

AGRICULTURE

Paper 5038/01

Paper 1

General comments

Many candidates do well where questions need an answer which relies on straightforward recall of facts but often do not fare as well when required to apply their knowledge to hypothetical situations that may be unfamiliar to them. It is essential that candidates are able to show understanding of knowledge and apply it to solve problems, if they are to gain high marks. Answers that do no more than repeat material from the question are unlikely to gain many marks. Where a list of specified length is needed, for example 'State **three** problems....', candidates do not benefit from giving more than the required number of answers, as the first three points, in this case, would be marked and any further examples would be ignored. Correct answers will not be selected from a list, as the candidate is not clearly demonstrating his or her knowledge. The candidate is also wasting time by giving a longer answer than required. When candidates are selecting the questions to answer in **Section B**, they should read each question carefully and make sure that their answers are relevant and address the question set. Irrelevant material, even if factually correct, will not gain marks and will reduce the time the candidate has to answer all the questions. If diagrams are required, marks are likely to be lost if a candidate does not include them and for marks to be gained, they need to be clear and fully annotated.

Comments on specific questions

Section A

Question 1

- (a) (i) The majority of candidates were able to name the labelled structures but some could not remember the correct order, which was: **A** – rumen, **B** – reticulum, **C** – omasum, **D** – abomasum.
- (ii) Most candidates knew that the role of the rumen is to store food for further chewing and a few mentioned bacterial action but the role of the abomasum was less well known. There needed to be an indication of enzyme digestion beginning (**not** ending) here.
- (b) Candidates were able to make sensible suggestions about problems, such as cattle getting lost or stolen or attacked by predators, damage to crops and other farmers' property leading to disputes, difficulties controlling grazing, breeding and infection.

Question 2

- (a) Many candidates could not identify the chemical symbols as P – phosphorus and K – potassium. As these symbols are used commonly on fertiliser containers, this is a worrying and disappointing failing.
- (b) (i) Many candidates did not know that ammonium sulphate was the chemical that contains nitrogen. This should be basic knowledge.
- (ii) The role of calcium carbonate, to neutralise acid soil, seemed to be better known.
- (c) Candidates who scored any marks here generally stated only that nitrogen is required for vegetative growth. It was hoped that more candidates would have given a more scientific and detailed answer, indicating that nitrogen is needed for protein synthesis and protein is required for growth.

- (d) Cheapness and availability were the main advantages stated, with only a few candidates mentioning improvement of soil structure. A few candidates mentioned storage and handling of manure as a disadvantage but many referred to the uncertainty of nutrient content making it difficult to target specific nutrient requirements. These were all good answers. 'Doesn't produce as high a yield' is too general an answer to be given credit as a disadvantage.

Question 3

- (a) (i) Although some leeway can be given in describing the feeding method of the pest causing the damage shown, 'biting and chewing' is the usual description and makes it clear that the candidate understands the type of pest involved. 'Eats leaves' or 'feeds on leaves' are ambiguous, especially the latter as this could describe sap-sucking insects, for example.
- (ii) Most candidates appeared to have identified the feeding method correctly, as an appropriate example, such as a locust or caterpillar, was usually given.
- (iii) Many candidates knew that systemic pesticide would be translocated through the whole plant so that damage only to the sprayed area would be unlikely. Some candidates were under the impression that systemic pesticides are absorbed by the roots from the soil, rather than by the foliage, which is where the insecticide is normally applied. Some thought that *systemic* referred to it attacking the insect's system.
- (b) (i) A number of candidates gave very general answers, such as 'biological control' or 'cultural control'. Specific examples of these were needed for the marks to be awarded. Examples of good answers were 'weed control', 'crop rotation', 'use of predators'.
- (ii) Toxicity, various environmental considerations, availability and cost were all good points made by candidates. A number also raised the issue of growing for an organic market, another pertinent point.

Question 4

- (a) (i) Most candidates gave the correct labels as: **A** – plumule, **B** – radicle, **C** – cotyledon. 'Shoot' and 'root' are insufficient for plumule and radicle, they would need to be qualified as 'embryonic' to gain the marks. Correct terminology should be known and used.
- (ii) Candidates were generally aware of the role of the cotyledon for storage of food. In order to gain a second mark it was necessary to indicate that this is needed for the seed to germinate, i. e. the embryo begins to grow, as it cannot photosynthesise until it emerges from the ground. 'Protection' was not sufficient for a mark. A candidate needed to indicate that the cotyledon could protect the plumule but not the radicle. Some candidates seemed to confuse the role of the testa and the cotyledon, in this respect.
- (b) (i) A surprisingly small number of candidates associated the size of the seed with the amount of food stored. The few who realised this explained that the food store would run out before emergence if the seeds were planted too deeply.
- (ii) It appears that candidates do not know the reason for preparing soils to different extents for different crops, although answers elsewhere suggest that they are aware that this occurs. The reason for a fine tilth, for small seeds, is that if crumbs are too coarse, the seeds may not make sufficient contact with soil particles. Therefore they cannot absorb moisture. Coarser crumbs may also allow them to fall too deeply, into air pockets, so they have insufficient food stored to emerge.

Question 5

- (a) 'Seeds', 'fertiliser', 'insecticides', 'herbicides', 'labour', 'fuel costs' and 'transport costs' were all good answers as items that could be entered as costs. However, candidates should be aware of the difference between these and **capital** costs such as tools or machinery that will remain as an asset and be used again in subsequent enterprises. These would not be entered as costs in this account.

- (b) It was essential that candidates fully indicated that returns minus costs would show whether a profit had been made. Simply stating that returns should be compared with costs is insufficient.
- (c) A number of candidates gave 'farm diary' as the answer. A specific record, such as a production record, breeding record or stock numbers was needed. A few candidates failed to notice that the question referred to a livestock enterprise and gave another record associated with crops. Candidates must read questions carefully in order to avoid losing marks unnecessarily.

Question 6

- (a) (i) Many candidates seemed to have limited understanding of the term *monoculture*, realising that it means growing a single crop but not necessarily that this may be done year on year on the same land. A clear statement was needed that this would result in depletion of the same nutrients again and again, with no time for recovery, hence increased fertiliser input.
- (ii) Good answers stated that the wheels of heavy machinery would increase pressure on the soil, causing compaction.
- (iii) A number of answers seen were 'to reduce erosion'. This was not sufficient for the mark, as this was given in the diagram and needed further qualification as to why this would occur. Answers such as 'to avoid damaging soil structure', 'to avoid restricting drainage or aeration', 'to avoid restricting root growth' or 'making emergence difficult' were good answers.
- (b) This question required candidates to apply knowledge to a situation with which they were not likely to be familiar. It required careful reading and assimilation of all the information provided. Candidates who gave answers related to savings in time spent and fuel or labour required (cost was accepted in these contexts) gained marks. Answers that simply stated that costs would be less did not gain a mark, as this is insufficient without giving a reason. Those that related cost to the possible costs of machinery were not given a mark as there was no evidence in the question to suggest that buying such a complex machine would cost less than several simpler, traditional ones. Relatively few thought about the use of such a machine in relation to the previous parts of the question but a few candidates gave good answers relating to reduced compaction or erosion risk, with less movement of machinery over the soil. A further possible answer was that the crop debris on the surface would prevent evaporation by acting as a mulch.

Question 7

- (a) Candidates are expected to know about methods of seed dispersal and should be able to give the likely method based on seed or fruit structure. This was clearly shown in each of the diagrams and should not have required candidates to be familiar with the exact species shown. Most candidates were able to do this and a number gained full marks here. **A** was likely to be dispersed by animals (or man) as the hooks would allow it to attach to an animal's coat. **B** was likely to be wind-dispersed. Some candidates identified this point but did not give a clear explanation of why they reached this conclusion. The feathery structures ('pappus' was correct but not essential for the mark) should have been mentioned, 'light seed' was not sufficient. **C** was generally given as explosive or self-dispersal, which was correct but again a clear statement of the reason for this answer was not given. The twisted pod was shown clearly in the diagram. Candidates familiar with this type of dispersal referred to unequal drying of the pericarp causing the twisting and bursting – good answers although the detail was not essential for the mark. It was clear from responses that some candidates continue to confuse dispersal with pollination.
- (b) Most answers were in terms of competition for water, nutrients and light but reducing pest and disease incidence, toxicity and tainting of animal products and crop contamination, avoiding impeding cultivations and harvesting and blocking waterways, were also accepted answers.

Section B

Question 8

There was little evidence that candidates had any real knowledge or practical experience of fence construction and this question was generally very poorly answered by those who attempted it. Most drew a single diagram with no construction details shown. Either one detailed and fully annotated diagram or individual diagrams relating to each aspect of construction were needed. The question set was frequently not addressed, with irrelevant information, such as the construction of a gate, being given.

- (a) (i)** Positioning and bracing of corner posts should have been shown.
- (ii)** Positioning of corner posts first and using a line between them, to allow the posts to be set in a straight line should have been described.
- (iii)** Depth of hole, materials for fixing the post in the ground and checking that the post is vertical should all have been described.
- (iv)** Details of fixing the wires, allowing for them to be tightened and how this is achieved were looked for.
- (b) (i)** Many examples did not give a clear indication of types of fence. 'Hedge' or 'post and wire mesh' were the sort of answers looked for. 'Wooden' or 'iron' are not sufficient, as these answers only name materials that could be used in many ways. 'Electric fence' would be a good answer, as this type of fence has a clear use.
- (ii)** Candidates were expected to be able give a clear and appropriate use for the type of fence mentioned, with a reason for this. As the types of fence mentioned were not clear, candidates could not fulfil this part of the question.

Question 9

- (a) (i)** Most candidates remembered to name the type of livestock they were describing. Candidates using poultry as an example were not really able to answer the question fully, as they should have realised if they had read it fully to begin with. References to 'on heat', 'giving birth' and 'AI' clearly need answers in terms of mammalian livestock.
- (ii)** This was generally well answered, with references to conformation, pedigree, yield, health and suitability for the prevailing conditions being amongst good answers seen.
- (iii)** Candidates seemed to understand the term 'on heat' although there was sometimes confusion in the signs that would be seen here and when the animal was ready to give birth.
- (iv)** The confusion of signs described in (iii) was again seen here, especially in relation to discharge from the vulva – typical of heat rather than readiness to give birth.
- (b)** This was generally well answered but candidates should avoid general answers related to cost, such as 'It is cheaper'. This needs be qualified with an indication of why, such as 'no need to keep a bull', if a mark is to be given.

Question 10

This was a popular choice and generally well answered.

- (i)** Most candidates remembered to state the name of the crop they had chosen. This was all that was required, no description of the crop was asked for and further detail did not gain marks here.
- (ii)** Description of soil preparation sometimes lacked detail. Reasons could be given for different cultivations, in terms of producing suitable conditions for planting or sowing. Details of care of the crop, after sowing or planting, were not asked for here. Irrelevant information does not gain marks.

- (iii) An explanation of timing of sowing or planting should be given, related to conditions such as rainfall or temperature and the requirements for these by the crop. It could also be related to pest or disease attack.
- (iv) It was clear that some candidates had little practical experience of the crops named as the crop spacings given were rather improbable, in some cases. Spacing within rows and between rows was looked for. Candidates should make clear what their figures refer to and that the units that they give are appropriate – for example, 2 m might be appropriate between bushes or trees but 2 cm would not be.
- (v) Marks could be gained for details of harvesting, drying, cleaning and grading, weighing, packaging and storage, as appropriate to the crop named. Some detail for points mentioned should be given, such as the means of drying a crop, whether by the Sun or mechanically or the materials used for packaging and reasons for this. In a few cases, such as sugar cane, where little is done between harvest and delivery to a processing plant, marks may be given for processing details, but this is not generally the case.

Question 11

This question was a popular choice but not well answered, in many cases, as the question set was not addressed. The question asked for the importance of factors in maintaining livestock health, not how the factors could be controlled.

- (i) Too many answers concentrated on how to eliminate parasites rather than their effects on livestock health. The idea of vectors, in the case of ectoparasites, should have been mentioned and internal organ damage by endoparasites. Lesions caused to an animal's skin also allow micro-organisms to enter and weakened animals are more susceptible to diseases. These points were seldom seen.
- (ii) Many answers stated only that clean water would avoid water-borne disease. The need for water as an essential part of the diet and in metabolic processes, so that bodily functions can continue, was not often mentioned. Examples, such as maintaining excretory processes, could have been given.
- (iii) As in the first section, too many answers concentrated on methods of controlling flies rather than the importance of this in maintaining livestock health. Flies as vectors of micro-organisms to food and water, as well as into the animals' blood, with suitable examples were points looked for.
- (iv) Many answers contained irrelevant information about the type of housing and how to clean it, rather than the importance of cleaning in preventing disease. Dirty housing attracts flies and vermin, which can carry disease to food and water and diseases and parasites are picked up directly from faeces – all points worthy of marks but omitted by many candidates.
- (v) Most candidates gained a mark for stating what a balanced ration is but could have expanded this by indicating why each element is needed to maintain a healthy animal. For example protein is needed for growth and repair and named minerals or vitamins for specific purposes, lack of them resulting in deficiency diseases such as anaemia. There were some good answers but many lacked detail.

Question 12

Answers to all parts of this question lacked detail.

- (a) This was badly answered by all those who attempted it. A description of a simple dam that would be constructed on a farm was looked for. Diagrams did not show detail and most of those who answered this seemed to have little knowledge of this type of construction. It is required knowledge in the syllabus and most standard texts have diagrams showing methods.

- (b)(i)** A clearly stated method of irrigation, such as 'sprinkler' or 'drip', was looked for. The question then made it clear that the source of water and some details of delivery, such as pumps, pipes and sprinkler heads were needed.
- (ii)** This part of the question was answered better. Both advantages and disadvantages should have been given. Candidates' knowledge was stronger on advantages, such as extending the season and the range of crops grown as well as improvements in yield and quality. Costs were mentioned as a disadvantage and some made references to erosion dangers but problems of salinisation could also have been mentioned.

AGRICULTURE

Paper 5038/03 practical

General comments

The majority of Centres did not indicate any problems with providing the apparatus or specimens for the practical examination, other than a few Centres stating that they were not given access to the Confidential Instructions until the day of the examination. However, a small number of Centres were unable to obtain visking tubing which was one of the suggested resources for **Question 1**. Some of these Centres substituted the visking tubing with another locally available and appropriate semi-permeable membrane. Most candidates attempted all parts of every question – indicating that there was sufficient time allocated for the examination. There were no cases of candidates infringing the examination rubric

It remains useful for more Centres to remind candidates of examination technique with regard to taking account of the mark allocation for each question in their responses. Again, some candidates continue to provide responses for practical questions by stating what they thought should be the outcome, as opposed to describing their actual observations.

Comments on specific questions

Section A

Question 1

- (a) (i) This question was answered well by most candidates, indicating that they had completed the appropriate practical procedure correctly. A minority of candidates used the terms positive or negative result instead of describing the necessary colour change. Such responses were not awarded a mark.
- (ii) This question was answered well by most candidates. They were able to use the results of their practical work in the previous question to conclude appropriately that AS1 contained both reducing sugar and starch.
- (b) (i) The results table for this question was completed well by many candidates. The results of tests for reducing sugar and starch after the experiment had been completed were usually more accurate than those conducted before the osmotic action had taken place.
- (ii) This question differentiated between candidates. The strongest candidates explained how the difference in size of the reducing sugar and the starch molecules affected how they might move across or be barred by the semi-permeable membrane by osmosis. Slightly weaker answers concentrated on the size differences between the molecules. The weakest candidates repeated their response to **Question 1 (a)(ii)** and concluded that the colour changes identified the presence or absence of starch or reducing sugar.

Question 2

- (a)(i)(ii) All candidates produced two drawings from AS2 and AS3. Most candidates should be congratulated for the clarity of the drawings. However some of the drawings were too small. Some of the candidates drew seeds rather than the entire fruit.

- (b) (i)** Most candidates were able to identify that the seeds would be dispersed explosively, or described an appropriate method suitable for the specimen involved.
- (ii)** The majority of candidates provided an appropriate reason for their suggestion of seed dispersal. A minority provided a response which was 'text-book' rather than from observation and consequently was not relevant to the specimen.

Question 3

- (a)(i)(ii)** Many candidates were able to provide a suitable description of the texture of the two soil samples. However, too many candidates provided responses which did not describe texture, but described colour, porosity or appearance.
- (b)(i)(iv)** This practical test was performed well by many candidates, but a large minority achieved results which indicated times that could not be achieved if the experiment had been completed properly. Additionally, some candidates claimed to have collected more water than they had added to the soil samples. This suggests that the candidates had not attempted the practical.
- (v)** This Question was answered well.
- (vi)** Most candidates provided a superficial response to this Question. The more able candidates referred to the spaces between soil particles and how water may remain attached to soil particles.
- (vii)** This Question was answered well.
- (viii)** Too many candidates described how they measured the volume of water released from the soil sample inappropriately using a beaker, rather than taking a more accurate reading by transferring the sample to a measuring cylinder.
- (c)** Most candidates were able to provide an unqualified but reasonable response to this Question. The more able candidates were able to provide an appropriate qualification to gain both marks.