

CHAPTER 3

AGRICULTURAL SCIENCES

The following report should be read in conjunction with the Agricultural Sciences question papers of the November 2017 NSC examinations.

3.1 PERFORMANCE TRENDS (2014 – 2017)

The number of candidates who wrote the Agricultural Sciences examination in 2017 decreased by 7 932 in comparison to that of 2016. The performance of the candidates in 2017 reflects a marked decline at the 30% level to 70,4% as well as at the 40% level to 39,9% compared to the last four years. Over the last four years the performance has declined by 12.2 percentage points at the 30% level and 13 percentage points at the 40% level, and this trend needs to be halted and reversed.

Table 3.1.1 Overall achievement in Agricultural Sciences

Year	No Wrote	No. achieved at 30% and above	% achieved at 30% and above	No. achieved at 40% and above	% achieved at 40% and above
2014	78 063	64 486	82,6	41 280	52,9
2015	104 251	80 125	76,9	46 895	45,0
2016	106 454	80 225	75,4	47 362	44,5
2017	98 522	69 360	70,4	39 353	39,9

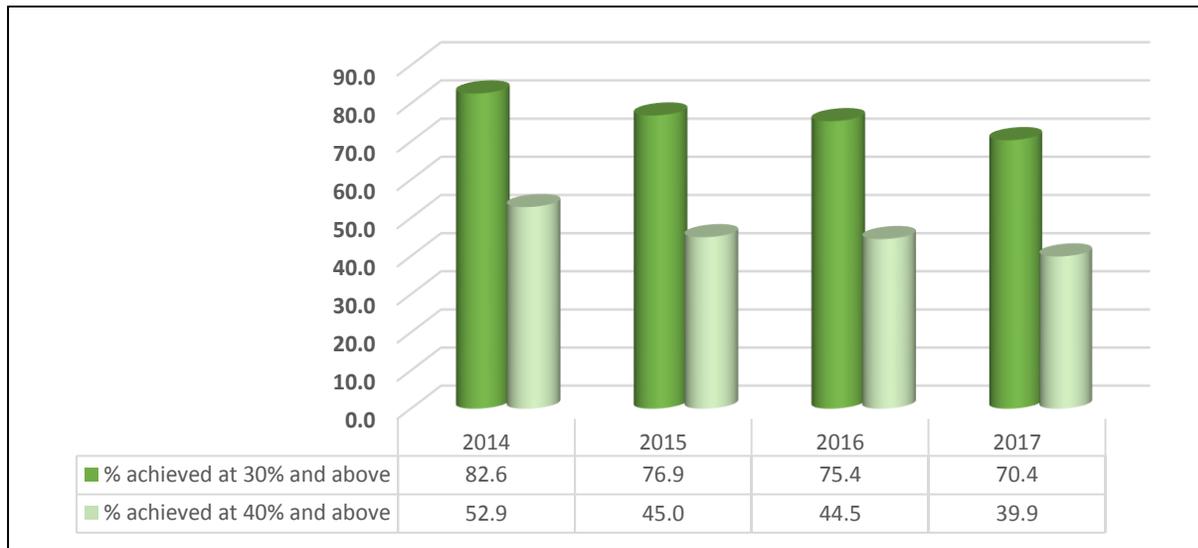
Despite the declining trend in the performance of candidates, encouraging signs of improvement were noticed in certain content across the two papers that were previously regarded as challenging for most candidates, which indicates that teachers are taking note of points raised in previous diagnostic reports.

These areas of content were: Animal production, protection and control; Management and marketing; Supply and demand; and Labour as a factor of production. Improved responses to questions on graphs were also noticed in certain centres.

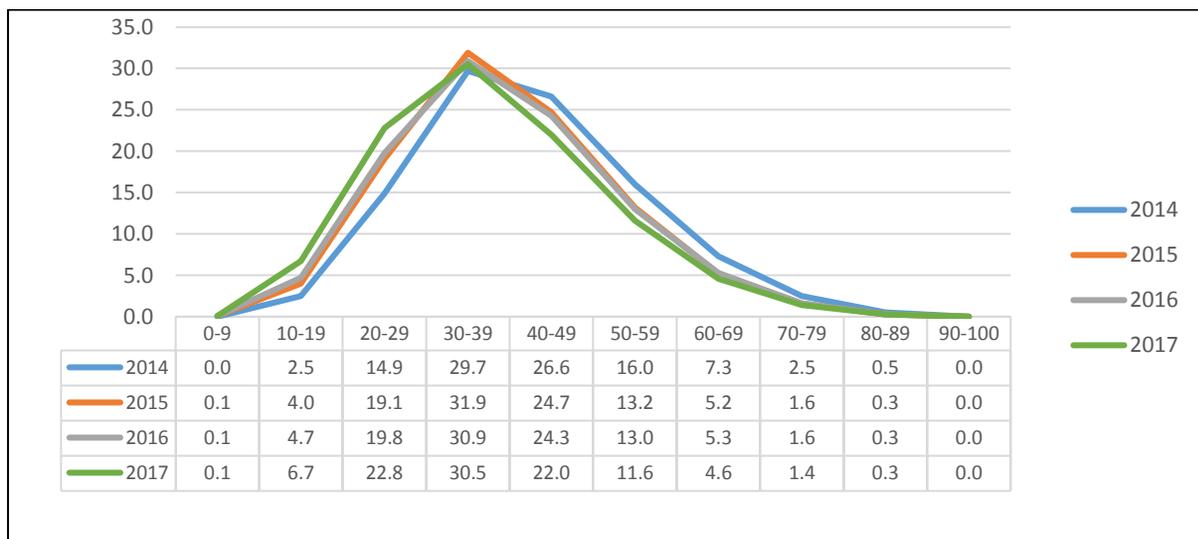
However, poor performance was noticeable in Agricultural management and genetics; Animal nutrition; Animal reproduction; and the short questions focusing on terminology and basic concepts.

The general decline in performance can be attributed to a number of factors. These include poor understanding of subject terminology and basic concepts, inability to respond to specific requirements of questions, lack of skill in basic calculations, and inability to analyse and interpret data from scenarios or schematic representations. These factors are covered further in further detail in this report.

Graph 3.1.1 Overall achievement in Agricultural Sciences (percentage)



Graph 3.1.2 Performance distribution curves in Agricultural Science (percentage)



3.2 GENERAL COMMENTS FOR PAPER 1 AND PAPER 2

This report contains comments on specific questions that proved difficult for candidates, as well as suggestions to rectify these. However, there are several factors that generally contribute to poor subject knowledge and poor performances by many candidates in the NSC Agricultural Sciences papers. These factors include a lack of basic knowledge of concepts and terminology applicable to the subject; the inability of candidates to address the specific requirements of each question and a lack of arithmetical, application and analytical skills.

The following general recommendations are applicable to both papers.

- (a) **The importance of formative testing:** Short, informal formative tests must be used to build the confidence of learners in all topics. Self-marking or peer-marking allows learners to benefit from immediate feedback by gaining an understanding of the mark allocation and by enabling them to promptly identify errors or valid alternative responses.
- (b) **Basic concepts & terminology:** Learners need to understand and explain basic concepts and terminology in order to engage effectively with each topic. The process of conceptualizing and understanding these concepts is more than merely rote-learning definitions. Terminology needs to be emphasised on a regular basis and should form an integral part of teaching and learning. Teachers are advised to make the teaching of terminology interesting to learners by integrating word puzzles in the teaching, learning and assessment process. Learners should also be encouraged to prepare a glossary or concept bank of subject terminology. Teachers are advised to use the following strategies to improve the teaching of basic concepts and terminology:
- Illustrate the meaning of new concepts and terms by using them in sentences and in short scenarios.
 - Identify new terms in every lesson, write them on the board and elaborate on the meaning and context of each.
 - Encourage learners to be attentive during lessons, to spot new terms and to find the meaning in a dictionary or textbook.
 - Learners should compile a glossary at the back of their notebooks i.e. a list of new terms per topic, with a brief, but clear definition next to each term. A separate notebook for this purpose may also be kept. By the end of the year, all learners should have a comprehensive glossary of all the relevant terms.
 - Include Agricultural Sciences terminology in all informal assessment tasks daily.
 - The distinction between challenging or confusing terminology could be illustrated or explained on class posters so that learners could be exposed to this on a regular basis.
- (c) **Enhancing learners' skills in accurately interpreting specific subquestions and using information that is relevant:** It is essential that learners have a good understanding of these verbs. This is emphasised in the *Examination Guidelines*. It is very unfortunate that weaker candidates under-achieve in the NSC examinations because they do not properly answer the specific questions and subquestions that are asked. Learners must be taught the meaning of the action verbs that are commonly used in the papers. Teachers are strongly advised to expose learners to the key verbs such as 'comment' and 'justify' and 'suggest'. Teachers are advised to use several past NSC papers that assess the same topic using different action verbs. These verbs should be included in both informal and formal assessment. This will enable learners to form a better understanding of the requirements of each question.
- (d) **Skills to be assessed:** Assessment should be such that it challenges the learners' ability to think beyond that which is simply presented in the textbooks. Learners need to be skilled in the

application of knowledge. Analytical skills of learners need to be developed through data response questions.

- (e) **Real-life scenarios:** Learners show a serious lack of application skills which indicates a lack of depth in their subject knowledge. Learners need to be exposed to more real-life agricultural situations to enhance deep learning. Where a practical demonstration is not possible, videos, magazines or internet articles can be productively used to illustrate aspects of the various topics more meaningfully. Teachers are advised to include scenarios and short statements in administering informal and formal assessment. They should first read and analyse scenarios with the learners before reading and analysing the follow-on questions. Learners may be requested to formulate their own questions based on the scenario which would help them to have a better understanding of the rationale behind scenarios. Teachers should then develop structured follow-on questions.
- (f) **Enhancing arithmetical and mathematical skills:** Examination papers in Agricultural Sciences contain many arithmetical or mathematical processes, e.g. drawing graphs, calculating percentages or calculating units of measurement. Learners also seem to lack appreciation of the magnitude of the various units such as tons and kilograms. Regular informal tasks on calculations incorporating these concepts is essential. It is very disappointing that some Grade 12 candidates cannot confidently handle these basic applications or calculations such as dividing by 1 000 to convert kilograms into tons. Teachers must not assume that learners have successfully engaged with these skills in other subjects or that learners have successfully transferred these skills from other subjects into the study of Agricultural Sciences.
- (g) **Use of past NSC papers:** Learners must have access to past examination papers but they should also be alerted to the limitations of past papers. It should be noted that, although past papers may cover the same content, they may have different foci, e.g. a question which asks for a *comment* requires a different response to a question which asks for a *justification* or *suggestion*.
- (h) **Reference to the CAPS, Examination Guidelines and previous Diagnostic Reports:** Teachers must teach and assess all content prescribed in *CAPS* and the *Examination Guidelines*. There might be topics that have not been covered in recent question papers, but they remain important content topics to be taught holistically. It is also imperative that teachers take note of comments and recommendations in previous Diagnostic Reports.

3.3 OVERVIEW OF LEARNER PERFORMANCE IN PAPER 1

General comments

- (a) The performance of candidates in Q1 has declined in comparison to that of 2016. Candidates performed the worst in Q1.2 and Q1.3.
- (b) Performance has declined in Q2 in nutrition, in this case relating to mineral and vitamin deficiency symptoms and energy value of feeds. Poor performance could be due to candidates' inability to respond to questions on energy value of feeds, minerals, vitamins and their deficiency symptoms.

- (c) Q3 on animal production, protection and control was well answered.
- (d) Q4 was not well answered due to misinterpretation of the synchronization of oestrus.
- (e) Follow-up questions requiring motivation or justification are still poorly answered by most candidates, indicating that candidates are not really exposed to these types of questions in class.

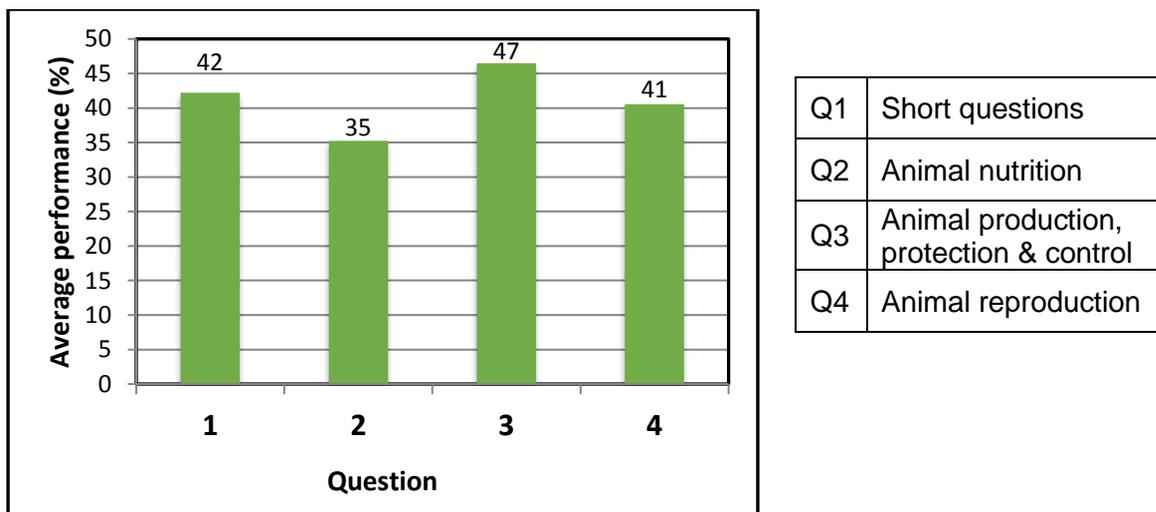
General suggestions for improvement

- (a) Teachers should use the *CAPS* and *2017 Examination Guidelines* when teaching and assessing formally and informally.
- (b) Informal assessment tasks should include sub-questions where a selection of correct and incorrect statements is included with the instruction written in upper case to emphasise the instruction.
- (c) Teachers should utilise the electronic media resources at their disposal, such as smart boards and the internet, when teaching concepts to improve learner spelling abilities.
- (d) Teachers need to be empowered on the English Across the Curriculum (EAC) programme to integrate English skills in the teaching, learning and assessment of the subject.
- (e) Teachers are advised to integrate data response questions in their informal assessment so that learners are enabled to respond appropriately.

3.4 DIAGNOSTIC QUESTION ANALYSIS FOR PAPER 1

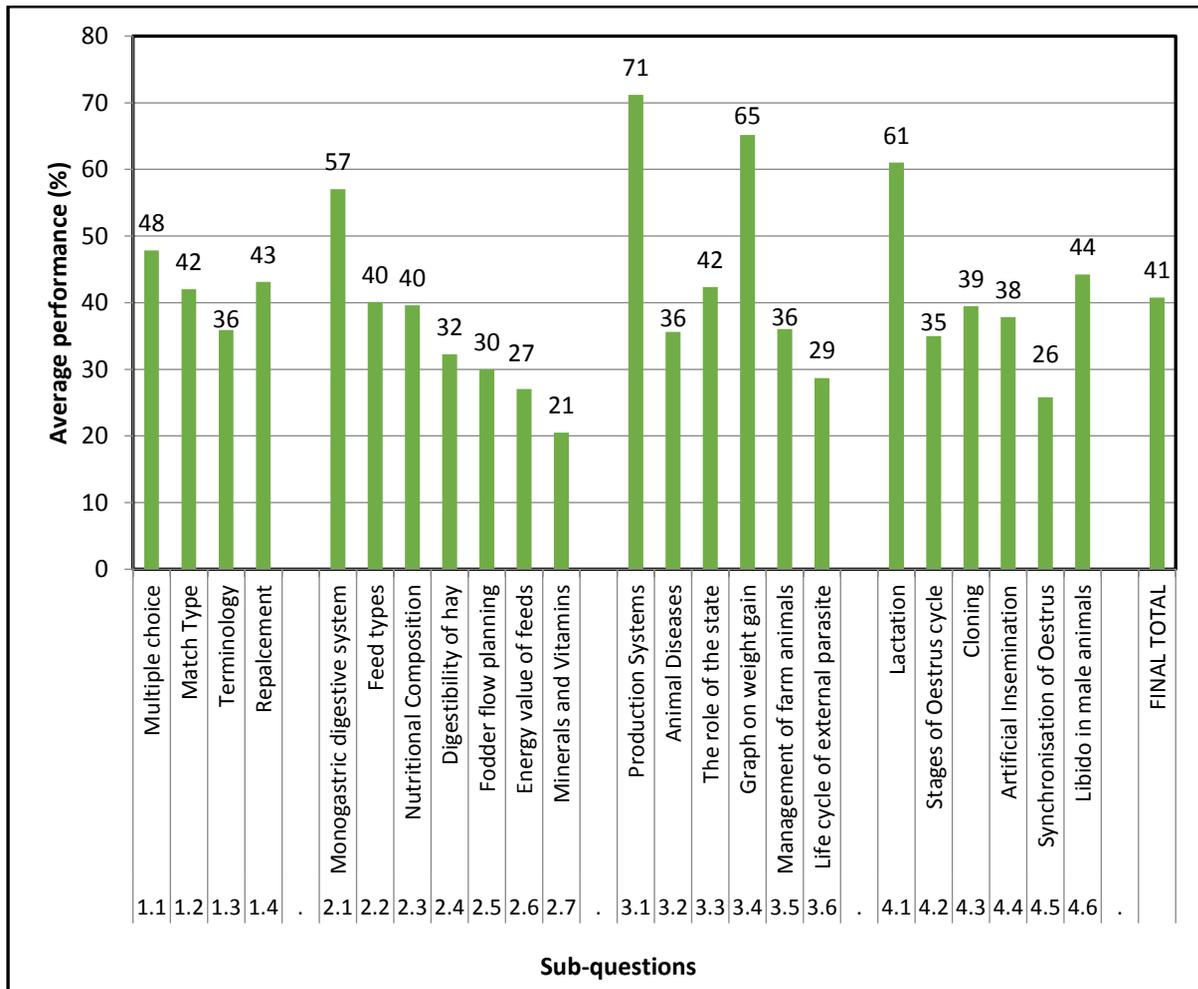
The following graph is based on data from a random sample of candidates. While this graph might not accurately reflect national averages, it is useful in assessing the relative degrees of challenge of each question as experienced by candidates.

Figure 3.4.1: Average marks per question expressed as a percentage in Paper 1



Q1	Short questions
Q2	Animal nutrition
Q3	Animal production, protection & control
Q4	Animal reproduction

Figure 3.4.2: Average marks per subquestion expressed as a percentage in Paper 1



3.5 ANALYSIS OF LEARNER PERFORMANCE IN INDIVIDUAL QUESTIONS IN PAPER 1

QUESTION 1: SHORT QUESTIONS (ANIMAL SCIENCES)

Q1.1 and Q1.2 were well answered. Learners seem to be familiar with these questions. The fact that candidates did not have to formulate their own responses might have helped. Q1.3 and Q1.4 are based on subject terminology and it is evident from their responses that candidates still do not know the terminology. This might also have an influence on the rest of the paper, since learners are struggling to express themselves in writing.

Common errors and misconceptions

- (a) In Q1.1.3, candidates had a challenge on the compounding of rations for production purposes while in Q1.1.6, candidates were unable to identify the signs of stress in farm animals.
- (b) In Q1.1.7, candidates lost marks due to their inability to categorise diseases, in this case 'contagious bacterial diseases'.

- (c) Candidates failed to associate the clotting of blood in fowls to Vitamin K, and hence they wrote 'none' as the correct response in Q1.2.1.
- (d) In Q1.2.2, learners displayed a lack of knowledge and understanding of the purpose and the requirements of the feed flow programme.
- (e) In Q1.3.1, candidates could not relate to the context of the question which was on improving the digestibility of grains by dry heating causing them to expand. They provided irrelevant responses such as boiling, chopping, soaking and grinding.
- (f) In Q1.3.3, candidates confused super-ovulation with synchronisation of oestrus while in Q1.3.4, their responses indicated that they concentrated on dilutants of semen and on control of pH and hence they randomly gave responses such as glycerol, egg white, milk or antibiotics.
- (g) In Q1.4.1, candidates provided inappropriate responses such as 'pylorus', which is a portion of the stomach, instead of 'cardiac sphincter'.
- (h) In Q1.4.3, hypoplasia was mistakenly associated with bulls only. Consequently, learners wrote 'cryptorchidism' and 'semen'.

Suggestions for improvement

- (a) In-depth explanation of rations should be emphasised to enable learners to apply this in their learning.
- (b) Teachers need to emphasise different types of diseases as indicated in the *Examination Guidelines* with learners.
- (c) In the teaching of a fodder flow programme, the purpose of the fodder requirements of farm animals should be emphasised. Learners should be exposed to practical situations, particularly with visits to nearby farms.
- (d) A comparison between factors determining digestibility of feeds and factors improving digestibility of feeds, should be emphasised through assignments and practical investigations.
- (e) Key differences between reproductive processes and techniques should be addressed through charts, posters and other visual aids to enhance understanding.
- (f) In the teaching of the different alimentary canals of farm animals, emphasis should not only be on the major parts, but also the glands together with the functions of the digestive juices they secrete.

QUESTION 2: ANIMAL NUTRITION

Common errors and misconceptions

- (a) In Q2.1.3, candidates were challenged by the functions of the bile. Some incorrectly provided functions of the 'pancreatic juice' as their response. Others incorrectly offered the response 'changing acid pH to alkaline' as 'changing alkaline to acid'.

- (b) In Q2.1.4, candidates did not specifically write 'lipase' as the fat-digesting enzyme in the pancreas; instead they wrote 'lipolytic enzymes' which is a group of fat-digesting enzymes.
- (c) In Q2.2.1 candidates classified feed type B correctly (roughage) but failed to provide the reason for feeding roughage to a ruminant in Q2.2.4. Instead, they provided functions of roughage and its characteristics as the response.
- (d) In Q2.3.2, candidates were unable to justify their identification of the feed. Some candidates justified suitability of feed B for growing animals as having a 'small', 'less' or 'low' nutritive ratio, instead of a narrow nutritive ratio.
- (e) In Q2.3.3, candidates used a formula to calculate the digestible non-nitrogen nutrients which was already provided in the data table. Most added the fat, carbohydrate and protein components. This was a clear indication that they did not know the meaning of non-nitrogen nutrients (carbohydrates and fats).
- (f) In Q2.4.2, candidates were unable to respond to the instruction 'comment with a reason' on the suitability of hay for feeding high-producing milk cows. Some indicated that hay is not suitable but could not provide a reason for the non-suitability.
- (g) In Q2.5.1, candidates' responses indicated an inability to analyse data correctly. They identified the shortage of feed as a challenge the farmer might encounter, however, they indicated pregnancy and lactation as problems instead of coupling the two aspects with increased consumption.
- (h) In Q2.5.2, some candidates responded by indicating that the 'buying of feed' is a precautionary measure for shortage of fodder in the dry season. This is an indication that the purpose of fodder flow was not understood.
- (i) In Q2.5.3, candidates lacked the basic skill of converting an amount in 'kg' to 'tons'. Some calculated the figures correctly but expressed their answers in tons without converting or dividing by 1 000.
- (j) In Q2.7.1, candidates could not link the minerals with their deficiency symptoms especially in B (deficiency of selenium), which was specific to pregnant cows. Responses such as dystocia, mastitis, swollen udder and sterility were incorrectly provided. These do not relate to the pregnancy period of a cow.

Suggestions for improvement

- (a) It is advised that different digestive glands of alimentary canals should be taught simultaneously with the major parts. A variety of resources with similar information should be used.
- (b) Teachers should use the flow diagram of the types of feed and indicate the characteristics of each feed type. Based on the characteristics of each feed type, it is advised that each feed type should be linked to the type of farm animal as they are also classified according to the digestive system.
- (c) In the teaching of a nutritive ratio, teachers are encouraged to emphasise implications of both a narrow and wide ratio and its suitability regarding growth, production and maintenance.

- (d) In the teaching of total digestible nutrients (TDN), it is advised that teachers should indicate that a protein is a nitrogenous nutrient while carbohydrates and fats are classified as non-nitrogenous nutrients. This will assist learners with subtracting the protein from the total digestible nutrients (TDN).
- (e) Teachers need to integrate data response questions when assessing learners on fodder flow so that they can become familiar with the terminology and key verbs in the questions, thereby gaining confidence in responding appropriately to questions such as Q 2.5.1.
- (f) Teachers should impress upon learners that buying feed is not an economical way to ensure that there is sufficient supply of feed. A viable precautionary measure would be to plan in advance to avoid shortages in fodder requirements. This might involve selling livestock or changing the production cycle of the farm animals.
- (g) Regular informal assessment on calculations and units of measurement is essential. Learners must be required to undertake regular practice of even the most basic calculations.
- (h) Teachers are advised to use a table to list examples, deficiencies, sources and forms of supplements in order to consolidate learners' knowledge on the topic of mineral and vitamin supplementation.

QUESTION 3: ANIMAL PRODUCTION, PROTECTION AND CONTROL

Common errors and misconceptions

- (a) In Q3.1.2, candidates compared the density of the sheep population to other farm animals instead of the number of sheep to the area they occupy.
- (b) In Q3.1.4, some candidates did not show how they calculated the total number of farm animals before obtaining the percentage of sheep on the farm.
- (c) In Q3.2.1, candidates could not identify the missing details in the table analysing three animal diseases.
- (d) In Q3.2.2, candidates were required to refer to the table to identify the roles of the state in controlling the specified diseases. They included general state services such as 'quarantine' instead of referring to those in the table.
- (e) In Q3.4.1, candidates were expected to provide the range of the number of days it would take the lambs to gain 1,8 kg. Many candidates inappropriately provided a specific number of days instead of the range of days, i.e. 8-24 days.
- (f) In Q3.4.2, candidates were expected to tabulate the information from a graph. A general mistake was that they did not provide a heading for the table, while some candidates lost marks due to wrong grouping of weight and days.
- (g) In Q3.5.3, candidates could not appropriately name the apparatus used to castrate young rams.
- (h) In Q3.5.4, some candidates wrote 'shelter' instead of 'shed' as a structure to protect sheep against adverse weather conditions.

- (i) In Q3.6.1, most candidates gave an incorrect identification of the parasite since they did not analyse the introductory statement in Q3.6. A clue was given that the parasite was not a tick as it was referred to as microscopic.
- (j) In Q3.6.4, some candidates did not earn full marks because they could not indicate two economic influences of the parasite on animal production.

Suggestions for improvement

- (a) Teachers are encouraged to ensure that the specific roles of the state are demarcated from any other measure to control diseases and parasites.
- (b) In teaching graphs, it is advised that all basics of drawing, plotting, analysing and interpretation are thoroughly taught, revised and assessed.
- (c) In the teaching of animal handling, teachers should emphasise the different techniques, tools or structures utilised to handle farm animals. Learners should also be exposed to demonstrations of the actual devices.
- (d) Besides simply focusing teaching on the types of diseases and parasites, teachers should also emphasise the impact these have on production enterprises.

QUESTION 4: ANIMAL REPRODUCTION

Common errors and misconceptions

- (a) In Q4.1.2, candidates could not interpret the requirements of the question to identify visible stimuli during milking. Some responses referred to non-visual factors, e.g. the sound of the milking machine or the sound of the calf.
- (b) In Q4.2.2, candidates were unable to apply the content knowledge of each stage of the oestrus cycle to the characteristics that were provided in the flow diagram. Instead, they matched the characteristics with one another or simply listed the stages in chronological order.
- (c) In Q4.3.2, candidates incorrectly indicated that the cell represented by D is a 'cloned cell'. Others incorrectly indicated that it was a 'zygote' or referred to it as a 'fertilised cell' instead of a 'fused cell'.
- (d) In Q4.4.2, candidates were unable to identify the apparatus represented by C, which is a nitrogen flask.
- (e) In Q4.4.3, some candidates responded incorrectly by giving characteristics and qualities of good semen other than the basic requirements for the collection of semen, while others provided the characteristics of a bull.
- (f) In Q4.5.1, candidates confused synchronization of oestrus with superovulation or artificial insemination. They failed to interpret that the injection of prostaglandin is only applied to the technique of synchronizing oestrus.

- (g) In Q4.5.2, candidates were required to state the disadvantages of synchronization of oestrus. Responses indicated that they were guessing by providing disadvantages of artificial insemination, embryo transfer and cloning.
- (h) In Q4.6, some candidates could not differentiate between the lack of libido and permanent sterility.

Suggestions for improvement

- (a) In the teaching of milk production, milk ejection and milking, learners should be taught that anything that is visible is what can be seen in a real-life situation. Teachers are also encouraged to take learners on educational excursions to observe these and other related processes.
- (b) In presenting the oestrus cycle, synchronization of oestrus cycle, artificial insemination, stages of pregnancy, embryo transfer, parturition and other reproductive processes, teachers should use flow diagrams, projections and schematic representations to identify key characteristics, hormones and processes.
- (c) Teachers must clearly differentiate between 'sterility' and 'infertility' in male and female animals.

3.6 OVERVIEW OF LEARNER PERFORMANCE IN PAPER 2

General comments

- (a) There was a remarkable decline in the performance of candidates in Q1. Candidates were generally confident in this question in past years, but the decline this year is mainly due to a lack of knowledge of subject terminology.
- (b) Q2 and Q3 reflected encouraging improvement, while the performance in Q4 was satisfactory.

General suggestions for improvement

- (a) The teaching of genetics should be enhanced by providing practical examples within the learning site, such as plants, flowers and livestock. There should also be integration with Life Sciences, as genetics is taught comprehensively in Life Sciences.
- (b) Teachers must ensure that all topics stipulated in the *CAPS* are comprehensively covered. Learners should also be encouraged to undertake a questioning approach, to learn from real-life situations and to undertake informal extra research.
- (c) Strategies to enhance learners' skills in understanding terminology, and mathematical and arithmetical calculations and procedures have been covered in this report. These strategies are particularly relevant to topics covered in this paper.

3.7 DIAGNOSTIC QUESTION ANALYSIS FOR PAPER 2

The following graph is based on data from a random sample of candidates. While this graph might not accurately reflect national averages, it is useful in assessing the relative degrees of challenge of each question as experienced by candidates.

Figure 3.7.1: Average marks per question expressed as a percentage in Paper 2

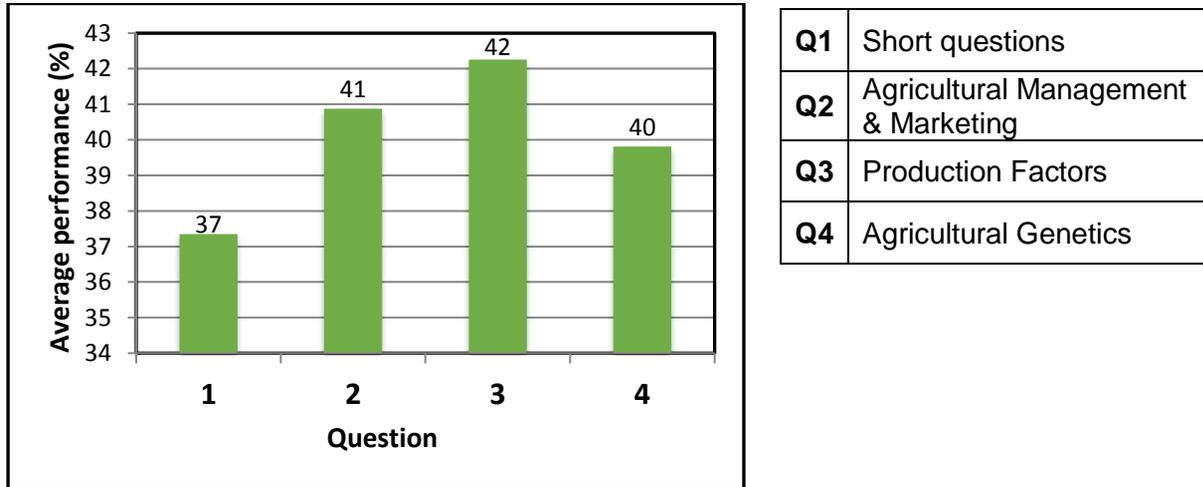
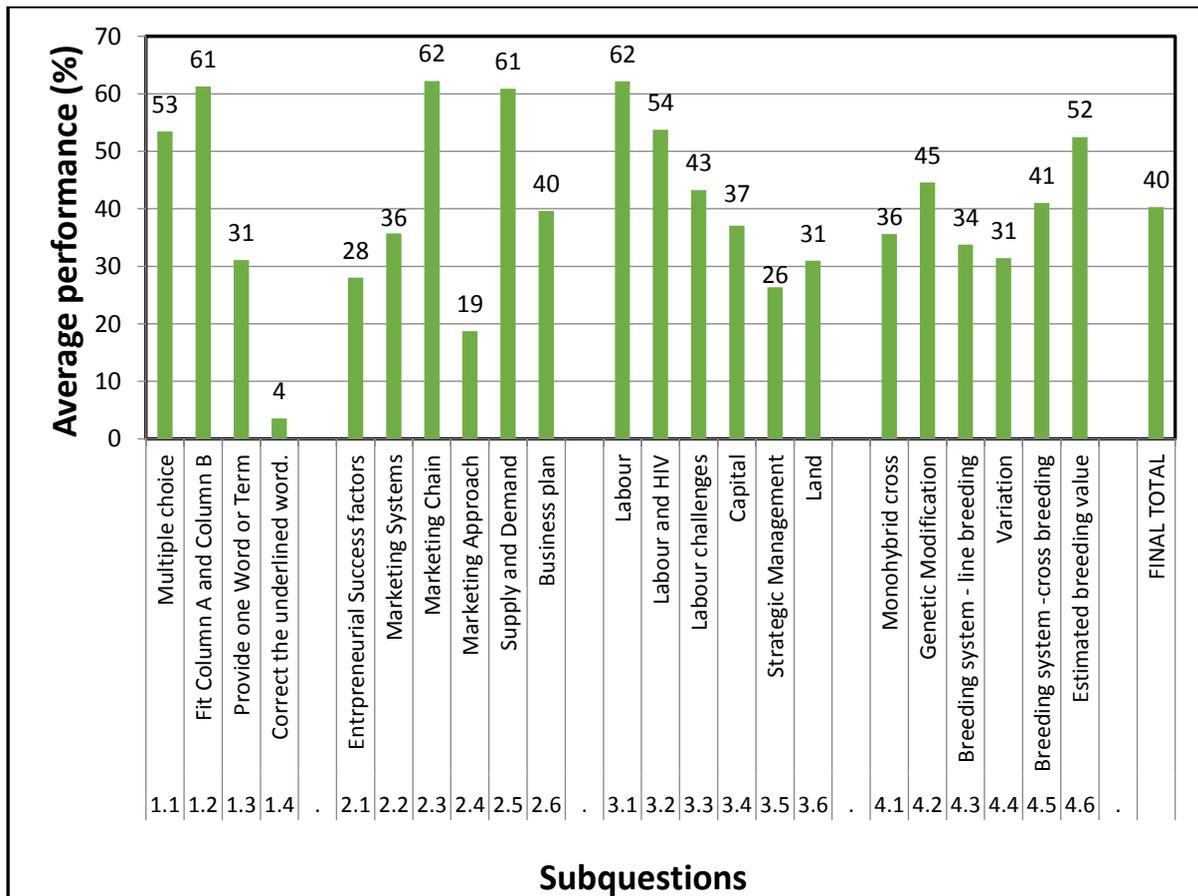


Figure 3.7.2: Average marks per subquestion expressed as a percentage in Paper 2



3.8 ANALYSIS OF LEARNER PERFORMANCE IN INDIVIDUAL QUESTIONS IN PAPER 2

QUESTION 1: SHORT QUESTIONS (AGRICULTURAL MANAGEMENT & GENETICS)

Common errors and misconceptions

- (a) In Q1.1.4, candidates provided random answers and could not give the correct combination of statements applying to the supply of a product.
- (b) In Q1.1.7, candidates could not provide the correct combination of statements applying to the Unemployment Insurance Act.
- (c) In Q1.1.10, most candidates were unable to provide the correct response regarding mutagen.
- (d) In Q1.2.4, candidates could not interpret that a 50 kW tractor is too small to cultivate 1 500ha of land. They therefore could not associate this with undercapitalisation.
- (e) In Q1.3.1, candidates were required to provide a term for the financial statement that summarises the assets and liabilities of a farming enterprise. They confused a 'balance sheet' with an 'income statement' or 'cash flow statement'.
- (f) In Q1.4, most candidates failed to provide relevant substitutes for the underlined words.

Suggestions for improvement

- (a) In the teaching of supply and demand, teachers should always integrate both the demand and supply curves in determining the price of a product.
- (b) Subject terminology is a serious challenge and this has been the case for many years. It is therefore recommended that it should form part of daily teaching, learning and assessment. This will also assist in the understanding of concepts such as balance sheets, income statements, cash flows and budgets.
- (c) Learners should be taught the conditions that are addressed in the various Acts of labour legislation. This should be done through case studies and scenarios.

QUESTION 2: AGRICULTURAL MANAGEMENT AND MARKETING

Common errors and misconceptions

- (a) In Q2.1.1, candidates could not identify the entrepreneurial success factors to link them to the different options in the diagram. Some candidates misinterpreted the diagram and responded inappropriately by giving the success factors associated with the personal characteristics of a manager, such as ability to plan and coordinate, implementation, monitoring and decision making.
- (b) In Q2.2.1, candidates had difficulty in linking the descriptions provided in the diagram with the marketing functions even though the answers were embedded in the descriptions. This clearly

indicated an inability to use knowledge of the marketing functions, namely transport, storage, packaging and processing, to answer the question.

- (c) In Q2.2.4, candidates failed to apply knowledge of the disadvantages of the marketing system in advising the farmer on how to improve his marketing strategy.
- (d) In Q2.3.1, candidates might have had knowledge of the concept of marketing chain but could not link it to marketing process.
- (e) In Q2.3.4, candidates failed to respond to the question specifically regarding transport; instead they referred to general factors that could hamper marketing, such as packaging.
- (f) In Q2.4, candidates failed to identify both marketing approaches using the examples given.
- (g) In Q2.5.1, candidates generally responded well to the drawing of the graph although some candidates reflected various shortcomings such as an incorrect heading, a histogram instead of a bar graph, manipulation of the axes, especially the y-axis, and confusing the x and y-axes.
- (h) In Q2.6.1, some candidates could not define the term 'business plan'. Instead, they provided long descriptions of what a business plan is used for.

Suggestions for improvement

- (a) Teachers are advised to clearly demarcate entrepreneurial success factors from managerial skills.
- (b) Learners should be taught to analyse diagrams, sketches, flow charts and to look for relevant information in the question, rather than attempting to recall answers from textbooks, notes or past papers.
- (c) It is very important to teach content holistically and not per topic in a vacuum, therefore making it possible for learners to see the connection between different topics relating to the same content. For example, the marketing chain should be taught in conjunction with marketing functions such as packaging, transportation, processing and storage (retailing).
- (d) Using real-life scenarios in the teaching of marketing approaches (i.e. niche, mass and multi segment) will enable learners to describe the size of the target market.
- (e) When teaching the drawing of a graph, it is important that learners be made aware that the independent variable should always be on the x-axis and the dependent variable should be on the y-axis. When drawing the graph, the following criteria should be taken into consideration:
 - Correct heading
 - Type of graph (bar/line)
 - X-axis correctly labelled
 - Y-axis correctly labelled

- Correct units on both axes
- Accuracy

(f) Teaching of a business plan should be done by emphasising the fact that it is a document. Furthermore, it should be emphasised that it is the basis and intention of the business.

QUESTION 3: PRODUCTION FACTORS

The improved performance can be attributed to candidates doing well in questions relating to labour. However, there were subquestions where candidates did not respond appropriately.

Common errors and misconceptions

- (a) In Q3.1.1, some candidates linked Job 1 with a leader, supervisor and even a managing director. This indicates that candidates have limited skills in using terminology related to the farming industry and positions.
- (b) In Q3.1.4, candidates failed to identify the type of temporary labourer and gave the job performed by the temporary labourer instead.
- (c) In Q3.2.1, candidates failed to identify the trend of HIV/Aids infections given in the graph. Some responded only to the one side of the trend omitting the rest, losing marks due to lack of interpretation skills.
- (d) In Q3.2.3, candidates had difficulty in naming the results of a HIV/Aids infection on the productivity of farm workers. They responded by stating how it is spread.
- (e) In Q3.4.2, candidates could not calculate the interest on the loan and therefore could not calculate the amount of money that needs to be repaid after a year.
- (f) In Q3.4.3, candidates found it very difficult to identify exactly what they had to calculate. They could not convert the weeks into months and link the eggs that are sold to the selling of broilers for three months.
- (g) In Q3.5.1, candidates' responses indicated they did not understand what a business strategy is; instead, they provided reasons for the development of a business plan.
- (h) In Q3.6.1, candidates did not know the term 'no-till practice' and most of them responded by indicating that there was low water surface movement, which is actually a result of the 'no-till practice'.
- (i) In Q3.6.2, candidates provided answers that do not relate to the given case study. They provided answers such as 'irrigation', instead of 'water management' and 'adaptation measures', to increase the land productivity.

Suggestions for improvement

- (a) In the teaching, learning and assessment of labour as a production factor, all aspects pertaining to labour (i.e. term, types, problems, increasing labour productivity, legislation and labour contract) should be considered as prescribed.
- (b) Interpretation of graphs and application of knowledge should be emphasised through regular integration into informal assessment.
- (c) Learners should be taught to interpret calculations based on scenarios and to be able to identify figures which relate to different items like profit and loan. They should also be taught basic rules in performing calculations.
- (d) Learners should be taught how to interpret and extract information from scenarios and case studies. This could be done by infusing such data response questions in their informal assessment.

QUESTION 4: BASIC AGRICULTURAL GENETICS

Common errors and misconceptions

- (a) In Q4.1.1, candidates failed to identify the type of dominance illustrated in the diagram. In their responses, candidates confused 'incomplete dominance' with 'co-dominance'. They consequently had difficulty in providing the two reasons for their answers in Q4.1.2.
- (b) In Q4.1.3, candidates performed poorly because they did not know the gender symbols for male and female. Their responses were inappropriate as they did not arrange the phenotype in accordance with the gender of the parents.
- (c) In Q4.2.1, candidates lost marks because they presented general benefits of genetic modification (GM) without considering the crop given in the case study.
- (d) In Q4.2.3, candidates performed poorly because they could not differentiate between the negative effects of GM to the environment, and social and health issues.
- (e) In Q4.3.2, candidates failed to provide the benefits of upgrading. They also confused 'upgrading' with 'cross-breeding'.
- (f) In Q4.4.1, some candidates could not identify the phenomenon of variation.
- (g) In Q4.4.2, candidates could provide only one reason for the possible external causes.
- (h) In Q4.4.3, candidates failed to state the importance of variation in plant breeding; instead they provided the importance of cross-breeding.
- (i) In Q4.5.2, candidates performed poorly because they were not able to justify a reason for the type of breeding (i.e. cross-breeding) in Q 4.5.1.
- (j) In Q4.5.4, candidates failed to understand that the question called for disadvantages of inbreeding, because they could not identify the breeding system (i.e. inbreeding).

Suggestions for improvement

- (a) Teachers should pay special attention to basic genetic concepts and terminology and unpack them through practical examples.
- (b) The different breeding systems should be taught to learners using real-life agricultural examples. Learners should also be taken to breeding stations for practical exposure. Teachers are also encouraged to teach these systems concurrently. In this way, learners will be able to understand the concepts better and to differentiate between the different systems.
- (c) Visual media should be integrated into the teaching of phenomena such as variation, to enhance understanding.