

ARTIFICIAL INSEMIATION

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 LO1-LG-26

TTLM Code: AGR ATI2TTLM 0919v1

**LO1- Participate in a team of semen
production**

Instruction Sheet-1	Learning Guide -#26
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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, Self-check 3” in **page -6, 8 and 10** respectively.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1” in **page -13.**

1. Introduction

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.

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.

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.

The most common semen collection methods are:

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

NB. The detail information of the testing male fertility and preparing mail dairy animal for semen collection is discussed in Module seven (7) learning guide #23 LO2 Assist in collection, production and distribution of germ plasm on information sheet #4 (providing work support according to OHS requirements).

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 | ✓ Collection vial |
| ✓ Paper towels | ✓ Lubricant |
| ✓ Gloves | ✓ Teaser cow |
| ✓ Straw cutter | ✓ Artificial vagina |
| ✓ AI Rod | ✓ Collection vial |
| ✓ Teaser cow | ✓ Thaw bath |
| ✓ Sheath | ✓ Extender- Straws |



- Extender



- Artificial vagina



- Straw



- Straw cutter



- Al Rod



- Gloves



- Collection vial



- Thaw bath

Self-Check 1	Written Test
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Part One: Write short answer for the following questions

1. Write down how to take semen from bull? (2pt)
2. Write down the 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: _____

Name: _____

Date: _____

Short Answer Questions

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

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

2.1. Processing Semen by following the enterprise guide lines

This unit covers the routine process of collecting semen for artificial and technical operation within enterprise guidelines for Occupational health and data on semen collection is accurate and recorded according to enterprise requirements. Asperm bank, semen bank or cryobank is a facility or enterprise which purchases; stores and many states also have regulations in addition to those imposed by the FDA. In the European Union a sperm bank must have a license according to the EU Tissue Directive. In the United Kingdom, sperm banks are regulated.

Semen handling, developing through practice, the ability to properly prepare semen for insemination, according to the recommendations. Each enterprise may adapt different systems of production and management. The following factors may be considered while designing a livestock farm, the semen collection yard and processing laboratory should be close to the bull.

NB. The detail information of the processing and handling semen is discussed in Module seven (7) learning guide #23 LO2 Assist in collection, production and distribution of germ plasm on information sheet #5 (handling and distributing germ plasm).

Self-Check 2	Written Test
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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 5 points unsatisfactory-below 5 points.

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____

2. _____

3. _____

3.1 Selecting and checking Suitable PPE

3.2. 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, Arm length glove, foot protection (boots), head protection (sunhat and sunscreen).

Self-Check 3	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What does full PPE mean? (2)
2. Why is it important for health care workers to wear personal protective equipment? (3)
3. What is gown used in healthcare? (3)

Note: Satisfactory rating 7 points unsatisfactory-below 7 points.

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____

2. _____

3. _____

ARTIFICIAL INSEMIATION
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

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

- ✓ Use the required materials, tools and equipment
- ✓ Undertake work in a safe and environmentally appropriate manner
- ✓ Handle 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

- ✓ Using the required materials, tools and equipment
- ✓ Undertaking work in a safe and environmentally appropriate manner
- ✓ Handling 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, Self-check 3” in **page -14, 16 and 19** respectively.

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:

- ✓ artificial vaginas
- ✓ a glass drier and sterilizer
- ✓ a microscope with heated stage
- ✓ scales
- ✓ an oven
- ✓ a sterilizer
- ✓ a cold room
- ✓ a filler and sealer of semen vials
- ✓ a freeze tray
- ✓ liquid nitrogen refrigerators for cooling and storage
- ✓ a disinfecting bath
- ✓ 3 double boilers
- ✓ a spectrophotometer
- ✓ a hot plate
- ✓ a pH meter
- ✓ a distillator
- ✓ a glass washer
- ✓ a stove
- ✓ a magnetic stirrer
- ✓ a semen vial printer
- ✓ a thermocouple.

Self-Check 1	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page.

1. list at least five material and equipment used in handling semen (5)?

Note: Satisfactory rating 4 points unsatisfactory-below 4 points.

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____

	manner
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2.1. Undertake work in a safe and environmentally appropriate manner

This, in turn, means that animals should be provided with adequate environmental temperature and relative humidity can be affected and for some species, elevated relative humidity may affect an animal's ability to cope with thermal extremes and the bottom-most cages in racks and safe working conditions for personnel. Describes policies and procedures in place to ensure safety and health of employees within work place. Work safe environment Involves hazard identification and control according to government standards and ongoing safety training and education for employees.

Self-Check 2	Written Test
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1. Discuss work place safety (5pt)

Note: Satisfactory rating 4 points unsatisfactory-below 4 points.

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____

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

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 water 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 ampules available from some AI companies to determine whether semen handling is impacting conception rates. The set consists of two colored ampules 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. 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 snugly into green adaptor or 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 accomplished 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 -3	Written Test
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1. write-down the most common technical mistakes that compromise the quality and fertility of sperm. (8pt)

Note: Satisfactory rating 6 points unsatisfactory-below 6 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____

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-3 Collect History

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

- ✓ 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)

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 –

- ✓ 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)

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 2,3,4, and Sheet 5.
4. Accomplish the “Self-check 1, Self-check 2,3,4 and Self-check 5” in **page -24, 27,33,35 and 37** respectively.

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

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.

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.

1.2. Pregnancy

The state of carrying a developing embryo or fetus within the female body. Is defined as the state of carrying a baby in your uterus. 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.

Gestation The carrying of the young in the uterus. 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. In heifers the udder increases in size at four to five months and this is a sign of pregnancy. It is not normally evident in mature cows until one to four weeks before calving. From six months onward (later in fat cows), foetal movements may be seen through the abdominal wall. In some cows the foetal heart sounds may be heard from the seventh month with the aid of a stethoscope. Abdominal swelling is not usually noticeable until the later stages of pregnancy.

Signs of approaching parturition

Some signs are observable in cows and heifers, others in one or other.

- ✓ In cows, the udder enlarges one to four weeks before calving. This is not a reliable sign in heifers as the udder begins to develop halfway through pregnancy.
- ✓ Production of colostrum – a creamy or pink secretion – begins from the udder.
- ✓ The white stringy vaginal mucus becomes more profuse.
- ✓ The mucus plug in the cervix liquefies.
- ✓ The animal usually moves to a quiet spot away from the rest of the herd.
- ✓ Heifers may become restless and lose their appetite.
- ✓ Pelvic ligaments relax under the influence of relaxin, 24 to 48 hours before calving, making the tail appear to be set higher and causing a looser walking action, i.e. 'springing'.
- ✓ The vulva swells to six times its normal size.

Self-Check -1	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is deference between pregnancy and Signs of heat? (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. _____

Information Sheet-2	Gather information on last calving date, number and parity of calving
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2.1. 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

2.2. 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. 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 the last lactations and all seasons in every run and also using pedigree information.

Calving interval (CI) is the period between calving. The most productive interval is one year. In order to reach this optimal period, the cow should become pregnant with in three months after calving. It is calculated as the interval between two successive calving. It is an indicator of a cow's reproductive performance. The longer the calving interval is, the lower the average dairy milk production will be. The longer the dry period is, the longer you have to feed a cow that does not produce milk that bring the income loss which is not economical to the farmer. Therefore, to shortening the calving Interval means the cow should come in heat within 40 days after calving so that the farmer should:

- ✓ Give good management care that means feeding, housing and health care to the cows and assure that the cow is in good condition.
- ✓ Close follow up and pay attention to heat detection.
- ✓ Consult AI technician in time.
- ✓ The animal should be inseminated and/or served within 60 to 80 days after calving.
- ✓ Keep clear records
- ✓ Pregency test should be done after 2-3 month of insemination or service.

2.3. 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 and it 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.

2.4. Parity of calving

A relation between a 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
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Define the calving date (2pts)
2. Define calving number (2pts)
3. Define parity of calving (2pts)

Note: Satisfactory rating - 6 points

Unsatisfactory - below 6 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____

2. _____

3. _____

3.2. Identify breed type of animals

3.1.1. Cattle breeds of Ethiopia

1. Arsi

Location: Found in the central highlands of Ethiopia, in Arsi, Shewa, Bale, Sidamo and Harar.

Special Characteristic: Small compact animals, with thin prominent dewlap, and small short horns;

Main use: Work, Meat, Milk



2. Ethiopian Boran

Main Location: The main habitat of the Ethiopian Boran is the southern rangelands of Ethiopia, with the Borana pastoralists.

Characteristic: Basically a beef animal, with large and wide frame; weighs up to 500 kg; it is also a good milk providing most of the staples for the pastoral community.

Main use: Milk, Meat



4. Horo

Main Location: Inhabits the highlands of north-western Ethiopia, mainly in the Horro Gudru area of eastern Wollega as well as adjoining parts of western Shoa and Illubabor.

Characteristic: Coat colour is mainly brown or reddish brown; cervico-thoracic hump, small to medium



5. Ogaden

Main Location: Found in the Ogaden area of Somali region of eastern Ethiopia.

Characteristic: Similar to the Ethiopian Boran with well developed hump and large dewlap; horns are short; mainly used for milk, but are also good beef animals (Rege and Tawah, 1999).

Main use: Milk, Meat, Work



6. Raya-Azebo

Main Location: Found in the region east of Lake Ashange in Tigray and the bordering areas of Wello in north-eastern Ethiopia.

Special Characteristic: Similar to the Danakil, except that the Raya-Azabo is a slightly bigger animal,

Main use: Work, Milk, Meat



7. Sheko

Main Location: Inhabits the humid parts of south-western Ethiopia with the Sheko tribe around Bench zone

Characteristic: Believed to have some level of trypanotolerance.

Main use: Meat and work



8. Danakil

Main Location: Maintained by the Afar people in southern Eritrea, north-eastern Ethiopia (Tigray and Wollo), particularly the lower Awash river valley, and parts of Djibouti.

Special Characteristic: Large and slender body, with long lyre-shaped horns, they are very similar to the Raya-Azabo cattle

Main use: Milk, Meat, Work



3.1.2. Exogenous breed

1. Black and white Holstein

cows make up over 90% of the U.S. dairy herd. Some Holsteins are red and white, but, aside from color, indistinguishable from black and white Holsteins. The U.S. Holstein is well known around the world for her ability to produce large volumes of milk, butterfat and protein. She is a very profitable cow for farmers when large amounts of feed with high levels of grain are available. The U.S. Holstein is relatively new to North America, with the first imports of registered Holsteins arriving in the 1880s. However, the breed has dominated production in the U.S. since the end of World War II, and advances in artificial insemination have increased her popularity in breeding programs around the world largely owing to her advantage in production over all other breeds.

2. Jersey Cow

The Jersey is the second most popular cow in the U.S. and makes up about 7% of the U.S. dairy herd. She is known for her smaller size (1000 lbs. for a mature Jersey cow versus 1500 lbs. for a mature Holstein cow), higher percentages of fat and protein in her milk, early maturity, and efficiency of milk production. Payment by milk processors to dairy producers based on the content of butterfat and protein in milk has increased the popularity of the Jersey, especially in markets where milk is manufactured into cheese. Other dairy breeds make up only around 2% of the dairy cattle population. These include:

3. Ayrshires

moderately large cows that are red and white to mahogany and white and are known for producing milk that is quite rich in butterfat and for the conformation of their udders;

4. Brown Swiss

large brown cattle that are known for their docile manner, high milk protein to milk fat ratio, sound feet and legs, and purported resistance to heat stress in hot and humid regions;

5. Guernseys

Red and white to mostly red and are somewhat larger than Jerseys and are known for the yellow color of the butterfat in their milk, which is rich in Beta-Carotene; and

6. Milking Shorthorns

A rugged breed of cattle that are red and white to mostly red, mostly white, or roan (speckled) and are known for milk that is well suited for cheese production and for their grazing ability.

Directions: Answer all the questions listed below.

1. write native breeds. (2pt)
2. list exogenous breed. (3pt)
3. what is the difference between native and indigenous breed? (2pt)

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____

2. _____

3. _____

4.1. Collect observable signs separately from history

Heat should be checked three to four times a day. Numerous studies indicate poor oestrus (heat) detection is the most common cause of prolonged inter-calving intervals in dairy cattle so herd managers must insure that animal attendants responsible for this are competent. Collect observable signs such as Standing heat including the following which lasting 12 – 18 hours

- ✓ Sniffs other animals and being sniffed by other animals. Especially sniffing vulvas or urine of other cows
- ✓ Mounts other animals and stands when mounted
- ✓ Bawls frequently
- ✓ nervous and restless
- ✓ Vulva is swollen and deep red
- ✓ Flow of clear mucus from the vulva

Self-Check –4	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

Note: Satisfactory rating - 5 points

Unsatisfactory - below 5points

1. Define heat? (4pt)

2. what are the observable sign on animal in heat? (5pt)

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____

2. _____

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

Working on one's own initiative forms the basis for safe and healthy working conditions. The employer and the supervisors acting as the employer's representatives are legally responsible for the safety and healthiness of the workplace. Occupational health and safety cooperation personnel are experts that promote the working conditions of the workplace. The law requires employees to also take care of their own safety and the safety of their co-workers. The Occupational Safety and Health Administration is the official body that sees to that the minimum standards for working conditions are followed.

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

Self-Check –5	Written Test
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Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. **Define** OHS (4pt)
2. **Define** Safety(3pt)

Answer Sheet

Score _____

Rating: _____

Note: Satisfactory rating - 7 points

Unsatisfactory 7- below

Short Answer Questions

1. _____

2. _____

ARTIFICIAL INSEMIATION

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 LO4-LG 29

TTLM Code: - AGR ATI2TTLM 0919v1

LO-4 Apply AI procedures

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

- ✓ 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.

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 –

- ✓ 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.

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 2,3,4 and Sheet 5.
4. Accomplish the “Self-check 1, Self-check t 2, Self-check 3” in **page -41, 46,53 and 55** respectively.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1” in **page -56 and two on page 57.**
6. Do the “LAP test” in **page – 58** (if you are ready).

Information Sheet-1	Identify history of the animal
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1. Identifying history of the animal

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

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

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

Self-Check 1	Written Test
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Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What are the recording types? (4pt)
2. List the information written on the card you record. (5pt)

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

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____

2. _____

2.1. Observe sign of heat

Estrus in cattle is commonly referred to as heat. It occurs every 18 to 24 days in sexually mature, open (no pregnant) female cattle when they are receptive to mounting activity by bulls or other cows or heifers

Heat detection is critical to heat synchronization and breeding programs, particularly artificial insemination and embryo transfer programs. Effective heat detection is often the most limiting factor in an artificial insemination program. Heat detection can also be used to monitor onset of puberty in heifers, regularity of estrous cycles in breeding age females, and breeding effectiveness of natural service sires via returns to heat in the cow herd.

Heat detection efficiency (rate) is the percentage of eligible cows seen or detected in heat. Eligible cows are cows eligible for insemination. Heifers have reached puberty if they have resumed normal estrus function (cycling) after calving (typically 40 days or more postcalving), are free of reproductive disorders or reproductive tract infections, and are open. A heat detection rate of 80 to 85 per cent should be attainable.

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
- ✓ Electronic odor detection devices.

Visual Observation

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 (8 hours)	Standing Heat (18 hours)	Going out of Heat (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.

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.

Chin-ball markers

which are used on bulls with penis amputated or deflected and cows or steers treated with testosterone. These methods allow the animals in heat to be marked, and then AI is used to breed them. However, the chin-ball marker is not normally used unless the first two methods have not produced satisfactory heat detection. Other methods such as combinations of aids, milk progesterone, video recorders, pedometers and vaginal probes may assist in detecting heat in a few herds. Remember that these detection aids require both time and other supplies, including sometimes very expensive computer-related items. Additional time in watching for heat is recommended.

The device placed under the chin of the bull, causes paint to be smeared on back of the cow if mounting takes place. It works on the principle of “ball point pen” i.e., if chin is pressed on rump it will mark animal in estrus. A buffalo bull fitted with chin ball detects heat efficiently if used at least twice daily

Electronic odor detection devices.

Principle of the device is based on detection of pheromones related to heat. The pheromones are the natural olfactory signal for bull that cow is in heat. Trained dogs were having the ability to detect estrus odour correctly in approximately 80 percent of estrus cow. Dog can detect estrus by urine and milk, after being trained with vaginal fluid samples. The odour is not emitted by vaginal mucus or urine was also reported.

Heat Mount Detector (HMD)

A heat mount detector is a device which can be glued on the midline of the cow's back between the hip bones. There are two main types of devices that are commonly used. The first type releases a coloured dye and the second device reveals on coloured panel similar to that of a ‘scratch it’ lottery ticket. Both systems rely on the sustained pressure and rubbing from the brisket of an animal which is mounting the standing cow to activate the device.

The positioning of the HMD pads will depend on the size of the cow to which it is fitted and the size of her herd mates who will mount her to trigger it. Bigger cows need the device placed near to the tail head. (Removal of the pad must be treated as a positive sign, because they are often lost with sufficient mounts.)

The advantage of HMDs is that they are visible from a distance and do not require interpretation for results as do tail paint or chinball harness marks.

Their disadvantages are that:

- ✓ pads may dislodge, especially in areas where cows rub on trees due to irritation caused by buffalo fly or ticks
- ✓ the adhesive may cause irritation and dermatitis
- ✓ there may be false positives
- ✓ application of the pads requires handling and labour
- ✓ extremes of weather may cause faulty operation.

Tail Paint

Using commercially available brands of tail paint, a 'plaque' of hair and paint approximately 20 cm long and 3-5 cm wide can be painted over the butt of the tail. This can best be done by painting both against and with the 'grain' of the hair on the tail. A thick plaque is needed.

This plaque lasts for just over a week under most conditions, unless disturbed by the mounting action of another animal. If the cow is mounted, the plaque will turn to powder and disappear leaving only a ring of coloured hair.

Tail paint disturbances however need to be 'read' and accurate interpretation of results may need considerable experience. Tail paint signs are not as definitive as heat mount detectors. The advantage of tail paint is that it is inexpensive. Different colours can be used e.g. one colour to identify cows cycling before commencement of the program, another during the program, and still another to see which cows cycled after the program.

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

1. Define heat detection (3pt)
2. Define Visual Observation (2pt)
3. Define Heat mount detectors(2pt)
4. Define Tail head markers (2pt)
5. Define Chin-ball markers(2pt)
6. Electronic odor detection devices(1pt)

Answer Sheet

Score = _____

Rating: _____

Note: Satisfactory rating 9 points unsatisfactory-below 9 points.

Short Answer Questions

1. _____

2. _____

3. _____

4. _____

5. _____

3.1. Prepare and assemble material and loading semen properly

Complete farm kit (for insemination with straws)

- ✓ Long life liquid nitrogen unit
- ✓ Dipstick for measuring nitrogen level
- ✓ Metal tool box 50 cm (or more) long (to hold pistolettes and sheaths)
- ✓ 1 (or more) mini-pistolettes with sheaths (pistolettes are sometimes called straw or insemination guns)
- ✓ 1 medium pistolette with sheaths
- ✓ Straw tweezers
- ✓ Clean, sharp scissors
- ✓ Arm length gloves of disposable plastic
- ✓ Glove lubricant
- ✓ Thawing flask and thermometer
- ✓ Paper towel
- ✓ Record book and semen inventory

3.1.1. Loading straw guns

1. Identify the bucket containing the required straw or straws by consulting the semen inventory. Thaw straws only one at a time. Semen should be placed in the cow as soon as practical after removal from liquid nitrogen.
2. Place and prepare the kit box. Check the temperature of the thawing solution. The temperature should be 35°C.
3. Lift the handle of the bucket from its notch, place it directly across the neck of the unit so that it now lies opposite its former position, then lift it to the desired height. Always keep the bucket as low as possible while keeping comfortable access to straws.
4. Remove the straw from the goblet using forceps. Grasp the laboratory end firmly, shake vigorously two or three times and place it immediately in the thawing solution. Shaking removes liquid nitrogen from the cotton wad on the manufacturer's plug and minimises the risk of explosion and/or straw splitting. The laboratory end is always up in the goblets, the thawing flask and the pistolette. Avoid undue exposure of semen.

Remember straws have no safe exposure time and once removed from liquid nitrogen should be used. When selecting and removing semen, work as far down the neck of the unit as is comfortable, preferably below the frost line. On cold

mornings the lifter may be held up by use of a bulldog clip to avoid burning of fingers.

When selecting and removing semen from the liquid nitrogen container always use forceps. If fingers are used there is a risk of burns from cold objects, and also a risk of damaging the semen due to heat transfer from the hands.

5. Return the buckets to their correct positions and replace the stopper.

6. Handle the straw only by the ends to avoid temperature fluctuation shock to the sperm.

Remove the straw from the thawing solution and dry with towel or paper. Grasp the manufacturer's end (the double wad end) and roll it between thumb and index finger to loosen the wad and facilitate easy ejection of semen. Recheck the name and number of the bull on the straw.

7. Remove the gun from its protective case and pull out the plunger to approximately the length of the straw. Place the straw into the insemination gun, manufacturer's end first (laboratory end up). A stop in the barrel prevents the straw going further than the correct distance. Hold the gun and the straw vertically and tap the laboratory end gently with the scissors. This will make the air bubble go as far up towards the laboratory plug as possible

8. Wipe the scissors. This avoids contamination of the straw about to be cut. Hold the loaded gun vertically at eye level and with scissors make a horizontal cut at 90° to the long axis of the straw through the air bubble, immediately below the laboratory plug or crimp. At least 1 cm of the straw should protrude from the end of the insemination gun. This, together with an accurate cut, is necessary to ensure a perfect seal between the straw and the sheath which is placed over the 'barrel'. Wipe scissor blades after cutting the straw to avoid contaminating the next straw to be cut.

9. Remove the sheath from its protective container and place it over the barrel. (Handle only the split end to keep the sheath clean.) Holding the lock ring above the tapered section, push the sheath on over the tapered section and through the lock ring until the end of the straw and the inside edge of the sheath are flush. Twist the lock ring and push it onto the tapered section to lock the sheath into position.

10. Push the plunger in until semen is just visible at the end of the sheath. This shortens the span of the fingers and thumb required when depressing the plunger during insemination. It also removes the chance of carrying contamination from the vagina into the uterus by eliminating the hollow space at the end of the sheath. Do not load more than two guns at any one time.

11. Insemination of the cow, as described in a later section, can then begin.

Self-Check –3	Written Test
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Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What are the material included in Complete farm kit (for insemination with straws)? (5pt)

Note: Satisfactory rating - 5 points

Unsatisfactory - below 5 points

Answer Sheet

Score = _____

Rating: _____

Short Answer Questions

1. _____

Information Sheet-4	Deposit semen in the uterus safely
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4.1. 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. The first step 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.

Procedure of carryout AI

- ✓ Wipe the lips of the cow's vulva clean of mucus, dirt and faeces using a clean paper towel.
- Provide a clean entry for the gun through the vulva – open the lips by pressing your arm down in the rectum or with the aid of paper towel.
- ✓ Direct the gun upwards at 45° to avoid the opening to the bladder.
- ✓ Follow the progress of the gun with your hand in the rectum.
- ✓ Do not push your hand towards the cervix ahead of the gun.
- ✓ Work the gun through the cervix. Place the index finger at the front of the cervix to feel the gun passing through, preventing the gun progressing too deep into the uterus.
- ✓ Position the gun so it is only just protruding from the front of the cervix.
- ✓ Deposit all the semen slowly into the body of the uterus just through the cervix.

NB. By manipulation of the cervix and gentle pressure on the gun, it should be possible to guide the tip of the gun through the cervix and into the uterus. The tip can usually be felt through the thinner wall of the uterus. The gun must not be carried further forward than just through the cervix (1 cm at the most). The maximum pressure which should be placed on the

gun is that which can be obtained when holding the gun with the thumb and one finger. With repeat cows (i.e. cows returning on heat), many sources recommend placing the gun only up to the middle of the cervix because up to 3% of pregnant cows may cycle at 3 and 6 weeks. Intra-uterine insemination may be harmful in these cases. Mid cervical insemination is much safer. Slowly deposit half to two-thirds of the semen in the body of the uterus and the remainder in the middle of the cervix.

- ✓ Wait a moment before withdrawing the gun.
- ✓ Remove the gun with a smooth action while the arm is still inserted in the rectum.

Dual placement of semen

The reason that placement of semen both in the uterus and the cervix is recommended as we show above is that it helps to overcome the unpredictability of ovulation times. In cattle, ovulation can occur from 2 to 26 hours after the end of heat. Semen deposited in the body of the uterus reaches the fertilisation site quickly to fertilise an ovum that is released earlier than normal. Semen deposited in the cervix survives longer. Due to its slow release from the cervix it is more likely to fertilise an ovum released later than normal.

Incorrect site of semen deposition

Inability to pass an insemination gun through the cervix, or difficulty in doing so, is primarily due to inexperience. A greater and far more common mistake is to pass the gun too far into the uterus. This fault is prevalent, irrespective of experience, and is caused solely by inattention to detail.

The best fertility is obtained by depositing half to two thirds of the semen in the uterine body and the remaining semen in the middle of the cervix. Since the uterine body is only 2 to 5 cm in length, uterine depositions must be made just through the cervix. Rapid sperm migration to both oviducts is facilitated by deposition in the body of the uterus

Sperm deposited in the cervix survive longer than sperm deposited in the uterus, therefore partial cervical deposition is advantageous for cows in early oestrus, and for cows having delayed ovulation.

Passing an insemination gun too far through the cervix reduces fertility because:

- ✓ All the semen is likely to be in one horn, which lessens the chance of sperm migrating to both oviducts.
- ✓ Laceration of the extremely delicate endometrium is likely, even when organs are handled gently. Blood is spermicidal.

The use of force to overcome difficulty in passing the insemination gun through the cervix is a frequent cause of laceration. This may lead to sterility because of adhesions. Finger and thumb pressure on the insemination gun is the maximum that should be

used. If the gun cannot be manipulated through the cervix, then all semen should be deposited in the middle of the cervix.

The placement of the gun is best checked through the side walls of the body of the uterus with the index finger and thumb from opposing sides, or with the index finger from underneath.

After insemination always check the tip of the sheath and straw for the presence of blood. This can be done whilst massaging the cervix after insemination. When feeling for the gun the index finger should not be placed on top of the soft wall of the uterus as the finger may push the sharp tip of the gun into the uterus wall and cause it to bleed.

Rough handling and poor technique may cause the rectum to balloon, making it impossible to manipulate the cervix successfully. Removal of the ballooning may be attempted by placing one or two fingers through the constricting ring at the end of the ballooned area and gently massaging. This may induce the rectum to contract and blow the offending air, together with some faeces, out past the arm of the operator, resulting in relaxation of the rectal wall and giving the operator a good opportunity to grasp the cervix. This technique may also be used to clear faeces from the rectum.

Self-Check –4	Written Test
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Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write down how to deposit semen in the uterus? (3)
2. where is dual placement of semen deposit? (2)

Note: Satisfactory rating - 5 points

Unsatisfactory - below 5 points

Answer Sheet

Score = _____

Rating: _____

Name_____

Date_____

Short Answer Questions

1. _____

2. _____

InformationSheet-5	Clean material and disposing waste
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5.1. 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.

After insemination, there are several clean-up steps you will want to follow.

- ✓ Inspect the gun tip for signs of infection. Make a note for your veterinarian if you see any.
- ✓ Bend the sheath and straw tip at a 90° angle and remove these from the gun.
- ✓ Tighten the O-ring back on the gun so it will not get lost.
- ✓ Double-check the bull's identity on the straw.
- ✓ Reverse strip your glove so the straw, sheath, and manure are trapped inside. Squeeze out any excess air; tie a knot in the open end and dispose of the glove.
- ✓ Wipe the gun clean and dry it before returning it to the insemination kit.
- ✓ If the gun becomes dirty after use, take it completely apart, wash with soapy water and rinse with clean water. Shake the gun to remove excess water, then allow it to completely dry before reassembly.

5.2. waste disposal

Removing and destroying or storing damaged, used or other unwanted domestic, agricultural or industrial products and substances. Disposal includes burning, burial at landfill sites or at sea and recycling.

Self-Check 5	Written Test
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1. Define cleaning (2pt)
2. What are the methods of cleaning(2pt)
3. What are the waste disposals methods?(3pt)

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

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____

2. _____

3. _____

Operation sheet -1	Procedures in loading straw
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Techniques to load straw is as follows: -

Step 1: Identify the bucket containing the required straw

Step 2: Place and prepare the kit box

Step 3: Lift the handle of the bucket from its notch, place it directly across the neck of the unit **Step 4:** Remove the straw from the goblet using forceps

Step 5: Return the buckets to their correct positions and replace the stopper

Step 6: Handle the straw only by the ends to avoid temperature fluctuation shock to the sperm

Step 7: Remove the straw from the thawing solution and dry with towel or paper

Step 8: Remove the gun from its protective case and pull out the plunger

Step 9: Wipe the scissors

Step 10: Remove the sheath from its protective container and place it over the barrel

Step 11: Push the plunger in until semen is just visible at the end of the sheath

Step 12: Insemination of the cow, as described in a later section, can then begin

Operation sheet -2	Deposit semen in the uterus
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Procedure of carryout AI

Step 1: Wipe the lips of the cow's vulva clean of mucus, dirt and faeces using a clean paper towel.

Step 2: Provide a clean entry for the gun through the vulva – open the lips by pressing your arm down in the rectum or with the aid of paper towel.

Step 3: Direct the gun upwards at 45° to avoid the opening to the bladder.

Step 4: Follow the progress of the gun with your hand in the rectum.

Step 5: Do not push your hand towards the cervix ahead of the gun.

Step 6: Work the gun through the cervix. Place the index finger at the front of the cervix to feel the gun passing through, preventing the gun progressing too deep into the uterus.

Step 7: Position the gun so it is only just protruding from the front of the cervix.

Step 8: Deposit all the semen slowly into the body of the uterus just through the cervix.

Step 9: Wait a moment before withdrawing the gun.

Step 10: Remove the gun with a smooth action while the arm is still inserted in the rectum.

LAP Test	Practical Demonstration
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Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 4 hours.

Task. Loading straw to AI gun

Task. Deposit semen in the uterus.

ARTIFICIAL INSEMIATION

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 0919LO5LG30

TTLM Code: - AGR ATI2TTLM 0919v1

LO-5 Assess quality of semen

Instruction Sheet	Learning Guide #30
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This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- ✓ Assess the quality of semen before, during, after production and at field levels.
- ✓ Do 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 –

- ✓ Assessing the quality of semen before, during, after production and at field levels.
- ✓ Doing 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 4.
3. Read the information written in the information “Sheet 1, Sheet 2.
4. Accomplish the “Self-check 1, Self-check 2, in page -65 and 68 respectively.

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

1.1.1. Semen 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. 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. Semen quality can be damaged during storage, thawing, and handling prior to insemination.

Visual evaluation for volume, colour, consistency/density, odour and observation for presence of foreign material should be made and recorded.

Physical character- The volume and macroscopic appearance of the bull semen varies between ejaculates, bulls, breeds and ages. However, a bull with less than 2 ml per ejaculate volume is not acceptable. Normal bull semen varies in color. Feed and Contaminants might change the color of semen. In case of contamination of semen, it will not be accepted for farther processing. In general, normal bull semen varies in appearance and range from milky, yellowish to creamy in colour.

Semen PH is measured with automatic PH-meter. Normal bull semen has a PH reading of 6.0 to 7.0. PH above 7 can be seen in semen with very low concentration or when there is an inflammatory process in reproductive organ.

Microscopic evaluation is done using a phase contrast microscope for mass activity and individual motility. Determination of concentration is done with a hemocytometer or a calibrated photometer.

At this point, if required, smears can be made for morphological studies and live/dead count. Nigrosin-eosin stain is recommended. Buffered nigrosin eosin solution is mixed with a drop of semen and smeared on a glass slide for morphological examination. It should be examined

under oil immersion. The smear is made by drawing the drop along to avoid mechanical damage to the spermatozoa.

For percentage alive at least two counts of one hundred spermatozoa should be made. If there is not good agreement between the two another two hundred are counted. Live cells have no pink eosin stain in them and appear uniformly white. If the spermatozoa are dead, the membrane is damaged and it is permeable to eosin. The dead spermatozoa have pink stain within them. Sometimes it is concentrated behind the acrosome, sometimes it is uniformly spread throughout the cell.

Sperm concentration of the sample is determined using a haemocytometer and is calculated as the following.

Calculation of Concentration of spermatozoa in French straw.

$$T = (d/80) n$$

Where:

T = number of sperm expressed in million per milliliter.

d = dilution rate used to prepare sperm-water suspension.

n = total number of sperm present within 20 counting squares in a Neubauer haemocytometer.

Example:

Assume you added 3.9ml of water to 0.1ml of semen resulting in a (0.1ml/3.9ml) 40 times dilution rate (d = 40).

Further assume you counted 263 sperm within 20 squares (n = 263).

$$T = (d/80) n$$

$$T = (40/80) 263 = 131.5$$

Thus, the straw contained 131.5 million sperm per milliliter.

A mini straw contains on average 0.22 ml semen. Therefore, the total number of sperm per straw is approximately 0.22×131.5 million sperm (28.93 million sperm per mini straw). The method described above may also be used to determine the concentration of sperm in a freshly collected ejaculate. Due to the high sperm concentration in the ejaculate one should however dilute 1:80 or 1:160 prior to filling the counting chamber.

Morphological examination can be done on the nigrosin eosin stained smear under oil immersion. Two counts of one hundred heads should be made or more if there is not good agreement. The most common abnormalities of the head are narrow, narrow at the base, pear shaped, abaxial and “undeveloped”. This last includes severely deformed spermatozoa with the tail coiled within or around the head and microcephalic heads. A count of structural

defects of the midpiece may be made but is not done routinely since these are uncommon in bulls. Similarly, acrosome abnormalities can be counted but they are not common in good quality semen.

At least two counts of one hundred spermatozoa (more if not good agreement) should be made of the midpiece and tail defects. This may be done on the nigrosin eosin smear or alternatively on a wet preparation of diluted semen (saline or buffered formal saline if the sample is to be kept) with a phase contrast microscope. The common abnormalities counted are proximal cytoplasmic drops, distal cytoplasmic droplets, tailless heads, singly bent tails, doubly bent tails and coiled tails.

The following are guides to the values of semen characteristics in the bull that indicate normal reproductive function:

- ✓ Motility (moving actively forward): > 50%
- ✓ Concentration: > 500 million /ml
- ✓ Live sperm: > 50%
- ✓ Abnormal sperm heads: < 20% (range for bulls with good fertility is 8–12%)
- ✓ Proximal droplets: < 4%; Distal droplets: < 4%
- ✓ Tailless: < 15%; Singly bent tails: < 8%; Double bent tails: < 4%; Coiled tails: < 3%
- ✓ Cells other than spermatozoa: none, or very few leucocytes or epithelial cells.

Automated computerised machines for recording motility and concentration and calculating the required dilutions are now frequently used in AI centres that can afford them.

They incorporate additional qualities of the motility including speed of movement and linearity. Semen used for artificial insemination should be of high quality. Characteristics will be better than the above limits indicating the “normal” range. When reproductive function is excellent, motility will be greater than 70%, head abnormalities will be below 10%. Centres should develop a system of morphological assessment and guidelines for limits beyond which semen is discarded. A routine count of normal/abnormal can be used as a screening test to ensure that semen processed and sold contains at least 70% normal spermatozoa. Detailed morphological examination is generally reserved for borderline samples. The assessment is also valuable in helping to reach a diagnosis when a bull fails to produce semen of processable quality as assessed by concentration and motility. Morphology is also useful in monitoring the semen of bulls with disturbances of reproductive function (eg. testicular degeneration) to establish a prognosis for future production of semen suitable for processing

The definition of motility is often ambiguous. Since the important criterion is “progressive forward motility”, this should be the basis for judgement. If there are 70% or more of spermatozoa moving actively forward the semen sample is of good quality and acceptable for processing.

The post freeze examination assesses both the ability of the semen to withstand freezing and thawing and the efficiency of the processing itself. If there are 40% or more of spermatozoa moving actively forward after freezing and thawing the quality is acceptable for AI. For selection/rejection purposes it does not matter very much if the others are slow,

swimming backwards in circles (singly bent tails) or immotile. However, these characteristics are important for diagnostic purposes, because they help to define the disturbance of function.

Some systems of evaluation characterize motility as follows: (a) % direction motility (moving forward); (b) % local motility (wiggling around without going forward); and (c) % no movement (possibly all dead). To judge this under the microscope, the general picture is first assessed, and then the type of motility of those moving is assessed. To be acceptable more than 50% should be moving, and of these more than 70% should show progressive motility.

Twenty million spermatozoa per straw (one cow dose) has been the standard for many AI centres. Some bulls reach their potential fertility with 15 million spermatozoa per dose, provided semen processing, handling and AI technique are excellent. Regular counts of sperm numbers per straw should be made for quality control. Many centres have standardised their own ways of assessing semen quality and sperm numbers per straw; they can be recommended for use provided they serve the purpose effectively.

Hygiene prerequisite to get quality semen at the field.

- ✓ Mount animals “teaser bull” must be kept clean in its hindquarters. Areas of contact by the erect penis or of general secretions up on the hair coat or skin of a mount shall be effectively and thoroughly disinfected between successively mounting bull.
- ✓ Sexual preparation of the bull prior to semen collection will improve the quality of semen obtained. This will be done through false mounting and allowing the bull to watch other bulls mounting.
- ✓ The hand of the person collecting the semen must not come in contact with the bull’s penis.
- ✓ It is necessary to clean the artificial vagina completely before each collection. It should have been dismantled beforehand; its various parts washed, rinsed and dried, and kept protected from dust. The inside of the body of the device and cone is dipped in alcohol before reassembly. Once assembled it should be kept in a cupboard, which is regularly cleaned and disinfected.
- ✓ The AV is simple and simulates natural mating. It should provide the proper: temperature, pressure (controlled by water and air) and lubrication for ejaculation.
- ✓ The lubricant used is packed in tubes and should be sterile. The rod used to spread the lubricant must be sterile and should not be exposed to dust between successive collections.
- ✓ It is strongly recommended that the AV not be shaken after ejaculation, as otherwise lubricant and debris may pass down the cone to join the contents of the collecting tube.
- ✓ The collecting tube for semen must be sterile, and the recommended method of sterilization is heating in an oven at 180^oC for at least 30min. They should be sealed while waiting use, for example by a plug of sterile cotton wool or aluminum foil, and kept in a sterile box or cupboard until required.
- ✓ After collection, the tube should be left attached to the cone and within its sleeve until it has been removed from the collection room for transfer to the laboratory.

Self-Check 1	Written Test
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Answer all the questions listed below. Use the Answer sheet provided in the next page:

- 1.what are hygiene prerequisite to get quality semen at the field? (2pt)
2. what is bull semen PH? (3pt)
3. how many sperm are there in one straw? (2)

Name: _____

Date: _____:

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)
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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.

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

Preventing transmission between farms

Protective clothing. If possible wear rubber footwear and either overalls or a cape on the farm. If this clothing becomes soiled it can be cleaned more readily than ordinary clothes. Use disposable plastic overshoes on farms which are known to have a disease problem.

Washing. Scrub buckets and boots, paying particular attention to the tread on the sole.

Chemical agents. Use soap and/or antiseptics to improve the efficiency of all cleansing procedures.

Towels. Use disposable paper towels.

Minimize equipment. Take the minimum of equipment into the dairy or shed. The more items carried, the greater is the likelihood of transmitting infective agents. Apart from the bucket and scrubbing brush, all items should be carried in an equipment box.

Preventing transmission between animals- Use disposable equipment once only. Do not split straws or re-use sheaths or insemination rods. When more than one cow is to be inseminated, the technician should use a fresh disposable glove for each insemination.

Preventing transmission from animals to humans- Gloves. The use of long 'obstetric gloves' is recommended. If gloves are not worn there is a strong possibility of serious infection occurring even though soap and/or antiseptics may be used for thorough washing immediately after insemination. Cuts and abrasions on the hands may permit the entry of infection.

Don't smoke. Smoking while handling contaminated insemination equipment is a sure way of transmitting infection to humans.

Liquid nitrogen can be dangerous if not handled correctly because of its extremely low temperature.

The following points must be given strict attention.

- ✓ Avoid contact with the liquid. Prolonged contact with the skin or contact with wet skin may result in severe burns. Contact with eyes (which are continually moistened by tears) may severely affect eyesight.
- ✓ Use metal forceps when removing straws from liquid nitrogen containers. Skin, if in contact with the cold metal of the buckets, will often stick and tear when removed.
- ✓ Insert objects into the liquid very slowly. This avoids the splashing which occurs when the liquid boils on insertion of 'warm' objects.
- ✓ When refilling containers pour the liquid slowly. This avoids 'blowout'. If the nitrogen boils vigorously it may shoot out the neck of the container. Don't use plastic funnels as these will crack and disintegrate.
- ✓ You should provide adequate ventilation when storing or transporting liquid nitrogen. Nitrogen gas is colourless, odourless and tasteless and, although inert, may cause dizziness and suffocation at very high concentrations because of the exclusion of normal air. Liquid nitrogen units are not designed to be transported in the passenger cabin of any motor vehicle.
- ✓ Use only the stopper supplied with the container. The stopper is designed to allow controlled evaporation of the liquid nitrogen. Attempted use of other stoppers will lead to dangerous pressure build up or to excessive loss of nitrogen.

Self-Check 2	Written Test
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Answer all the questions listed below. Use the Answer sheet provided in the next page:

2. Define and discuss OHS (3pt)?
3. Define and discuss safety (2pt)?
4. How we Prevent transmission of disease between farm(2pt)
- 5.

Note: Satisfactory rating 5 points unsatisfactory-below 5 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____
2. _____
3. _____

ARTIFICIAL INSEMIATION

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 LO6LG31

TTLM Code: - AGR ATI2TTLM 0919v1

LO6: Record data and clean up on completion of work

Instruction Sheet	Learning Guide #31
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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, Sheet 2,3 and Sheet 4.
4. Accomplish the “Self-check 1, Self-check t 2, Self-check 3” in **page -72, 75,,78 and 80** respectively.

Information Sheet-1	Record data on semen collection
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A semen collection permit holder shall keep a record containing the documents relating to his operations.

Such documents shall include:

(1) For each breeding bull staying in the establishment where activities under permit are carried out:

- ✓ its name and registration number;
- ✓ its date of birth and breed;
- ✓ its place of origin, the name and address of the seller or owner;
- ✓ the date of its admission and the date it began service;
- ✓ the pedigree of the animal and the results of the young sires proving program to which he was submitted;
- ✓ the percentage of females inseminated once without being reinseminated between the 60th and 90th days following;
- ✓ the date, nature and results of examinations, the name and address of the person who carried out the examinations, and where applicable, the diagnoses and the treatments prescribed;
- ✓ the date and cause of death or extermination and manner of disposal of the carcass;
- ✓ a certificate issued by a laboratory establishing its blood types and certifying the authenticity of the pedigree;
- ✓ the registration certificate of any bull registered in the stud books of a breeders association;

(2) for each ejaculate collected in the establishment where the activities under permit are carried out:

- ✓ the identity of the bull, the name and address of the owner of the animal, where the bull is not owned by the permit holder;
- ✓ the time at which the collection was made;
- ✓ the name or initials of the person responsible for the collection and for each operation or examination to which the semen is subjected, the date and nature of such operations or examinations and the result of such examinations;

- ✓ the volume of semen collected, rejected or conditioned, its concentration and degree of dilution;
- ✓ the results of the quality tests carried out on fresh and frozen semen, including the results of the spermogram giving the concentration and motility

Self-Check 1	Written Test
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Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. what documents shall include in the record during semen collection? (5pt)

Note: Satisfactory rating 10 points unsatisfactory-below 10 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____

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

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 is small holder 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 produce milk, 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 dairy productivity, 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 Jersey and Holstein Friesian breeds, manageable and profitable for small scale commercial farmers in urban and peri urban areas of the country. Adequate information has been generated on the production system in the different areas. 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 2	Written Test
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Answer all the questions listed below. Use the Answer sheet provided in the next page:
 What is future direction in dairy cattle production? (4pt)

Note: Satisfactory rating 3 points unsatisfactory-below 3 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____

3. Disposing waste

3.1. Disposal of farm waste 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.

3.2. Disposal of dead Animals some 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).

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).

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.

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.

Reference

1. [https://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/epw8724/\\$FILE/cowcalf_chapter10.pdf](https://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/epw8724/$FILE/cowcalf_chapter10.pdf)

Self-Check 3	Written Test
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Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. How can you manage dead animals? (2pt)
2. How can you manage disposal of farm waste? (3pt)

Note: Satisfactory rating 4 points unsatisfactory-below 4 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____

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

Reference

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

[ways-to-make-small-businesses-safer/housekeeping](http://www.worksafe.vic.gov.au/safety-and-prevention/small-business/12-ways-to-make-small-businesses-safer/housekeeping)

Self-Check 4	Written Test
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Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. When you finished your work how you cleaning the materials? (3pt)
2. How you reuse equipment and materials? (2pt)

Note: Satisfactory rating 4 points unsatisfactory-below 4 points

Answer Sheet

Score = _____

Rating: _____

Short Answer Questions

Name: _____

Date: _____

1. _____

2. _____

