was generally good but sometimes data was presented in a simplistic way with little or no explanation. The strongest candidates 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 clearly labelled using appropriate units with a clear, sufficiently detailed heading. Graphs were annotated to ensure the reader could understand what was being shown. These candidates identified any abnormalities clearly and referenced them for further discussion.

Results of investigations need to be recorded in detail and candidates need 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 identified clearly the precautions required to ensure results were as accurate as possible.

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

This is an area which would benefit from more focus at some centres as some candidates were unable to produce valid deductions from their own evidence. Candidates need to be encouraged to do more than simply state or describe the results they have obtained. The strongest candidates fully explained the reason for their results, and their conclusions related to the data and outcomes of their investigation. Weaker candidates needed to draw conclusions and explain and discuss their results and outcomes in detail, taking care to use background research and to link this to their own findings.

Many candidates saw experimental error or natural events beyond their control as spoiling or limiting their ability to draw conclusions and to evaluate their results appropriately. Candidates need to be encouraged to show and explain the importance of events beyond their control, and to link these to the conclusions that can be drawn from such events when addressing the final outcomes. It is important that candidates identify and explain how errors may have occurred and how these might impact on their ability to draw a firm conclusion.

5. The ability to recognise limitations of the investigation

Most candidates addressed this area in some detail and attempted to demonstrate a clear understanding of this skill by explaining the limitations of their investigations. The strongest candidates took great care to fully explain how future amendments or alterations to their procedure could possibly overcome the problems which they had encountered. However, some candidates made general statements which were not explained sufficiently to meet the marking criteria. The importance of this skill area needs to be explained to candidates before attempting to deliver the coursework.

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

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

Photographs greatly improved many reports making it easier to see and understand the work undertaken and these showed the outcomes which the 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.

Most centres marked this section accurately and in general, the investigations were well presented.