



## EXAMINATIONS AND ASSESSMENT CHIEF DIRECTORATE

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# 2019 NSC CHIEF MARKER'S REPORT

SUBJECT:	AGRICULTURAL SCIENCES
PAPER:	1
DURATION OF PAPER:	2 ½ HOURS
DATES OF MARKING:	01 – 14 DECEMBER 2019

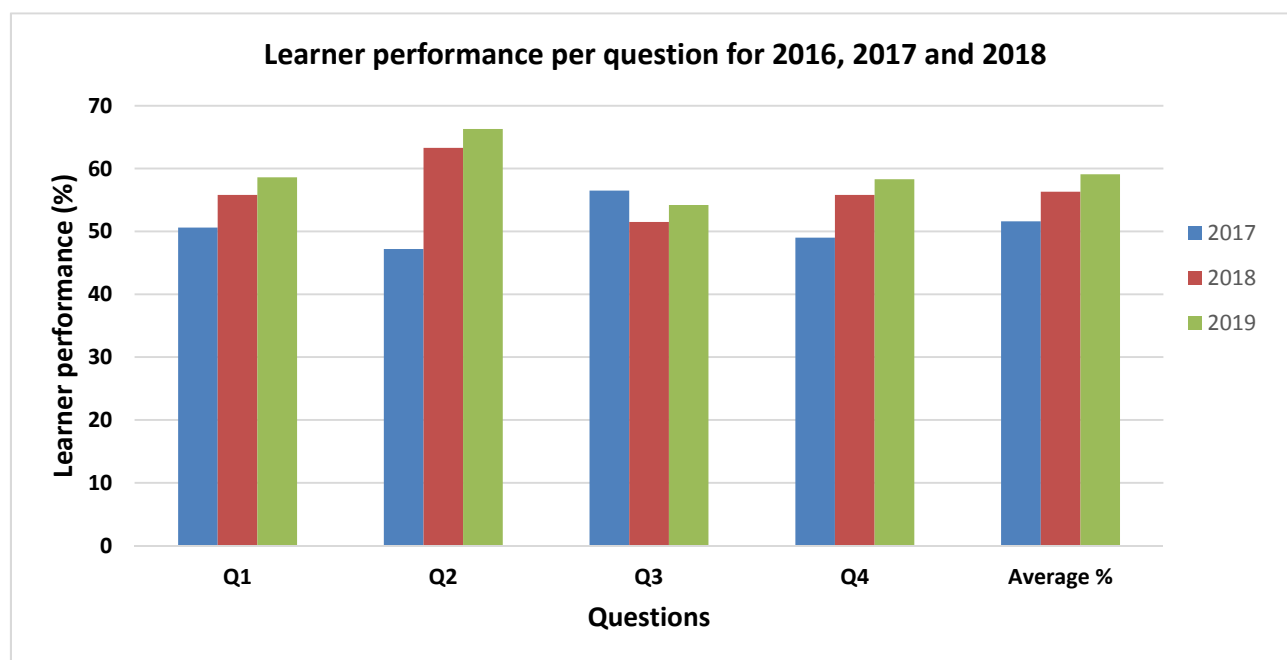
### SECTION 1: (General overview of Learner Performance in the question paper as a whole)

- ✓ The general picture depicted by the statistical analysis from both Rasch (100 scripts) and 7-point scale for Agricultural Sciences P1 in the Eastern Cape indicates that performance in the paper has improved this year compared to the past three years. The lowest score achieved was 0 and the highest 133 out of 150 marks. Candidates' average performance has increased in 2019 to 59, 1%, which is an improvement of 2, 8 % from 2018 (56, 3) leading to the improved quality of passes. A huge number of candidates have bunched at levels 1, 2, 3 and 4, but the total number of candidates who obtained levels 5, 6 and 7 has slightly increased.
- ✓ Learners performed slightly better in question 1 followed by question 2, question 4 and lastly question 3. Question 3 was the most problematic question to most candidates, and it is in the same question where most candidates obtained the lowest marks.
- ✓ Animal nutrition (question 2) used to challenge candidates in the previous years, but the 2019 matric cohort showed great improvement. A number of candidates scored below 10 % and three of them got zero out of 150 marks. The improved performance in the paper could be attributed to the commitment and team work by teachers, learners and other stakeholders with a special emphasis on focused intervention classes by districts together with schools through subject advisors where strategies employed addressed challenges highlighted in the diagnostic report.
- ✓ The general overview of learner performance for the paper generated from the statistical analysis has been summarized in table 1 and 2 and figure 1 and 2 below:

Table 1: performance per question

Que stio n	TOPIC OR ASPECT TESTED	HIGHEST ACHIEVER			LOWEST ACHIEVER			AVERAGE MARK			AVERAGE %		
		2017	2018	2019	2017	2018	2019	2017	2018	2019	2017	2018	2019
1	○ Animal Nutrition ○ Animal Production Protection and Control ○ Animal Reproduction	43	45	45	00	02	00	23	25	28	50,6	55,8	58,6
2	Animal Nutrition	34	35	35	00	00	00	17	22	25	47,2	63,3	68,3
3	Animal Production, Protection and Control	34	31	33	02	00	00	20	18	20	56,5	51,5	54,2
4	Animal Reproduction	32	33	34	00	00	00	17	20	23	49,0	55,8	58,3
GRAND TOTAL		124	134	133	02	05	00	76	85	96	51,6	56,3	59,1
MAXIMUM MARKS		150	15	15	15	15	150	15	15	15	100	100	100

Figure 1: Average performance (%) per question

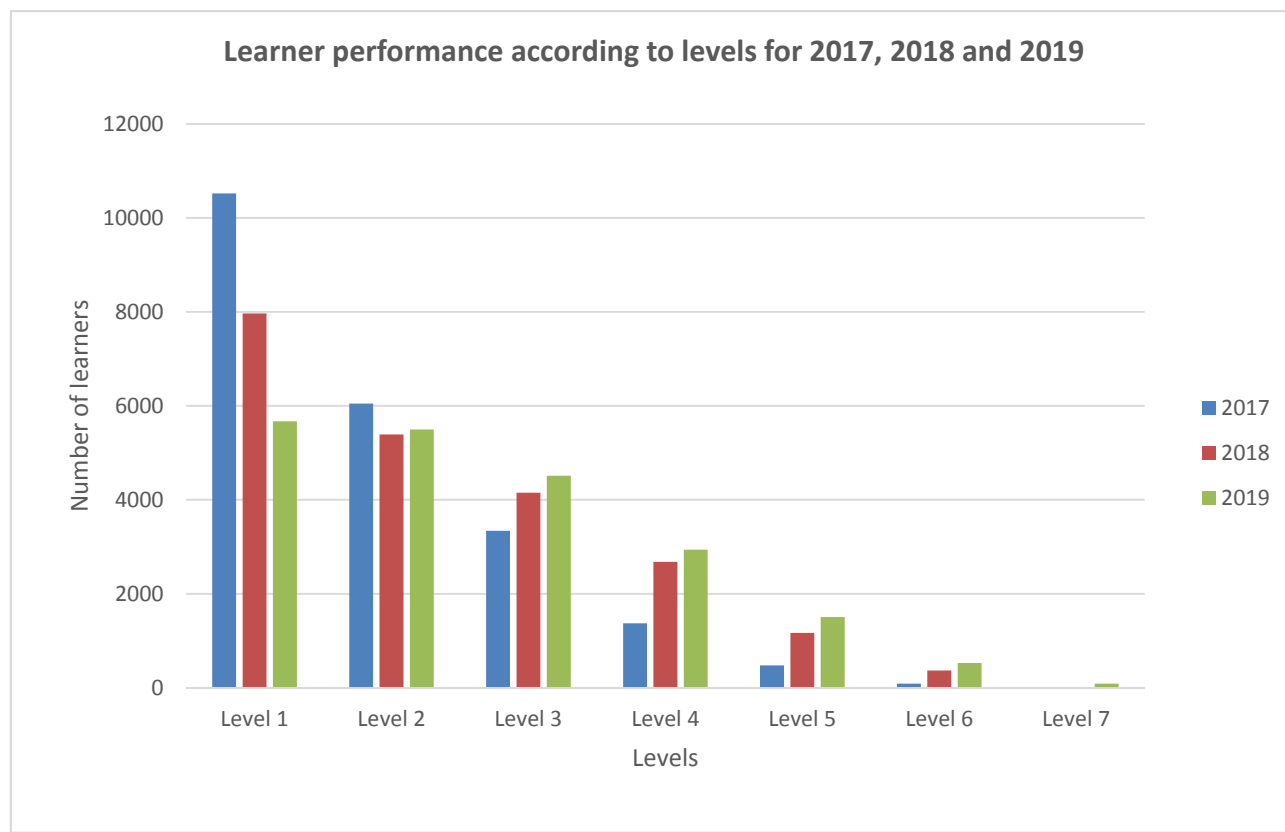


QUESTION	KNOWLEDGE (CONTENT) AREA ASSESSED FOR EACH QUESTION
QUESTION 1	Animal Nutrition, Animal Production, Protection & Control and Animal Reproduction (Multiple Choice questions; Column A & B; Terminology and Term replacement)
QUESTION 2	Animal Nutrition
QUESTION 3	Animal Production, Protection & Control
QUESTION 4	Animal Reproduction

Table 2: performance according to levels

Year	Levels	1	2	3	4	5	6	7	TOTAL
2017	No. of Learners	10522	6048	3342	1372	476	88	17	21 865
	Percentage (%)	48,1	27,7	15,3	6,3	2,2	0,4	0,08	51,9 %
2018	No. of Learners	7665	5391	4152	2680	1169	368	71	21796
	Percentage (%)	35,2	24,7	19,0	12,3	5,4	1,7	0,3	64,8
2019	No. of Learners	5670	5497	4511	2938	1506	526	87	20735
	Percentage (%)	27,3	26,5	21,8	14,2	7,3	2,5	0,4	72,6

**Figure 2: Performance of candidates according to levels**



- ✓ It is evident from the statistical analysis that the bulk of the candidates achieved between levels 1 and 3 and very few between levels 4 to 7. The number of candidates achieving at level 1 is steadily decreasing every year and also both the quantity and quality of passes (levels 4 to 7) is increasing bit by bit. Despite these improvements, our learners are still not performing at the desired level, turning this graph to a bell shape is what every agricultural sciences teacher and specialist should aim and work for.

## SECTION 2: Comment on candidates' performance in individual questions

(It is expected that a comment will be provided for each question on a separate sheet).

QUESTION 1		
General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?		
✓ Average learner performance of 59, 1% in question 1 displayed an incline of 3, 3% compared to 55, 8% of 2018.		
Average mark from the sample of 100:		26
SUB-QUESTION	TOPIC OR ASPECT TESTED	AVERAGE % FROM SAMPLE
1.1 – 1.4	<ul style="list-style-type: none"><li>• Animal Nutrition</li><li>• Animal Production Protection and Control</li><li>• Animal Reproduction</li></ul>	59,1%
✓ Learner performance in the entire question 1 indicates that it was fairly answered by candidates, with an average mark of 26. Fairly answered because most candidates achieved above 18 marks, and there was evidence of a gradual increase in several candidates who achieved more than 50% in this question. The highest mark scored in this question was 45 with the lowest being 00 out of a total of 45 marks. Questions 1.1 and 1.2 were fairly answered, and for a change learner performance improved in questions 1.3 and 1.4 even though they still challenged weaker candidates who failed to supply the appropriate terms/ phrases of the described statements in 1.3 and in 1.4 they could not correctly replace the underlined words to make the statements true.		
✓ The easily obtainable marks in question 1.1 were in questions 1.1.1, 1.1.2, 1.1.5, 1.1.6 and 1.1.9 while questions 1.1.3, 1.1.7 and 1.1.10 challenged even the cream of the crop (top learners). Questions 1.2.2, 1.2.4 and 1.2.5 were also a challenge to more than 60% of the candidates. Questions 1.3.1, 1.3.3 and 1.3.5 provided the candidates with opportunity to collect marks whilst 1.3.2 and 1.3.4 were difficult.		
✓ In question 1.4 the easy marks were in questions 1.4.3, 1.4.4 and 1.4.5. It is also very important to note that some of the candidates were not able to take advantage of these 'easily obtainable marks'.		

(b) Why the question was poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.	
1.1	<p>Average of 51, 7% for sub-question 1.1. Best learner scored full 20 marks and lowest was 00 in this sub question.</p> <ul style="list-style-type: none"><li>✓ In sub-question 1.1.1 more than 90% of candidates did well in choosing A as a correct answer. Very few chose option C, i.e. they added the dry matter intake (15kg) and dry matter excreted (6kg) instead of subtracting) clearly revealing that they don't understand the concept of digestibility.</li><li>✓ More than 60% of the learners in sub-question 1.1.2 were uncertain about the components of the crude fibre, and that they were unable to differentiate between the soluble and insoluble forms of carbohydrates.</li><li>✓ Very few learners were able to get marks in question 1.1.3, most opted for D just because it had duodenal juice which they related to the duodenum of the question. Surely they didn't know that hydrochloric acid in A, pepsin in D and gastric juice in B are components in the stomach (gastric juice) not in the duodenum of the small intestines.</li><li>✓ Most learners struggled to get the correct answer in sub-question 1.1.4, but those who knew the function of lacteal dealt with it easily.</li></ul>

	<ul style="list-style-type: none"> <li>✓ Sub-question 1.1.5 was fairly answered by most candidates, but some seem to have missed the NOT in the question statement.</li> <li>✓ Question 1.1.6 was fairly answered because it was straight forward question, and easy to spot i.e. "Cattle, sheep and goats cannot be transported on the same truck".</li> <li>✓ Sub-question 1.1.7 was poorly answered. The expected correct response for 1.1.7 was B, but most candidates opted for C and D as they are also not very far from being correct, but they failed to understand that animals need to be kept off the liver fluke host infested areas.</li> <li>✓ Sub-question 1.1.8 was well answered. More than 80% of candidates proved that they were familiar with the term zoonotic disease.</li> <li>✓ Poorly answered by virtually all candidates including the top achievers. Some top achievers scored 18 out of 20 in the multiple choice question, challenged by 1.1.10, one of the reasons could be that learners failed to read the question to the end, hence they missed the last part (in cows), which is why they chose cryptorchidism and impotence as responses, which affect bulls only.</li> <li>✓ Candidates performed better in combination questions (1.1.4 and 1.1.6).</li> </ul>
1.2	<p>Average of 50% for sub-question 1.2. Best learner obtained full 10 marks and the weakest performer obtained 0.</p> <ul style="list-style-type: none"> <li>✓ This question was well answered by most learners. The highest was 10 and lowest 00, out of 10 marks with 4 as an average mark.</li> <li>✓ Candidates who disregarded the instruction to write A only, B only, Both A and B and None were penalised, but the number of these cases have decreased considerable.</li> <li>✓ Learners were unable to correctly analyse the questions before making informed choices. Sub-questions 1.2.1 and 1.2.3 seem to be the favourite of the candidates, but 1.2.2, 1.2.4 and 1.2.5 gave most of learners a tough time. Learners should have known that active absorption needs ATP energy to move against the concentration gradient as against the passive absorption (moving along concentration gradient) which is by osmosis and diffusion and does not need energy.</li> </ul>
1.3	<p>Average of 50, 3% for sub-question 1.3. Highest mark was 10 and again 0 was the lowest.</p> <ul style="list-style-type: none"> <li>✓ The highest mark obtained by candidates was 10 and the lowest 00, with an average mark of 5. Sub-questions 1.3.1, 1.3.3 and 1.3.5 brought a few smiles to most of the candidates especially in a question where most of the learners used to score 0 out of 10 marks. Performance in this question has improved compared to previous years, even though questions 1.3.2 and 1.3.4 proved tough for majority of learners.</li> <li>✓ Most of the learners managed to score 6 marks out of 10 from sub-questions 1.3.1, 1.3.3 and 1.3.5 and were challenged by questions 1.3.1 and 1.3.2. The few that gave the correct terms struggled with the correct spelling such as lightning instead of lighting, feed / fodder plan for fodder flow plan. Very few learners (less than 10%) knew the answer for the pregnancy problem caused by excessive collection of fluids in the tissues or between foetal membranes which is hydrops / hydro or dropsy foetus</li> </ul>
1.4	<p>Average of 60% for sub-question 4.4. Highest was 5 and the lowest was 0.</p> <ul style="list-style-type: none"> <li>✓ Generally performance of learners was slightly better in the sub question compared to previous years, because it was fairly answered. This question was well handled by most candidates and only the weaker candidates could not take full advantage of the easy marks on offer in this question.</li> <li>✓ Highest mark was 5 lowest 00 and average of 3 marks. Candidates collected valuable points from questions 1.4.3, 1.4.4 and 1.4.5. Very few learners obtained marks from 1.4.1 and 1.4.2</li> </ul>

### (c) Provide suggestions for improvement in relation to Teaching and Learning

- ✓ Candidates should be given enough informal tasks to train them on tackling data response questions, and terminology journals should be developed for each topic to improve and expand learners' understanding of the subject terminology as well as their vocabulary.
- ✓ Learners should be exposed to other forms of reading materials other than textbooks e.g. internet, PowerPoint presentations on different topics especially for the topics like
- ✓ Learners need to be exposed to various activities including various calculations during their informal activities. Teachers in collaboration with subject advisors should develop concept bank from different

references per topic to exercise learners on the language of the subject. These concepts should be assessed timeously so as to allow learners the opportunity to constantly engage with them until they are understood clearly.

- ✓ Compilation of a document to explain the common action verbs and the expected responses should be prioritised by subject advisors and teachers. Learners should write monthly tests assessing them on work already covered and only on section A type questions.
- ✓ Teachers must apply the same teaching, assessment and marking principles in the FET lower grades (i.e. grade 10 and 11) and these learners must also be exposed to examination instructions and questions so that they are confident when they are confronted with the question paper and so that the jargon of the examination does not become an obstacle.
- ✓ Educators should also develop interesting games when teaching terminology using word puzzles, cards, charts and PowerPoint presentations, which can also improve their spelling competency.
- ✓ Educators should utilize the electronic media resources at their disposal such as smart boards and internet when teaching concepts to improve learner spelling ability.
- ✓ Educators should train learners on how to identify the main phrases in a question in order to relate to the specific content studied.
- ✓ Study groups could be formed and learners who have firmly grasped topics can support those who have a poor grasp of topics.
- ✓ Teachers from different schools in a given circuit or cluster could work closely together to support one another in mediating challenging topics for learners.
- ✓ Teachers MUST use the CAPS Document and Assessment guidelines when teaching and assessing formally and informally.

**(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.**

- ✓ Candidates showed no competence in eliminating the incorrect options in Question 1.1 and in matching the items in column A with the descriptions in column B in Question 1.2.
- ✓ Candidates who did not do well were unable to provide insight and failed to comprehend basic examination terminology.
- ✓ The candidates who performed well had a good knowledge of and insight into the content, a good command of the English language and managed to respond in accordance with the instructions and the mark allocation.

<b>QUESTION 2</b>											
<b>(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?</b>											
<p>✓ Question 2 was generally fair to candidates, most candidates performed well in this question, the lowest score recorded was 0 and the highest was 35 marks with an average mark of 22. Performance in this question improved significantly this year to 63, 3% compared to 47, 2% in 2018.</p> <table border="1"> <tr> <td colspan="2"><i>Average mark from the sample of 100:</i></td><td>22</td></tr> <tr> <td><b>SUB-QUESTION</b></td><td><b>TOPIC OR ASPECT TESTED</b></td><td><b>AVERAGE % FROM SAMPLE</b></td></tr> <tr> <td>2.1 – 2.6</td><td>Animal Nutrition</td><td>63,3%</td></tr> </table> <p>✓ More than five candidates managed to get 35 out of 35 marks in question 2, which is unprecedented since the dawn of the CAPS. Teacher's efforts in preparing, engaging and drilling candidates on various approaches to grasp content, concepts and terminology of animal nutrition need to be acknowledged, although there are some challenges that need to be addressed as mentioned in the report below. The following questions were challenging to most learners 2.1.4; 2.2.2; 2.2.3; 2.3; 2.4.2 and 2.5.1</p>			<i>Average mark from the sample of 100:</i>		22	<b>SUB-QUESTION</b>	<b>TOPIC OR ASPECT TESTED</b>	<b>AVERAGE % FROM SAMPLE</b>	2.1 – 2.6	Animal Nutrition	63,3%
<i>Average mark from the sample of 100:</i>		22									
<b>SUB-QUESTION</b>	<b>TOPIC OR ASPECT TESTED</b>	<b>AVERAGE % FROM SAMPLE</b>									
2.1 – 2.6	Animal Nutrition	63,3%									
<b>(b) Why the question was poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.</b>											
<p>✓ Although performance has improved in question 2, some learners experienced difficulty in manipulating and interpreting questions based on data. The language issue played its role for learners who did not do well in the question, they could not express themselves well in English, as result they were unable to correctly phrase their responses.</p>											
2.1.	Average of 53,7 for sub-question 2.1										
	<p>✓ Question 2.1.1 was well answered by the candidates but still some could not differentiate between classifying and naming the example or type of alimentary canal.</p> <p>✓ Question 2.1.2 was well answered by the majority but some explained how features work (i.e. the processes) and not naming the adaptation feature, such as chewing the cud, rumination, belching etc.</p> <p>✓ Question 2.1.3 well answered by the majority but some failed to understand the question why the fowl cannot be fed a ration high in crude fibre. They failed to link adaptation features of non-ruminants to the question.</p> <p>✓ Question 2.1.4 was a problematic question to learners, although they know the importance of non-nitrogenous substances to ruminants but explaining how the substances such as urea are converted by the animals to get proteins proved to be a big challenge.</p>										
2.2	Average of 62,9% for sub-question 2.2										
	<p>✓ It was evident from the candidates' responses for 2.2.1 that correct manipulation of data is still a challenge that need to be addressed urgently and vigorously, because most candidates could not draw conclusions from the data. Poor performance in 2.2.1 showed that learners could not classify feeds correctly as they constantly referred to maize meal as a carbohydrate rich roughage</p> <p>✓ In question 2.2.2 candidates could not use the data to correctly justify not recommending the ration as the only source of feed for lambs at two weeks which are similar to non-ruminants at that stage. Instead of basing their argument on high crude fibre content of the ration, difficult to digest for non-ruminants, absence of micro-organisms they wrote low protein content and wide nutritive ratio as a reason.</p>										

	<ul style="list-style-type: none"> <li>✓ Question 2.2.3 was fairly performed. Most candidates did not understand the question but they got the mark for “freely available” from the general knowledge of knowing that natural grass grows freely on the pastures.</li> </ul>
2.3	<p>Average of 69,9% for sub-question 2.3</p> <ul style="list-style-type: none"> <li>✓ In question 2.3.1 learners performed poorly. The identification of feed in the square challenged the candidates, they could not understand that a feed rich in protein has a higher percentage than the one poor in protein, hence it should have a lesser value in the ratio to give the desired DP otherwise a higher value of a protein rich feed in the ratio will exceed the required DP and will not be sustainable.</li> <li>✓ In question 2.3.2 most candidates calculated the maize meal kg using the values of the sunflower oilcake meal as a result their responses affected the performance in the subsequent question 2.3.3 where they were required to calculate maize meal in the 250kg mixture</li> <li>✓ Many candidates lacked the mathematical skills of expressing values as a percentage and converting percentage or parts of maize to kg.</li> </ul>
2.4	<ul style="list-style-type: none"> <li>✓ In sub-question 2.4.1 most learners were able to score 3 marks in the calculation of the NR of feed B, although some were challenged by the formula. Some forgot to put 1 representing the ratio in the formula, they wrote  <math display="block">\text{NR} = \frac{\% \text{TDN} - \% \text{DP}}{\% \text{DP}}</math> instead of  <math display="block">\text{NR} = 1 : \frac{\% \text{TDN} - \% \text{DP}}{\% \text{DP}}</math> </li> <li>✓ Some candidates failed to express the TDN and DP as a percentage in the formula</li> <li>✓ Candidates performed poorly in question 2.4.4 because justifying for the suitability of feed A and B for growing young animals challenged them. Most of the learners justified for A only, meaning that they could not capture that they are required to justify for both feed A and B. They also struggled to understand that first they had to put their side of the argument in both feeds before the justification.</li> <li>✓ The fact that question 2.4.2 was too loaded for 2 marks also contributed to the poor performance, because candidates were just basing their responses on the NR without saying whether the feed is suitable or not. Some candidates identified feed A correctly as a feed suitable for young growing farm animals, but failed to provide the main reason for supplying feed A to growing animals instead they wrote feed A has little crude fibre or high total digestible nutrients (TDN), they could not relate growth to high protein content or narrow nutritive ratio (NR) of the feed. Some learners provided suitability of feeds for growing animals as having a small, less or low nutritive ratio instead of narrow or wide NR. Some addressed fattening, maintenance</li> </ul>
2.5	<p>Average of 56,8% for sub-question 2.5</p> <ul style="list-style-type: none"> <li>✓ In question 2.5.1 learners were unable to present the formula for Metabolic Energy, instead they were writing long calculations resembling the schematic representation of energy flow, leading to errors and loss 2 of marks.</li> <li>✓ In question 2.5.2 majority of learners scored the mark for identification of energy A (body heat), although some gave the forms in which animals lose heat such as sweating.</li> <li>✓ In question 2.5.3 they performed very well because they were able to give importances of net energy especially that the marking guideline was wide open in the sub-question to allow for different examples of maintenance and production.</li> </ul>
2.6	<p>Average of 59,6% for sub-question 2.6</p> <ul style="list-style-type: none"> <li>✓ On average 69.6% candidates performed well in sub-question 2.6. They were able to draw the graph as presented in the latest Agricultural Sciences examination guidelines. Teachers prepared their learners so well for the graph as a result most of them were getting the full 6 marks even those who scored low marks were getting 4 marks on average in the graph, however scaling proved to be a challenge for some candidates leading to a loss of the mark for Y-axis label and calibration.</li> <li>✓ Some candidates struggled to differentiate between dependent and independent variables as a result they were placing minerals in both axis where in the X-axis they put names of the minerals instead of the ratios. Some learners could not differentiate between a bar graph and histogram</li> </ul>



**(c) Provide suggestions for improvement in relation to Teaching and Learning**

- ✓ Candidates should be given enough informal tasks to train them on tackling data response questions, to improve and expand learners' understanding of the subject content knowledge as well as their vocabulary and these tasks should expose them to various activities including different forms of calculations and graphs. Teachers should guide learners on how to process data in all forms (tables and graphs, calculations etc.) especially fodder flow programme.
- ✓ Instruction verbs should be unpacked to learners and must form part of the informal assessment during the development of learners for examination readiness.
- ✓ Teachers should emphasise the concepts of digestibility coefficient, nutritive ratio, energy value of feeds and TDN. Different approaches to teaching the digestibility coefficient and energy values should be employed, for example, explanation of the concept, the meaning, formulae, interpretation and implications of all NR and the ability to analyse the data with its units in order to arrive at the correct answer. When teaching calculations, teachers should constantly train learners on different forms of conversion of scales.
- ✓ Terminology journals should be developed for each topic to improve and expand learners' understanding of the subject terminology. Teachers should also expose learners to other forms of reading materials other than textbooks e.g. farmer's weekly, extracts from internet, PowerPoint presentations on farming activities, etc.
- ✓ Teachers should at times approach the external and internal structure of alimentary canal by addressing the different sub-systems and their functioning whilst presenting the entire digestive system, where possible samples of different digestive systems be made available as teaching aids to enhance teaching and learning of nutrition topic.
- ✓ The CAPS Agricultural Sciences policy document (page 41) and 2017 Grade 12 Agricultural Sciences Examination guidelines (page 11) clearly addresses the approach on how to teach the types of feeds, therefore teachers should constantly use these documents whenever they prepare for their teaching and assessment.
- ✓ Educators should guide the candidates on how to use past question papers so that they don't just take the answers but read the whole question with understanding and then respond accordingly.

**(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.**

- ✓ Teachers are advised to promote reading and analysis of text and should discourage memorising without understanding the concepts, focusing on all aspects of the content that are listed in the CAPS document and Examination Guidelines. Remember there might be topics that have not been covered in recent question papers, but still remain important content topics to be taught.
- ✓ Learners should be able to link the data given to the content that they have been taught in class even before they work on the questions given. Learners have a tendency of memorizing instead of reading with understanding hence they fail to apply the knowledge they have learnt, instead they regurgitate previous papers' responses. Teachers need to place more emphasis on making the learners understand the concepts instead of just memorizing by assessing them the way national papers are structured.
- ✓ Learners displayed understanding of calculating the digestibility coefficient in question 1 and TDN in question 2, however they are still challenged with the formula, conversion, units and implications of the calculated value.
- ✓ Types, examples, deficiencies, sources and forms of supplementing minerals should be presented in a table form using different Agricultural Sciences and Life Sciences sources when compiling as informed by the CAPS and Examination guidelines to address concerns raised in question 1.3.1 and 2.6
- ✓ Learner responses in question 2.6 serve as evidence that some teachers are teaching with only one textbook available at school which is not acceptable. Teachers should have a minimum of three different prescribed

textbooks and make notes thereafter to supplement the missing content from the learner's textbook.

### QUESTION 3

(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?

- ✓ The general learner performance of in question 3 was not inspiring and it was the worst performed question in 2019 for Agricultural Sciences P1. It also contributed mostly to this poor in the question. Learner performance in animal production has improved this year especially in question 3.2 on housing and handling facilities, but candidates failed dismally in animal health section of question 3.
- ✓ Question 3 has contributed greatly to the poor performance of most learners with an average of 50, 5% compared to 49,0% in 2017. The highest score recorded is 33 and the lowest 00 out of 35 marks, with an average of 18 marks. Question 3.

Average mark from the sample of 100:		18
SUB-QUESTION	TOPIC OR ASPECT TESTED	AVERAGE % FROM SAMPLE
3.1 – 3.6	<ul style="list-style-type: none"><li>• Animal Production</li><li>• Animal Protection and Control.</li></ul>	50.5%

- ✓ Learners performed poorly in the following sub-questions 3.1; 3.2.5; 3.4; 3.5 and 3.6

(b) Why the question was poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

3.1	Average of 74,5% for sub-question 3.1
	<ul style="list-style-type: none"><li>✓ Almost 60% of candidates managed to obtain the full marks in sub-question 3.1.1, because they took their responses directly as they were presented from the graph. Candidates could not relate the lowest critical temperature and heat production with the type of production system, hence they struggled to give a reason in question 3.1.2</li><li>✓ The challenge cited in question 3.1.1 and 3.1.2 affected sub-question 3.1.3 because identification of the most economical animal to keep depend on their understanding of the relationship between the lowest critical temperature and heat production with the type of production system.</li><li>✓ In question 3.1.4 candidates could not give the two reasons from the graph that dairy cattle can be able to survive without shelter because it can produce more heat and has very low lowest critical temperature.</li><li>✓ In question 3.1.5 candidates performed poorly because they did not understand the influence of high and low temperature on feed consumption.</li></ul>

3.2	Average of 63,1% for sub-question 3.2
	<ul style="list-style-type: none"> <li>✓ Learners performed fairly in question 3.2.1 although the picture used was not suitable for the question on production systems but fitted well on types of intensive production system.</li> <li>✓ Performance in question 3.2.2 was not good although candidates demonstrated understanding of how to analyse the picture on different production systems in order to identify the name of system depicted. The picture used confused them, hence they gave responses such as extensive because chickens are fending for themselves, freely moving to get food for themselves</li> <li>✓ Some candidates still confused extensive with external and intensive with internal when naming the production systems. Other learners confused production systems with farming systems because they also gave commercial and subsistence farming systems as the response for question 3.2.1</li> <li>✓ Most candidates managed to score 2 marks in 3.2.3 because they could relate the pictures with its purpose in both cases (a) and (b).</li> <li>✓ Question 3.2.5: The stimulus (picture D) was not very clear in the question paper as a result many candidates identified equipment E as a “water reservoir” instead of a “automated feeding machine, hence they gave storing of water as a purpose.</li> </ul>
3.3	Average of 34,3% for sub-question 3.3
	<ul style="list-style-type: none"> <li>✓ Performance in question 3.3 was fair, although some learners mentioned the handling equipment rather than the actual guidelines. Candidates confused basic guidelines for handling farm animals with basic guidelines for transporting farm animals</li> </ul>
3.4	Average of 48,3% for sub-question 3.4
	<ul style="list-style-type: none"> <li>✓ The sub-question 3.4.1 based on diseases challenged candidates, they could not classify parasite A according to its life cycle instead they gave examples of external parasites such as blue tick, brown-legged and names of the hosts such as man, human and pig instead of one host. The challenge experienced by candidates in 3.4.1 influenced their performance in question 3.4.2 where they had to name the protozoan disease transmitted by parasite A.</li> <li>✓ Candidates struggled to answer question 3.4.3, because they could not relate the internal parasites B and C to their symptoms and ways of controlling its infestation.</li> <li>✓ Phrasing of question 3.4.4 could be the reason for the dismal performance in the question. Candidates gave reasons instead of requirements of the use of medication in farm animals. The question might have been phrased as “Name TWO requirements before the use of medication in farm animals”</li> </ul>
3.5	Average of 37,8% for sub-question 3.5
	<ul style="list-style-type: none"> <li>✓ Candidates struggled to answer question 3.5.1. The question was not difficult it just needed candidates to apply their knowledge of symptoms of different diseases. However, the way question 3.5.1 is designed with a lot of embedded questions could have caused the poor performance, because those who could not identify diseases affecting animals 1, 2 and 3 lost all the 5 marks in subsequent questions</li> <li>✓ Knowledge of the level of seriousness of animal diseases was tested in question 3.5.2, but most candidates could not show competence in the topic.</li> <li>✓ The sub-question 3.5.3 required the identification of the pathogen causing the disease in animal 2 (fungus), many learners could not specifically write a pathogen instead they wrote fungal disease</li> </ul>

	<p>fortunately the marking guidelines catered for them too.</p> <ul style="list-style-type: none"> <li>✓ In sub-question 3.5.4 candidates confused control measures by the state and those by the farmer, they gave quarantine, awareness and killing all animals affected by the disease. Candidates could not understand that control measures in most cases depend on the level of seriousness of the animal disease, they suggested that all animals infected with rabies should be killed and in 3.5.5 suggested that animals with anthrax should be treated and vaccinated. They lacked the knowledge that vaccination is meant to prevent the disease not to control it.</li> </ul>
3.6	<p>Average of 53,0% for sub-question 3.6</p> <ul style="list-style-type: none"> <li>✓ This was a straight forward question that required candidates to remember and recall the content taught in class, despite that candidates performed poorly in question 3.6.</li> <li>✓ In question 3.6.1 candidates gave incorrect general symptoms of diseases and those of plant poisoning such as restlessness, tiredness, weak, loss of appetite, anorexia etc.</li> <li>✓ In question 3.6.2 they gave incorrect responses like give enough water, vaccination, rotational grazing, quarantine and isolate as ways to treat salt poisoning</li> </ul>

<b>(c) Provide suggestions for improvement in relation to Teaching and Learning</b>	
✓	The drop in question 3 performance can be attributed to a number of factors including relying too much on previous question papers, candidates lacking content knowledge, inability to apply theory learnt in class to a farming situation, failure by schools to organize farm visit for learners
✓	The paper assessed content knowledge learnt in class by providing different agricultural contexts before candidates to test different skills and an extent to which they can apply those in solving farming related challenges, unfortunately many candidates displayed lack of these skills especially when it comes to handling and housing facilities.
✓	Teachers should access the handling facilities, housing facilities, tools, apparatus and equipment used in animal production on internet, periodicals and magazines, and present using PowerPoint for the learners. The activity can assist learners to be able to identify the name of the tool, its functions or use, design features, management practise and the reason for its use.
✓	Teachers should seek assistance from other educators in neighbouring schools for topic/s where the teachers feel uncomfortable, because it is evident that most teachers do not cover the animal production and animal health topics thoroughly for learners to understand facilities and concepts involved.
✓	The animal health section should be approached by teachers the way it is presented in the examination guidelines. Learners should be taught how to associate a deficiency disease to its symptoms

<b>(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.</b>	
✓	Candidates must be trained on how to adhere to the instructions as provided in the previous question papers, emphasise on its importance relative to obtaining marks in the examination.
✓	Subject advisors and teachers should train learners on how to handle all types of question in a question paper, concentrating on the correct interpretation of questions more than correct responses.
✓	Animal diseases should be taught in a table form as presented in the CAPS document (page 46) and Examination guidelines (page 14) in order to expose learners to the holistic approach of all the important diseases found in South Africa as prescribed for Grade 12.
✓	The role of state and the farmer should be taught separated when teaching the animal health section. At the end of each sub-topic in animal health section a summary of these roles should be presented to learners as they form the important aspect of the topic.

<b>QUESTION 4</b>		
<b>(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?</b>		
✓ The general performance of learners in question 4 reflected a marked incline by a noteworthy margin of 6,8% from 49% in 2017 to 55,8% in 2018. candidates		
<i>Average mark from the sample of 100.</i>		20
<b>SUB-QUESTION</b>	<b>TOPIC OR ASPECT TESTED</b>	<b>AVERAGE % FROM SAMPLE</b>
4.1 – 4.5	Animal reproduction	55,8%
✓ Learners performed poorly in the following sub-questions 4.1; 4.2.3; 4.2.4; 4.6 and 4.7		

<b>(b) Why the question was poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.</b>	
4.1	<p>Average of 53.3% for sub-question 4.1</p> <ul style="list-style-type: none"> <li>✓ In the light of the commendable performance generally in the question, challenges were experienced in sub-question 4.1.1 where learners could not correctly identify the reproductive processes and hormones depicted in the mating diagram.</li> <li>✓ This sub-question's (4.1.1) aim was to assess the candidates' ability to apply their knowledge of the reproductive processes in the cattle's reproductive cycle and the hormonal control involved. Candidates' analytical skills were tested in this question and many were found wanting. Very few candidates (less than 10%) were able to get full marks.</li> <li>✓ In question 4.1.1 five in ten candidates could not correctly identify the hormones that initiated mating by animal A (cow) and animal B (bull). Many candidates wrote progesterone instead of testosterone for animal B which is a bull. Had candidates correctly identified animal B as a bull, the hormone progesterone which is a female hormone wouldn't have been a very common response. Some candidates could have confused animal B for a female cow depicting signs of oestrus (mounting other cows). Other responses written were FSH and LH which are the hormones that initiates ovulation.</li> <li>✓ Even though in question 4.1.2 the instruction was not specific, candidates fell short in linking and relating the functions of oestrogen (in cows) and testosterone (in bulls) to the illustration showing the two animals mating. About 95% of the candidates gave the general functions of oestrogen and testosterone such as, responsible for the secondary characteristics, preparation for implantation etc. They should have limited their responses to functions of hormones within the context of mating e.g. stimulates mating behaviour in cows (i.e. come to oestrus, allow mating) and bulls (i.e. libido or sexual urge).</li> <li>✓ In sub-question 4.1.3(b) candidates were to identify the reproductive processes in the illustration. Again candidates could not analyse the picture correctly. More than half of the candidates incorrectly wrote pregnancy/gestation instead of birth as the reproductive process that precedes lactation which indicates that they do not know the correct sequence of the reproductive processes. Others missed the point and wrote the stages of mating such as copulation, mounting and dismounting etc.</li> <li>✓ Prolactin was a very popular incorrect response as the hormone that initiates milk let-down for sub-question 4.1.4 although oxytocin was the correct answer. There were also candidates who confused</li> </ul>

	<p>the word 'initiate' with inhibit and hence they wrote adrenalin as the answer.</p> <ul style="list-style-type: none"> <li>✓ Some candidates also confused the function of oxytocin with that of prolactin. The function of prolactin is to stimulate the production/synthesis of milk whilst the function of oxytocin is to stimulate milk let-down/release. The question however, was a higher order question which was not simply asking for the function of oxytocin, because it was already in the question. The question required them to explain how the hormone oxytocin functions in the milk let-down process i.e. how it influences the milk release in cows and therefore very few candidates, less than 10% met the requirements of the question.</li> </ul>
4.2	<p>✓ Average of 63.9% for sub-question 4.2</p> <ul style="list-style-type: none"> <li>✓ The performance was commendable in this sub-question.</li> <li>✓ In 4.2.1 Candidates were to name the process of sperm formation and the majority got the mark although some gave responses such as gametogenesis (too general) spermatozoa, mating, sperm formation and other farfetched responses.</li> <li>✓ Question 4.2.2 was well answered. Candidates were asked to identify a high-quality sperm from the given picture but instead, some could not identify but described the characteristics of a high quality sperm or semen e.g. milky and sticky.</li> <li>✓ In Question 4.2.3 the majority (80%) of the candidates did not know that the instrument used for sperm evaluation is a microscope. Responses like pistollete, semen straw, artificial vagina were common. Some also wrote macro-scope which means something else and they lost the mark.</li> <li>✓ Question 4.2.4 was performed very well. Many candidates, including weak ones presented good arguments/explanations that warranted full marks although some seemed to think that abnormal sperms have ability to fertilize an egg cell with the result being an abnormal embryo/calf (i.e. they have a misconception that an abnormal sperm will give rise to a deformed/abnormal calf). Bulls that ejaculate a large percentage of abnormal sperms are said to be impotent (inability to fertilize a cow).</li> </ul>
4.3	<p>Average of 63.9% for sub-question 4.3</p> <ul style="list-style-type: none"> <li>✓ The performance for this sub-question was at 67% i.e. 4 out of 6 marks, obtained from both 4.3.1 for rearranging the steps of Artificial insemination and 4.3.2 for the disadvantages of Artificial insemination. Very few candidates, less than 30% scored full marks in 4.3.1 but most of them mixed up the steps. For step 1 they wrote 'excess faecal matter is removed'. This step did not indicate that the excess faecal matter is removed from the cow and as a result some candidates might have thought that faeces are removed from the surrounding to clean the insemination venue. Also for the last two steps candidates might have assumed that one checks for pregnancy after one has already inseminated the cow. This mix-up may be due to less practical application opportunities given to learners in class.</li> <li>✓ In question 4.3.2 where the candidates were expected to give disadvantages of artificial insemination to farmer they generally did well. Some candidates though, wrote the advantages. There were those that indicated that the AI offspring can be sterile or infertile definitely confusing it with species crossing.</li> </ul>
4.4	<p>Average of 49% for sub-question 4.4</p> <ul style="list-style-type: none"> <li>✓ The general performance of candidates in this sub-section 4.4 was fair with most of the candidates obtaining between 2 and 3 marks.</li> <li>✓ Candidates in Question 4.4.1 wrote 'foetal stage', foetus stage which was correct. Some associated the stage with birth hence the answers parturition stage, expulsion of foetus.</li> <li>✓ In Question 4.4.2 the considerable number of candidates were able to correctly place the membrane C in number (c) but very much struggled identifying the correct membranes asked in Questions 4.4.2 (a) and (b). When asked to identify the membrane that attaches the foetus to the uterus they opted for membrane D instead of membrane A. They should have known that the placenta is attached to the embryo by means of the umbilical cord and attaches the embryo to the uterus. (i.e. umbilical cord connects the embryo with the placenta, placenta is the area of attachment of the foetus with the mother's uterus). Then for (b) is letter B (allantois) which is the extension of the urinary bladder of the foetus.</li> </ul>
4.5	<p>Average of 48.9% for sub-question 4.5</p>

	<ul style="list-style-type: none"> <li>✓ Question 4.5.1 was well answered by all learner categories. Some of the learners could not analyse the question well, that it was asking for behavioural signs of parturition. They just wrote any sign of parturition they could think of and lost marks. In some cases, language proved to be a problem in responses such as crying loud instead of cows making bellowing noise, urinate rapidly instead of urinate frequently, stands alone instead of isolates itself from the herd.</li> <li>✓ Question 4.5.2 was fairly answered but incorrect responses such as dystocia, injuries, environment and stress were common.</li> </ul>
4.6.	<ul style="list-style-type: none"> <li>✓ Question 4.6.1 delivered a low blow to virtually all the candidates. The greater majority of the candidates inclusive of the top ones failed to relate superovulation and its importance in embryo transfer and instead they only wrote the general definition of superovulation. They only wrote 'multiple ova are released in one oestrus cycle'. The trick of the question was in mentioning that these ova are superior or carrying desirable characteristics. There were also candidates who gave the definition of synchronisation, meaning they confused superovulation with synchronisation.</li> <li>✓ The positive is that most of the candidates managed to get marks in the ensuing questions especially in question 4.6.3 and 4.6.4. The concept embryo flushing in 4.6.2 is still a challenge to more than 50% of the candidates. They wrote that embryo flushing is the removal of unwanted embryos, or removal of unwanted characteristics in the embryos, removal of ova or ovum instead of harvesting of viable superior embryos. Some of the candidates confused embryo flushing with Enucleation, writing removal of nucleus.</li> <li>✓ Although many candidates (more than 70%) did well in Question 4.6.3, some of them lost the mark because they wrote the donor donates a nucleus instead of ova or embryo. It is in nuclear transfer where a nucleus is used, not in embryo transfer. Very few candidates did not know the purpose of the recipient cow in embryo transfer even though some made the same mistake of confusing the embryo with the nucleus.</li> </ul>
4.7	<ul style="list-style-type: none"> <li>✓ In question 4.7.1 advantages of cloning (NT) Most of the candidates exceeded the expectations in terms of how well they attempted this sub question. In question 4.7.1 (a) they mentioned the desirable or superior traits that the farmer can get. The other advantages of nuclear transfer to the farmer were hardly mentioned. In question 4.7.1 (b) the greater majority of the candidates wrote that nuclear transfer (cloning) would benefit the veterinarian services in terms of the job opportunities and the income or profit the veterinarians will make when hired by the farmers and they were not awarded a mark notwithstanding the fact that some of the learners gave the correct answers such as the production of stem cells, research, medicines and preservation of the rare or endangered species.</li> <li>✓ In question 4.7.2 disadvantages of nuclear transfer (NT) Surprisingly this question was fairly answered by the candidates. There were many instances where candidates mentioned the concerns about the safety of animal products from cloning as well as the ethical and religious concerns about cloning. There were also some candidates who wrote cloned animals have a shorter shelf life instead of shorter lifespan.</li> </ul>

<b>(a) Provide suggestions for improvement in relation to Teaching and Learning</b>	
✓	Some challenges identified in the previous examinations still persist and they must be given priority. These recurrent areas of weakness must be incorporated in the subject improvement plans and become the baseline for intervention by Subject Advisors. Continued reference to previous Chief marker and diagnostic reports is strongly advised.
✓	Teachers should use the CAPS policy and the examination guidelines when planning and executing their lessons. All learners should have unrestricted access to these documents so that they can also play an active role in their learning.
✓	Subject terminology and definitions for Animal reproduction must be clearly understood by learners. Teachers need to lay a solid base of concepts and use them frequently until they are understood.
✓	English across curriculum must be reinforced and be integrated in both teaching, learning and assessment of

the different topics. The candidates who performed well had a good knowledge of and insight into the content and texts, a good command of the English language and managed to respond in accordance with the instructions and the mark allocation. Teachers are therefore encouraged to work collaboratively to integrate a school-based language strategy that aims to improve learner performance

- ✓ Also the use of the frequent reinforcement of small segments of learning and an emphasis on frequent diagnostic assessment of the learner's progress, paired with immediate corrective instruction.
- ✓ In addition, standardized formal tasks should be prepared in order to raise the level of questioning and to train learners to be ready in answering questions such as those in question 4 that need critical thinking, reasoning and application.
- ✓ Teachers should ensure that learners do not take the oestrus cycle and hormonal functions as two different/separate topics but should clearly show how the two concomitantly relate and when presenting the oestrus cycle, they should use graphs, tables, flow diagrams, schematic representations to show characteristics, functions, hormones and processes involved in the different stages.
- ✓ Animal reproduction section should be taught using diagrams, sketches and flow charts with pictures to link the different topics/reproductive processes in their chronological order and to show how these processes interweave.
- ✓ Videos and projection of ASAAE slides should also be used for enrichment and enhancement of learning.
- ✓ Learners must be taught that if they are asked for THREE points, for example in the question where they were asked to write the behavioural signs of birth, they must choose the three points that are most likely to be credited.
- ✓ Candidates must be exposed to examination instructions and questions so that they are confident when they are confronted with the question paper and so that the jargon of the examination does not become an obstacle.

**(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.**

- ✓ Learners tend to confuse the accessory glands (prostate glands, vesicular glands, bulbo -urethral gland) with each other and with the secondary sex organs and their functioning in Animal reproduction.
- ✓ They also need to know that cryptorchidism and impotence can only refer to the bull not the cow.
- ✓ Teachers must not take it for granted that all learners know the difference between a bull and a cow, sperms and semen, calving and lambing and other simple agricultural terminology. They often learn better by seeing and hearing than by reading and therefore incorporating pictures (illustrations), films, simulations, videotapes, and audio into lessons might help eliminate some of these inadequacies.