

TVET CERTIFICATE V in ANIMAL HEALTH

MINOR SURGERY

ANHMS302

Perform minor surgery

Competence



Credits: 5

Learning hours: 50

Sector: Agriculture and food processing

Sub-sector: Animal health

Module Note Issue date: June, 2020

Purpose statement

This module describes the skills and knowledge required to perform minor surgery on animals without supervision. Upon completion of the module, the learner will be able to

Perform wound and abscess treatment Execute male castration, perform dehorning,

Apply hoof trimming techniques, Perform livestock caudectomy, Perform trocarisation

Deleted:

Table of Contents

Elements of competence and performance criteria		Page No.
Learning Unit	Performance Criteria	
1. Learning unit 1 Perform Injections	1.1 Proper selection of material tools and equipment for injections according to their types and uses	4 Learning Unit 6 – Perform small ruminants caudectomy
	1.2 Proper identification of injection sites according the animal species and drugs	
	1.3 Proper application of injections techniques according to the clinical cases and manufacturer's instructions	
2. Learning unit 2 Perform wound and abscess treatment.	2.1 Proper selection of material tools and equipment for wound and abscess treatment according to their clinical cases	9
	2.2 Proper wound cleaning and debridement according to the clinical case.	
	2.3 Proper application of wound suturing and dressing techniques according to the clinical cases.	
3. Learning unit 3 Execute male castration	3.1 Proper selection of material tools and equipment for male castration and restraining according to the species and castration types	22
	3.2 Appropriate application of animal restraining techniques according to the species and castration types	
	3.3 Adequate application of bleeding castration techniques according to the animal species and age	
	3.4 Adequate application of non-bleeding castration techniques according to the animal species and age.	
4. Learning unit 4 Perform dehorning	4.1 Proper selection of material tools and equipment for dehorning and restraining according to the species and types of dehorning	31
	4.2 Proper application of animal restraining techniques according to the species and age	
	4.3 Adequate application of disbudding/ dehorning techniques according to age	
	4.4 Proper conducting of saw dehorning method according to age	
5. Learning unit 5 Apply hoof trimming techniques	5.1 Proper selection of material tools and equipment for hoof and claw trimming and restraining according to the species	38
	5.2 Proper application animal restraining techniques according to the species and age	
	5.3 Careful checking of hoof and claw condition according to the animal species	
	5.4 Proper conducting of hoof and claw trimming	

	operation according to clinical condition	
6. Learning unit 6 Perform small ruminant caudectomy	6.1 Proper selection of material tools and equipment for caudectomy and restraining according to the species	43
	6.2 Proper application animal restraining techniques according to the species and age	
	6.3 Proper conducting of bleeding caudectomy operation according to the species	
	6.4 Proper conducting of non bleeding caudectomy operation according to the species	
7. Learning unit 7 Perform trocarisation of the rumen	7.1 Proper selection of material tools and equipment for rumen trocarisation and restraining according to the species	49
	7.2 Proper application animal restraining techniques according to the species and age	
	7.3 Proper application of rumen trocarisation techniques according to the species and clinical cases	

LU & PC is linked in LO inside the content

Total Number of Pages: 54

Learning Unit 1 – Identify different types of injections

LO 1.1 – Identify different types of injections

Definition

Injection is a method of administration of medicine by using syringe and a needle

- **Topic 1: Identification of the types of injections**

- ✓ **Intramuscular injection**

An intramuscular injection is an injection given directly into the central area of a specific muscle. In this way, the blood vessels supplying that muscle distribute the injected medication via the cardiovascular system.

- ✓ **Sub cutaneous**

It is a method of administering medication. Subcutaneous means under the skin. In this type of injection, a short needle is used to inject a drug into the tissue layer between the skin and the muscle. Drugs injected subcutaneously are more slowly absorbed into the body than intra muscular injected drugs.

This route can be useful for depot/sustained release of drugs, where longer duration of therapeutic effective concentration is required.

- ✓ **Intravenous**

Intravenous injections, abbreviated as IV, involve inserting a needle into a vein, allowing a substance to be delivered directly into the bloodstream.

An intravenous injection provides the quickest onset of the desired effects because the substance immediately enters the blood, and is quickly circulated to the rest of the body.

Because the substance is administered directly into the bloodstream, there is no delay in the onset of effects due to the absorption of the substance into the bloodstream.

This type of injection is the most common and is used frequently for administration of medications in an inpatient setting.

Another use for intravenous injections includes for the administration of nutrition to the animals which cannot get nutrient through the digestive tract.

The drugs which are high irritant such as anti-carcinogenic drugs or hypertonic solutions, which cannot be given through any other route, can be administered with intravenous route.

- ✓ **intra mammary injection**

It is the type of injection where the drugs are sent into the mammary gland, by way of an intramammary infusion. This is needed to get antibiotics into the udder to treat mastitis infections.

- ✓ **intradermic injection**

Intradermal injections, abbreviated as ID, consist of a substance delivered into the dermis, the layer of skin above the subcutaneous fat layer, but below the epidermis or top layer. An intradermal injection is often given at a 5 to 15 degree angle with the needle placed almost flat against the skin.

Absorption from an intradermal injection takes longer than when the injection is given intravenously, intramuscularly, or subcutaneously. For this reason, few medications are administered intradermally.

It is primarily employed for diagnostic tests like Tuberculin (for diagnosis of tuberculosis) or any other allergic tests. It is used for local anaesthesia and some vaccines are also injected intradermally

✓ **intra articular**

It is also called a joint injection (intra-articular injection) where the drugs are deposited just into joint or articular inter-space, across the synovial membrane. This procedure is used in the treatment of inflammatory **joint** conditions, such as rheumatoid arthritis, psoriatic arthritis, gout, tendinitis, bursitis, and occasionally osteoarthritis.

✓ **intracardiac**

Intracardiac injections are injections that are given directly into the heart muscles or ventricles. They can be used in emergencies, although they are rarely used in modern practice.

✓ **Intraperitoneal**

Occasionally, it may be necessary to give large amounts of fluid to a sick creature. Often these quantities are best given intraperitoneally (I.P).that is, the fluid is injected into the stomach cavity where it is then absorbed by the peritoneum lining. It is injection where we use a long bevel needle into hallow of the right side.

This method is preferred in emergency administration of drugs as an alternative to intravenous injection, especially in vicious and uncooperative animals or in cases of laboratory animals.

LO 1.2 –Identify the sites of injection

- **Topic 1 identification of injection site**

Predilection sites of Sub cutaneous injection

- ✓ In smaller animals a fold of skin on the back of the neck is easiest.
- ✓ In large animals use a fold of shoulder skin or the under the neck.
- ✓ For pigs use the skin behind the ears or in front of the back legs
- ✓ In dogs the injection is given under the skin over the top of the neck is a good site
- ✓ The best place to give the injection is generally under the loose skin on the back of your bunny's neck, in the region between their shoulder blades. Using one hand, you can lift the skin and form a tent shape

Predilection sites of Intramuscular injection

- ✓ In the cattle, give the injection over the back leg or into the side of the neck.
- ✓ In sheep, goat pigs and dogs give the injection into the side of the thigh it is the easiest to perform and allow rapid diffusion from injection site to the animal's body.
- ✓ Intramuscular injections in adult sheep and goats can be given in the rump, into the muscle that bulges between the hook bone and pin bone of the hip. In young animals, particularly goats, there may be very little muscle, so you may prefer to inject between a rib and the skin.

- ✓ Intramuscular injection in pig can be given on the neck just behind and below the ear, but in front of the shoulder.
- ✓ In poultry, Intramuscular injections are given into the breast muscle
- ✓ The recommended sites for IM injection in the rabbit are the cranial (front) thigh muscles, or the lumbar muscles to the side of the spine and just cranial to the pelvis.

Predilection sites of intrarticular injection

The most common sites used for intrarticular injection is into the capsule of joint

Predilection sites of intradermal injection

The most common sites used are the inner surface of the forearm and the upper back, under the scapula

Predilection sites of intra-peritoneal injection

Luckily, goat, sheep, and cattle have a ready-made area for needle insertion: the right paralumbar fossa. This is a triangle area between the hipbone (the forward bone of the pelvis) and the last rib, with the vertebrae forming an upper boundary. Only the right side of the animal is used because a large part of any ruminant's stomach (rumen) lies in the left side and could be injured by an injection there

Predilection sites of intramammary injection

Predilection sites of intramammary injection is just into the teat

Predilection sites of Low Epidural injection

- ✓ In large animals, the most common sites for epidural administration of anesthetic agents are the first coccygeal intervertebral space (Co1-Co2) and the sacrococcygeal intervertebral space (S5-Co1) [3, 4].
- ✓ The lumbosacral intervertebral space is the most common site for epidural injection of analgesic drugs in sheep and goats

Predilection sites of High Epidural injection

High epidural block can be produced by injection of local anaesthetic solution into the epidural space at the lumbosacral junction.

Predilection sites of Intravaginal injection

Predilection sites of Intravenous injection

Pig: Ear vein

Cattle, Sheep and Goat: Jugular vein.

Poultry: Wing vein

LO 1.3 – Apply injection techniques

- **Topic 1: Application of injection techniques**

1.3.1 Aseptic preparation of the site

The risk of infected injection sites can be reduced by maintaining clean working conditions and equipment. The surfaces of tables and restraint equipment should be kept free of dust, moisture and manure. After use, syringes can be disinfected by disassembling and washing with hot soapy water, rinsing with alcohol and drying before reassembly. Soaps, alcohol and other disinfectants will cause live or modified-live vaccines to become inactive. Syringes used for live or modified-live vaccines should be sterilized using either moist or dry heat. If it is necessary to rinse out a syringe during use, then draw sterile saline or sterile water into and out of the syringe several times.

1.3.2. Injection techniques

✓ Intramuscular Injections

Draw air into the syringe and inject the same volume of air into the bottle as the volume you plan to take out of the bottle to equalize the pressure. Failure to do so will make it difficult to withdraw the contents of the vial or bottle.

After filling the syringe with the product to be injected, point the syringe upwards and tap the barrel with your finger to make air bubbles move upwards into the syringe tip. Slowly and carefully push the plunger to eject the air bubbles from the syringe before injecting the product.

Procedure

- ✚ Restrain the animal properly.
- ✚ Clean and disinfect the injection site.
- ✚ Take the needle off the syringe.
- ✚ Slap the injection site with the back of the hand.
- ✚ Plunge the needle quickly into the muscle.
- ✚ Attach the syringe to the needle. If blood enters the syringe a blood vessel is hit. Do not inject unless you've hit the right site. Repeat the process until no blood is seen.
- ✚ Inject the drug.
 - While pulling the needle out massage the area. It will aid in the absorption of the medicine and reduce leakage through the puncture in the skin

✓ Subcutaneous Injections

Procedure for subcutaneous injection

- ✚ Choose an area where there is loose skin.
- ✚ Raise the loose skin and insert the needle. Angle the needle so that it is at a 30 to 45 degree angle from the surface of the neck
- ✚ Inject the drug. You should be able to feel the fluid under the skin.

- ✚ After injection is completed, massage the site as this aids in the absorption and reduces leakage of the drug.

✓ Intravenous Injections

Procedure

- ✚ Apply pressure on the vein to make it swell so you can find it more easily.
- ✚ Push the needle into the vein. When the needle enters the vein, blood will enter the syringe through the needle.
- ✚ Take pressure off or release the vein.
- ✚ Slowly inject the rest of the content of the syringe.
- ✚ Once finished, remove the needle.
- ✚ Apply pressure on the site with cotton moistened with 70 % alcohol.

The following figure shows the angles of injection for different types of injections

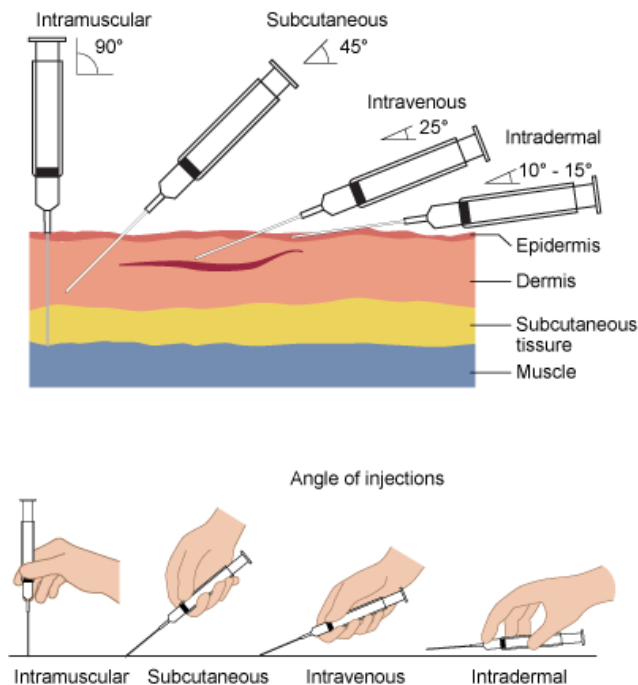


Figure 1: angles of injection for different types of injections

Learning Unit 2 – Perform wound and abscess treatment

LO 2.1 – Select material tools and equipment for wound and abscess treatment

• Topic 1: Selection of material tools and equipment for wound and abscess treatment

1. Definitions

- ✓ **A wound** is defined as a disruptive injury to any of the tissues of the body, especially which caused by physical means rather than a disease and with interruption of continuity. Though most often the result of a physical cause, a burn is also considered as a wound. Both follow the same processes towards the restoration to health otherwise known as healing.
- ✓ **An abscess (Latin: abscessus)** is a collection or pocket of pus in a cavity formed by disintegrating tissue and surrounded by inflamed tissue. Pus itself is a product of inflammation, accumulating where infection is present. Abscesses can arise in any part of the body, but occur most often in the skin. Pyogenic bacteria are frequently the source of the infection, but other microorganisms or an injury can also cause abscesses.

2. Materials tools and equipment used in wound and abscess treatment

✓ Drugs

- Antibiotics
- antiseptics
- anti-inflammatory
- Tranquilisers
- Anesthetics

✓ Tools

- Scissors
- Crush
- Ropes
- Nose lead
- Needles
- Syringes
- surgical blades
- scalpel handle
- adhesives tape
- Wash bottles
- Forceps

✓ Dressing materials

- Cotton Gauze
- Impregnated gauze
- Antibacterial ointments
- Iodine based
- Silver based
- Hydrofibres and alginates

LO 2.2 –Incise an abscess

• **Topic 1: Description of the types of abscess**

Types of abscess

Abscesses are classified into two main categories which are septic and sterile or aseptic abscesses.

A. Septic abscesses

Most abscesses are septic, which means that they are the result of an infection. Septic abscesses can occur anywhere in the body.

Septic abscesses are also divided into 2 types:

- A cold abscesses: these are abscesses which not only don't show the common clinical signs of inflammation such as heat and redness but they are also less painful. Pain generally occurs only when pressure is applied. These swellings can be chronic, persisting. Cold abscesses are usually associated with granulomatous infections such as tuberculosis and mycotic infections. When a cold abscess forms, the infected area fills with pus which can harden over time.
- Hot abscesses: A well-circumscribed focus of acute inflammation with the usual signs of a 'hot' abscess such as heat, pain, swelling and redness.

B. Sterile abscesses

Sterile abscesses are those which develop as a result of non-living irritants such as drugs. If an injected drug like penicillin is not absorbed, it stays where it was injected and may cause enough irritation to generate a sterile abscess with no infection involved.

• **Topic 2: Treatment of abscess**

1. Abscess maturation

The treatment consists of hastening the maturation of the abscess by application of counter irritant such as iodine ointment 5%. Applying heat in the form of a warm compress, such as a warm flannel, may help reduce any swelling and speed up the abscess maturation as well as healing. However, the flannel should be thoroughly washed afterwards, to avoid spreading the infection.

For larger and/or persistent skin abscesses, the administration of the antibiotics may help clear the infection and prevent it from spreading. The use of antibiotics will usually start before a specific type of bacteria has been identified, so "broad-spectrum" antibiotics will initially be given. These are designed to work against a wide range of known infectious bacteria and will usually cure most common infections.

2. Abscess puncture and incision

In certain cases it is advisable to open the abscess as soon as it is diagnosed. This is like when the abscess is localised near a vital organ or in the abdominal cavity or near the joint. During the procedure, the surgeon will make a cut (incision) in the abscess, to allow the pus to drain out. The animal must be restrained appropriately to facilitate the work of the surgeon and to avoid any potential accidents. The skin over the abscess should be clipped and shear and antiseptic application. An open is made at the most dependent part of the swelling which is fluctuating and its better in the ventral part of the swelling to provide complete drainage of the abscess cavity.

3. Drainage of abscess

- ✓ After the pus is removed, the cavity should be checked for any foreign body and necrotic tissues should be removed.
- ✓ Then a thorough flushing of the cavity should be made with a suitable antiseptic like 10% povidone iodine.
- ✓ The abscess cavity should be packed completely with gauze saturated with Iodine 5%. Iodine gauze helps in the destruction of the lining membrane of the abscess cavity and reduces the level of contamination with the microorganisms.
- ✓ The packed gauze is therefore removed every 24 hours and again the cavity is flushed with a mild antiseptic solution. An appropriate antibiotic should be administered for 3-5 days following the drainage and drains may be removed when discharges sero-sanguineous and diminishes in volume

LO 2.3 –Dress a wound

• Topic 1: Description of the types of wound

Types of wounds

Wound can be classified according to different criteria such as level of skin damage, nature of the wound, depth and loss of substances, causes and level of contamination.

A. According to the level of the skin damage

Under this category, we have two types of wounds which are closed and open wounds.

✓ Closed Wounds

Closed wounds are types of wounds where the skin remains intact but the underlying tissues are damaged, two major types are classified under this category.

- ✓ **Contusion:** occurs when there is bleeding beneath the skin into the soft tissue.
- ✓ **Haematoma:** well-defined pocket of blood and fluid beneath the skin. Collection of blood under the skin and tissue.

✓ Open Wounds

For open wound, either the skin or the mucous membrane and the underlying tissues are damaged. Under this classification, more classifications can also be done.

B. According to nature of the wounds

- ✓ **Abrasion:** superficial loss of skin resulting from rubbing or scraping the skin over a rough or uneven surface.
- ✓ **Laceration:** tear in the skin that can be partial or full thickness cut. Can also be defined as incision or jagged.
- ✓ **Puncture:** occurs when the skin is penetrated by a pointed or sharp object.
- ✓ **Incision:** an open wound with clean, straight edges usually done with a sharp instrument.
- ✓ **Avulsion:** involves tearing off or loss of a flap of skin.
- ✓ **Amputation:** traumatic cutting or tearing off a finger, toe, leg or arm.

C. According to depth or losses of substances

- ✓ **Partial wound:** Characterized by destruction of epidermis.
- ✓ **Superficial wounds:** Lesion occurs on subcutaneous tissue, and superficial blood vessels. Bones may be involved.
- ✓ **Deep wounds:** with lesions of muscles and/or tendons.
- ✓ **Penetrating wound:** when it is entrance wound only. ☐
- ✓ **Perforating wound:** when it is entrance and exit wound. Generally puncture wounds do not cause serious external bleeding but there may be significant internal bleeding and damage to vital organs.

D. According to causes of the wound

- ✓ **Intentional wounds:** are wounds created for therapy. Ex: surgical incisions and venipunctures for starting IV therapy or for collecting blood specimens.
- ✓ **Unintentional wounds:** are results from trauma-like falls, vehicular accidents, gunshots, etc.

E. According to level of contamination

- ✓ **Clean wounds:** are not infected: Microbes have not entered the wounds. Closed wounds are usually clean and so are intentional wounds created under surgical aseptic conditions.
- ✓ **Clean contaminated wounds:** occur from the surgical entry of the urinary, reproductive, respiratory or gastrointestinal system. These systems are not sterile and contain normal flora (group of bacteria that normally exist in the human system).
- ✓ **Contaminated wounds:** have a high risk of infection. Unintentional wounds are generally contaminated. Wound contamination occurs also from breaks in surgical asepsis and spillage of intestinal contents.
- ✓ **Infected wounds:** are also called dirty wounds. They contain a large amount of bacteria and show signs of infection.
- ✓ **Chronic wounds:** are those that do not heal easily (Pressure ulcers, decubitus ulcers, bed sores).

• **Topic 2: wound suturing**

Wound suturing is a key for a good healing. There are different techniques and methods of wound suturing which vary according to many factors such as the nature of the wound, the availability of the suture materials, etc.

A. Suture materials

Suture is any strand of material used to approximate the tissue edges and give artificial support while the tissue heals naturally.

Classification of sutures materials

Based on suture material absorption, they are 2 main classes of sutures such as absorbable and non-absorbable sutures.

Class of sutures	Nature	Use
Absorbable sutures	Down over a specific time frame and be absorbed by the body	In temporary support the healing tissue will eventually support itself.
Non absorbable sutures	Designed to either be left permanently in the body or are to be removed after a certain healing	Generally used in tissue where even though healing may occur; the new tissue may never have the needed strength to support itself.

	period.	Usually removed in 10-14 days, but this may vary by location and situation.
--	---------	---

Table1. Classification of suture materials based on suture material absorption

The two main types are also classified as follow:

Origin of the suture material

1. Natural suture material
 - ✓ Made from animal or plant materials.
 - ✓ Their protein composition can elicit the most pronounced tissue reaction (inflammation).
 - ✓ Their useful strength in tissue varies from a few days with Plain Catgut to several months for Silk, and can vary with the individual.
2. Synthetic Suture material
 - ✓ Can be made from synthesizing a wide variety of polymers.
 - ✓ These materials cause less tissue reaction than natural fibres, therefore their strength and absorption rate (for absorbable suture) is more uniform and predictable in all individuals.

Nature of the suture material

1. Braided (Multifilament) sutures
 - ✓ This construction involves several filaments or strands being braided or twisted together.
 - ✓ This results in a strong suture that is flexible and easy to handle.
 - ✓ They pass less easily through tissue than smooth monofilaments and the resulting "tissue drag" can cause tissue trauma.
2. Monofilaments suture materials
 - ✓ Result in a single strand or filament.
 - ✓ The surface is very smooth and passes easily through tissue. However, they can be difficult to handle and tie as they are less flexible than braided sutures.

B. Suture patterns.

Choice of suture pattern should be based on the basic concept of providing the wound with maximum security with minimal alteration to healing. So, the choice depend on the area or region where is the wound and the affected tissue/organ.

1. Subcuticular sutures

They are placed in the dermis, beneath the epithelial layer and they are 2 types: continuous or interrupted sutures

a) Interrupted sutures

- Interrupted sutures use strands to tie and cut after insertion;
- This provides a more secure closure, because if one suture breaks, the remaining sutures will hold the wound edges in approximation;
- It is used if a wound is infected, because microorganisms may be less likely to travel along a series of interrupted stitches.

Suture	Description
--------	-------------

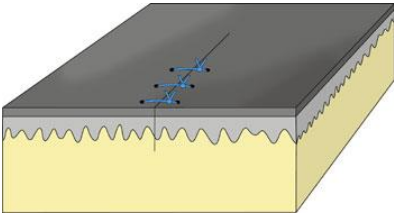
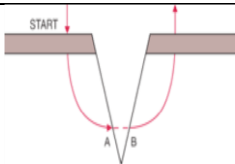
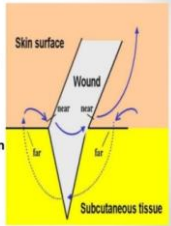
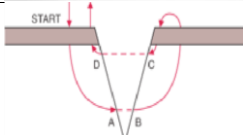
Simple interrupted	✓ Can be used to complete the closure without excessive tension. ✓ The suture begins and ends equidistant from the wound margins. □ Points B must be at the same depth.	interrupted  
Interrupted horizontal mattress		
Interrupted vertical mattress	With the Interrupted Vertical Mattress, the first pass of the needle is the same as a large simple suture, but instead of tying off, another smaller bite is taken back across the wound to end on the starting side. Both ends are	Vertical Mattress Suture • The far far, near near technique. • Indications: where the wound edges tend to evert • Advantages: greater closure strength and better distribution of wound tension • Disadvantages: Scar formation and the formation of edge necrosis.  

Table 2: **Classification of interrupted suture patterns**

b) Continuous subcuticular suture patterns

The most commonly used running suture, the Simple Continuous pattern begins with a simple suture at one end of the wound. The tail is cut without the needle, and suturing is continued. Sutures are snagged up as they are done, except for the last one, which is left as a loop. The tail is tied to the loop.

Procedure of doing Continuous subcuticular suture patterns

1. Begin at one end of the wound, approximately 1 cm opposite the apex of the ellipse;
2. Make a bite, as if placing an interrupted stitch exactly at the apex of the excision;

3. Select one edge of the wound, and make a subcuticular bite parallel to the skin surface;
4. Make a similar bite, backspacing slightly, in the opposite edge of the wound;
5. Continue this procedure, exiting the skin after you have gone 2 cm, until you reach the other apex of the excision. Remember to backspace slightly, as this is critical to fine, equal eversion of the two wound edges;
6. Make your last bite, with the needle pointing upward, at the apex;
7. Exit the skin approximately 1 cm opposite the apex;
8. Pull gently to approximate the wound;
9. Anchor the ends by tying the suture back on itself;
10. If there is a small gap in the closure line, approximate it using a fine epicuticular interrupted stitch.

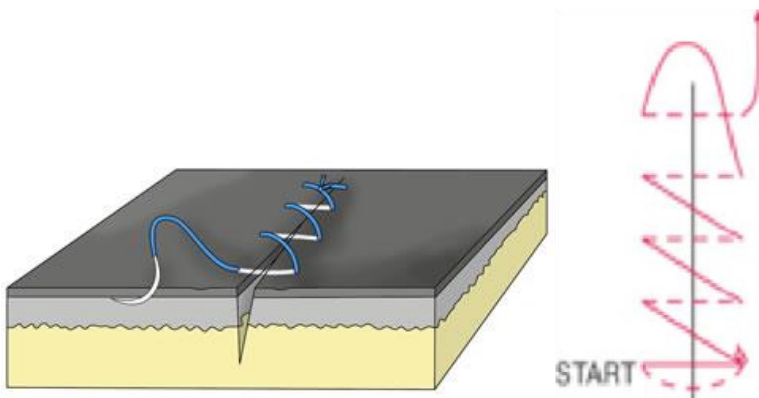


Image 2: continuous suture pattern

2. Deep Sutures

Deep sutures are placed completely under the epidermal skin layer. They may be placed as continuous or interrupted sutures and are not removed postoperatively.

3. Purse String Sutures

Purse-string sutures are continuous sutures placed around a lumen and tightened like a drawstring to invert the opening. They may be placed around the stump of the appendix, in the bowel to secure an intestinal stapling device, or in an organ prior to insertion of a tube (such as the aorta, to hold the cannulation tube in place during an open heart procedure).

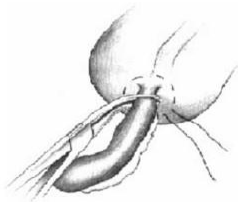


Image 3: purse string suture

4. Ligature

A **ligature** consists of a piece of thread (**suture**) tied around an anatomical structure, usually a blood vessel or another hollow structure (e.g. urethra) to occlude the lumen

It may be used to effect hemostasis or to close off a structure to prevent leakage.



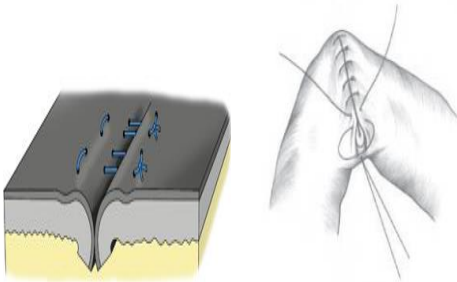
Image 4: Ligature around blood vessel

5. Anastomotic Closure Technique

This refers to a connection between two tubes or passages that would usually branch away from each other.

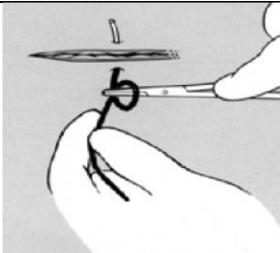
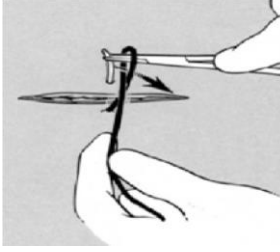
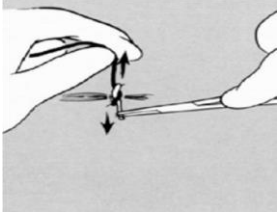
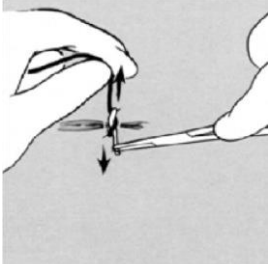


6. Inverted Closure Technique



- ✓ turns incision edges inward, away from surgeon
- ✓ may be desirable when closing hollow organs
- ✓ better “seal” against fluid leakage
- ✓ minimizes exposed suture and subsequent adhesions
- ✓ decreases the size of a hollow organ’s lumen (avoid if already small)
- ✓ avoid in skin as delays healing

C. Square knot instrument tying

Step 1. Position the needle holder The instrument tie is performed with a needle holder held in the surgeon's right hand. The left hand holds the fixed suture end between the tips of the thumb and index finger. The needle holder is positioned perpendicular to and above the fixed suture end. By keeping the length of the free suture end relatively short (<2 cm), it is easy to form (arrow) suture loops as well as to save suture material. Because the needle holder passes the free suture end through the suture loop, knot construction can be safely accomplished without detaching the needle from the fixed suture end.	
Step 2. Form the first suture loop The fixed suture end held by the left hand is wrapped over and around the needle holder jaws to form the first suture loop. If the suture is wrapped twice around the needle holder jaws, the first, double-wrap throw of the surgeon's knot square will be formed. A double wrap, first throw displays a greater resistance to slippage than a single-wrap throw, accounting for its frequent use in instrument ties in wounds subjected to strong, static skin tensions.	
Step 3. Clamp free suture end and withdraw it through the suture loop to form the first, single-wrap throw The tips of the needle holder jaws grasp the suture end and withdraw (arrow) it through the first suture loop.	
Step 4. Advance the first single-wrap throw to wound surface The needle holder held in the right hand advances toward the wound. This single wrap throw is advanced to the wound surface by applying tension in a direction (arrows) that is perpendicular to that of the wound. Once the first throw of the square knot contacts the skin, the edges of the mid-portion of the wound are approximated.	

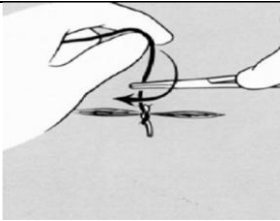
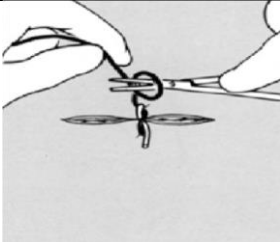
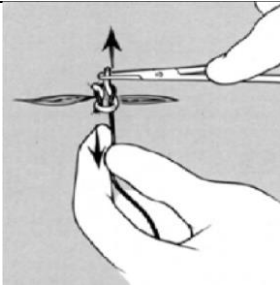
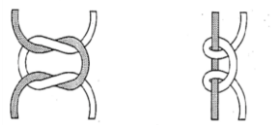
Step 5. Position the needle holder The needle holder releases the free suture end. The right hand holding the needle holder moves away from the surgeon to be positioned perpendicular to and above the fixed suture end. A second throw will be formed by the left hand as it wraps the fixed suture end over and around (arrow) the needle holder jaws. If the surgeon were to place the needle holder beneath the fixed suture end, the ultimate knot construction would be a granny knot.	
Step 6. Form the second suture loop The fixed suture end held by the left hand is wrapped over and around the needle holder to form the second suture loop. With the suture wrapped around the needle holder jaws, the needle holder is moved to grasp the free suture end, after which it is withdrawn through the suture loop.	
Step 7. Clamp suture end and withdraw it through the suture loop to form the second, single-wrap throw The tips of the needle holder jaws grasp the free suture end and withdraw (arrow) it through the second suture loop. By withdrawing the free suture end through the loop, a rectangular-shaped second throw is formed. The surgeon will apply tension to the suture ends in a direction perpendicular to that of the wound.	
Two main types of knots	

Table 3: knot instrument tying

D. Sutures trimming and levelling (Cutting Sutures)

Once the knot has been securely tied, the ends must be cut. Before cutting, make sure both tips of the scissors are visible to avoid inadvertently cutting tissue beyond the suture.

E. Suture removal

Sutures should be removed at the earliest possible time to prevent or minimize suture reaction and suture marks but they should remain in place long enough to prevent wound dehiscence and scar spread.

When the wound has healed so that it no longer needs the support of non-absorbable suture material, skin sutures must be removed.

The length of time the sutures remain in place depends upon the rate of healing and the nature of the wound. Sutures should be removed before the epithelium has migrated into deeper parts of the dermis, generally between days 10-14 post-operative, but this may vary.

The following steps are recommended:

Step 1: Clean the area with an antiseptic. Hydrogen peroxide can be used to remove dried serum encrusted around the sutures.

Step 2: Pick up one end of the suture with thumb forceps or thumb and index finger, and cut as close to the skin as possible where the suture enters the skin.

Step 3: Gently pull the suture strand out through the side opposite the knot with the forceps. To prevent risk of infection, the suture should be removed without pulling any portion that has been outside the skin back through the skin.

- **Topic 3: management of wound**

1. **Wound cleaning technique**

- a) **Wound cleaning and debridement**

Occasionally, cleansing of a wound is required to help clear the wound of debris, such as devitalized tissue or excessive exudates, which may otherwise delay wound healing. In these situations, gentle irrigation of the wound with either warm sterile saline or water (as per NICE recommendations) via a syringe, rather than swabbing or bathing, should be performed to minimize trauma to the wound and to maintain an optimum healing environment. Wound cleansing is not necessary for removal of exudates within the normal limits. It is also important to remember that wound cleansing is itself a form of interference with wound healing and if performed excessively may delay wound healing.

- b) **Shaving**

It is the removal of the hair around the wound using scissors or blade. The best way to treat minor scratches, tears and punctures is with the "clip and clean" method of basic wound care. This involves clipping the hair from around the wound and then washing it with an antiseptic solution.

- c) **Trimming**

If part of the wound has dead or damaged skin then it may need to be trimmed or removed. This is because infection is more likely to develop in dead skin.

A wound that becomes infected after it has been stitched or closed up, can cause serious complications. After the wound is cleaned (and trimmed of dead or damaged tissue, where necessary), a sterile dressing is normally applied.

Large, severe or deep bites may require an operation to clean the wound and repair underlying structures that may be damaged, such as tendons.

2. **Wound dressing**

For a fast and safe healing, the wound needs to be dressed. Wound dressing consists of applying some sterile dressing materials with purposes of protecting wounds from further injury and microbes, Absorb drainage, Promote comfort, Cover unsightly wounds, Provide moist environment for wound healing, Control bleeding for wounds that bleed excessively.

Wound dressings are based on

- ✓ Types of wounds;
- ✓ Size;
- ✓ Location;
- ✓ Amount of drainage;
- ✓ Presence or absence of infection.

Table 4: Common dressing materials

Protective dressings		Anti-microbial dressings		Absorbent dressings		Autolytic debridement	
Gauze	Inexpensive, easily accessible, easy to apply	Antibacterial ointments	Can be applied to areas where dressings are difficult to apply	foam	Absorb moderate exudate	Films	Occlusive, allows exchange of gases
Impregnated gauze	Nonadherent, preserves moisture	Iodine based	absorbent, not to be used in thyroid disorders	Hydrogels	Can absorb minimal wound exudate or rehydrate wound, absorption function predominant here	Hydrogels	Can absorb minimal wound exudate or rehydrate wound; rehydration function predominant here
		Silver based	Broad spectrum with low resistance	Hydrofibrils and alginates	Absorbs heavy exudate	Hydrocolloids	Occlusive, not for exudative or infected wounds

B. Dressing methods

- ✓ Dry to Dry Dressing: simply called dry dressing

- ✓ Wet to Dry Dressing: a gauze dressing saturated with solution is applied over the wound with additional wet dressings applied as needed; solutions act to soften the dead tissues around the wound; the dressing is removed when it dries out
- ✓ Wet to wet dressing: a gauze dressing saturated with solution is applied over the wound and kept moist (not allowed to dry out)

C. Securing dressing

- ✓ Dressing needs to be secured to keep bacteria from entering the wound and to absorb drainage - Non-Allergenic Tapes and Montgomery ties are used to secure dressings.
- ✓ Tapes should extend beyond each side of the dressing but never to encircle the entire body part.
- ✓ If swelling occurs, it means that dressing is impairing circulation.

Heat and cold applications: Heat and cold applications are often ordered to promote healing, comfort and reduce tissue swelling.

3. Post-operative care

Regardless of the mechanism of wound healing, the aims of post-operative wound care remain the same. This serves to allow the wound to heal rapidly without complications, and with the best functional and aesthetic results.

Optimal management of surgical wounds is an important part of post-operative recovery and health care professionals should monitor the process of acute wound healing, prevent wound complications and treat appropriately if complications arise. The key elements of post-operative wound management include timely review of the wound, appropriate cleansing and dressing, and early recognition and intervention of wound complication

- ✓ Keeping wounds clean
- ✓ Antibiotic treatment
- ✓ Autolytic debridement
- ✓ Dressing

Learning Unit 3 – Execute male castration

Castrating is routine practice on a livestock farm which consists of neutering male animals by removing the testicles, either surgically or otherwise. Thus, castration aims at making the testis of male farm animals functionless. Although castration is done for different reasons, it is recommended that bull calves not needed for breeding be castrated sometime between 4-10 weeks of age.

LO 3.1 – Select material tools and equipment for male castration and restraining

- **Topic 1 selection of material tools and equipment for male castration and restraining**

Restraining material:

- ✓ Drugs:
 - Local anaesthetics (Lidocaïne)
 - Tranquillizers
- ✓ Materials:
 - Crush
 - Animals
 - Ropes,
 - alcohol,
 - soap
 - Antibiotics,
 - antiseptics (iodine)
- ✓ tools
 - Scalpel,
 - catgut,
 - scissors,
 - hemostatic folceps,
 - Burdizzo castratome elastrators
 - elastrator bands
 - Cotton Gauze Clips
 - Scissors
 - Needles
 - Syringes
 - surgical blades
 - scalpel handle
 - suture materials
 - Wash bottles
 - Animal rope
 - crush

LO 3.2 – Apply animal restraining techniques

- **Topic 1: Application of animal restraining techniques**

1. Cattle and buffaloes

- ✓ In Rwanda we often use the technique of attaching the head of the animal on a tree or a picket. We pass a rope with knot around the base of the horns, the animal is brought against trunk or peg we tie it.
- ✓ Clamp-snuffer is a tool to tighten the mucus of the nose, which can also be done by pinching with your thumb and forefinger.
- ✓ Working chute is ideal for restraining cattle. it must be well designed so as not to allow the animal to turn around inside.
- ✓ If the animal is strong and very aggressive, quieting it with xylazine at a dose of 0.1-0.2 mg/kg. There is however a significant risk of regurgitation.

How to put adult cattle down on the ground with a rope

- ✓ Get three or four people to help
- ✓ Choose a place where the ground is soft
- ✓ Tie the animal's head low down the ground with a short rope or halter
- ✓ Make a big loop with a knot that does not slip
- ✓ Put the loop over the animal's head, then pull the rope over the animal's back and put it around the body just behind of its front legs and just in front of the back legs
- ✓ Pull on the rope with two or three people
- ✓ As soon as the animal lies down at least one strong person should hold its head firmly on the ground to stop it getting up again. Tie the animal's legs to prevent it from kicking

2. Small ruminant restraining

Sheep

- ✓ push a sheep against a wall and hold it with your legs
- ✓ tie a sheep up with just a loop of rope or use a curved piece of metal to keep a sheep
- ✓ to secure a sheep for examination or treatment stand on animal's left side and hold it up under the jaw with your left hand. hold a fold of skin in front of animal's back right leg with your right hand. Lift the sheep and put it on its bottom then hold it.

Goats

- ✓ Use a rope or collar around the neck to hold a goat
- ✓ You can trim a goat's feet while it is standing
- ✓ Tie the goat's head and lift the foot you want to trim
- ✓ If you move goat in lorry make sure to fill the lorry or put something in the lorry so they are close together and do not fall over

Pigs

- ✓ Use the loop with a stiff handle
- ✓ Stand behind the pig and put the loop over the pig's nose into its mouth.

- ✓ Slide the loop over the top jaw till it is just behind the tusk then tighten it and lift a little to tie the pig more securely, tie another rope over the whole nose to keep the jaws closed and stop the first rope sliding off.

Dogs

- ✓ Make a dogcatcher
- ✓ Slide the loop over the head and pull it tightly then put another loop over the dog's head and pull the other way
- ✓ Tie the dog's mouth shut to stop it biting using a thin rope or strip of cloth

Rabbits

- ✓ Catch a rabbit by holding the skin over the neck. You can put your hand around the ears at the same time
- ✓ Do not hold a rabbit just by the ears, you will damage it
- ✓ Hold a rabbit with its head under your arm or hold it with one hand under the back legs

Birds

- ✓ There are different ways of holding birds depending on what type of bird it is.
- ✓ Pick up a large bird by on wing and other leg
- ✓ Hold a chicken by the legs
- ✓ Catch a duck from behind then grip the wing and hold it

LO 3.3 – Apply bleeding castration techniques

• **Topic 1: identification of castration purpose**

The main reasons of castration can be grouped into two categories:

- Therapeutic reasons;
- Zootechnical reasons.

i. Therapeutic indications

Medical reasons of castration include:

- ✓ injuries to the testicles (eg. trauma to the testicles);
- ✓ cancer of the testicles - common in older dogs;
- ✓ torsion of the testicle;
- ✓ retained testicles (also called cryptorchidism or ectopic testes);
- ✓ when there is a perineal hernia/rupture present;
- ✓ to treat prostate disease (hypertrophy or cancer;
- ✓ To treat tumours around the anus (adenomas).

ii. Zootechnical indications

Castration is carried out for several zootechnical reasons:

- ✓ to increase growth rate;

- ✓ it causes physical changes in the body;
- ✓ to improve the quality of meat - meat from entire male animals (e.g. boars) often has a very strong, unpleasant smell and taste;
- ✓ prevent aggressive behaviour between individuals;
- ✓ to prevent unwanted breeding - farmers only want to breed from the best genetic stock;
- ✓ makes the animal more suitable to perform farm jobs (Oxen);
- ✓ Maintain the correct male to female ratio.
- ✓ To improve the meat quality

• Topic 2: description of gross anatomy of testicle

Gross anatomy of testicle

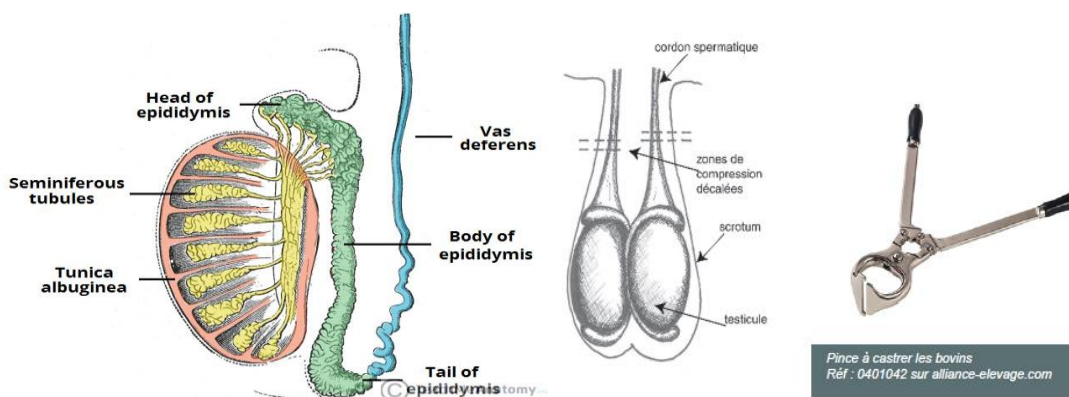


Figure A. Superficial Anatomy of Scrotum and Testicle

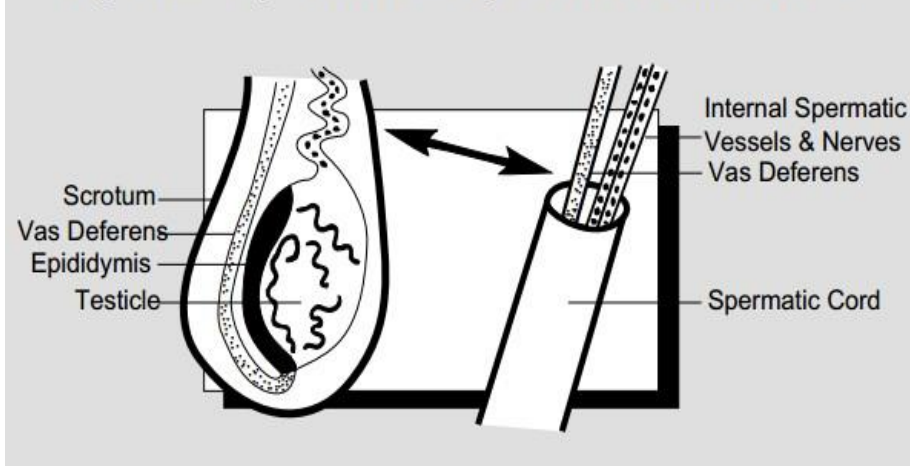


Figure 4: anatomy of scrotum and testicle

● Topic 3: Description of castration methods

Castration can be carried out using the following methods:

- A. Bloodless methods
- B. Bleeding methods

The different methods are more suitable for different sizes and age of animals, It is good to match castration method to size and age of animal.

A. Bloodless methods

These methods are known as “bloodless” methods since no cutting is done and when done properly the skin is not even broken. The bloodless methods include:

- Burdizzo (pincer) methods
- Elastrator (loop, rubber ring) methods
- Immunocastration and chemical method

1. The burdizzo (pincer) method

The Burdizzo method crushes the blood vessels, interrupts the blood supply to the testicle and thus kills the testicle. Good restraint is essential because the Burdizzo must be in place about 10 seconds to crush the artery.

Advantages of burdizzo method

- ✓ Desirable for show steers because of the large and well-shaped cod that is formed in wellfinished steers.
- ✓ Similar advantages as described above with banding.
- ✓ No tetanus shot required because there is no scrotal atrophy occurring

Disadvantages of burdizzo

- ✓ Best done by an experienced operator or veterinarian
- ✓ One cord can only be cut at a time, and cannot slip from the clamps of the Burdizzo
- ✓ Mistakes are likely to occur if not done properly: the cord may be incompletely crushed and the animal may develop staginess later.

Procedure

- ✚ Use this technique when the spermatic cord can be palpated - one month and older.
- ✚ Choose and use the proper sized forceps for the size of animal. With undersized forceps, there will be too much tissue between the jaws and there will not be enough force to properly crush the arteries.
- ✚ Find the spermatic cord on one side of the scrotum.
- ✚ Reach between the hind legs and grasp the scrotum above the testicles.
- ✚ The spermatic cord runs from the testicle into the male's body. It is about the size of a pencil and moves easily from side to side in its half of the scrotum.
- ✚ Pinch the cord to the outside edge of the scrotum between your thumb and forefinger.
- ✚ If right handed, use your left hand to hold the cord and your right to operate the Burdizzo.
- ✚ Position the Burdizzo correctly for crushing. One jaw of the Burdizzo has projections at each end to keep the spermatic cord from slipping out of the Burdizzo.

- Place the jaw with the projections on the front side of the scrotum. Point the projections toward you.
- Include only the part of the scrotum that contains the spermatic cord between the jaws of the Burdizzo. Do not crush more of the scrotum than necessary. The jaws should be placed just above (1-1.5 cm) the top of the testicle.
- Close the Burdizzo, count out 10 seconds and check to be sure the spermatic cord has been held between the jaws of the Burdizzo. You can also rock the spermatic cord back and forth in the jaws.
- Release the Burdizzo, move it to a new site 1 cm below your first site, and repeat steps four and five. Choose a site below the first crush to minimize acute pain from a second crush.
- Repeat the procedure on the opposite side. Stagger the pinched areas on the left and right side of the scrotum. Do not pinch a part of the scrotum that lines up with a pinch on the opposite side. The crush lines must not overlap the centre-line of the scrotum.
- Check the male four to six weeks later to be sure the testicles have shrivelled. The testicles swell initially and then degenerate and shrink in size.

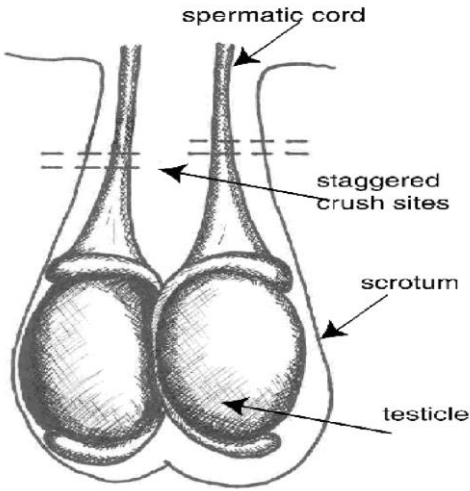
	Use this technique when the spermatic cord can be palpated - one month and older. Choose and use the proper sized forceps for the size of animal. With undersized forceps, there will be too much tissue between the jaws and there will not be enough force to properly crush the arteries.
 Crush sites for burdizzo castration	 Post castration changes: uncastrated buck (left); buck castrated 5 weeks earlier (right)

Table 5:Castration using burdizzo method

2. The elastrator(loop, rubber ring) method

- ✚ Elastic band castration cuts off blood supply to the testicles.
- ✚ A lack of blood supply kills the testicles. The equipment for banding young animals less than three weeks of age is called an elastrator.
- ✚ An elastrator is the tool used to apply an elastic band to the neck of the scrotum. The elastic band obstructs blood flow to the testicles and the scrotum.



Figure 5: elastrator castration method

Advantages of elastrator method:

- ✓ Bloodless (no blood is lost when banding or crushing the cords through the scrotal wall);
- ✓ Less chance of infection occurring because no open wounds are created;
- ✓ More painless than cutting because the area quickly numbs after the band is put on: there is a little discomfort, but it goes away after a while;
- ✓ Quick and easy to do if done properly;
- ✓ No risk of maggot infestation if done during the fly season;
- ✓ Cutting off blood supply enables the testes and scrotum to gangrene and fall off on their own.

Disadvantages of elastrator method:

- ✓ Mistakes can happen: put the rubber ring around the testis instead of the cord, one testicle is only banded because the other hasn't descended yet, ring is too brittle and comes off sooner than the scrotum starts to atrophy, etc.
- ✓ A little painful during the application, but the area goes numb very quickly soon after.
- ✓ Tetanus shot may be required as there is risk of infection as the scrotum atrophies and sloughs off.

Technique

The elastrator method being more suitable to very young animals

1. The rings must be strong enough to cut off blood flow in the arteries as well as the veins. If not, the scrotum will swell.

2. Vaccines must be given weeks in advance of banding.
3. Pull both testicles into the scrotum. A muscle attached to each testicle will be pulling against you.
4. Place the rubber band on the elastrator.

Hold the elastrator with the prongs facing up. Close the handles to open the band.

5. With the animal standing and both testicles in the scrotum, stretch the ring open and slip the open band up over the scrotum. Release the band just above the top of the testicles (~0.5 cm), not at the base of the scrotum.

6. Check to be sure both testicles are still in the tip of the scrotum and that the ring is placed properly. If not, cut the ring with scissors and start again.

7. Remove the elastrator from under the band.

3. The immuno-castration and chemical method

Immuno-castration involves the use of hormones to suppress the production of testosterone. It only offers a temporary effect and the injections must be repeated (usually at six month intervals) throughout the animal's life.

Chemical castration includes the injection of toxic chemicals, such as lactic acid, directly into the testes to cause irreparable damage. Chemical castration requires a lot more skill than other methods of castration and has a much longer healing time and therefore a greater negative impact on animal welfare than other forms of castration. It also has a high failure rate. Some males continue to produce male hormones after chemical castration.

B. Bleeding methods (Open castration)

This is also referred to as surgical method where the testicles are partially or completely opened and removed. This technique has both blessings as well as curses which are the following.

Advantages of open castration

- ✓ Easy to see that two testes are present
- ✓ Quick and a highly common practice used among ranchers
- ✓ Great way to collect enough calf testes to make some Rocky Mountain or Prairie Oysters!

Disadvantages of open castration

- ✓ Risk of blood loss, infection and maggot infestation;
- ✓ Cannot be performed during fly season;
- ✓ Knife may not be sterilized, inducing infection;
- ✓ Cutting the cord may not be done properly increasing the chance of blood loss for the animal;
- ✓ More painful for the animal than banding, depending on the method of cutting used;
- ✓ Can cut oneself whilst castrating the animal: knives are sharp and must be handled properly and safely.

Procedures

The following are the steps followed in the bleeding method:

- ✓ Begin by washing your hands and instruments thoroughly with soap and water and then disinfectant;

- ✓ Cast the animal down and hold the front and hind legs;
- ✓ Disinfect the scrotum using a disinfectant;
- ✓ Wash your hands;
- ✓ For mature male apply localized anaesthesia on the scrotum;
- ✓ Pull and squeeze the scrotum;
- ✓ Use sterilized surgical blade/knife or razor blade;
- ✓ Using a razor blade or surgical knife, make a vertical slit on the scrotum;
- ✓ Squeeze out the testes;
- ✓ Pull out the spermatic cord and tie it;
- ✓ Using emasculator or knife cut the spermatic cord after the knot towards testes or cut without knot when use emasculator;
- ✓ Repeat the process to remove the second testes;
- ✓ Disinfect the wound using Dettol or ash or cream to prevent infection;
- ✓ Stitch the open wound;
- ✓ Apply a fly repellent;
- ✓ Let the animal free.

While this method is the most reliable and least expensive method of castration, it is the most painful and also has the greatest potential for infection and fly infestation. It is essential that proper aseptic technique is used when castrating by the surgical method.

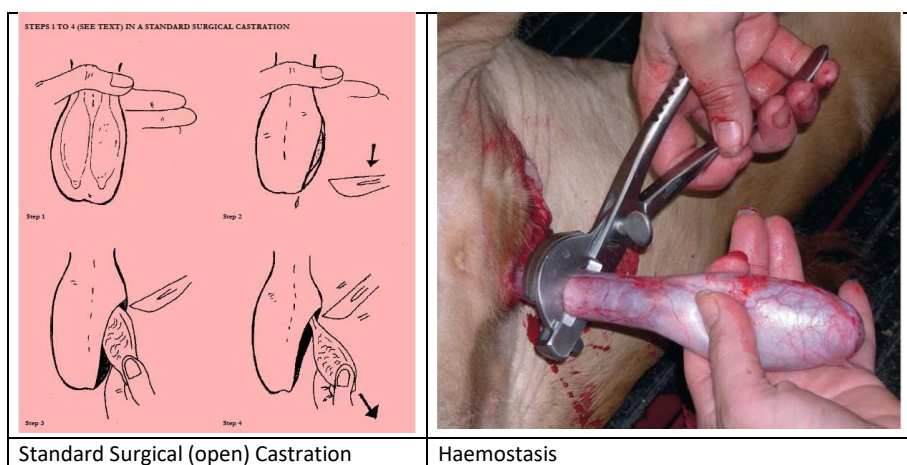


Figure 6: **Open castration**

- **Topic 4: identification of castration complication**

The various complications associated with castration are common causes of mal practice.

To avoid complications associated with castration, the practitioner should have a good understanding of male reproductive anatomy and of the various techniques of castration.

Practitioners should understand also why complications of castration occur and should be able to resolve complications that do occur. Complications encountered can include:

- ✓ Post-operative swelling and oedema;
- ✓ Infection;

- ✓ Penile damage;
- ✓ Haemorrhage;
- ✓ Swelling and Scrotal / preputial oedema;
- ✓ Septic funiculitis, commonly referred to as scirrhus cord;
- ✓ Eventration;
- ✓ Peritonitis;
- ✓ Hydrocele;
- ✓ Pronounced masculine behaviour persists after castration;
- ✓ Clostridial infection at the surgical site.

● **Topic 5: identification of the post castration care**

The following are the post castration care:

- ✓ Confine animal to a well-bedded area or clean pasture and keep him there for three to four hours. This will allow the bleeding to stop;
- ✓ Treat animal with a long-acting antibiotic, just in case, immediately after the castration is complete;
- ✓ Keep animal in close observation for about a week to keep an eye out for swelling or stiffness from infection;
- ✓ Apply a fly spray, if flies are going to become a problem;
- ✓ If the wound swells or the animal becomes stiff and depressed, isolate him immediately and the wound should be bathed with hot water, and antibiotics should be administered;
- ✓ You may open and drain the wound;
- ✓ You may have to make sure the wound gets cleaned out after the vet has done the initial clean-out, using warm water and an antiseptic.
- ✓ Once everything has cleared up and/or the animal has healed up nicely, you can release him back to the herd.

Learning Unit 4 – Perform dehorning

LO 4.1 – 1. Select materials tools and equipment for dehorning and restraining

Topic 1 Selection of materials tools and equipment for dehorning and restraining

Dehorning or disbudding, is the process of removing or arresting the growth of the horn by destroying the root of the horn bud. Cattle, sheep, and goats are often dehorned for economic and safety reasons. The procedure is commonly performed early in an animal's life.

4.1.1 Dehorning instruments

1	Disbudding iron		-Burn the buds of horns in young calves -Thermo-hemostasis -cauterization
---	-----------------	---	---

2	Horn gouge		Remove the horn buds/ very small horns
2	Barnes dehorner		Used to cut small horns in calves, goats and sheep
	Electric dehorner		-Burn the buds of horns in young calves -Thermo-hemostasis -cauterization
3	Keystone or guillotine		Used to remove medium to large horns
4	Dehorning saw		To incise the horn and bones
5	Wire saw with handles		To incise large horn and bones

Table 6: Materials tools and equipment for saw method

LO 4.2 – Apply animal restraining techniques

• Topic 1. Application of animal restraining techniques

4.1.2 Restraining technique for dehorning according to animal species

- ✓ The animal to be dehorned is usually restrained, either using a dehorning table or with chemical restraint (sedation). This ensures that the dehorning procedure can be done safely and properly.

- ✓ Young calves are run through a head gate (similar to a Cattle crush) or haltered to ensure the safety of the calves and handlers.
- ✓ Calves more than a few months old are held in a head gate and their head restrained with a dehorning table or chin bar.
- ✓ Smaller animals like sheep and goats may be restrained by hand or with use of halters.

Comment [M1]: It may be better if you support this text with photo

LO 4.3 – Apply disbudding/ dehorning techniques

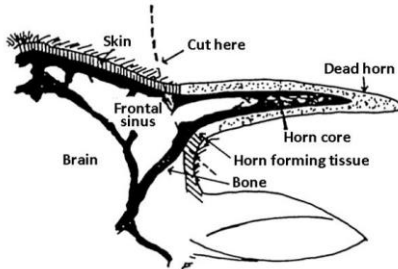
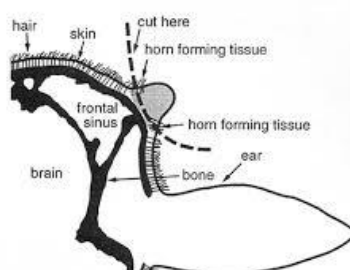
• **Topic 1. Application of disbudding/ dehorning techniques**

A. Dehorning purpose

Horns are removed for several reasons:

- ✓ Prevention of horn bruising of other cattle;
- ✓ Aids in safety of husbandmen;
- ✓ Facilitates handling especially in dairy cattle;
- ✓ Increased market value especially in feedlot animals;
- ✓ Dehorning improves the appearance;
- ✓ Prevent accidents (fractures of the horns, trauma because horns can be tangled in fences, branches or other objects);
- ✓ Prevent facilities damage;
- ✓ Nutrients washed in the formation of horns can be used elsewhere in the body of the animal.
- ✓ Reduce space in transportation vehicles;
- ✓ Treatment of horn damage or in case of disease (fracture, necrosis of horn).

B. Anatomy of the horn

	The main parts of the horn are: ✓ Cornual diverticulum of frontal sinus ✓ Horn forming tissue (Corium and periosteum) ✓ Dead Horn
	Anatomy of a growing horn Young calf The horn grows from the skin around its base – at different rates with different breeds. The horn bud is usually free floating in the skin over the skull base in calves less than about two months old. As the calf gets older, this horn bud attaches to the skull bone and a small horn forms.

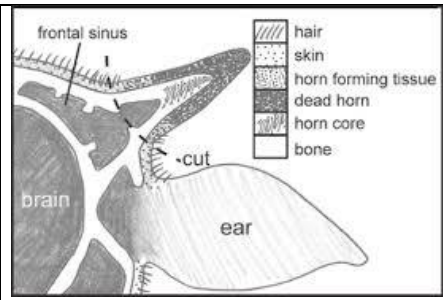
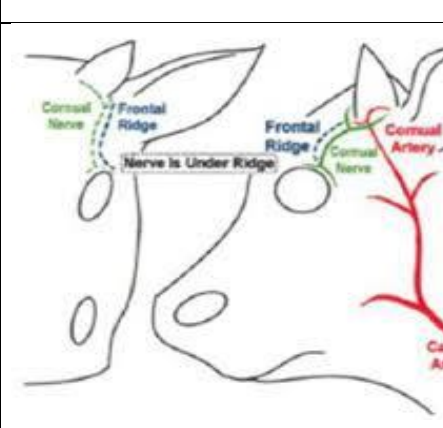
	Older calf After the horn bud attaches to the skull, the horn grows out from under the skin. It becomes a bony extension of the skull with the hollow centre of the horn opening into the frontal sinus. The brain lies directly under the frontal sinus covered by a thin layer of bone. Dehorning after the horn attaches increases the risk of entering the frontal sinus and subsequent infection
	Anatomical structures to take into account while dehorning

Table 7: Anatomical structure of the horn

C. Dehorning techniques and methods

Dehorning can be carried out in the following ways:

- ✓ Hot of hot iron;
- ✓ By use of chemicals;
- ✓ By use of a saw;
- ✓ By use of an elastrator.

1. Hot iron method

This is the faster and bloodless method by using electric disbudding irons ; but fire-heated irons are used in field situations.

- ✓ The animal to be dehorned is casted down.
- ✓ The hind legs and front legs are held or the animals can be confined in a crush or squeeze chute.
- ✓ Clipping the hair from the area
- ✓ Local anaesthesia is recommended
- ✓ (Corneal nerve block).
- ✓ An iron metal is put in fire until it is red –hot;
- ✓ The iron is passed over growing buds of the horns;
- ✓ The hot iron burns off the horn buds;
- ✓ The method is quick, cheap and no bleeding occurs as the hot iron seals off the blood vessels;
- ✓ Apply antibiotic powder or ointment.



Figure 7: Dehorning using hot iron method

2. Chemical methods

- ✓ It is the dehorning operation with the purpose to cauterize and kill the germinal epithelium that germinates the horn by using available chemical pastes.
- ✓ The chemical commonly used is KOH or Caustic Potassium Pencil or dehorning paste.

Procedures:

- ✓ Proper handling of animal(in squeeze chute)
- ✓ The hair around the horn bud is clipped or shaved cleaned and disinfected;
- ✓ Vaseline is applied below the clipped area to prevent the chemical entering the eyes.
- ✓ KOH pencil rubbed hard around the shaved part until blood comes out or apply a dehorning paste into the button with a flat stick.
- ✓ When the chemical enters the blood, destroys the cells responsible for development of the horn .The small horns fall off after some time.
- ✓ The shaved area is later coated with Vaseline after rubbing KOH pencil to prevent entry of chemical into the animal's eyes.
- ✓ The animals is confined indoors sometime to limit rotting.
- ✓ Allow the paste to dry completely before allowing the animal to nurse.
- ✓ Keep out of rain for several days.
- ✓ Isolation of dehorned animal because others may lick it.

3. Wire saw methods

The dehorning of adult cattle should be performed carefully because it can be the origin of serious complications. In this case surgical saw or wire saw are used. The following steps may be followed:

- ✓ This is commonly carried out on hard ,old horns;
- ✓ sedation is recommended;
- ✓ Animal is confined in a crush;
- ✓ Apply anaesthesia to prevent pain; block the corneal nerve with 2% lignocaine. This may be completed with a ring block at the base of horn in adult cattle;
- ✓ Make a circular incision and include one centimetre of skin around the base of the horn;
- ✓ A saw (wire saw) is used to cut off the horns;
- ✓ Place a saw (wire saw) in the incision and cut the horn.

As sawing begins, the wire is held in place with a blunt forceps to prevent it moving from the intended incision site.

- ✓ Ensure that the direction of cutting is away from the ear and that the resulting wound is level;
- ✓ Sawing generate enough heat to minimize haemorrhage;
- ✓ If significant bleeding occurs use sharp haemostatic forceps to stop it by traction or torsion of the vessels;

- ✓ Application of gauze to pack the sinus to prevent dust and rain that may precipitate sinusitis.

4. Elastrator method

A strong rubber is stretched using an elastrator. The stretched rubber ring is placed at the base of the horn buds. The small horns fall off after 3-6 weeks. The method is not permanent as the horns will grow again.



Figure 8: Dehorning using elastrator method

D. Complication of dehorning

Although dehorning is regarded as one of the simplest surgical operations, when it is not done cautiously it can result in some serious complications. Below is a list of the most common of them,:

- ✓ Increased haemorrhage in adult animals;
- ✓ Risk of bacterial infection which results in sinusitis, production of pus infection and possible brain abscessation;
- ✓ Parasitic invasion (myiasis=fly maggot);
- ✓ Dehorning that leave an open wound should not be used during fly season. Paste and hot dehorning are acceptable any time of the year;
- ✓ Animal should be monitored for signs of infection following dehorning such as redness, swelling and discharge;
- ✓ Avoid the use of elevated feeders immediately after the procedure to prevent entry of debris into the wound minimize environmental exposure as dust and rain may increase the risk of sinusitis;
- ✓ Never dehorn animal in wet weather because the healing rate is decreased and the risk of infection increased

E. Post-operative care

- ✓ A number is Bleeding is more likely with older cattle. Artery clamps can be used to reduce the bleeding;
- ✓ After bleeding has slowed or stopped, apply blood coagulation powder and fly spray to the wound;
- ✓ After dehorning the dehorned animal must be cleaned;
- ✓ Apply a wound dressing;
- ✓ Inspect dehorned animal regularly for at least 10 days(in calf);
- ✓ If there is pus, use sulfonamide and renew the bandage.

LO 4.4 – Conduct saw dehorning method

- **Topic 1:conducting saw dehorning method**

The dehorning of adult cattle should be performed carefully because it can be the origin of serious complications. In this case surgical saw or wire saw are used. The following steps may be followed:

- ✓ This is commonly carried out on hard ,old horns;
- ✓ sedation is recommended;
- ✓ Animal is confined in a crush;
- ✓ Apply anaesthesia to prevent pain; block the corneal nerve with 2% lignocaine. This may be completed with a ring block at the base of horn in adult cattle;
- ✓ Make a circular incision and include one centimetre of skin around the base of the horn;
- ✓ A saw (wire saw) is used to cut off the horns;
- ✓ Place a saw (wire saw) in the incision and cut the horn.

As sawing begins, the wire is held in place with a blunt forceps to prevent it moving from the intended incision site.

- ✓ Ensure that the direction of cutting is away from the ear and that the resulting wound is level;
- ✓ Sawing generate enough heat to minimize haemorrhage;
- ✓ If significant bleeding occurs use sharp haemostatic forceps to stop it by traction or torsion of the vessels;
- ✓ Application of gauze to pack the sinus to prevent dust and rain that may precipitate sinusitis.

Learning Unit 5 – Apply hoof trimming techniques

Hoof trimming is a surgical operation which is required more often than not as it the most efficient remedy for many hoof conditions either infectious or non-infectious.

LO 5.1 – Select material tools and equipment for hoof and claw trimming and restraining

- **Topic 1 Selection of materials tools and equipment for hoof and claw trimming and restraining**

Table 8: Hoof and claw trimming instruments

	Nail trimmers and scissors		To cut nails
	Hoof picks		To remove the debris from the hoof before examination
	Hoof trimmers: Hoof nipper (p311)		To cut the horn of hoof
	Hoof Knife (p315)		To trim the sole of foot in cattle/horse

Other materials and equipment

- ✓ Animals Halters

- ✓ Ropes
- ✓ nose lead
- ✓ crush
- ✓ scissors/pruners
- ✓ scalpels
- ✓ hoof picks
- ✓ hoof brushes
- ✓ Tranquilisers
- ✓ Wash bottles
- ✓ Antibiotics
- ✓ antiseptics
- ✓ anti-inflammatory drug
- ✓ anesthetics

LO 5.2 – Apply animal restraining techniques

- **Topic 1: Application of animal restraining technique**

Small ruminants

- ✚ Because good restraint is essential, castration requires two people. One person to hold the animal while the other one castrates.
- ✚ It is best to put young lambs and kids on a table covered with sacks or on baled hay.
- ✚ The person holding the animal sets it on its butt or tail in an upright position in his lap or stands or kneels behind the animal.
- ✚ He should then grasp the front and back legs at the knee and hock on each side, holding firmly.
- ✚ The animal should have its back to the assistant

Large animals

- ✚ To prevent additional injury to both you and the calf during the procedure.
- ✚ The younger the calf, the easier it is for you to restrain it.
- ✚ Calves older than a month of age require two people to restrain it. However, one person can effectively restrain a one-week-old calf and do all the necessary operations.
- ✚ If you have access to a calf table, use this instead as it greatly simplifies your job that you have to do.

LO 5.3 – Check hoof and claw condition

- **Topic 1: Checking of hoof and claw condition**

In many domestic animals, hoof is affected by different pathological conditions. The causes vary from infections to many neglected no-infectious diseases. Regardless whether there are infectious or not, their negative impact on production is huge.

1. Hoof anatomy

Like any other organ, the hoof has both soft and hard anatomical structures. For a good and successful trimming, a surgeon and/or his assistant should know the anatomy of the hoof. The following images illustrate the structural anatomy of the hoof.

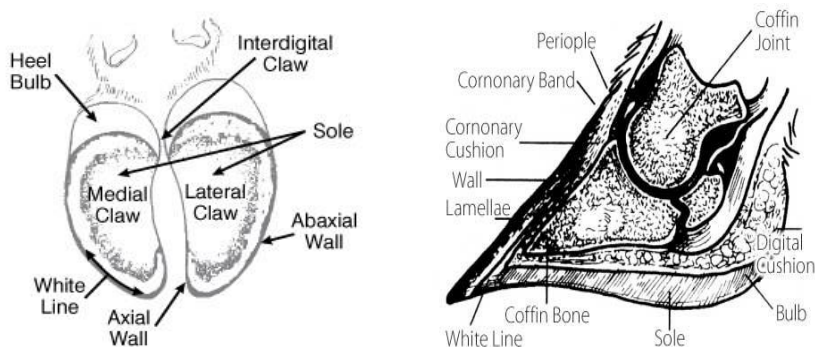


Figure9: anatomical structure of the horn

2. Hoof conditions

In many domestic animals, hoof is affected by different pathological conditions. The causes vary from infections to many neglected no-infectious diseases. Regardless whether there are infectious or not, their negative impact on production is huge.

3. Non-infectious hoof conditions

a) Overgrowth

Hooves may grow continuously during the life of the animal. Normally, movement of the animal wears away the hoof wall at various rates, depending on the nature of the ground surface and activity level of the animal. Overgrowth may occur and require trimming to prevent potentially harmful deviations of the hoof such as corkscrew claws and scissor claws. Uneven growth can also cause friction between the digits in the interdigital cleft, resulting in sores and abscesses and possible development of foot rot.

b) Foreign body

Several types of foreign objects such as nails, sharp rocks, and glasses may cause wounds or there are found in tissues of hooves.

c) Non infectious diseases

Laminitis: Laminitis (also termed founder) is inflammation of the laminae of the hoof/foot, the soft tissue structures that attach the coffin or pedal bone of the foot to the hoof wall. Apart from the main clinical signs of inflammation, it is also characterised by lameness and sometimes the cow end up lying down. An arched back and slow movement are also common signs of Laminitis.



Figure 10: laminitis in cattle

4. Hoof infection diseases

The hoof in domestic animals is affected by different infectious agents and mostly those which are environmental. The table below summarises the main infectious diseases of the hoof which may require hoof trimming as part of the treatment.

Diseases	Description	Illustrative image
Digital dermatitis	It is an inflammation of the skin around the cattle hoof. It is most commonly found at the back of the foot between the bulbs of the heels	
Foot Rot	Characteristics of foot rot can be seen if the skin between the claw and above the foot is swollen, painful and warm to the touch. Foot rot is usually combined with fever and decreased milk production.	
Interdigital Dermatitis	Bacteria in the interdigital skin area tend to cause infections which triggers extra horn formation with a characteristic smell.	

Table 9: Hoof infection diseases

5. Hoof examination procedure

The examination of the hoof is mainly clinical although, it might require some laboratory work. The clinical examination is done as follow:

- ✓ Observation of animal in movement
- ✓ Cattle must be restrained in a chute
- ✓ Legs are lifted with ropes or use of an anti-kick device
- ✓ Animal may be put in lateral recumbency
- ✓ Clean the concerned foot thoroughly ;
- ✓ Using an appropriate sharp knife cut off small pieces of hoof ,this may help in in localization of lesion.

LO 5.4 – Conduct hoof and claw trimming operation

- **Topic 1 Conducting of hoof and claw trimming operation**

1. Hoof trimming procedures

For the success of the operation, normal procedures are to be followed. Although there is no standard approach, the following should be followed:

- ✓ Animal is well restrained;
- ✓ Using a sharp knife to cut off small pieces of hoof until the hoof is a normal sharp;
- ✓ It is the edges of the hoof that need cutting most; do not cut too deep especially over the soft middle part of the hoof;
- ✓ If the foot bleeds, stop cutting and put antiseptic on the foot;
- ✓ If the foot smells or is hot and painful, it is probably infected or has an abscess.

Note that when the animal begins to react (in trimming) stop the operation and the judgement of thickness of corneous tissues by finger print. When the sole appear pink, it indicates that trimming is approaching the blood supply and should not go further. If there is appearance of blood (this is the sign of wound) use antiseptic and bandage.

2. Hoof trimming complications and prevention

Hoof trimming complications and prevention

- ✓ **Haemorrhage** is the commonest complication when blood vessels (arteries and/or veins) are tampered with during the operation.
- ✓ **Infections** are also common when by mistake the surgeon trims very deep and thus creating wounds which are therefore portal entry for some microorganisms such as staphylococci and clostridia which can infect the animals.

3. Preventions of hoof trimming complications

In order to prevent the complications, some measures are to be taken.

The following are the most important but a few.

- Working in aseptic conditions;
- Hoof trimming must done carefully and avoid making wounds (because bleeding may occur or it is the entry point of microorganisms).

4. Postoperative care

The postoperative consists of the following:

- The animal should be kept in clean dry place for at least two weeks;
- The bandage should be changed after 48 hours; this is done after cleaning the hoof and disinfection;
- General antibiotherapy, if there is if an infection.

Learning Unit 6 – Perform small ruminants caudectomy

LO 6.1 – Select materials tools and equipment for dehorning and restraining

Small ruminant caudectomy is a common practice in the sheep rearing. It is the removal of the tails or removal of part of the tail from lambs. Docking is carried out at the age of 1-3 months. It is done by use of a sharp knife or a rubber ring.

● Topic 1: description of anatomy of the tail.

Gross anatomy of the tail

The tail in domestic animals is made of a number of vertebrae which varies with animal species. Like any other organ, these vertebrae are covered by some muscles and the skin which are all supplied by blood vessels and nerves.

The table below shows the number of coccygeal vertebrae among different animal species.

	Cattle	Swine	Sheep	Horse	Humans	Poultry
Cervical	7	7	7	7	7	14
Thoracic	13	13-17	13-14	18	12	
Lumbar	6	5-7	6-7	6	5	
Sacral	5	4	4	5 fused	5 fused	
Coccygeal	18-20	20-23	16-18		4 fused	6

Table 10 : coccygeal vertebrae among different animal species

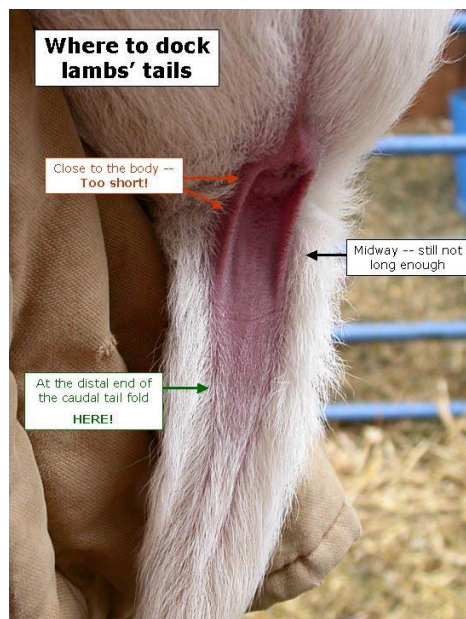


Figure 11: image shows where the docking is done.

- **Topic 2 description caudectomy.**

1. Indications of caudectomy

Tail docking in lamb remains an important husbandry practice for sheep health, welfare and management reasons outlined below:

- Reduces urine and faecal soiling or dag formation and thus minimises susceptibility to fly strike;
- Improves external parasite control; Improves effectiveness and efficiency of dagging, crutching and shearing;
- Improves the cleanliness of the wool;
- Reduces faecal contamination and risks to food safety at livestock processing plants;
- Increase the fat deposition on the tail;
- Reduced incidence tail injury and improved performance;
- Reduced incidence of mastitis.

2. Types of caudectomy

The most common methods of tail docking lambs include:

- A. Bleeding method
- B. Bloodless method

A. Bleeding method

Common Bleeding methods of tail docking include:

- ✓ Cauterisation (docking with a hot iron);
- ✓ Cutting and crushing method (docking with an Emasculator);
- ✓ Sharp excision (docking with a scalpel or knife blade);
- ✓ Emasculatome method (docking with the Burdizzo).

B. Bloodless method

The Common bloodless method of tail docking is the rubber ring. Lambs should be at least 24 hours old before bands are applied, and bands should only be applied during the lamb's first week of life

Rubber ring methods

This is the most widely used method. Using an elastrator, a constricting latex ring is applied to the tail below the level of the anus in males and the vulva in females. The ring cuts off blood supply to the tail, causing it to shrivel and fall off 10-14 days later. Use rubber rings when lambs are 7-10 days old, and the tail should drop off 10-14 days later.

Some producers cut the dead tail off with a knife. Don't cut the tail off below the ring as the blood can attract blowflies. Lambs that are banded are more prone to tetanus since the band (ring) creates an anaerobic environment which is conducive to the tetanus organism. Immunity from tetanus is important.

Banding causes some pain to the lamb, but the pain is short-lived. Pain can be reduced if a clamp is applied across the tail immediately distal to the ring. The use of a local anaesthetic, such as lidocaine, can be used to reduce the pain felt by the lamb.



Figure 12: caudectomy using elastrator method

● **Topic 3: Selection of materials tools and equipment for dehorning and restraining**

Materials

- Animals
- Cotton Gauze clips,
- Needles
- Syringes
- surgical blades
- suture materials
- Antibiotics,
- anti-inflammatory
- Tranquilisers
- Local anesthetics

Tools

- antiseptics
- Wash bottles
- Scissors
- scalpel handle
- Ropes
- Nose lead

LO 6.2 – Apply animal restraining techniques

Topic 1 applying restraining technique for caudectomy

Restraining technique for caudectomy

The lamb is restrained off the ground or in the lap, with hindquarters facing the clinician. The right legs are held in one hand, and the left in the other.



Figure 13: sheep handling for caudectomy operation

LO 6.3 – Conducting bleeding caudectomy operation

- Topic 1: conducting bleeding caudectomy operation

1. Procedures

The following table describe the different bleeding techniques procedure

 An electric docking iron	1. Cauterisation (docking with a hot iron) An electric docking iron cuts and cauterizes the tail simultaneously. Cutting the tail off with a knife causes excessive bleeding. Application of a hot iron to the stump, will cauterize the tail stump in the same manner as the electric docker.
--	---

 An emasculator	2. Cutting and crushing method (Emasculator) An emasculator has both a cutting and crushing mechanism. It can be used for tail docking. The crushing mechanism seals the blood vessels on the tail remaining on the lamb, while the cutting edge effectively removes the tail. The emasculator should be left on the tail for approximately 30 seconds to help prevent bleeding.
 Scalpel	3. Sharp excision (scalpel or knife blade) A small majority of farmers use this method. Severing at a joint is easier and therefore swifter. A scalpel or very sharp knife which is not used for any other purpose must be employed. It should be placed in an antiseptic liquid such as povidone-iodine ("Povidine") or chlorhexidine gluconate ("Hibitane") after use on each lamb. Good hygiene is essential.
	Soiled tails should be cleaned and swabbed with a dilute Povidine or Hibitane solution before docking and the operator's hands should be washed and dried frequently. An assistant should catch and restrain the lambs thereby allowing the operator to keep his/her hands free from contaminants. Applying a wound powder or spray (eg. Terramycin aerosol) to the stump may help prevent infection.
 Emasculatome	4 . Emasculatome method (Burdizzo) A Burdizzo or similar bloodless castration instrument is used to crush the tail, preferably on a joint. A Burdizzo is similar to an emasculator except it does not have a cutting mechanism. It is held in place for 5 or 6 seconds and then a knife is used to cut off the tail below the crush.

Table 11: Common Bleeding tail docking methods

2. Main complications of caudectomy

Haemorrhage, infections and Rectal prolapsed are the most common complications, though they are rare when the procedure is performed. Haemorrhage is usually minimal at the early age. Instruments should always be thoroughly cleaned and disinfected between animals. Medication for pain control, antibiotics, and insect repellent may be necessary after tail docking.

✓ **Haemorrhage**

Risk of serious haemorrhage (bleeding), particularly in older lambs, which causes a major set-back or at worst is fatal; leaves an open wound which can allow entry of bacteria, not suitable in fly season; there is scientific evidence that it is the most painful method; two people required if hygiene to be maintained.

✓ Infections

Application of a tight band around the tail produces extra-luminal compression of the arteries and veins, resulting in impeded arterial flow and venous drainage in the tissues. Lack of perfusion compromises the supply of oxygen and metabolic substrates to the tissues and results in ischemia. Continued ischemia induces severe cellular damage and coagulation necrosis.

Necrotic tissue, such as the ischemic distal tail after banding, is prone to infection with pathogens. Clostridial organisms, ubiquitous in soil, may colonize the wound and result in local or systemic infection. Tetanus and gangrene have been reported after tail docking, and vaccination against clostridia is recommended prior to performing the procedure.

✓ Rectal prolapse

Ultra-short tail docking may also contribute to the incidence of vaginal prolapses. Because when tails are docked too short, the muscles attaching to the tail bone are weakened.

A rectal prolapse is when a portion of the rectum protrudes outside the anus. It is easy to recognize. The exposed tissue is usually a bright, cherry red (at first). Eventually, the exposed tissue becomes dry and cracked, causing more irritation and straining.

If left unattended, a rectal prolapse can become a life-threatening condition and a cruel way for an animal to die, as untreated animals may prolapse their entire intestinal tract and go into shock.

Sheep of any breed, age, or sex may be affected. Ewe lambs that prolapse should not be retained for breeding, as they are more likely to prolapse their vaginas at lambing.

3. Prevention of caudectomy complications

Different measures can be taken to prevent caudectomy complications:

- ✓ Only dock if necessary;
- ✓ Avoid docking lambs less than 24 hours old and older than a week of age;
- ✓ Only dock healthy lambs;
- ✓ Ensure lambs to be docked are protected against the Clostridial diseases;
- ✓ Avoid docking in bad weather or in soiled, muddy surroundings or during the fly season;
- ✓ Check afterwards, especially last thing at night, for signs of ill effects such as haemorrhage or excessive discomfort;
- ✓ Ensure all operators are trained and competent.

Learning Unit 7 – Perform trocarisation of the rumen

LO 7.1 – Select material tools and equipment for rumen trocarisation and restraining

• Topic 1: Selection of materials tools and equipment for rumen trocarisation and restraining

Trocarisation insertion of a pointed instrument (trocar) into a body cavity or an organ. The trocar usually is inside a cannula so that once the trocar penetrates the membrane, it can be withdrawn and the cannula remains in place. Trocarization usually is performed in ruminants (buffalo, cattle, goat) for acute cases of bloat to relieve pressure and save the animal. When trocarization is performed for treatment of ruminal bloat, it may be called ruminal paracentesis.

Trocarisation is one of the simplest surgical interventions performed to relieve the bloat in large ruminants. It is considered to be the last resort to prevent death due to bloating.

Materials tools and equipment for rumen trocarisation and restraining

- ✓ Trocar and cannula,
- ✓ antiseptics (iodine, alcohol, soap)
- ✓ Scalpel
- ✓ Crush
- ✓ Ropes
- ✓ Nose lead
- ✓ Animal

LO 7.2 – Apply ruminants restraining techniques for trocardisation

• Topic 1 : Applying ruminant restraining techniques for trocardisation

Cattle

- ✓ Use a strip of strong cloth to make animal move
- ✓ To catch an animal you can make a circle of rope at the end of a pole
- ✓ Leave a long stick tied to the horns to manage bad-tempered cows .it helps them catch and handle the animal more safely
- ✓ For animal that haven't horns or that resist being held by them put your fingers in it nose and pull the head close to you to hold it firmly
- ✓ Grip the animal's jaw
- ✓ Use of a nose ring with a rope attached to it to hold the nose of very strong cattle
- ✓ You can hold the animal securely or tie it up with a halter close to the animal's head
- ✓ Tie the animal between two trees
- ✓ Use three poles to hold an animal, make simple race and crush.

Sheep

- ✓ push a sheep against a wall and hold it with your legs
- ✓ tie a sheep up with just a loop of rope or use a curved piece of metal to keep a sheep

- ✓ to secure a sheep for examination or treatment stand on animal's left side and hold it up under the jaw with your left hand .hold a fold of skin in front of animal's back right leg with your right hand. Lift the sheep and put it on its bottom then hold it.

Goats

- ✓ Use a rope or collar around the neck to hold a goat
- ✓ You can trim a goat's feet while it is standing
- ✓ Tie the goat's head and lift the foot you want to trim
- ✓ If you move goat in lorry make sure to fill the lorry or put something in the lorry so they are close together and do not fall over

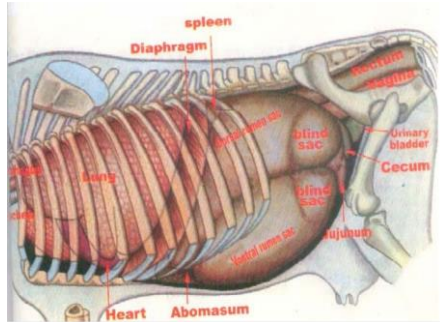
LO 7.3 – Apply rumen trocarisation techniques

- **Topic 1 Applying the rumen trocarisation techniques**

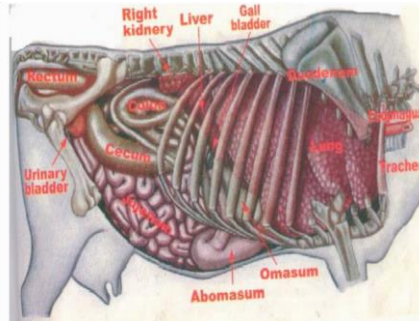
7.3.1 Topographic anatomy of rumen

In order to perform a successful trocarisation, one needs to know very well the topographic anatomy of the abdomen and more especially the topographic anatomy of the rumen.

The rumen extends from the diaphragm to the pelvic inlet, on the left half of the abdominal cavity. It makes up over 65% of an adult cow's total stomach volume.



Topographic anatomy of cattle (left side)



Topographic anatomy of cattle (right side)

Figure 14: Topographic anatomy of cattle

7.3.2 Trocarisation purpose

Trocarisation is one of the simplest surgical interventions performed to relieve the bloat in large ruminants. It is considered to be the last resort to prevent death due to bloating.

7.3.3 Trocarisation techniques

Trocarisation technique though it is regarded as one of the easiest and simplest surgical intervention, its technique is one of the most delicate to avoid incidents, accidents and probable complications.

Landmarks for the puncture site are the left side on a horizontal line level with the top of the patella, approximately 15-20 cm posterior to the last rib or 15-20 cm caudoventral to the costochondral junction of the last rib.

The following are steps involved in techniques:

- ✓ The operation is normally done the animal in standing position. There is need to know that an animal with bloat can't be recumbent as it has breathing problems because of pressure on the diaphragm.
- ✓ The operation is performed on the centre of the left paralumbar fossa (see image below);
- ✓ The site of operation is well shaved and disinfected with any available disinfectant;
- ✓ A small notch is made through the skin, exactly in the centre of the paralumbar fossa to allow an easy insertion of the trocar;

- ✓ Then, the trocar is powerfully inserted mounted with the canula. After that, the canula is removed from the trocar to allow the escape of free gas from the rumen. A successfully ruminal paracentesis will be indicated by a sound made by a smelling gas escaping from the rumen. In addition, the abdominal pressure will be noticed. Depending on the amount of gases and the type of trocar used, there might be need for attachment of the trocar to the skin and in that case the trocar will be attached with aid of two stitches on its either sides;
- ✓ The trocar will be maintained for about 24 to 48hours and the wound will heal spontaneously.

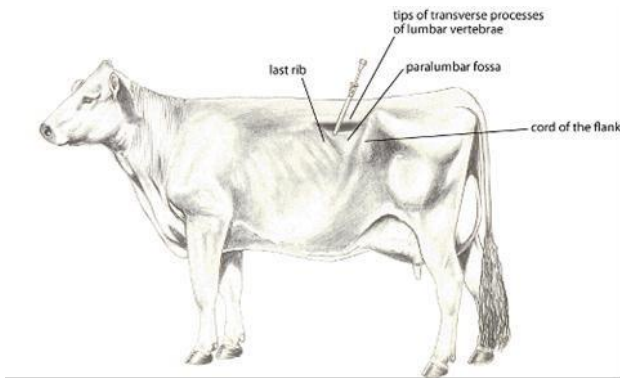


Figure 15.Cannulation of rumen's cow.

Reference(s):

1. Diane McKelvey, K. Wayne Hollingshead (2003). Veterinary Anaesthesia and Analgesia, 3rd edition, Mosby.
2. Elizabeth A. Hanie (2005). Large Animal Clinical Procedures for Veterinary Technicians, Mosby, 561 pp.
3. Jason Ndikuwera (2008). A guide to common surgical techniques for practicing veterinarians, Guide 7, Fountain Publishers, 122 pp.
4. Steven L. Stockham, Michael A. Scott (2008). Fundamentals of Veterinary Clinical Pathology, 2nd edition, Wiley-Blackwell, 908 pp.
5. <http://www.luresext.edu/goats/training/mgqa.html> (accessed on 11/11/2020)
- 6.