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Ministry of Labor and Skills

Animal Health

Level-II

Based on March2022, Version 4 Occupational standard



Module Title: - Performing Reproductive Health Care and Artificial Insemination Activities

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Ministry of Labor and Skills

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Introduction to the Module

This module covers the knowledge, skills and attitude required to identify and prevent the prevailing reproductive diseases or infertility problems and carry out pregnancy diagnosis. It also contains knowledge and skill to conduct semen handling and Artificial Insemination procedures in promoting Bedding production/productivity of animals..

LG #17	LO#1-Identify and manage reproductive Disease and Fertility problems

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Reproductive anatomy and physiology of farm animals
- Understanding and diagnosis of reproductive diseases and fertility problems
- Prevention and control of infertility problems
- Providing advice to the beneficiaries
- Hazard identification and risk minimization

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Acquire Basic understandings on reproductive anatomy of normal/healthy animals.
- Identified infectious and non-infectious reproductive diseases and fertility problems of farm animals.
- Recognize, risk assesses and control existing and potential hazards in the workplace ccording to OHS requirements.
- Diagnose reproductive diseases and fertility problems based on veterinary clinical examination and appropriate information from records.
- Identify, isolate and care sick animals according to the organizational guidelines.
- Reportidentified infertility problems to immediate supervisors to take appropriate preventive and control measures according to national and enterprise guide lines.
- Provided advice to beneficiaries in accordance to the enterprise guidelines.

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the information Sheets
4. Accomplish the Self-checks

Information Sheet 1

1.1 Reproductive anatomy and physiology of farm animals

1.1.1 Anatomy of female and male reproductive system

Male Reproductive System

The male reproductive system has several interconnected working parts that must function together for successful mating to occur. In the reproductive system of a male mammal, the major organs are the testicles, epididymis, scrotum, vas deferens, urethra, seminal vesicles, prostate gland, Cowper's gland, and penis.

- **Testicles** (the left and right) are the essential male generative glands or gonads, which along with the epididymis and its associated structures lie in the scrotum ineach of the domestic animals. It plays a major role in animal reproduction byproducing sperm, or the male sex cells, also called spermatozoa. Testicles also produce a hormone, testosterone, which causes the appearance and behavior of the animal to have masculine traits. Every male animal has two testicles. Sperm cells enter the epididymis attached to each testicle. They are stored there while they mature.

- The**scrotum**isatwo-lobedsacthatcontainsand protects the two testicles. It also regulates the temperature of the testicles, which must be maintained below body temperature. When the environmental temperature is lower than the desired temperature, the scrotum contracts, pulling the testicles toward the body for warmth. When the environmental temperature is higher than the desired temperature, the scrotum relaxes, permitting the testicles to drop away from the body. This temperature regulation is greatly important to the reproductive process because of its effect on the production and vitality of sperm.

Structure of the Scrotum

- Externally covered by skin, which is thin, elastic relatively hair less, lack subcutaneous fat and is supplied with sweat and sebaceous glands. At the median planethereislongitudinalraphe which marksthe septum scroti(externally, a median groove marks the division into right and left compartments).
- Tunica dartos- a tough fibromuscular layer attached to the skin. composed of under skin muscle and fibro-elastic tissue that divides the scrotum in to two halvesor sacs which contracts during cold weather andrelaxes in hotweather (temperature regulation)
- Scrotal (spermatic) Fascia- has many layers
- External Cremaster muscle
- Tunica Vaginal communis (Parietal layer of the vaginal tunic)
- Tunica vaginal propria (visceral layer of vaginal tunic that covers the outer portion of testicles and epididymis
- Tunica albuginea.

The scrotum provides testicular temperature from 4-7^{0}C cooler than the general body temperature under normal.

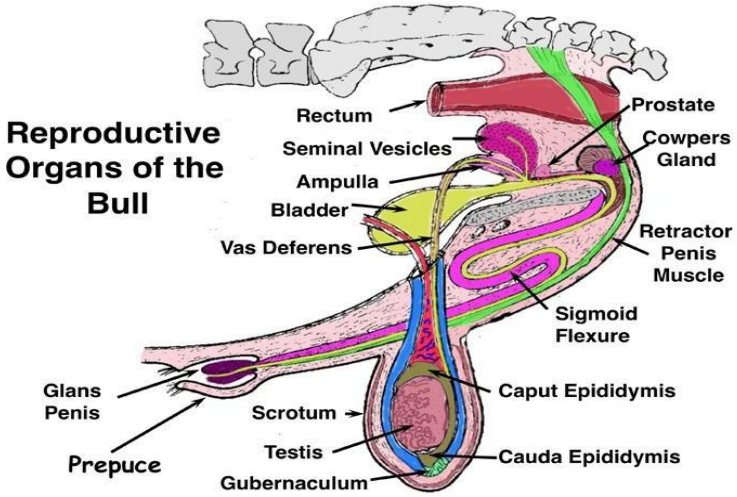
- Vas deferens is a transportation tube that carries the sperm-containingfluidfrom each epididymis to the urethra.
- The urethra is the large, muscular canal extending from the urinary bladder to the end of the penis.
- Accessory sex glands add volume and nutrients to the sperm-rich fluid coming from the epididymis.
- The seminal vesicles open into the urethra to produce a fluid that protects and transports sperm.
- The prostate gland is near the urethra and the bladder. It produces a fluid that mixes with the seminal fluid throughout animal reproduction. The mixture of seminal and prostate fluids and sperm is called semen.

- The Cowper's gland produces a fluid that moves down the urethra ahead of the seminal fluid. This fluid cleans and neutralizes the urethra, helping protect the sperm as they move through.
- The penis deposits the semen within the female reproductive system. The urethra in the penis is surrounded by spongy tissue that fills with blood when the male is sexually aroused. This causes an erection, which is necessary for copulation, or mating, to occur.
- The sigmoid flexure, commonly found in bulls, rams, and boars, and the retractor muscle extend the penis from the sheath, a tubular fold of skin.
- The glans penis at the tip of the penis acts as a sensory organ.

The spermatic cord- the testicle is fixed in scrotum by the spermatic cord and scrotal ligament. This cord starts from internal abdominal ring of inguinal canal to testis. The spermatic cord is composed of:

- Testicular(spermatic)artery
- Testicular (spermatic) vein- constitutes close-meshedpampiniform plexus in which the arteries are embedded. The plexus reduces to a single vein andjoins the caudal venacava
- Cremastermuscle
- Lymphaticvessels
- Nerves
- Vaginaltunic
- Vas deferens.

Note; the spermatic cord is the structure which is important during castration of animals; it



should be properly ligated in open castration (equine) and closed with burdizzo in closed castration.

Figure 1.1 Male Reproductive Organs

The Female Reproductive System

The female mammal has a complex system of organs that compose the reproductive system. Producers must be familiar with these various organs and their functions to ensure successful reproductive development of their livestock. Some major organs that make up the female reproductive tract are the ovaries, oviducts, uterus, vulva, clitoris, and vagina.

A female mammal typically has two **ovaries**. Within each ovary are hundreds of tiny follicles, or cavities, where the ova are produced. The ova, or eggs, are the female sex cells. Each ovum is the largest single cell in the body. The ovaries also produce the female sex hormones, estrogens and progesterone.

A. **Oviducts or fallopian tubes**: are tubes that carry the ova from the ovaries to the uterus. They reside close to the ovaries but are not attached to them.

B. **Infundibulum:** is the funnel shaped end of each oviduct nearest an ovary. At ovulation a follicle ruptures, releasing an ovum that is caught by the infundibulum. After copulation, sperm move through the uterus to the oviduct. Fertilization of the ovum occurs in the upper end of the oviduct. The fertilized egg known as a zygote, moves to the uterus about three days after fertilization.

C. **The uterus of a mammal** is a Y-shaped structure consisting of the body, two uterine horns, and the cervix. It lies in a nearly horizontally position on top of the bladder. The **myometrium** is a muscle layer; the **endometrium** is the lining. The size and shape of the uterus vary with the species. The upper part of the uterus consists of two uterine horns that progress to the oviducts, or fallopian tubes. In most species, except the horse, pregnancy occurs in the uterine horns. In the horse, however, pregnancy occurs in the body of the uterus.

   The uterus is the site where the fetus grows until parturition, or birth. The uterus of a mammal that normally produces a large number of offspring at each breeding cycle has relatively large horns and a small body. In contrast, the uterus of a mammal that normally produces a single offspring or twins has smaller horns and a larger body.

D. **Cervix** is the lower outlet of the uterus. It is composed primarily of connective tissue and constitutes the gateway between the uterus and the vagina. Like the rest of the reproductive tract, the cervix is lined with mucosal cells, which make significant changes as the animal goes from one estrous cycle to another during pregnancy, or gestation.

E. **Vulva:** is the external opening of the reproductive and urinary systems. The exterior, or the visible parts of the vulva, consists of two folds called the **labia majora** (are fleshy and homologous with the scrotum in the male). Inside the labia majora are two folds called the **labia minora** (are homologous with the shaft of the penis in male).

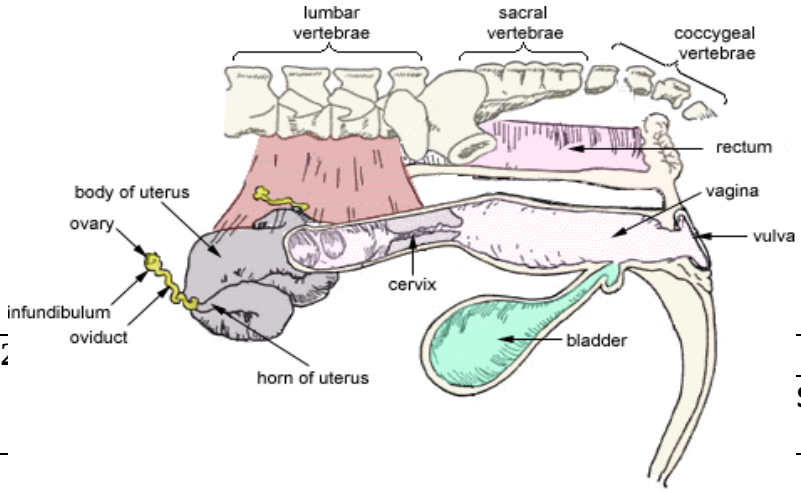
F. **Clitoris** is the sensory and erectile organ of the female (is homologous with the glans penis in males). It is just inside the vulva. The clitoris develops from the same embryonic tissue as the penis in the male and produces sexual stimulation during copulation.

G. Lastly, the **vagina** serves as the female organ of copulation at mating and as the birth canal at parturition. It is the passage between the cervix and the vulva. The lining is moist during estrus and dry when the animal is not experiencing estrus.

To have a successful livestock operation, a producer must understand animal reproduction.
To gain complete understanding, a producer must be familiar with the parts of female reproductive systems. In a female reproductive system, the major organs are the ovaries, oviducts, uterus, vulva, bladder, clitoris, and vagina.

Checking Your Knowledge:

- Name the parts of a female mammal's uterus.
- What is the sensory and erectile organ of the female?
- What is external opening of the female reproductive system?



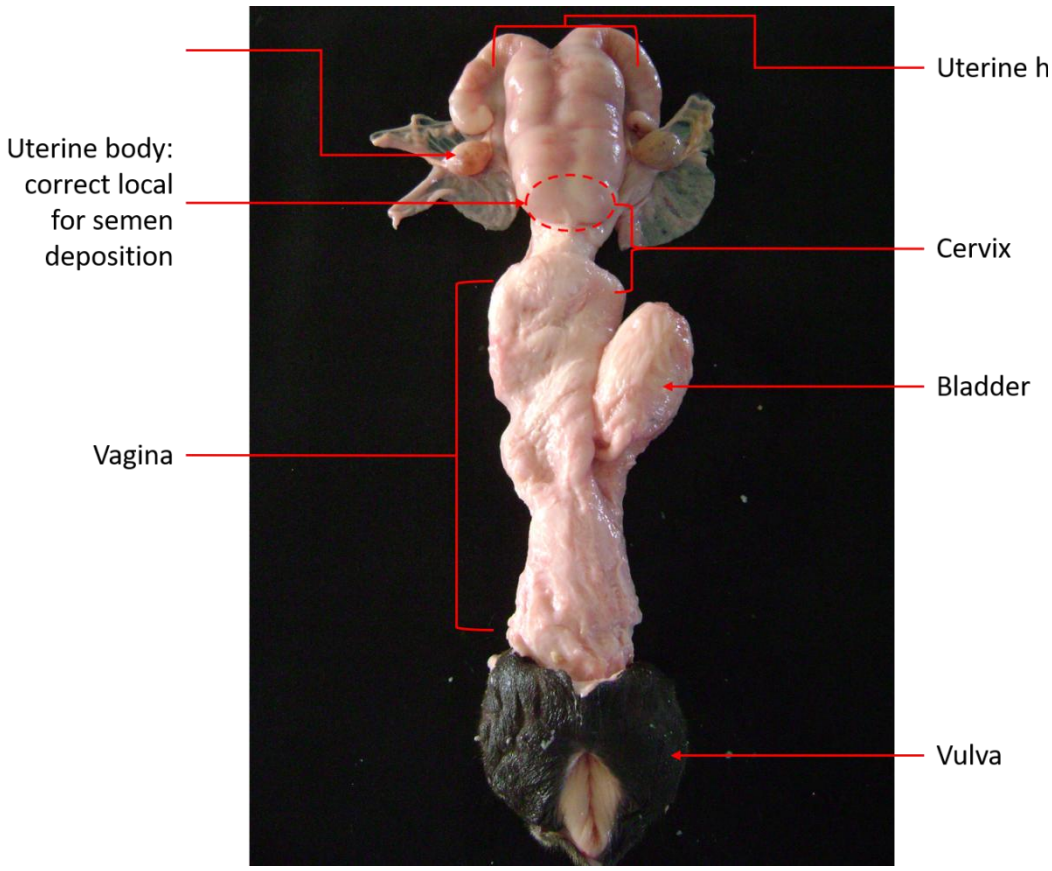


Figure1.2 Anatomy of female reproductive organ

(Cortés-Beltrán, D., and Gonella-Diaza, A. M, 2021)

Physiology of Female Reproduction

- **Puberty** -Is the period during which reproductive organs first become functional.This differs among the different species.Mare (2 year)Heifers (7-15 month), ewes, sows, bitch(6 month) . Great variations can be found with in a single species depending up onclimate, Nutrition, Heredity etc.
- **Oogenesis**-Is the formation of the haploid ova by meiosis cell division in the ovary. Oogenesis is completed during the embryonal development.The ova kept dormant until

the animal reaches to puberty.The ova develops on the cortex of the ovary.The period of development continuous cyclicalythrough out the fertile life.The interval from the beginning of one heat period to the beginning of the next heat period is called estrus cycle.The estrus cycle period varies in different species.

Table 1.1 Average estrus cycle with duration and gestation period in different species

Species	Estrus cycle	Gestationperiod	Durationofestrus
Cow	21days	9 month	14-18hrs
Mare	21days	11month	5days
Ewe	17days	5 month	3-84hrs
Sow	21days	3month(114 days) 3week 3days	15-95hrs

Based on the cycle animals are grouped in to 3 different groups

a. Monoestrus-onceinayear
b. Diestrus–twiceinayear
c. Poly estrus–many times in ayear
    - Seasonal poly estrous
    - Year round poly estrous

The estrus cycle has four phases:

i. **Proestrus-** Periodofthebuildingupwherefollicesincreaseinsize,vaginalwall thickens and uterine vascularity increase.

ii. **Estrus -** Period of heat and greatest receptivity to male, rupture of ovarian follicle in most farm animals.

iii. **Metestrus-**Formationofthecorpusluteum,changeinvaginalwallanduter

iv. **Diestrus -**Short period of inactivity before the next proestrus period during the breeding season of polyestrus.

The **oestrous cycle** is the sequence of hormonal changes that occurs throught he **ovarian cycle**.These changes influence the behaviour and bodyc hanges of the female(**Figure7**).

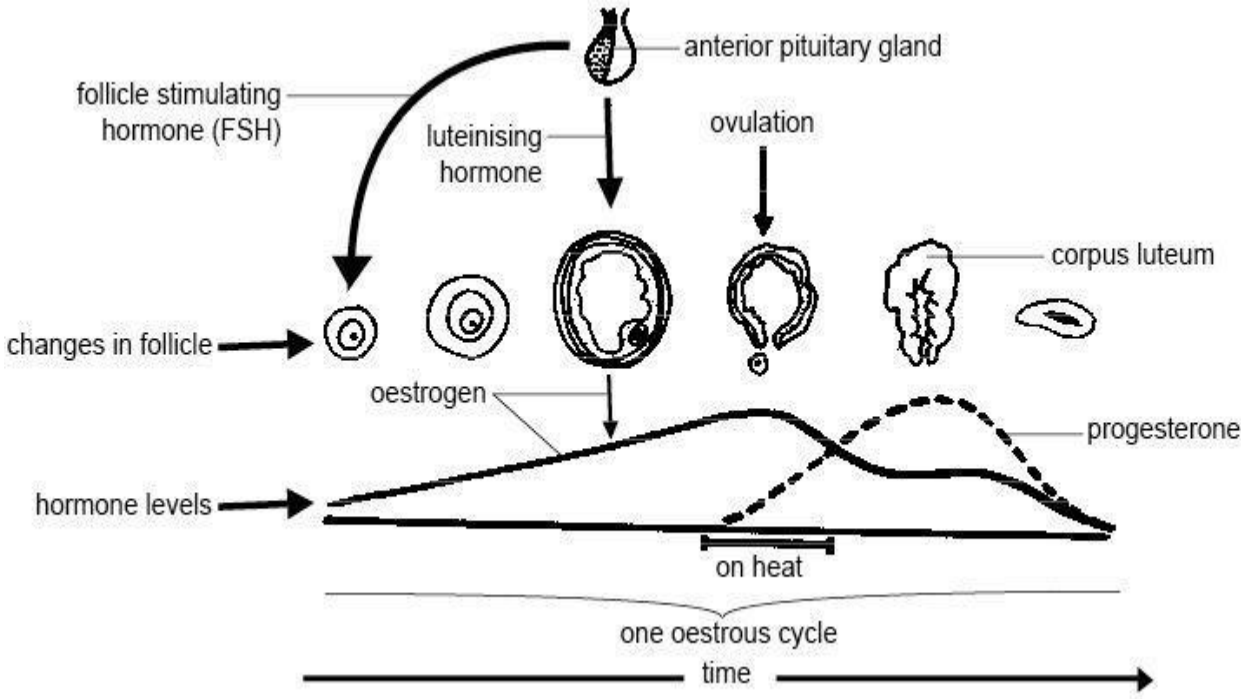


Figure1.3 The oestrous cycle

The firs hormone involved in the oestrous cycle is **follicl estimulatinghormone (F.S.H.),** secreted by the **anterior pituitary gland** .Itstimulates the follicle to develop. As the follicle matures the outer cells begin to secrete the hormone **oestrogen** and this stimulates the mammary glands to develop.It also prepares the lining of the uterus to receive a fertilized egg. Ovulation is initiated by a surge of another hormone from the anterior pituitary, **luteinizing hormone (L.H.).** This hormone also influences the development of the corpus luteum, which produces **progesterone**, a hormone that prepares the lining of the uterus for the fertilized ovum and readies the mammary glands for milk production. If no pregnancy takes place the corpus luteum shrinks and the production of progesterone decreases. This causes FSH to be produced again and a new oestrous cycle begins.

Alternatives which may follow metestrus.

- Pregnancy-Period of gestation
- Anestrus–Longperiodofinactivitybetweensexualseason
- Pseudopregnancy– Changessimilartopregnancybutnoembryoor fetalis present.

Ovulation - The process by whichone or more female cell or egg are released frommatured ovarian follicles.

Fertilization -Is the union of the female gametes to the male gametes to form one single cell called zygote.The zygote starts to divide with in the oviduct and also form aprotection cover called zona pellucida andthisreach to the uterus 3-4 days indomestic animals except in dog and cat 5-18 days.

Gestation period -The period from the time of fertilization to the period of parturition.The initiationofparturitionisbasedondifferentfactorstheactualconditiontoeach species is not known it is postulated:

- When size & weight of the fetus increases the fetus lacks sufficient nutrients from the mother.
- Asthesize&weightoftheuterusincreasesthemotherunabletocarrythefetus.
- Theincreaseinestrogen&decreaseprogesteronehormone.

During parturition there is a normal ways of presentation, posture and position to the species any abnormality leads the animal to the condition known as dystocia (difficulty in birth). Anterior presentation of the forelimbs & the head is the normal ways of presentation.

Physyiology of Male reproductive system

Functions of Primary and accessory sex organs

- Sex organs in males
  - ✓ I primary sex organs are a pair of testes(singular: testis) lying outside the abdominal cavity, enclosed in a sac called the scrotum. The placement of testes outside the

body results in the temperature of the testes beinglower than that of the rest of the body, a condition favorable to produce healthy sperms.

- ✓ **Secondarysexorgans**inamaleareseminiferoustubules,epididymis, spermduct,seminal vesicles, prostate gland, Cowper's gland and penis.
- ✓ The male accessory sex glands produce the bulk of the***ejaculate***, or ***semen***, the mediumfor transport of sperm. Semen provides favorable conditions for nutrition of sperm and actsas a buffer against the natural acidity of the female genital tract.

Theaccessorysexglandsincludethe:-

- Ampullaoftheductusdeferens
- Vesiculargland
- Prostateglandand
- Bulbourethral gland.

Except for the prostate,these glands ar epaired.Thereisconsiderablevariationinshapeandsize of the various accessory sex glands among species, but the relative location is similar in all animals .

a. Ampullae

The **ampullae**are glandular enlargements associated with the terminal parts of the ductus deferentia. They are well developed in the stallion, bull, and ram and absent in the boar. Glands of the ampullae empty into the ductus deferentia and contribute volume tothesemen.

b. VesicularGlands

The ***vesicular glands*** (formerly called seminal vesicles) are paired glands associated withthe genital fold. In most domestic species, each vesicular gland merges with the ipsilateralductus deferens, creating the short ***ejaculatory duct,*** which empties into the pelvic urethra. In the boar, the vesicular glands open into the urethra separately from the ductus deferentia. The vesicular glands of the stallion are hollow, pear-shaped sacs; those of the bull, ram, and boar are lobulated glands of considerable size.

c. ProstateGland

The ***prostate gland*** is an unpaired gland that more or less surrounds the pelvic urethra. In farm animals the prostate gland comprises various combinations of diffuse and compactparts extending along the pelvic urethra under cover of the urethral muscle. The multiple ducts of the prostate gland open in two parallel rows, one on each side of the lumen of the urethra. Theprostateproducesanalkalinesecretionthatgivessemenitscharacteristic odor. In older intact male animals, the prostate may become enlarged and interfere with urination.

d. Bulbourethral Glands

The ***bulbourethral*** (formerly Cowper's) ***glands*** are paired glands on either side of the pelvic urethra just cranial to the ischial arch but caudal to the otheraccessoryglands. Bulbourethral glands are especially large in the boar.

e. The **prepuce** is an invaginated fold of skin surrounding the free extremity of the penis. Theoutersurfaceisfairlytypicalskin,whiletheinnermucousmembraneconsistsofapreputiallaye r lining the prepuce and a penile layer covering the surface of the free extremity of the penis.

f. The Penis

Themaleorganofcopulation,the***penis***,maybedividedintothreegeneralareas:

- **Glans**,orfreeextremity
- Mainportion,or **body**and
- Two **crura**,or roots,

g. The Testes

Sperm need temperatures between 2 to 10 degrees Centigrade lower and then the body temperature to develop. This is the reason why the testes are located in a bag of skin called the**scrotal sacs** (or**scrotum**) that hangs below the body and where the evaporation of secretions from special glands can further reduce the temperature. In many animals (including humans) the testes descend into the scrotal sacs at birth but in some animals they

do not descend until sexual maturity and in others they only descend temporarily during the breeding season. A mature animal in which one or both testes have not descended is calleda **cryptorchid**and is usually infertile.

The problem of keeping sperm at a low enough temperature is even greater in birds thathave a higher body temperature than mammals. For this reason bird's sperm are usually produced at night when the body temperature is lower and the sperm themselves are more resistant to heat.

The testes consist of a mass of coiled tubes (the **seminiferous** or**sperm producing tubules**) in which the sperm are formed by meiosis (Fugure 3). Cells lying between the seminiferous

tubules produce the male sex hormone **testosterone**.

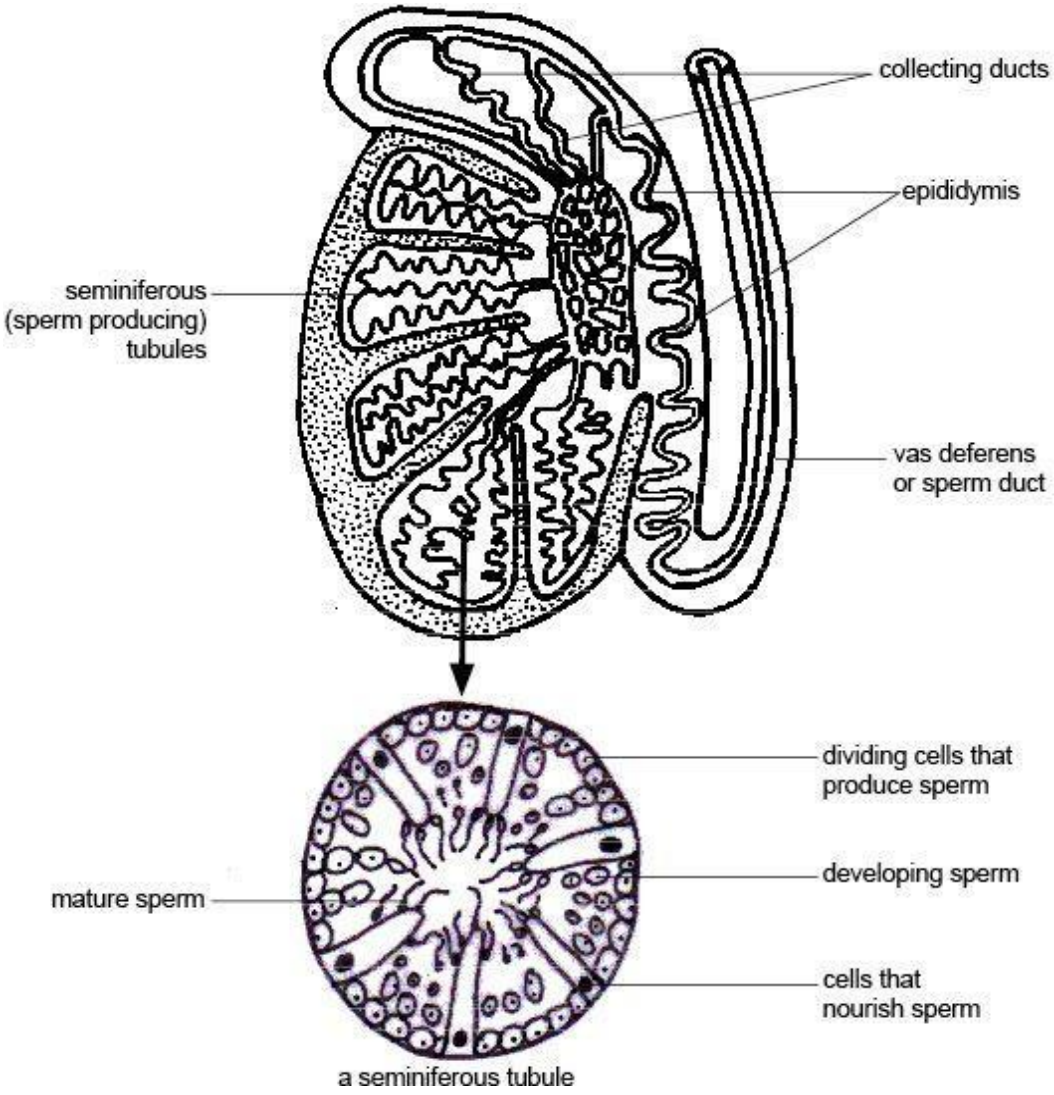


Figure1.4-ThetestisandamagnifiedseminiferoustubuleSemen

Semen consists of 10% sperm and 90% fluid and as sperm pass down the ducts from testis to penis, (accessory) glands add various secretion.

Penis for mand shape

Dogs, bears, seals, bats and rodents have a special bone in the penis which helps maintain the erection (see Figure 1 above). In some animals (e.g. the bull, ram and boar) the penishas an “S” shaped bend that allows it to fold up when not in use.

In many animals the shapeof the penis is adapted to match that of the vagina. For example, the boar has a corkscrew shaped penis, there is a pronounced twist in bulls’ and it is forked in marsupials like the opossum. Some have spines, warts or hooks on them to help keep them in the vagina and copulation may be extended to help retain the semen in the female system. Mating can last up to three hours in minks, and dogs may “knot” or “tie” during mating and cannot separate until the erection has subsided.

Sperm

Spermaremadeupofthreeparts:a ***head***consistingmainlyofthenucleus, a***midpiece***containing many mitochondria to provide the energy and a ***tail***that provides propulsion (see Figure 3).

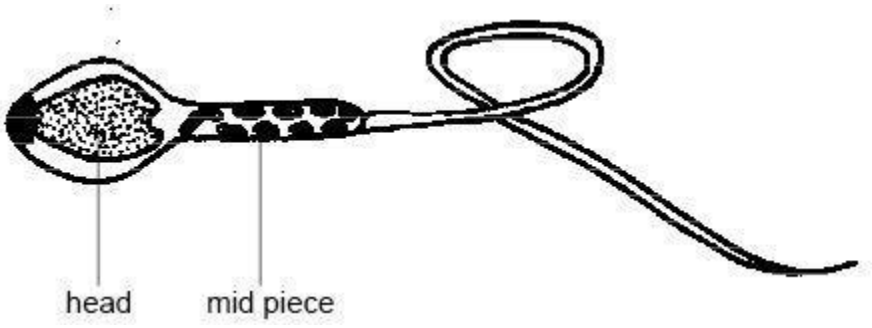


Figure1.5 Asperm cell

A single ejaculation may contain 2-3 hundred million sperm but even in normal semen as many as 10% of these sperm may be abnormal and infertile. Some may be dead whileothers are inactive or deformed with double, giant or small heads or tails that are coiled or absent altogether.

When there are too many abnormal sperm or when the sperm concentration is low, the semen may not be able to fertilize an egg and the animal is infertile. Make sure you don't confuse infertility with impotence, which is the inability to copulate successfully.

Sperm do not live forever. They have a definite life span that varies from species to species. They survive for between 20 days (guinea pig) to 60 days (bull) in the epididymis but once ejaculated into the female tract they only live from 12 to 48 hours. When semen is used for artificial insemination, storage under the right conditions can extend the life span of some species.

AccessoryGlands

Three different glands may be involved in producing the secretions in which sperm are suspended, although the number and type of glands varies from species to species.

a. **Seminal vesicles**are important in rats, bulls, boars and stallions but are absent in cats and dogs. When present they produce secretions that make up much of the volume of the semen, and transport and provide nutrients for the sperm.

b. **Prostate gland**isimportant indogsand humans. It producesanalkaline secretion that neutralizes the acidity of the male urethra and female vagina.

c. **Cowper's glands**(bulbourethral glands) have various functions in different species. The secretions may lubricate, flush out urine or form a gelatinous plugthat traps the semen in the female reproductive system after copulation and prevents other males of the same species fertilizing an already mated female. Cowper's glands are absent in bears and aquatic mammals.

1.2 Understanding and Diagnosis of Reproductive Diseases and Fertility Problems

Introduction

Most producers experience a herd problem with reproductive performance at some time. This may change in management. When reproductive efficiency declines, the dairy producer should work with the herd veterinarian, artificial insemination (Al) technician, feed company representative, county Extension agent and other resource people to troubleshoot the causes and determine solutions to the problem.

Several diseases which infect small ruminants result in abortion or reduced fertility and some may also infect humans (zoonotic diseases). Each of the diseases listed below will be briefly outlined. Those marked with an asterisk (*) may also cause human disease. Akabane Disease, Bluetongue Disease, Border Disease (Hairy Shaker), * Brucellosis, * Campylobacter (vibrio), * Enzootic (Chlamydial) Abortion, Flagellated bacterium (Flexispirarappini), * Leptospirosis, * Listeriosis * Q fever, * Rift Valley Fever, * Salmonellosis, Tick Borne Fever, * Toxoplasmosis, * Wesselsbron Disease.

Heat stress causes infertility in farm animals and represents a major source of economic loss. In response to heat stress, managers can attempt a variety of approaches to improve reproduction. These approaches usually involve modifying the environment (i.e., attempting to cool cows during reproduction), modifying the genetics of the animal (i.e., breeding to heat tolerant breeds) or intensifying reproductive management during periods of heat stress. Heat stress affects reproduction in all major farm species. Dairy cattle are particularly sensitive to heat stress because of the metabolic heat produced in lactating cows. Reproductive disease such as infertility and abortion can lead to major economic losses for beef cattle causes that lead to reproductivediseases.

1.2.1 Infectious reproductive diseases

Common bacterial reproductive diseases

- **Leptospirosis**
  - ✓ **Causative Agent**: All the pathogenic leptospires were formerly classified as members of the species *Leptospirainterrogans*, however the genus has recently been reorganized. The genus *Leptospira*consists of 20 species and includes nine pathogenic, five intermediate and six saprophytic species. The majority of pathogenic serovars are found in the three species with a global distribution – *L. interrogans*, *L. borgpetersenii*, and *L.kirschneri*.

  - ✓ **Disease Signs**: Acute leptospirosis should be suspected in the following cases: sudden onset of agalactia (in adult milking cattle and sheep); icterus and haemoglobinuria, especially in young animals; meningitis; and acute renal failure (in dogs). Chronic leptospirosis should be considered in the following cases: abortion, stillbirth, birth of weak offspring (may be premature); infertility; chronic renal failure (in dogs); and cases of periodic ophthalmia in horses. Two major chronic microbiological sequelae of leptospiral infection present particular diagnostic problems: the localisation and persistence of leptospires in the kidney and in the male and female genital tract. Chronically infected animals may remain carriers for years or life and serve as reservoirs of the infection for other animals andhumans.

  - ✓ **Spread of Agent**: Carried and spread in the urine by a wide variety of previously infected animals, from rodents to ruminants, swine, canines, etc. Spread especially via contaminated water. Cattle being run with sheep or goats should be evaluated as to their potential as a reservoir of infection.

  - ✓ **Diagnosis**: The demonstration of leptospires in blood and milk of animals showing clinical signs suggestive of acute leptospirosis is considered to be diagnostic. However, isolation from blood is not often successful because bacteraemia is transient and not always accompanied by clinical signs. Dogs are often treated with

antibiotics before samples are collected for testing for Leptospira,whichfurther decreases the likeil hood of identifying the agent in blood.The of identifying the agent inb lood.

The demonstration of generalized leptospiral infection in a range of organs taken at necropsy is also considered to be diagnostic. However, if the animal lives long enough or has been treated with antibiotics, it may be difficult to detect intact organisms systemically; immunohistochemistry can be particularly helpful in identifying residual leptospiral antigen in these cases. Demonstration of leptospires in the genital tract, kidneys, or urine only must be interpreted with full consideration of the clinical signs, and serological results as these findings may merely indicate that the animal was a carrier.

- ✓ **Treatment**: Antibiotics are effective but it may require an extended treatment time to cure the carrier state.
- ✓ **Prevention / Control:**
  - Avoid using leptospira contaminated water as a source of drinkingwater.
  - Isolation of animals ill or aborting fromLepto.
  - Vaccines are available for some serovars and are variablyeffective.

- **Listeriosis**
  - ✓ **Causative Agent:***Listeria monocytogenes*. Common in goats; sheep affected occasionally. man may be infectected
  - ✓ **Disease Signs**: Nervous disorder (clinical signs of circling disease), Abortion - decomposed fetus; necrosis of cotyledons and inter-cotyledon area; necrotic foci in liver and lung (0.5-1.0 mm). May have severe uterine infection after abortion. Abortions commonly occur during late pregnancy. Generalized infection (septicemia) - fever, digestive upset, or respiratoryinfection.
  - ✓ **Spread of Agent**: Spoiled silage - with soil and rodent contamination and poor ensiling (pH > 5.6).
  - ✓ **Diagnosis**: Culture of aborted fetus, affected brain (nervous form), or other tissues.
  - ✓ **Treatment**: Early and/or herd treatment with antibiotics may be indicated in an outbreak.
  - ✓ **Prevention / Control:**

- Large numbers of the infectious bacteria may be present in the feces, meat and milk of infected animals, as well as aborted fetus andtissues.
- Manure should be well composted before applying to vegetable crops and they should be well washed beforeuse.
- Cooking will protect against infection. Pregnant women and others with reduced immunity should avoid soft cheeses and raw or semi-cooked meats such as lunch meats, hot dogs, sausage,etc.
- Water may be contaminated but can be purified by boiling or chemicaltreatment

- **Brucellosis**

✓ **Causative Agent:**

- *Brucella melitensis*- infects goats and sheep; common in many countries; infects man. (The principal cause of humanbrucellosis.)
- *B. abortus*- infects primarily cattle but can infect sheep and goats; infectsman.
- *B. suis*- infects swine; can also infect cattle andman.
- *B. canis*- infects dogs; can infect man, but rarelydoes.
- B. ovis - infects sheep as a major cause of epididymitis in rams; no known effect inman.

✓ **Disease Signs**: Abortion in late gestation, retained placenta, perhaps some weak newborn animals,

✓ **Spread of Agent**: Oral ingestion of organisms from the fetus, placenta, uterine discharge, or contaminated feed and water, enters through conjunctiva, mucous membranes, wounds and intact skin. Unpasteurized milk can be a source.

✓ **Diagnosis:**

- Culture of organism from fetus, placenta,etc.
- Serological tests on animals which abort (or herd mates). Tests can also be conducted on milk orwhey.
- An intra-eyelid allergy test is available as a screening test that could be used in areas without laboratoryaccess.

✓ **Treatment**: No treatment will effectively eliminate the carrier state, in animals.

✓ **Prevention / Control**

- Many countries have control programs involving testing and slaughter of infected animals. Some countries have eradicated this disease via theseprograms.
- Vaccines are available and have been successfully used in control programs, until these programs enter the later stages of eradication. Strain 19 and RB51 (for *B. abortus*) have been used in the U.S. and the Rev 1 strain (for *B. melitensis*) is used in many other countries.
- Isolate abortinganimals.
- Clean up and burn the aborted fetus and placenta, contaminated bedding, manure,etc.
- Keep all aborted tissues and fluids away from dogs, birds,etc.
- Clean and disinfect floors, feedbunks, buildings, equipment,etc.
- Use serologic tests to identify infected animals and send toslaughter.
- Quarantine herd or area until further serological testing reveals no newcases.
- Buy all replacement animals from herds or flocks that have been certified free of brucellosis or have animals tested as serologically negative prior to bringing them into herds or flocks which are free ofbrucellosis.

- ***Campylobacter(vibriosis)***
  - ✓ **Causative Agent:** Primarily an abortion problem in sheep but can occasionally affect goats.
    - *Campylobacter fetus* subsp. *fetus* (primaryagent)
    - *C. jejuni*- common in the digestive tract of dogs; can also cause sheep abortion. This organism is a major cause of human gastroenteritis. It has been found in wild and domestic ruminants, swine, dogs, cats and fowl. Infection results from consumptionof

      contaminated water, food, raw milk and contact with feces of infected animals (especially young animals with diarrhea).

  - ✓ **Disease Signs:**
    - Abortions and stillbirths in late termpregnancy.
    - Fetus decomposed and 40% have orange-yellow, necrotic foci in liver (similar to those caused by FlagellatedBacterium).

- Inflamed placenta, necrotic cotyledons, leathery area betweencotyledons.

✓ **Spread of Agent:** Aborted fetus, tissues and all discharges, digestive tract is probably a long- term reservoir.

✓ **Diagnosis☹ laboratory)**

- Cultureorganism.
- Smear of uterus, placenta uterine discharge or fetalabomasum.
- Fluorescent Antibody (FA) test ontissues.
- Dark-field microscope to observeorganism.

✓ **Treatment**: Parenteral antibiotic if the aborting ewe becomes ill.

✓ **Prevention / Control:**

- Ovine vaccines are available but should be used prior to exposure. They may not protect for allstrains.
- Antibiotics can be fed prophylactically during pregnancy (tetracycline at 100mg/hd/day)
- Feed in mangers and water in troughs to avoid contamination of feed and water by thoseaborting.
- Remove aborting ewes, fetus, placenta, etc. from lambingarea.
- Parenteral injection of oxytetracycline (antibiotic) followed with repeated injections, will decrease the abortion loss. The long acting antibiotic products are preferred. Or, antibiotics (tetracycline or related product) can be fed at 400 mg/hd/day for 5 days and then followed with continued feeding of antibiotics (tetracycline at 200mg/hd/day).

- **Salmoneliosis**

✓ **Causative Agent:**

- *Salmonella abortus sp. Ovis, S. dublin and S.typhimurium*
- For other areas, an outbreak of salmonella is usually related to stress and/or poor sanitation. A variety of salmonella organisms have beenisolated.

✓ **Disease Signs**: The pregnant dam becomes ill, at any stage of gestation, runs a fever and then aborts.

- ✓ **Spread of Agent**: Salmonella occurs worldwide and may infect almost all types of animals, including rodents, birds and man. Some infected individuals become clinically normal carriers, who continue to shed the organism intermittently. It tends to localize in the gall bladder and is then shed in the feces during periods of stress.
- ✓ **Diagnosis**
  - The aborted fetus is partially decomposed with no specificlesions.
  - Culture of the fetus, placenta and uterinedischarge.

- ✓ **Treatment**: Administration of antibiotics may benefit ill animals but could be counter productive if used for the general population of animals, due to the development of antibiotic resistance by theorganism.
- ✓ **Prevention / Control**
  - Some producers are currently planning to establish salmonella free farms. But for most producers, this organism is so widespread as to make that impractical. It is very important to implement good sanitation practices and minimize stress to animals to control thisdisease.
  - Protect feed and water from fecalcontamination.
  - Clean up and dispose ofmanure.
  - Isolate aborting animals and clean up aborted products and thearea.
  - Isolate animals withdiarrhea.

II. Common viral reproductivediseases

- **Rift valley fever**
  - ✓ **Causative Agent**: Virus - infects sheep, goats, cattle and humans. Endemic on African continent (most of continent); especially the sub-Saharan area. Periodic outbreaks when high rainfall and a susceptible population.
  - ✓ **Disease Signs**: Fever, hepatitis, and death of newborn animals. Illness and abortion in pregnant females. Outbreaks are favored by high rainfall.
  - ✓ **Spread of Agent**: Arthropod vectors (gnats, mosquitoes), To man by direct contact or aerosol.
  - ✓ **Diagnosis:**

- Sudden outbreak of illness with fever, short course and high death rate ofnewborn.
- Affecting sheep, cattle and influenza-like disease in attending persons,simultaneously.
- Liver swollen, mottled andfriable.
- Serologicaltests

✓ **Treatment**: No specific treatment; just good nursing care

✓ **Prevention / Control:** Vaccines are available, Control of mosquitoes and gnats.

- **Bovine viral diarrhoea virus(pestivirus)**

✓ **Causative Agent**: Bovine viral diarrhoea virus (BVDV) is a pestivirus in the family Flaviviridae

✓ **Disease Signs**: Acute BVD occurs when previously unexposed antibody-negative cattle come into contact with Ncp BVDV. Following transient viraemia, cattle seroconvert over 34 weeks and remain antibody positive for up to three years. Many acute BVDV infections are subclinical, but some cattle become pyrexic, appear dull and have oral/nasal erosions that quickly heal (242). Transient diarrhoea and milk drop may be the only signs in lactating dairy cattle and most affected animals recover uneventfully. There have been isolated recorded outbreaks of acute BVDV-1infectioncausingfatalenteritisindairycows.Affectedcattleareleucopenicduringtheacute phase of disease, which may increase susceptibility to other infectious disease agents (e.g. Salmonella spp., infectious bovine rhinotracheitis [IBR], BRSV and coccidia) and cause more severe clinicaldisease.

✓ Clinical recovery follows acute BVDV infection in non pregnant cattle, with seroconversion and immunity for up to three years. However, more importantly, acute BVD in naeve pregnant cattle can cause various problems following transplacental infection of the fetus depending on the stage ofpregnancy.

✓ **Spread of Agent**: the virus is transmitted by direct contact between animals and transplacental to the fetus

✓ **Diagnosis:**

- Based on clinicalsign
- BVD microtiter virus isolation or BVDVELISA

- ✓ **Treatment**: there is no specific treatment
- ✓ **Prevention / Control:** Both killed (K) and modified-live virus (MLV) vaccines are available and both types of vaccine will confer acute disease protection

III. Common protozoal reproductivediseases

- **Trichomoniasis**
  - ✓ **Causative Agent**: Trichomonas foetus is a flagellate protozoan parasite transmitted venereally by natural service or by AI if semen is contaminated.
  - ✓ **Disease Signs**: A transient balanoposthitis may develop and then the male becomes an asymptomatic carrier. In females there are repeated returns to oestrus with or without a mucoflocculent vaginal discharge around one week after an infected service. Pyometra may develop in some cows. Abortion may occur at 24 months.
  - ✓ **Spread of Agent**: The organisms which cause the disease are found in the genital tracts of cattle with transmission occurring during mating. The disease can also be spread, to a lesser extent, by contaminated equipment used for calving or artificial insemination (AI), or if contaminated semen is used forAI.
  - ✓ **Diagnosis**: To confirm a diagnosis of trichomoniasis, specimens need to be collected from bulls, preferably after at least two weeks sexual rest, as this allows the number of organisms (if present) to build-up in the prepuce, thereby increasing the chance of detection. Cows that have been pregnancy-tested as empty, are known to have aborted, or have a uterine discharge, should also be sampled.Samples should be taken using a long pipette attached to a 20 ml syringe or another suction device.In bulls, the pipette should be inserted into the sheath and up beside the penis. The sample is then collected either by gently scraping or flushing with a quantity of saline while holding the prepuce closed. Suction is then applied to collect the sample.

In cows, a sample is taken from the vagina in a similar manner. The sample is then expressed immediately into a special culture medium which ensures that the organism will survive until it reaches the laboratory. Your veterinarian will need to order this medium in advance. Therefore, if trichomoniasis is suspected only after visiting your herd, a second

visit will be necessary once the kit has been obtained from the laboratory. Testing for both trichomoniasis and another reproductivediseasevibriosisisusuallydoneonthesamesample,collectedfromthebull's prepuce.

If only one test is carried out, there is about an 80– 90 per cent probability of detecting an infected herd. If the test is repeated at weekly intervals three times, detection rates increase to 99 per cent. For this reason, four negative tests are normally required before bulls can enter artificial breeding centers.

- ✓ **Treatment**

: Females will self-cure within a few months. Bulls need topical treatment with metronidazole, imetridazole or ipromidazole, otherwise they remain carriers; however, there is the risk of incomplete treatment if trichomonads have invaded the urinary tract. Ideally, infected bulls should be slaughtered. Disease is effectively controlled by correctly operated AI. Disease-free herds should be maintained using natural service through strict biosecurity and purchase of clean (virgin) replacements.

- ✓ **Prevention / Control:**

The best way to ensure that the disease is not introduced to your herd is to buy bulls from reputable studs, never from saleyards, and by ensuring that boundary fences are secure. When introducing stock, virgin heifers and bulls are the safest options. If there is any reason to suspect an increased risk of trichomoniasis, for example, intended purchase of bulls from northern Australia, testing prior to purchase isrecommended.

Controlling other reproductive diseases such as vibriosis (campylobacteriosis) and leptospirosis with appropriate vaccination programs will make trichomoniasis easier to detect. When introducing bulls to a property, it is good practice to buy them in advance of when they are needed, so that vaccinations have time to take effect prior to joining. Bulls should be quarantined on arrival, and given two doses of vibriosis and leptospirosis vaccine a month apart, prior to their use in the herd. Unless you can obtain assurance, preferably a vendor declaration that these vaccinations have been done, always complete a vaccination program yourself. Accurate breeding records, pregnancy testing, and a tight joining period, are essential in diagnosing a reproductive problem in yourherd.

- **Chlamydial reproductivediseases**
  - ✓ **Causative Agent**: Chlamydia psittaci (other strains cause poly-arthritis and eye lesions [keratitis]). May infect sheep, goats, cattle and humans. Widespread throughout the world.
  - ✓ **Disease Signs**: Late term abortion (during last month); stillbirths or weak newborn. Usually only abort once. Fetus is usually fresh. There is often an inflamed placenta with necrotic, red-brown cotyledons and a thickened intercotyledon area.
  - ✓ **Spread of Agent**: From aborted products (fetus, placenta, discharge), orally or inhalation to susceptible animals. If infected late in gestation, they will usually abort in the next pregnancy. If infected early in gestation, they would usually abort later on (late pregnancy). Ewe lambs can be infected at birth and would then abort during their firstpregnancy.
  - ✓ **Diagnosis:**
    - Make slide smears of vaginal discharge or placenta, stain with giemsa and observe under microscope for elementarybodies.
    - A fluorescent antibody and serological test are alsoused.
  - ✓ **Treatment**: Treat ewes / nannies in flock that have not lambed or aborted. Use a long-acting oxytetracycline injection followed by including in the feed, an oral tetracycline type product (at 400-500 mg/hd/day).
  - ✓ **Pevention / Control:**
    - Isolate all affected ewes and any surviving lambs, away from pregnantewes.
    - A vaccine has shown some benefit, when it is available. It must be given prior to breeding and requires two doses the firstyear.
    - First year abortion rate is often 20-30%, but usually only 5% afterthat.

IV. Common rickettsial reproductivediseases

- **Qfever**
  - ✓ **Causative Agent:Coxiellaburnetii(rickettsia)**

- ✓ **Disease Signs**: Can cause abortion in sheep (late term or delivery of weak lambs), goats, and cattle. Flu-like symptoms in man; usually self-limiting but can be fatal. An acute and chronic form of the disease.
- ✓ **Spread of Agent**: Sheep, goats, and cattle are common hosts, but many other species may be infected. Excreted in milk, urine, feces and with especially high numbers in the birth fluids and fetal membrane. Most of the human cases diagnosed have been related to animal research facilities located at medical institutions. These are usually related to aerosol transmission Pregnant cats have been identified as sources of human infection. Ticks can serve as a reservoir, and also spread the disease.
- ✓ **Diagnosis**: Serological tests, Histopathology
- ✓ **Treatment**: Prompt treatment with tetracycline will reduce the duration of acute illness. Treatment of animals is not effective in preventing shedding of the organism.
- ✓ **Prevention / Control:**
  - Burn or bury reproductive offal.
  - Infection in closely confined animals is almostuniversal.
  - The level in research flocks can be reduced by periodically testing their serum and culling anyinfected.

Tick bornef ever

- ✓ **Causative Agent**: A rickettsia (Ehrilichia (cytoecetes) phagocytophilia), transmitted by ticks. Occurs in sheep, cattle and goats.
- ✓ **Disease Signs**: Fever, stiffness and lameness. A high percent of those affected abort and some die.
- ✓ **Spread of Agent**: Bite of infected tick.
- ✓ **Diagnosis:**
  - Evidence of tick parasitism, fever, depression, and abortions. Lameness and gait appears similar tolouping-ill.
- ✓ **Treatment:**
  - Oxytetracycline at 11 mg/kg per day for several days, fordam.
  - Ethoxyethyglyoxaldithiosemicarbazone (early in course) depresses fever and parasitemia.

- ✓ **Prevention / Control:** Avoid heavy exposure of susceptible sheep to tick vector. Bring new sheep into area of the disease during periods of low tick activity, to allow them to acquire a natural immunity.

1.2.2 *Non infectious causes of reproductive failure*

- ***Male factor***

In the past, it was more difficult to assess individual male. However, artificial insemination has made this an easier factor to evaluate. If AI is involved you must consider the following:

- collection techniques;
- extension and semen evaluationtechniques;
- transport and storage techniques; and inseminationtechniques.

- **Femalefactors**

Age at first mating still plays a large role in poor reproductive performance. Animals bred too young (in case of pigs) have not had a chance to ovulate at their maximum rate, and this can result in low born alive data. They may also have poor performance in later parities, and often never catchup.

When evaluating feed in a herd, the two essential considerations are nutrient quality of the feed, and the volume of feed or feed intake for the farm. It has been my experience that most feed-related problems have to do with total feed intake in gestation and lactation rather than quality of the diet. This does not mean that one should not look at nutrient content as well as the mixing and delivery systems on the farm.

- **Management factors**

Management of the breeding herd is important. One must look at the quality of animal care and organization by employees. This is often very difficult to judge, since when employees are being observed they may be on their best behavior. It is important to meet with employees and make sure they understand the proper techniques in mating animals, and that they understand the physiology and normal biology of theanimal.

- **Environmental factors**

The animals' living conditions must be evaluated. Housing temperatures must be examined, particularly during the wintertime. Breeding and gestation environments should not be much below 65°F. This may be a problem, particularly for individually crated animals that can't lie together to maintain some body heat. In the summer, it is important to keep temperatures as comfortable as possible with cooling systems and increased air movement.

1.2.3 Identify Fertility Problems

Infectious and toxic causes ofinfertility

Leptospirosis, Trichomoniasis, Campylobacteriosis and BVD are common causes of infertility (all are mentioned in previous section), the rest are mentioned below:

- **Infectious Bovine Rhinotracheitis(IBR)**

This is the most frequently diagnosed viral cause of abortion. This virus causes respiratory disease and pink eye as well. IBR can cause failure to conceive, early embryonic death and abortionslaterinpregnancy,abortion"storms"whereseveralanimalsabortinashortperiodof time can also occur. There are many commercial vaccines available to help control IBR. These should be incorporated in to an over all herd healthprogram.

- ✓ **Diagnosis**

Serological tests: The virus neutralisation test and various enzyme-linked immunosorbent assays (ELISA; indirect or gB-blocking) are most widely used for antibody detection. With the

ELISAs, antibodies can be detected in serum or plasma, and with lower sensitivity in milk or bulk milk samples.

- ✓ **Prevention**:

Requirements for vaccines and diagnostic biologicals: Inactivated and attenuated live vaccines are available. The vaccines protect cattle clinically in case of infection and markedly reduce the subsequent shedding of field virus. Although vaccination may not prevent field virus infection of individual animals, spreading of wild-type virus in infected herds is efficiently reduced. The vaccines must not induce disease, abortion, or any local or systemic reaction, and must be geneticallystable.

- ✓ **Naplasmosis**
  - ✓ **Cause**: a protozoa called Anaplasma
  - ✓ **Transmission**: Anaplasmosis is spread primarily by ticks and bloodsucking insects, and by man through careless use of instruments. The infection is also infrequently passed from an infected cow to her unborn calf. Although colostrum ingestion and absorption is essential for new calves, colostral antibodies do not increase the natural resistance calves have against the disease.

  - ✓ **Diagnosis**: Three tests are routinely used to detect the presence of anaplasma antibodies in blood. They are the complement fixation (CF), fluorescent antibody (FA), and the rapid card agglutination (RCA) tests.

  - ✓ **Treatment**: Once an infection has been diagnosed, the most effective treatment is the administration of oxytetracycline. One intramuscular injection of 9 mg/lb. of body weight of long-acting oxytetracycline during acute infection will usually prevent death if the disease is not too far advanced.

  - ✓ **Prevention**: Presently there is only one commercially available vaccine against anaplasmosis. This is a killed product that will reduce death loss, but will not prevent the disease. Two injections given 4 to 6 weeks apart with annual boosters are recommended. In rare cases, new calves born to vaccinated dams may develop an anemic crisis and die.

  - ✓ **Nitratetoxicity**

Like plants, ruminant animals also use the nitrogen in nitrates to make protein. Conversion is made by bacteria in the rumen. Nitrite, one of the intermediate products in this conversion, is the cause of nitrate poisoning. Nitrate toxicity occurs when high nitrate levels in the feed overwhelmtheanimal'sdigestivesystemtotheextentthattherateofconversionofnitrateto nitrite is faster than the conversion of nitrite to ammonia (which is incorporated into amino acids and protein). When this happens, nitrite accumulates and is absorbed into the bloodstream.

There, it reacts with the oxygen-carrying hemoglobin, changing it into a form (methemoglobin) that cannot transport oxygen to the lungs and body tissues. The animal literally suffocates. Cattle are much more likely to be affected than sheep orhorses.

- ✓ **Clinical sign**:

Symptoms of nitrate poisoning appear suddenly. Dyspnea (difficult breathing) becomes progressively more severe until signs of marked respiratory distress—mouth breathing, violent respiratory movements, and extreme apprehension—are observed. A rapid and weak heart beat, below normal body temperature, muscular weakness, loss of muscular coordination (staggering gait and muscular tremors), blue coloration of mucous membranes, and marked dilation of pupils.

Subacute or chronic nitrate poisoning may result in reproductive problems, including abortions. Abortions due to nitrate are usually accompanied or preceded by some evidence of nitrate poisoning in the animals, including bluish discoloration of unpigmented areas of the skin or mucous membranes.

- ✓ **Treatment**:

If you suspect nitrate poisoning, call your veterinarian immediately. Since death comes from oxygen deficiency, cattle should be handled as little and as quietly as possible to minimize oxygen usage. Administration of a 2% solution of methylene blue by your veterinarian aids in the reconversion of methemoglobin to hemoglobin, increasing the oxygen carrying capacity of the blood and reversing the poisoning process. This treatment may need to be repeated since absorption of nitrate will continue from a full rumen. Mineral oil ormucilaginous substances may be given orally to protect irritated mucous membranes, help reduce the absorption of nitrates, and aid in their elimination.

1.3 Prevention and Control of Infertility Problems

1.3.1 Distingushing Signs of Infertiliy

Reproductive problems in dairy cattle are observed by the dairy farmer as **infertility** (problem cows that do not become pregnant), abortions and birth of still-born or deformed calves. Non-

visible reproductive problems such as increase in the calving to first heat interval and unapparent heat cycles are becoming a bigger problem in high producing and seasonal herds.

Infertility: Indicates a degree of reduced fertility, which results in failure to produce or delay in producing the annual live calf.

Infertility interfere with the move from one generation to the other.

Infertility has effect on efficient production of milk since pregnancy and parturition are necessary for the initiation and maintenance of lactation in the species.

Classification: -

Based on affected Parts infertility can be classified in: -

a) Anatomical disorders
b) Physiological (Functional) disturbance
c) Management disturbance
d) Reproductive diseases
e)

a. **Anatomical or Congenital disorders**

- Ovarian agenesis
- Ovarian hypoplasia
- Segmental aplasia of the Mullerian ducts
- Freemartin

b. **Functional disturbances**

- Anestrus
- Cystic ovarian disease (COD)
- Persistent corpus luteum
- Embryonic mortality
- Delayed Ovulation
- Infantilism
- Repeated Breeding
- Abortion
- Retained placenta
- Uterine infection in post-partum cows

- Heat stress and its effect on reproduction
- Heat stress
- Nutrition and reproduction disorder
- Infectious diseases
- irregular estrus :
  - ✓ Very short estrus<18 days.
  - ✓ Very long estrus >24 days.

c. **Management factors:**

- **Holding cow open too long**, low breeding efficiency.
- **Breeding too soon**. It is recommended that cows should not be bred until 60 days after calving. These 60 days are needed for the uterus to come to its normal condition.
- **Time to breed**
  - ✓ Incorrect time of insemination reduces fertility
  - ✓ The best time of insemination is 10 -11 hours after ovulation.
- **Poor nutrition**
  - ✓ Energy and protein intake
  - ✓ Vitamin deficiency such as A and D.
  - ✓ Mineral deficiency such as P.

Silent estrus - Animal has estrus but doesn't show signs

d. **Reproductive diseases of cattle associated to reproduction disorders.**

- Reproductive diseases are diseases that interfere with the reproductive function of male and female animals
- This interference is expressed in the form of reduced or total absence of fertility.
- It can affect individual animal or the herd, the entire population.
- In male animals, this reproductive disturbance can affect the sexual behavior and the ability to impregnate.

Reproductive diseases can be divided into **four** general classifications:

a. **True venereal** diseases transmitted by sexual contact;
b. **Infections** that specifically attack the reproductive system;

c. **Inflammatio**n of specific organs caused by various agents;

d. **Debilitating** disease that lowers efficiency of all the body systems.

- **Thecause of these reproductive diseases** are:
  - ✓ Nutritional mismanagement
  - ✓ Management in general
  - ✓ Genetically factors
  - ✓ Infectious diseases

- **Diseases spread by semen**

Semen has great potential for spreading infectious diseases

Semen can be infected from:-

- ✓ Testes
- ✓ Accessory sex organs
- ✓ Preputium
- ✓ Circulatory system
- ✓ Tissue fluids entering urogenital system
- ✓ Microorganisms in the atmosphere
- ✓ Teaser animal
- ✓ Unsterilized equipment

- **Themost important diseases spread by semen** are
  - ✓ Brucellosis
  - ✓ Vibrio –Comply- bacteria's
  - ✓ Trichomonas's
  - ✓ Tuberculosis
  - ✓ Leptospirosis
  - ✓ Para tuberculosis
  - ✓ Blue tongue
  - ✓ IBR / IPV
  - ✓ BVD
  - ✓ Enzootic bovine leucosis

1.3.2 Disease Control Measures

Control: is the reduction of the morbidity and mortality from diseases, and is a general term embracing all measures intended to interfere with the unrestrained occurrence of disease, whatever its cause.

Methods of Control

- **Quarantine** - It is the isolation of animals that are either infected or suspected of being or non-infected animals that are at risk. Quarantine is used to isolate animals when they are imported from countries where exotic diseases are endemic. In this case suspected animals are isolated until infection is either confirmed or discounted.
- **Creation of unfavourable environment:** this may be related to the livestock or the environment.
- **Disinfection-** it involves the destruction of pathogenic organisms on inanimate objects, usually by physical or chemical means. All disinfectants are effective against the vegetative forms of organisms but not necessarily against the spore form of the organisms.
- **Immunization** - It is the process by which antibody is produced or administered for the prevention or treatment of disease. Generally, there are two types of immunity.
    - ✓ **Natural immunity** - It is attributed to antibodies present or appearing without obvious external stimulus.
    - ✓ **Acquired immunity**- is that which an animal develops or receives at any time after birth.
- **Active immunization**-follow actual injection and also artificial stimulation with living or attenuated microorganisms, dead organisms or their components or products.
- **Passive immunization**- is the result of natural transfer of antibodies from the mother to the foetus or new born animal or the injection of antitoxins and other antiserum.

For Zoonotic diseases

- ✓ Appropriate treatment of cases
- ✓ Educate the public to:
    - Prevent fecal contamination of soil, water, human and animal foods
    - Cook beef and pork
    - Use latrines

- Avoid drinking untreated milk or eating products made from untreated milk
- Eliminate infected animals
- Use barrier precaution (gloves and clothing in the handling of carcasses and products of potentially infected animals)
- Keep dogs and cats at home and immunize them
- Destroy stray animals where rabies is endemic
- Bury carcasses of animals intact
- Vector control and elimination of reservoir host

✓ Education of workers to control dust by ventilating rooms of hazardous industries where wool and goat's hair is processed.

1.4 Providing advice to the beneficiaries

Taking good care of animal health does not only mean treating an animal when it is sick. It also means helping the animal to avoid becoming ill.

Disease prevention

General preventive measures are:

- Hygiene. Cleaning and disinfecting.
- Water. Always ensure free access to clean and fresh water.
- Good feed and regular feeding.
- Shelter for protection against bad weather (rain, wind and cold, or intensive sunshine).
- A peaceful environment (avoid unrest and stress).
- Quarantine.
- Vaccinations.
- Worm prevention: i.e. Tick control
- Disposal of a dead animal

1.5 Hazard identification and risk minimization

1.5.1 Identify and report OHS hazard

Hazard: A source of unwanted or excess energy with the capacity to cause damage, loss or injury.

Risk: The combination of the likelihood that a hazard will actually result in an accident and the consequences of that accident, often expressed as the product of the two.

OHS (occupational and health safety): The definition reads: "Occupational health safety should aim at the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations; the prevention amongst workers of departures from health caused by their working conditions; the protection of workers in their employment from risks resulting from factors adverse to health; the placing and maintenance of the worker in an occupational environment adapted to his physiological and psychological capabilities; and, to summarize, the adaptation of work to man and of each man to his job."

When the materials, tools, equipments prepared and used and handled they may cause OHS hazards and they may breakdown themselves. Most of the hazard caused by: Unwise uses, handle, load and unload of materials, tools, equipments and unsafe work environment etc.

Some of the OHS hazards associated with PG works are: Chemical and hazardous substances, Accidental hazard on the human body by cattle kick and solar radiation, Zoonotic diseases, dust, noise, air and soil born microorganisms, sharp hand tools and equipment, manual handling, holes, physical damage by aggressive animals, mud, slippery and uneven surfaces.

The main required tasks of an Occupational Health and Safety Practitioner include:

- Systematic evaluations of the working environment
- Endorsing preventative measures which eliminate reasons for illnesses in the work place
- Giving information in the subject of employees' health
- Giving information on occupational hygiene, ergonomics and also environmental and safety risks in the work place

1.5.2 Apply OHS safety policies and procedure to minimize risks

- Apply OHS requirements in accordance with regulations/codes of practice and enterprise safety policies and procedures. This may include:
    - ✓ using of relevant protective clothing and equipment,
    - ✓ use of tooling and equipment,
    - ✓ workplace environment and safety handling of material,
    - ✓ use of enterprise first aid,
    - ✓ Hazard control and hazardous materials and substances.
    - ✓ using gowns, rubber boots of appropriate size, goggles, respirators, cap, and gloves
    - ✓ following Occupational health and safety procedures designated for the task
    - ✓ Checking and fulfilling required safety devices before starting operation.
- **Apply safe operating procedures and OHS requirements regarding:**
    - ✓ Restraints safety,
    - ✓ Handling of PG and operation,
    - ✓ Handling of PG manual in the work place ,
    - ✓ Working in proximity to animals.
    - ✓ Apply emergency procedures **:**
    - ✓ emergency shutdown and stopping of equipment

Procedures: -Hazard policies and procedures, emergency policies and procedures, procedures for use of personal protective clothing and equipment, hazard identification and issue resolution procedures, job procedures and work instructions, reporting procedures, and the installation of workplace safety signage.

General occupational hazard safety precautions

- Understanding of the root causes of the specific occupational hazards such as, chemical hazards, Zoonotic Disease like brucellosis, rabies, bovine tuberculosis, toxoplasmosis ,RVF ,cysticerccosis ,hydatidosis and other work place hazards.

- Taking measures for each source of hazards, before or after they are occurring. These safety precautions include work place clothing's like over all, gloves, or nose covering cloth.

Self-check 1

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Test I: Choose the best answer (1 point)

1. **Except one**, all are the causes of anatomical or congenital disorders infertile of animals?

A.Ovarian agenesis

B.Ovarian hypoplasia

C.Segmental aplasia of the Mullerian ducts

D. Freemartin

E. All

2. Based on the affected part which one of the following is/ are not the classification of infertile in animals?

A. Anatomical disorder

B. Physiological (Functional) disturbance

C. Management disturbance and Reproductive diseases

D. None

3. Which one of the following are/is not management factor of animals infertility?

A. Holding cow open too long

B. Breeding too soon

C. Poor nutrition

D. Ovarian agenesis

4. Which one of the following is/are **not** the causes of reproductive diseases?

A. Nutritional mismanagement

B. Management in general

C. Time to breed

D. Infectious diseases

5. _____is the indication of reduced infertility or failure to produce or delay in producing the annual live calf.

A. Diseases B. Infertility B. Quarantine D. Zoonosis

Test 2: Short anwers(3pt each)

1. _____ An unplanned event that may or may not result in damage, loss or injury(2pt)
2. Define fertility, infertility and sterility(3pt)
3. Write-down at least four reproductive disease of dairy cattle with their symptoms, treatment and control method (4pt).
4. What are the main required tasks of an Occupational Health and Safety Practitioner? (2 pts.)

LG #18	LO #2- Perform Artificial Insemination Procedures

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

2.1. Phases and signs of oestrus cycle
2.2. Case history of the animal for service
2.3. Preparation for artificial insemination
2.4. Carryout estruses synchronization
2.5. Schedule for insemination process
2.6. Semen handling techniques
2.7. Preparing materials and equipment for insemination
2.8. Personal protective clothes and equipment
2.9. Selecting and thawing of semen
2.10. Keep breeding record and evaluate AI efficacy
2.11. Cleaning and waste disposal
2.12. Zoonotic diseases of reproductive organs

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Address detail case history of the animal came for the service form the owner.
- Understood the phases of estruses cycle.
- Detectt the main sign of oestrus/heat.
- Restrain and correctly assess animals intended for insemination for insemination according to the supervisor/ industry guide lines.
- Identify and Prepare animals in heat for insemination according to the industry guide lines.
- Carry out estruses synchronization as required, according to the industry code of conduct.

- Schedule Timing of insemination process to ensure availability of resource and personnel requirements.
- Prepared and use the required materials, tools and equipment according to the industry guidelines.
- Properly handle and periodically top-up collected semen during storage, distribution and at field levels according to the industry guidelines.
- Prepare the necessary materials and equipment for insemination according to industry code of practice.
- Use personal protective clothes and equipment according to the industry guidelines.
- Selected and thaw the semen according to accepted industry practices.
- Carry out insemination maintaining all the veterinary sanitation procedures.
- Record insemination and breeding data and evaluate AI efficiency according to the industry requirements.
- Clean and return materials and equipment to be reused to safe and appropriate place whereas other wastes are safely disposed.

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the information Sheets
4. Accomplish the Self-checks
5. Perform Operation Sheets
6. Do the “LAP test”

Information Sheet 2

Introduction to Artificial Insemination Techniques

Artificial insemination is the technique in which semen with living sperms is collected from the male and introduced into female reproductive tract at proper time with the help of instruments. This has been found to result in a normal offspring. In this process, the semen is inseminated into the female by placing a portion of it either in a collected or diluted form into the cervix or uterus by mechanical methods at the proper time and under most hygienic conditions. .

Artificial insemination is not merely a novel method of bringing about impregnation in females. Instead, it is a powerful tool mostly employed for livestock improvement. In artificial insemination the germplasm of the bulls of superior quality can be effectively utilized with the least regard for their location in far away places. By adoption of artificial insemination, there would be considerable reduction in both genital and non-genital diseases in the farm stock.
Artificial Insemination (AI) is an Assisted Reproductive Technology (ART) used worldwide to deposit stored semen directly into a cow or heifer's uterus. It is a tool for improving reproductive performance and genetic quality of livestock. This technique is frequently used in the dairy and beef cattle industries as a way to more rapidly improve desired characteristics through intensive genetic selection. AI has significant advantages, such as facilitating the use of superior quality sires (without the expense and risk of ownership) and greatly reducing the risk of introducing venereal diseases into the herd. It is important to emphasize that closely following the recommended protocol is essential for the process to be successful. The objective of this article is to offer tips for successful utilization of AI on your operation.

Defintions

- **Restraining:** is the technique of keeping animal under the control or within limit.
- **Occupational health & safety (OHS):** it aims at the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations.

- **Artificial insemination (AI**) is a reproductive technology by which semen is collected from male animal, processed, stored, and introduced in to the reproductive organ of female animal with an inseminating gun or instrument by skilled person..
- **Personal Protective Equipments:** -are those equipments that used to protect the body of workers from external hazardous matters or conditions during work activities in the workplace.
- **Heat period:** A time when the animal shows estrous signs or when shows the need to be served by bull or artificially.
- **Heat detection** is checking wither the female animal on heat or not
- **Estrus (heat) Period** is the time during which the female will accept the male for copulation or breeding
- **Estrus (heat)** is a fairly well-defined period that occurs in no pregnant cows once each 19 to 23 days (average 21 days).
- A good AI program requires a well trained and experienced inseminator, good herd management, suitable handling facilities and a well-trained herd man. Without this AI becomes impractical.

Advantages and Disadvantages OfAI

Advantages of AI

- Better genetic improvement
- Better breeding records
- No hidden expenses
- Spread of disease can be controlled
- Crossbreeding is easier
- More uniform calf crops
- Calving season can be narrowed
- Dangerous bull need not be kept on the farm and
- Organized breeding management and record services are provided.
- In swine AI is often used to decrease the cost of maintaining males at the production unit.

- In turkey's AI is used because mating cannot occur naturally.

Disadvantages of AI

- It requires well-trained operations and special equipment; Necessitates the knowledge of female reproductive tract
- It requires more time than the natural services.
- It necessitates the knowledge of structure and function of reproduction, on the part of the operator.
- It requires well-organized facility and close supervision of the actors of this sector.
- It is not yet fully practical to bring cows in "true heat" at will, heat detection requires more time and tedious
- It reduces market for the bulls while that for the superior germ plasm is increased.
- Selection of the sire should be very rigid in all respect.
- It may be subjected to certain disease if comprehensive and strictly controlled hygienic is not in place.

2.1 Phases and signs of oestrus cycle

Estrus is defined as the period where a female (in this case, a cow or heifer) is receptive to a male (or, the bull). Estrous, on the other hand, is the whole reproductive heat cycle that a female goes through, from heat period to no heat period (Proestrus, Estrus, Metestrus, and Diestrus).

Estrus is actually a result of the release in estrogen from a maturing follicle in the cow's ovaries prior to ovulation. Secretions from the reproductive tract act as lubricant for breeding and help sperm travel to the uterus.

Theestruscycle hasfourphases:

- **Proestrus**-Periodofthebuildingupwherefollicesincreaseinsize,vaginalwall thickens and uterine vascularity increase.

- **Estrus** -Period of heat and greatest receptivity to male, rupture of ovarian follicle in most farm animals.
- **Metestrus** - Formation of the corpus luteum, change in vaginal wall and uter
- **Diestrus** - Short period of inactivity before the next proestrus period during the breeding season of polyestrus.

Table 2.1 Sign of estrus in cattle, goat and sheep

Animals			
Sign of estrus	Cattle	Goat	sheep
	Standing when mounted	standing when ridden	The only way to tell if the ewe is in estrous is if she accepts the ram
	Nervousness	Nervousness	
	Swelling of the vulva	Swelling, red vulva	
	Frequent urination	Frequent urination	
	Mucus discharge from the vulva	Mucus discharge from the vulva	
	Trying to mount other animals	Ride other animals	
	Bellowing when isolated	Bleating ,Shaking the tail	

The only reliable sign of estrus are **standing to be mounted**

There are primary and secondary indicators of heat. The primary sign of heat occurs when

the female stands immobile and allows other animals to mount her. Each stand lasts only 4 to 6 seconds.Secondary indicators may signal that a cow is in heat, coming into heat or going out ofheat. These include:

- mounting other cows
- clear mucous discharge
- chin resting and rubbing
- swollen red vulva, frequent urination
- muddy flanks and ruffled tailhead
- bawling, restlessness, sniffing behavior
- decreased milk production and off feed

The decision to inseminate a cow should be based on standing heat, not on secondary signs of heat.

2.2 Case History of the Animal for Service

Identifying history of the animal

There are different record keeping in dairy farm such as feeding, health, milking, and breeding which is used to identify the animals from each other's. This can be done in many ways, from very simple to comprehensive. In case of large scale farms use advanced software programs, this help the dairy farmer to improve his/her profit by keeping proper farm data record using cow card (i.e. a card having history of individual animal in the farm) and it is an important tool. On this card you note down:

- Animal ID (ear tag number)
- Age
- Birth and current weight
- Calving date
- First heat
- All following heats
- the first insemination and the next ones
- Mark your control moments (pregnancy check, when in heat again)
- Special attentions (drop in milk production, lameness, mastitis, etc.)
- Look every day on each cow card
- Detect your control moments from the cow

So, this helps to provide adequate information for breeding and genetic improvement of thestock.

2.3 Preparation for Artificial Insemination

2.3.1 Preparing Animals for safe insemination

Visual heat detection

Female animal preparation for AI includes selection of animals for AI through heat detection, pregnancy diagnosis and general health status examination then followed by prevention of natural breeding.

Accurate heat detection is necessary to maintain a 12-month calving interval, where at least 90% of cows should show standing heat within 60 days after parturition (i.e. 60 days after calving).Successful heat detection involves looking for one or more of the following signs at least twice a day:

- Stand to be mounted by other cows
- Have a swollen vulva and clear mucus discharge on the tail
- Show unusual behavior such as holding milk, bellowing, frequent urination, aggressiveness, restlessness and licking and rubbing against other cows.
- Sniffing and being sniffed by others
- Tail paint applied as a strip going about 10 centimeters forward from the highest area of the tail. Cows being mounted have the paint strip rubbed or broken. This is a cheap method adopted by many farmers.
- Records of dates and services can be used to calculate the date of the next expected heat.

The AI technician must make sure that the cow is genuinely in estrus and that she is not pregnant. If he identifies as the cow is in heat he should prevent the cow from natural breeding and if there is any suspicion that the cow may be pregnant, the insemination should be done only half-way in to the cervix.

The cow should be in good health. Specifically, she should be free of any evidence of infection of the reproductive tract. Particular attention should be paid to cows that have had

abnormal calving (e.g. dystocia, retained placenta and uterine prolapsed), as they may require a longer period after calving for involution of the uterus and to return to normal fertility. The AI will be performed only when the technician decides as the cow is fit for artificial insemination.

2.3.2 Artificial Insemination Techniques

Artificial insemination is the technique that deposits semen in to cow`s reproductive organ with an inseminating rod or instrument. Artificial insemination requires semen to be collected from a bull, who is encouraged to mount a dummy cow or sometimes a teaser cow and his penis is manually directed in to an artificial vagina in which the semen is temporarily store before being transferred to a more permanent storage facility after the addition of a dilute, which contains egg yolk, water, sodium and potassium salts and antibiotics. The dilute prevents temperature shock, buffers the ph and increase sample volume about 100 times. Permanent storage is achieved in the frozen state in liquid nitrogen in a flask that can be transported from farm by the inseminators. When an inseminator visits a farm, he or she expects the recipient cow to be ready and restrained. Semen is then deposited in the uterine body using an insemination gun.

Procedures for Artificial insemination techniques

Follow the following procedures and inseminate the cow properly

a. Bring the cow which is on heat before 12 to 18 hours into the crush/service crate
b. Put on the protective outer garment, and boots
c. Take semen straw from nitrogen liquid container by forceps
d. Put the semen straw in thermo flask which contains 37^0c worm water for 15 up to 30 seconds
e. Remove the semen straw from thermo flask then remove water from semen straw by clean towel and insert the semen straw into inseminator gun
f. Cut non cotton part tip of semen straw then Cover the inseminator gun by AI sheath
g. Wear the full arm length glove on the left hands sprinkling on it little clean water and apply little soft soap.

h. Insert the gloved left hand in the rectal cavity of animal and remove the fecal matter /cow dung obstructing the forward hand movement
i. Feel the reproductive tract and mouth of the cervix with the left hand fingers and grasp it gently through the rectal wall
j. The inseminator gun which contain semen straw on the one end is inserted into the vagina mainly using right hand
k. Push the catheter into the cervix
l. Holding the tip of the catheter inside with left hand and pressing the syringe handle with the right thumb deposit the semen on uterus
m. Remove the inseminator gun from reproductive organ of female animal
n. Release the animals from restraining place
o. Clean and restore the re use material and dispose the other
p. Take the record about all information

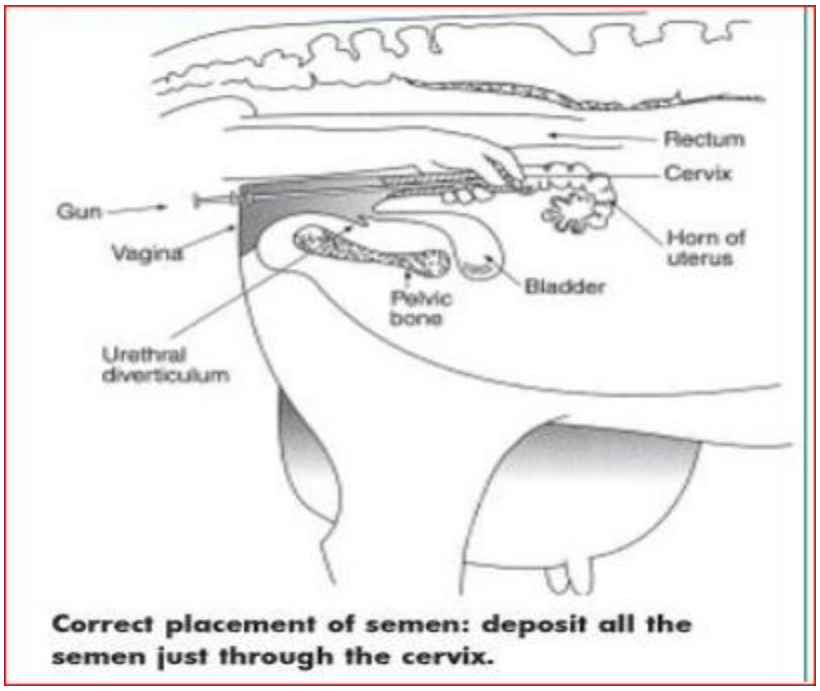


Figure 2.1 site for semen deposition

2.4 Carryout Estruses Synchronization

2.4.1 Understanding Estrus Synchronization of Cattle

Reproductive failure is a major source of economic loss in the beef industry. The majority of this loss occurs because cows do not become pregnant during a defined breeding season.

You can give cows an additional chance to become pregnant during a defined breeding season by using estrous synchronization. Synchronizing estrus is simply manipulating the bovine estrous cycle to cause the majority of cows to show standing estrus around the same time

Estrus Synchronization is the process of manipulating the estrus cycle that results in standing estrus (heat) in the majoriy of animals in a short time. It is an important reproductive management tool for dairy cattle production where the majority of animals are bred by artificial insemination.It permits the efficient use of AI and the embro technology

2.4.2 Estrus synchronization procedure

- Manipulation of the reproductive process and offers several benefits
- Reduces and in some cases eliminates the need to detect estrus and allows the
- herd manager to schedule breeding activities in a predetermined period lasting from 1 to 12 days.
- Artificial insemination (AI) activities are confined to a few intensive days
- Creates a more uniform calf crop.
- Enables more cows to be bred to a superior sire.
- Shortens the breeding and calving seasons.
- Cows not conceiving will return to estrus again beginning about 18 to 25 days after the synchronization period.
- The females will still be synchronized to a slight degree, which gives a second chance to artificially inseminate each female in the early part of the breeding season.
- Without synchronization, the herd manager is faced with a 21-day period of

continual estrus detection and only one opportunity for AI in most females.

- This is because only 5 to 7 percent of females will display estrus more than once during the first 21 days of breeding

For best results with estrus synchronization program and ensure optimum fertility and ranchers should:

- Provide adequate nutrition, because undernourished cows may not respond to treatment, much less conceive.
- Vaccinate before the breeding season to prevent reproductive diseases.
- Arrange for the services of experienced AI technicians.
- Acquire high-quality semen.

Estrus synchronization producers

Estrus synchronization programs use one or combination of three hormones:

I. Prostaglandins
II. Progesterone
III. GnRH

I. **Prostaglandins (PG**) are produced naturally in the animal's body and function, in part, to affect the estrous cycle. In cyclic females, estrus occurs within 2 to 6 days after they are given intramuscular injections of prostaglandin F2 alpha (Lutalyse®) or one of its analogues (ProstaMate®, Estrumate®, estroPLAN®, In-Synch®).

Remember: Anestrous females do not respond to prostaglandin injections. Estrous-cyclic females can respond to injections between days 7 and 16 of their cycles if they have a functional corpus luteum (CL).

The CL is a gland that develops in the ovary and secretes the hormone progesterone into the cow's blood. Estrous-cyclic females at days 0 to 6 and 17 to 21 of their cycles are without functional CLs and do not respond to injections. However, an estrous-cyclic female without a functional CL will respond to injections if they are given in a specific sequence.

II. **Progesterone** is a naturally occurring hormone that functions to maintain pregnancy. This hormone also "blocks" estrus and ovulation during the diestrus phase of the estrous cycle.

Two kinds of progesterone products are used to synchronize estrus:

A. controlled intra-vaginal release device (CIDR®), which is an insert that contains progesterone. A special applicator tool is required to insert the device. A string is attached for removal at the end of the treatment.

B. MGA® (melengestrol acetate), which is a progestin feed additive. It acts like progesterone in the body. Because both CIDR® and MGA® products "hold" animals out of estrus, their timed removal will synchronize estrus in responding females. When CIDR®s are used in combination with GnRH or prostaglandin, 20 to 40 percent of anestrous females may be induced into estru.

III. **GnRH, or gonadotropin-releasing hormone** (trade names Cystorelin®, Fertagyl®, Factrel® and OvaCyst®), is a naturally occurring hormone that causes the release of other hormones. One of these hormones affects follicle development on the ovary; another causes ovulation. Research indicates that when GnRH is given with prostaglandin to estrouscyclic and noncyclic females, the patterns of follicular development are altered, inducing ovulation. This treatment may induce estrus in 10 to 30 percent of anestrous females.

GnRH treatment not recommended for pre-pubertal heifers because these young heifers have not yet established fertile estrous cycles and have no consistent response to this hormone injection

Three synchronization protocols

The three protocols discussed below:

- ✓ Low-cost and high labor
- ✓ To medium-cost, medium-labor
- ✓ To higher cost, low labor and fixed-time AI.

The key is to select a protocol that fits your needs in regard to cost, labor, time, animal handling, experience and other factors.

I. One shot PG (12 days estrus detection required**)**

This is a low-cost, low-risk program. It requires more labor, but that also allows animals to be observed for cyclicity. Hence, the possibility of wasting semen on non-cycling animals is minimized.

- **Days 0 to 6**. No injections are given. Begin estrus detection and AI by the AM-PM rule (that is, females are inseminated 12 hours after the onset of estrus). Continue estrus detection and AI for 6 days.
- **Day 0** should coincide with the usual start of the breeding season.
- **Day 6**. Calculate the percentage of females inseminated in the first 6 days.
- If it is less than 15 percent, the number of estrous-cyclic females may not justify continuing the program.
- If it is more than 15 percent, inject all females not inseminated in the first 6 days with an intramuscular prostaglandin shot.
- The dosage will depend on the type of prostaglandin used. Read and follow the label or prescribed directions.
- **Days 6 to 12**. Continue estrus detection and AI (following the AM-PM rule).

II. **CIDR® - PG** (3 or 4 days estrus detection required)

- **Day 0**. Insert a CIDR device.
- **Day 6 (or 7).** Remove the CIDR and inject prostaglandin. (The label recommends day 6, but research suggests day 7 is acceptable.).
- **Day 7 (or 8).** Begin estrus detection and AI for 3 to 4 more days (AM-PM rule).

III. **Fixed-time AI (TAI) Co-Synch + CIDR®**(No estrus detection required)

- **Day 0**. Insert a CIDR® device. Inject GnRH.

- **Day 7**. Remove the CIDR® device and inject prostaglandin. If you are treating lactating cows in "marginal" body condition, a 48-hour calf removal may improve the response.
- **Day 9**. Inject GnRH and begin timed (or mass) AI at 54 ± 2 hours for heifers, 60 ± 6 hours for cows.

Other synchronization protocols

Many other synchronization protocols are also available.

Some use estrus detection, fixed time AI, or combinations of both early estrus detection and fixed-time AI (the latter being used when it may be desirable to improve AI conception in early estrus responders rather than waiting to do fixed time AI with the whole group).

Some protocols use an alternative progestin product called MGA®, a feed additive offered by feed mills that are permitted to mix medicated feeds. Although MGA® is used to prevent estrus in feedlot heifers, it can also be used to synchronize estrus in breeding females.

Inseminating a group of synchronized cattle:

Breeding a group of cattle during a short period of time following estrous synchronization may present problems for the herd manager and Al technician. Although artificial insemination of synchronized cows is the final step in a synchronization-breeding program, it is critical to the success of the entire program. It is important that special consideration be given to proper semen handling and insemination technique to ensure optimum conception rate.

- **Personnel**

Assign each person a job to move the breeding phase of this program along efficiently. One individual should be responsible for thawing semen and preparing the inseminating gun. This relieves the AI technician of additional tasks, allowing concentration on proper AI technique. Additional people could move cattle to and from the breeding chute. Everyone should be thoroughly instructed in their specific jobs prior to the breeding.

- **Physical facilities:**

Ensure an adequate holding area is available where heifers can be assembled for treatment, heat detection, and breeding. This area should have a breeding chute or similar arrangement where animals can be treated and artificially bred in a safe and efficient manner, If possible, the synchronized animals should be observed for heat following hormone treatment. This would require that the holding area be equipped with sufficient feed and watering facilities for approximately five days until all synchronized cows are bred. The breeding chute area should be covered to protect semen, supplies, records, and personnel from adverse weather.

Procedures:

a) **. Prepare a list of selected mattings** if numerous AI sires are to be used for breeding the synchronized cattle. This list could be used in selecting which unit of semen is to be thawed and inseminated for each particular cow. An inventory system describing the location of semen from each bull within the semen tank is also desirable.

b) **Follow thaw procedures** according to the recommendations of the AI organization supplying the semen. The thaw water must be maintained at the proper temperature for each dose of semen thawed. NOTE: recent research from Washington State has shown that 10 to 20 straws can be thawed simultaneously as long as the thaw bath water remains a constant 95ºF and the environmental temperature is not severely cold. Straws thawed in bulk should be agitated slightly to keep them from sticking together. Bulk thawing of semen should only be considered when a large group of synchronized cattle are to be inseminated.

c) **Do not prepare the insemination gun** too far in advance of insemination. Breed the cow as soon as possible after the semen is properly thawed and the inseminating equipment is assembled.

d) **Prepare insemination devices in a warm**, clean environment near the breeding chute, but far enough away to avoid excessive dust and debris near the cattle. This will minimize the chance of contaminating the equipment and semen.

e). Other considerations:

- **Handle animals gently** to avoid unnecessary excitement before, during, and after breeding. Undue excitement may adversely affect sperm transport within the female reproductive system causing a lower conception rate.

- **Breed animals based on standing heat**, remembering to breed the animals 10 to 12 hours after the beginning of standing behavior.
- **Use proper insemination techniques**. Sufficiently qualified inseminators should be on hand if many cows are to be bred over a short period. Consult your Al representative for advice and help in this regard. The success of a synchronization-breeding program depends on prior planning, teamwork, and attention to detail by everyone involved.

2.5 Schedule for insemination process

- **Proper Time of insemination**
  - ✓ When heat is observed at morning inseminates the cows at afternoon and when heat is observed at afternoon inseminate the cows on the next morning.
  - ✓ Because ovulation occurs 24-30 hours after the onset of heat, insemination should occur near the end of estrus. Isolate the cow in quite area away from the herd until heat is over

2.6 Semen handling technique

2.6.1 Introduction

Handling of semen, particularly the 0.25 ml straw, is critically important. Thawed semen needs to be protected from cold and heat shocks and an inseminated within 6 to 8 min of thawing. Uterine horn insemination give a modest improvement in conceptions rates (CRs) particularly in situations where CRs are low following uterine body inseminations.

Introduction The low and variable CRs following AI is a major cause of production inefficiency and involuntary culling rates in cattle herds and ultimately reduces profitability. For heifers, beef and moderate yielding dairy cows, it appears that fertilisation rate generally

lies between 90% and 100%. The objective of an insemination is to ensure that there is an adequate reservoir of competent, capacitated, motile sperm in the caudal region of the oviductal isthmus, the site of the main sperm reservoir in the cow, at the time ovulation to ensure the highest possible fertilisation rate. This is a prerequisite to achieving a high embryo survival and pregnancy rate. There are many 'cow' and 'semen' factors that affect fertilisation rate. Other factors that impact on fertilisation include inseminator competency, handling of semen, site of semen deposition, heterospermic insemination and timing of AI.

2.6.2 Processing of semen

Semen processing includes:

- Semen collection
- Semen evaluation
- Semen dilution
- Semen dilution
- Semen cooling
- Semen packing
- Semen freezing
- Quality control (evaluation after freezing)
- Semen storage

- **Semen evaluation**: it must be rapid and effective to reject poor quality semen. Minimum standard set to fertile bull sperm, over 500million sperm/ml, over 50% motile spermatozoa, more than 80% normal morphology.
  - ✓ *Appearance and volume:* should relatively opaque, uniform and creamy appearance and 2 to 10 ml.
  - ✓ *Motility and mass activity:* Minimum of 50% sperm move normal, you can check by degree of wave formation, and light microscope.
  - ✓ *Concentration*: measured by electronic photometer. Eg. Bull 5-6ml/ejaculation, average concentration of sperm 800- 1200million/ml these can serve about 300- 500 cows by means of AI.
  - ✓ *Morphology:* abnormal morphology do not affect fertility unless it exceeds 20%. E.g of abnormality (detached head, coiled or bent tails).

- **Semen extender/diluents** are used to increase livability in vitro (out of the body)**,** increase volume of semen, and provide protection. Commonly used extenders for frozen semen are:
  - ✓ Tris- glycerol diluents
  - ✓ Glycerol egg yolk- citrate
  - ✓ Milk glycerol
  - ✓ Commercial diluents
- **Semen conservation:** *freezing of semen*: semen is maintained at 34C before and after dilution.
  - ✓ Every insemination dose contain at least 15-40 million
  - ✓ Straw marked with bull ID and date of ejaculation
  - ✓ Semen is frozen in liquid nitrogen at (-196c).

The correct semen collection procedures involve scheduling males at optimum interval, sexual preparation and use of correct techniques. Well managed and properly fed bull can produce semen starting from age of one year. The best performing sire must be selected for semen collection and production. The bull can be selected based on different information. Bull can be selected based on general and special physical examination.

a. ***General physical examination of bull:*** This is based on general body condition, feeding condition sense organ etc.

b. ***Special physical examination:*** this focus on reproductive organ
   - ✓ The scrotum checked for size, symmetry, circumference, elasticity
   - ✓ Palpation of prepuce and penis for deformities and infection
   - ✓ Locomotor system and body condition hook, bowling leg, sickle etc
   - ✓ Serving behavior libido, erection, mounting and dismounting etc

The selected animal must be restrained in prepared chutes.

- **Preparing Semen processing machineries and equipment**

Semen collection materials must be cleaned and stored properly. The most important materials that used in semen collection include;

- ✓ Artificial vagina (AV)
- ✓ Electro ejaculator
- ✓ Conical centrifuge tubes with stoppers
- ✓ Thermos
- ✓ Pasteur, capillary and graduated plastic pipets
- ✓ Vortex mixer
- ✓ Microscope
- ✓ Microscope slides and coverslips
- ✓ Warmer tray
- ✓ Water bath
- ✓ Centrifuge
- ✓ Dead-Alive stain
- ✓ Sodium citrate solution (98.6 mm)
- ✓ Egg yolk extender (98.6 mm Na citrate; 20% egg yolk)
- ✓ Skim milk extender (98.6 mm Na citrate; 20% pre-heated skim milk)
- ✓ Spectrophotometer
- ✓ Frozen straws of bull semen
- ✓ 95oF water in container (thermos wide mouth

- **Semen Analysis (processing)**
  - ✓ Sperm concentration(quantity); 5ml/bull
  - ✓ Sperm quality; white jelly color
  - ✓ Sperm motility -.
  - ✓ Sperm morphology

- **Hemocytometers' :-**Can be used to count blood cells and spermatozoa. A hemacytometer has two chambers and each chamber has a microscopic grid etched on the glass surface

- **Semen storage**
  - ✓ After collected and extended, semen is put into a semen straw.
  - ✓ That straw is placed into a Liquid Nitrogen container.
  - ✓ Each container contains a Cane, which consists of the semen straws themselves.
  - ✓ Liquid Nitrogen has a temperature of -196°C.

Thawing

- Put the frozen semen straw in to 35°C-37°C water for 30 - 60 seconds.
- Pocket thaw
- Be very careful when removing

- Straw from Nitrogen container

- **Processing the Semen**
  - ✓ After the semen sample passes a thorough evaluation, it must be processed using an extender.
  - ✓ The extender dilutes the semen sample so it divided into several units for the fertilization of many eggs.
  - ✓ The extender also dilutes the waste products produced by the sperm so the sperm remains viable.
  - ✓ Extender also provides nourishment and protects the semen after it has been frozen
  - ✓ Common **extenders** added to semen include
    - Milk
    - Egg Yolk
    - Glycerine
    - Antibiotics
  - ✓ After the extender has been added to the semen, it is checked again for motility.
  - ✓ The semen is then placed into straws.
  - ✓ Each straw contains enough semen to artificially inseminate a female once (one-half cc).
- **Freezing the Semen**
  - ✓ Semen is frozen at a constant rate until it reaches a temperature of **(–196 c^o) –320 F^o.**
  - ✓ Semen is stored in liquid nitrogen tanks to preserve it

Inseminating :-Carefully inserting the syringe with semen in to the female reproductive organ end of cervix by using AI Gun

2.7 Preparing materials and equipment for insemination

AI Kit

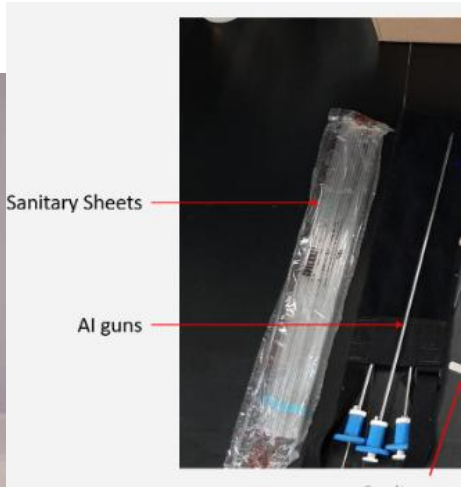
The basic insemination kit should contain a stainless-steel AI gun, straw cutter or scissors, tweezers, non-spermicidal lubricant, thermometer, and thaw unit (water bath or wide-mouth thaw thermos). In addition, disposable supplies like split plastic sheaths, sanitary covers, plastic palpation gloves, and paper towels (Figure 1). The AI kit must be stored in a dry, dust-free, clean place. It is important to clean the kit before and after performing AI.

Table 2.1 Equipments, tools and materials used for AI with their function

N	Name of AI materials	Function of materials
1	Liquid nitrogen container	Used to store semen for long time without lose its function
2	AI sheath	Used to cover Inseminator gun
3	Scissors	Allows to cut tip of non cotton part of semen straw
4	Insemination gun	Used to introduce semen into female reproductive organ
5	forceps	Used to pick up semen straw
6	Thermometer	To measure temperature
7	AI bag	To carry AI material
8	Thermo flask	To store worm water
9	semen straws	Used to hold semen inside
10	warm water	To Increase the motility of the semen
11	Soft soap , little water	For sprinkling on full hand glove
12	Goblet	To hold semen straw
13	Towel	To clean drop of water from semen straw after it removed from worm water
14	Boiler	Used to boil water







Thermo flask (thaw unit) Liquid nitrogen container with goblets







Thermo meter Scissor





Forceps Semen straw

Figure 2.2. selected AI eqipments and tools (Cortés-Beltránand Gonella-Diaza, 2021)

2.8 Personal Protective Clothes and Equipment (PPE)

2.8.1 Introduction to Personal Protective Equipment (PPE)

Personal protective equipment (**PPE**) :-PPE is used by workers in various work settings. Gloves, hard hats, safety glasses, ear plugs, aprons, laboratory coats, safety shoes, respirators, helmets, goggles, or other garment or equipment designed to protect the wearer's body from injury by blunt impacts, electrical hazards, heat, chemicals, and infection, for job-related occupational safety and health purposes. Items such as fire extinguishers, first aid kits are equipment to support the personal protection of the subject.

Appropriate personal protective equipment must be selected and checked before the materials and equipment's can use Based on the activities. When a hazard cannot be removed from the work place PPE must be considered.

NB. PPE does not eliminate hazards from the workplace but places a barrier between the worker and the hazard. If the PPE fails or is not used properly, the worker will be exposed.
In order to ensure that workers are provided with correct PPE, and that the PPE is used properly, the Occupational Safety and Health Administration (OSHA) has developed standards for certain types of PPE. The employer must provide to employees certain PPE when a workplace hazard assessment reveals the need for its use. Standards have been developed for hard hats, work shoes, gloves, eyewear, and respirators.

2.8.2 Types of Personal Protective Equipment

There is a large variety of PPE available. It can range from simple safety glasses to full body suits. The selection and proper use of PPE is vital to health and safety on the job. The following is a current list of PPE recommended

A. Duties related to PPE;

- Provide handlers with the PPE in pregnancy Diagnosis , and sure it is;
  - ✓ Clean and in operating condition
  - ✓ Worn and used correctly
  - ✓ Inspected before each day of use

- ✓ Repaired or replaced as needed

- Be sure respirator fit correctly
- Take steps to avoid heat illness.
- Provide handlers a Chemicals free area for
  - ✓ Storing personal clothing not in use
  - ✓ Putting in PPE at start of task
  - ✓ Taking off PPE at end of task
- Do not allow used PPE to be worn home or taking home Care of PPE
  - ✓ Store and wash used PPE separately from other clothing and laundry.
  - ✓ If PPE will be reused, clean it before each day of re use, according to the instruction from the PPE manufacture unless the pesticides labeling specifies other requirements. If there are no other instructions, wash in detergent and hot water.
  - ✓ Dry the clean PPE before storing
  - ✓ Store PPE away from other clothing and away from pesticides areas.
  - ✓ Replacing respirator purifying elements

Use appropriate PPE's as of the regulations and rules in the requirements.

PPE required for AI work

- Sun hat - to protect solar radiation
- Respirator - to prevent dust particle
- Full hand glove - used to cover full hand to prevent abrasive during inserting hand into rectal cavity
- Gaggles - protect eye from dust, chaff, and chemicals
- Boots - protect any hazards from leg
- Over all - it covers all body below the neck

2.9 Selecting and thawing of semen

The following general recommendations can be deduced in sement handlingamdthawing :

- Within the liquid nitrogen storage tank have the canisters containing the straws clearly labelled.

- Maintain an up-to-date inventory of semen straws, bull codes and their location within the liquid nitrogen tank.
- When locating straws keep the canister below the frost line and avoid lifting the canister for too long in the process.
- Remove the straw using a forceps, remove any excess liquid nitrogen and place in water at 35°C for 45 s (range 30 to 60 s).
- Thaw only sufficient straws that can be inseminated with 10 min (see later). If multiple straws are being thawed avoid direct straw-to-straw contact during the thawing process.
- Before loading the AI gun, pre-warm it, particularly if the environment is cold. This can be done by stroking it vigorously with clean paper towel, placing it close to your body for a few minutes in advance or using a purposen designed AI gun warmer unit.
- Remove the straw from the water bath, wipe dry, insert into the AI gun, cotton plug end first and cut the straw about 7 mm below the crimped end.
- Securely attach the AI sheath over the loaded gun.
- If there is a delay (>10 to 15 s) before insemination wrap the loaded gun in a towel to provide hygienic and thermal protection or place in a gun warmer.
- In very warm environments it is important that loaded AI guns are protected from solar radiation and elevation and temperatures above 35°C.
- Clean the vulva of the cow with paper towel before insemination

2.10 Keep breeding record and evaluate AI efficacy

2.10.1 Record Keeping of AI Work

Records are essential to AI as semen is from bulls. AI technicians expected to keep and report as he/she inseminate cow. AI records include service date, calving date, sex of calf, and occurrence of abortion, repeat breeding, IDNo of served female, sire number, and number of pregnant cow.

As a program grows, Modern data processing systems provide high processing power at moderate cost and may even be leased on a monthly or yearly basis. In the following a simple record system is presented; it is designed for hand operation.

The inseminator must fill in two documents for each insemination namely the insemination ticket in duplicate and the cow card.

- **The insemination ticket**

The inseminator must fill in an insemination ticket for everyinsemination. The insemination tickets are pre-numbered in duplicate:

- ✓ one copy is handed over to the farmer and serves as a receipt
- ✓ the other copy is handed in to the main centre; this is done at least once a week

- **The cow card**

The inseminator always carries a sufficient number of cow cards with him. For every new, not previously inseminated cow, a cow card is filled in; if necessary, the cow concerned is identified by ear notching, by the inseminator. The cow card remains with the cow and must be presented by the farmer to the inseminator.

The inseminator must check the cow card before inseminating the animal; ***because it gives the following information: -***

- ✓ is it a first or a repeat insemination?
- ✓ the length of the preceding sexual cycle (in case of a repeat insemination)
- ✓ the age of the cow
- ✓ the number of previous calving

Moreover, the cow card is the only means to identify the cow properly before insemination.

Remember: no insemination without prior identification!

Importance of Records

- ✓ to monitor yields and performance
- ✓ to plan a breeding program
- ✓ to monitor disease problems
- ✓ to identify farm management problems
- ✓

Records which should be kept on each female are:

- ✓ Date of first estrus and subsequent estrus dates
- ✓ Breeding dates with identification of service sire
- ✓ Results of final pregnancy check at 60 days
- ✓ Date to turn dry

- ✓ Actual parturition date
- ✓ Identification
- ✓ Sex and disposition offspring
- ✓ Parturition of abnormal occurrences such as dystocia
- ✓ Record all treatments

Artificial Insemination Database Application should be used for recording, managing and reporting information from the field and the laboratory. This is termed the Minimum Data-Set.

The MDS includes the following:

- ✓ Farmer, farm and address
- ✓ Identification of cow (number or name)
- ✓ Breed of cow and breed of its sire and dam
- ✓ Last calving date
- ✓ Whether milking information
- ✓ Date of AI
- ✓ Interval from heat to AI (hr)
- ✓ Time of AI (AM/PM)
- ✓ Site of semen deposition (uterus/cervix/vagina)
- ✓ Semen used (bull, breed and batch)
- ✓ Milk sampling dates
- ✓ Progesterone values in milk samples
- ✓ Date of PD and result
- ✓ Remarks

2.10.2 Evaluating AI efficacy

AI efficiency can evaluated by assessing

- None return rate
- number of services per conception
- pregnancy rate
- calving rate
- calving interval.

These parameters in turn may indicate the breeding efficiency of the animal, the efficiency and ability of the inseminator, and the fertility and quality of the semen.

I. INDIVIDUAL COW AI RECORD

Farmer: _____ *Farm:* _____
Address: _____
_____
Cow ID: _____ *Breed:* _____
Breed of Sire: _____ *Breed of Dam:* _____ *Milking only: Yes/No*
Birth Date: _____*Lactation No.:* _____ *Suckling: for letdown only/once per day/twice per day/*
Last Calving date: _____ *Remarks:* _____ *Ad libitum/other* _____

AI No	*Date*	*Heat to AI (hr)*	*AI Time (am/pm)*	*Site of AI (U/C/V*)*	*Bull & Breed*	*Semen Batch*	*Date of Milk Sample*			*Result of Milk Progesterone (nmol/l)*			*PD date & Result*	*Remarks*
							1	*2*	*3*	*1*	*2*	*3*		

*(*U=uterus=cervix=vagina)*

Name of Inseminator: _____*Signature:* _____*Date:* _____

Laboratory Interpretation and Recommendations:

Name: _____ *Signature:* _____ *Date:* _____

2.11 Cleaning and Waste Disposal

2.11.1 Maintain, clean, and dispose material tools and equipments

Cleaning is the removal of foreign **material** (e.g., soil, and organic **material**) from objects and is normally accomplished using water with detergents or enzymatic

Cleaning is the process of removing unwanted substances, such as dirt, infectious agents, and other impurities, from an object or environment. Cleaning occurs in many different contexts, and uses many different methods. Several occupations are devoted to cleaning.

Before and after doing artificial inseminationwork care must be taken for not to damage or break any materials, tools, and equipments.

But if it is happened, maintaining, cleaning and safe work site during activities should be undertaken.

The importance of clean, maintain and store tools and equipments

- To keep quality of the equipments and tools
- To save the work site environment
- It protect from chemical, accidental, body contact hazards
- It increases the duration of the materials, tools and equipments

Materials which return to store or disposing

Disposable materials :

- ✓ Ai glove
- ✓ Ai sheath
- ✓ Semen straw
- ✓ Paper based materials

Reusable materials should be clean and dry

Never dispose waste materials every where

2.11.2 Guide lines for cleaning tools and equipments

- Separateother materials
- Handle the contaminated with neoprene or rubber glove

- Wash the materials
- Handling them on a lineout side and housing them down with water(ppe)
- Be careful when disposing of rinse water. If it contains herbicides do not dispose of it on a garden or loan area.
- Do not mix the contaminated materials with others in a washing machine.
- Put only a few contaminated materials the same area at a time, grouping together those that are contaminated by the same chemical. And set the machines for full load.
- Use hot water
- dry materials

2.11.3 waste disposal

Waste may include Packing materials, plastic materials (gloves, sheath, and syringe) and chemicals and or reagents used. Removing and destroying or storing damaged, used or other unwanted domestic, agricultural or industrial products and substances is a mandatory. Disposal includes burning, burial at landfill sites or at sea and recycling.

2.12 Zoonotic Diseases of Reproductive Organs

2.12.1 Introduction

The word '**Zoonosis**' (Pleural: Zoonoses) was introduced by Rudolf Virchow in 1880 to include collectively the diseases shared in nature by man and animals. Later WHO in 1959 defined that Zoonoses are "those diseases and infections which are naturally transmitted between vertebrate animals and man". Zoonoses include only those infections where there is either a proof or a strong circumstantial evidence for transmission between animals and man.

This is a systematic review of the role of awareness and educational programmes in the prevention and control of zoonotic diseases. To address prevention and control of zoonotic diseases in the general public, there is need for implementation of effective interventions. The awareness creation should involve the use of various mass media like: television, radio, internet, video show, leaflet and booklet distribution, bill-board and sign post and should be

done to meet individual cultural group and social economic status. Combination of these two interventions by any organisation, any country or even at global level would be of great help to prevention and control for zoonotic diseases, reduce the global burden of zoonoses and also promote the health of the general public. There can be high effectiveness in public health measures towards zoonotic diseases prevention and control, if educational programmes and awareness are included as part of the structured programme, especially when delivered together.

Venereal disease- disease transmitted through sexual.

2.12.2. Relevant Zoonotics

A disease of animal that can be transmitted to humans.

Brucellosis

It is caused by bacteria of the genus Brucella and characterized by abortion, retained placenta, and to a lesser extent, orchitis and infection of the accessory sex glands in males. The disease is prevalent in most countries of the world. It primarily affects cattle, buffalo, bison, pigs, sheep, goats, dogs, elk, and occasionally horses. The disease in people, sometimes referred to as undulant fever, is a serious public health problem, especially when caused by B melitensis.

Spread to Man

- Man becomes infected when in direct contact with cows at abortion, calving or in the post calving period.
- Vets and stockhandlers are particularly at risk from the splashing of infected droplets into the eye.
- Infection occurs in people drinking unpasteurised milk or milk products.
- Symptoms include recurrent bouts of fever, headache, muscle and joint pains and general weakness. Brucellosis is often confused with malaria and influenza.

Prevention is by wearing of appropriate PPE (overall, hand gloves, eye goggles and face mask) while handling a case suspected with abortion in late gestation.

Q Fever

Q Fever was first identified in Queensland, Australia; hence its name. This is a bacterial disease and an important zoonosis. Q Fever is caused by an organism called Coxiellaburnetii.

It is found all over the world, in every country where it has been sought. Its main importance is its ability to infect man, and to cause abortions, metritis (inflammation of the lining of the uterus), and mastitis in infected ruminants.

Coxiellaburnetii is an extremely difficult organism to eliminate. It is very tough, resisting most disinfectants, heat and drying, and surviving for years in dust.

Mode of Spread

There are two different cycles:

- The bacterium cycles between small free-living ground mammals and ticks.
- The bacterium cycles in domestic ruminants (cattle, sheep, goats), independent of the wild animal cycle.

Ticks can act as reservoirs of the organism. Tick-free cycles in domestic ruminants allow the organism to be concentrated in the genital tract and udder, from where large numbers are shed in milk, faeces or urine, or, from the genital tract at lambing or calving. A wide variety of other animals and birds may also be affected and play a part in spreading Coxiellaburnetti. These include dogs and several species of birds. At-risk animals, and man, become infected by inhaling infected fluid discharges in the air or dust loaded with dried discharges.

The disease is highly infectious. Animal handlers are particularly at risk from infection, especially at lambing or calving, from inhalation, ingestion or direct contact with birth fluids or after birth. However the main route of most human infections is by inhalation of contaminated air droplets or dust originating in infected ruminants or other animals e.g. cats.

Spread can occur up to 10 kilometers from the source of infection by wind dispersal of dried reproductive products, such as afterbirth, genital discharges, etc from infected sheep, cattle and goats, depending on wind condition. Symptoms in man;

- ✓ Symptoms of Q fever in man can easily be mistaken for those of flu: fever, headache, chills, muscle pains, lack of appetite and nausea. The incubation period is about 2 to 3 weeks, and the disease lasts for 1-2 weeks.

- ✓ The infection of pregnant women can result in abortion or premature delivery. Control

Recovered animals remain infected and infective for many years and sometimes for life. It is therefore necessary to take the steps to limit the spread of infection by adopting hygienic precautions at the time of lambing, kidding and calving. In particular afterbirths should be destroyed.

Self-Check 2

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

Test I: Multiple choice (1 point)

A	**B**
1. Semen	a. for preserving semen
2. Water bath	b. for removing dry straw after thawing
3. Incisors	c. for stroring small amount of semen
4. Sheath	d. for measuring Temprature of water
5. Lubricants	e. for holding look warm water
6. Thermometer	f. for covering AI gun
7. Straw	g. for cutting tips of straw
8. Liquid nitrogen	h. male germplasm
9. Paper towels	i. for reliving pain during inserting hand
through rectum	

Test I: Short Answer Questions

1. Discuss on use of or advantage and disadvantage of AI (2 pts)
2. What is estrous synchronization? .Explain the procedures we have to follow?
3. List down at least three zoonotic diseases (3 pts)
4. What is temperature of water used for thawing semen? (4pts)
5. What is the use of thawing semen? (3pts)

Note: **Satisfactory rating – points 12 Unsatisfactory - below 12 points**
You can ask you teacher for the copy of the correct answers.

Operation Sheet 2

3.1 Preparing Animals for Artificial Insemination

A. Tools and equipments

- ✓ PPE
- ✓ Restraing material (Rope, crush etc)
- ✓ Lubricant
- ✓ Breeding records
- ✓ Liquid nitrogen container
- ✓ AI sheath
- ✓ Scissors
- ✓ Insemination gun
- ✓ Forceps
- ✓ Thermometer
- ✓ AI bag
- ✓ Thermo flask
- ✓ semen straws
- ✓ warm water
- ✓ Soft soap, little water
- ✓ Goblet
- ✓ Towel

B. Procedures for preparing animals

- Wear personal protective equipment
- Selecting and preparing diagnostic equipments
- Documentation
- safe restraining of animals
- Drafting dairy animals to be tested

C. Procedures to inseminate a cow based on maintaining all the veterinary sanitation procedures

- Bring the cow which is on heat before 12 to 18 hours into the crush/service crate
- Put on the protective outer garment, and boots
- Take semen straw from nitrogen liquid container by forceps
- Put the semen straw in thermo flask which contains 37^0c worm water for 15 up to 30 seconds

- Remove the semen straw from thermo flask then remove water from semen straw by clean towel and insert the semen straw into inseminator gun
- Cut non cotton part tip of semen straw then Cover the inseminator gun by AI sheath
- Wear the full arm length glove on the left hands sprinkling on it little clean water and apply little soft soap.
- Insert the gloved left hand in the rectal cavity of animal and remove the fecal matter /cow dung obstructing the forward hand movement
- Feel the reproductive tract and mouth of the cervix with the left hand fingers and grasp it gently through the rectal wall
- The inseminator gun which contain semen straw on the one end is inserted into the vagina mainly using right hand
- Push the catheter into the cervix
- Holding the tip of the catheter inside with left hand and pressing the syringe handle with the right thumb deposit the semen on uterus
- Remove the inseminator gun from reproductive organ of female animal
- Release the animals from restraining place
- Clean and restore the re use material and dispose the other
- Take the record about all information

LAP TEST 2

Name……. ID……..

Date…….

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within **1** hour. The project is expected from each student to do it.

Task-1 ConductArticial Insemination Techniques

LG #19	LO #3- perform Pregnanacy Test in Livestock

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

3.1 Physiology of reproductive hormones
3.2 Fertilization and embryo development
3.3 Methods of pregnancy test and gestation lengths
3.4 Materials and equipment for pregnancy diagnosis
3.5 Procedure for pregnancy test
3.6 Stage of pregnancy, growth postural and positional abnormalities
3.7 Differential diagnosis for pregnancy
3.8 Records keeping and reporting test result
3.9 Monitoring any injury after post-testing

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Develope basic understandings on the physiology of reproductive hormones in female animals.
- Explain fertilization and embryo development in animals.
- Mention gestation lengths in different species of animals.
- Mention methods of pregnancy test in animals.
- Identify and risks assess OHS hazards continually and implement suitable controls.
- Use PPE according to organization requirement.
- Complete preparation of relevant documentation according to organisation requirements and procedures.
- Prepare materials and equipment needed for pregnancy diagnosis.
- Mustered, yarded and safely restrain animals in line with organisational policy.

- Carried out pregnancy diagnoses following standard guidelines and procedures
- Identify the stage of pregnancy, growth postural and positional abnormalities of pregnancy following the recommended guide lines.
- onsider differential diagnosis for pregnancy diagnosis.
- Keep records and report test results according to organization requirements.
- Dispose debris and veterinary medicine containers from pregnancy testing operations in full consideration of environmental considerations and controls.
- carryout Regular monitoring of animals post testing to ensure that no evidence of physical damage or injury is evident

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the information Sheets
4. Accomplish the Self-checks
5. Perform Operation Sheets
6. Do the “LAP test”

Information Sheet **3**

3.1 Physiology of reproductive hormones

3.1.1 Physiology of female reproductive system

The principal functions of female reproductive system are:

1. Production of ova and
2. Production of sex hormone that maintains the development of genital tract and facilitates the successful implantation and development of the embryo in the uterus.

Development and maturation of ovarian follicle

Unlike the testes in which gametogenesis begins at puberty and continues throughout life, gametogenesis in the ovaries begins in uterus. From the second month of fetal life because of the presence of meiosis –stimulating factor in the females. However, the gametogenesis proceeds only up to the prophase of the first meiotic division. Therefore, at birth, all the germ cells in the ovaries are primary oocytes. The ovarian cycles are dependent on the secretion of gonadotrophins: LH and FSH from the anterior pituitary. The cycles are classified into two broad phases according to the specific changes in the oocyte, the adjacent connective tissue. The phases are known as: follicular phase and luteal phase.

Follicular phase

The follicular phase is concerned with the formation of a mature ovum, and terminates with the release of the ovum (ovulation). The stages of the follicular development are as follows:

i. Development of primary follicles:

they are developed from primordial (initial) follicles. A layer called follicular epithelium encloses the oocytes. The cells surrounding become organized into two layers: an inner layer known as theca interna and outer layer called theca externa.

ii. Development of secondary follicles:

At this stage the oocytes reaches its full size and is eccentrically located within a thickened area of zona granulesa.

Under the influence of LH, the theca interna cells differentiate and begin to synthesize and secrete oestrogens. The rising oestrogen levels inhibit FSH secretion from anterior pituitary. But promote LH release.

iii. Development of mature (Graafian) follicles:

Graafian folliclescontain mature ova and rupture at oestrus and release the ova into the oviduct.

Ovulation: the follicular phase end with the rupture of the mature follicle and release of the oocyte, the phenomenon is known as ovulation. Ovulation occurs late in estrus or shortly after its termination and is stimulated by LH.

There are five stages in the estrous cycle.

- **Proestrus:**The anterior pituitary gland (adenohypophysis) produces follicle stimulatinghormone (FSH) and some luteinizing hormone (LH), which cause development of the follicle. The follicle starts producing estrogen, which stimulates the buildup of the walls of the vagina and uterus to prepare for copulation and pregnancy.
- **Estrus:**This is the period of female receptivity. Ovulation usually occurs during the end of this period in spontaneous ovulators. FSH levels are decreasing and LH levels are increasing.
- **Metestrus:**In this post-ovulatory phase, the CL starts secreting progesterone, which prevents further development of other follicles. The CL also is responsible for maintaining the uterine lining to support the fetus during pregnancy.
- **Diestrus:**This is the short period of quiet in seasonally polyestrus animals. First the CL degenerates; then one or more follicles develop (depending on whether it is a litter bearing animal) and estrus repeats.
- **Anestrus:**The CL degenerates during this period of calm between breeding seasons.

Luteal phase

Formation of Corpus Luteum:

After ovulation follicular cavity contracts (collapses) and fills with blood, forming the corpus haemoragicum. The follicular cells lining the cavity proliferate and transform into luteal cells that form the corpus luteum. Then after, if fertilization doesn't occur, the "CL" decreases in the size and becomes white or pale brown structure known as corpus albicans. The process of regression of corpus luteum is known as luteolysis.

Corpus luteum begins to regress from 14-16 days after ovulation, if fertilization and implantation do not occur.

Corpus luteum during pregnancy

Progesterone production is necessary for the maintenance of pregnancy. Except in the mare, in which the placenta secretes progesterone, there is an obligatory requirement of corpus luteum. For continuous secretion of progesterone during pregnancy. The CL remains relatively constant until calving and it degenerates within a week postpartum in cow. It also become corpus albican and ends its function.

Hormones that are involved in the female reproductive system

A). Hormones from anterior pituitary glands:

- **Follicle stimulating hormone (FSH): -** it stimulates growth and maturation of ovarian follicles.
- **Luteinizing hormone (LH): -** stimulate rupture of matured follicle and formation of corpus luteum.
- **Prolactin(PRL): -** stimulate the breast to produce milk.

B). Hormones produced by posterior pituitary gland:

Oxytocin: - activates the milk letdown mechanism and also stimulates the uterine contraction in late pregnancy.

C). Hormones produced by uterus:

- **Prostaglandin $F_{2\alpha}$-** stimulates regression of corpus luteum and induces parturition.
- **Relaxin: -**it may be produced by placenta to make the cervix relax and open fully in the final stage of pregnancy.
- **Chorionic gonadotropin: -**is a hormone produced by the placenta and excreted in the urine of pregnant female. It is useful for early detection of pregnancy.

D). Hormones produced by the ovary:

- **Oestrogen: -** produced in ovarian follicles, small amount by adrenal gland placenta. Its main function is development of secondary sexual characteristics (development of teats, udder, vagina, etc.)
- **Progesterone: -** produced by corpus luteum. It stimulates preparation of the uterus for pregnancy. It also stimulates development of the udder and onset of lactation in association with oestrogen.

3.2 Embryonic Development during Early Pregnancy

Early pregnancy in domestic livestock encompasses the period of development of the embryo in the oviduct after fertilization of the oocyte(s) by sperm, formation of a blastocyst in the uterus, and elongation of the conceptus (embryo/fetus and associated extraembryonic membranes) after hatching of the blastocyst from the zona pellucida in the uterus. Conceptus elongation requires the uterus and is concomitant with pregnancy recognition signaling to maintain the corpus luteum (**CL**) and progesterone (**P4**) secretion as well as the onset of implantation for establishment of pregnancy.

Uterine receptivity for conceptus elongation and implantation develops in response to P4 and is modified in response to products from the conceptus such as prostaglandins (**PG**) and interferons (**IFN**).

Fertility can be defined as pregnancy rates to a single insemination. Based on that definition, fertility is high in sheep (85%) and pigs (90%), moderate in beef cattle (45%), and low in dairy cattle (35% or less in high-producing cattle) and humans (25%).

Consequently, infertility and subfertility are major problems in domestic livestock as well as in humans. The majority of embryonic mortality occurs after fertilization and during the first two to three weeks of pregnancy in cattle and month of pregnancy in pigs. Direct effects of embryonic mortality are reflected in reduced conception rates in cattle and reduced litter size in pigs and sheep. New management tools are needed in livestock to decrease embryonic mortality and pregnancy loss, thereby increasing overall herd fertility, reproductive and productive longevity, and sustainability of livestock enterprises.

Zygote to blastocyst

General aspects of conceptus development, from fertilization to the time of hatching from the zona pellucida, are relatively similar in all mammals. Following fertilization in the oviduct, the zygote, surrounded by the zona pellucida, starts to divide, forming blastomeres. Inherited proteins and RNAs from the oocyte and sperm initially control embryo development. After undergoing genome activation, the zygote develops into a morula embryo. During the process

of compaction, the outer cells of the morula adhere to each other and develop into the trophectoderm, whereas the inner cells gather at one pole of the embryo to form the inner cell mass resulting in a blastocyst. Blastocyst formation is generally initiated shortly after entry into the uterus, which occurs around 2 and 4 days after ovulation in the sow and cow or sheep, respectively. The blastocyst then hatches from the zona pellucida on days 8 to 9, thereby exposing the outer surface of trophectoderm of the conceptus directly to the uterine environment. All stages of zygote to blastocyst development can occur entirely in vitro after fertilization of oocytes with sperm; however, the success rate is less in vitro, and the quality of the resulting blastocyst is less than in vivo, suggesting a major influence of the environment of the ovarian follicle, oviduct, and uterus on early embryonic development.

Conceptus elongation, pregnancy recognition signaling, and implantation

Establishment of pregnancy in domestic ruminants (i.e., sheep, cattle, and goats) begins at the conceptus stage and includes pregnancy recognition signaling, implantation, and placentation. The hatched blastocyst slowly grows into a tubular or ovoid form and is then termed a conceptus. The hatched ungulate blastocyst does not invasively implant into the endometrium as in rodents and humans. Rather, it remains in the uterine lumen for an extended period of time, where it undergoes a phase of rapid trophectoderm growth and development, termed elongation. Elongation of the conceptus is initiated on days 11–12 in the pig, days 12–13 in sheep, and days 13–14 in cattle and is concomitant with pregnancy recognition and implantation.

Maternal recognition of pregnancy is the physiological process whereby the conceptus signals its presence to the maternal system and prolongs the lifespan of the ovarian CL. Pregnancy recognition signaling occurs on day 12 in pigs, days 13–14 in sheep, and days 16–17 in cattle. Conceptus elongation involves exponential increases in length and weight of the trophectoderm and onset of extraembryonic membrane differentiation, including gastrulation of the embryo for formation of the yolk sac and allantois that are vital for embryonic survival and formation of a functional placenta. Common stages of implantation include:

- hatching from zona pellucida;
- pre-contact and orientation of the blastocyst with uterine luminal epithelium (**LE**);
- apposition between conceptus trophectoderm and uterine LE; and

- adhesion of conceptus trophectoderm to uterine LE.

3.3 Methods of Pregnancy Test and Gestation Lengths

3.3.1 Introduction to Pregnancy Diagnosis

Pregnancy: - Pregnancy is the condition of a female animal while young are developing within her uterus. The interval, the ***gestation period,*** extends from ***fertilization*** of the ovum to the birth of the offspring. It includes fertilization, the union of the ovum and sperm; ***early embryonic development*** in the lumen of the female reproductive tract; ***implantation*** of the ***embryo*** in the uterine wall; ***placentation,*** the development of fetal membranes; and continued growth of the ***fetus.*** Normal gestation periods vary greatly from species to species

Methods of pregnancy diagnosis in the domestic animals can be classified into visual, clinical and laboratory methods. In most domestic animals clinical methods are currently used. Visual methods are far from perfect in domestic animals. In animals like cattle, buffaloes and mare's recto genital palpation and trans-rectal ultrasonography continue to be the methods of choice for an accurate and early pregnancy diagnosis. In sheep, goat, sow, bitch and cat ultrasonography is the only reliable method of pregnancy diagnosis. In the camel cocking of the tail is an effective visual method of pregnancy diagnosis and recto genital and ultrasonography are also useful. Laboratory methods used in past and developed in recent years are described.

3.3.2 Methods of pregnancy diagnosis

The methods of pregnancy diagnosis have been classified into two (direct and indirect) or three categories:-

i) Visual methods
ii) Clinical methods
iii) Laboratory tests.

- **Visual Methods**

✓ **Non return to estrus**

When an animal is mated and it does not return to estrus the owner usually thinks that the animal has become pregnant and hence has not returned to estrus. This happens because during pregnancy, the concept us inhibits the regression of the corpus luteum and thus, prevents the animal from returning to estrus. However, many a times the animal does not return to estrus because of non-regression of CL due to reasons other than pregnancy. Moreover, in the seasonally breeding species the animal may not return to estrus (when mating is done during the end of the breeding season) because the season was over.

An estrus and the rare occurrence of gestational estrus in cattle can affect the reliability of non-return to estrus as a method of pregnancy diagnosis. Moreover, difficulty in estrus detection and silent estrus render this method of pregnancy diagnosis un-suitable. In dairy cows non-return rates usually over estimate true pregnancy diagnosis and are also affected by the detection procedure used. Moreover, estrus expression appears to be reduced in intensity and duration in the present day dairy cows leading to lower estrus detection efficiency.

Therefore, the probability of misdiagnosis of pregnant females by estrus observation appears to be increased. This may be confounded by a small proportion of pregnant cows expressing estrus and some cows expressing prolonged inter-estrus intervals of around 24 days. Therefore, non-return to estrus is an unreliable procedure for pregnancy diagnosis in most domestic animal species.

✓ **Other changes (signs)**

Besides the non-return to estrus a few of other visual signs of pregnancy appearing in late pregnancy include:-

- Increase in the size of the abdomen
- Development of the udder specially in dairy heifers (4 months onwards)
- Slight vaginal discharge (from 4-5 months onward in dairy cows) and
- Movements of the fetus visible externally (especially in fed cows on the right side of abdomen 6 months onwards).

However, the accuracy of these visual diagnostic symptoms is always low and a clinician must use them as a supplement to clinical diagnosis.

A. Methods of Pregnancy Diagnosis:Cattle

- ✓ **Indirect method**
  - ✓ **Milk and Blood Progesterone Tests**
    - Measured in blood and (or) milk samples taken 21 to 24 days after a known breeding date.
    - Elevated progesterone concentrations > 1 ng/mL would be indicative of a cow with a CL and possibly pregnant; whereas, progesterone < 1 ng/mL is indicative of no CL present.
      - Milk test results are known within hours but blood test results can take days.
      - The test can lead to false positives due to prolonged luteal phases and retained CL. Therefore, it is not a commonly used management practice. The test is actually more effective in telling you an animal is open due to low progesterone (< 1 ng/mL).
  - ✓ **Pregnancy Specific Protein B (PSPB) Test**
    - Requires a blood sample taken 30 days after a known breeding date.
    - Elevated levels are indicative of an early pregnancy.
    - PSPB are produced by placenta.
    - Expensive and time consuming process that takes days to get results.
- **Direct method**
  - ✓ **Ultrasound**
    - Transrectal ultrasonography after day 25 of pregnancy. Results are known immediately.
    - Detection of amniotic vesicle, fluid, fetus, and fetal heartbeat.
    - Sex fetuses from approximately day 55 - 70 of pregnancy.



Figure 3.1. pregnancy detection using Ultra sound

- **Rectal Palpation**

  ✓ Palpation of pregnancy through the rectal/uterine walls. Results are known immediately

  ✓ Technician palpates for fetal membranes, amniotic vesicle, cotyledons and fetus.

  ✓ An experienced technician can determine pregnancy 35 to 40 days after insemination.

- **External Ballottement**

  - After the 7th month of gestation, pregnancy can be confirmed by external ballottement. The method involves vigorous ballottement of the ventral abdomen and flank with the clenched fist. The object is to push the fetus, which is floating in the fetal fluids, away from the body wall and then identify it as it swings back against the fist which is kept pressed against the abdominal wall.

B. Methods of Pregnancy Diagnosis: mares

- **Blood progesterone test**

  ✓ Performed 18 to 20 days after known breeding/ovulation dates.

  ✓ Known breeding dates, detect for presence or absence of corpus luteum (CL)

  ✓ Low progesterone (< 1 ng/mL): mare is not pregnant due to lack of CL

  ✓ High progesterone (> 1 ng/mL): mare could be pregnant but can lead to false positives due to pseudopregnancy, retained CL, prolonged luteal phase.

- **Blood test for equine chorionic gonadotropin (eCG)**

  ✓ Secretion of eCG by endometrial cups from day 40 to 100 of gestation.

  ✓ Commercial kits used to be available to test for eCG in blood and they are no longer used.

  ✓ Limited usefulness since it will not allow determination of pregnancy < 40 d post breeding.

- **Estrogen concentrations (blood or urine)**
  - ✓ Estrogens are high in middle/last trimester of pregnancy.
  - ✓ An enzyme-linked immunosorbent assay (ELISA) can be used to determine estrone sulfate concentrations in horses, which can be used to determine pregnancy status 70 days after breeding.
- **Ultrasound (See ultrasound handout)**
  - ✓ Transrectal ultrasonography after day 14 of pregnancy. Results known immediately.
  - ✓ Detection of amniotic vesicle, fluid, fetus, and fetal heartbeat.
  - ✓ Sex fetuses from approximately day 55 - 70 of pregnancy.
- **Rectal Palpation**
  - ✓ Palpation of pregnancy through the rectal and uterine walls. Results known immediately.
  - ✓ Technician palpates for changes in uterine tone, shape of uterus, and presence and size of the amniotic vesicle. Pregnancy can be determined 20 days after insemination.

3.3.3 Gestation Length

Table 3.1 Gestation Period in Different Species

Animal	Length of pregnancy
Cow	280 days
Buffalo	320 days
Sheep	150 days
Goat	150 days

Average length of gestation

Species	Length in Days	Avg. in Months*
Cattle	279-292	9
Goats	145-155	5
Sheep	144-151	5
Swine	112-115	3 mo. 3 wks. 3 days
Horse	330-342	11

3.4 Materials and Equipment for Pregnancy Diagnosis

The following materilas and equipments are used in pregnancy diagnosis

- Restaning (crush)

- Stethoscope
- Thermometer
- Vaginal speculum (optional)
- Gloves of different size
- Lubricant

3.5 Procedure for Pregnancy Test

3.5.1 Preparing materials and equipments

The most important materials that used for pregnancy diagnosis include:

- Stethoscope
- Thermometer
- Ultrasonography (optional)
- Vaginal speculum (optional)
- Progesterone assay kits
- Gloves of different size
- Disinfectants
- Lubricants

3.5.2 Preparing and restraining the animal

The animal to be examined should be properly restrained. Cows and buffaloes can be securely restrained in a Travis or chute. At many situations when this is not available the hind legs of cows are tied with a rope to avoid kicking and the head is held securely. The tail is held to one side by an assistant. Pressing on the back relaxes the pelvic structures and reduces peristalsis.

Position or examination at a later date. Palpators must take every care to avoid damage to themselves by the kick of the animal.

Mares can be easily made to enter a chute however; some nervous mares need different restraint procedures. It is often safe for the palpator to make the mare stand on one side of a small wall (3 ft) and the examiner stand on the other side of the wall. Stable wooden rails can sometimes serve the purpose. A good approach would be to tie both hind legs with one fore leg using rope.

A twitch on the lower lip, ear or nose and/or lifting one fore leg may be required. Nervous mares sometimes move sideways or try to jump resisting any examination. Such mares need tranquillization.

Female camels are examined in a sitting position with both hind, and forelegs tied together separately with ropes. An assistant holds the head tightly. Vicious females often require pressure on the back by legs of persons standing on both sides to prevent side wise movements.

The examiners must wear proper clothing including coveralls, gum boots and disposable plastic or rubber full arm sleeves. This is essential to protect the examiner from contracting zoonotic disease and spoiling his clothes. Separate trousers and shirts made of dark coloured (green or blue) slightly thick cloth are easier for working compared to a single cover all. Plastic long sized aprons are used by many clinicians in the field.

Sufficient lubrication must be used while introducing the hand in the rectum. Non-irritating soap and water or liquid paraffin is a suitable lubricant. Since, the feces of the mare are harder and the peristalsis stronger, more frequent lubrication is essential in the mare. Tail bandaging is also advantageous in the mare to avoid tail hairs enter the rectum and cause damage to the rectal wall.

Why is rectal palpation used to determine pregnancy status?

- The primary reasons rectal palpation is used to determine pregnancy status is because it is an inexpensive and highly accurate method of detecting pregnancy at most stages of gestation.
- The convenience of using ultrasound to detect pregnancy tends to decrease as cattle and horses enter their second trimester of pregnancy. As a result, it is easier and more practical to determine pregnancy using rectal palpation.
- Pregnancy status can be detected accurately with a lab test in a most large and small animal species. However, this process is expensive and time consuming. Therefore, it is more practical and takes less time to determine pregnancy status by rectal palpation.

Why do we want to determine pregnancy status in cattle?

- Allows for identification of pregnant females to retain in the breeding herd. In order for a cow to be a productive member of the cowherd, she must have a calf about every 365 days.
- Allows for identification of cows to be culled from the breeding herd including non-pregnant (**"open")** cows or cows that became pregnant very late in the breeding season.
  - ✓ **Open cows** are unproductive since they will not provide a calf during the next calving period and become an economic liability to maintain until the next breeding season.
  - ✓ Cows that become pregnant very late in the breeding season are less productive and have a difficulty having a calf every 365 days.
  - ✓ Culling practices such as these are common for beef, dairy, sheep, and swine producers but would not be a common practice in companion animals and horses.
- Allows producers to better assess of the reproductive performance of their operation. This would include when cows became pregnant during the breeding season, whether there are herd health problems based on the stages of pregnancy and (or) increased number of open animals, or there are sub-fertile bulls resulting in a high percentage of open cows after the end of the breeding season.

Why do we want to determine pregnancy status in horses?

- Allows for identification of pregnant or non-pregnant (open) mares early in breeding season.
- Knowledge of pregnancy status allows the brood mare manager to cease teasing of mares for breeding purposes, which allows for more efficient use of labor and resources during the breeding season.
- Provides additional information relative to the reproductive status of the mare based on findings of palpation (i.e., uterine or ovarian status).
- Allows for identification of twins early in gestation which allows manager to make the decision to eliminate one twin before gestation is too far along. Twins are not desirable in horses.
- Allows for monitoring of pregnancy during early gestation. If a mare is palpated open, she can be evaluated and rebred expeditiously.
- Allows for monitoring of pregnancy during mid and late gestation. This is important in mare's that are known to have had a history of maintaining a late term pregnancy.

3.5.3 Steps of Rectal Palpation in Cattle

- **Utilization of proper palpation equipment and restraining**
  - ✓ A protective sleeve (arm length glove) is put over the arm used for palpation.
  - ✓ It is important to use a non-irritating lubricant that is placed on the palpation sleeve, which assists the palpator in getting their arm into the rectum of the cow.
- **Visual assessment of the rear end of the cow.**
  - ✓ Make sure that she has two external outlets under the tail, otherwise you've been had!!
  - ✓ Check the cow's body condition. Extremely thin cows are usually open.
  - ✓ Look for signs of recent estrous activity.
  - ✓ Rubbed tail head or a scab.
  - ✓ Mud on the animal's sides and (or) rump.
  - ✓ Clear mucus discharge from the vulva.
- **Entry into the Rectum**
  - ✓ Entry into the rectum is accomplished by forming the fingers into a cone and gently but firmly inserting it into the anus.
  - ✓ The presence of the hand in the rectum stimulates the defecation reflex which manifests itself in peristalsis as well as tenesmus.
  - ✓ Examination must be discontinued during a peristaltic wave and a wave must never be allowed to pass over the hand.
  - ✓ Instead, the wrist should be brought back to the anus but it should not be removed.
  - ✓ Feces must be removed from the rectum for nearly the entire length of the arm without allowing air to enter. Aspiration of air into the rectum causes **"ballooning"** which absolutely prevents examination.
- **Determination of internal structures of the reproductive tract and pelvis**
  - ✓ **Cervix**: landmark structure that is palpated first as it leads to the uterus
    - Find cervix by sweeping the floor of the pelvis from side to side.
    - Caution, location of the cervix should not be used as a primary criterion for pregnancy.
  - ✓ **Uterine horns:** primary anatomical structure palpated to determine pregnancy status.
    - **Size:** uterine horns increase in size as gestation advances.

- **Location:** in relation to pelvic rim, advances in anterior direction (foreward).
- **Tone:** pregnant horns have a flaccid feeling to them.
- Within the uterus the presence of **fluid, embryo/fetus, and placentomes** are palpated for to assist in determining the pregnancy status of the animal.

✓ **Chorionic membrane:** Detected by grasping the uterine wall between thumb and forefinger and lifting slightly; called "slipping the membrane". CAUTION, this can terminate pregnancy if too much pressure is used and the chorion is damaged.

By mid-gestation, the placentomes are large enough to palpate

✓ **Ovaries**

- Presence of a corpus luteum (CL) which produces progesterone.
- Use the CL to determine the side of pregnancy up to 120 days.
- A smooth ovary with no significant structures (follicles, CL) is an indication that the female is probably anestrous or non-cycling; hence, she is probably not pregnant.
- **Uterine artery palpation** (During mid to late gestation pregnancy)
- Found on the right side near the forward edge of the pelvis. The artery is enlarged and when pressure is applied to it, it generates a **"BUZZ"** in the fingers of the palpator.
- Increased diameter allows for increased blood flow, which is coincides with an increase in the size of the placenta and fetus.

Summary of Recommendations Regarding Pregnancy Diagnosis in the Cow by Rectal Palpation

✓ Pregnancy determination should be the first step of the genital examination.

✓ No animal should be classified as non-pregnant unless the uterus has been retracted and both uterine horns are examined their entire length.

✓ No animal should be classified as pregnant unless at least one positive sign of pregnancy is recognized

✓ A few animals cannot be adequately examined by even the most experienced - admit this and re-examine at a later date.

✓ Do not treat for any reproductive disorder unless you are certain that the animal is non-pregnant.

The average length of gestation in the cow ranges between 270 to 290 days with an average of 284 days. To calculate due date, subtract 3 months from the breeding date, and add 14 days **(this is the same as adding 284 days).**

Example - Bred April 2, 1992 - Due 4-3 = 1, Jan 2 + 14 = Jan 16, 1993

3.5.4 Steps of Rectal Palpation: Horses

- **Physical restraining of mare**
  - ✓ Make sure that the mare is restrained to provide safety for mare and handlers
  - ✓ Prepare tail to keep tail hair out of the way of the palpation process
- **Palpate for anatomical land marks of reproductive tract**
  - ✓ Remove excess feces from rectum to allow for better palpation of reproductive tract
  - ✓ the rectum of the mare is much more sensitive than the cows. Therefore, care must be taken when palpating the mare.
  - ✓ Palpation of cervix, uterus, and ovaries
  - ✓ Location and size of uterus may provide early indication of pregnancy status

3.5.5 Rectal palpation in female camels

The corpus luteum formed on the camel ovary (ovulation is induced by mating) persists and is necessary for the entire gestation. The persistence of the CL is one of the earliest sign of pregnancy as otherwise; the luteal phase is very short. The CL is out of reach by day 90 of pregnancy. The left uterine horn is inherently longer than the right horn and this must be kept in mind when making pregnancy diagnosis in female camels.

- The earliest detection of uterine change (increase in diameter and appearance of fluctuation) is palpable at about 40-15 days.
- Between 60-70 days, the left uterine horn is increased about twice to its non gravid size, has a thin wall and fluctuates
- The uterus becomes cranial and ventral after the third month of pregnancy.
- The cervix is pulled forward and lies just at the pelvic brim by 4 months.
- At 5 months of pregnancy, the uterus is completely in an abdominal position with a small degree of fluctuation but the fetus is not always palpable.

- The fetus becomes palpable again beyond the 6th month of pregnancy, first with ballottement, and then, the head and legs become easily palpable by the 7-8 months as the fetus starts its ascent.
- By the 9th month, movement can be observed by inspection of the right flank of the animal.
- At around 11 months the fetal legs can be easily found in the pelvic cavity.

The precise estimation of the stage of pregnancy beyond 3 months, because of the absence of cotyledons and difficulty in reaching the fetus in this species is difficult. The fetal membrane slip is not seen in camels because of a diffuse placenta.

3.5.6 Pregnancy Diagnosis in the Ewe and Doe

- Marker ram - will mount and mark only non-pregnant ewes
- Progesterone levels - high levels indicate pregnancy, 18 days - ewe, 21 days - doe.
- Intra-rectal Doppler - detects fetal pulse with an accuracy of about 97% beginning as early as 20 to 25 days after service.
- Real-time ultrasound - most accurate during late gestation, but good results after 28 days.
- Rectal abdominal palpation **(Hulet's method)** useful at 60 to 115 days of gestation, 97% accuracy after 60 days. Not recommended for does.
  - ✓ fast overnight
  - ✓ restrain ewe on back
  - ✓ lubricated plastic rod 21", 5/8" diameter is inserted into rectum
  - ✓ palpate fetus between hand and rod
- Radiography - accurate after 60 days for does, 50 to 80 days for ewes.
- Anterior vaginal biopsy - over 40 days; pregnant ewes have cuboidal epithelium
- Midventral laparotomy

3.5.7 Pregnancy Diagnosis in sows

- Estrus detection - failure to return to heat after being bred
- Ultrasound - ultrasonic amplitude-depth **(echo)** analysis (**A-Mode)** permits rapid accurate **(>95%)** detection of pregnancy between 30 and 90 days of gestation.

- Vaginal biopsy - histological evaluation of the cranial vaginal epithelium. The best time to test is between 18 to 25 days of service.
- Plasma progesterone levels 17 to 24 days after mating
- Plasma estrone sulphate 25 to 30 days after service
- Rectal palpation of the cervix, uterus and uterine arteries beginning about day 21 after mating. This is only possible in very large sows.
- Real-time ultrasound **(B-Mode**) scanning is highly accurate **(99-100%**) from about 22 days of gestation.

3.6 Stagesof Pregnancy

3.6.1 Developmental Stages

There are three main periods of development in a young calf's life. The period of the ovum is that time from fertilization until the egg has divided enough times to take on a particular form. This occurs on about the thirtieth day, when there is an enfolding of the layers of the developing egg. At this stage, the newly developing animal is called an embryo.

The period of the embryo lasts until the fetal membranes begin to attach to the lining of the uterus, approximately 38 days. During the embryonic stage, various organs and systems are laid down. These include:-

- The respiratory system
- Nervous system
- Digestive system
- Circulatory system and
- Reproductive system.

The embryo, as it develops, floats freely in the uterine cavity, bathed by a secretion called uterine milk.

When the embryo is about 38 days old, the fetus period begins. This term is used until the newborn is expelled at parturition (birth). During the fetus stage, continued attachment takes place at the numerous caruncles lining the uterus. These attachments provide transfer of nutrients and waste materials for the developing fetus. Birth occurs about 280 days after fertilization.

You may need to stage pregnancy if records are not kept or a bull runs with the herd. You may need to confirm AI dates, or an AI date may not match what you feel. You may be asked to estimate parturition dates for beef herds.

3.6.2 Estimating stages of pregnancy by rectal palpation (in cow)

- **30 to 45 days**
  - ✓ Cervix & uterus are usually in the pelvic canal.
  - ✓ One horn is slightly enlarged and fluid-filled. CL is on the same side as gravid horn.
  - ✓ Membrane slip technique used to detect pregnancy. **Proceed with caution because damage to membrane can cause pregnancy to be terminated.**

- **45 to 60 days** (60 days is A in figure)
  - ✓ Cervix is typically in the pelvic cavity.
  - ✓ Pregnant uterine horn begins to fill with fluid with little fluid in non-pregnant horn.
  - ✓ **Amniotic cavity is about the size of a hen egg.**
  - ✓ Use membrane slip technique. Caution: too much pressure can damage membranes
- **60 to 90 days** (90 days is B in figure)
  - ✓ Cervix moves in anterior position; torsion evident when you attempt to pick up the tract.
  - ✓ Pregnant horn is at the anterior part of pelvic brim and may start to fall over the rim.
  - ✓ **Amniotic cavity is about the size of a grapefruit & fetus about size of a small rat.**
  - ✓ Difficult to move hand completely around the pregnant uterus.
  - ✓ This stage of gestation is the earliest stage that most individuals like to start to palpate pregnancy with a high degree of accuracy.
- **90 to 120 days** (120 days is C in figure)
  - ✓ Cervix is at the pelvic brim.
  - ✓ Uterine body enlarged and fluid-filled about the size of a football. Uterus usually dropped over the pelvic brim.

- ✓ **Fetus is the size of a small cat.**
- ✓ **Start to feel the placentomes.**

- **120 to 150 days** (150 days is D in figure)
  - ✓ Cervix is almost completely over the pelvic brim.
  - ✓ Uterine body and horns are not easily palpated.
  - ✓ **Placentomes about the size of quarters or larger.**
  - ✓ **Fetus is the size of a large cat.**
- **150 to 180 days**
  - ✓ Cervix is well over the pelvic brim.
  - ✓ Entire uterus is stretched and fluid-filled and well down into the body cavity.
  - ✓ Very hard to palpate fetus if you have short arms.
  - ✓ **Placentomes are about the size of a fifty-cent piece.**
  - ✓ There is a nice buzz to the uterine artery.
- **180 to 210 days** (150 days is E in figure)
  - ✓ Pregnancy easy to detect. Fetal head is at or near pelvic cavity and can be palpated.
  - ✓ **Fetus about the size of a beagle dog.**
  - ✓ **Placentomes are about the size of a silver dollar.**
  - ✓ There is a very strong buzz to the uterine artery.
- **210 days to term**
  - ✓ Pregnancy is easy to detect.
  - ✓ Fetal calf quite often located in pelvic cavity and its head is easy to feel.
  - ✓ Very strong buzz to the uterine artery when digital pressure is applied to it.
  - ✓ **Bounce fetus like a basketball.**

3.6.3 Pregnancy stages in mares

- **Day 16**
  - ✓ increased uterine tone with firm and tubular uterus
  - ✓ Cervix becomes long, firm and rope-like
- **Day 20**
  - ✓ Palpation of embryonic vesicle (30 to 40 mm diameter)

- ✓ Central bulge in uterus, typically located at base of horn

- **Day 28**
  - ✓ Embryonic vesicle size of egg
- **Day 35**
  - ✓ Embryonic vesicle size of lemon
- **Day 42**
  - ✓ Embryonic vesicle size of orange
- **Day 49**
  - ✓ Embryonic vesicle size of grapefruit
  - ✓ Uterine horns start to loose their tubular tone
- **Day 56**
  - ✓ Embryonic vesicle size of cantaloupe
  - ✓ Conceptus starts to occupy nearly the entire uterine horn and ½ uterine body
- **Day 60 -100**
  - ✓ Uterus increases in size and starts to be drawn over pelvic brim and into abdomen
  - ✓ Day 60 conceptus: 12 – 15cm long
  - ✓ Day 85 the fetus becomes palpable
- **Day 120 – 150**
  - ✓ Fetus is readily palpated
- **Day 150 – 210**
  - ✓ Difficult to palpate fetus because it is deep in abdominal cavity.

3.6.4 Growth posture and position abnormality

Reproduction abnormalities

There are various diseases and abnormalities that affect the reproductive system of domestic animals. These diseases commonly result in early embryonic deaths, abortions, mummification and infertility.

A. Embryonic Death, Abortion and Abnormal Fetal Development in Cattle

Pregnancy may be terminated prematurely, resulting in abortion due to death of the conceptus or failure of the uterine environment to support the fetus. Abnormal fetal development may result in abortion or in a calf that dies soon after birth. Many cases of bovine abortion are not diagnosed.

Etiology

- Viruses, bacteria (including rickettsia and chlamydiae), molds, protozoa, or other infectious agents may attack the placenta or the fetus, or both. Some of these microorganisms reach the uterus hematogenously; others (such as venereal infections) are contracted during mating.

- Infectious abortion may be sporadic or a herd problem. Herd problems usually are associated with significant losses and may be caused by infectious bovine rhinotracheitis, bovine viral diarrhea, brucellosis, leptospirosis (various serotypes), campylobacteriosis, trichomoniasis, anaplasmosis, ureaplasmas, mycoplasmas and others not yet identified.

- Mycotic abortion usually is caused by Aspergillus or Mucor spp, which reach the uterushematogenously and cause abortion in late gestation. In many of these fetuses, the skin is not affected; in others, ringworm-like lesions are seen. The placenta frequently is severely affected with necrosis of the cotyledons and thickening of the intercotyledonary areas. Diagnosis is based on identification of the fungus through culture of the fetal or placental tissues, histologic examination of these tissues, or direct examination of cotyledons after clearing with potassium hydroxide solution. These abortions are almost always sporadic, and the only means of control is to reduce exposure to the fungi.

Sporadic losses may result from Listeria sp (a bacterium occasionally present in silage when pH is >7); miscellaneous bacteria such as Haemophilus sp, Arcanobacterium pyogenes, Staphylococcus aureus, Bacillus cereus, Pasteurella multocida, Pseudomonas aeruginosa, Streptococcus bovis, Chlamydia sp, and others; or viruses (eg, bluetongue).

- Noninfectious causes of abortion are numerous; the most common include: 1) recessive or lethal genes (or both), hydrocephalus, osteopetrosis (“marble bone” disease), arthrogryposis (“crooked calf” syndrome), and several others, some not fully identified; 2)

toxins (eg, excessive nitrates from feed or water), certain pine needles, poisonous plants (eg, lupine, locoweed), or mycotoxins (moldy feeds); 3) hormonal imbalances in the pregnant dam; 4) injuries affecting the pregnant cow; and 5) nutritional deficiencies, particularly of vitamin A, vitamin E or selenium (or both), iodine, and manganese.

Heat stress in cattle can cause early embryonic death and lower the herd pregnancy rate. The mechanism by which heat stress affects embryonic survival is complex. Heat stress can disrupt early embryonic development. Effects of heat stress on embryonic survival decrease as embryos advance in development. Heat stress at day 1 or days 1–3 after breeding reduces embryonic survival.

Diagnosis

Accurate diagnoses of reproductive loss contribute to the cumulative herd history and provide criteria for evaluating the impact on herd performance, and the need for implementation of preventive measures. Laboratory assistance is needed in most cases. Carefully selected, properly preserved, quality specimens should be submitted to a diagnostic laboratory for analysis. Even with these, the exact cause of an abortion may not be detected, especially if it is noninfectious. Many infectious causes can be excluded, however, which assists in formulating a preventive strategy. Laboratory diagnosis of abortion requires both serology and examination of the fetus and placenta. For serology, paired blood samples should be collected from the aborting dam, with the first sample taken at the time of abortion and the second 10–14 days later. An absolute diagnosis may be impossible because, in many cases, the causative agent may not be present when abortion occurs.

Defective newborn calves can be recognized only by a thorough examination and sometimes only after some time has passed.

Prevention and Control

Several factors are critical to prevent and control abortion and development of defective calves.

- A balanced nutritional program helps control losses associated with mineral or vitamin deficiencies and poor-quality feeds, including moldy grains and forages.

- Genetic selection and accurate record-keeping help to detect and eliminate bloodlines that prove to be carriers of recessive or lethal genes.
- Appropriate housing and handling facilities decrease the incidence of accidents and provide an environment conducive to health.
- The cattle producer and veterinarian should work together to assess the herd's reproductive performance, tailor a vaccination program to the herd's specific needs, and diagnose and control potential herd problems.

B. Retained Placenta

Retention of afterbirth (placenta) is usually defined as failure to expel the foetal membranes within 24 hours of giving birth. Normally expulsion takes place within 3-8 hours afte delivery of the calf.

Causes

- The incidence is increased by abortion,
- difficult calving,
- milk fever, t
- win births,
- advancing age of the cow,
- premature birth,
- inflammation of the placenta and
- various nutritional disturbances -deficiencies of selenium, Vitamin A, copper and iodine increase the incidence of retained placenta. Providing selenium prior to calving reduces the incidence of retained placenta.

Cows which fail to drop the afterbirth within 36 hours are likely to retain it for 7 -10 days. This is because substantial uterine contractions do not proceed beyond 36 hours of the birth of the calf and if the membranes have not been expelled by this time their subsequent separation from the uterine wall can only occur as a result of the rotting of the afterbirth connections to the uterus and their expulsion then depends on the speed of the normal shrinking of the uterus.

Diagnosis

This is normally straightforward. Degenerating, discoloured and increasingly unpleasant-smelling membranes are seen hanging from the vulva more than 24 hours after calving.
Treatment

Generally speaking uncomplicated cases of retained placenta require no treatment. Manual removal of retained foetal membranes in the cow is NOT recommended and is potentially harmful.

Ideally stimulating uterine contractions by the use of drugs such as oxytocin or prostaglandins to expel the retained placenta is the most rational treatment. But after 24 hours there is very litttle response from the uterine muscle and so response to such treatment is unpredictable and generally poor.

Sheep and goats may also be affected by retention of the placenta. Systemic treatment with antibiotics to guard against infection and gentle traction may be used.

C. Anoestrus

Anoestrus is a condition where some cows do not show heat signs for a long time after calving. In this case, no ovulation takes place. The condition can be caused by an infection or inflammation of the uterus and underfeeding of the cow, especially with minerals.
Diagnosis

Rectal examination by qualified vet to determine the cause.

Prevention

- Proper feeding and mineral supplementation of dairy cows including:
  - ✓ Adequate quantity and good quality roughage.
  - ✓ Adlibitum mineral supplementation.

D. Endometritis

This is the inflammation of the endometrium (internal lining and mucus membrane of the uterus). It occurs as a result of an infection by microorganisms. Infection normally occurs during mating or around labour and delivery by such organisms as Campylobacter fetus or Trichomonas fetus and other opportunistic bacteria like the Corynobacterium pyogenes, E. coli and Fusobacterium necrophorum. Endometritis often occurs following difficult or abnormal labour or delivery and/or retained placenta.

Clinical Signs

- Discharges.
- Repeated heat after mating.

Diagnosis

- History of repeated heat.
- Difficult calving.
- Retained placenta.

Prevention and Control

- Routine and strict hygiene at calving:
  - ✓ Cows should be kept clean at calving.
  - ✓ Ensure that calving boxes are cleaned and disinfected.

E. Silent Heat

Silent heat is the term used when a cow which has already shown heat signs shows them again after 6 weeks or later. The regular heat period at 3 weeks is often referred to as the silent heat. The heat signs might have been weak and therefore not observed. If the cow has been inseminated before, she might have had an early abortion so that she shows heat signs again 6-9 weeks after the last insemination.

Clinical Signs

- Small vulva.
- Long tuft of hair at the ventral end of the vulva.
- Clitoris is prominent when you open the vulva.
- Complete anoestrus.

Diagnosis

Rectal palpation and use of breeding records.

Prevention

- ✓ Proper feeding and mineral supplementation of dairy cows including;
  - Adequate quantity and good quality roughage.
  - Adlibitum mineral supplementation.
- ✓ Timely and regular heat detection.

3.7 Differential Diagnosis for Pregnancy

Introduction

Owners are many times confused on the outcome of a pregnancy that did not progress normally and often present their animals for a definitive diagnosis to a clinician. Some pathological conditions mentioned bellow should be identified to be different from a normal pregnancy. Only rarely does a **urinary bladder full** of urine creates confusion for the presence of an early pregnancy (2-3 months) in dairy cows. This can be easily differentiated by the absence of palpation of both uterine horns and the ease with which the animal urinates when the bladder is gently massaged leading to disappearance of the enlargement. Rarely **tumors of the genital tract** can create confusion, but their consistency and location is different. The differential diagnosis of three conditions commonly encountered by clinician's namely mummified fetus, macerated fetus and/or pyometra/mucometra is described below

Mummified fetus

A uterus with mummified fetus has thick uterine walls, absence of fluid and placentomes and a hard palpable structure. The fetus is closely apposing the uterine wall. The fremitus is absent.

Maceration of the fetus

There is copious vaginal pus discharge. The uterine wall is thick and doughy. There is no dorsal bulging of the uterus and placentomes are not palpable. Parts of bones are sometimes palpable separately floating tacked up. The fremitus is absent.

Pyometra and Mucometra

These two conditions are many times difficult to differentiate from normal pregnancy especially when the pus or mucus is present in enormous quantity (sometimes 20-40 liters) so that the uterus is largely enlarged and placed on the abdominal floor.

- In pyometra the uterine wall is thick, uterus is doughy and placentomes or fetus is not palpable and the fremitus is absent. However, it is always safer to make a re-examination 1 to 2 months later when the clinician is not sure, or make use of ultrasonography to differentiate the condition. Sonographic evaluation would depict anechogenic fluid without cotyledons and echogenic material accumulated. A clinical

therapy to terminate the corpus luteum on an assumption that the condition is pyometra could be hazardous and loss to the owner, if unfortunately the condition was a normal pregnancy.

- In mucometra, the positive findings of pregnancy are absent, but, contrary to pyometra the uterine wall is thin. Ullrasonography can easily differentiate the condition from pregnancy. When these two conditions are to be differentiated from early pregnancy a characteristic feature found most often is the bilateral enlargement of both uterine horns, which is not found in pregnancy. The fetus is not palpable in these two pathologies, and often there is a history of vaginal discharge.

3.8 Records Keeping and Reporting Test Result

3.8.1 Keeping records and Reporting outcomes

To improve any practice on the dairy farm records are of paramount importance. The breeding or reproductive area can only be altered and improved if a producer is willing to put time and effort into starting and faithfully maintaining a record-keeping program. The record-keeping program can be as complicated or as simple as one wants. A producer can buy breeding wheels or other devices that can make reproductive record keeping easy. There is, however, a very simple system that can be set up by any producer.

There are many types of records that should be recorded in the dairy farm. Among that four records are essential dates a producer must record on an individual cow to improve reproductive performance:

- Calving Date
- Heat dates
- Breeding dates
- Conception date or date heifer confirmed pregnant.

Calving Date

The calving date is the most important because it starts the next reproductive cycle. You should start to record heat dates immediately after calving. Recording heat dates on cows even before they are ready to breed is important because it lets you know if the cow is cycling properly and gives you an idea of the cow's individual reproductive cycle. If you don't see a cow in heat within 50 days after calving, a veterinarian should examine her to be sure she is cycling

properly and does not have an infection or other reproductive disorder. In fact, it is an excellent practice to routinely have a veterinarian check each cow soon after freshening to be certain that all of the reproductive organs are functioning properly, and to treat any abnormal cows.

Heating dates

All heat dates should be reported so that the cycle length can be estimated. A good practice is to record the days elapsed between observed heats so that you can check if the cow is cycling and if you are observing heat properly. If heats are not noticed it can be due to either reproductive failure or poor heat detection practices.

Breeding dates

Accurate recording of breeding dates is essential for successful pregnancy checks by a veterinarian. Every cow should be checked for pregnancy at 40-50 days after breeding. If it is assumed that the cow is bred just because she has not been observed in heat after breeding, it could seriously jeopardize the reproductive program. One may have several cows he thinks are bred that are open. Such cows, when dried off, will be culling candidates. This can be eliminated by having all cows that are bred and not observed in heat for 40-50 days checked for pregnancy by a veterinarian. The veterinarian is an integral part of the reproductive program. Every producer should be on a routine herd health program.

Conception date

Recording conception dates is important so that the cows are dried off at the right time (60 days before freshening). Recorded conception dates also help in assigning housing for dry cows, establishing feed requirements for fresh cows, and estimating income during the year from the sale of milk.

Breeding Register

Cow No.	*Date of calving*	*Fist Service*			*Second Service*			*Third Service*			*1st PD*	*2st PD*	*Expected date of*	*Origin of*	*Weight of*	*Sex of*	*Number of Calf*	*Remarks*
		Date	*Time*	*Method*	*Date*	*Time*	*Method*	*Date*	*Time*	*Method*								

Calf Register

Calf number	Date of Birth	Date of Numbering	Sire/Dam	Sex of Calf	Birth Weight	Disposal		Remarks
						How	Date	

3.9 Monitoring any injury after post-testing

Safety

Rectal palpation is widely used and considered a safe method for pregnancy diagnosis in cattle. Nonetheless early or inappropriate palpation of the amniotic vesicle may damage the embryo and cause embryonic mortality.

Personnel who are working with pregnancy testing may exposed to different risks such as zoonoses, physical injury and sterility. In animls may result in physical injury.

Self check 3

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page (2pts)

Task 1: choose the best answer from the given alternatives (2 pts.)

1. A condition were young is developed in the uterus of female animal is___
   A, Gestation B, Pregnancy C, Ovulation D, None
2. The interval between fertilization of ovum to the birth of offspring is____
   A, Gestation Length B, Implantation C, Embryo D, all
3. An External Portion of the reproductive tract that vary in size and breeds is ____
   A, Cervix B, Urinary Bladder C, Vulva D, Except B, all are correct
4. The internal wall of cervix folded and protrude toward the exterior of reproductive tract.
   A, Vagina B, Cervical Rings C, Bladder D, All
5. The place were semen is deposited during insemination
   A, Uterine Body B, Vagina C, Vulva D, none

Task 2: Short Answer

1. Types of diagnostic methods in domestic animlas (2 pts.)
2. How can we differentiate normal pregnancy from mucometra, Myometra and maceration (5 pts.)

Note: **Satisfactory rating - 6 points** **Unsatisfactory - below 6 points**

ıoperation Sheet 3

3.1. Preparing animals for pregnancy diagnosis

A. Tools and equipments

- ✓ PPE
- ✓ Restraing material (Rope, crush etc)
- ✓ Disinfectant
- ✓ Lubricant
- ✓ Breeding records
- ✓ Ultra sound

B. Procedures for preparing animals and equipments

- Wear personal protective equipment
- Selecting and preparing diagnostic equipments ready
- Documentation
- safe restraining of animals
- Drafting dairy animals to be tested
- Procedures for pregnancy diagnosis by rectal palpation
  - ✓ Put on PPE
  - ✓ Assemble necessary materials
  - ✓ Present the animal to be examined
  - ✓ Restrain the animal
  - ✓ Wear gloves
  - ✓ Remove manure from the rectum
  - ✓ Retract the uterine and cervix
  - ✓ Try to palpate the foetus in the uterus based on key indicators of pregnancy
  - ✓ Keep and report record
- Procedures for prganacy diagnosis using ultra sound
  - ✓ Put on PPE
  - ✓ Assemble materials used for examination
  - ✓ Restrain the animal

- ✓ Insert the probe in the rectum of cow/heifers
- ✓ strategically position it above the uterus

LAP TEST 3

Name……. ID……..

Date…….

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within **1** hour. The project is expected from each student to do it.

Task-1 Prepare the tools and equipmnts required for preganancy diagnosis

Task- 2 Perform pregnancy diagnosis using rectal palpation under the supervision of the supervisor.

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