The availability of this product is due to the financial support of the National Department of Agriculture and the AgriSETA. Terms and conditions apply.
Dear Learner - This Learner Guide contains all the information to acquire all the knowledge and skills leading to the unit standard:

**Title:** Explain animal anatomy and physiology  
**US No:** 116260  
**NQF Level:** 3  
**Credits:** 5

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>
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<tr>
<th>Title</th>
<th>ID Number</th>
<th>NQF Level</th>
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<td>49048</td>
<td>3</td>
<td>120</td>
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<td>National Certificate in Plant Production</td>
<td>49052</td>
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Please mark the learning program you are enrolled in:

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<tr>
<th>Are you enrolled in a:</th>
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<td>Skills Program?</td>
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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.

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.

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

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.
What are we going to learn?

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What will I be able to do?

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

- Evaluate animals with respect to their internal and external anatomical systems and physiology.
- Gain specific knowledge and skills in animal anatomy and physiology.
- Operate in an animal production environment implementing sustainable and economically viable production principles.

Learning Outcomes

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

- Basic reporting writing technique.
- The effect of variations in symptoms on the animal and the products of the various anatomical systems.
- Appropriate codes of practice, processes, procedures and legislation relating to the handling and evaluation of animals and dissections.
- Applicable actions to be performed in the event of various cues being perceived in the animal and its anatomical systems.
- Applicable sensory cues regarding processes (normal or abnormal) within animals and their anatomical systems.
- Applicable interaction between various interrelated anatomical systems.
- Applicable products of the various anatomical systems within animals.
- Applicable characteristics and properties of animal anatomical systems and components.
- Applicable biological names, concepts and terminology.
- Dissections technique.

What do I need to know?

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

- NQF Level 2: Explain external animal anatomy and physiology.
1 Anatomical systems

After completing this session, you should be able to:
SO 1: Identify and understand the structures, composition and physical and biological components of the various anatomical systems.

In this session we explore the following concepts:

- Animals are anatomically evaluated according to criteria.
- The various structures, physical components, products and interrelated changes per anatomical system are evaluated and described.
- The purpose of the various anatomical systems and structures are explained.

1.1 Introduction

To understand the importance of the knowledge and skills you will obtain in this unit standard it is necessary to understand the definitions of terminologies in this study field:

<table>
<thead>
<tr>
<th>Definition</th>
<th>Description</th>
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<tbody>
<tr>
<td><strong>Anatomy</strong></td>
<td>Anatomy is the study of the composition and structure of the body and its tissues.</td>
</tr>
<tr>
<td><strong>Physiology</strong></td>
<td>Physiology is the study of the functions of these structures and tissue of the animal’s body.</td>
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</table>

The bodies of most farm animals that you are going to study will be represented in smaller animals like rabbits. It is not always possible to dissect large animals like sheep, but you will get good exercise in dissecting a rabbit. Except for the external and alimentary (digestive) canal, there are not major differences in the anatomical structures between a rabbit and sheep/cattle.

1.2 Different systems of importance

For the purpose of this module we are going to focus on a diary as a basis of explaining the different systems of importance.
Let’s discuss our animal according to basic morphology and external characteristics.

**The Head**

- **Ears:**
  
  The ears must be well formed and round with good pigmentation to prevent sunburn.

- **Horns:**
  
  The horns are usually undesirable since most animals can cause harm to themselves and also to each other, especially when the animals are being handled.

- **Eyes:**
  
  Big, twinkling eyes are a sign of good breeding along with prominent eyebrows to protect the eyes.

- **Nose:**
  
  The edge of the nose must be darkly pigmented to protect the animal from sunburn and the nostrils must be large for good breathing. The nose of a healthy cow is always damp.
Mouth:
A large wide mouth is necessary to ensure that the animal is able to eat well. Take note that the animals top jaw bites straight down onto the bottom jaw as this can be a common deformity in cattle and this prevents them from being able to eat properly.

Neck
The neck is correctly connected to the head, the body and to the shoulders. In diary cattle breeders strive to ensure well-formed necks that will enhance femininity instead of muscle definition. Diary cattle must not have loose skin around their throat area.

Hump
In diary cattle there is no prominent hump and only bulls have a slight visible hump.

Shoulders
A diary cow’s shoulders are lean and sometimes gaunt but not pinched and must connect elegantly to the shoulder blade and neck.

Back
The back of any species of cattle must be long and straight and must widen in the direction of the loin.

The Loin
This is the area that must carry most of the animal’s weight and must be strong and wide.

The Chine
The chine is very important as it enhances the fertility of the cow. The slope of the chine is important and must drop slightly in the direction of the tail. If the chine is flat or hangs over too much it should be discriminated against.

Tail
The tail must be well connected or well positioned to join the back. A cow with a ‘baboon shaped tail’ it is unsightly and it obstructs the mating process.

Hips and thighs
Diary cattle must have strong hips but without a muscular occurrence, especially at the back of the cow between the legs because the udders are situated in this area. Cows with big udders cannot move easily since the space between the legs is limited and her movement can be worsened when she is too muscular in that area.
Legs and ankles

Strong slim legs are a good attribute for diary cows to have. Back legs must be straight, well formed downwards towards the hooves. The hooves must not turn inwards (pigeon toed) or turn outwards like a duck. Seen from the side, the pasterns (the connection between the hoof and the leg) must not have a straight appearance but must not hang over too much as both deformities will affect her stride.

The Udder

When selecting a cow, the shape of the udder must be carefully judged whilst looking at the build of the cow. The ideal udder is smooth, uniformly structured and the four teats must be easily distinguished. The udder must have strong medial and lateral ligaments to prevent sagging. The back part of the udder must be smoothly and levelly joined and must be wide between the legs. The front part of the udder must be positioned behind the belly where it joins smoothly to the belly. The teats must be well formed, uniformly seized and levelly positioned, as they must fit securely into the teat socket of a milking machine.

The Belly

The belly must be long, deep and the ribs must be well sprung to ensure space for good digestion. The more a cow can eat the better the production.

Shoulder blade and front legs

Shoulder blades must not protrude (stick out) in diary cows and must be evenly joined to the chest and belly. Front legs must be strong and lean so that weight can be evenly placed.

Chest

The chest must be well formed to allow enough space for the lungs. A small chest is undesirable. The chest must be wide and well shaped.

General build attributes

After the above-mentioned points are judged individually it is important to look at a cow as a whole. Uniformity is important, meaning that all the animal’s body parts should fit well together. What is the over all appearance? A diary cow’s weight is always wedged shaped towards the back.

Classification

Let’s classify our animal according to the standard animal nomenclature.

- Scientific classification
- Kingdom – ANIMAL
- Phylum - CHORDATA (those animals having a backbone)
Class- MAMMALIA (milk giving)
Order - ARTIODACTYLA (even-toed, hoofed)
Sub-order - RUMINATIA (cud chewing)
Family - BOVIDAE (hollow horn)
Genus - BOS (ruminant quadrupeds)
Species - TAURUS (most domestic breeds) or indicus (humped cattle).

1.3 Anatomical structures to identify during dissection

It is assumed that you will dissect or get a demonstration of a dissection of a ruminant. The following instruments are necessary when dissecting an animal. See figure below.

Photo of dissecting set, knife and saw

You will use the scalpel and scissors to do the delicate dissection and the knife to skin and open the animal. The facilitator will explain the use and dangers of the dissecting tools to you.
Please complete Activity 1: Dissection of a ruminant (sheep)

- The facilitator will help you with the dissection of a sheep (or any other suitable animal). Alternatively a demonstration of a dissection of a sheep or other animal can also be acceptable if it’s not possible for you to do the dissection. Follow the sequence explained or demonstrated in dissecting the animal.
- Identify the different parts of the body as guided by your facilitator. Your facilitator will ask you to identify parts from any of the following body sections:
  - Body parts before dissection
  - Thorax
  - Abdomen

NB. Your mentor will assess you during this activity.
1. Dissection procedure.
2. Identification of different parts in a dissected animal.

1.4 **The structures of the different anatomical systems in the body**

If you dissect an animal you must know what to look for. At first you must go through a description of the sequence of the dissection.

### External anatomical parts

The animal will have external parts that have very definite functions in the body. As a guideline the part and its function is written down below. Find it and identify it.

### External structures of a ruminant farm animal

#### Head

- **Lips:** - To eat and chew
- **Mouth:** - To eat
- **Nose:** - To smell
- **Ears:** - To hear
- **Eyes:** - To see
- **Teeth:** - The upper and lower jaws to grind the food.

#### Thorax

- The front limbs attached here and its movement; skin – hair or wool – sweat organ.

#### Abdomen

- **Skin:** hair or wool and sweat organ.
- On the belly side: male reproductive organ.
Pelvic area
- Skin: hair or wool. The female’s reproductive organ (and excretion of water) and the anus are situated here.

Hind legs
- Skin – hair or wool – MOVEMENT.

1.5 Dissections

- **Dissection of head**
  - **Head**
    - Teeth - grinding fodder
    - Palate - help with the mechanical eating process

- **Dissection of neck**
  - Blood supply to the head through veins and arteries.
  - Wind pipe (trachea) transport air to the lungs.
  - The Esophagus (throat) transport food to the stomach.
  - Also look for the thyroid gland both sides of the trachea - endocrine gland that secretes thyrotropic hormone (thyroxine, TSH).

- **Dissection of the thorax**
  - The thorax, otherwise known as the rib cage covers the lungs and heart.
  - Major blood arteries and veins are located here.
  - Aorta carries blood from heart to body.
  - Vena Cava Inferior carries blood from posterior part of body to heart.
  - Vena Cava Superior carries blood from anterior (front) part of body to the heart.

- **Dissection of the heart**
  - The **right side** of the heart pumps blood to the lungs.
  - The **left side** of the heart pumps blood via the aorta to the body.

Look closely to the heart of the animal you dissected the left chamber wall is thicker (more muscles) because it needs to force the blood through the body. The right chamber wall is thin and it only pumps blood through to the lungs. Find the four chambers of the heart and try to follow the flow of blood through the heart by looking at the valves and arteries leaving the heart and the veins entering the heart.
NB. The diaphragm (a membrane between the abdominal and the thoracic cavities) assist with the respiration.

(If you look at the diaphragm before the cavity is open, you will see the lungs and other structures through the diaphragm. If you puncture it with a sharp object, the lungs will collapse as it sucks in air through the puncture.)

## Dissection of the abdomen

- **Liver and gall bladder**: The liver & gall purifies and detoxifies the blood and store gall and glycogen in the cells.
- **Rumen**: Fermentation of fodder by micro-organisms takes place here. That is why it is called a fermentation chamber.
- **Reticulum**: Same function as the rumen.
- **Omasum**: Absorb water from the digested food.
- **Abomasum**: Digest food by the working of enzymes.
- **Small intestine**: Digest and absorb food.

When dissecting the small intestine, note the length as well as the consistency of the content. The large intestine (the colon) is large and it is easy to see the process of water absorption due to change in consistency of the lumen contents. The change becomes clear as the colon becomes smaller and smaller. As the colon becomes smaller and proceeds towards the anus, the dung (faeces) forms a nearly dry pellet that is finally excreted.

- **Pancreas**: Emit pancreatic juice into the small intestines
- **Spleen**: Helps with defense system.
- **Colon**: Absorb moisture from the intestinal lumen.
- **Rectum**: Absorb water and store dung before it is excreted.
- **Kidneys**: Regulate the fluid volume of the body
- **Lymph nodes**: Forms a barrier between the digestive and the lymphatic system canal and are part of the defense system.

- **The bladder**: It stores urine.

## Reproductive systems

You will notice that the central nervous system start in the head and run through the body via the spinal canal. The spinal chord (nerves) itself is protected by the bones of the spine. Between every separate spinal bone there are branches of the nervous system. They are easy to recognize because they appear very bright white.
Dissection of the limbs will reveal the muscles and ligaments as well as the long bones, arteries and nerves. Try to understand the working of the muscles and the joints. The tissue around joints is very tough and strong as it carries heavy weights and assists strong movement.

When the posterior side of the abdominal cavity is inspected you will find the bladder and in the female animal the female reproductive organs.

The female reproductive system consists of the external opening, the vagina, the cervix and the uterus with two horns, one on the left and one on the right side. The horns become smaller and smaller in diameter to form small ducts called the fallopian tubes. The fallopian tubes end in funnel like structures. On each side, near to the funnels of the fallopian tubes, the ovaries are found. Most active ovaries are about the size of a medium bean and have a very distinctive appearance. See figure below.

The female reproductive system

- Left horn of the uterus
- Right horn of the uterus
- Left ovarium with follicle
- Right ovarium with corpus luteum
- Fallopian tubes
- Body of the uterus
- Opening of the cervix
- Vagina
- Opening of uretra
- Clitoris
- Vulva
The male reproductive system

The scrotum and testes of the male are externally visible between the hind legs. The figure above represents the different parts of the male reproductive system.

<table>
<thead>
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</table>
Session 2  Interrelated activities

After completing this session, you should be able to:

SO 2: Identify the interrelated activities pertaining to the various anatomical systems.

In this session we explore the following concepts:

♦ The different transport systems in the body.

2.1 Introduction

You have looked at the different anatomical parts of the animal by dissecting it. You have seen the different organs and structures. The different systems do have very definite functions in the body. If these systems are damaged or diseased it will affect its function and have a severe effect on the function of the whole body. The body has a negative feedback control over the excretion of hormones that regulate certain body functions. The hormones are secreted by certain glands and transported through the blood to an organ in another part of the body. The organ will then react to the hormone and either secrete another substance or fulfil its normal function in the body. The function of the body is regulated and coordinated in this way.

There are a few very important transport systems in the body that is responsible for the whole body to function as a whole and link the function of the organs to that of the body. That is the circulatory system, the respiratory system, the nervous system and the lymphatic system. You have identified the different systems in the body. To understand the working of the body, you must fully identify the transport systems. The lymphatic system is not so easily identified but you will easily see the lymph nodes. They form part of a duct system more or less the same as the venous part of the blood circulatory system. The lymph in the lymphatic veins is collarless and therefore not as visible as blood veins.

The lymphatic system opens in the vena cava inferior just where it enters the thorax cavity from the liver and abdomen. All the filtered lymph is therefore joined with the blood in the blood circulatory system and form part of the fluids of the body. The kidneys regulate the fluid volume of the body. In the next level unit standard the functions of the different system will be discussed as well as the integration of the function of the different systems.
The nervous system

The nervous system is divided into two parts e.g.

- The central nervous system includes the brain and bone marrow.
- The Peripheral nervous system includes the voluntary and involuntary nerves.

The brain controls all functions and movements of the body and the messages are transported to the bone marrow and peripheral nerves and to the muscles and organs of the body.

Blood and blood circulation system

The main purpose of blood is to transport nutrients, water and certain types of gasses throughout the body. Blood also transports waste material to the excretion organs of the body.

Blood is made up of blood cells and a liquid part.

There are various blood cells and each has its own function:

- Red blood cells
  These cells contain albumin or protein in the form of iron e.g. Hemoglobin allows red blood cells to transport gasses (oxygen and carbon dioxide) through the body.

- White blood cells
  These cells protect the body against diseases and organisms.

- Blood Plasma
  This is found in the bone marrow and assists with the coagulation of blood or assists the blood to clot.

  The heart is the main organ that is responsible for the moving of blood inside the body. It works like a pump, which switches on and off and the blood is pumped rhythmically through the blood vessel system.

  The blood vessels that transport blood away from the heart are known as arteries and blood vessels that transport blood to the heart are known as veins.

The lymph gland/node system

Apart from blood, as a fluid, which runs in the blood vessels, there is also tissue fluid found in the muscles and other tissue of the body. This fluid collects in lymph nodes, which is very thin tubes with thin walls.

These tubes, which drain the entire body, combine together in the cavity of the chest in a vein opening. On the way to the chest it passes through various lymph
glands that act as filters for infection. In the lymph glands the white blood cells have an opportunity to fight germs.

There are various lymph glands, which are placed throughout the body, and these keep the body free from infections.

**The respiratory system**

The purpose of the respiratory system is to obtain oxygen in the lungs where the blood is purified and to release carbon dioxide and other waste gasses out of the lungs.

The respiratory system includes the following organs:

- Nose
- Larynx
- Trachea or wind pipe
- Bronchial tubes
- Lungs

The muscles in the chest cavity contract to enlarge the chest cavity and cause a vacuum that brings about the flow of air through the nose into the lungs. The lungs branch out into small cavities, which are called alveoli (serve as a filter). Around the alveoli is a very fine network of arteries and capillaries that are filled with blood containing oxygen. Oxygen is taken from the air into the alveoli and transported through the fine membranes and capillary arteries and this process is called diffusion. At the same time the carbon filled blood excretes carbon dioxide into the alveoli through diffusion.

The muscles in the chest cavity relax and the cow exhales the carbon dioxide.

**The Urinary System**

A cow's kidney works like a filter which separates waste products and certain mineral salts from the water releasing clean water to be used in the body.

The product of the urinary system is urine and this collects in the bladder. Cattle release urine through the urine canal which opens into the vagina (female) or in the case of bulls it is situated at the tip of the penis.
Please complete Activity 2.

**Group activity**

The class must split in two equal groups.

- One group must get as much information as possible on the concept of negative feedback in the body. At least five examples must be discussed where negative feedback controls the secretion or other function in the body.
- The other group must get as much information possible to explain the concept of homeostasis in the body.

**NB.** These tasks must be done within two days. Your facilitator will give you guidance. After you finished the group sessions, you can then discuss the relation between the two concepts and what will happen if the negative feedback in the body became positive. Make notes of the discussion in the class to be used for an assignment on Homeostasis in the body that must be handed in as part of your portfolio of evidence.

Please complete Activity 3.

**Discussion**

Discuss the way a cow must be managed and how she is adapted to give a BCC of less than 400 days.

<table>
<thead>
<tr>
<th>Concept (SO 2)</th>
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<tbody>
<tr>
<td>Normal interrelated activities pertaining to the various anatomical systems and their products are explained.</td>
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<tr>
<td>Variations, problems and probable causes pertaining to various anatomical systems and their products are explained.</td>
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</tr>
<tr>
<td>A course of action based on the knowledge related to the interrelated activities within anatomical systems and their products are described.</td>
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Symptomatic variations and abnormalities within animals

After completing this session, you should be able to:
SO 3: Identify, understand and evaluate symptomatic variations and abnormalities within living animals, in the various anatomical systems.
SO 4: Identify, understand and evaluate and the probable causes of abnormalities and deviations in the anatomy and physiology of animals.

In this session we explore the following concepts:
- Let’s look at and understand the basic anatomical systems of dairy cattle as compared with animals such as fish, mammals and insects
- Let’s look at the musculature
- Let’s look at the digestive system
- Let’s look at the reproductive system

3.1 The basic anatomical systems of dairy cattle

**The skin and covering**

A cow’s hide is dry and water proof and is well suited to perform its function. From out of the hide the following grows: hair, hooves and horns. Hooves and horns have almost the same composition as the hair. The largest area of the animal’s body is covered by hair, except the nose area, under the tail, udder and the scrotum. The hair serves as a mean of protection against pests, plagues and climate conditions. The hide sweats in order to cool the animal’s body down, especially when the animal is experiencing stress.

**Let’s look at the skeleton**

The skeleton is made up of bone, cartilages and ligaments.

The base of the skeleton includes the spine, ribs and chest bone while the appendage skeleton includes the ligaments.
Bones can be divided into four groups: Long bones, short bones, flat bones and irregular bones.

### 3.2 Musculature system

#### Let’s look at the muscles

The Muscles are categorised into groups:

- **Voluntary muscles**
  
  These muscles are found in the neck and back and are influenced by the animal’s will. The animal thus decides if these muscles should work or not and is commonly known as meat.

- **Involuntary muscles**
  
  These muscles are found in the intestinal canal and bladder and work without assistance and decision.

- **Heart muscles**
  
  These are highly specialised muscles and are found in the heart.

### 3.3 Digestive system

#### Let’s look at the digestive system

Herbivores can be categorised into two groups: i.e.

- **Non-Cud Chewers (horse family)**
  
  The horse has a smallish stomach, but a large intestine where large quantities of food can be accommodated.

- **Ruminants (sheep and cattle)**
  
  Food ends up in the rumen where digestion takes place with the aid of microorganisms. The digestive system of cattle is comprised of the following parts and has the following functions i.e.
The lips and tongue

Movement of the lips is very limited. The top surface of the tongue has hard projections that project in the direction of the throat. The cow twists its tongue around a tuft of grass and turns its head sideways to grasp the grass with its bottom teeth and break it off into its mouth.

Teeth

Only small bottom teeth and molars are found in cattle. These are used to cut grass off and to regurgitate. Another advantage of cattle and sheep having teeth is that their age can be ascertained.

Salivary gland

This gland secretes saliva into the mouth which makes the swallowing process easier. In cattle 55 litres are excreted per day.

Oesophagus

It connects the mouth and the stomach with a mucous membrane which is surrounded by involuntary muscles.

Compounded stomach

In the regurgitating process the stomach is clearly separated into different compartments and can be separately distinguished e.g. Rumen or the leaf stomach, (reticulum), omasum and the (milk stomach) abomasums.

- Large intestine
- Small intestine

Figure 2. Digestive System of the Bovine
3.4 **The reproductive system**

- **The female reproductive organs are comprised of the following:**
  - Vulva: This is an opening of the female reproductive organs which is found just under the anus.
  - Vagina: This tubular part is what connects the vulva to the cervix.
  - Cervix: Narrowed connection between the vagina and uterus.
  - Uterus: This is the area where the foetus develops into a calf.

[Diagram of female reproductive system]

Oviduct or Fallopian tubes where egg cells move towards to the uterus so that fertilisation can take place.

Ovaries are almond shaped organs where the egg cells develop and are secreted.

Cows come in heat every 18-24 days and this means they are in heat and are ready for fertilisation. During this time the ovaries secrete egg cells which are transported to the fallopian tubes so that they are ready for the male sperm cell to fertilise. The pubescent cycle of cows lasts about 6-24 hours before she goes into the next cycle.

If the sperm fertilises the egg cell a foetus will develop and 9 months later a calf will be born.

- **Herd combination**

  As a general directive, the following percentages can be used for a herd combination (Engelbrecht, 1991)

  - Cows in production - 45%
  - Dry cows - 10%
Heifers: Ten months to pre-calving - 24%
Heifers: Six weeks to ten months - 13%
Calves: Birth to six weeks - 8%

**Production cycle**

The production cycle (or between calving cycles (BCC)) is the period in a cow’s life between the birth of one calf and her next calf. The recommended objectives for BCC is (Department of Agriculture, KwaZulu-Natal, 1995):

- An average period of 365 days.
- A cow should never have a BCC of less than 330 days, 90% of 330 to 400 days and less than 10% a BCC of more than 400 days.

The BCC is better understood when it is divided into separate components, as illustrated in Figure 2.1.

![Diagram of the periods and events in between calving periods](image)

**Figure 2.1: Diagram of the periods and events in between calving periods**

- **Lactation period**
  
The period from calving until the cow is dried up, is the lactation period and the period in which the cow produces milk. This period is usually 300 to 305 days (43 weeks) with limits of 265 to 340 days (38 to 49 weeks).

  The length of the lactation period depends on the open period and the production level.
Open period (OP)

This is the period between calving and re-conception. This period depends on the voluntary waiting period and the breeding period. The length of this period is an average of 85 days (12 weeks), with limits of 45 days to 120 days (seven to 17 weeks).

Voluntary waiting period (VWP)

The (VWP) refers to the minimum time a farmer should allow between calving and the first mating. Normally it varies from 45 to 60 days. It is not recommended to start with the next breeding cycle before 60 days (eight weeks).

Breeding period (BP)

The breeding period is the open period minus the VWP (BP=OP - VWP), in other words, the time from the end of the VWP to conception. The length of this period depends on the number of times that the cow was in heat before fertilisation (conception) took place.

Gestation period

The period from conception to calving is the gestation period and usually varies from 280 to 285 days. It varies slightly between different breeds and is also dependant on the gender of the calf. For practical purposes it can be taken as 280 days (40 weeks).

Dry period

This is the period between the end of lactation until the cow calves again. It is usually 56 days (objective is 45 to 57 days). To determine this date you have to calculate from the conception date, in other words, conception date plus 224 days.

Low producing cows, caused by illness or cows with extended coverings (open periods), can possibly reach uneconomical low levels of production towards the end of her lactation period. It is therefore possible that her dry period will be longer than 56 days. The length of the gestation period is also variable and may not be exactly 280 days, with the result that the length of the dry period varies with approximately a week.
The male reproductive organs are comprised of the following:

♦ The **testes** produce spermatozoa and hormones.

♦ The **scrotum** protects and supports the testes. It regulates the temperature.

♦ The **epididymis** stores the sperm and is the location of final maturation of sperm.

The spermatogenesis takes 61 days. One bull can produce up to 10 billion cells per day.

Let’s look at the internal systems...

♦ The mobile system

This is the system that assists the body with movement in order to move backwards and forwards.

This system implies the skeleton and muscles of the body.
3.5 Abnormalities

- Brucellosis
  - Transmission
  This illness is transmitted sexually via a bull. A bull, when mating with an infected cow, makes contact with the placenta or birthing liquids which carries the disease. The disease is then transmitted from an infected cow to uninfected cows.
  
  - Symptoms
  This is a highly contagious disease which can also affect humans. In female animals abortions do occur during advanced stages of pregnancy and in male animals through infection in the testes. Humans are infected through drinking milk from the infected animal or when Artificial Insemination is performed without the use of surgical gloves.
  
  - Control
  Infected animals are branded with a C brand and are destroyed.

- Bloating
  This is caused by the collection of gas in the large stomach of regurgitates due to excessive nourishment. Gasses are secreted during the digestive process. In normal circumstances these gasses are passed through the mouth regularly. Bloating takes place when these gasses cannot be passed.

  - There are two types of bloating i.e.
  
  This can happen when something blocks the oesophagus or when the oesophagus is swollen due to poisoning. A blockage or obstruction can be removed with a pipe or by hand. Phone a vet in serious cases!

  - Foamy-bloating:
  When withered foodstuff (for example Lucerne) is eaten, air bubbles collect in the large stomach or rumen. Use a medicine (Bloat Guard) or dosing syrup to assist with the relief of this process.
Let's explore the major cues regarding gross abnormalities that might affect dairy cattle.

If you have the knowledge of cattle diseases you will be able to prevent and treat them. Good management can prevent many of these diseases.

♦ Tick damage

- Ticks can cause damage to cattle, particularly around the udder and ears. The wounds left behind after feeding (suckling blood) can be infected with bacteria or flies might pester them.
- Some ticks can cause severe damage to cattle, especially those that transmit heart water.
- Prevention is better than cure! Control the ticks by using pour-on, by means of a plunge dip or spray dip if you have the facilities. Pour-on is easier to use, as you do not need additional facilities but is more expensive.
- The management of tick control: once a week during the wet season and every second week in the dry season.
- You may be able to treat less often if you vaccinate the cattle against tick-borne diseases.

♦ Brucellosis

- Brucellosis can cause abortion in cows and is also highly infectious to people.
- People get infected by handling infected animals or by drinking contaminated milk from.
- Drink pasteurised or treated milk!
- Signs of disease in people are tiredness, headaches, night sweat, muscle pain and loss of appetite.
- Prevention involves vaccination and testing of the blood of the animal.
- All female calves are vaccinated between 4 and 8 months of age. A live vaccine is used. It is therefore best to allow your veterinarian or animal health technician to vaccinate the cattle.
- Pregnant animals must not be vaccinated because they will abort!!!!
- Your state veterinarian or animal health technician to check if they are free of brucellosis should test cows annually.
- Cows testing positive for brucellosis are branded with a C brand on the neck. Do not buy a cow with this brand, because she is infected and may spread the disease to your other cows.
- Note that many different diseases can cause abortion. Brucellosis is commonly known as the major cause of brucellosis. The bull may spread some of these. If your cows are aborting it is very important to get the cause identified by your state veterinarian. Care must be taken when handling aborted calves. Wear gloves to protect you from becoming infected.
Tuberculosis (TB)
- Cattle with tuberculosis often become very thin with time.
- People can get TB from cattle by drinking infected milk.
- You should have your herd tested for TB every year by your state veterinarian. (This involves a skin test).
- Animals testing positive are given a T brand on the left side of the neck.

Diet-related problems
The consequences of and reasons for eating plastic bags and wire are:
- This occurs when cattle are underfed or if their diet lack of phosphorus particularly during the dry season. Another reason is the accidental intake of wire lying around.
- Plastic bags can block the stomach while wires can puncture it. In both cases the animal will look sick and uncomfortable at first and then usually dies.
- Once the cow has eaten plastic bags or wire, the only effective treatment is an operation, which is expensive.

Prevention involves the following:
- Feed cattle well, especially in winter
- Clear wires and plastic bags from the grazing area

Poisonous plants
- Toxic plants can cause serious diseases and death in cattle.
- It is important to know whether toxic plants appear in your area and to react accordingly. Prevent your cattle from grazing in that field.
- Poisoning can especially be a problem when you buy new animals that are not used to the plants in your area and are more likely to eat toxic plants.
- Poisoning can also happen when you move cattle to new paddocks where toxic plants occur.

A common poisonous plant is “gifblaar”. Poisoning mostly occurs at the end of the dry season when this plant is the only green foodstuff to eat. The plant leads to sudden death in cattle.

Foot problems
- Cattle can get foot problems especially if they are kept in damp conditions such as in the kraal or grazing in wetlands.
- These problems can be avoided by clean conditions.
- One such problem is foot rot that is an infection between the claws of the feet. The foot is swollen and may have a bad odour. The animal becomes lame and may have difficulty eating enough, as it cannot walk long distances. The only treatment is with antibiotics (penicillin antibiotics are best). There are many different types (read the instructions on the
bottle). The long-acting injections are better as you only need to inject once. The dosage is linked to the weight of an animal. For example, if the prescription reads 1 ml for each 10 kg, you would give 40 ml to an animal weighing 400 kg. A formalin footbath will hasten the healing process.

- Another foot problem can be overgrown hooves that eventually also cause lameness. Treatment involves trimming of hooves.

♦ Botulism
- Botulism occurs when cattle eat hay or silage polluted by carcass material, bones or poultry litter when grazing.
- Cattle will eat carcass material and bones when there is a lack of feed or if they have a phosphorus deficiency in their diet during winter.
- This disease causes paralysis and the animal usually dies.
- Treatment is only possible in the early stages and requires an antitoxin and/or penicillin.
- Prevention involves vaccination and good nutrition during winter. You should also burn or bury all carcasses, bones or decaying material.

♦ Worms
- Worms can lead to poor condition, particularly in calves.
- The only way of prevention or treatment is by de-worming.

### Disease prevention

♦ Vaccination
- Calves should be vaccinated against black quarter, botulism, tetanus and anthrax at the age of 3 and 4 months. A second vaccination for black quarter, botulism and tetanus is necessary 4 weeks later.
- Female calves should be vaccinated against brucellosis at the age of 4 to 8 months. Pregnant animals should never be vaccinated.
- Cattle should get a booster vaccination yearly against anthrax, black quarter and botulism.
- Calves should be vaccinated against tick-borne diseases at the age of 3 to 9 months.
- Speak to your veterinarian or animal health technician about the need for other vaccines in your area.
- It is very important to vaccinate your cattle as recommended per disease and as per area. In failing doing that the cattle will not be properly protected against the diseases. Vaccinated cows will also pass on some immunity to the calves.

♦ Tick and worm control
- Ask your state veterinarian or animal health technician for the best methods to control ticks and worms in your area.
- Tick and worm remedies are normally sold in containers meant for large numbers of animals. (It may be a good idea for a group of animal owners to share the remedies, as it is quite expansive).
Brucellosis and TB testing

- Your local or provincial veterinarian should do this annually.

**Conclusion**

- Good hygiene, management and nutrition are the most important factors in producing healthy cattle.
- Prevention is better than cure! Vaccinate and practise good tick and worm control methods.
- For advice and treatment, always speak to your state or private veterinarian or your animal health technician. A veterinarian can only administrate many of the drugs.
- When using drugs for treatment, make sure that you give the correct dosage (the drugs must also be registered for use in cattle) over the correct length of time to ensure effectiveness.
- Animal products (milk and meat) should not be used before the withdrawal period of drug treatment has passed.

**Difficult Births**

This can be influenced by various factors. It is usually a commonly experience when cows give birth to their first-born. When an animal is giving birth there should be supervision without unsettling or disturbing the animal. If there should be a complication and it may take too long for the vet to arrive, you should aid the cow. Try to dislodge the calf and then insert a set pill into the cow’s birth canal to decrease the inflammation.

- Held-back afterbirth

The afterbirth that does not come out must be left. If the afterbirth is not emitted with a light tug it will be necessary to use an enema which must be placed as deep as possible into each uterus. Always use a long plastic glove.

- Lactic Fever

This condition occurs after giving birth and is caused by the fact that the cow withdrew too much calcium from her body which is transferred to the udder and to develop the unborn calf’s body. Lactic fever implies a calcium deficiency in her diet. Calcium is transported through the blood stream to the unborn where it is used for muscle tone and development. Symptom of lactic fever: The cow is paralysed and she must be treated with very quickly or else she will die. Calsitad must be injected into the cow’s veins and her diet must be adjusted.
Diarrhoea & Dehydration

Internal parasites, incorrect feeding and infectious diseases can cause this. This often leads to dehydration. Such animals must be treated immediately with water and electrolytes.

Mastitis

This is the most important and prominent disease found in diary cattle and costs the diary industry thousands of rand each year. This disease originates from bad management, unhygienic conditions and microbiological infections that infects the udder.

♦ Symptoms

The udder is swollen, turns red and is painful. Puss is emitted from the teats. There are 3 types of mastitis, e.g.

- **Sub clinical mastitis:** The udder and the milk are infected but no symptoms are observed except for clods in the milk. Lack of treatment can lead to acute mastitis.
- **Acute mastitis:** The cow develops a high temperature/fever and is seriously ill. The tissue in the back quarters of the cow’s udder can be destroyed and the cow can loose most of her value as a producer.
- **Chronic mastitis:** If the cow’s udder is not fully recovered and the tissue is not rehabilitated after acute mastitis this can cause a contestant painful infection.

♦ Treatment

Infected udders must be treated with care. Firstly, milk the cow thoroughly, to the last drop! Antibiotics can now be injected directly into the udder via the teat. Massage the udder softly allowing the ointment to spread and well absorbed in the udder.

Please complete Activity 4:
**Individual activity**
Give an example of a vaccination programme for the specific type of animal that you are doing your practical on.

Please complete Activity 5:
**Discuss**
The problem of mastitis is found in most types of farm animals and even humans. Discuss the causes, symptoms and possible solutions for this problem.
<table>
<thead>
<tr>
<th>Concept (SO 3 &amp; 4)</th>
<th>I understand this concept</th>
<th>Questions that I still would like to ask</th>
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<tr>
<td>An understanding of normal symptoms and variations pertaining to the various anatomical systems and their products is demonstrated.</td>
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<tr>
<td>An understanding of abnormal symptoms and variations and their probable causes, pertaining to the various anatomical systems and their products is demonstrated.</td>
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<tr>
<td>A course of action based on the perception of the symptoms and variations in anatomical systems and their products is described.</td>
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<tr>
<td>The normal anatomy and physiology of animals are described.</td>
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<tr>
<td>Abnormal anatomical and physiological deviations are described.</td>
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<tr>
<td>The possible or probable causes of anatomical and physiological deviations or abnormalities are described.</td>
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</table>
## Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Anatomy</td>
<td>The study of the way living things are put together and what the parts are.</td>
</tr>
<tr>
<td>Animal</td>
<td>A many-celled living thing that can move (at least part of its life) and must eat other living or once-living things.</td>
</tr>
<tr>
<td>Carbohydrate</td>
<td>Foods that provide energy. They are often called starches and sugars, and are found in things like bread, pasta, fruit, and cereal.</td>
</tr>
<tr>
<td>Carbon dioxide</td>
<td>A gas that animals give off when they breathe. Unlike plants, animals take in oxygen and release carbon dioxide.</td>
</tr>
<tr>
<td>Classification</td>
<td>Sorting things into groups with similar traits.</td>
</tr>
<tr>
<td>Digestion</td>
<td>Changing food into a form the body can use.</td>
</tr>
<tr>
<td>Endo skeleton</td>
<td>A skeleton that’s inside the body (like your skeleton).</td>
</tr>
<tr>
<td>Enzyme</td>
<td>Substances made by the body that help changes happen. Example: pepsin, which helps digest protein in the stomach.</td>
</tr>
<tr>
<td>Exoskeleton</td>
<td>A hard outer structure, such as the shell of an insect or crustacean, that provides protection or support for an organism.</td>
</tr>
<tr>
<td>Evolution</td>
<td>Change in living things over very long periods of time and the development of new species from older species.</td>
</tr>
<tr>
<td>Hide</td>
<td>The skin of an animal.</td>
</tr>
<tr>
<td>Invertebrate</td>
<td>An organism without a backbone.</td>
</tr>
<tr>
<td>Kingdoms</td>
<td>The five large groups into which scientists have classified all living things. (Currently, scientists are discussing whether there ought to be seven kingdoms instead.)</td>
</tr>
<tr>
<td>Life cycle</td>
<td>All the stages in an animal's life, from egg to adult.</td>
</tr>
<tr>
<td>Mammal</td>
<td>A warm-blooded vertebrate that grows hair on its skin and (in females) produces milk for its young, and usually gives birth to live young.</td>
</tr>
<tr>
<td>Oesophagus</td>
<td>A muscular tube that goes down your throat to your stomach.</td>
</tr>
<tr>
<td>Organ</td>
<td>Two or more tissues working together to do a job for the body. Examples: bone, brain, and stomach.</td>
</tr>
<tr>
<td>Organ system</td>
<td>Organs working together to do a job for the body. Examples: skeletal system, digestive system.</td>
</tr>
<tr>
<td>Species</td>
<td>A group of living things that is very closely related and can interbreed.</td>
</tr>
<tr>
<td>Term</td>
<td>Description</td>
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<tr>
<td>------------</td>
<td>-----------------------------------------------------------------------------</td>
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<tr>
<td>Udder</td>
<td>The milk-secreting organ of a cow or sheep. Milk is produced in the spongy</td>
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<tr>
<td></td>
<td>tissue in the udder and secreted from the teats. Cows have four teats and</td>
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<tr>
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<td>ewes two.</td>
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<tr>
<td>Vertebrate</td>
<td>An animal with a backbone.</td>
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<tr>
<td>Warm-blooded</td>
<td>Having a warm, constant body temperature that doesn't depend on the outside</td>
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<td></td>
<td>environment.</td>
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</tbody>
</table>
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. What is the definition of the term anatomy?</td>
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<tr>
<td>2. Name the four stomachs found in ruminants and the function of each</td>
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<td>3. How long is the gestation period of a cow?</td>
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<tr>
<td>4. What is the meaning of the term Dry- Period</td>
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<td>5. What is the function of the epididymis in the male reproductive system?</td>
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<tr>
<td>6. What is the importance of brucellosis?</td>
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<tr>
<td>7. What is the difference between chronic- and acute mastitis?</td>
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<tr>
<td>8. Name a disease that is spread by ticks?</td>
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</tbody>
</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>
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<tbody>
<tr>
<td>Can you identify problems and deficiencies correctly?</td>
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<td>Are you able to work well in a team?</td>
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<td>Do you work in an organised and systematic way while performing all tasks and tests?</td>
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<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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<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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<td>Can you base your tasks and answers on scientific knowledge that you have learnt?</td>
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<td>Are you able to show and perform the tasks required correctly?</td>
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<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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</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 your 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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SOUTH AFRICAN QUALIFICATIONS AUTHORITY

REGISTERED UNIT STANDARD:

Explain animal anatomy and physiology

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<td>2007-10-13</td>
<td>SAQA 0156/04</td>
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PURPOSE OF THE UNIT STANDARD

The learner achieving this unit standard will be able to evaluate animals with respect to their internal and external anatomical systems and physiology. In addition they will be well positioned to extend their learning and practice into other areas of animal production and agriculture.

Learners will gain specific knowledge and skills in animal anatomy and physiology 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.

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 Level 2: Explain External Animal Anatomy and Physiology.

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 understand the structures, composition and physical and biological components of the various anatomical systems.

**OUTCOME RANGE**
This includes but is not limited to fish, birds, mammals, insects, crustaceans, reptiles and amphibians as relevant to the context of application.

**ASSESSMENT CRITERIA**

**ASSESSMENT CRITERION 1**
Animals are anatomically evaluated according to criteria.

**ASSESSMENT CRITERION 2**
The various structures, physical components, products and interrelated changes per anatomical system are evaluated and described.

**ASSESSMENT CRITERION RANGE**
Products include but are not limited to blood, hormones, enzymes and other glandular secretions, ova, lymph, semen, sperm, digestive fluids, tears, sebum, slime, cochineal, silk, faeces, bee products, meat as relevant to the context of application.

**ASSESSMENT CRITERION 3**
The purpose of the various anatomical systems and structures are explained.

**SPECIFIC OUTCOME 2**
Identify the interrelated activities pertaining to the various anatomical systems.

**OUTCOME RANGE**
This includes but is not limited to fish, birds, mammals, insects, crustaceans, molluscs, reptiles and amphibians as relevant to the context of application.

**ASSESSMENT CRITERIA**

**ASSESSMENT CRITERION 1**
Normal interrelated activities pertaining to the various anatomical systems and their products are explained.

**ASSESSMENT CRITERION 2**
Variations, problems and probable causes pertaining to various anatomical systems and their products are explained.

**ASSESSMENT CRITERION 3**
A course of action based on the knowledge related to the interrelated activities within anatomical systems and their products are described.

**SPECIFIC OUTCOME 3**
Identify, understand and evaluate symptomatic variations and abnormalities within living animals, in the various anatomical systems.

**ASSESSMENT CRITERIA**
ASSESSMENT CRITERION 1
An understanding of normal symptoms and variations pertaining to the various anatomical systems and their products is demonstrated.

ASSESSMENT CRITERION 2
An understanding of abnormal symptoms and variations and their probable causes, pertaining to the various anatomical systems and their products is demonstrated.

ASSESSMENT CRITERION 3
A course of action based on the perception of the symptoms and variations in anatomical systems and their products is described.

SPECIFIC OUTCOME 4
Identify, understand and evaluate and the probable causes of abnormalities and deviations in the anatomy and physiology of animals.

ASSESSMENT CRITERIA

ASSESSMENT CRITERION 1
The normal anatomy and physiology of animals are described.

ASSESSMENT CRITERION 2
Abnormal anatomical and physiological deviations are described.

ASSESSMENT CRITERION 3
The possible or probable causes of anatomical and physiological deviations or abnormalities are described.

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:

- Dissections technique.
- Applicable biological names, concepts and terminology.
- Applicable characteristics and properties of animal anatomical systems and components.
- Applicable products of the various anatomical systems within animals.
- Applicable interaction between various interrelated anatomical systems.
- Applicable sensory cues regarding processes (normal or abnormal) within animals and their anatomical systems.
- Applicable actions to be performed in the event of various cues being perceived in the animal and its anatomical systems.
- Appropriate codes of practice, processes, procedures and legislation relating to the handling and evaluation of animals and dissections.
- The effect of variations in symptoms on the animal and the products of the various anatomical systems.
- Basic reporting writing technique.

UNIT STANDARD DEVELOPMENTAL OUTCOME
N/A

UNIT STANDARD LINKAGES
N/A

Critical Cross-field Outcomes (CCFO):

UNIT STANDARD CCFO IDENTIFYING
Problem Solving: Relates to outcome:
- Identify the interrelated activities pertaining to the various anatomical systems.

UNIT STANDARD CCFO WORKING
Teamwork: Relates to outcomes:
- Identify, understand and evaluate symptomatic variations and abnormalities within living animals, in the various anatomical systems.
- Identify, understand and evaluate and the probable causes of abnormalities and deviations in the anatomy and physiology of animals.

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

UNIT STANDARD CCFO COLLECTING
Interpreting Information: Relates to outcome:
- Identify the interrelated activities pertaining to the various anatomical systems.

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

UNIT STANDARD CCFO DEMONSTRATING
The world as a set of related systems: Relates to all outcomes.

UNIT STANDARD ASSESSOR CRITERIA
N/A

UNIT STANDARD NOTES
N/A

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