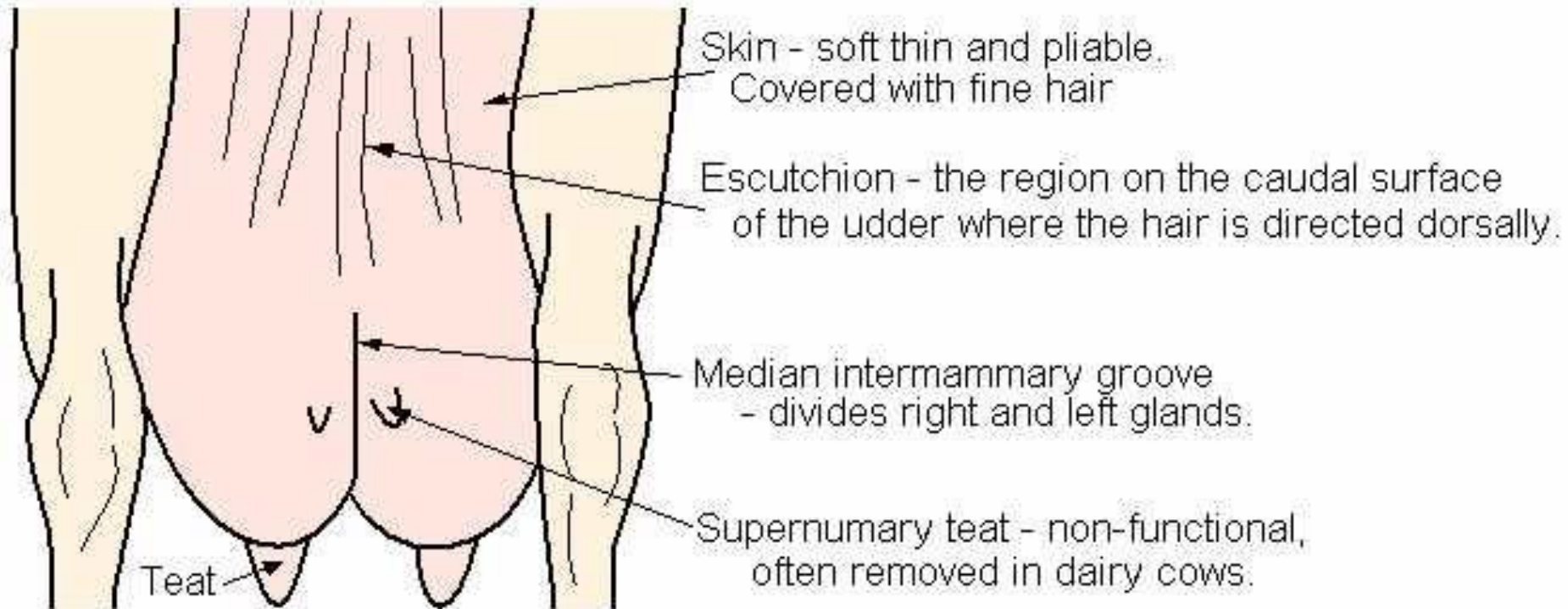
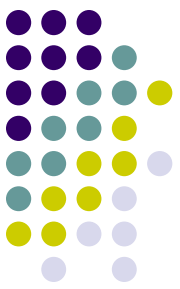
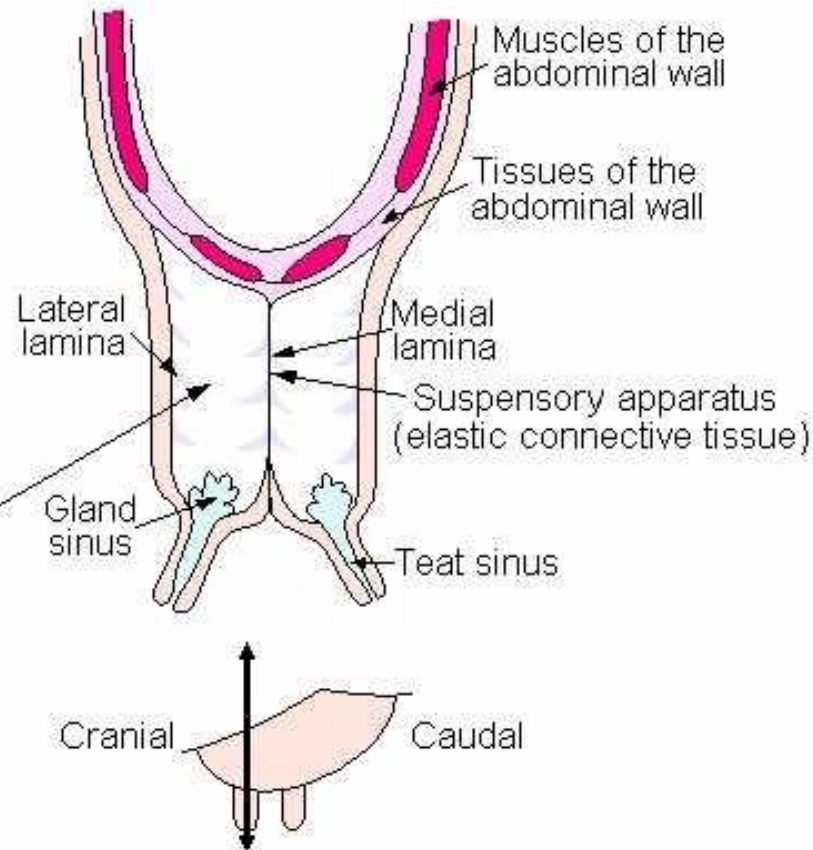
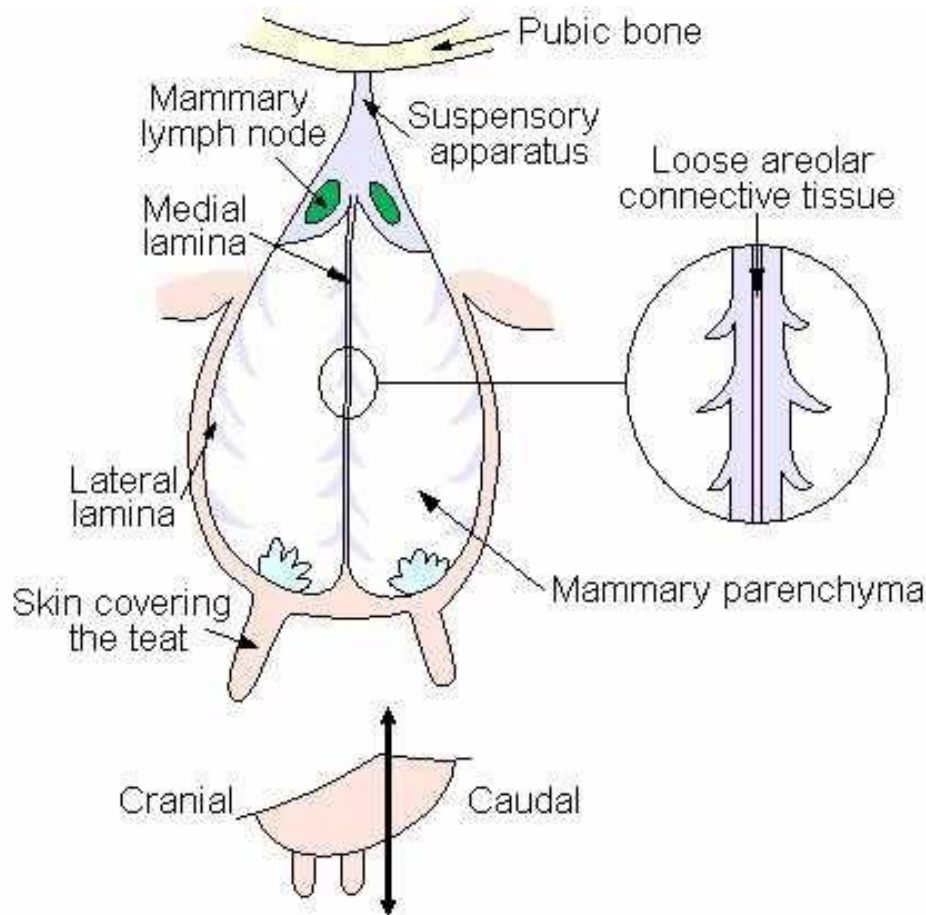


# Bovine mammary gland

Ibrahim MH Alrashid







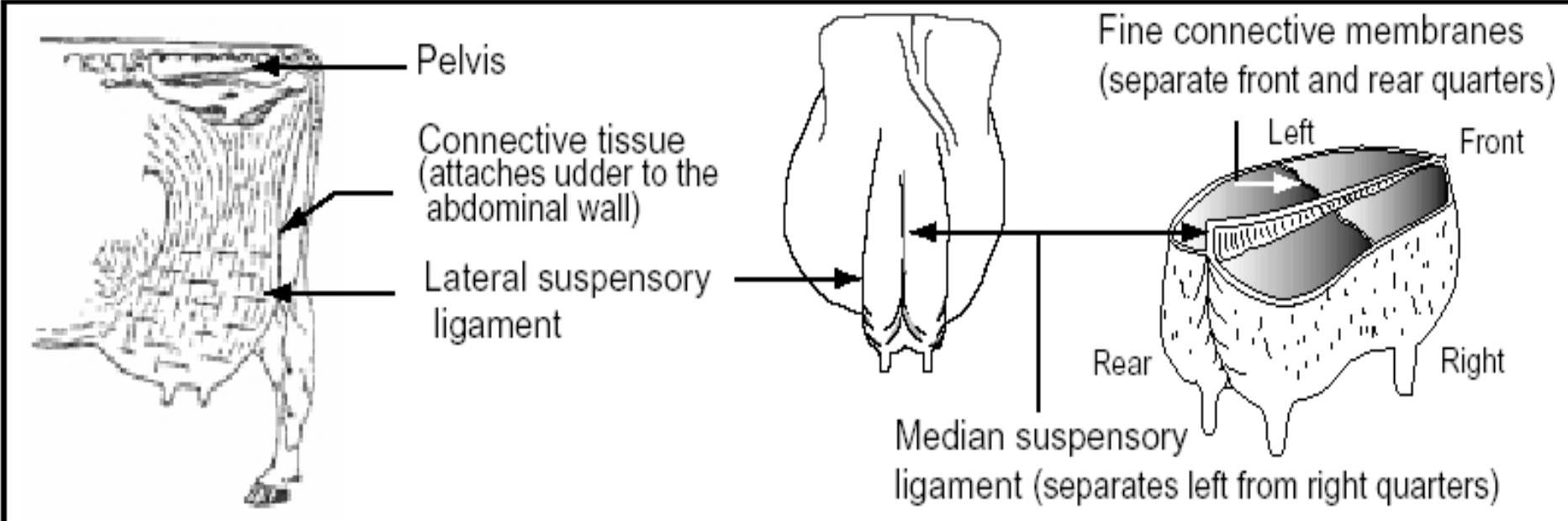
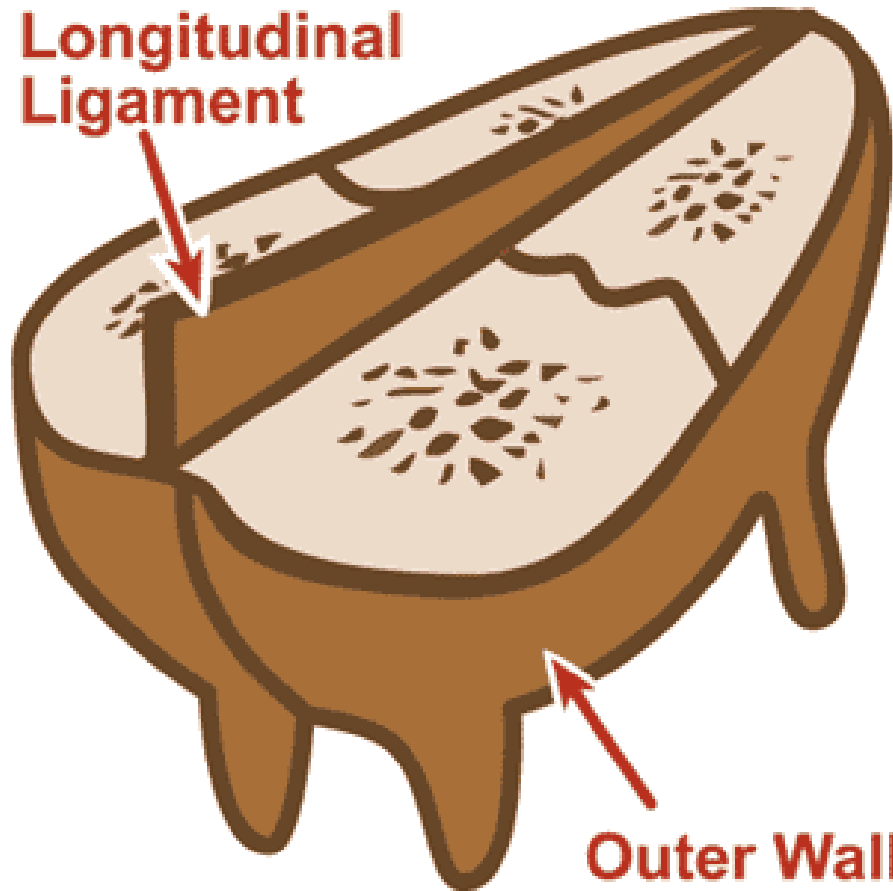
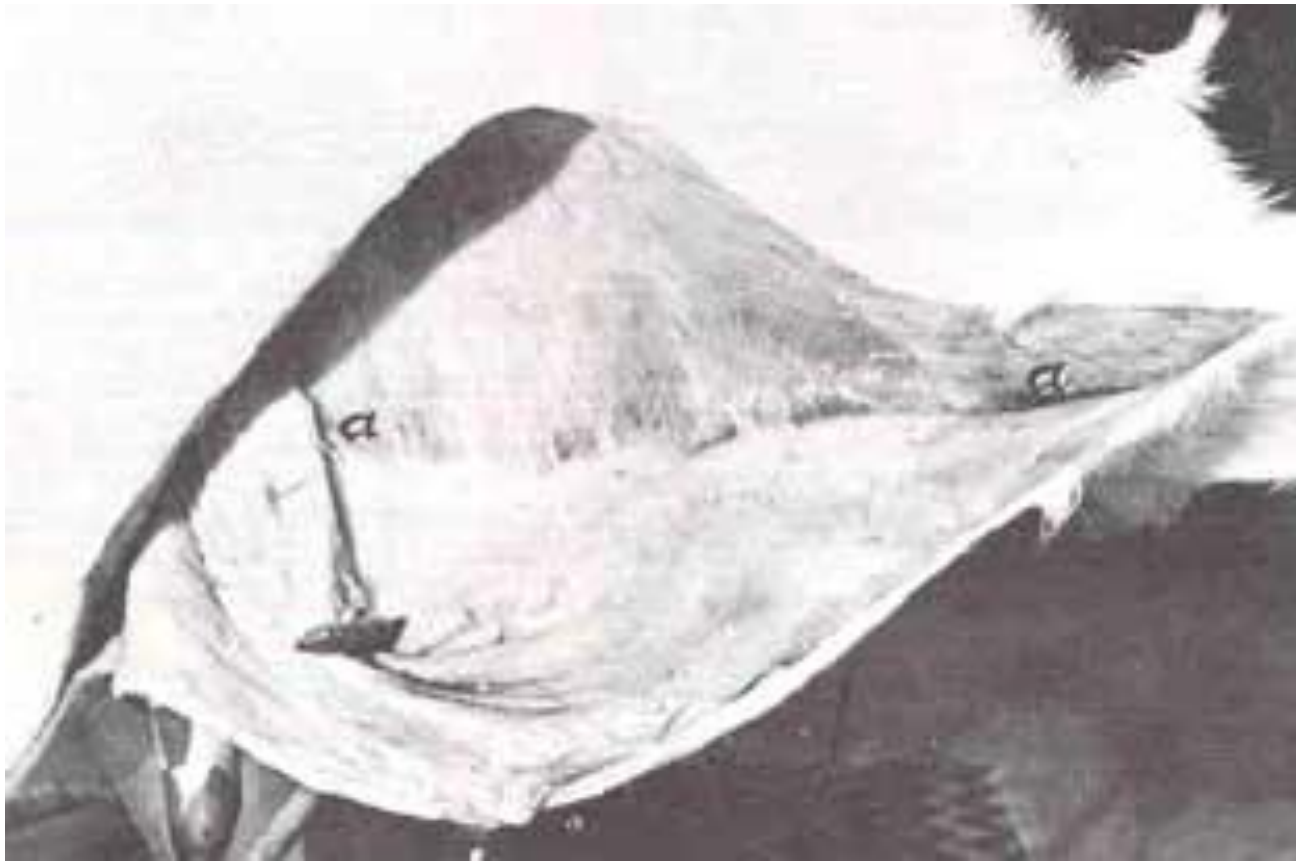
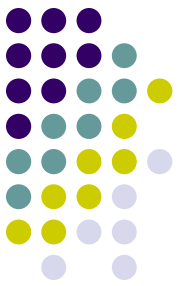


Figure 1: The support system of a cow's udder



The udder of a cow producing 40 lbs. of milk in a 12-hour period can weigh up to 100 lbs.

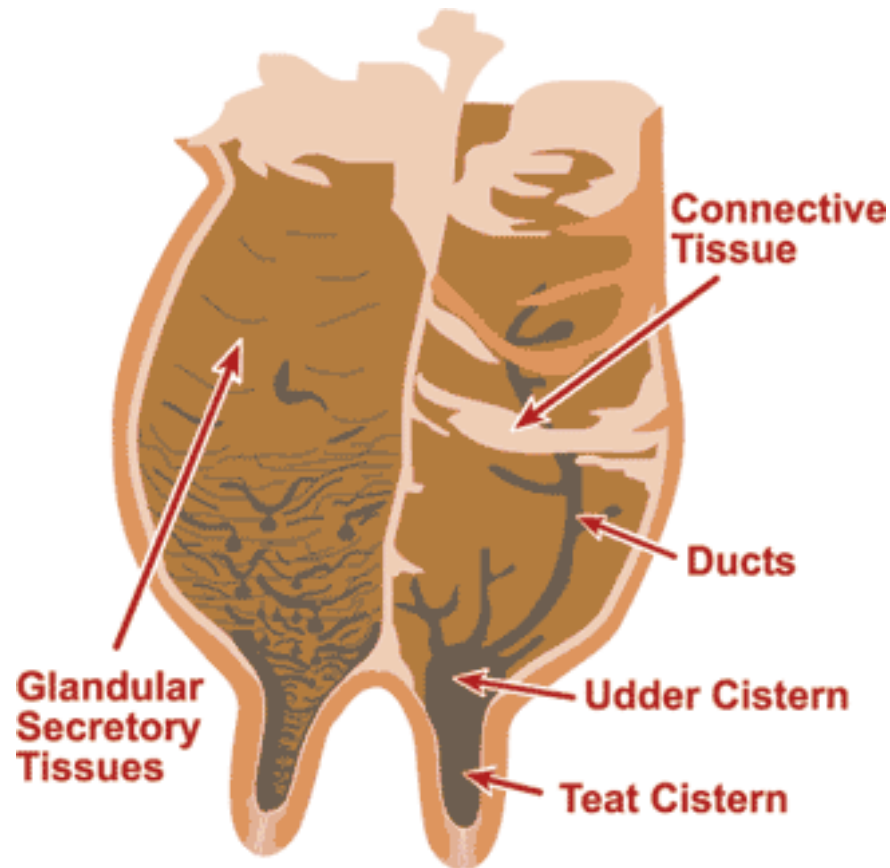


- **Skin and Subcutaneous Tissue :**
  - a minor capacity to suspend and stabilize the udder
  - protects the interior of the udder from injury and bacteria.



## **Median Suspensory Ligament**

- The most important support for the udder (MSL)
- Clearly divides the udder into the right and left halves
- The MSL is composed of elastic tissue that stretches to allow the udder to expand as it fills with milk.



## **Lateral Suspensory Ligament**

- Chiefly fibrous and non-elastic (don't stretch).
- The LSLs extend along both sides of the udder and at intervals send sheets of tissue into the gland to provide support to the inside contents of the udder

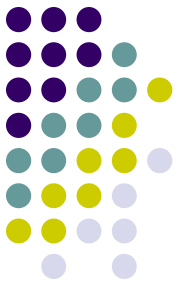


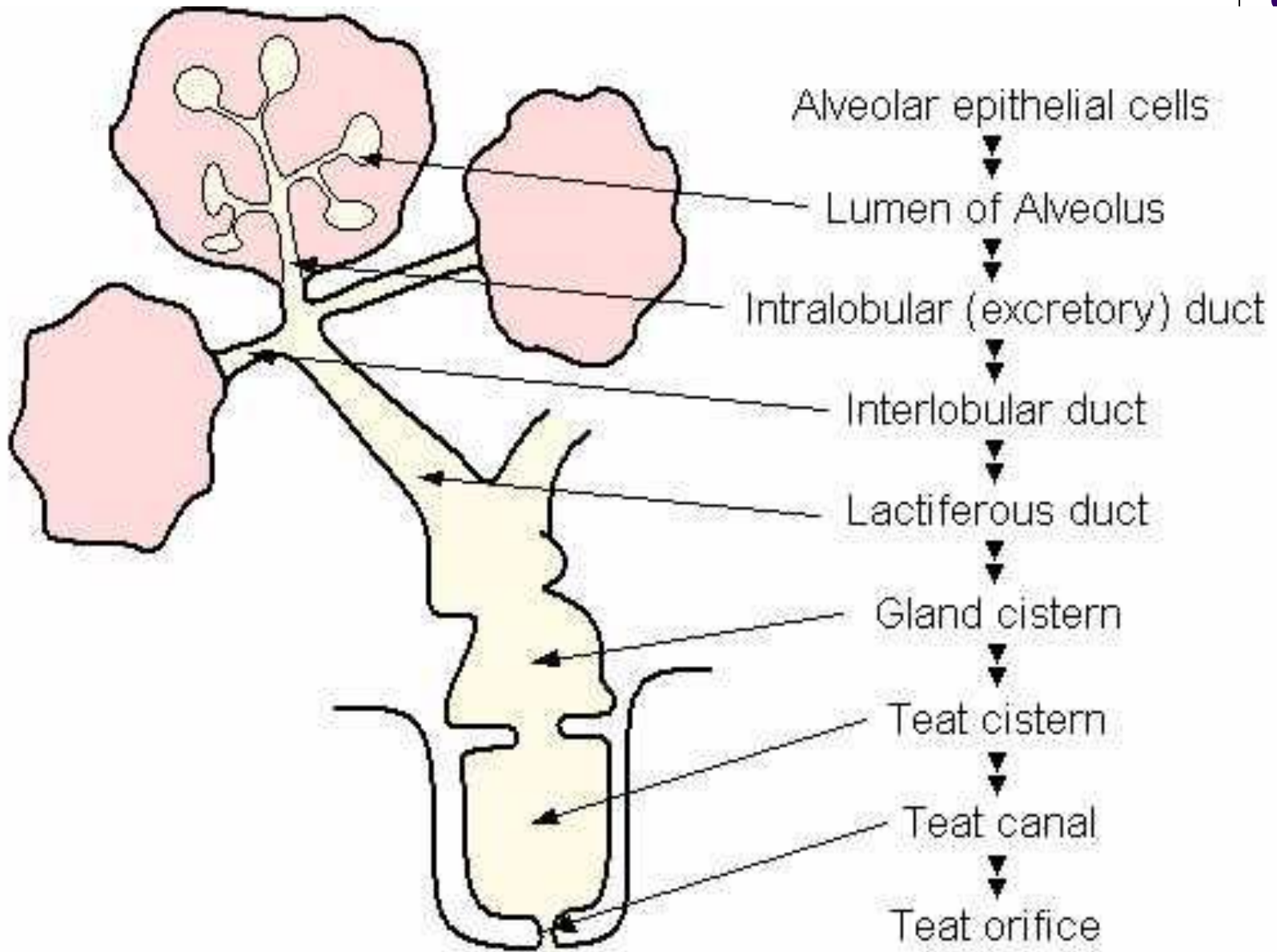
- **Pendulous Udder**

If the Medial and Lateral suspensory ligaments weaken and the cordlike structure that attaches the fore udder to the body wall stretches, the result can be a pendulous udder.

- Disadvantages of a pendulous udder include:

- Cleaning difficulty
- Milking difficulty
- Risk of injury
- Risk of mastitis





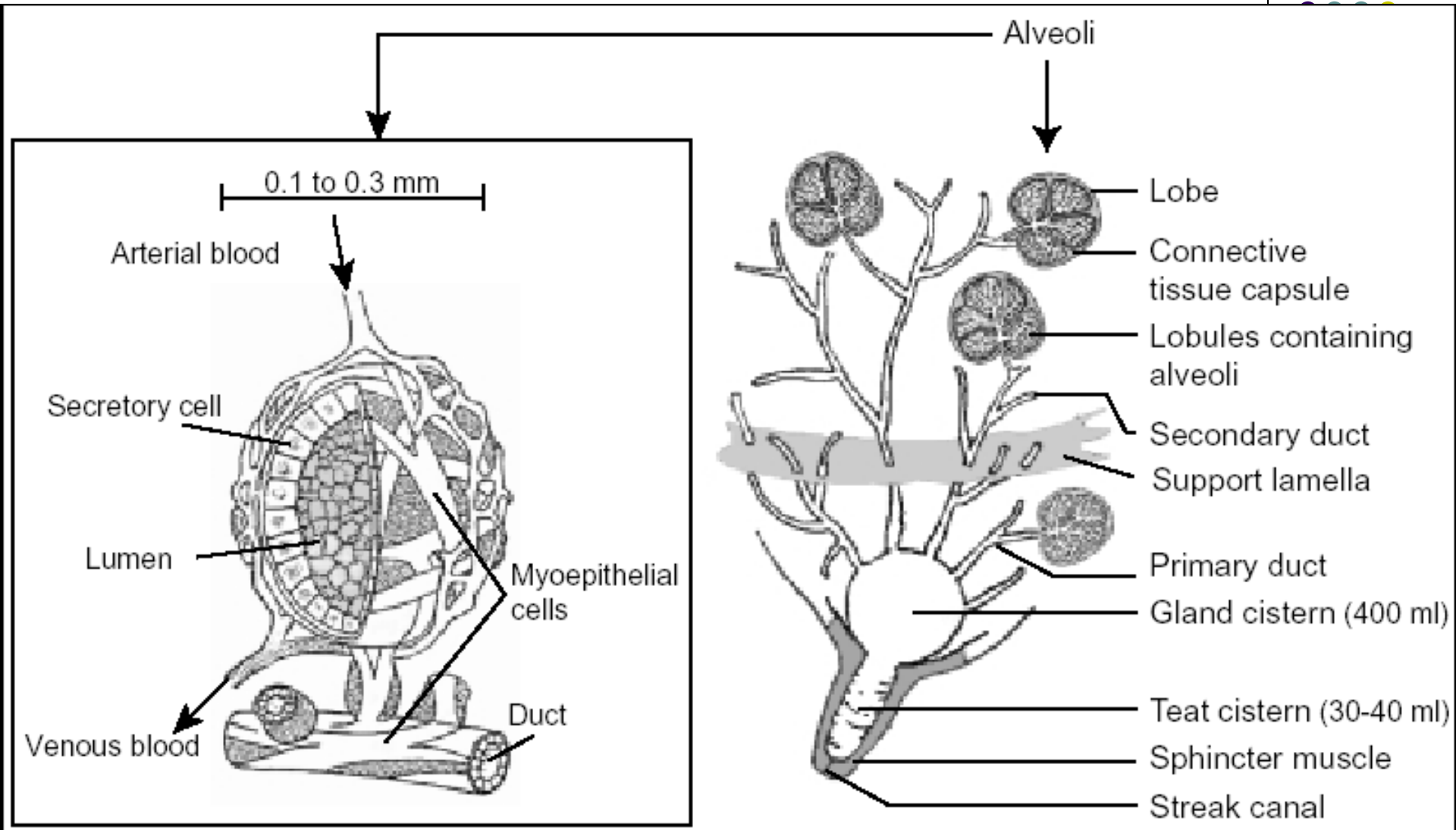
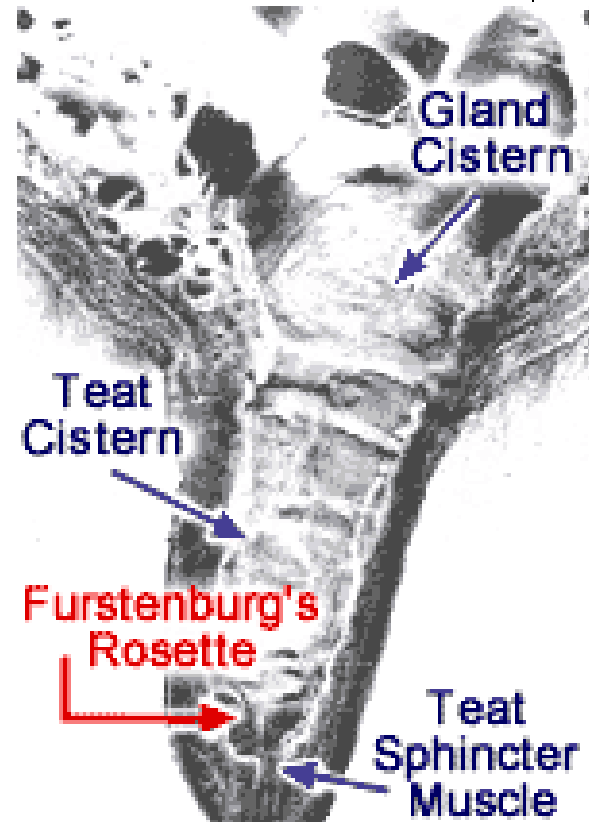
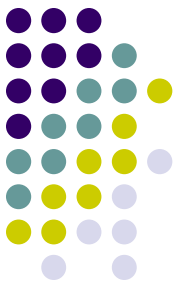


Figure 2: Alveoli and ducts form the milk secretory system

# Fürstenburg's Rosette

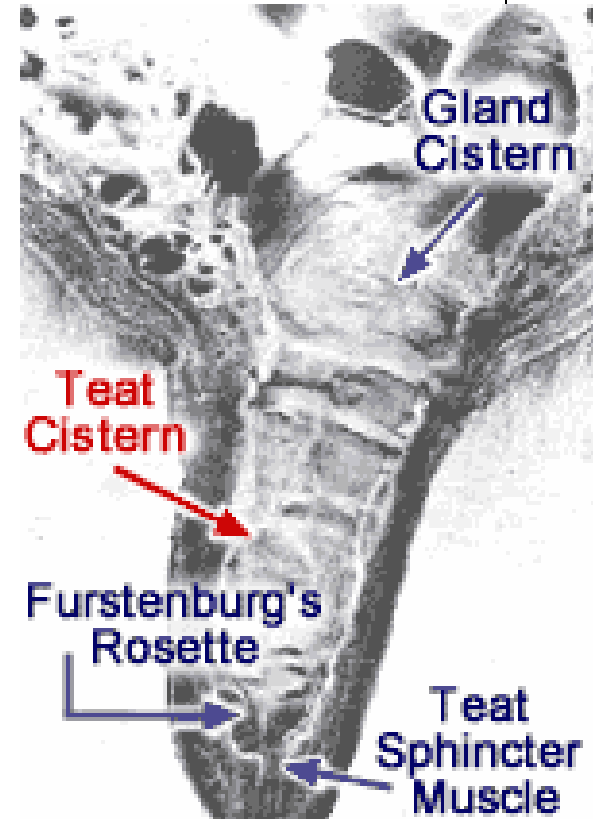
- Fürstenburg's rosette is located directly above the streak canal.
- It is made up of loose folds of membrane that smooth out as milk accumulates in the udder.
- This aids in blocking the escape of milk between milkings.
- This can be damaged by improper milking or by improper use of mastitis infusion nozzles.





## Teat Cistern

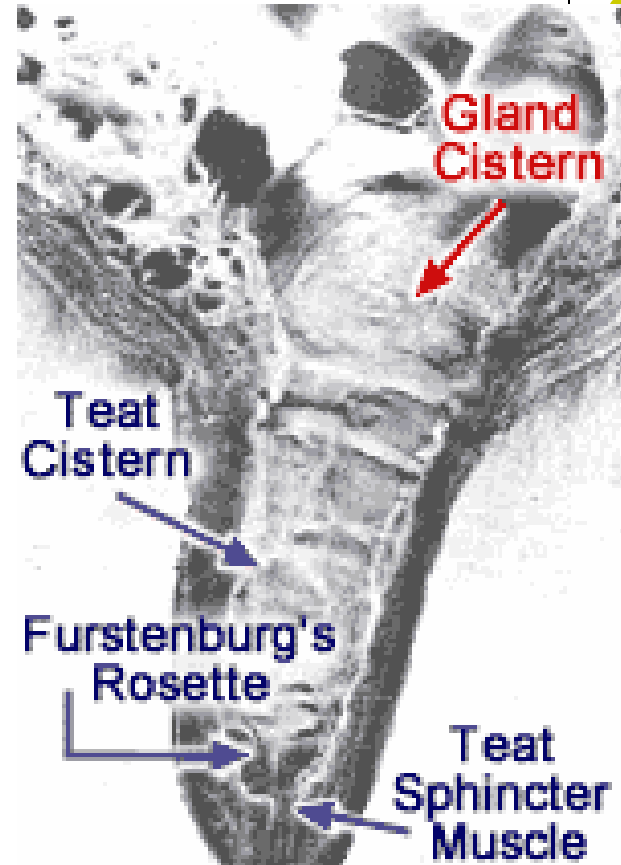
- The teat cistern is the cavity inside the teat that holds from 1/2 to 1 1/2 ounces of milk, depending on the size of the teat. -The teat cistern is the holding chamber where milk accumulates before it is removed through the teat end during milking.
- It refills continuously during milking.
- This is where the first milk to be removed accumulates between milkings.





## Gland Cistern

The gland cistern joins to the teat cistern at the base of the udder. The gland cistern, which can vary greatly in capacity, functions as a collecting vessel for milk from the major milk ducts that flow into it. The gland cistern fills rapidly during milk letdown.



# Types of Antibiotic Treatment



- Intramammary infusion products
  - 1. the quick-release, short-acting types designed specifically to treat mastitis in lactating cows
  - 2. the slow-release, long-acting types formulated specifically to treat subclinical mastitis in dry cows and to prevent new infections in dry cows: remain in the udder for  $\geq 21$  days



# Drying-off

- Regeneration of new milk secreting cells
- Restore body energy and nutrient reserves
- 50-70 days, never less than 40 days before the expected calving date
- Reducing the concentrate → reduce milk yield
  - Intermittent milking
  - Sudden cessation of milking



# Dry Cow Treatment Procedure (1)

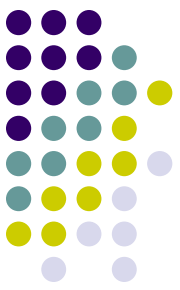


- Milk the udder out completely.
- Clean and dry teats with a single paper towel or cloth.
- Dip all teats in an effective teat dip. Allow 30 sec before wiping teats with single service paper towel or cloth.
- Starting with the teats on the far side of the udder, disinfect the teat ends by scrubbing each for a few seconds with a separate alcohol-soaked cotton swab
- Treat quarters in reverse order; near side first, far side last

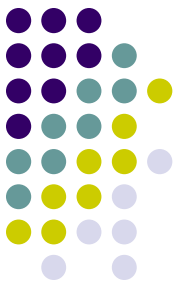
# Dry Cow Treatment Procedure (2)



- Insert only the tip of the cannula (6 mm or ¼ in) into the teat end prior to infusing. Massage the treatment up into each quarter.
- Dip teats in an effective germicidal product after treatment.
- Practical teat dip all treated cows at least once a day for two weeks after drying-off and for two weeks before calving.
- Remove the cows from the milking herd to prevent antibiotics from entering the milk supply

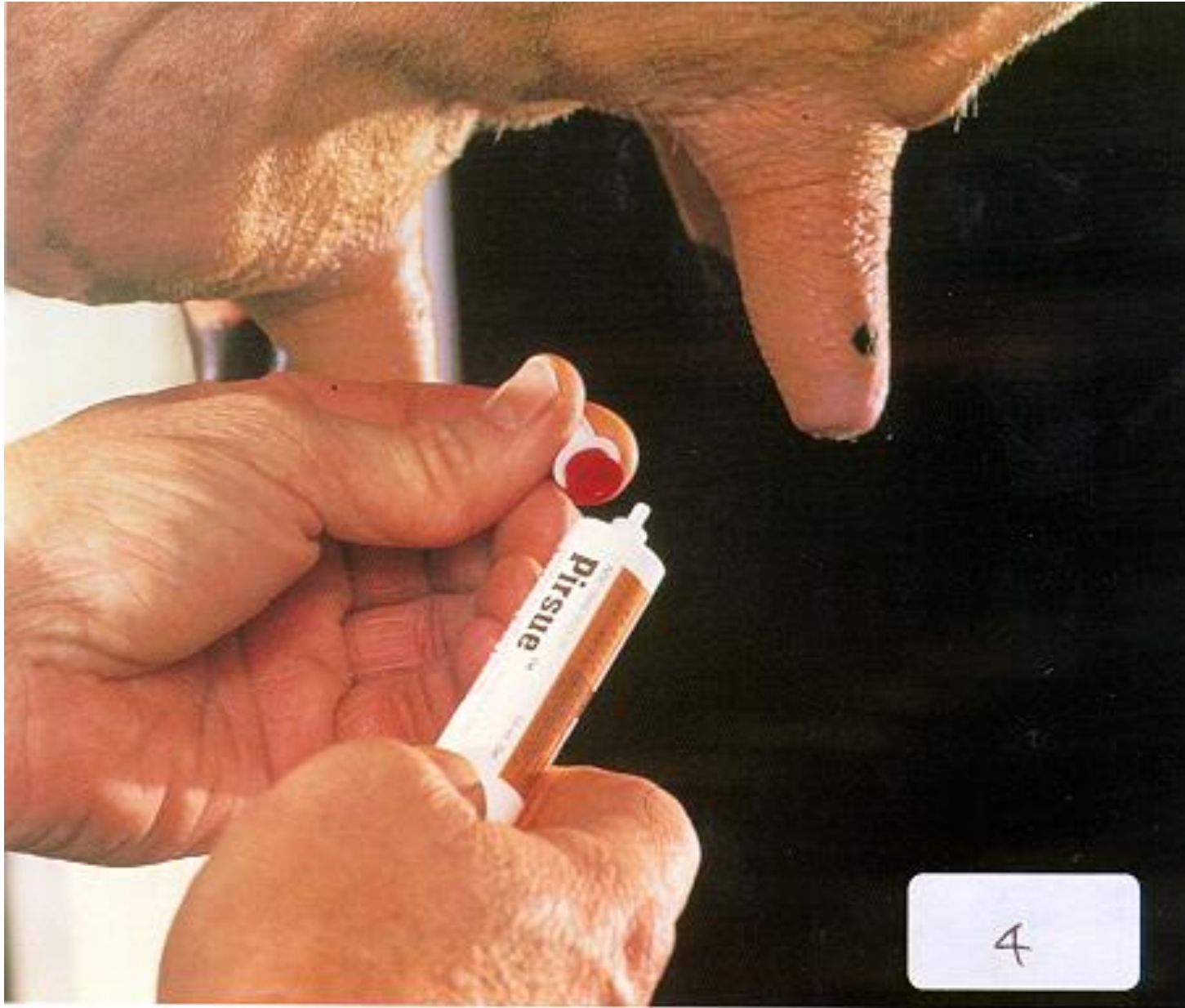
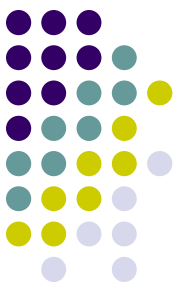


1. Udder should be clean and dry. Be sure quarters are completely milked out.

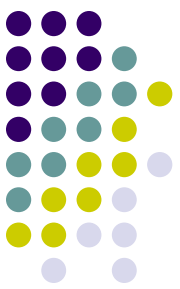


2. Scrub the end of each teat with a pad or cotton ball soaked in 70% alcohol. Sanitize teats farthest away first, then nearest teats.



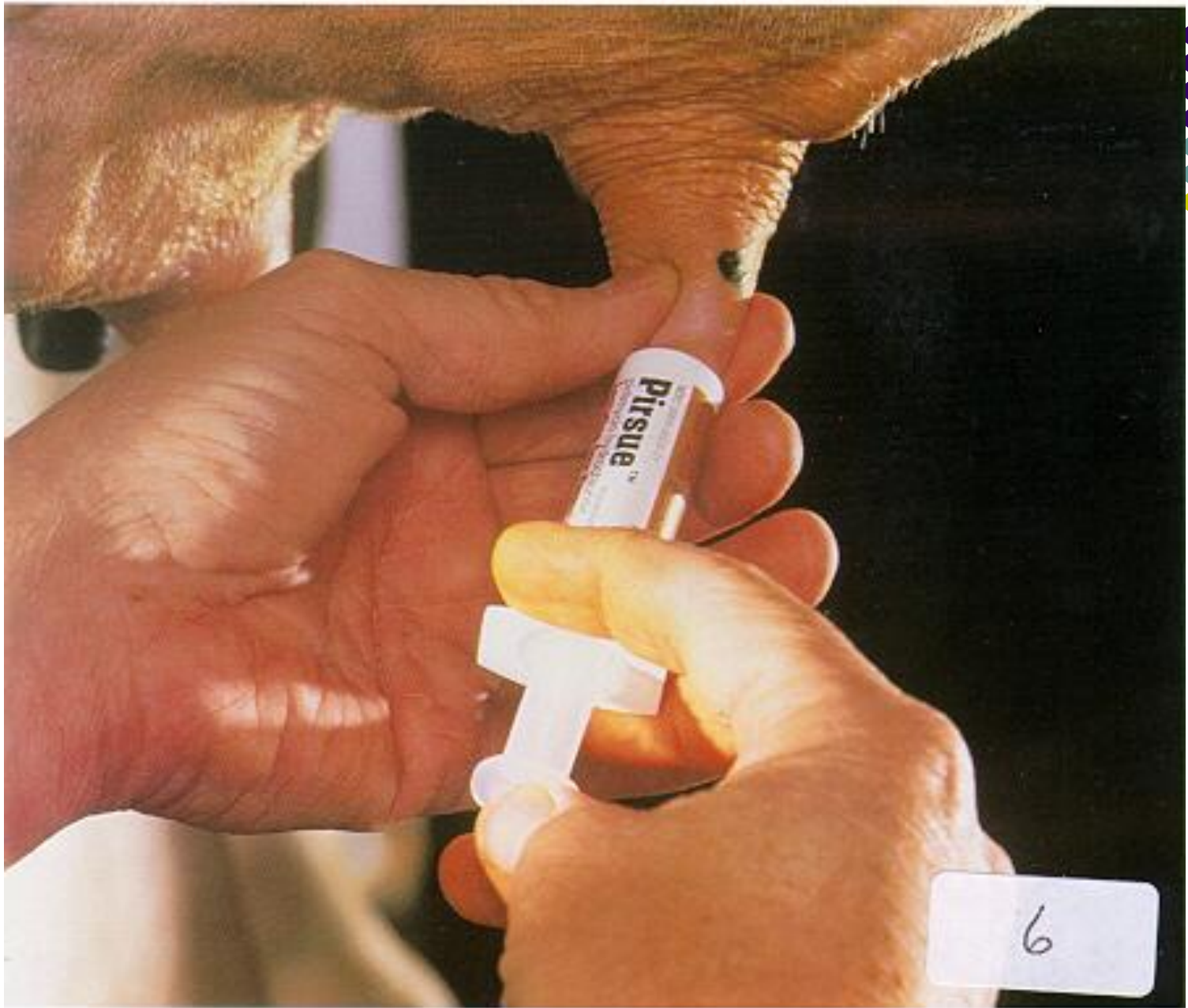


3. Remove the cap from the infusion tube without contaminating the tip.



4. Insert the canula 1/8 - 1/4" into the teat end. Infuse nearest teats first, then teats farthest away.



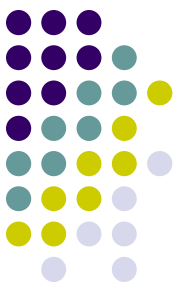


5. Gently infuse the contents of the infusion tube.

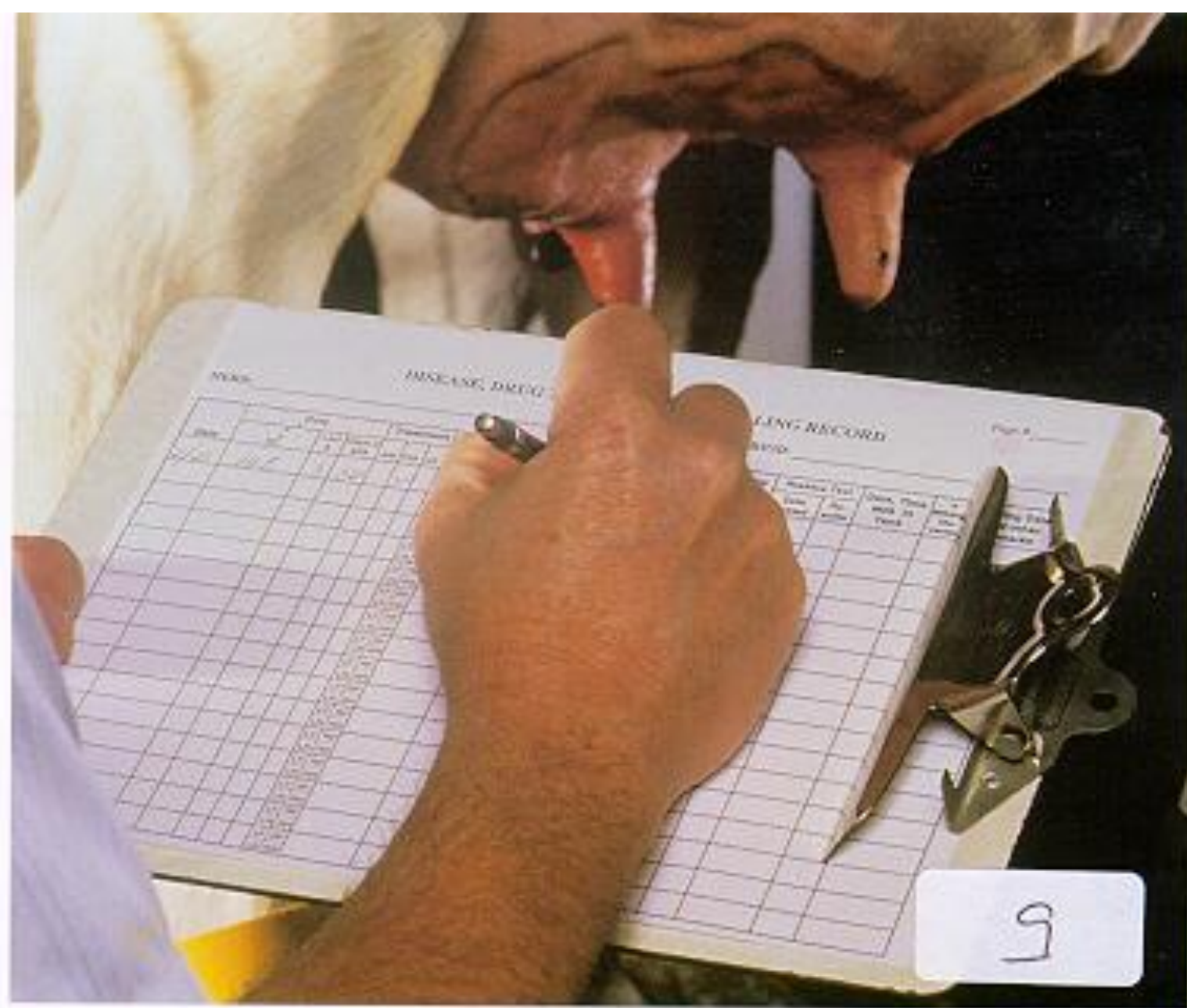


6. Dip or spray teats in a germicidal, post-milking teat dip.



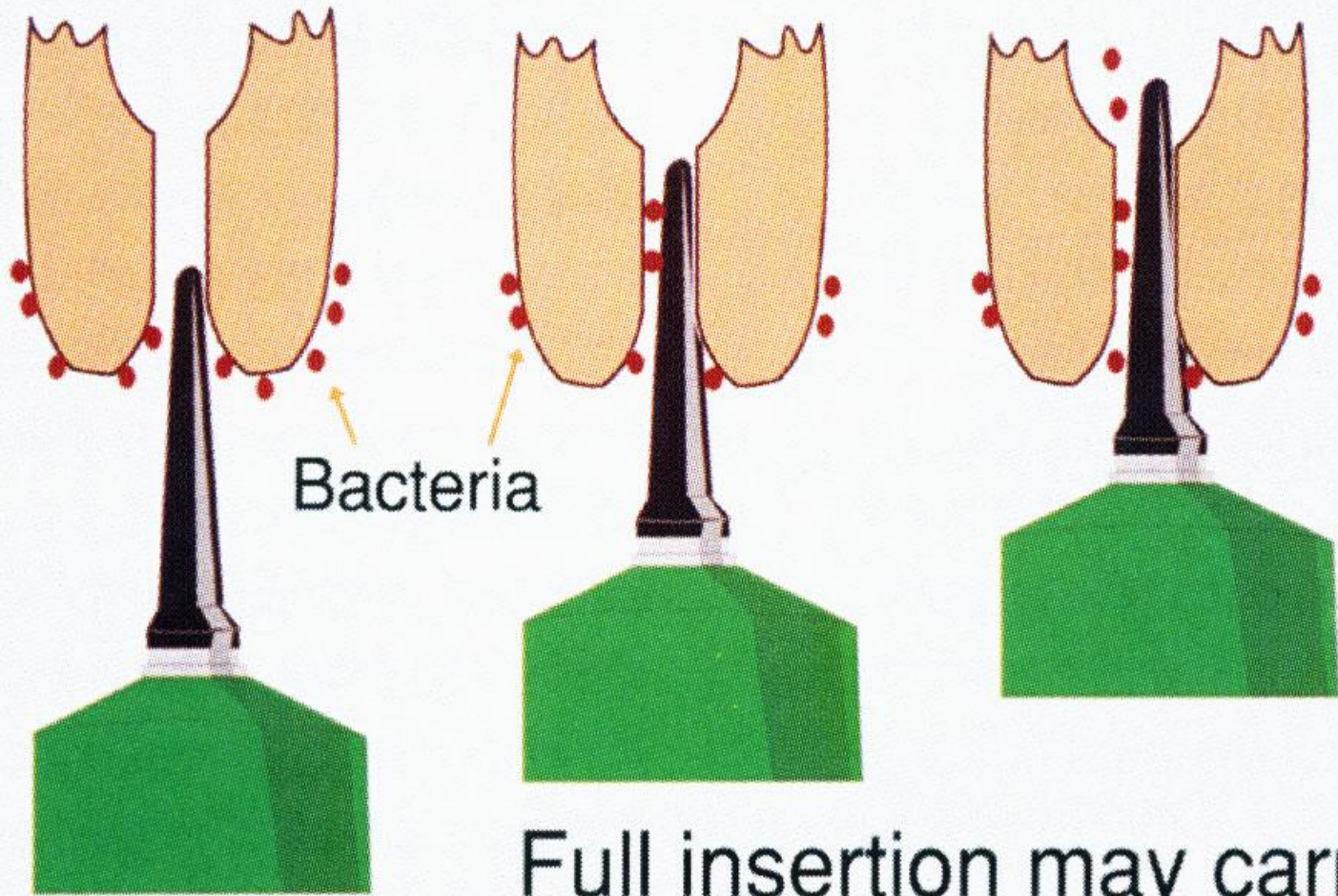


7. Identify the cow to avoid contaminating the milk supply.  
Follow withdrawal recommendations.



8. Record treatment information in permanent records.





Full insertion may carry  
bacteria into the udder

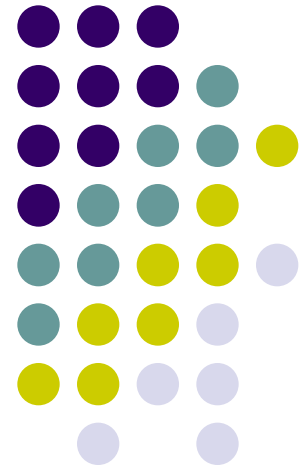
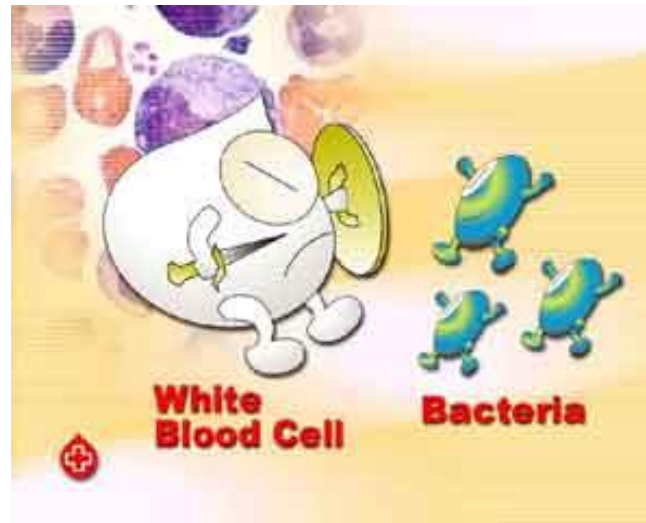
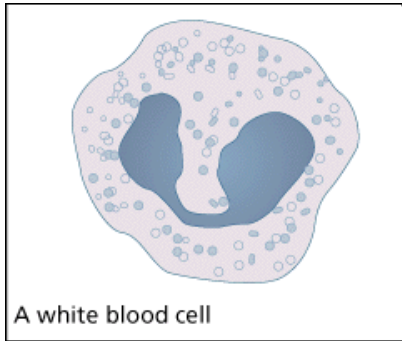
Figure 5-2. *Partial insertion minimizes the risk of pushing bacteria into the udder.*



# General Considerations

- Laboratory culture and sensitivity test
- Early dry off
- Number of infusions
- Teat dips
- Vaccination or Immunization
- Sanitation
- No dry period
- Dry cow therapy to Bred Heifers

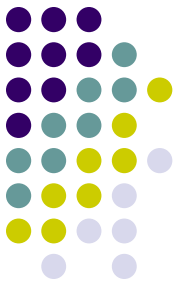
# Defense Mechanism and Immunity of Mammary Gland



# Natural Disease Resistance Factors in the Mammary Gland



- Physical Barrier
- Cellular Immunity
- Humoral Immunity
- Phagocytosis



# Physical Barrier

- Teat shape
- Streak canal
- Teat sphincter
- Keratin
- Streak canal diameter
- Furstenberg's rosette
- Intramammary infection
- Bacteria

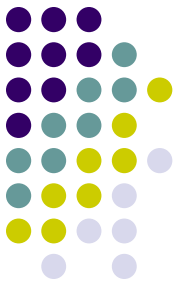


# Cellular Immunity

- Leukocyte ~ Milk Somatic Cell
- ~60% are macrophages
- ~30% are lymphocytes
- ~10% are polymorphonuclear cells
- Innate immunity = first line defense mechanism
- Chemotactic activity by cytokines released from lymphocytes
- Phagocytosis



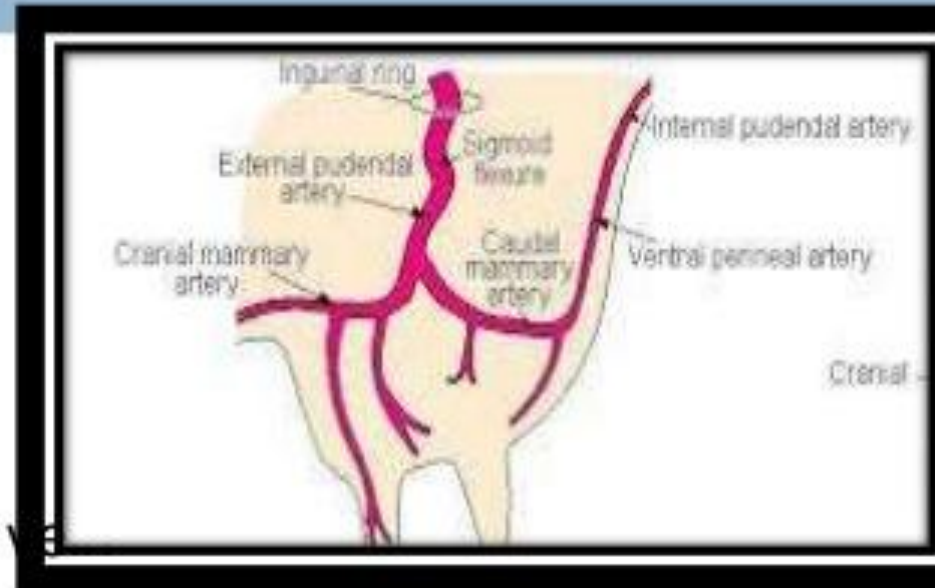
# Blood supply of the udder

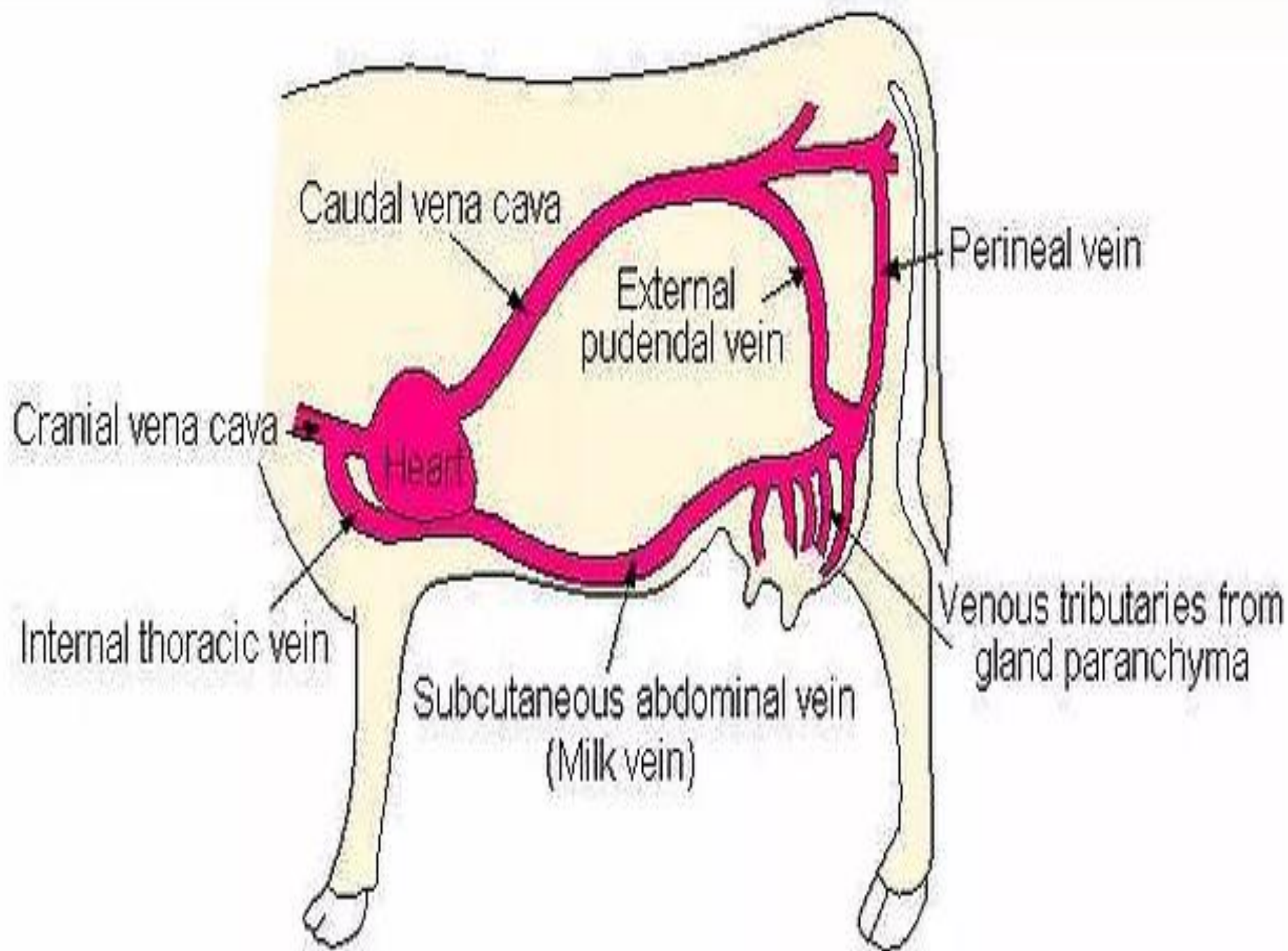


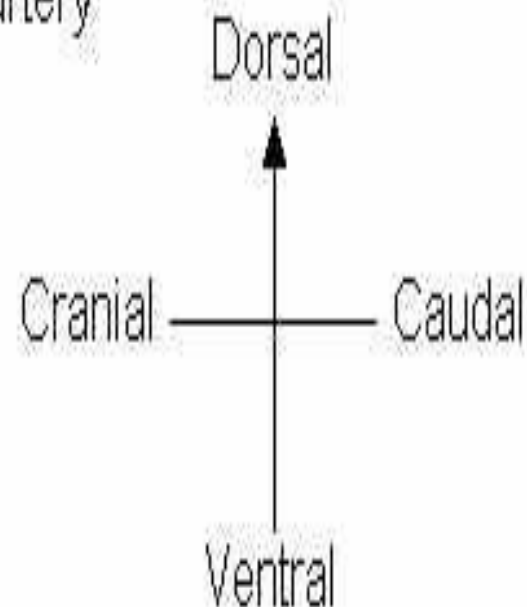
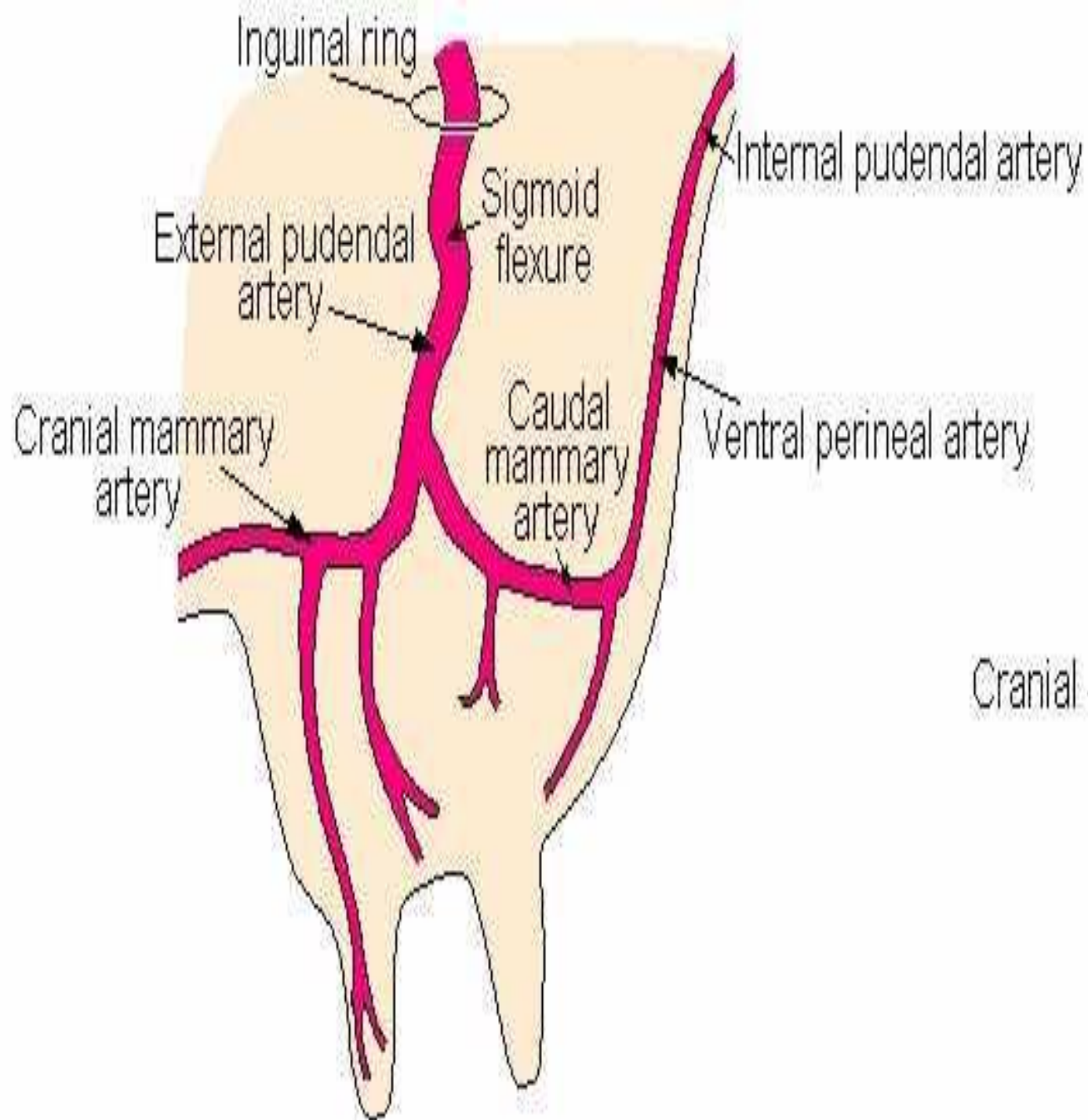
- **Arteries:**
- The main blood supply to the inguinal mammary glands is from the **external pudendal artery**. This arises indirectly from the external iliac artery via the deep femoral artery. The external pudendal artery passes through the inguinal canal. In species which also have **thoracic and abdominal mammary glands** (bitch, queen, sow) additional blood supply is derived from the **internal thoracic artery** and its branches - cranial superficial epigastric arteries as well as from **lateral thoracic** and **intercostal arteries**.

# Blood supply

- Arteries
- External pudendal artery
- Internal thoracic artery
- Lateral thoracic artery
- Intercostal artery
- Veins
- Cranial superficial epigastric vein
- Internal thoracic vein
- Caudal superficial epigastric vein
- External pudendal vein
- Pudendal nerve
- Superficial inguinal lymph node

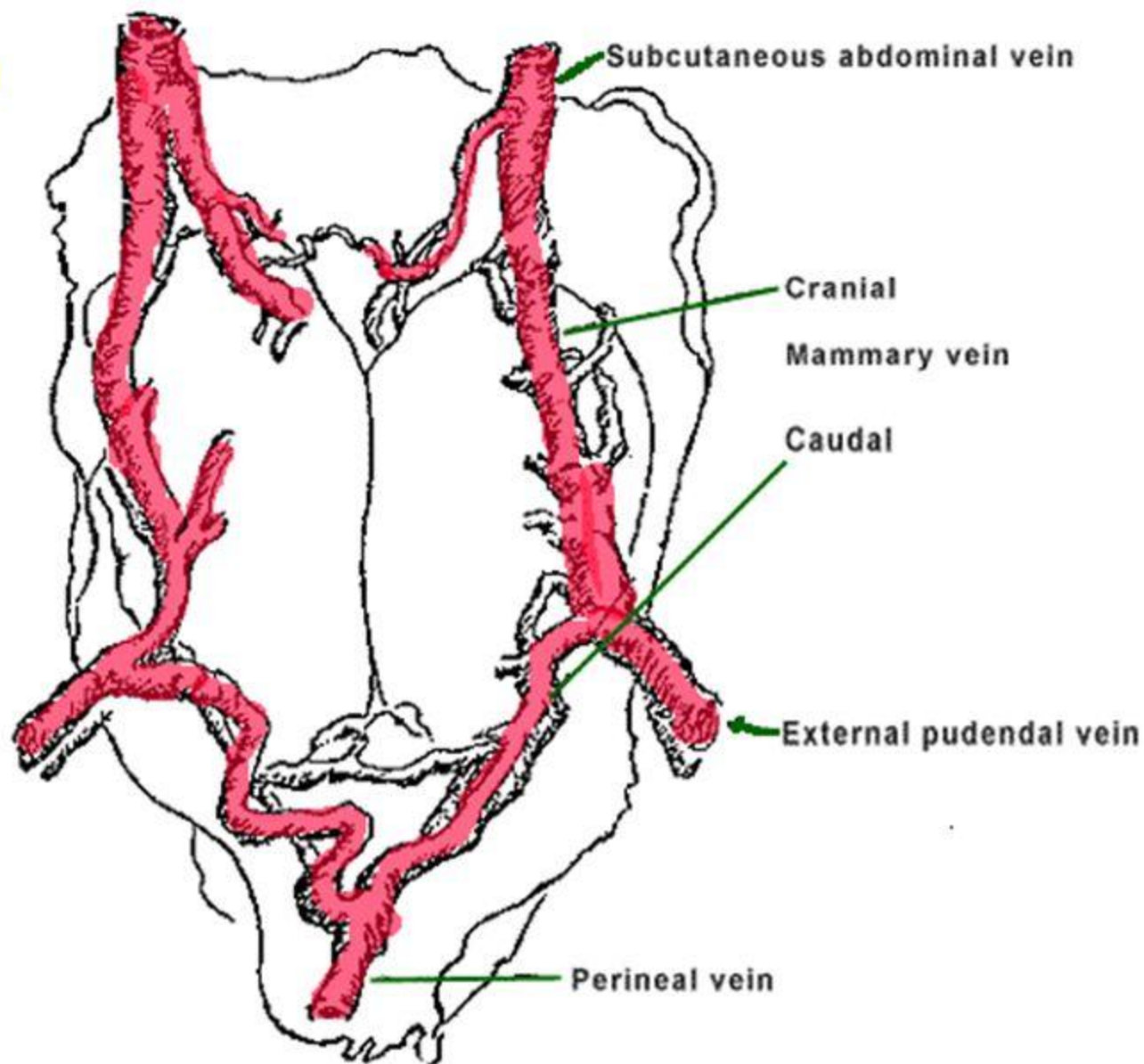




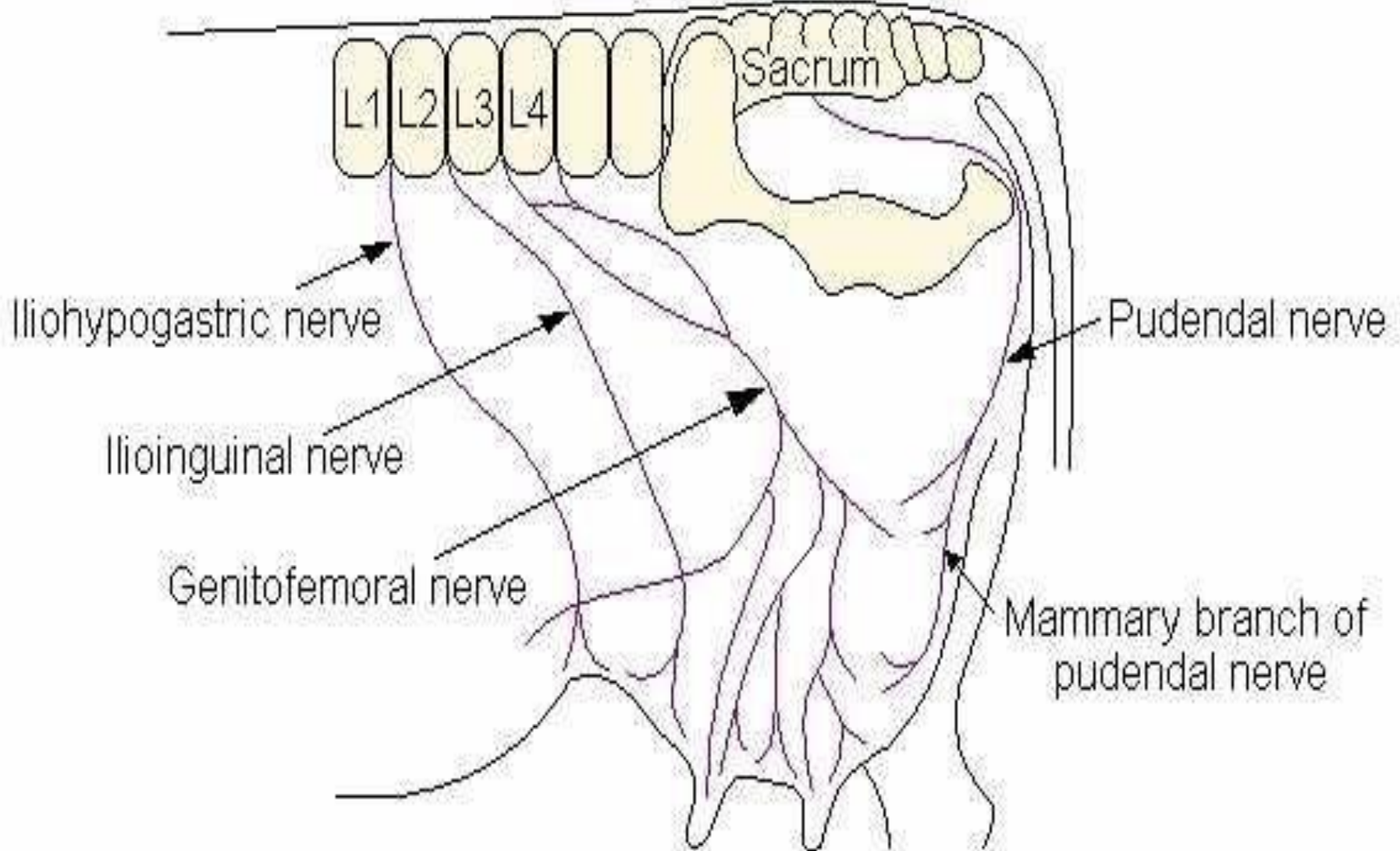




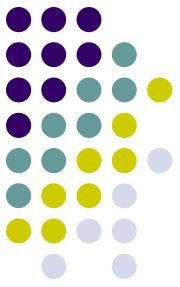
# Venous Circle



# Innervation:

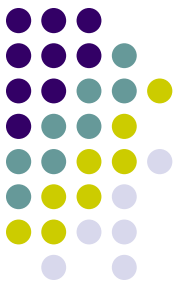


# Innervation:



- Somatic innervation is via the ventral rami of the spinal nerves. In the cow, the ventral branches of L1 and L2 (**iliohypogastric and ilioinguinal**) supply the skin of the cranial glands. Mammary branches of the **pudendal nerve** supply the caudal aspect of the udder. There is sympathetic innervation to the blood vessels and teat sphincter smooth muscle. Mammary glands also have major influence from endocrine hormones

# Surgical affections of the udder and teats



- **Congenital anomalies**
- **1. Absence of the udder:** Is exceedingly rare and only met with in cases of hermaphroditism.
- **2. Supernumerary glands:** Occurs only in multi-parous animals.
- **3. Absence of the teat.**
- **4- Supernumerary teats:** This may occur and can be present anywhere on the udder but are most frequently seen posterior to the last two normally placed teats.



# Supernumerary teats



# Treatment:



- It is better to amputate the accessory teats when that animal is young heifer, before the gland becomes active

# Procedure:

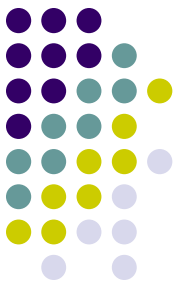


- Infiltrate the base of the teat by means of 2 % Xylocaine as local anesthetic. An elliptical incision is made including the necessary teat. Crush the tissue and the skin is then sutured in an interrupted pattern



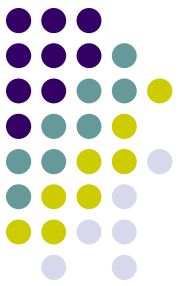
- **5. Contracted sphincter or teat orifice "hard milker":**
- The condition may be congenital in origin or may be acquired as a result of trauma to the end of the teat. There is a small stream of milk, and prolonged milking time. There may be loss of milk due to incomplete milking or trauma to the teat due to attempts for strenuous milking methods.

# Treatment:



- Local infiltration anesthesia or instillation of 5 ml of 2 % xylocain or similar local anesthetic into the teat canal will provide anesthesia. The orifice should be cleansed, antiseptic applied, and the orifice enlarged. The enlarging procedure may be accomplished by inserting of lichtigy teat knife, ringed teat slitter or stoll teat bistoury. The opening in the sphincter is maintained at the desired size by inserting a Larson teat tube and leaving it in place for 5-7 days. Milking is accomplished





- **6-Occlusion of the teat orifice:**
- This is a congenital anomaly characterized by the occlusion of the teat orifice deposit the teat fills with milk at the time of lactation. It may also be acquired as a result of trauma at the teat orifice that results in healing with occlusion

# Acquired surgical affections:



- **1- Lacerations:**

- Lacerations of teats and or udder that do not penetrate sufficiently to allow milk to flow from the wound may be handled as any other laceration, keeping in mind that large amounts of scar tissue or flaps of skin may interfere with milking or have an undesirable cosmetic effect. Lacerations or trauma in the area of the teat sphincter may lead to stenosis. If there are flaps of skin that protrude, they should be sutured or removed. Portions of nonviable skin should be trimmed back to confirm to normal contour of the teat.



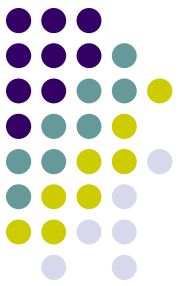


- **2- Teat Fistula:**

- The term, teat fistula, refers to an opening in the wall of the teat, connecting the exterior to the pre-existing channel, the teat canal is characterized by persistent outflow of milk. Such fistula may be congenital or acquired. It is mostly acquired as a result of penetrating wound that extend to the teat canal or cistern and fails to heal completely because of the continuous drainage of milk.







- **Treatment:**
- 1. Anesthesia can be obtained by a ring block at the base of the teat or local infiltration anesthesia of the wound edges using 2 % solution of xylocaine Hcl.
- 2. The entire area is prepared for aseptic surgery by washing the field of the operation with soap and water, swap with alcohol. Tincture iodine should never be used because of its marked irritant effect.



- 3. Apply a suitable tourniquet as the rubber tube of the blood transfusion set at the base of the teat or teat band as much high as possible to secure haemorrhage during the operation.
- 4. The wound edges should be, if necessary, debrided before suturing. If the fistula is old and the tissue around it have healed, the tract should be excised before suturing.



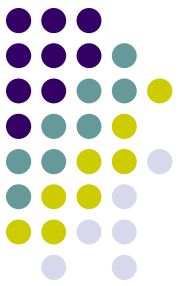
- 5. Apply a teat siphon to guard against injuring tissues of the other side and to avoid excessive trimming.
- 6. The teat fistula is then sutured after dusting the site with an antibiotic powder.



- **3- Haematoma of the udder:**
- Haematoma of the udder is relatively common in cattle having pendulous udder as a result of contusion and rupture of a subcutaneous blood vessels. The condition is characterized by its sudden onset and fluctuency. A septic puncturing the swelling may be necessary to confirm diagnosis







- **Treatment:**
- Small haematomas of the udder should never be opened immediately. Opening the haematoma is after a week post occurrence. The blood clot is removed and the cavity is painted with tincture of iodine. The cavity is then packed tightly to guard against further bleeding. Large haematomas in front of the udder should not be opened till the blood is clotted, usually after 10 days and proceed as before.



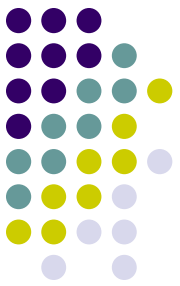
- **4- Lactiferous Calculi (Milk Stones):**
- Milk stones which are found in the udder may result from accumulation of lime salts of milk over a point of crystallization. The latter may be desquamated epithelium. Sometimes, these calculi are freely movable in the teat canal if their sizes relatively smaller than the diameter of the canal. When being larger in size, they obstruct the lumen of the teat canal.



- **Treatment:**
- If the calculi are of small size, they can be removed by manipulation during milking. Larger calculi obstructing the teat canal can be crushed by means of special forceps. In other cases of milk stones, it may be necessary to enlarge the opening at the end of the teat by cutting through the sphincter of the teat canal one or more times.



- **Treatment:**
- If the calculi are of small size, they can be removed by manipulation during milking. Larger calculi obstructing the teat canal can be crushed by means of special forceps. In other cases of milk stones, it may be necessary to enlarge the opening at the end of the teat by cutting through the sphincter of the teat canal one or more times.



- **5- Abscess of the Udder:**
- Abscesses of the udder may develop beneath the skin as a result of infection of a
- haematoma. It may occur in the parenchyma of the udder as a result of chronic mastitis especially in goats. It may also occur as a result of supramammary lymphadenitis. Generally, abscess formations most commonly occurs secondary to the traumatic wound.







- **Treatment:**
- Following confirmation of diagnosis, the treatment should be done on the general principles for treatment of abscesses. If there are multiple abscesses, mastectomy (partial or total) according the involvement of one quarter or more on the entire udder, is then indicated. If there is involvement of the supramammary lymph node, lymphadenitis it should be extirpated.



- **6- Membranous obstruction of the teat canal (teat spider or blind quarter:**
- This condition may be congenital associated with failure development of the teat cistern or teat canal, or acquired due to mastitis, trauma, or tumors.



- **Treatment:**
- When the membrane is thin, it may be penetrated with alligator forceps in closed position then opened up to spread the opening. Alligator forceps may also be used to grasp the membrane and pull it open.
- Use of special instrument such as teat slitter, or teat spiral to open the membrane and result in milk flow.
- It is helpful not to milk the quarter completely until it heals



- **Gangrenous mastitis**
- Gangrenous mastitis occurs sporadically during the **first three months of lactation** often associated with poor milk supply related to **ewe underfeeding** and **over-vigorous sucking** by the lambs.
- death and loss of lambs.





- The condition is more common in ewes nursing **triplets** than twins, and very rare in ewes rearing singletons. It is usually caused by organisms such as *Mannheimia haemolytica* and *Staphylococcus aureus*.
- Gangrenous mastitis is a **major welfare concern** and is a sporadic cause of ewe



- **Warts**
- Warts are caused by viruses.
- Warts can be cauliflower like or thin and long in shape. There are up to 7 different shapes.
- Warts sometimes disappear within 2 months but sometimes they persist and have to be removed.
- Cattle can also be vaccinated against warts. The vaccine used is made from warts.



- **Polyps of the Teat canal.**
- These are small peace growths attached to the wall of teat canal.
- The polyps hinder the milking process and sometimes even block the passage of teat canal. Teat polyps can easily take out by Huges teat tumor extractor (in which teat tumor extractor is inserted into the teat canal



- after ascertaining (determining) the location of polyps).If its location is above the teat canal surgically removed. The polyps are excised (removed) by milking or relived with alligator forceps.



- **Tumor of mammary gland.**
- These are infrequently in lactating animals, fibro adenoma reported in heifer.
- Surgically removed under caudal block or local infiltration analgesia.

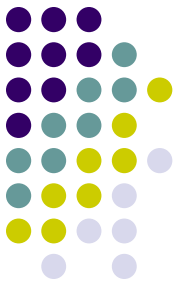
# Type of udder anesthesia



- **Local anaesthesia:**
- Infusion with local anaesthetic, inverted V- block ring block.
- **Regional anaesthesia:**
- Perineal nerve block may be used for surgery on the caudal teats and the escutcheon of the udder.
- **Epidural anaesthesia** may be used as an alternative to local analgesia for teat surgery in cows.
- **lumbar paravertebral** anaesthesia (blocking L1, L2, L3) or segmental lumbar epidural anaesthesia may be used in the standing COW,
- **General anaesthesia:** This is occasionally



# Complication of the operation:



- Bleeding.
- Abscess and Stitches abscess.
- Subcutaneous emphysema.
- Hernia.
- Adhesion.
- Infections and Dead occurs duo to shock.

Thank you!  
James!



