AGRICULTURE

| Paper 5038/01 |
| Paper 1 |

General comments

It is essential that candidates make sure that they have a good knowledge of <u>all</u> processes and organisms specified in the syllabus, if they are to be able to attempt all questions in *Section A* and have a realistic choice in *Section B*. It was disappointing that the first two questions in *Section A*, which were straightforward, showed a lack of knowledge, by many candidates, of two such topics. Candidates also need to ensure that their answers are sufficiently detailed to make clear their understanding of a topic. In *Section B*, unless specified, a list is not an adequate answer. Some detail, to indicate a greater depth of knowledge, is generally required. It is also essential to ensure that a candidate's response answers the question set. Some candidates continue to pick out a term or topic, mentioned in a question and simply write all they can remember about it, without considering whether this is relevant. This does not indicate an ability to reason or apply knowledge and will result in lost marks. It is expected that candidates will have had some practical experience, on a small scale, of growing food plants and seeing how animals are cared for under domestication. In many cases it is clear that this practical experience is lacking. Many answers would be improved if this situation were addressed.

Comments on specific questions

Section A

Question 1

(a)(i) The processes are:
A – nitrification,
B – absorption,
C – death/decay/decomposition/excretion/faeces.

Most candidates correctly identified **C** but a surprising number were unable to name **A** or **B** correctly. Many candidates seemed to be unfamiliar with the nitrogen cycle as answers indicated guesswork, with wrong answers being random rather than showing any pattern. For example, identifying **A** as de-nitrification shows little grasp of the principles.

(ii) Lack of knowledge of this topic was born out here, where many candidates knew little or nothing of nitrogen fixation. Good answers referred to atmospheric nitrogen being utilised by nitrogen-fixing bacteria in root nodules.

(b) Most candidates indicated that sandy soils drain easily but needed to make it clear that the dissolved nitrates would then be washed out, by rain for example, for maximum marks to be awarded. Reference to leaching made it plain that this was understood.

Question 2

Maize is specified in the syllabus as the wind pollinated plant that candidates should have studied so details of flower and fruit should be familiar. In many cases this was clearly not the case, with relatively few candidates able to identify the structures in Fig. 2.1 or 2.2. and some referring to insect pollination.

(a)(i) Correct labels were: **A** – stamen (or anther or tassel), **B** – stigmas (or silks). Many candidates were unable to identify these structures.

(ii) Candidates who identified the structures correctly also knew that the function of **A** is production of pollen and that of **B** is to catch pollen.

(b) (i) **C** was the endosperm. A common error was to label it 'cotyledon'. **D** was the plumule. 'Radicle' was a common error.

(ii) Conditions for seed germination should be basic knowledge for this subject so it was disappointing that so many could not list them. The presence of water and oxygen, plus a suitable temperature are essential. 'Temperature', without further qualification, is not an acceptable answer. Soil nutrients are irrelevant in terms of seed germination. As this was a common error, it suggests that candidates may not fully understand the term.

Question 3

(a) (i) Most candidates were able to read the graph correctly to give a figure for the yield of 5700 kg per ha but many forgot to include the units, essential for the mark to be awarded.

(ii) Candidates who answered correctly realised that the farmer would sow seed at the higher rate with no increase in yield, thus wasting seed and, therefore, money. Both the graph and the question indicate <u>no decrease</u> in yield between 100 and 150 kg per ha but many candidates stated that the yield decreased.

(iii) The idea of competition, for water, nutrients, space (and consequently light), were seen in many good answers. Candidates could also have indicated that this would not only result in fewer plants fruiting but also that the fruit formed (ears or cobs) would be smaller.

(b) There seemed little evidence of any practical knowledge of sowing. Losses to birds and animals were recognised but the lack of even spacing and any depth control were seldom identified as resulting in lower germination and growth. Broadcasting should not result in large amounts of seed falling outside field boundaries so seed landing on rocks or infertile ground are not relevant.

Question 4

(a) Candidates answered this well. Danger to the operator as well as to others and to animals in the area, together with wastage of spray (and therefore money), plus pollution risks, especially of water, were all well made points.

(b) The question specified precautions <u>other than avoiding windy conditions</u> – a point missed by some candidates, with consequent loss of marks. The question also referred to the operator <u>using</u> pesticides so storage precautions were not relevant here. Use of protective clothing is one precaution. Candidates will not gain full marks for listing separate items of protective clothing.

(c) (i) 'Biological' or 'physical' will not gain marks as methods of insect control as, alone, they give no information and do not indicate any knowledge by the candidate. A specific example, such as the use of a predator, crop rotation or early planting, is needed.

(ii) There were many good answers here. The weakest referred to avoiding unspecified 'pollution' but there were references to cost, availability of the insecticide, the problem of resistant pests and killing beneficial insects and organic growing. All of these show a good awareness of problems and factors in modern agriculture.

Question 5

Some candidates did not read the questions carefully in (b) so their answers were not appropriate.

(a) (i) The genotype of the black bull was Bb and that of the red cows was bb.

(ii) A correct genetic diagram and an indication of the phenotypes of the resulting calves were needed for both marks to be awarded. Many candidates gave the correct diagram but did not state the phenotypes, so answers were incomplete. A punnet square seems to lead to fewer errors than a branching diagram. Candidates need to take care that the crosses shown are correct, if they use the latter, with the correct number of links to each allele.

(b)(i) The question asked how breeds of cattle could have been improved, so answers related to selective breeding and cross-breeding with exotic or imported breeds were relevant but reference to better feeding and conditions were not as these could not affect a breed.

(ii) This question asked for reasons other than breeding so better feeding, care and conditions were answers that gained a mark here. References to AI or breeding were not relevant.

Question 6

This question was well answered, with candidates showing a good level of knowledge.

(a)(i) The crop stores food before digestion and the gizzard grinds up the hard food particles. This was generally well known.

(ii) The gizzard has muscular walls that churn food and it contains small stones that help in the breakdown. Most candidates gave only one point, a few described both.

(b)(i) The correct order was: 1 – remove dung, 2 – clean all surfaces, 3 – apply a disinfectant, 4 – leave empty for 14 days. Most candidates gave the correct order.

(ii) Candidates knew that the disinfectant would kill pathogens. 'Kill disease' is insufficient, reference to disease-causing organisms, such as bacteria, is needed. Few candidates were able to get a second mark here, however. Most thought that the 14 day interval was so that the disinfectant smell would dissipate or that it was needed for the disinfectant to work but they seemed unaware that this interval would be important in allowing parasites to die out.

Question 7

Lack of knowledge in the use of simple tools points to a disappointing lack of practical experience in sowing and growing crops on a small scale.

(a)(i) The correct order was C, A, B, given by very few candidates.

(ii) There seemed little knowledge of the function of these tools. In addition, candidates did not take into account that the question referred to preparation of a seed bed on previously uncultivated ground. A spade is a digging implement that will turn the soil, burying weeds in the process (using it to 'dig holes for seeds' is not practical and, while using it to move manure might be a secondary role, it is not the primary role of this tool in seed bed preparation). A fork is used to break up large soil particles and would not efficiently turn soil. A rake is for levelling the seed bed when the soil has been cultivated with spade and then fork.

(b) This part of the question was generally well answered. Candidates described care of tools in detail, mentioning care of both metal and wooden parts to prevent rusting of metal and rot or insect damage to the wooden handles. Dry, secure storage, maintenance, in terms of sharpening, straightening and the tightening of screws, as well as correct usage were all well-made points.

Section B

Question 8

(a) Most candidates remembered to state the name of a ruminant animal. A few candidates used an inappropriate example, such as pig or chicken. Being able to give a correct example of a ruminant is part of the question so candidates who do not do this will not gain maximum marks. This will also apply where no animal is mentioned. Thus candidates may be penalising themselves unnecessarily if they do not read the question requirements carefully. General symptoms of ill-health were looked for, such as dull eyes and coat, high temperature, fever, the condition of faeces and urine, lack of appetite. Uncharacteristic behaviour, such as isolation or lethargy, was also accepted but candidates should not give a long list of vague signs, such as weakness or tiredness, since these are all part of abnormal behaviour so will only gain this mark. If candidates give specific symptoms related to a particular disease, they must state the disease that would be indicated, but this sort of detail is to be welcomed as it shows practical knowledge.

(b)   Many candidates did not address the question set. Answers were often about stockmanship rather than about housing and living conditions while some concentrated on the construction of the house. Candidates mentioned the importance of clean housing, utensils, water and food and many referred to correct temperature and ventilation but most could have related these more clearly to the way in which they prevent disease. Good answers included reference to destruction of pathogens, avoiding parasites and other organisms in air and water and avoiding vectors of disease. A few made the point that well-cared for animals resist disease better and some gave good examples of good practice, such as foot-baths at entrances.

Question 9

Many candidates gave rather general answers about grazing and pasture without relating this to the questions posed, so answers were not always relevant. There was also duplication of answers from one section to another, when each of these asked a different question. Some also answered in terms of fences in farming in general (keeping animals out of crops, for example), rather than in terms of grazing, as the question asked.

(a)   Some candidates mentioned rotational grazing in this section, which is not a treatment of pasture and was more appropriate in the answer to (b). Irrigation, use of fertilisers and re-seeding with better grasses were all good points. Sowing legumes was also valid but candidates did not always relate this to use of pasture. Their high protein content would be significant in animal fodder whereas the addition of nitrates to the soil, mentioned by many, would be more important when growing them as part of an arable rotation.

(b)   Candidates did not state how the fences would be used but listed the effects of fencing, then repeated this in (c). Good descriptions of rotational grazing or the use of electric fences in strip grazing were expected but many answers lacked any detail. Parasite reduction and conservation of good-quality dry season fodder would both be relevant in improved quality of pasture.

(c)   Candidates understood that fencing can reduce stock losses and that a higher yield may be obtained though improved pasture but few mentioned that it could allow a higher stocking rate and could reduce parasite infestation by rotational grazing, thus leading to improved yield etc.

Question 10

This question was a less popular choice than the others but, where candidates attempted it, answers were often excellent, gaining full marks. The names of the strokes, positions of the valves and movements of the cylinder were clearly stated and many candidates also provided diagrams. These were often invaluable in confirming the valve positions where a candidate had not already made them entirely clear. A few errors and omissions occurred in some answers – there was reference to the spark plug but not to the production of a spark and the petrol/air mixture was not always correctly described as the presence of air was sometimes missed. These minor points apart, this was a very well-answered question.

Question 11

(a)   Candidates made a good attempt at this but many did not make their answers relevant to the situation described, of a farm far from a town or city. The difference between monoculture and mixed farming was understood. However, the important fact, of monoculture producing a single cash crop that would supply a commercial market and require transport to buyers or exporters, possibly unavailable in a remote rural location, was not clearly stated. Answers became a list of the advantages of mixed farming over monoculture, without reference to the situation described. Whilst many of these points were valid, answers did not give a convincing demonstration of the candidates' ability to apply knowledge, rather than simply repeating a list of facts. Self-sufficiency and reduction of need for transport for inputs or to distant markets were included in good answers.

(b)   Many candidates gave a list of correct factors but could have given a little more detail. 'Outline' does not indicate that each point needs a great deal of elaboration but the answer should be more than just a list. For example, 'climate' could include rainfall and temperature with seasonality and quantity included. Candidates who gave some detail of a factor often backed this up with an example of a choice of crop that might be made, giving their answer increased validity. In the same way, topography of the land available could be related to choice of an arable or animal enterprise. Reference to soil type, markets and demand were often mentioned and some

candidates made excellent points about government policy and local customs and culture affecting choice.

Question 12

(a)   Some candidates continue to confuse dispersal with pollination. Most candidates concentrated on the spread of weeds by seed, although they did not always make it clear that the fruits or seeds were the structures being dispersed. Mechanisms were described, for example hooks on seeds that attach to an animal's coat, but few candidates gave named examples of weeds that would be spread by each mechanism. This sort of detail would have improved and clarified answers where detail given was rather vague. There was little reference to perennial weeds that can be dispersed by vegetative material, which can occur during cultivations, for example.

(b)   Most candidates gave a variety of weed control methods, with most mentioning herbicides. It is essential that the difference, between herbicides and insecticides, is understood. Some candidates seem to use the terms interchangeably and named examples are often given incorrectly. Whether a herbicide is systemic or contact is less significant in a description than whether it is selective or non-selective, a point missed by many candidates. This can also affect timing of application so herbicides can be used pre- or post-emergence. Where a question asks for a description of weed control methods, this sort of detail is looked for. The many other cultural methods used to control weeds - hoeing, mulching, crop spacing, burying weeds by ploughing, controlled burning etc. - were also included in candidates' answers.

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Candidates found the paper accessible and almost all candidates gained marks for each question. **Question 1** proved to be the best discriminator where candidates failed to fully follow the practical instructions marks were lost in the latter part of the question.

Question 2 some Centres used millons reagent test for protein. Centres were allowed marks for correct response but should note this is a hazardous test owing to the presence of mercury.

Question 3 was answered exceptionally well candidates producing clear and accurate diagrams. Candidates could apply their practical knowledge to interpreting the effect of a faulty spark plug on engine performance.

Question 1

(a) Almost all candidates were able to identify the coarse and gritty nature of a sandy soil.

(b) Candidates identified humus and organic matter and were aware of the presence of clay.

(c) Candidates produced variable diagrams often not clearly indicating the higher humus content in **AS2**, marks were credited for getting the particles in correct size order. Quite a few candidates appeared to reverse the order.

(d) Allowance was given as long as there was at least 4 mm more in **AS2** and **AS1** was less than 5 mm.

(e) Almost all candidates were able to relate the appropriate soil with a suitable reason. Well drained soils were understood better than rich organic soils.

Question 2

(a) Not all candidates were able to correctly label the outside structure of a bean seed, *hylum* being the least well known, and some candidates were calling the *testa* cotyledon.

(b) Almost all candidates drew clear diagrams and were able to label the parts appropriately.

(c) Nearly all candidates gave an appropriate colour for the starch test. A few candidates confused the test with sugars.

(d) Centres either knew this or were unable to answer. Some pleasing descriptions of test were given for fat. As mentioned earlier a worrying number of Centres are still using millon reagent test for protein.

Question 3

(a) 99% of candidates were able to identify **AS5** as a spark plug.

(b) Drawings were of an exceptionally high standard. Marks were awarded for a drawing where four parts were clearly identifiable including *terminal, ceramic casing, metal casing or nut, washer and electrodes.* Where candidates labelled the appropriate part, marks were also awarded.

(c) It was really interesting to read a wide range of possible answers, of which most were very credible and demonstrated real understanding of the working of a 4 stroke petrol engine. The most common answers were carbon or oil fouled electrodes, dirty or wet or cracked ceramic casing.