Learner Guide
Primary Agriculture

Advanced Breeding Practices for Farm Animals

My name: ..................................................
Company: ..................................................
Commodity: .......................... Date: ..................

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Before we start...

Dear Learner - This Learner Guide contains all the information to acquire all the knowledge and skills leading to the unit standard:

<table>
<thead>
<tr>
<th>Title:</th>
<th>Apply advanced breeding practices for farm animals</th>
</tr>
</thead>
<tbody>
<tr>
<td>US No:</td>
<td>116216</td>
</tr>
<tr>
<td>NQF Level:</td>
<td>3</td>
</tr>
<tr>
<td>Credits:</td>
<td>4</td>
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</tbody>
</table>

The full unit standard will be handed to you by your facilitator. Please read the unit standard at your own time. Whilst reading the unit standard, make a note of your questions and aspects that you do not understand, and discuss it with your facilitator.

This unit standard is one of the building blocks in the qualifications listed below. Please mark the qualification you are currently doing:

<table>
<thead>
<tr>
<th>Title</th>
<th>ID Number</th>
<th>NQF Level</th>
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<th>Mark</th>
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<tbody>
<tr>
<td>National Certificate in Animal Production</td>
<td>49048</td>
<td>3</td>
<td>120</td>
<td>Y</td>
</tr>
<tr>
<td>National Certificate in Plant Production</td>
<td>49052</td>
<td>3</td>
<td>120</td>
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</tbody>
</table>

Please mark the learning program you are enrolled in:

Your facilitator should explain the above concepts to you.

This Learner Guide contains all the information, and more, as well as the activities that you will be expected to do during the course of your study. Please keep the activities that you have completed and include it in your Portfolio of Evidence. Your PoE will be required during your final assessment.

What is assessment all about?

You will be assessed during the course of your study. This is called formative assessment. You will also be assessed on completion of this unit standard. This is called summative assessment. Before your assessment, your assessor will discuss the unit standard with you.

Assessment takes place at different intervals of the learning process and includes various activities. Some activities will be done before the commencement of the program whilst others will be done during programme delivery and other after completion of the program.

The assessment experience should be user friendly, transparent and fair. Should you feel that you have been treated unfairly, you have the right to appeal. Please ask your facilitator about the appeals process and make your own notes.
Your activities must be handed in from time to time on request of the facilitator for the following purposes:

- The activities that follow are designed to help you gain the skills, knowledge and attitudes that you need in order to become competent in this learning module.

- It is important that you complete all the activities, as directed in the learner guide and at the time indicated by the facilitator.

- It is important that you ask questions and participate as much as possible in order to play an active role in reaching competence.

- When you have completed all the activities hand this in to the assessor who will mark it and guide you in areas where additional learning might be required.

- You should not move on to the next step in the assessment process until this step is completed, marked and you have received feedback from the assessor.

- Sources of information to complete these activities should be identified by your facilitator.

- Please note that all completed activities, tasks and other items on which you were assessed must be kept in good order as it becomes part of your Portfolio of Evidence for final assessment.

**Enjoy this learning experience!**
How to use this guide …

Throughout this guide, you will come across certain re-occurring “boxes”. These boxes each represent a certain aspect of the learning process, containing information, which would help you with the identification and understanding of these aspects. The following is a list of these boxes and what they represent:

**What does it mean?** Each learning field is characterized by unique terms and definitions – it is important to know and use these terms and definitions correctly. These terms and definitions are highlighted throughout the guide in this manner.

**Activity**

You will be requested to complete activities, which could be group activities, or individual activities. Please remember to complete the activities, as the facilitator will assess it and these will become part of your portfolio of evidence. Activities, whether group or individual activities, will be described in this box.

**Example**

Examples of certain concepts or principles to help you contextualise them easier, will be shown in this box.

**How am I doing?**

The following box indicates a summary of concepts that we have covered, and offers you an opportunity to ask questions to your facilitator if you are still feeling unsure of the concepts listed.

**My Notes …**

You can use this box to jot down questions you might have, words that you do not understand, instructions given by the facilitator or explanations given by the facilitator or any other remarks that will help you to understand the work better.

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SAQA Unit standard
What will I be able to do?

When you have achieved this unit standard, you will be able to:

♦ Use and apply advanced breeding practices.
♦ Use the reproductive cycles of farm animals as management and decision-making tools.

Learning Outcomes

At the end of this learning module, you must is able to demonstrate a basic knowledge and understanding of:

♦ Reproductive cycles and breeding methods.
♦ Factors affecting the reproductive cycles of farm animals.
♦ The advantages and disadvantages of different breeding methods.
♦ The effect of nutritional, health, seasonal and environmental factors on reproduction.
♦ Breeding procedures and breeding programmes.
♦ Purpose of this is to improve knowledge and inclusion of reproductive cycles and breeding methods into a breeding programme.
♦ Communication and reporting skills.
♦ Record keeping skills.
♦ Understanding the correct procedures and policies to be followed for the breeding season.

What do I need to know?

It is expected of the learner attempting this unit standard to demonstrate competence against the unit standard

♦ US 116107 (NQF 2): Identifying breeding practices for farm animals.
♦ US 116173 (NQF 2): Evaluate external basic animal anatomy and morphology.

Methodology used

♦ It is assumed that the learner that attempts this Unit Standard demonstrated competence in Unit Standard 116107. Unit Standard 116107 incorporated a large amount of on-farm observation. In this Unit Standard there will be more discussions and theoretical explanations.
♦ The different breeding methods will be discussed. Where appropriate the learners will be taken to a practical facility or shown visual material to explain the concepts further. You will be assessed throughout the learning process. At the end of the Unit Standard a short theoretical summative assessment will be performed in the form of a test.
1 Signs of giving birth and problem births in female breeding animals

After completing this session, you should be able to:
SO 1: Identify and classify the signs of giving birth and problem births in female breeding animals.

In this session we explore the following concepts:
♦ Signs of giving birth.
♦ Pre-parturient period.
♦ Birth and birth problems.
♦ Post-Parturient period.
♦ Species parturient behaviour.

1.1 Introduction

In Unit Standard 116107, you studied animals giving birth. Different species react and express different signs of birth. It will be difficult for you to study all the species so we will concentrate on sheep, cattle, pigs and horses.

1.2 Signs of giving birth

Many free-living species seek out remote or concealed sites for giving birth and there are also strong indications that many domesticated animals deliberately try to avoid the hours of supervision when giving birth. However, because they can be kept under close supervision, the behaviour of farm animals during parturition is relatively well explored and documented.

The process of birth passes through three very definite stages: this is normally the case with species in which single births occur. But in those animals in which multiple births occur (pigs, cats and dogs) for example, it can be said that there are only two phases, the second and the third stages being interchanged regularly.

♦ The first stage refers to the dilatation of the cervix and the associated behaviour of the animal.
♦ The second stage is the expulsion of the foetus itself.
♦ The third stage is the passage of the afterbirth or foetal membranes.
These phases extend into the broader, more general behavioural periods of pre-partum, birth and post-partum.

Partum/Parturition - process of giving birth by a female

The behaviour of the female animal is generally not very defined and may vary even at different births in the same animal. Cows and goats tend to isolate themselves and seek a place to hide more than a sheep ewe does. Dogs and cats will seek shelter and a nesting place to give birth. Most females will be mainly concerned about the place to give birth and care for their young than eating.

1.3 Pre-parturient period (period before giving birth)

The pre-parturient period extends from late gestation (the carrying of the unborn foetus by the mother) to the beginning of the first stage of labour. Apart from certain changes in the attitude towards any previous offspring still being nursed, there is generally little of significance in the animals’ behaviour until parturition itself is very close. Once parturition is imminent, many animals separate themselves from the main group and select a site for the birth. Many species at free range choose inaccessible areas where the birth may occur unhindered.

The domesticated ruminants often appear to withdraw from the grazing group when birth is only an hour or two away but in some cases; the parturient animal has simply failed to keep up with the grazing drift of the main herd or flock. In the immediate pre-partum phase, the 24 hours before parturition, definite behaviour patterns begin to emerge. The animal becomes increasingly restless and frequently alters her position and possibly also her disposition.

Gradually still greater restlessness becomes evident until a stage is reached where the animal changes her position every few minutes. Recognition of this pre-parturient behaviour in the pregnant animal allows the time of birth to be predicted accurately in the majority of cases. It has been observed in the pre-parturient sow that while most of the time during the three days before the onset of labour is spent sleeping and feeding, an increasing amount of nest-building behaviour is shown. This is usually evident in the form of bedding chopping.
A similar pattern of behaviour to that in the parturient sow is seen in the cow: much sleeping and feeding during the days immediately before parturition and moments of restlessness culminating in almost continuously restless and erratic behaviour. Sometimes during the pre-parturient period, muscular contractions of the kind that herald the onset of labour itself may even take place so that one is given the impression that the actual birth is about to occur. There is strong behavioural evidence of the build-up of pain in the parturient animal during the late pre-partum phase. It seems that the pain serves to signal the forthcoming events to the animal. Pain secures the entire attention of the parturient animal and its total participation in the birth process. Increasing restlessness and other evidence of a build up of pain constitute the predominant indications of the late pre-partum period and the phase associated with the first stage of labour.

1.4 **Birth**

Pain is most evident during this phase, which corresponds with the second stage of labour, i.e. birth.

As has been noted, the activities of the single-bearing (monotocous) dam are separable into three phases. In the multiple-bearing (polytocous) species, the parturient process is such that the activities of the second and third stages are interrelated. It would be more accurate therefore to talk of only two stages, namely, the pre-parturient period and the period of foetus and foetal membrane expulsion.

At this stage of labour the contractions of the uterus are regular. Even at the end of this stage, they can be very strong and frequent. These events terminate the second stage with acceleration in the expulsive efforts of the dam. Provided there is no impediment to its delivery, the foetus is then expelled by a combination of voluntary and involuntary muscular contractions in the abdomen and uterus. Repeated straining, particular abdominal straining, is therefore the principal feature of maternal behaviour at birth. The straining efforts increase in number and recur more regularly when the second stage of labour has begun. At this time the strong reflex abdominal and diaphragmatic contractions are synchronized with those of the uterus.

One of the main obstacles to single births is the passage of the foetal forehead through the taut rim on the dam’s vulvar opening. Once the head is born the rate of passage of the foetus is greatly accelerated. The shoulders follow the head within a few minutes and, immediately after this, the remainder of the neonate very quickly slips out of the birth passage. The mother’s vigorous straining usually ceases when the foetal trunk has been born; often there is a short resting period at this point while the hind limbs of the neonate are still in the recumbent mother’s pelvis(an event commonly occurring in unassisted horse births).
Immediately on being born, ungulate neonates exhibit typical struggling movements and upward tilting of the face before they make efforts to stand.

During birth, the posture of the dam varies a great deal. Some remain recumbent throughout birth; in others there is alternate lying, standing and crouching. The duration of the second stage of labour is usually much shorter than the first stage.
1.5 **Post-Parturient Period**

In the immediate postpartum period, the dam is engaged in the third stage of labour and in the grooming of the neonate. The third stage is mainly concerned with the expulsion of the foetal membranes or afterbirth. Many animals occupy themselves by eating the afterbirth after its final expulsion (*placentophagia*). It has been said by some observers that the time thus spent by the mother parallels the efforts of the newborn in struggling and attempting to mobilize itself. Not all animals are placentophagic; cows and sows are, while mares are not.

![Picture 3](image-url)

1.6 **Species Parturient Behaviour**

- **Mares**

  The first indications that a mare is nearly foaling can be seen in the swelling of the udder and teats, which, in most cases, becomes apparent about two days before the birth occurs. Also at this time, a wax like fluid is emitted from the teats, although this may occur weeks before actual foaling. About four hours before parturition...
sweating is evident at the elbows and on the flanks. The first sign of labour occurs when the mare becomes increasingly restless.

She may perform circling movements, look around at her flanks, get up and lie down spasmodically and generally show signs of anxiety. At the onset of parturition feeding ceases abruptly. The mare rises and lies down again more frequently than before, rolls on the ground and laps her tail against her perineum. Subsequently she adopts a characteristic straddling position and crouching posture, frequently urinating at the same time. The mare may also show flehmen, especially after the allantoic fluid has escaped with the rupture of the allantochorion about the end of the first stage of labour when extremely vigorous straining - typical of the mare alone - occurs for the first time.

Just before straining starts an unusually high rising of the head is sometimes observed. But when straining begins the mare soon goes down flat on her side and the expulsive efforts become intensified. From the first signs of sweating it may be deduced that the first stage of labour, which lasts for about four hours, has begun, but false starts are not uncommon. After some straining the water bag (amniotic sac) becomes extruded within it one foetal foot usually precedes the other. The bouts of straining become more and more vigorous until the muzzle of the foetus appears above the fetlocks. Although the straining bouts at this period are very vigorous the amniotic sac does not rupture. Most of the delivery time is normally taken up with the birth of the foal’s head. Soon after this the remainder of the foal, except its hind feet, is expelled from the vagina. The reflex head movements of the almost wholly born foal finally burst the amniotic sac the foal begins to breath and its further reflex limb actions may extract the remainder of its hind legs from the dam. The mare rising may cause final expulsion of the legs.
The duration of this second stage of labour is, on average, about 17 minutes although in normal circumstances it may last anything from 10 to 70 minutes. Following the completion of birth mares often lie and rest.

1.7 Birth problems

There are several birth problems that may occur among farm animals. There are a few that occur more regularly and we will give attention to them. For the more complicated problems a veterinary surgeon must be called for help.
Problems that might arise prior to births

In sheep there are a few problems that arise in the last part of gestation.

♦ Pregnancy Toxaemia

Also known as ketosis, lambing sickness or twin lamb disease. This is a very important metabolic disease and can be prevented if understood. It is discussed a little deeper than the other diseases.

Pregnancy toxaemia, a sub acute metabolic disease of ewes in advanced pregnancy, is characterized by hypoglycaemia, ketonemia, ketonuria, weakness and blindness, and is caused by rapid growth of twin or triplet foetuses, declining nutrition and stress. The disease is called "Dom siekte’ in Afrikaans because at the start of the disease the ewe appears stupid. The main cause is a quick drop in blood glucose.

There are many reasons for this disease but the main reason is the restricted capacity of the rumen of the ewe due to the increasing size of the foetuses and the resultant decrease in energy value of the feed consumed. Because of this the extra demand for energy of the foetuses cannot be met. Eighty percent of the lamb birth weight forms during the last six weeks of pregnancy. The growing foetuses exert an obligatory demand for seventy to eighty five grams of glucose per day. The normal non-pregnant sheep produces and uses eighty to a hundred grams of glucose per day for maintenance.

Very little dietary glucose is absorbed thus hypoglycaemia develops and the ewe becomes dependant on gluconeogenesis (Body fat tissue is converted to glucose) to convert body reserves to energy. Maternal tissues hydrolyse fat, convert the resulting glycerol to glucose and oxidize the fatty acids for energy and in the oxidative process form ketone bodies (acetone, aceto -acetic acid, and hydroxybutyric acid), which may accumulate to concentrations of hyperketonemia.

The demand for glucose also triggers several other metabolic paths to produce glucose and these results in a severe metabolic imbalance and death as a result of shock and brain damage. Animals that show straddling of the hind limbs, tremors and signs of coma must be reported immediately so that attempts can be made to bring up their blood sugar levels before too much damage to the liver and kidneys occur.

Enough high quality energy feed during the last stages of gestation may help to prevent the disorder. Energy supply should be increased to one and a half times maintenance level. A daily intake of a grain supplement is an excellent source of energy. Treatment by a veterinarian who can induce parturition may save the ewes’ life.
Hypocalcaemia

Also known as Lambing sickness, milk-fever or transport tetany. Hypocalcaemia is an acute metabolic disease of sheep and is characterised by tetany, incoordination, paralysis, and coma and is caused by an inadequate supply of metabolisable calcium. Because the disease has wide geographic distribution and occurs in pregnant ewes, lactating ewes, rams, and feedlot lambs, and causes considerable financial waste, it is a concern for the sheep industry.

Economic losses result from deaths, maternal neglect and abandonment of nursing lambs, and loss of live weight among feedlot lambs. The common development of hypocalcaemia among dairy cows and other domestic animals adds economic significance to the condition.

Lambs traveling vast distances and especially when they refuse to eat may develop this disturbance at arrival at the destination. Except for calcium treatment, most animals with hypocalcaemia die.

Clinical Signs and Post-mortem Lesions: In all classes of affected sheep, symptoms develop abruptly. Affected ewes in early stages show stiff and uncoordinated movements and straddled stance, especially in the hind limbs. Later muscular tremors, muscular weakness, apprehension and rapid breathing are prominent.

Ewes in advanced stages fall to sternal recumbency, with the head extended forward and the posterior limbs extended backwards; they develop paralysis and pass into coma. Most sheep and cattle affected with hypocalcaemia promptly respond to intravenous or subcutaneous administration of 50 to 100 ml of 20 % calcium gluconate. Some animals may require one or more additional treatments.

Hypomagnesemia

Also known as grass tetany, grass staggers or wheat pasture poisoning. Hypomagnesemia is an acute metabolic disease of pasture sheep and cattle and is characterized by excitative bearing and spastic tetany and is caused by a depressed supply of metabolizable magnesium from prolonged consumption of lush immature grasses. Because the disease has wide geographic distribution and causes extensive financial waste to grazing ewes, it bares major importance and high concern for the entire sheep industry. As production emphasis shifts from range lands to pasture flocks, hypomagnesemia will acquire even more importance.

Occurrence:

hypomagnesemia occurs in all breeds of lactating ewes grazing early spring pastures. Although most cases develop in ewes during the first 4 weeks of lactation, other classes of sheep occasionally develop the disease. It is an important disease in America, Netherlands and Australia and in wheat grazing areas and exclusive grazing on lush green grasses causes hypomagnesemia.
At the beginning of hypomagnasemia outbreaks, several ewes may develop characteristic signs. Affected animals are overly excited by ordinary stimuli, such as rapid driving, dog barking, physical restraint, lamb nursing, and loud noise. Breathing accelerates, tremors begin, and walking and running movements become difficult (because of muscular in-coordination). As the condition progresses and as strong stimuli continues, some ewes fall to a recumbent position, convulse, pass into coma, and finally die. Before the violent muscular actions the body temperature is normal, but during convulsions it may rise to 43 degrees Celsius.

Producers prevent Hypomagnesemia by feeding crude magnesium oxide dissolved in water.

♦ Mastitis (Blue udder)

Mastitis is an acute infectious but not contagious disease of lactating ewes and is characterized by severe necrotizing (destruction of tissue) inflammation of the mammary gland, a systemic reaction and reduced milk secretion and is usually caused by bacteria.

On the basis of cause and clinical manifestations, veterinarians classify two forms of mastitis (1) gangrenous mastitis, usually caused by Staphylococcus aureus, and (2) hard mastitis, commonly caused by Pasteurella haemolytica. Because the disease occurs in both range and farm flocks of most countries and causes significant financial waste, mastitis is a major concern for the sheep industry.

Economic losses result from deaths of affected ewes, milking incapacitation of recovered glands and abandonment of lambs, and from the cost of therapeutic programs.

Veterinarians diagnose both staphylococcal and pasteurella mastitis from evidence of signs, lesions and laboratory findings. Fever, depression and unilateral swelling of the udder area are indicative signs. Inoculating the ewes against Pasteurella haemolytica may help. If treated early, penicillin and Streptomycin give satisfactory results.

■ Problems during birth

Other birth problems may occur during the labour period. Sometimes the orientation of the foetus in the uterus prevents normal birth and the animal must be helped. If a female animal is too long in labour it must be reported to the Supervisor so that expert help can be given.

Minor problems can also occur where the head gets stuck because the birth canal is too small. Sometimes with a little help the foetus can be assisted to be born. If the front legs protrude, a gentle pull in the direction of the hind legs may be all that is needed (Do not exert too much force and do not pull toward the tail). Most of the time when the head and front legs are out, the body will soon follow. The illustration provided below provides some examples of abnormal and normal birthing positions.
Retention of the afterbirth has occurred if it did not come loose in the first few hours after the newborn was delivered. Here also a gentle pull can help. If the afterbirth is still stuck in the uterus, report it to your supervisor. Sometimes expert advice and action is needed to remove the afterbirth and to correct the situation with medication. Always wear protective clothing and gloves when retention of the afterbirth needs you to touch the afterbirth. There are several Zoonotic diseases that can be contracted by humans and which can cause severe discomfort to a human.

Please complete Activity 1: Individual exercise
Write an assignment regarding the problems that can occur during the birth process.

- Describe different forms of dystocia
- Describe how these problems can be resolved (if at all).

This assignment should be descriptive, contain pictures if possible and be at least 3 pages in length. Your facilitator will provide you with the necessary stationary.

Use the learning materials from previous unit standards in the field of animal breeding or reference materials from the internet, library of magazines.
**Picture 7**

Normal presentations:
- a Anterior
- b Posterior
- c Twins

Abnormal presentations:
- a Foreleg back
- b Head back
- c Breech
- d Twins jammed at pelvis
<table>
<thead>
<tr>
<th>Concept (SO 1)</th>
<th>I understand this concept</th>
<th>Questions that I still would like to ask</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signs of the normal birth process are identified and classified in a group of female breeding animals.</td>
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<tr>
<td>Birth problems are classified and the level of assistance with such problems is correctly determined.</td>
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</tr>
<tr>
<td>Signs of any abnormal behaviour in the birth process is recognised and recorded.</td>
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<tr>
<td>Animals that are observed to have completed parturition and those that had birth problems are identified and recorded.</td>
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<tr>
<td>Basic assistance to the animals that are having birth problems is rendered.</td>
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Session 2 Different breeding methods in farm animals

After completing this session, you should be able to:
SO 2: Demonstrate an understanding of the different breeding methods in farm animals.

In this session we explore the following concepts:
♦ The ratio of males to females.

2.1 Introduction

In South Africa the environment on farms where farm animals are produced varies. Some of the farms are extensive and big and others are more intensive. The breeding methods that will be used will depend on the ability of the farmer to handle the animals during the breeding season. There are practical reasons why all the methods may not be applied on every farm. Some methods may be difficult and costly. For example, the dairy industry is well organised due to the use of artificial insemination. Semen can be stored for long periods of time and transported all over the world. It is only in the last decade or two that artificial insemination in sheep and other species has developed in such a way that it can be practically implemented.

Please complete Activity 2:
The facilitator will divide your class into groups. Each group will be assigned one of the following topics for which an assignment must be written:
1. The advantages and disadvantages of mass mating.
2. The advantages and disadvantages of group breeding
3. The advantages and disadvantages of hand mating (hand breeding)
4. The advantages and disadvantages of artificial insemination.

Try to obtain as much visual material as possible to explain the breeding methods in class. After completion of your assignment, discuss your topic with the rest of the class so that everyone in the class will understand the different breeding methods.
Hand in your assignments as part of your formative assessment and Portfolio of Evidence.
Please complete Activity 3:

The facilitator will arrange with a dairy or sheep farmer for you to visit his farm where a demonstration of artificial insemination will be observed. Make notes on the procedures and discuss the procedures in class and answer the following questions on worksheets that will handed out to you by your facilitator.

- **Is it possible to store the semen of a bull for a long time?** Explain how it is stored and how it is used in practice.
- **Do you need special equipment to use the bull’s semen?** Explain how the equipment looks and how it is stored and used.
- **Can you use artificial insemination any time or must you wait for specific signs in the cow or ewe before you use the method?** Explain your answer.

Choose the correct answer out of the possible answers provided below.

**a) How many cows or ewes can be inseminated from a specific bull or ram?**

(i) It depends on the amount of straws with semen that is available.

(ii) Only one cow or ewe.

(iii) Thousands of cows or ewes.

**b) The following aspects are harmful to semen.**

(1) Metal (2) Direct sunlight (3) Egg yolks (4) Extreme cold (5) Heat higher than 38 degrees Celsius (6) Mechanical shock (7) Glass (8) Variation in temperature (9) Blood (10) Urine.

**c) How will you examine a semen sample before you inseminate the cow?**

Choose the correct answers (More than one answer may be correct)

(i) Use a telescope (ii) Use a microscope (iii) Make use of a glass plate warmed to body temperature (iv) Examine the sample for motility and colour (v) Examine the sample on a cold glass. (vi) Store the sample in a refrigerator before you examine it.

**d) How will you clean the equipment used for insemination?**

(i) Disinfect with alcohol or other disinfectants. (ii) Clean it with soap and water and rinse off with distilled water before you dry it. (iii) Clean it with soap and water (iv) Boil it in distilled water or clean rainwater before you dry it. (v) Clean it with cold water and put it in steam oven (autoclave).
2.2 The ratio of males to females

- **Mass mating**
  With this method three to four percent rams are put among a flock of ewes or a herd of cattle. On extensive farms especially in sheep this is the most common breeding method. The farmer must also make sure that there are enough fertile rams available to mate with the ewes. Several methods can be used to make sure that the ewes are served. In beef cattle the numbers are usually smaller and sometimes the farmer will give more attention to the heifers and the old cows. Sheep however can be run in very large camps and definite methods must be exploited to ensure that all of the ewes are covered by a fertile ram.

  - Methods to make sure Mass Mating are a success.
    - Make sure that the rams are fertile by testing them before they are put among the ewes.
    - If you mate for a period of six weeks make sure the rams get rest during the mating period.
    - Use between 3-4% fertile rams among the ewes (Three % when all the rams have experience and 4 % when some of the rams in the group are young rams).

  - How to rest the rams
    - The best way to rest your rams is to divide the rams into two groups.
    - Make sure the condition of the rams is good.
    - Give them enough exercise. Exercise and good nutrition is the most important aspect to keep your male animals healthy and fertile.
    - Put in half the rams for two weeks. Then the other half for the next two weeks and rest the first half. Put all the rams among the ewes for the last two weeks.
    - It is also a good thing to make sure that the breeding animals (males and females) mingle every day. One water trough in the breeding camp will help in this respect. For group mating, hand mating and artificial insemination the farm has better control over the mating process and therefore fewer rams can be used.
    - An important point to remember is that the rams must be observed and rams with a poor libido and dexterity must be replaced with more vigorous rams.

- **Group mating (group breeding)**
  This is where the farmer selects a few ewes and mates them with a certain ram. The selected ewes accompanied by a selected ram are run in a small paddock or camp for about a month.
Hand mating (hand breeding)

Hand mating is a little more complicated. The farmer runs his 300 ewes in a camp, every morning the sheep are gathered in a big kraal and teaser rams are put in with them. Then, when a teaser ram identifies an ewe in oestrus by mounting her, the ewe is caught and taken out and put with a fertile ram in a small kraal.

All the ewes that must be mated with that particular ram, is put in the kraal with him. When the ram has mated the ewe, she is marked, put on record and returned to the mated flock.

After all the oestrus ewes are identified, the flock is allowed to graze for the rest of the day until the afternoon. In the early evening the flock is gathered again and the same procedure is repeated as in the morning. The ewes that were mated in the morning are mated again as well as the new ewes that are in oestrus. The new ones are also marked and put among the mated ewes to be mated again the next morning.

Picture 8

Group of ewes identified for hand mating and mated one by one by a specific ram
AI (Artificial Insemination)

Artificial Insemination is a technical method of breeding. Although this method is commonly used in dairy farming, in sheep farming it is rare. A few management methods can be followed:

- The ewes are synchronized by inserting a progesterone sponge into their vaginas.
- The sponge is removed and the ewes are then injected with PMS (Pregnant Mare Serum) to induce oestrus so that the ewes start ovulating at the same time. Artificial insemination can then be carried out in the morning and in the afternoon.
- You need special equipment to inseminate an ewe (this will be discussed under the Unit Standard for artificial insemination).
- The second method follows the hand-mating method to select oestrus ewes. The ewes that are in oestrus are then artificially inseminated. The procedure is repeated in the afternoon.

<table>
<thead>
<tr>
<th>Concept (SO 2)</th>
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</table>
Session 3

Basic reproductive cycles of farm animals

After completing this session, you should be able to:

SO 3: Demonstrate an understanding of the basic reproductive cycles of farm animals.
SO 4: Define the factors affecting the reproductive cycles of farm animals.

In this session we explore the following concepts:

♦ Breeding season.
♦ Environmental factors in seasonal variation.
♦ Differences in the oestrus cycle between species.
♦ Other factors that have an influence on the intensity and occurrence of oestrus.
♦ Breeding seasons and breeding programs.

3.1 Introduction

The breeding season of different farm animals differs. Dairy cattle, pigs and merino sheep have very long breeding seasons (Seasonal breeding seasons). Other species like chickens and certain sheep breeds like the Blackface and Southdown are short season breeders (Seasonal breeders). The Angora goat is also a goat with a definitive breeding season.

Please complete Activity 4:

The facilitator will divide your class into two groups. The one group will compile a list of farm animals with a definitive short breeding season and the other group will compile a list of farm animals with long breeding seasons. Find reasons why the breeding seasons differ and what regulates the breeding season. Sometimes the farmer can manipulate the breeding season artificially. Visit your library and find out how this is done. Report back and discuss the two group’s findings.
3.2 Breeding Season

One of the most well known seasonal breeding livestock breeds in South Africa is the Angora goat. Although it is possible to breed Angoras out of season it is not practical. The breeding season starts more or less from February and ends more or less in July. During the breeding season the rams will be sexually very active and the ewes will become cyclic and express oestrus every 17–21 days. During the rest of the year they will not express oestrus and the rams will also become sexually inactive. Although the Dorper and Merino sheep have a much longer breeding season they can, if the circumstances allow it (e.g. with good nutrition) breed throughout the year. Under normal conditions their breeding activity reduces during the hot summer months from October to the end of January. Dairy cattle and pigs express very little seasonal breeding and can be bred in a more structured and planned way by the farmer.

Many British sheep breeds are strictly seasonal breeders. In contrast, tropical sheep breeds such as the Indian Bikaneri show no seasonal anoestrus (i.e. they can breed all year). A long breeding season is a genetically dominant characteristic and is most probably derived from animals that historically were developed in the tropics or sub-tropics. For example, all Merino crosses exhibit a long breeding season like the Merino. Also, the Dorper has only a one-month anoestrus period. Silent ovulation (the female ovulates but no oestrus is detected) usually occurs at the beginning and the end of the breeding season.

3.3 Environmental factors in seasonal variation

- Photoperiodicity (Daylight ratio)

There are only a few experiments on the action mechanisms of photoperiodicity in domestic mammals; most of the results have been obtained in sheep. However, it is possible to speculate that physiological processes found by photoperiodic manipulation in this species are also involved in many light-sensitive vertebrates. The most conclusive experiment was done using two photoperiodic cycles per year. Under such environments, the animals experience two breeding periods. If the ewe is allowed to mate regularly, lambing occurs every six and a half months. This is made up of a period of 150 days (gestation) proceeded by 45 days of lactation anoestrus. Similar photoperiodic manipulation is also effective in the ram. With two photoperiodic cycles per year, there are two periods of decreasing spermatogenesis activity coinciding with the two periods of increasing day length.

The egg laying ability in poultry is also regulated by regulating daylight length.
3.4 Differences in the oestrus cycle between species

The oestrous cycle lasts from 16 to 21 days in domestic mammals (ewe: 16-17 days; cow, sow, goat: 20-21 days). The duration of oestrus differs according to species and varies from one female to another within the same species. The same holds true in respect of the time of ovulation, which occurs 24-30 hours after the onset of oestrus in most ewes and cows, and 35-45 hours in the sow (Table 1).

The length of oestrus and the time of ovulation vary in relation to internal and external factors.

<table>
<thead>
<tr>
<th>Table I</th>
<th>Oestrous Cycle. Oestrus and Ovulation in Farm Animals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of Oestrous Cycle</td>
<td>Duration of Oestrus</td>
</tr>
<tr>
<td>Ewe</td>
<td>16-17 days</td>
</tr>
<tr>
<td>Goat</td>
<td>21 days (Also short cycles)</td>
</tr>
<tr>
<td>Sow</td>
<td>19-20 days</td>
</tr>
<tr>
<td>Cow</td>
<td>21-22 days</td>
</tr>
<tr>
<td>Mare</td>
<td>19-25 days</td>
</tr>
</tbody>
</table>

In the mare, 18% of oestrus is abnormally long ($\geq$ 10 days) in March, whereas such cycles are not observed during the full breeding season at the beginning of summer.

The oestrous cycle is divided into two very unequal phases.

- ♦ A luteal phase that extends from the formation of the corpus luteum after ovulation, until its regression at the end of the cycle.
- ♦ A phase of rapid follicular development which begins when the corpus luteum regresses and ends with oestrus and the ovulation of one or more Graafian follicles. The luteal phase lasts 14-15 days in the ewe and 16-17 days in the cow and sow. The follicular phase is short: 2-3 days in the ewe and goat; 3-5 days in cow and sow.
Schematic representation of the blood hormones during the oestrus cycle of the ewe (Speroff et al. 1982).

### 3.5 Other factors that have an influence on the intensity and occurrence of oestrus

- The health status of both the female and the male animal, will have an influence on the ability to breed (Animals in poor health will have difficulty to breed).
- Females that receive an un-balanced ration with a poor body condition score will not necessarily show oestrous.
- Body condition in males does not play a big role in spermatogenesis and bulls can produce healthy sperm even when they are in poor condition. But, when they are not healthy their sperm production, libido and dexterity will be reduced.
3.6 Breeding seasons and breeding programs

Please complete Activity 5:

You must create a basic breeding program for the following farmers:

- A Dairy farmer (No definite breeding season.)
- A sheep farmer that farms with Merinos (Lower sexual activity during the very hot months of October, November, December and January).
- An Angora Farmer (Very definite breeding season February till July.)
- A sheep farmer that farms with Dorpers (Long breeding season).

The following must be in the program:

- Time of year when the rams and bulls can be tested for fertility.
- Time of year the actual mating will take place (Breeding season).
- Time of year the offspring will be expected.
- Time of year that no breeding activity will take place.

<table>
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<tr>
<td>The significance of oestrus cycles is explained and applied to a breeding programme.</td>
<td></td>
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<tr>
<td>The reproductive cycles of male farm animals are explained and integrated into the breeding programme</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Factors affecting the reproductive cycles of farm animals are integrated into the breeding programme of the enterprise.</td>
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</tbody>
</table>
Now that you have studied all the relevant aspects of advanced breeding practices for farm animals, let’s summarize the work that you have done:

A. **You have studied the basic reproductive cycles of farm animals and the factors that will affect the reproductive cycles.**
   - You have looked at the breeding seasons of farm animals.
   - You have looked at the environmental factors and seasonal variations of the breeding cycle.
   - You have looked at the factors that influence the intensity and occurrence of oestrus.
   - You have compiled a breeding program for a farmer.

B. **You have looked at the different mating methods used for breeding.**
   - Mass mating
   - Group mating
   - Hand mating
   - Artificial insemination
   - You have looked at the ratio of males to females used in different breeding methods.
   - You have looked at the methods to ensure that mating is successful.

C. **Breeding programme design**
   - You have created a basic breeding program for a dairy farmer, a merino farmer, a Dorper farmer and an Angora goat farmer by considering the length of the breeding season respectively.
   - You have looked at the factors that determine intensity of the oestrus cycle in farm animals.
Am I ready for my test?

♦ Check your plan carefully to make sure that you **prepare in good time**.
♦ You have to be found **competent** by a qualified **assessor** to be declared competent.
♦ Inform the assessor if you have any **special needs** or requirements **before** the agreed date for the test to be completed. You might, for example, require an interpreter to translate the questions to your mother tongue, or you might need to take this test orally.
♦ Use this worksheet to help you prepare for the test. These are **examples of possible questions** that might appear in the test. All the information you need was taught in the classroom and can be found in the learner guide that you received.

1. **I am sure** of this and understand it well
2. **I am unsure** of this and need to ask the Facilitator or Assessor to explain what it means

<table>
<thead>
<tr>
<th>Questions</th>
<th>1. I am sure</th>
<th>2. I am unsure</th>
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<tbody>
<tr>
<td>1. Name the three stages of the birth process.</td>
<td></td>
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<tr>
<td>2. Name three behavioural changes when females are about to give birth.</td>
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<tr>
<td>3. What is the main difference between the birth of a foal and the birth of a calf?</td>
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<td>4. What is placentophagia?</td>
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<td>5. Name three potential birth problems.</td>
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<td>6. Name four different types of breeding systems</td>
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<tr>
<td>7. What is the average length of a cow and a goat’s oestrus cycle?</td>
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<tr>
<td>8. Name three advantages of mass breeding.</td>
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<tr>
<td>9. Name three methods that a farmer can use to manipulate the breeding season.</td>
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</table>
Checklist for practical assessment …

Use the checklist below to help you prepare for the part of the practical assessment when you are observed on the attitudes and attributes that you need to have to be found competent for this learning module.

<table>
<thead>
<tr>
<th>Observations</th>
<th>Answer Yes or No</th>
<th>Motivate your Answer (Give examples, reasons, etc.)</th>
</tr>
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<tbody>
<tr>
<td>Can you identify problems and deficiencies correctly?</td>
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<tr>
<td>Are you able to work well in a team?</td>
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<tr>
<td>Do you work in an organised and systematic way while performing all tasks and tests?</td>
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<tr>
<td>Are you able to collect the correct and appropriate information and / or samples as per the instructions and procedures that you were taught?</td>
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<tr>
<td>Are you able to communicate your knowledge orally and in writing, in such a way that you show what knowledge you have gained?</td>
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<tr>
<td>Can you base your tasks and answers on scientific knowledge that you have learnt?</td>
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<tr>
<td>Are you able to show and perform the tasks required correctly?</td>
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</tr>
<tr>
<td>Are you able to link the knowledge, skills and attitudes that you have learnt in this module of learning to specific duties in your job or in the community where you live?</td>
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</tbody>
</table>

- The assessor will complete a checklist that gives details of the points that are checked and assessed by the assessor.
- The assessor will write commentary and feedback on that checklist. They will discuss all commentary and feedback with you.
- You will be asked to give your own feedback and to sign this document.
- **It will be placed together with this completed guide in a file as part of you portfolio of evidence.**
- The assessor will give you feedback on the test and guide you if there are areas in which you still need further development.
Paperwork to be done …

Please assist the assessor by filling in this form and then sign as instructed.

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Bibliography

Books:
Reproduction in farm animals Hafez 1974

World Wide Web:
Taurus.co.za
vetproductsonline.co.za

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  Ms N Matloa
SOUTH AFRICAN QUALIFICATIONS AUTHORITY
REGISTERED UNIT STANDARD:

Apply advanced breeding practices for farm animals

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<td>NSB 01-Agriculture and Nature Conservation</td>
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<td>2007-10-13</td>
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PURPOSE OF THE UNIT STANDARD

The learner achieving this Unit Standard will be able to use and apply advanced breeding practices, such as breeding practices and use of reproductive cycles, in farm animals.

Learners will gain specific knowledge and skills in animal husbandry and will be able to operate in an animal production environment implementing sustainable and economically viable production principles.

They will be capacitated to gain access to the mainstream agricultural sector, in animal production, impacting directly on the sustainability of the sub-sector. The improvement in production technology will also have a direct impact on the improvement of agricultural productivity of the sector.

The profession will benefit in general by having learners trained in the field of breeding, which will contribute to the performance and productivity of the enterprise.

LEARNING ASSUMED TO BE IN PLACE AND RECOGNITION OF PRIOR LEARNING

It is assumed that a learner attempting this Unit Standard will demonstrate competence against the following Unit Standards or equivalent:

- NQF 2: Identify basic breeding practices for farm animals.
- NQF 2: Evaluate external animal anatomy and morphology.

UNIT STANDARD RANGE

Whilst range statements have been defined generically to include as wide a set of alternatives as possible, all range statements should be interpreted within the specific context of application.

Range statements are neither comprehensive nor necessarily appropriate to all contexts. Alternatives must however be comparable in scope and complexity. These are only as a general guide to scope and complexity of what is required.

UNIT STANDARD OUTCOME HEADER
Specific Outcomes and Assessment Criteria:

SPECIFIC OUTCOME 1
Identify and classify the signs of giving birth and problem births in female breeding animals.

OUTCOME RANGE
Breeding animals may include but are not limited to cattle, sheep, goats, pigs, horses, poultry, game, fish and other as related to the context of operation.

ASSESSMENT CRITERIA

ASSESSMENT CRITERION 1
Signs of the normal birth process are identified and classified in a group of female breeding animals.

ASSESSMENT CRITERION 2
Birth problems are classified and the level of assistance with such problems is correctly determined.

ASSESSMENT CRITERION 3
Signs of any abnormal behaviour in the birth process is recognised and recorded.

ASSESSMENT CRITERION 4
Animals that are observed to have completed parturition and those that had birth problems are identified and recorded.

ASSESSMENT CRITERION 5
Basic assistance to the animals that are having birth problems are rendered.

SPECIFIC OUTCOME 2
Demonstrate an understanding of the different breeding methods in farm animals.

OUTCOME RANGE
Farm animals may include, but is not limited to, cattle, sheep, goats, pigs, horses, poultry, game and fish as related to the context of operation. Breeding methods include group breeding, hand breeding, artificial inseminations and other as related to the context of operation.

ASSESSMENT CRITERIA

ASSESSMENT CRITERION 1
The different breeding methods of farm animals are explained.

ASSESSMENT CRITERION 2
Appropriate breeding methods are applied.

ASSESSMENT CRITERION 3
Advantages and disadvantages of a breeding method are explained according to the
enterprise.

**SPECIFIC OUTCOME 3**
Demonstrate an understanding of the basic reproductive cycles of farm animals.

**OUTCOME RANGE**
Farm animals may include but are not limited to cattle, sheep, goats, pigs, horses, poultry, game, and fish as related to the context of operation.

**ASSESSMENT CRITERIA**

**ASSESSMENT CRITERION 1**
Oestrus cycles of female farm animals are described and explained.

**ASSESSMENT CRITERION 2**
The length of the oestrus cycle in the different species of farm animals are defined and compared.

**ASSESSMENT CRITERION 3**
The significance of oestrus cycles is explained and applied to a breeding programme.

**ASSESSMENT CRITERION 4**
The reproductive cycles of male farm animals are explained and integrated into the breeding programme.

**SPECIFIC OUTCOME 4**
Define the factors affecting the reproductive cycles of farm animals.

**OUTCOME RANGE**
Farm animals may include but are not limited to cattle, sheep, goats, pigs, horses, poultry, game, and fish as related to the context of operation.

**ASSESSMENT CRITERIA**

**ASSESSMENT CRITERION 1**
The nutritional factors influencing reproductive cycles are identified and explained.

**ASSESSMENT CRITERION 2**
The influence of the health status of the animal on reproductive cycles is explained and defined.

**ASSESSMENT CRITERION 3**
The seasonal effects on the reproductive cycles is described and illustrated.

**ASSESSMENT CRITERION 4**
The effect of environmental factors on the reproductive cycles is identified and explained.

**ASSESSMENT CRITERION 5**
Factors affecting the reproductive cycles of farm animals are integrated into the breeding programme of the enterprise.
UNIT STANDARD ACCREDITATION AND MODERATION OPTIONS

The assessment of qualifying learners against this standard should meet the requirements of established assessment principles.

It will be necessary to develop assessment activities and tools, which are appropriate to the contexts in which the qualifying learners are working. These activities and tools may include an appropriate combination of self-assessment and peer assessment, formative and summative assessment, portfolios and observations etc.

The assessment should ensure that all the specific outcomes; critical cross-field outcomes and essential embedded knowledge are assessed.

The specific outcomes must be assessed through observation of performance. Supporting evidence should be used to prove competence of specific outcomes only when they are not clearly seen in the actual performance.

Essential embedded knowledge must be assessed in its own right, through oral or written evidence and cannot be assessed only by being observed.

The specific outcomes and essential embedded knowledge must be assessed in relation to each other. If a qualifying learner is able to explain the essential embedded knowledge but is unable to perform the specific outcomes, they should not be assessed as competent. Similarly, if a qualifying learner is able to perform the specific outcomes but is unable to explain or justify their performance in terms of the essential embedded knowledge, then they should not be assessed as competent.

Evidence of the specified critical cross-field outcomes should be found both in performance and in the essential embedded knowledge.

Performance of specific outcomes must actively affirm target groups of qualifying learners not unfairly discriminate against them. Qualifying learners should be able to justify their performance in terms of these values.

- Anyone assessing a learner against this Unit Standard must be registered as an assessor with the relevant ETQA.
- Any institution offering learning that will enable achievement of this Unit Standard or assessing this Unit Standard must be accredited as a provider with the relevant ETQA.
- Moderation of assessment will be overseen by the relevant ETQA according to the moderation guidelines in the relevant qualification and the agreed ETQA procedures.

UNIT STANDARD ESSENTIAL EMBEDDED KNOWLEDGE

The person is able to demonstrate a basic knowledge of:

- Reproductive cycles and breeding methods.
- Factors affecting the reproductive cycles of farm animals.
- The advantages and disadvantages of different breeding methods.
- The effect of nutritional, health, seasonal and environmental factors on reproduction.
- Breeding procedures and breeding programmes.
- Purpose of this is to improve knowledge and inclusion of reproductive cycles and breeding methods into a breeding programme.
- Communication and reporting skills.
- Record keeping skills.
- Understanding the correct procedures and policies to be followed for the breeding season.

UNIT STANDARD DEVELOPMENTAL OUTCOME

N/A
UNIT STANDARD LINKAGES
N/A

Critical Cross-field Outcomes (CCFO):

UNIT STANDARD CCFO IDENTIFYING
Problem Solving: Relates to all outcomes.

UNIT STANDARD CCFO WORKING
Teamwork: Relates to all outcomes.

UNIT STANDARD CCFO ORGANIZING
Self-Management: Relates to all outcomes.

UNIT STANDARD CCFO COLLECTING
Information Evaluation: Relates to all outcomes.

UNIT STANDARD CCFO COMMUNICATING
Communication: Relates to all outcomes.

UNIT STANDARD CCFO SCIENCE
Use of Science and Technology: Relates to all outcomes.

UNIT STANDARD CCFO DEMONSTRATING
Interrelatedness of systems: Relates to all outcomes.

UNIT STANDARD CCFO CONTRIBUTING
Self-development: Relates to all outcomes.

UNIT STANDARD ASSESSOR CRITERIA
N/A

UNIT STANDARD NOTES
N/A

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