ARTIFICIAL INSEMIATION

NTQF Level -II

Learning Guide –26

Unit of Competence: - Assist AI Technique and Semen Handling

Module Title: -Assisting AI Technique and Semen Handling

LG Code: AGR ATI2 M08 0919 LO-1--LG-26

TTLM Code: AGR ATI2TTLM 0919v

LO1 Participate in a team of semen production

Instruction Sheet-1	Learning Guide -#26

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

- ✓ Doing pre-collection works.
    - Testing male dairy for fertility
    - Preparing male dairy for semen collection
    - Preparing all the necessary materials, equipment, tools and utilities
- ✓ Processing semen by following the enterprise guide lines.
- ✓ Selecting and checking suitable Personal Protective Equipment (PPE) prior to use

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you will be able to –

- ✓ Do pre-collection works.
    - Testing male dairy for fertility
    - Preparing male dairy for semen collection
    - Preparing all the necessary materials, equipment, tools and utilities
- ✓ Process semen by following the enterprise guide lines.
- ✓ Select and check suitable Personal Protective Equipment (PPE) prior to use

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information “Sheet 1, Sheet 2, and Sheet 3”.
4. Accomplish the “Self-check 1, Self-check t 2, and Self-check 3” **in page -8, 12,and 15** respectively.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1, Operation Sheet 2 and Operation Sheet 3” **in page -9, 10,and 13.**
6. Do the “LAP test” **in page – 16**(if you are ready)

Information Sheet-1	Do pre-collection works

1.1. Do pre-collection works

Semen (**seminal fluid)**: is an organic fluid that may contain spermatozoa. It is secreted by the gonads (sexual glands) and other sexual organs of male or hermaphroditic animals and can fertilize female ova. In humans, seminal fluid contains several components besides spermatozoa: proteolytic and other enzymes as well as fructose are elements of seminal fluid which promote the survival of spermatozoa, and provide a medium through which they can move or "swim". Semen is produced and originates from the seminal vesicle, which is located in the pelvis. The process that results in the discharge of semen is called ejaculation. Semen is also a form of genetic material. In animals, semen has been collected for cryoconservation. Cryoconservation of animal genetic resources is a practice that calls for the collection of genetic material in efforts for conservation of a particular breed.

Four semen collection methods have been reported in marmosets these are:

1.Vaginal washing after copulation.
2.Electro ejaculation.
3.Caudal epididymis collection and
4.Penilevibratory stimulation (PVS) .

1.1.1. Testing Male dairy for fertility.

In summary, we prospectively investigated dairy foods intake in relation to semen quality among men attending a fertility clinic in an academic medical center and found that low-fat dairy foods, especially low-fat milk, were positively associated with sperm concentration and progressive motility resulting in higher.

- Testing male animals for fertility: the animal which is free from disease must be evaluated for reproductive performance as listed in table below.

Category	Threshold
Scrotum circumference	30cm at 15 month age
	31cm at15-18 month age
	32cm at 18 to 21 month age
	33cm at 21 to 24 month age
	34cm at 25 month age
Sperm morphology	Minimum of 70% normal sperm
Sperm motility	Minimum of 30% normal sperm

1.1.2. Prepare Male dairy for semen collection

A large majority of dairy cows in the US, Canada and European countries are artificially inseminated. Artificial insemination of beef cows is also popular, particularly in purebred herds. The advantage of AI over natural service is that it facilitates rapid genetic improvement by allowing use of only the top bulls. Some bulls have sired more than 100,000 offspring via AI.

Semen collection from bulls using an AV requires three people: one to handle the teaser animal, one to control the bull and one to collect the semen. It is important that the collection area have non-slip flooring to avoid injuries and because ejaculation may be inhibited if the bull is nervous about his footing. Bulls are heavy and should have regular hoof care. Poor hoof condition can inhibit the bull from mounting or cause pain when dismounting.

The back and rear quarters of the teaser are washed with a disinfectant every collection day. It is also common for the rear quarters to be clipped routinely. The bull's preputial hair should be clipped in preparation for using the AV. These sanitary precautions are intended to minimize microbial contamination of the semen being collected.

Collecting semen:

The most common semen collection methods are:

A. Artificial vagina
B. Electro ejaculation
C. Massage method.

A. Artificial vagina: Is the best and commonly used method. Consists of outer support with inner jacket containing temperature controlled water and pressure, and collecting funnel and container.

When the male mounts the female, the sheath is grasped and the penis is directed in to the artificial vagina for ejaculation. Prior to semen collection all parts of AI should be cleaned, sterilized and assembled to AV.

Mature bull requires an outer casing 40cm in length and 5.1-5.7cm in diameter. In case of shoat it should be 20cm long and 5cm in diameter.

Semen Collection

- The most common method of collection is the artificial vagina as this results in the highest quantity and quality of semen.
- The artificial vagina consists of a large rubber tube lined with a water holding jacket.
- A receptacle for collecting the semen is attached to the end of the tube.

- Bulls are trained to mount a dummy or teaser female, while a technician guides the bull's penis into the artificial vagina.
- As the bull ejaculates, the semen is collected in the receptacle at the opposite end of the artificial vagina.
- After the semen has been collected, it is examined in the lab under a microscope for motility and morphology.

Advantage of AV

- ✓ Uncontaminated sperm and natural stage
- ✓ Free from extraneous secretion
- ✓ Viability of sperm is better
- ✓ No female is needed if dummy is success

Disadvantage of AV

- Difficult to get male that serves AV
- Slightly costly and require technical hands

B. Electro ejaculation: electrode or probe inserted into rectum to stimulate ejaculation through stimulation of reproductive system by gradual increase of voltage, not widely used with boars or stallions. Electro ejaculation is usually used only with bulls and rams which are unable or unwilling to mount and to serve an artificial vagina. Results are rather variable as to the quality of the ejaculate collected, and are dependent upon the skill of the technician making the collection, as well as individual animal variability

Advantages

- ✓ Collect semen without sexual response from the male
- ✓ Collect from males unable to copulate
- ✓ Female in estrus not needed

Disadvantages

- Equipment cost
- Possibility of misuse

C. Massage method: the simplest method of semen collection by massaging seminal vesicle and ampulae. This method commonly used to collect semen from turkeys, ducks and dog.

Personal protective equipment (PPE)

Some PPE that used during semen collection includes:

- ✓ Boots
- ✓ Overalls
- ✓ Gloves
- ✓ Sun protection (sun hat, sunscreen

1.1.3. Prepare all the necessary materials, equipment, tools and utilities.

All necessary materials which enable semen collection, technicians, restraining chutes must be prepared to carry out semen collection procedures properly.

- Gloves - Paper towels

Lubricant -Teaser cow - Collection vial

- Thaw bath - Extender- Straws

-Straw cutter

- AI Rod

- Sheath

_Artificial vagina

- Extender

- Artificial vagina

- Straw

- Straw cutter

- AI Rod

- Gloves

- Collection vial

- Thaw bath

Self-Check 1	Written Test

Name: _____ Date: _____

Part One: Write short answer for the following questions

1. Write down how to take semen from bull**?** (2pt)
2. Write downthe necessary materials, equipment and tools semen collection**?** (3pt)
3. Write down the advantage and disadvantage of artificial vagina and electro ejaculation**?**(4pt)
4. Define about the semen (3pt)**?**

Answer Sheet

Score = _____

Rating: _____

Short Answer Questions

1._____
2._____
3._____

Note: Satisfactory rating 10 points unsatisfactory-below 10 points.

Operation Sheet-1	***Collect semen by AV***

procedures

Step 1. Mount--female in estrus, teaser animal or dummy

Step 2. Restrain mount

Step 3. Clean bull's sheath and belly

Step 4. Lead bull to mount to tease and be teased

Step 5. As bull mounts, grasp sheath and direct penis into AV

Step 6. Hold AV near buttocks parallel to angle of vagina

Step 7. Let bull serve the AV (don't thrust AV on penis)

Step 8. Do not touch penis

Operation Sheet-2	*Collect semen electro ejaculator*

Procedures

Step 1. Restrain the bull to be collected within the chute.

Step 2. Place electrode probe within bucket of soapy water (soapy water serves as a lubricant) and then place probe fully within rectum.

Step 3. Gradually increase "signal" intensity to the electrode over a period of 3 to 8 seconds and then return to zero.

Step 4. Rest 5 to 15 seconds between stimulations.

Step 5. Repeat stimulation process to induce erection, protrusion and ejaculation. The timing of the stimulations and the voltage applied should be keyed to the ram's response. Ideally, protrusion of the penis occurs before ejaculation.

Step 6. Avoid collecting the first fluid discharged and attempt to procure the portion having higher sperm concentration. Collect the semen into the hand-held centrifuge tube. Stopper the tube, label it and insert it into the thermos.

Step 7. Identify four semen collection methods

Information Sheet- 2	Process Semen by following the enterprise guide lines

1.2. Definition of semen processing

Semen processing includes Semen collection, Semen evaluation, semen dilution and extension, packing, printing and preservation.

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 preservation (freezing of 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).
- ❖ Control of semen during processing, storage and field use.

Semen Evaluation

After the semen has been collected, it is examined in the lab under a microscope for motility and morphology**.**

Self-Check 2	Written Test

Name: _____ Date: _____

Directions: answer all the following questions listed below

1. Define the semen extender (2pt)***?***
2. Define semen bank (3pt)***?***
3. Define semen preservation (3pt)***?***

Note: Satisfactory rating 6 points unsatisfactory-below 6 points.

Answer Sheet

Score = _____

Rating: _____

Short Answer Questions

1._____
2._____
3._____

Operation sheet 2	Process Semen

Procedures

Step1. Take the Tris- glycerol diluents

Step2. Take the Glycerol egg yolk- citrate

Step3. Take the Milk glycerol

Step4. Take the Commercial diluents

Step5. Every insemination dose contain at least 15-40 million

Step6. Straw marked with bull ID and date of ejaculation

Step7. Semen is frozen in liquid nitrogen at (-196c).

Step8. Control of semen during processing, storage and field use

Information Sheet- 3	Select and check Suitable Personal Protective Equipment (PPE) prior to use

1.3. **Selecting and checking Suitable PPE**

1.3.1 **Definition** (**PPE)**

Personal protective equipment (**PPE**) is protective clothing, helmets, goggles, or other garments or equipment designed to protect the wearer's body from injury or infection. The hazards addressed by protective equipment include physical, electrical, heat, chemicals, biohazards, and airborne particulate matter.

PPE includes:

Protective clothing (apron, suit, and gown),

Eye protection (goggle)

Respiratory protection (facemask),

Gloves: hard and soft glove,

Surgical gowns,

Isolation gowns,

Armlengthglove,

Foot protection (boots),

Head protection (sunhatand sunscreen)

Self-Check 3	Written Test

Name: _____ Date: _____

Directions: answer the following questions

1. What does full PPE mean? (2)

2. Why is it important for health care workers to wear personal protective equipment? (3)

3. Why are gowns used in healthcare? (3)

Note: Satisfactory rating 8 points unsatisfactory-below 8points.

Answer Sheet

Score = _____

Rating: _____

Short Answer Questions

1._____
2._____
3._____

LAP Test	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 8-12 hours.

Task 1: Collect semen using AV.

Task 2: Collect semen using electro ejaculator**.**

Task 3: collect process semen using semen extender and semen evalaution

List of References material

1. https:// 1.www.ncbi.nlm.nih.gov › pmc › articles › PMC4008690
2.
    - https://training.gov.au/Training/Details/AHCAIS301Ahtt ps://www
    - pub.iaea.org/MTCD/Publications/PDF/TE_1480_web.pdf
    - https://www.nddb.coop/.../**guidelines**/PIP-Vol-VII-Training-and-capacity-building-**guidelines**-for-NDP-I.pdf
    - AHCAIS301A - Collect semen - training.gov.au
    - https://training.gov.au/Training/Details/AHCAIS301A
3. https://en.wikipedia.org › wiki › Personal_protective_equipment

ARTIFICIAL INSEMIATION
NTQF Level -II

Learning Guide #27

Unit of Competence: -Assist AI Technique and Semen Handling
Module Title: - Assisting AI Technique and Semen Handling
LG Code: - AGR ATI2 M08 0919 LO2-LG#27
TTLM Code:- AGR ATI2TTLM 0919v1

LO2 Handle semen

Instruction Sheet-2	Learning Guide #27

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

- ✓ Using the required materials, tools and equipment
- ✓ Undertaking work in a safe and environmentally appropriate manner
- ✓ Handling Semen properly during processing, storage and distribution

This guide will also assist you to attain the learning outcome stated in the cover page.
Specifically, upon completion of this Learning Guide, you will be able to –

- ✓ Use the required materials, tools and equipment
- ✓ Undertake work in a safe and environmentally appropriate manner
- ✓ Handle Semen properly during processing, storage and distribution

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information “Sheet 1, Sheet 2, and Sheet 3”.
4. Accomplish the “Self-check 1, Self-check t 2, and Self-check 3” **in page -22, 27, and 30** respectively.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1,” **in page -23.**
6. Do the “LAP test” **in page – 24** (if you are ready)

Information Sheet-1	Use the required materials, tools and equipment of handle semen

2.1. Use the required materials, tools and equipment of handle semen

Sperm are motile and vigorous cells, but also fragile and susceptible to damage and killing by several environmental conditions. When collecting and handling semen it is critical to avoid exposing sperm to two types of insults:

- ***Exposure to toxic chemicals****:* Keeping collection equipment clean and disinfected is important, but soap and disinfecting chemicals are quite potent spermicidal. Take great care to rinse the inner liners of the artificial vagina and collection tubes with deionized water to remove such agents. It is usually best to use new, sterile collection tubes. Finally, be certain to lubricate artificial vaginas with a lubricant known to be non-toxic to sperm.
- ***Thermal stress****:* Sperm are sensitive to both heat and cold. Rapid chilling of semen results in a phenomenon called "cold shock" that is often manifest by abnormal sperm motility and morphology. Short periods of exposure to temperatures just a few degrees above body temperature will usually kill large numbers of sperm.to avoid thermal stress, the collection tube end of the artificial vagina should be covered with an insulating cone. Additionally, microscope slides, cover slips, stains, extenders and pipets used to handle and examine sperm are best maintained on a warming plate prior to use, as shown below. If you are performing a large number of analyses, a heated microscope stage is also a valuable piece of equipment

Semen from most species is not damaged by exposure to room temperature (20-22 C) for an hour or two. If longer periods of maintenance are required, it is best to dilute the raw ejaculate in a buffered nutrient solution - usually called an *extender* - and cool it slowly to refrigerator temperature (4-5 C). A large number of extenders have been developed, usually for use in freezing semen. They are similar in having an energy source (e.g. glucose), buffers to maintain pH (e.g. Tris or citrate) and a source of protein (e.g. 20% egg yolk).

A simple method for preparing extended, chilled semen is to dilute the raw semen with warm extender, suspend the tube into an empty beaker through an insulated lid (e.g. Styrofoam; see image to right), then place the beaker into a refrigerator. The air in the beaker will cool slowly, thereby avoiding cold-shocking the sperm.

Extended, chilled semen is frequently transported for insemination, providing a useful alternative to either freezing or immediate use. To maintain temperature, special containers are made just for semen transport. The "Equitianer" pictured at right contains coolant cans and insulation to keep the semen sample cool for overnight shipping.

2.1.1. Definition of Semen

Semen is most commonly **collected** from bulls in bull studs using an artificial Mount or are too fractious for easy handling (**e.g.** range bulls)**.Semen** is - a viscid whitish fluid of the male reproductive tract consisting of spermatozoa suspended in secretions of accessory glands

Self-Check 1	Written Test

Name: _____ Date: _____

Directions: Answer all the questions listed below.

1. Discuss semen handling (2)?
2. Define semen (2)?
3. Differentiate exposure *to toxic chemicals and thermal stress (4)?*

Note: Satisfactory rating 8 points unsatisfactory-below 8 points.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1._____
2._____
3._____

Operation sheet 1	*Exposure to toxic chemicals of semen handling*

Procedures

Step1. Keep collection equipment clean and disinfected is important

Step2. Take soap and disinfecting chemicals are quite potent spermicidal

Step3. Take great care to rinse the inner liners of the artificial vagina

Step4. Collect tubes with deionized water to remove such agents

Step5. Sterile collection tubes.

Step6. Finally, be certain to lubricate artificial vaginas with a lubricant

LAP Test	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Task 1: make semen handling by using *exposure to toxic chemicals of semen handling*

2.2. Undertake work in a safe and environmentally appropriate manner

Artificial Insemination (AI) has a range of benefits to dairy farmers, such as providing access to the best genetics, supporting animal health and the safety of people who work on farms.

AI enables farmers to access the best bull (male) genetics from all across the globe. Farmers want to improve the production, health traits, fertility and longevity of their dairy cattle by using a balanced approach to breeding. Animal health is also improved through the use of AI. Straws of semen collected from AI bulls are carefully screened for infectious diseases which may otherwise be transmitted from bulls to cows through natural breeding. AI bulls are also monitored for genetic mutations which may cause congenital malformations. By understanding the pedigree and genetic composition of these bulls, farmers are also able to supervise matings in a way that reduces inbreeding and selects for improved welfare traits, such as cows that do not grow horns. The safety of people who work on farms is also important and can be benefited by the use of AI. Bulls can be dangerous to keep on-farm and require special care to handle. Teams of bulls must be managed carefully to ensure that their social hierarchy is stable before allowing them into the herd. Bulls can also be damaging to cow health if not carefully managed, especially during wet weather on slippery surfaces. Although some farmers use bulls with their cows after a short AI period, others do not due to concerns for the safety of staff and family. Artificial insemination usually involves detecting female cows that are on ‘heat’. Once identified, these cows are inseminated by a trained farmer or professional AI technician who performs the technique ensuring minimum discomfort for the cow. This guide was produced with the dairy industry in response to requests from farmers for straightforward information to help them make working in the dairy safer. It provides practical safety solutions to specific hazards, and information on how to control or eliminate safety hazards. Making your farm safe requires planning, and farmers are encouraged to use this guide in the preparation of their own safety action plans that include detailed assessments of their specific safety hazards and actions to control or eliminate those hazards. Three Steps to Safer Dairy Dairy farming can be a hazardous occupation. Farmers have large and sometimes unpredictable animals to control. They use heavy equipment and must deal with issues such as hazardous substances, zoonotic diseases, confined spaces, and working at heights and manual handling. Technological advances have reduced some hazards but created others. For example, rotary dairies have created very efficient milking but have also introduced crushing and trapping points. As with any safety plan, making your dairy safer involves identifying hazards and the relative risk involved with each hazard so that control measures can be prioritized. Not all farms are the same and even though there are similarities in work practices and risks, you need to identify,

assess and put in place your own risk control solutions to achieve the best safety outcome for your farm. Many hazards can be reduced through regular housekeeping. Maintaining a clean and tidy dairy as part of everyday operations will result in a safer workplace. While specific safety requirements for each farm will vary, there are three simple steps to achieving a safer workplace:

- Find the hazards
- A Fix the hazards
- Assess the risks

Self-Check 2	Written Test

.

Name: _____ Date: _____

Directions: Answer all the questions listed below

1. Write down three simple steps to achieving a safer workplace?(6pt)

Note: Satisfactory rating 8 points unsatisfactory-below 8 points.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1._____

Information Sheet-3	Handle Semen properly during processing, storage and distribution

2.3. Handle Semen properly during processing, storage and distribution

Scawfell Genetics is pleased to announce the opening of their state of the art semen processing lab, which complements their long-standing **bull stud** and

recently opened **semen storage** and distribution facilities.
Both the bovine **semen store** and semen processing lab hold both domestic and export licenses and boast the most modern, technologically advanced and efficient laboratory equipment currently available.

2.3.1 Semen processing

In this **process**, the **semen** is inseminated into the female by placing a portion of it ... (A.I.) is deposition of **semen** into the female genital tract by **means** of instruments. ... frozen and stored for indefinite periods has revolutionized AI **in cattle**.

Scawfell Genetics has invested in the most up to date straw filling machine available from IMV Technologies, which guarantees perfect packaging every time, unique traceability and eliminates waste. The most advanced lab equipment for speed, efficiency and lower cost of production.
The semen processing lab also has the capability of doing a full semen analysis from the click of a button ensuring optimum results, less human error and waste than traditional methods.

2.3.2 Semen storage

The discovery that bull semen could be successfully frozen and stored for indefinite periods has revolutionized AI in cattle. In 1949, British scientists discovered that addition of glycerol to the semen extender improved resistance of sperm to freezing. Glycerol acts to remove water from the sperm cell prior to freezing and prevents the formation of cellular ice crystals which would damage the sperm. There are two methods of freezing and storing semen: dry ice and alcohol (-100 degrees F) and liquid nitrogen (-320 degrees F). Liquid nitrogen is preferred because there is no evidence of fertility deterioration with age. Fertility gradually declines in semen stored in dry ice-alcohol.

Frozen semen can be stored indefinitely if proper temperature is maintained. A recent report told of a calf born from frozen semen stored for 16 years. Fresh, liquid semen can be successfully stored for 1 to 4 days at 40 degrees F. Semen is usually stored in glass ampoules. Other methods appear promising, particularly the French-straw. Several AI organizations have gone to this method exclusively. Artificial coloring is frequently added to semen extenders in order to distinguish one breed from another. Complete identification of the bull is required on each individual semen container.

Semen Storage and Distribution

We have invested in the most up-to-date semen processing and storage facilities providing complete inventory management, secure storage tanks and security to give our breeders peace of mind that their cattle genetics are in the best hands.

- Domestic and Export licensed store
- State of the art liquid nitrogen storage tanks equipped with fail safe sensor protection
- Custom built buildings with 24 hr monitoring
- 3-point biosecurity system
- 24 hr online access to stock inventory for breeders
- No hidden fees or costly extras

Self-Check -1	Written Test

Name: _____ Date: _____

Directions: Answer all the questions listed below

1. Define Semen processing? (3pt)
2. Define Semen storage**?** (3pt)

Note you are satisfactory if you score 13 point.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1._____

2._____

List of Reference Materials

1. http://www.vivo.colostate.edu/hbooks/pathphys/reprod/semeneval/semenanal.html

2. https://www.dairyaustralia.com.au/dairyaustralia/farm/animal-management/fertility/artificial-insemination?keyword=artificial%20insemination

http://jobsafesa.asn.au/wp-content/uploads/2012/03/Dairy-Safety.pdf

3.

- https://www.ncbi.nlm.nih.gov/books/NBK54046
- https://www2.gov.bc.ca/.../envir_best_practices_manual_complete.pdf

ARTIFICIAL INSEMIATION

NTQF Level -II

Learning Guide –#28

Unit of Competence: - Assist AI Technique and Semen Handling

Module Title: Assisting AI Technique and Semen Handling

LG Code: - AGR ATI2 M08 0919 LO3-LG-28

TTLM Code: - AGR ATI2TTLM 0919v1

LO-3Collect History

Instruction Sheet	Learning Guide #28

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

- ✓ Gathering information on sign of heat and pregnancy
- ✓ Gathering information on last calving date, number and parity of calving
- ✓ Identifying breed type of animals
- ✓ Collecting observable signs separately from history
- ✓ Doing work according to Occupational Health and Safety (OHS)

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you will be able to –

- ✓ Gather information on sign of heat and pregnancy
- ✓ Gather information on last calving date, number and parity of calving
- ✓ Identify breed type of animals
- ✓ Collect observable signs separately from history
- ✓ Do work according to Occupational Health and Safety (OHS)

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information “Sheet 1, Sheet 2, Sheet 3 and Sheet 4, sheet 5”.
4. Accomplish the “Self-check 1, Self-check t 2, Self-check 3 and Self-check 4 Self-check 5” **in page -36,40, 42, 46 and 48** respectively.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1,” **in page -37**
6. Do the “LAP test” **in page – 38**(if you are ready)

Information Sheet-1	Gather information on sign of heat and pregnancy

3.1. Gather information on sign of heat and pregnancy

If cows sniff each other's' vulva and urine they may both come into heat. Cows can be coming into heat if they stand resting the chin on the back of another or are seen to lick or gently butt each other. Restlessness and calling loudly can also mean the female is coming into heat. Goats in particular become very noisy.

Gestation length does vary by breed and by sex of the calf. Gestation length ranges from 279 to 287 days. For most breeds, 283 days would be common. Cows carrying bull calves tend to have a slightly longer gestation compared to cows carrying heifer calves.

Several methods are available to determine if a cow or heifer is pregnant.

Non-return to estrus

If estrus signs are not observed around 3 weeks after service or insemination, the cow is generally assumed to be pregnant. However, even if estrus detection is good, not all of these cows will be pregnant. On the other hand, up to 7% of pregnant cows will show some signs of estrus during pregnancy. Insemination of these animals may result in embryonic or fetal death.

More reliable methods for detecting early pregnancy in cattle are:

- **Rectal palpation**

  Advantage: immediate result enabling early treatment of non-pregnant cattle.
  Accuracy: depends on the experience of the practitioner and can reach 95%.
  Rectal examination is usually carried done between 35 and 65 days post AI.

- **Hormone measurements**

  The progesterone secreted by a functional corpus luteum between 18 and 24 days after service or insemination is an early indication of pregnancy. It can be assayed in milk or plasma. Optimal assay time is 24 days after service or AI, this eliminates the possibility of long estrus intervals which might result in false positives.

- **Early Pregnancy-associated Protein** recently available tests detect so called early conception factor (ECF) or pregnancy-associated glycoprotein in blood samples. They are reported to detect the pregnancy-associated glycoprotein within 48 hours of conception.
  Because of the high incidence of embryonic mortality this test should be treated solely as an indication of conception. Pregnancy should be confirmed later by rectal or ultrasound examination.

- **Ultrasound examination** Early identification of non-pregnant cows post breeding improves reproductive efficiency and pregnancy rate in cattle by decreasing the interval between AI services and increasing AI service rate.

 **Ultrasound examination**

3.1.1. Signs of heat

- Mounting Other Cows.
- Cattle that exhibit this behavior may be in heat or approaching heat.
- Mucus Discharge.
- Swelling and Reddening of the Vulva.
- Bellowing, Restlessness, and Trailing.
- Rubbed Tail head Hair and Dirty Flanks.
- Chin Resting and Back Rubbing.
- Sniffing Genitalia.
- Head raising and Lip Curling.

3.3. Definition of pregnancy

The state of carrying a developing embryo or fetus within the female body.

Pregnancy, also known as gestation, is the time during which one or more offspring develops.

Is - containing a developing embryo, fetus, or unborn offspring within the body.

Is defined as the state of carrying a baby in your uterus.

3.4. **Definition**of gestation: the carrying of the young in the uterus.

Self-Check -1	Written Test

Name: _____ Date: _____

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

1. What is deference between rectal palpation and ultrasound examination? (3pt)

2. Define gestation? (3pt)

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1._____

2._____

Operation sheet 1	detecting early pregnancy in cattle

Procedures

Step1.Examine rectal palpation

Step2. Examine hormone measurements

Step3. Sure early Pregnancy-associated Protein

LAP Test	Practical Demonstration

Name: _____ Date: _____
Time started: _____ Time finished: _____

Task 1: follow three steps by using detecting early pregnancy

Information Sheet-2	Gather information on last calving date, number and parity of calving

3.2. Gather information on last calving date, number and parity of calving

Gestation calculator. Date when calf is due is from a given date of service based upon 283 days of pregnancy. Enter month and day and indicate whether it is

3.2.1 Calving date and parity

Generally younger cows and smaller breeds calve up to 10 days earlier and older cows and larger breeds calve up to 10 days later. Calving Date Calculator

As age and season of calving, stage of lactation, herd and number of days open and tests should not exceed 75 days, parity number should be consistent with calving date and class consisted of cows calving in December/January, while thelast lactations and all seasons in every run and also using pedigree information.

3.2.2 Calving number

Looking for information on the first cycle after a cow has calf and Gestation length does vary by breed and by sex of the calf andit depends on a number of things.

Calving is a memory for now, but during the many upcoming winter meetings, the number of cows calving within the first 21 days of the calving.

3.2.3 Parity of calving

A relationbetweena pair of integers: if both integers are odd and both are even they have the same parity, if one is odd and other is even they have the different parity.

Self-Check -2	Written Test

Name: _____ Date: _____

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

1. Define thecalvingdate (2pts)?
2. Definecalving number (2pts)?
3. Defineparity of calving (2pts)?

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1._____
2._____
3._____

Information Sheet-3	Identify breed type of animals

3.3. Identify breed type of animals

Cattle breed diversity, distribution, population status and their threats Ethiopia is the home of diversified cattle breeds. This is due to its diversified agro ecology, topography and nearness to Asia where most domesticated animals in Africa (EBI, 2016) were originated. A breed is a homogenous group of livestock which are phenotypically unique from other groups or subpopulations of the same species (Halimanietal, 2010). There are 28 indigenous breeds/types of cattle that have been recognized to exist in Ethiopia (EBI, 2016). These are grouped in to five major cattle types, large and small East African Zebu, Sanga, Zenga (a bred between Sanga and Zenga) and tourine types that are distributed to be found in all agroecological zones depending on their merit to a particular production system from arid tropical to afro alpine ecosystems. However, the genetic distinctiveness among most Ethiopian local cattle breeds, are largely unknown and unidentified. The purity of indigenous cattle breeds is under threat due to crossbreeding, inbreeding, lack of institutional capacities and policies which support the use of imported breeds for crossbreeding purposes. On the other hand, some authors mentioned thatbreed improvement programs of Ethiopian indigenous cattle remain too few while the demand of livestock products is continually increasing (BerhaneHagos, 2015). Other major constraints that limit cattle production in the country are, shortage of feed, water, diseases treatment and prevention, and poor housing (AndualemTonamo, 2016).The situation is aggravated by lack of records and uncontrolled mating systems practiced in the smallholder production system (Rege, 1999). This is definitely true in Ethiopia where in most cases, the breeding practice is both unplanned and indiscriminate crossbreeding between indigenous and exotic breeds that produce non-descript/crossbred cattle, which are now dominating in urban and per urban areas of the central highlands.Identification and characterization activities conducted on livestock resources of Ethiopia are not exhaustive. As a result, there is no complete and up-to-date breed level population data for most of the breeds, and this makes determination of the status and trends difficult. There are, however, some indigenous breeds which are known to be found at different threat levels. Sheko (the only taurine breed in east Africa) and Fogera cattle appear to be highly threatened as a result of interbreeding with other local breeds and changes in the production systems. In addition, Begait, Irob, Ogaden, Afar and Borana cattle breeds are also facing various degrees of threats (EBI, 2016). Thus, characterization and identification of indigenous cattle breeds, including their unique traits, should be given high priority. That should be a precondition in designing conservation and sustainable utilization programs to help indigenous breeds to compete in changing production environments with limited production resources such as land, feed, labour and capital in the future.

Self-Check -3	Written Test

Name: _____ Date: _____

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

1. Define breed? (2pt)
2. How many types breed in Ethiopia? (4pt)
3 How many divided major cattle types? (4pt)

Note: **Satisfactory rating - 8 points** **Unsatisfactory - below 8points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1._____
2._____
3._____

Information Sheet-4	Collect observable signs separately from history

3.4. **Collect observable signs separately from history**

A non-pregnant cow with a normal estrus cycle will release an egg and show heat about every 21 days (variation: 18-24 days).

The typical signs of heat are:

1. Restlessness, the cow separates from other cows when it is walking in the field.
2. Some breeds bellow to attract the bull. Zebu (=native) cattle, however, normally do not bellow.
3. Milk production and food intake may decrease.
4. The cow tries to mount other animals, sniffs at others, and other cows sniff at the cow in heat.
5. Other cows try to mount the animal in heat and she stands and allows them to do so: standing heat.
6. The lips of the vulva become red and swollen.
7. A thin, clear discharge from the vulva opening can be seen, sometimes sticking to the tail and skin surroundings.
8. By rectal palpation increased uterus tonus can be felt. Extra care in heat observation needs to be taken with buffalo cows.

Many of them:

- Show very poor signs of heat and may have silent heat
- Come on heat late at night when the signs are more difficult to detect.

Normally, the farmer will not see all signs of heat at the same time. Some signs of heat may be absent or too weak to be observed.

The standing heat period normally lasts 18-20 hours, but may be several hours shorter or longer.

For the inseminator it is important not only to question the farmer about previous inseminations, treatments and proper heat signs but also to check by himself that the cow to be inseminated:

1. Really is in heat: insemination of cows not in heat easily causes infection of the uterus (metritis, pyometra).
2. Has no reproductive disease (especially uterus infection), in which case insemination is not likely to succeed.
3. is not pregnant already: insemination of pregnant cows results in abortion.

Timing of insemination:

The best possibility for getting a cow pregnant is when insemination is done in the last half of the standing heat period or within 6-8 hours after the end of the standing heat period.

The normal working routine to follow is:

1. If the farmer observes heat early in the morning, inseminate in the afternoon of the same day.
2. If the farmer observes heat in the afternoon, inseminate early next morning.

Fertilization, that is the combining of egg and sperm, takes place when the egg reaches the egg duct. If the A.I. technician performs the insemination too early, the sperm deposited in the cow dies before the egg reaches the egg duct. If he performs the insemination too late, the egg dies before the sperm is deposited. Therefore, neither too early and too late inseminations will result in pregnancy.

Estrous cycles

Puberty coincides with the beginning of estrous cycles. Estrous cycles are the recurring hormonal and physiological changes that occur within the bodies of most mammalian females that lead to ovulation and the development of a suitable environment for embryonic and fetal growth. The cow is considered polyestrous, which means that she will continue to undergo regular estrous cycles until death unless the cycle is interrupted by a pregnancy.[18]

In cows, a complete estrous cycle lasts 21 days. Most commonly, dairy producers discuss the estrous cycle as beginning when the cow is receptive to breeding. This short phase lasting only about a day is also known as estrus or colloquially, heat. The cow will often exhibit several behavioral changes during this phase including increased activity and vocalizations. Most importantly, during estrus she will stand still when mounted by another cow or bull.

Mating and pregnancy

In the United States, artificial insemination (AI) is a very important reproductive tool used on dairy facilities. AI is the process by which sperm is deliberately delivered by dairy managers or veterinarians into the cow's uterus. Bulls “donate” semen at a stud farm but there is never any physical contact between the cow and the bull when using this method.[19]

This method of insemination quickly gained popularity among dairy producers for several reasons. Dairy bulls are notoriously dangerous to keep on the average dairy facility.

AI also makes it possible to speed the genetic improvement of the dairy herd because every dairy farmer has access to sperm from genetically superior sires. Additionally, AI has been shown to reduce spread of venereal diseases within herd that would ultimately lead to fertility problems. Many producers also find it to be more economical than keeping a bull. On the other hand, AI does require more intensive reproductive management of the herd as well as more time and expertise. Detection of estrus, becomes reliant on observation in the absence of bulls. It takes considerable expertise to properly inseminate a cow and high quality sperm

is valuable. Ultimately, because dairy production was already a management intensive industry the disadvantages are dwarfed by the advantages of the AI for many dairy producers.

The majority of cows carry a single calf. Pregnancy lasts an average of 280 to 285 days or a little less than 9 and one half months.

Self-Check –N4	Written Test

Name: _____ Date: _____

Directions: Answer all the questions listed below.

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5points**

1. Discuss about the estrous cycles? (4pt)

2. Discuss about Mating and pregnancy? (5pt)

3. If the cow gets heat in the early morning, at what time can we inseminate? (3pt)
4. Also if the cow gets heat in the early afternoon, at what time can we inseminate?

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1._____
2._____
3._____
4._____

Information Sheet-5	Doing work according to Occupational Health and Safety (OHS)

3.5. Doing work according to Occupational Health and Safety (OHS)

Livestock handling in dairy production is associated with a number of health and safety issues. A large number of fatal and nonfatal injuries still occur when handling livestock. The many animal handling tasks on a dairy farm include moving cattle between different locations, vaccination, administration of medication, hoof care, artificial insemination, ear tagging, milking, and loading onto trucks. There are particular problems with bulls, which continue to cause considerable numbers of injuries and fatalities in dairy production. In order to reduce the number of injuries during animal handling on dairy farms, it is important to understand the key factors in human-animal interactions. These include handler attitudes and behavior, animal behavior, and fear in cows. Care when in close proximity to the animal is the key for safe handling, including knowledge of the flight zone, and use of the right types of tools and suitable restraint equipment. Thus, in order to create safe working conditions during livestock handling, it is important to provide handlers with adequate training and to establish sound safety management procedures on the farm.

Occupational health and safety work is regulated by various laws, such as the Occupational Safety and Health Act, the Occupational Health Care Act and the Work Safety Supervision Act. Their goal is to make sure that working is safe and healthy and that issues are addressed cooperatively in the workplace. In practice, these acts oblige employers to assess work risks; orient and guide people to do their work, provide occupational health care, and support the employees' working capacity.

Above all, the goal of occupational health and safety work is to ensure that employees can and are able to do their work effectively. Occupational health and safety may be seen as a burden, but it has considerable benefits for the company, as healthy employees enjoy their work more and are guaranteed to be more productive.

Definition OHS and Safety occupational Health and Safety OHS Definition - Occupational health and safety (OHS) relate to health, safety, and welfare issues in the workplace. Occupational safety and health (OSH), also commonly referred to as occupational health andas defined by the World Health Organization (WHO) “occupational health deals with all aspects of health and safety in the workplace.

Safety is state of being certain that adverse effects will not be caused by some agent under defined conditions.

Self-Check –N5	Written Test

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

1. Define OHS? (4pt)

2. Define Safety of AI? (3pt)

Answer Sheet

Score _____

Rating: _____

Note: **Satisfactory rating - 7 points** **Unsatisfactory 7- below**

Short Answer Questions

1._____
2._____

List of Reference Materials

1. Vikaspedia.in › livestock › general-management-practices-of-livestock ›
   https://beef.unl.edu/faq/pregnant-cows

2.https://www.angus.org/Mobile/Animal/AnmGestationCalc.aspx
https://cattletoday.com/gestation.shtml
https://beef.unl.edu/faq/pregnant-cows
ttps://www.drovers.com/article/beeftalk-know-your-herds-calving-distribution

3.https://www.jbino.com/docs/Issue05_10_2018.pdf

4. https://www.thoughtco.com/dairy-farming-ancient-history-171199

   http://www.fao.org/ag/againfo/resources/documents/Dairyman/Dairy/V4U6_1.htm

5.https://ttk.fi/en/wellbeing_at_work_and_occupational_health_and_safety/occupational_health_and_safety_work_in_the_workplace

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ARTIFICIAL INSEMIATION

NTQF Level -II

Learning Guide #29

Unit of Competence: - Assist AI Technique and Semen Handling

Module Title: - Assisting AI Technique and Semen Handling

LG Code:- AGR ATI2 M08 0919 LO–#4-LG-#4

TTLM Code:- AGR ATI2TTLM 0919v1

LO-4 Apply AI procedures

Instruction Sheet	Learning Guide #29

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

- ✓ Identifying history of the animal.
- ✓ Observing sign of heat
- ✓ Preparing and assemble material and loading semen properly.
- ✓ Depositing semen in the uterus safely.
- ✓ Cleaning material and disposing waste.

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you will be able to –

- ✓ Identify history of the animal.
- ✓ Observe sign of heat
- ✓ Prepare and assemble material and loading semen properly.
- ✓ Deposit semen in the uterus safely.
- ✓ Clean material and disposing waste

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information “Sheet 1, Sheet 2, Sheet 3 and Sheet 4, sheet 5”.
4. Accomplish the “Self-check 1, Self-check t 2, Self-check 3 and Self-check 4 Self-check 5” **in page -53, 57, 61, 67 and 70** respectively.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1, Operation Sheet 2 and” **in page -71 and 72.**
6. Do the “LAP test” **in page – 73** (if you are ready)

Information Sheet-1	Identify history of the animal

4.1. Identify history of the animal

Artificial insemination (AI) is a process by which sperm are collected from the male, processed, stored and artificially introduced into the female reproductive tract for the purpose of conception. AI has become one of the most important techniques ever devised for the genetic improvement of farm animals. It has been most widely used for breeding dairy cattle and has made bulls of high genetic merit available to all.

HISTORY OF AI The history of AI is interesting. Old Arabian documents dated around 1322 A.D. indicate that an Arab chieftain wanted to mate his prize mare to an outstanding stallion owned by an enemy. He introduced a wand of cotton into the mare's reproductive tract, and then used it to sexually excite the stallion causing him to ejaculate. The semen was introduced into the mare resulting in conception. Anthony van Leeuwenhook, inventor of the microscope, first observed human spermatozoa under magnification. This finding led to further research. Spallanzani is usually considered the inventor of AI. His scientific reports of 1780 indicate successful use of AI in dogs.

In 1899, Ivan off of Russia pioneered AI research in birds, horses, cattle and sheep. He was apparently the first to successfully inseminate cattle artificially. Mass breeding of cows via AI was first accomplished in Russia, where 19,800 cows were bred in 1931. Denmark was first to establish an AI cooperative association in 1936. E.J. Perry of New Jersey visited the AI facilities in Denmark and established the first United States AI cooperative in 1938 at the New Jersey State College of Agriculture.

The AI industry has grown tremendously in the United States since its beginning. In 1970, USDA reported that 7,344,420 dairy females were bred artificially, 46% of the female dairy cattle population.

ADVANTAGES AND DISADVANTAGES OF AI The greatest advantage of AI is that it makes possible maximum use of superior sires. Natural service would probably limit the use of one bull to less than 100 matings per year. In 1968, AI usage enabled one dairy sire to provide semen for more than 60,000 services. Exposure of sires to infectious genital diseases is prevented by use of AI which reduces the danger of spreading such diseases. Time required to establish a reliable proof on young bulls

Self-Check 1	Written Test

Name: _____ Date: _____

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

1. Discuss history of AI (6pt)?
2. Discuss the advantage and disadvantage of AI (6pt)?

Note: Satisfactory rating10 points unsatisfactory-below 10points.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1._____

2._____

3._____

Information Sheet-2	Observe sign of heat

4.2. Observe sign of heat

Heat Signs and Detection Methods

Several methods of heat detection can be implemented. Some involve using heat detection aids. Several different methods can be combined to improve heat detection rates and accuracy. These include visual observation, heat mount detectors, tail head markers (paint, chalk, crayon, paste), chin-ball markers, detector animals, and electronic heat detection devices.

Visual Observation

Is a commonly used method of heat detection. It involves a trained observer's recognizing and recording signs of heat. Observable signs of heat include mounting or attempting to mount other cattle, standing to be mounted by other cattle, smelling other females, trailing other females, bellowing, depressed appetite, nervous and excitable behavior, mud on hindquarters and sides of cattle, roughed up tail hair, vulva swelling and reddening, clear vaginal mucous discharge, and mucous smeared on rump.

The surest sign of heat is when a cow or heifer allows other cattle to mount her while she remains standing. This is called standing heat. Cattle may be willing to mount others but may not stand to be mounted when outside of standing heat. This usually indicates she is either coming into or going out of standing heat. This method requires observation of cattle at least twice daily, typically early in the morning and late in the evening for best results. More frequent observation of cattle for heat improves detection accuracy and increases the likelihood of recognizing the optimal time for breeding cattle, particularly in Cattle in which heat is less intense or shorter in duration.

Nearly 20 percent more cattle will be observed in heat when checked four times per day versus checking twice daily. Check cattle as often as practical. Space heat detection observation times evenly over 24 hours. Each observation period must be sufficiently long, usually at least 30 minutes, to be effective.

Standing heat can occur any time in a 24-hour period. However, the most likely time for a cow or heifer to show heat signs is at night. The season of the year can influence this, with more cows showing heat at night in hot weather and more showing heat during the day in cold weather. Housing conditions can also have an effect on the distribution of heat during a 24- hour period. Hot weather, high production, crowded conditions, and high stress environments may reduce mounting activity.

Timeline for Heat Signs in Cattle			
.	Coming into Heat	Standing Heat	Going out of Heat
.	(8 hours)	(18 hours)	(14+ hours)
Heat Signs	• Stands and bellows • Smells other cows • Head butts other cows • Attempts to ride other cows but will not stand to be mounted • Red, moist, slightly swollen vulva • Clear mucous discharge from vulva	• Stands to be mounted • Rides other cows • Bellows frequently • Nervous and excitable	• Attempts to ride other cows but will not stand to be mounted • Smells other cows • Clear mucous discharge from vulva

Observers must distinguish among cattle coming into heat, in standing heat, and going out of heat. Females that are in standing heat, were in standing heat yesterday, or will be in standing heat tomorrow are the most likely herd mates to mount other cows or heifers in heat. Observe cows away from the feed bunk so feeding behavior does not interfere with heat detection. Cattle need nonslip footing and ample room to interact freely. Dirt footing increases mounting and standing activity more than concrete footing.

Heat Detection Aids

Heat detection aids are available. They should be used to supplement but not replace visual observation. These include tail paint, Kamar Heat mount Detectors, Estrotect Heat Detectors, Bovine Beacon, tail head markers, chin-ball markers, and the Heat WatchII System, an electronic detection system that records mounting behavior.

Heat detection aids differ in their application method, detection method, cost per animal, and detection accuracy.

When Cows Show Heat	
Time	**Cows showing heat signs, per cent**
6 am to noon	22 per cent
noon to 6 pm	10 per cent
6 pm to midnight	25 per cent
midnight to 6 am	43 per cent

Detector (teaser) animals can also assist in heat detection. Teaser animals include several types of gomer bulls, which are surgically altered to prevent successful insemination. Select gomer bulls that will not become excessively large. Acceptable disposition and freedom from disease are also important in gomer bulls.

Management Considerations

Good management is important for a successful heat detection program. Animals must have clearly readable, unique identification. An adequate area and equipment for heat detection must be available. This may include binoculars or the ability to approach cattle very closely. Nighttime observations may require artificial lighting, such as security lights, flashlights, or lanterns. Record keeping supplies such as paper, writing utensils, and clocks are important, along with a well-organized recordkeeping system.

Persons detecting heat must be well trained in heat detection and recording. Instruct all persons detecting heat to record cow or heifer ID, time of observation, and all signs of heat observed. Record all heat periods detected, even if the cow or heifer will not be bred on that heat. Then breeding wheels, calendars, or heat expectancy charts can be used to help predict future heat.

Self-Check –N2	Written Test

Name_____ Date_____

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

1. Define heat Detection Aids (2pt)?
2. Define heat detection (3pt))?

3. Define Visual Observation (2pt)?

Note: Satisfactory rating7 points unsatisfactory-below 7points

Answer Sheet

Score = _____

Rating: _____

Short Answer Questions

1._____

2._____

3,_____

Information Sheet-3	Prepare and assemble material and loading semen properly

4.3. Prepare and assemble material and loading semen properly

4.3.1. Care and maintenance of equipment

Liquid nitrogen storage tank: The most important investment a producer makes to improve herd genetics is the semen storage tank. This tank (Figure 1) is a large, vacuum-sealed, aluminum refrigerator encased in an extremely efficient insulation system. To ensure maximum liquid nitrogen holding times, the tank should be stored away from direct sunlight in a cool, clean, dry, dust-free, well ventilated environment that can easily be reached daily. Never store a tank directly on a concrete floor; always elevate it on a wooden pallet or pieces of thick cardboard to prevent acids in the concrete from corroding the bottom of the tank. With proper handling, most tanks will last for years; however, all liquid nitrogen tanks will eventually fail due to aging and loss of vacuum. The first indication of tank failure is an accumulation of thick, icy frost around the neck or vacuum fitting at the top of tank, caused by liquid nitrogen evaporation. Even a well maintained tank eventually will need to be refilled or recharged with liquid nitrogen. Monitor the level of nitrogen in the tank with a dip-stick twice a month, and keep a simple log to detect any drastic changes in nitrogen levels. The rule of thumb is that to avoid damage to stored semen, refill the tank before the liquid nitrogen level falls below 2 inches. A tank that is allowed to “go dry“requires almost twice as much liquid nitrogen when recharging.

The AI kit: a well maintained insemination kit or box should always be clean and free of dirt, dust, and manure. Unsanitary equipment increases the chances of introducing infection into a cow’s sterile uterus. The basic kit should contain the following:

- A warm-water thaw unit with thermometer
- Scissors or citocutter
- Tweezers
- Two stainless-steel inseminating guns with o-rings
- Plastic disposable split sheaths with green adaptor
- Plastic disposable shoulder-length gloves
- Paper towels
- AI lubricant in small squirt bottle (detergents or soaps are spermaticides)
- 95% alcohol in small plastic jar

• Pen and writing paper

• Eye-protection glasses

Any deviation from this basic AI equipment will impede a trained technician from practicing proper semen handling techniques. Always check to ensure that the AI kit is completely stocked before proceeding with thawing semen.

Proper semen handling for AI technicians: The primary objective of proper semen handling is to optimize conception by preserving sperm fertility until insemination has taken place. A technician's goals include minimizing the time of exposure of semen to extreme fluctuations in temperature and direct sunlight (ultraviolet light destroys semen) and preventing contamination with manure, water, detergents, and other substances. The most common technical mistakes that compromise the quality and fertility of sperm include the following.

Improper thawing temperature and thaw time for frozen semen: Thaw semen straws in warm water (95–98°F) for a minimum of 45 seconds. Always check the ware temperature in the thawing device before pulling a frozen straw from the liquid nitrogen tank. Monitor thaw time with a watch or timer that has a second indicator. Never thaw semen in your shirt pocket.

Improper retrieval of frozen straws from a liquid nitrogen tank: Always keep the canister below the frost line when locating a straw of semen. Avoid lifting the canister too high or too long during this process. If the semen unit cannot be located within 5–10 seconds, drop the canister back into the tank and try again. Keep a frequently updated semen inventory with the tank for quick location of bull numbers. Use monitor ampoules available from some AI companies to determine whether semen handling is impacting conception rates. The set consists of two colored ampoules that "trip" at different temperatures, one at exposure time of more than 30 seconds (blue) and the other suggesting semen damage (red). If the blue ampule is tripped, the technician needs to be retrained in semen handling procedures. If both ampules are tripped, have semen checked immediately because damage due to improper thawing of frozen semen may have occurred (Figure 2).

Thawing too many straws at once or taking too long to inseminate cows Thaw only one straw at a time. Research conducted in Hawai'i has shown that thawing multiple straws lowered conception rates (C.N. Lee et al. 1997). Once a straw is thawed, it is recommended that the semen be deposited into the cow within 15 minutes.

Straws not properly dried after removal from warm water thaw: Always wipe the straw completely dry with a clean paper towel before loading it into the inseminating syringe. water is extremely lethal to semen.

Semen not protected from direct sunlight: whenever handling semen always protect straw from ultraviolet light with a clean paper towel to prevent sperm cell damage.

Failure to warm up syringe gun on cold days or to keep cool on hot, sunny days: Cold or hot shock to semen results in damage to morphology and motility of sperm.

Using bare hands to retrieve straws from liquid nitrogen tank: Use tweezers rather than fingers to pull semen from canes. This is primarily for the safety of the technician. Liquid nitrogen can cause severe “cold burns” or frostbite.

Semen straw not properly cut open or not fitted correctly into green adaptor: Straws need to be cut at a straight across, not at an angle, at the crimped sealed end and snapped snuggly into green adaptor of a plastic split sheath to prevent semen back flushing into breeding gun during insemination.

Use of soap or detergent as a lubricant: Soaps and detergents are lethal to semen. Always use an approved non-spermicidal AI lubricant when breeding cattle.

Plunger not pulled back before loading insemination gun: Always pull back the plunger approximately 6 inches before loading a straw into a semen gun. Not doing so will cost a unit of semen.

Fast or rough depression of plunger to deposit semen into the cow: Use a slow, gentle motion to depress the plunger on the inseminating gun. Complete depression should be ac complished in no shorter than 5 seconds.

Failure to use an o-ring on the inseminating gun: Always lock the split plastic sheath into place on the inseminating gun with an o-ring. Otherwise, the sheath will slip, leading to improper semen placement during insemination of the cow.

Sheaths left out in hot weather :Always store plastic sheaths in a cool place out of direct sunlight to avoid irreversible shrinking and curling of plastic sheaths, which renders them unusable.

Taking shortcuts during insemination: It is highly recommended that all technicians attend an annual refresher course before the breeding season begins. Check that all equipment is functioning properly and all supplies are stocked to avoid makeshift improvisations that may undermine a successful AI program. Always wear covered shoes when working with cattle.

Self-Check –N3	Written Test

Name_____ Date_____

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

1. Define Liquid nitrogen storage tank**?** (4pt)

2. Discuss the objective of Proper semen handling for AI technicians**?** (4pt)

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Short Answer Questions

1._____

2._____

4.4. **Deposit semen in the uterus safely**

The recto-vaginal technique is the most commonly used method to artificially inseminate cattle. The basic skills required to perform this technique can be obtained with about three days practice under professional instruction and supervision.

Additional proficiency and confidence will be achieved with further work on your own.

Step1. In the insemination process is to restrain the animal to be inseminated.

There are several things to keep in mind when choosing a location for inseminating cattle Including:

- Safety of both the animal and the inseminator.
- Ease of use.
- Shelter from adverse weather.

Regardless of whether you are left or right handed, it is recommended that you use your left hand in the rectum to manipulate the reproductive tract and the right hand to manipulate the Insemination gun. This is because the rumen or stomach of the cow lies on the left side of the abdominal cavity, displacing the reproductive tract slightly to the right. Thus, you will find it much easier to locate and manipulate the tract with your left as opposed to right hand.

A gentle pat on the rump or a soft-spoken word as you approach for insemination will help to avoid startling or surprising the animal. Raise the tail with your right hand and gently massage the rectum with the lubricated glove on your left hand. Place the tail on the back side of your left forearm so it will not interfere with the insemination process. Cup your fingers together in a pointed fashion and insert your hand in the rectum, up to the wrist. Gently wipe the vulva with a paper towel to remove excess manure and debris. Be careful not to apply excessive pressure, which may smear or push manure into the vulva and vagina.

With your left hand make a fist and press down directly on top of the vulva. This will spread the vulva lips allowing clear access to insert the gun tip several inches into the vagina before contacting the vaginal walls. Insert the gun at a 30º upward angle to avoid entering the urethral opening and bladder located on the floor of the vagina. With the gun about 6 to 8 inches inside the vagina, raise the rear of the gun to a somewhat level position and slide it forward until it contacts the external portion of the cervix. You will note a distinct gristly sensation on the gun when it contacts the end of the cervix. The cervix consists of dense connective tissue and muscle and is your primary landmark for inseminating cattle. It has often been described as having the size and consistency of a turkey neck. The size will vary, with post partum interval and age of the animal. The cervix usually has three or four annular rings or folds. The opening into the cervix protrudes back into the vagina. This forms a 360º blind-ended pocket completely around the cervical opening. This pocket is referred to as the fornix.

In most cows, the cervix will be located on the floor of the pelvic cavity near the anterior end of the pelvic bone. In older cows with large reproductive tracts, the cervix may rest slightly over the pelvic bone and down into the abdominal cavity. To become a successful inseminator it is very important that you always know where the tip of the insemination gun is located. The walls of the vagina consist of thin-layered muscle and loose connective tissue. The insemination gun can be easily felt with your palpating hand. As you insert the breeding gun into the vagina, keep your gloved hand even with the gun tip. Manure in the rectum can often interfere with your ability to palpate the cervix and gun tip. However, it is seldom necessary to remove all the manure from the bowel. Instead, keep your open hand flat against the floor of the rectum, allowing the manure to pass over the top of your hand and arm. While handling the cervix you may notice rectal constriction rings attempting to force your arm from the cow. To relax these rings, place two fingers through the center of a ring and massage back and forth. The constriction ring will eventually relax, pass over your hand and arm, and you can continue the palpation process. Because the reproductive tract is freely movable, cows that have strong rectal and abdominal contractions in response to being palpated may actually push their reproductive tract back into the pelvic cavity. This will cause many folds to form in the vagina.In such cases, the insemination gun will often get caught in these folds and little or no progress will be made until they are removed. If you can locate the cervix, grasp it and push it forward. This will straighten the vagina and the gun should pass freely up to the cervix. If you cannot locate the cervix, encircle the gun tip with your thumb and forefingers. With a straightening motion of your wrist, gently “milk” the folds out of the vagina a little at a time. Slide the gun forward and repeat the process until the cervix is reached. At this point it is important for you to understand that inseminating a cow is a two-step process.

The first step is to get the gun tip to the cervix. To accomplish this you must work the vagina and cervix forward, away from you to straighten the vaginal folds. If you do not feel the gristly sensation of the cervix On the gun, you are still in step One of the process.

Once the gun is in contact with the external surface of the cervix You are ready to begin step2.

Step 2. You place the cervix on or over the insemination gun. That is right, the cervix is placed on the gun, the gun is not passed through the cervix. Excessive movement or probing with the insemination gun during the second step is seldom productive and in fact, is very often counterproductive. Ground gained is often lost and we find ourselves back in a vaginal fold. The key to Mastering step 2 of the insemination process is to know how to hold and Manipulate the cervix and concentrating on doing the work with the hand inside the cow, not the one holding the gun. When the gun first contacts the cervix, you will usually find that the

tip is in the fornix directly over top of the opening. Grasp the external opening to the cervix with the thumb on top and forefingers underneath.

This closes the fornix at Top and bottom. As in step 1 we must still know the location of the gun tip. This is accomplished with the palm and third and fourth fingers of your palpating hand. Use your palm and these two fingers to guide the gun tip to the cervical opening located between your thumb and fore fingers. With gentle probing the opening should be located. You will feel the gun slide forward until it contacts the second cervical ring. Maintain gentle but steady or ward pressure on the gun and slide your thumb and forefingers just in front Of the gun tip and re-grasp the cervix. Because the cervix is composed of dense Connective tissue and muscle, it is difficult to clearly distinguish the gun tip when it is located within this structure. However, you can determine the approximate Location by bending the cervix. Using the flexibility of your wrist, twist and bend the cervix until you feel the second ring slide over the gun tip. Repeat the process until all the rings have been passed over the gun tip. In some cases, it may be necessary to bend the cervix at a 90º angle to clear the cervical folds. Remember, you are placing the cervix over the gun, not the gun through the cervix. A slight jiggle or “give-and-go” of the gun may sometimes be necessary to help pass by a fold, but for the most part gentle forward pressure is all that is necessary and gun movement should be minimal. When all rings of the cervix have been cleared, the gun should slide forward freely with little resistance. Since the uterine wall is very thin, you will once again be able to clearly feel the insemination gun. You are now ready to check your placement and deposit the semen. Rotate your gloved hand until it lies on top of the cervix. With your index finger, locate the far end of the cervix. Pull back on the gun until you feel the tip directly underneath your finger near the internal opening of the cervix. Raise your finger and slowly deposit the semen. Push the plunger slowly so that drops of semen fall directly into the uterine body. With proper A.I. technique and gun placement, semen will be deposited in the uterine body. Uterine contractions will then transport spermatozoa forward to the horns and oviducts with a good distribution of both sides. When the insemination gun is more than 1” through the cervix, all the semen will be deposited in only one horn.

This creates a situation of uneven semen distribution. Should the animal ovulate from the opposite horn, conception rates may be compromised. Be sure to raise your finger after checking gun placement. Not doing so may obstruct one horn, again creating a situation of uneven semen distribution. When checking gun tip placement, be careful not to apply excessive pressure. The delicate uterine lining is easily damaged, predisposing the cow to uterine infections and reduced fertility.

Make sure you push in with the plunger and do not pull back on the gun.

Pulling back may result in much of the semen dose being deposited in the cervix and vagina instead of the uterine body.

Although the recommended site of semen deposition is in the uterine body, research suggests that when exact gun tip placement is in doubt, depositing semen slightly into one uterine horn is less likely to compromise fertility than cervical deposition. However, If the cervical mucous of a cow which has been previously inseminated feels thick and sticky on the gun, she may be pregnant. In this case deposit the semen about halfway through the cervix. After properly depositing semen, slowly pull the gun from the reproductive tract. Remove the gloved hand from the rectum and shake off the excess manure. Check the gun tip for signs of blood, infection or semen leakage inside the sheath. Make notes for your veterinarian or future reference where appropriate. Remove the sheath from the gun and hold it in the gloved hand. For the final time, check to confirm which bull you have used. Remove the glove starting at the top of your arm by turning it inside out as you remove it. Remove air from the glove and tie a knot at the open end to trap manure, the sheath and dirt Inside. Dispose of the used glove in a proper receptacle. Wipe the gun clean and dry and return it to the proper storage location. Some of the most important aspects to remember when inseminating a cow to Attain maximum breeding efficiency are:

• Be gentle. Don’t use too much force.

• Insemination is a two-step process. Get the gun to the cervix, and then Place the cervix over the gun.

• Deposit the semen just through the cervix into the uterine body.

• Take your time.

• Relax.

When the insemination gun is more than 1” through the cervix, all the semen Will be deposited in only one horn.

Correct insemination procedures will result in better breeding efficiencies.

More selection pressure can then be placed on economic traits such as milk and beef production enabling you and your family to realize a higher return on your semen investment dollars.

1. Because the rumen displaces the reproductive tract to the right, it is much easier to locate and manipulate the tract with your left

2. The opening into the cervix protrudes back into the vagina.

3. The cervix is located on the floor of the pelvic cavity near the anterior end of the pelvic bone.

4. As you insert the breeding gun into the vagina, keep your gloved hand even with the gun tip.

5. Keep your open hand flat against the floor of the rectum, allowing manure to pass over the top of your hand and arm.

6. To relax rectal constriction rings, insert two fingers through the center of the ring and massage back and forth

7. Grasp the cervix and push it forward to straighten vaginal Folds.

8. Grasp the external opening to the cervix with the thumb on

Top and the forefingers underneath to close the fornix and Guide the gun tip into the cervix. Use your

9. Using the flexibility of your wrist, twist and bend the cervix Until you feel the second ring slide over the gun tip.

10. Use your index finger to check gun placement (1/4 inch Past the end of the cervix) before depositing semen.

11. Push the plunger slowly so that drops of semen fall directly Into the uterine body.

Self-Check –N4	Written Test

Name_____ Date_____

Answer all the questions listed below.

Part one: Choose the best answer

1. Which one is include about the choosing a location for inseminating cattle? (3pt)

A. Safety of both the animal and the inseminator. B. Ease of use.

C. Shelter from adverse weather. D. All

2. Which one of the following are correct insemination procedures step1, step2 and step3

A. Because the rumen displaces the reproductive tract to the right, it is much easier to locate and manipulate the tract with your left

B. The opening into the cervix protrudes back into the vagina

C. The cervix is located on the floor of the pelvic cavity near the anterior end of the pelvic bone.

D. All

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

Answer Sheet

Score = _____

Rating: _____

Choose the answer Questions

1.
2.

InformationSheet-5	Clean material and disposing waste

4.5. Definitionof cleaning

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.

Cleaning occurs in various commercial, domestic, personal, and environmental contexts, which differ in scale and requirements.

- Commercial cleaning
  - Terminal cleaning, in healthcare settings
- Environmental remediation, the removal of pollution or contaminants from the natural environment
- Housekeeping, including spring cleaning
- Hygiene, including personal grooming

Cleaning is broadly achieved through mechanical action and/or solvent action; many methods rely on both processes.

- Washing, usually done with water and often some kind of soap or detergent
  - Pressure washing, using a high-pressure stream of water
- Abrasive blasting, typically used to remove bulk material from a surface, may be used to remove contaminants as well
- Acoustic cleaning, the use of sound waves to shake particulates loose from surfaces
  - Ultrasonic cleaning, using ultrasound, usually from 20–400 kHz
  - Megasonic cleaning, a gentler mechanism than ultrasonic cleaning, used in wafer, medical implant, and industrial part cleaning
- Carbon dioxide cleaning, a family of methods for parts cleaning and sterilization using carbon dioxide in its various phases
- Dry cleaning of clothing and textiles, using a chemical solvent other than water
- Flame cleaning of structural steel with an oxyacetylene flame
- Green cleaning, using environmentally friendly methods and products
- Plasma cleaning, using energetic plasma or dielectric barrier discharge plasma created from various gases

- Sputter cleaning, performed in a vacuum by using physical sputtering of the surface
- Steam cleaning, in both domestic and industrial contexts
- Thermal cleaning, in industrial settings, involving pyrolysis and oxidation
- Wet cleaning, methods of professional laundering that avoid the use of chemical solvents

Self-Check 5	Written Test

Name: _____ Date: _____

1. Define cleaning (3pt) ?
2. Write down the methods of cleaning (3pt) ?

Note: Satisfactory rating 6 points unsatisfactory-below 6 points.

Answer Sheet

Score = _____

Rating: _____

Short Answer Questions

1._____

2._____

Operation sheet-4	Some of the most important aspects to remember when inseminating a cow to attain maximum breeding efficiency

Procedures

Step1. Be gentle. Don’t use too much force.

Step2. Insemination is a two-step process. Get the gun to the cervix, and then

Place the cervix over the gun.

Step3. Deposit the semen just through the cervix into the uterine body.

Step4. Take your time.

Step5. Relax.

Operation sheet-4	Correct insemination procedures

Step1. Because the rumen displaces the reproductive tract to the right, it is much easier to locate and manipulate the tract with your left

Step2. The opening into the cervix protrudes back into the vagina

Step3. The cervix is located on the floor of the pelvic cavity nearthe anterior end of the pelvic bone.

Step4. As you insert the breeding gun into the vagina, keep your gloved hand even with the gun tip

Step5. Keep your open hand flat against the floor of the rectum,allowing manure to pass over the top of your hand and arm.

Step6. To relax rectal constriction rings, insert two fingers throughthe center of the ring and massage back and forth

Step5.Grasp the cervix and push it forward to straighten vaginalfolds.

Step7.Grasp the external opening to the cervix with the thumb on top and the forefingers underneath to close thefornixandguide the gun tip into the cervix.Use your

Step8.Using the flexibility of your wrist, twist and bend the cervixuntil you feel the second ring slide over the gun tip.

Step9.Use your index finger to check gun placement (1/4 inchPast the end of the cervix) before depositing semen.

Step10.Push the plunger slowly so that drops of semen fall directlyinto the uterine body.

By

LAP TEST	Practical Demonstration

Name: _____ Date: _____
Time started: _____ Time finished: _____

Task1. Make insemination following the most important aspects to inseminate a cow

Task 2. Follow the correct insemination procedures

List of Reference Materials

1. Peters, J. L., P. L. Senger, J. L. Rosenberger, and M. L. O'Connor, (1984) "Radiographic evaluation of bovine artificial insemination technique among professional and herdsmen-inseminators." *Journal of Animal Science* 59, 1671.

2. Gallagher, G. R., and P. L. Senger, (1989). "Concentrations of spermatozoa in the vagina of heifers after deposition of semen in the uterine horns, uterine body, or cervix." *Journal of Reproduction Fertilization* 86,1

3. waste disposal

4.https://int.search.myway.com/search/GGmain.jhtml?p2=%5EY6%5Expv191%5ETTAB03%5Eet&ptb=525AC829-7141-4C2F-944F-9DC79147FF80&n=785821a8&cn=ET&ln=en&si=gset1ad3&tpr=hpsb&trs=wtt&brwsid=&searchfor=Deposit+semen+in+the+uterus+safely&st=tab

5.https://int.search.myway.com/search/GGmain.jhtml?p2=%5EY6%5Expv191%5ETTAB03%5Eet&ptb=525AC829-7141-4C2F-944F-9DC79147FF80&n=785821a8&cn=ET&ln=en&si=gset1ad3&tpr=hpsb&trs=wtt&brwsid=cfaf7e1f-dfd2-4249-b61f-9248bb2e5c40&searchfor=Clean+material+and+disposing+waste&st=tab

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ARTIFICIAL INSEMIATION

NTQF Level -II

Learning Guide #30

Unit of Competence: - Assist AI Technique and Semen Handling

Module Title: - Assisting AI Technique and Semen Handling

LG Code:- AGR ATI2 M08 0919 LO–#-5-LG-–#-5

TTLM Code:- AGR ATI2TTLM 0919v1

LO-5 Assess quality of semen

Instruction Sheet	Learning Guide #-5

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

- ✓ Assessing the quality of semen before, during, after production and at field levels.
- ✓ Doing work according to Occupational Health and Safety (OHS)

This guide will also assist you to attain the learning outcome stated in the cover page.
Specifically, upon completion of this Learning Guide, you will be able to –

- ✓ Assess the quality of semen before, during, after production and at field levels.
- ✓ Do work according to Occupational Health and Safety (OHS)

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information “Sheet 1, and Sheet 2,”
4. Accomplish the “Self-check 1, and Self-check t 2,” **in page -78, and 80** respectively.
5. If you earned a satisfactory evaluation from the “Self-check**.**
6. Do the “LAP test” **in page –** (if you are ready)

InformationSheet-1	Assess the quality of semen before, during, after production and at field levels.

5.1. Assess the quality of semen before, during, after production and at field levels.

5.1.1Semen quality

Semen quality is a measure of the ability of semen to accomplish fertilization. Thus, it is a measure of fertility in a man. It is the sperm in the semen that is of importance. Semen quality involves both sperm quantity and quality. Decreased semen quality is a major factor of male infertility.

Cryptorchidism, hypospadias, testicular cancer and poor semen quality make up the syndrome known as testicular dysgenesis syndrome.

Male fertility and semen evaluation is of paramount importance as its semen is used to breed a number of females.

Many of semen centers has made its mandatory to evaluate the semen in accordance to central monitoring for semen station.

Assessing quality before semen is used reduces time and resources involved. Evaluated as soon as possible after collection to avoid the changes due to exposure to light chemicals lubricants etc, hence forth, vitality, motility and morphology of spermatozoa are in the initial quality parameters judging semen quality.

Self-Check 1	Written Test

Name: _____ Date: _____:

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

1. Define male fertility and semen evaluation (2pt) ?

2. Discuss semen quality(3pt) ?

Note: Satisfactory rating 5 points unsatisfactory-below 5 points.

Answer Sheet

Score = _____

Rating: _____

Short Answer Questions

1._____

2._____

3._____

InformationSheet-2	Do work according to Occupational Health and Safety (OHS)

5.2. Do work according to Occupational Health and Safety (OHS)

A health and safety program is a definite plan of action designed to prevent accidents and occupational diseases. Some form of a program is required under occupational health and safety legislation in most Canadian jurisdictions. A health and safety program must include the elements required by the health and safety legislation as a minimum.

Because organizations differ, a program developed for one organization cannot necessarily be expected to meet the needs of another. This document summarizes the general elements of a health and safety program. This approach should help smaller organizations to develop programs to deal with their specific needs.

Is one of most important aspects of human concern? It aims an adaptation of working environment to workers for the promotion and maintainance of high degree of physical, mental and social well being of workers in all occupations

5.2.1 Policy statement

An organization's occupational health and safety policy is a statement of principles and general rules that serve as guides for action. Senior management must be committed to ensuring that the policy is carried out with no exceptions. The health and safety policy should have the same importance as the other policies of the organization.the policy statement can be brief, but it should mention:

- Management's commitment to protect the safety and health of employees.
- The objectives of the program.
- The organization's basic health and safety philosophy.
- Who is accountable for occupational health and safety programs?
- The general responsibilities of all employees.
- That health and safety shall not be sacrificed for expediency.
- That unacceptable performance of health and safety duties will not be tolerated.

The policy should be:

i. Stated in clear, unambiguous, and unequivocal terms.
ii. Signed by the incumbent Chief Executive Officer.
iii. Kept up-to-date.
iv. Communicated to each employee.
v. Adhered to in all work activities.

Self-Check 1	Written Test

Name: _____ Date: _____

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

1. Defineand discuss OHS (3pt)?
2. Define and discuss safety(2pt)?
3. What is the policy statement (4pt)?

Note: Satisfactory rating 5 points unsatisfactory-below 5 points

Answer Sheet

Score = _____

Rating: _____

Short Answer Questions

1._____

2._____

3._____

List of Reference Materials

1.Levine, Hagai; Jørgensen, Niels; Martino-Andrade

2.https://www.ccohs.ca/oshanswers/hsprograms/basic.html

ARTIFICIAL INSEMIATION

NTQF Level -II

Learning Guide #31

Unit of Competence: - Assist AI Technique and Semen Handling

Module Title: - Assisting AI Technique and Semen Handling

LG Code:- AGR ATI2 M08 0919 LO6-LG-6

TTLM Code:- AGR ATI2TTLM 0919v1

LO-6 Record data and clean up on completion of work

Instruction Sheet	Learning Guide #-6

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

- ✓ Recording data on semen collection.
- ✓ Supplying information to relevant authorities to promote research and improvements.
- ✓ Disposing waste
- ✓ Keeping clean-up work site, reusable equipment and materials on completion of work.

This guide will also assist you to attain the learning outcome stated in the cover page.
Specifically, upon completion of this Learning Guide, you will be able to –

- ✓ Record data on semen collection.
- ✓ Supply information to relevant authorities to promote research and improvements.
- ✓ Disposing waste
- ✓ Keep clean-up work site, reusable equipment and materials on completion of work.

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information “Sheet 1, and Sheet 2, Sheet 3, Sheet 4 ”
4. Accomplish the “Self-check 1, and Self-check t 2, check t 3 check t 4” **in page -87, 90,93,and 95**respectively.
5. If you earned a satisfactory evaluation from the “Self-check**.**
6. Do the “LAP test” **in page –** 98 (if you are ready)

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Information Sheet-1	Record data on semen collection

6.1.Record data on semen collection

- The information, such as date of AI, semen types, bull ID, breed, semen production date, month of AI, name of AI centre and **sperm motility** percentage, date of return for repeated AI after the first insemination etc. were included in this format.
- Bull ID/name of bull was given by Central Artificial Insemination Laboratory (CAIL) at CCBSDF, Savar, Dhaka, Bangladesh on the basis of breeds of bull viz. pure breed, cross-bred, local breed, sources of bull/semen, pedigree of bull etc. The management systems of these bulls were maintained as per recommendation of CCBSDF, Savar, Dhaka. Feeding and management system in three AI centres/stations were more or less uniform throughout the experiment. All the bulls of the AI centres/stations were kept in similar housing and management. The bulls were housed individually in pens with sufficient cross ventilation and protected from hot-sun and heavy rainfall to avoid abrupt fluctuation of their body temperature during the whole period. The bulls were exercised once in a week in the form of running on the field. No bull was affected with remarkable diseases. The bulls of three centres were regarded as clinically healthy and free from any significant abnormalities. The bulls were vaccinated routinely against Anthrax, HS, Blackleg, and FMD and dewormed against Fascioliasis and Roundworm.
- **Semen types, Semen processing and preservation procedure:** Two types of semen (chilled and frozen) were produced from 3 AI centres/stations and used randomly for AI at greater Rajshahi.
- **Chilled semen:** District AI centre, Rajshahi, routinely used Egg yolk- citrate extender for processing of chilled semen.
  The semen was diluted to obtain $20x10^6$ progressive motile spermatozoa per ml i.e., an insemination dose. Individual insemination doses were transferred into glass vial, covered by cork and preserved at +4 to 8°C until used. Semen showing less than 50% motility after processing was not preserved for AI.
- **Frozen semen:** For frozen semen at Central AI laboratory, CCBSDF, Savar, Dhaka and RDCIF, Rajabarihat Egg-yolk Tris- fructose acid glycerol extender were used routinely. The semen diluent contained 6.4% (v/v) glycerol and $30x10^6$ spermatozoa per 0.25 mL i.e., one individual dose.

Individual insemination doses were succeed in 0.25 mL French straws and the straws were preserved in liquid nitrogen (-196°C) in cryocan. Only semen straw showing that ≥40 % post thaw motility was preserved for AI.

- **Gradation of semen quality:** The bull semens were graded as best, good and poor quality based on pre-set criteria on semen evaluation data given in Table 1.
- If semen characteristics from a bull did not meet any one or more criteria mentioned in the above table, it was classified as good or poor. The values set in the criteria were the mean of 5-10 sample of individual bulls. The gradation of bulls was completed before analyzing fertility data.

Record data on semen collection and freezen

NAME OF THE SEMEN OWNER:
KENNEL NAME:
STREET ADDRESS:
CITY OR STATE OR ZIP:
TELEPHONE NUMBER: **FAX NUMBER:**

STUD IDENTIFICATION		
REGISTER NUMBER:		
REGISTRATION NUMBER:		
BREED:	COLOR:	DOB:
TATTOO OR MICROCHIP :		
SIRE REG. NAME:		
SIRE REG. NUMBER:		
DAM REG. NAME:		
DAM REG. NUMBER:		
POSITIVE IDENTIFICATION CONFIRMED:		

As owner or agent owner of the above mentioned stud dog ihere by authorize representatives of south mesa of veterinary hospital to collect, freeze and store the semen from said stud dog pursuant to to terms specified in the collection contract.

Signature_____

Date_____

COLLECTION DATA				
DATE	**STRAW IDENTIFICATION**	**FROZEN**	**STRAWS (EVAL)**	**NET STORED**

SEMEN COLLECTION LOCATION
DATA:
ADDRESS:
CITY OR STATE OR ZIP:
TELEPHONE NUMBER: **FAX NUMBER:**

6.1.1. Definition of data is facts or information used usually to calculate, analyze or plan some thing

Self-Check 1	Written Test

Name: _____ Date: _____

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

1. Define data? (2pt)
2. Differentiate chilled semen and frozen semen? (4pt)

Note: Satisfactory rating 6 points unsatisfactory-below 6 points

Answer Sheet

Score = _____

Rating: _____

Short Answer Questions

1._____

2._____

3._____

Information Sheet-2	Supply information to relevant authorities to promote research and improvements

6.2. Supply information to relevant authorities to promote research and improvements

6.2.1 Dairy Research

Dairy in Ethiopia is dominantly based on cattle milk and to some extent from camels and goats, particularly in the pastoral systems. The main form of production issmallholder low input systems. The urban and peri-urbandairy system is market oriented with improved breeds,feeding systems, health and husbandry practices. Most farmers keep cattle as a dual purpose animal to producemilk, meat and primarily for provision of draft power to support crop production. The objective of the national dairy research program is to improve the overall dairyproductivity, through generating appropriate technologies of genotype, feeding, health, product processing, socioeconomics and marketing components of the commodity and demonstrate successful practice to farmers and different relevant actors. Market oriented dairy development will be the major focus area in the country, where dairy productivity will be improved through creating a system where efficient provision of inputs and services, strong market linkages through involving the private partners is strengthened so that the system is eventually sustainable.

Achievements: The major research achievements on dairy is introduction and adaptation of exotic dairy breed sin to the country, and development of cross breeds, particularly crosses of local boran cattle with that of Jerseyand Holstein Friesian breeds, manageable and profitable for small scale commercial farmers in urban and periurban areas of the country. Adequate information has been generated on the production system in the differentareas. Improved management and husbandry practices of local dairy cattle though putting them into sustained applications and improvement of local genotypes have still faced challenges. Furthermore, several technologies and associated information of feeds, nutrition, health improvements, dairy processing of dairy cattle have been developed, demonstrated and disseminated to farmers and small scale dairy cooperatives. Some information on dairy marketing is also available. Preliminary adoption studies showed large number of farmers in the different areas has successfully changed their livelihood and living standards through adoption of improved dairy production practices.

Future Directions: Despite the research endeavors on dairy improvement so far, success has been limited to specific areas and beneficiaries, leaving the national demand still at a greater gap even for household consumption. Major constraining reasons are substantially examined and/or understood. Taking these facts in to account, dairy improvement in the future is expected to look into improvement specificities such as intensive farming, breed, reproduction, feeding system, health, artificial insemination, dairy value chain and marketing depending on predicted food demands and policy directions on milk and meat improvement in Ethiopia. While working on the long term strategy, demonstration and dissemination of available technologies are the major directions. The issue of technology multiplication like heifers and forage seeds are important areas to address.

Self-Check 1	Written Test

Name: _____ Date: _____

Answer all the questions listed below.

1. Discuss about the dairy research? (4pt)

Note: Satisfactory rating 10 points unsatisfactory-below 10 points

Answer Sheet

Score = _____

Rating: _____

Short Answer Questions

1._____

2._____

3._____

Information Sheet-3	Disposing waste

6.3. Disposing waste

6.3.1 Disposal of farm waste must be managed with caution prior to disposal. Securely store waste in a closed, and possibly locked, area or container to ensure safety for family, livestock, pets and wildlife. on-farm dumps, though generally not recommended, can be used exclusively for the disposal of small amounts of inert materials. The dump should be located on a naturally dry site, and be fenced to prevent entry by children and animals.

6.3.2.Disposal of dead Animalssome death loss will occur on cow/calf operations, no matter how well they are managed. Disposing of dead animals quickly and effectively is important to reduce the risk of disease. It is also important in maintaining good neighbor relations. Carcasses can be a source of disease if scavenged by wildlife or pets. Some of these diseases can then be passed back to livestock or even humans. Carcasses are also unsightly, a source of odour and a breeding site for flies.

Disposal of dead animals must occur within 48 hours of death unless the carcass is frozen. Disposal of any animal suspected to have died from a reportable disease must be done in accordance with the Health of Animals Act(Canada).

6. 3.3. The disposal options permitted in Alberta are:

- Transportation to a rendering plant for disposal.
- Burial in farm pit.
- Burning within regulations.
- Composting.
- Sending to a Class I or II landfill.
- Natural disposal (except for animals that have been euthanized with drugs and chemicals).

6.3.4. Managing dead animal disposal

Rendering dead animals must be picked up by rendering plants within 48 hours of death. The carcass must be stored until pickup.

6.3.5. When storing carcasses:

- Select a site for the storage area close to the farm entrance to minimize the need for collection vehicles to enter the property.
- Use an area that will minimize the spread of disease. For example, do not store the carcass near a waterway or water body or where it will be easily scavenged.
- Use special storage bins or refrigeration until the carcass can be picked up.

Self-Check 1	Written Test

Name: _____ Date: _____

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

1. Discuss the dead animals? (6pt)
2. How can you manage dead animals? (6pt)
3. How can you managedisposal of farm waste? (7pt)

Note: Satisfactory rating 16 points unsatisfactory-below 16 points

Answer Sheet

Score = _____

Rating: _____

Short Answer Questions

1._____

2._____

3._____

Information Sheet-4	Keep clean-up work site, reusable equipment and materials on completion of work

6.4. Keep clean-up work site, reusable equipment and materials on completion of work

Housekeeping practices are part of the workplace quality program as well as the safety program. Poor housekeeping practices such as inadequate cleaning of work areas and equipment may lead to a build-up of bacteria that could contaminate meat product. Good housekeeping is also fundamental to maintaining a clean, tidy and safe working environment. This factsheet focuses on the safety aspects of housekeeping.

In addition, good housekeeping practices generally reflect good management practices and pride in the workplace, signaling that the company cares about safety. This is important in an industry that needs to win and maintain the trust of the general public that the company can consistently produce quality product to customer specifications. Worksites that have poor housekeeping practices with rubbish, waste and broken items around the grounds and a general appearance of poor maintenance do not instil confidence in consumers about the products produced on site.

Poor housekeeping practices may cause accidents in the workplace and/or provide fuel for fires. Poor housekeeping practices may lead to slips, trips and falls. These accidents may be the result of:

- poor maintenance practices
- inadequate cleaning practices
- cracked and uneven floors
- work areas and walkways blocked by waste, equipment, unused items, broken items etc
- spills
- hoses and equipment lying around
- product overflow
- waste that hasn’t been disposed of
- items that haven’t been put away
- inadequate storage facilities
- rubbish that hasn’t been disposed of
- broken items such as broken pallets stacked up against walls

Self-Check 1	Written Test

Name: _____ Date: _____

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

1. When you conclusion on your work how you cleaning the materials? (6pt)
2. How can you reusable equipment and materials

Note: Satisfactory rating 16 points unsatisfactory-below 16 points

Answer Sheet

Score = _____

Rating: _____

Short Answer Questions

1._____

2._____

3._____

Operation sheet 3	disposal options permitted in Alberta

Procedures

Step1. Dispose the transportation to a rendering plant

Step2. Burial in farm pit

Step3. Burning within regulations

Step4. Make Compost

Step5.sending to a Class I or II landfill

Step6. Make natural disposal

Operation sheet 3	storing carcasses

Procedures

Step1. Select a site for the storage area close to the farm entrance to minimize the need for collection vehicles to enter the property.

Step2. Use an area that will minimize the spread of disease. For example, do not store the carcass near a waterway or water body or where it will be easily scavenged.

Step3. Use special storage bins or refrigeration until the carcass can be picked up

LAP TEST	Practical Demonstration

Name: _____ Date: _____
Time started: _____ Time finished: _____

Task1 Make disposal options according to the permitted in Alberta

Task 2. Follow and make the procedure of dead animals according the storing carcasses

List of Reference Materials

1.https://scialert.net/fulltextmobile/?doi=pjbs.2006.2207.2214

2.Ethiopian Institute of Agricultural Research (EIAR). All Rights Reserved. Public Communication Directorate Tel: +251-116-454452/+251-116-454413 Fax:+251-116-461294/465412 E-Mail:eiar@eiar.gov.etP.O.Box: 2003 Addis Ababa Ethiopia

3.https://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/epw8724/$FILE/cowcalf_chapter10.pdf

4. Work Safe Victoria, Housekeeping http://www.worksafe.vic.gov.au/safety-and- prevention/small-business/12-ways-to-make-small-businesses-safer/housekeeping