



ARTIFICIAL INSEMIATION

NTQF Level -II

Learning Guide

Unit of Competence: -Assist Artificial

Insemination Procedures

**Module Title: -Assisting Artificial Insemination
Procedures**



Learning Guide –22

Unit of Competence: -Assist Artificial

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Procedures**

LG Code: AGR ATI2 M07 0919 LO1-LG-22

TTLM Code: AGR ATI2 TTLM 0919v1

**LO 1: Assist in AI site selection
and crush construction**



Instruction Sheet-1	Learning Guide #22
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This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- ✓ Using PPE, equipment, tools and materials
- ✓ Select AI site according to enterprise guidelines.
- ✓ Constructing AI crushes
- ✓ Carrying out work following the OHS requirements

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 Personal protective clothes, equipments, tools and materials
- ✓ Select AI sites.
- ✓ Construct crushes.
- ✓ carried out Work following the OHS requirements.

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”.
4. Accomplish the “Self-check 1, Self-check t 2, Self-check 3 and Self-check 4” **in page -8, 11, 14 and 17** respectively.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1, Operation in **page -18**.”
6. Do the “LAP test” **in page – 19** (if you are ready).



1. Introduction

Artificial insemination is the technique in which semen with living sperms is collected from the male and introduced into female reproductive tract at proper time with the help of instruments. This has been found to result in a normal offspring. In this process, the semen is inseminated into the female by placing a portion of it either in a collected or diluted form into the cervix or uterus by mechanical methods at the proper time and under most hygienic conditions. The first scientific research in artificial insemination of domestic animals was performed on dogs in 1780 by the Italian scientist, Lazanno Spalbanzani. His experiments proved that the fertilizing power reside in the spermatozoa and not in the liquid portion of semen. Few further studies under research station conditions helped this technique to be used commercially all over the world including India.

Artificial insemination is not merely a novel method of bringing about impregnation in females. Instead, it is a powerful tool mostly employed for livestock improvement. In artificial insemination the germplasm of the bulls of superior quality can be effectively utilized with the least regard for their location in faraway places. By adoption of artificial insemination, there would be considerable reduction in both genital and non-genital diseases in the farm stock.



1.1 Using Personal protective clothes, equipment's, tools and materials

All equipment (including clothing affording protection against the weather) which is intended to be worn or held by a person at work which protects them against one or more risks to their health and safety. Personal protective equipment PPE refers to equipment used as a barrier between an individual and a hazard that could result in an injury or occupational illness. The following are used in artificial insemination work.

- ✓ Boots
- ✓ Overalls
- ✓ Gloves
- ✓ Sun protection (sun hat, sunscreen).
- ✓ Eye goggles
- ✓ Towel or tissue paper Artificial vagina
- ✓ Catheters
- ✓ Petri dishes
- ✓ Microscope
- ✓ Insemination sheath and guns,
- ✓ Pipettes or insemination gun
- ✓ Liquid nitrogen
- ✓ Liquid nitrogen containers
- ✓ Thermos flask and Scissors
- ✓ Artificial vagina –Used to collect semen in bulls, stallions, rams and buck goats.
- ✓ A.I. Box- This is important because it can carry most of the equipment needed to A.I. a cow or heifer. It is also a handy way to keep all of your equipment organized and somewhat clean.



Paper towels- are used to keep things clean After the semen comes out of the cito thaw, you use paper towels to wipe off the water because water kills semen You use the paper towels to put over the end of the A.I. Rod so that no dirt gets into the straw of semen



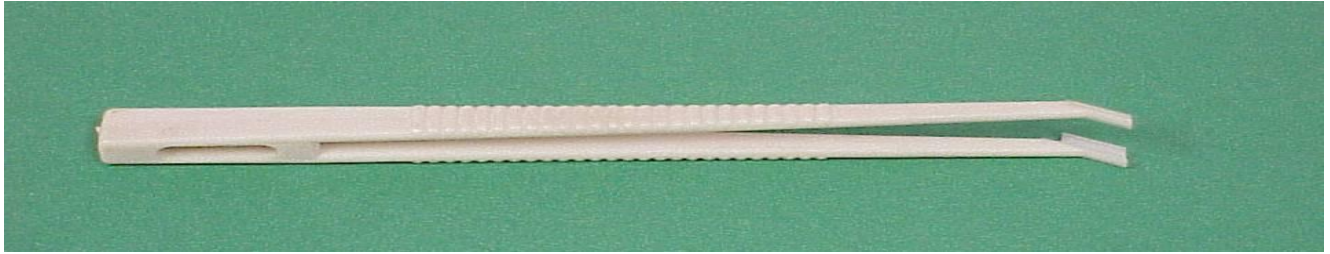
Safety Glasses- Used to protect your eyes when: you are around the liquid nitrogen you are thawing the semen because a straw may explode in your eyes
Cotton Glove- A cotton glove is used to protect your hand when you get the semen out of the liquid nitrogen refrigerator.



Cito Cutter- Used to cut the melted end of the straw off. It gives you a square cut so that you can seed the straw more secure into the sheath.



Tweezers- It is an easier way to get the straws out of the goblets and it also makes it quicker.

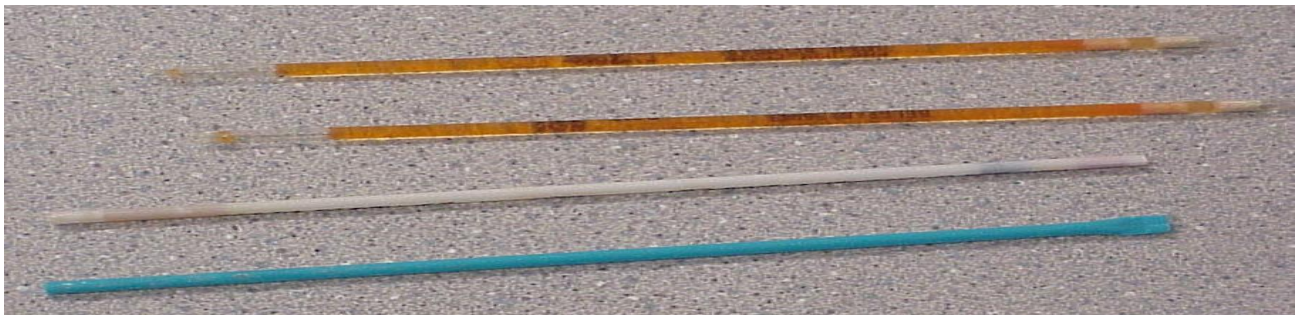


Shoulder Length Glove- A shoulder length glove is important to keep your hands clean. Protects the cow from some infection and diseases.

A.I. Rod- This equipment is used to implant the semen into the cow or heifer.

Sheath- Snap the straw of semen into the sheath at this end Leave the straw sticking out for about 1 inch. The sheath then goes over the A.I. Rod for cleanliness

Semen Straws- These straws contain valuable semen



The Liquid Nitrogen Refrigerator- This refrigerator contains all of your valuable semen that you need to A.I. your cow or heifer. This bottle also contains liquid nitrogen. Never set the refrigerator directly on a cement floor; always have cardboard or carpet under it because the cement wears away the shell of the tank.



- Artificial vagina



- Extender



- Straws



- AI Rod



- Gloves



- Straw cutter



- Collection vial



- Thaw bath





Self-Check -1	Written Test
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Directions: Match from column B to column A

A

1. Watch
2. Water bath
3. Incisors
4. Sheath
5. Lubricants
6. Thermometer
7. Straw
8. Liquid nitrogen
9. Paper towels
10. Semen

- a. For preserving semen
- b. For removing drying straw after thawing
- c. For Storing small amount of semen
- d. For measuring temperature of water
- e. For holding look warm water
- f. For covering AI gun
- g. For cutting tips of straw.
- h. For decreasing pain during inserting hand through rectum
- i. For knowing how long we thawing the semen
- j. Male germ plasma

B

Note: Satisfactory rating above 7 points

Unsatisfactory - below 6 points

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

1.2. Site Selection for Artificial insemination

Before selecting certain area for AI services, certain facilities should be available such as milk collection and processing, disease control and high standard of herd management. Resource should not stretch too far because continuity of operation is primarily considered. Area with primitive farm management a change in attitudes management practice is required before AI is introduced successfully. Field service can be organized in several ways.

- a) **Travelling on request** - Farmers may call technician any time so he/she visit when asked.
- b) **Stationed technician** - Here technician stationed at certain point or farm and the farmer bring their cows.
- c) **Daily rounds** - Technician is to travel certain route every day. Means of transport must be adjust to local conditions.
- d) **Collection center** -Establishing heifer collection centers close to AI is essential.
 - ✓ **AI service area should be selected with due consideration to:**
 - Market prospects
 - Feed availability
 - Animal disease control
 - Out let of milk
 - Densely populated areas
 - Roads and accessibilities such as telephone

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. what are the field service organized for AI site selection? (2pt)
2. Write criteria's applied for AI site selection (3pt)

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

1.3. Introduction

The insemination crush should be approximately 1.5 m long and 66 cm wide. It should have a concrete floor for hygiene and to minimise wear. The crush and its surrounding area must be roofed. A head bail is useful but should only be used in extreme cases. Restraint of the cow and safety of the operator can be achieved easily with a britching chain (Tindall chain) or backing gate. Squeeze bails or crushes provide the most complete restraint of any animal. Animals requiring such restraint procedures are generally not suitable for most artificial breeding programs. Timber yards and crushes are preferable in some cases to steel, as the noise made by steel facilities will upset the cows unless they are worked through the yards regularly. Nervous and frightened cattle will not go in to calf as easily as quiet cows. Where possible, water should be connected at the yards, for washing equipment and for settling dust if necessary.

A crush which will allow most straightforward tasks to be carried out in safety (including oral treatments and work from the rear end, but not belly or foot trimming) will:

- ✓ Have a locking front gate and yoke (ideally self-locking) to allow the animal's head to be firmly held. Additional head bars will prevent the animal tossing its head up and injuring people;
- ✓ Have a rump rail, chain or bar to minimize forward and backward movement of the animal. Make sure this is always used;
 - be secured to the ground or, if mobile, to a vehicle;
 - be positioned to allow you to work safely around it, without the risk of contact with other animals, and have good natural or artificial lighting;
 - Allow gates to open smoothly with the minimum of effort and noise. Regular maintenance will help;
 - Have a slip-resistant floor, made of sound hardwood bolted into place (nails are not suitable), metal chequer-plate, or with a rubber mat over the base.

Consider the need for shedder gates after the crush to allow animals to be sorted into groups. Work around the crush will be more convenient if it is under cover with a workbench nearby (for documentation, veterinary medicines, instruments).

1.4. Construction of AI crush considering

The constructed crush should fulfill the following criteria's:

- ✓ Access gate for inseminator

- ✓ Removable restraining bar
- ✓ Head gate
- ✓ Latch, held down by door spring

A cattle crush can be assessed on the major features of:

- ✓ Versatility and suitability for all the jobs to be done on the cattle
- ✓ Safety for handlers
- ✓ Durability
- ✓ Price
- ✓ Serviceability (maintenance)
- ✓ Noise
- ✓ Light variation
- ✓ Stock – choking and leg damage; head control; baulking gates; adjustment for different classes of stock
- ✓ Non-slip flooring
- ✓ Split vet gate and side gates. Aim is to provide maximum restraint to the animal while allowing unobstructed access to all parts of the body.

1.4.1. Facilities and Equipments

Material s used to construct cattle crush are: -

- ✓ Pick axe and Sow/ Electric power for tubular metal crush/
- ✓ Axe and Peg
- ✓ Tubular metal or swan timber or dressed timber
- ✓ Shovel and Hammer
- ✓ Meter and Nails
- ✓ Hoe and Rope and other

Procedures for Construction of Cattle Crush

- ✓ Select appropriate site for construction
- ✓ Prepare all the necessary materials and equipment
- ✓ Layout the length, width and height of the crush depending upon the number of animals
- ✓ Put peg in each corner
- ✓ Level the area that are already selected
- ✓ Construct the gun pole and other parts of the crush
- ✓ Finally Check the strength of the crush

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. List the material used for constructing cattle crush? (3pt)
2. What are the major features can be assessed on the cattle crush construction? (5pt)
3. What is the measurement area of AI crush? (2pt)

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

Reference

Keith L. Smith. 2002. Cattle Handling and Working Facilities, Ohio State University Extension

Sandi Jephcott. 2009. Crush Design & Safety

1.4. Carry out work following OHS requirements

OHS requirements should be kept in a location central to the work being performed and readily available to the work force. Some safe work practices will require specific job procedures, which clearly set out in a chronological order each step in a process. But safe work procedures should be included in the company's "worker orientation" program. All workers should be aware of the fact that safe job procedures have been established, are in effect, are written down and must be followed.

In order for communication be effective between those involved in occupational health and safety, the safety profession and other professions, it is important that we use common words such as 'accident, injury, hazard, safety, health and risk' with some consistency. Unless these words are given specific definitions in legislation; some effort must be made to give these words acceptable meanings.

Accident: An unplanned event that may or may not result in damage, loss or injury.

Injury: Damage to the body resulting from a delivery of energy to the body above the capacity of the body to cope with that energy or an interference with the normal function and systems within the body.

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

Safety: an individual's perception of risk. Two alternative definitions are 'safety is a state of mind where by workers are made aware of the possibility of injury at all times' (from ted Davies, a mining safety expert, derived from Osborne, Canada), and 'safety is a state in which the risk of harm (to persons) or damage is limited to an acceptable level' (Australian standard 4801). Some would argue for 'tolerable' not 'acceptable', saying no risk is acceptable.

Health: the degree of physiological and psychological well-being of the individual.

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

Work safe provided safe tips for cattle handlers, including veterinarians and AI technician in the yards. The Most important thing is to inspect the yards before using them. There should ideally be at least two people working the yards. Training and supervision of inexperienced employees or contractors, including veterinarians, is essential.

Other safety issues veterinarians and cattle producers should be aware of Work safe.

- ✓ Keep cattle and people separate.
- ✓ Keep children away from the cattle yards.
- ✓ Turn off electric fencing off when visitors, including veterinarians are on the property.
- ✓ Employ or generate experienced and trained staff.
- ✓ Sign post areas clearly.
- ✓ Provide adequate lighting.
- ✓ Do not let he pen or crush floor to build up as this reduces the height of the fence.
- ✓ Maintenance is key.
- ✓ Ensure insurance is up to date and appropriate.
- ✓ First aid kits should be readily available.

There are a variety of chemicals used on cattle. Veterinarians should be aware of these and their poisons schedule and be prepared to wear PPE when necessary and also be aware of how the animal will react to the chemical being administered. Cattle may have a chemical administered by a farm employee at the same time as the vet is performing a procedure. If veterinarians are not familiar with the chemical being used, they should read the label on the container. The farmer should also have a material safety data sheet (MSDS) available for the vet to scan. Prior to the vet visit, the vet and farmer should have an agreement that staff will be trained as needed while the vet is there, for example safe handling of cattle; correct administration of chemicals; regularly using new needles and syringes; ensuring the 'gun' used for administering chemicals is cleaned appropriately before starting and it is calibrated; wearing of PPE to minimize chemical exposure; prevention of zoonotic diseases.

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

- 1. What are safety issues veterinarians and cattle producers should be aware of Work safe? (3pt)
- 2. ----- An unplanned event that may or may not result in damage, loss or injury(2pt)

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

1.1. The procedure Constructing AI crushes;

Step 1- Select appropriate site for construction

Step 2- Prepare all the necessary materials and equipment

Step 3- Layout the length, width and height of the crush depending upon the number of animals

Step 4- Put peg in each corner

Step 5- Level the area that are already selected

Step 6- Construct the gun pole and other parts of the crush

Step 7- Finally Check the strength of the crush

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 1: construct AI crush used for Insemination.

Learning guide #23

**Unit of Competence: Assist with Artificial
Insemination Procedures**

**Module Title: Assisting Artificial Insemination
Procedures**

LG Code: AGR ATI2 M07 0919 LO2-LG-23

TTLM Code: TTLM Code: AGR ATI2 TTLM 0919v1

**LO2. Assist in collection, production
and distribution of germ plasm**

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

- ✓ Developing good sanitary practice
- ✓ Restraining dairy animals intended for germ plasm collection
- ✓ Preparing laboratory materials, equipments and tools needed for germ plasm
- ✓ Providing work support according to OHS requirements.
- ✓ Handling and distributing germ plasm
- ✓ Doing work under close supervision of the supervisor.

This Learning 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 :

- ✓ Develop good sanitary practice
- ✓ Handle and restrain animals
- ✓ Prepare animals for insemination and germ plasm production
- ✓ Apply basic principles of semen collecting, storing and transferring techniques
- ✓ Prepare and use of laboratory materials, equipment and tools
- ✓ Handling and distributing Semen

Learning Activities

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”.
4. Accomplish the “Self-check 1, Self-check t 2, Self-check 3 Self-check 4 and Self-check 5” in **page -24, 27, 29,34 and 42** respectively.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1” in **page -43**.
6. Do the “LAP test” in **page – 44** (if you are ready).

Information Sheet-1	Developing good sanitary practice
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2.1. Developing good sanitary practice

Hygiene precautions are observed to minimize, if not eliminate, the physical transfer of infective disease agents:

- ✓ Between farms
- ✓ Between animals
- ✓ From animals to humans
- ✓ Into the cervix and uterus
- ✓ From miscellaneous sources.

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.

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.

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.

Clean the vulva. Cleaning of the vulva prior to introduction of the insemination gun should receive careful attention. When gross contamination is present, a clean paper towel should be used for a final cleaning. Ensure the lips of the vulva are closed during cleaning to prevent faecal material entering the vagina.

Open the vulva. No matter how thoroughly the vulva is cleaned, the area will never be sterile. For this reason, it is essential that the lips of the vulva be parted to permit free entry of the tip of the insemination gun. Opening of the vulva is part of step 6 of the insemination procedure above. Opening the vulva can generally be achieved by wrist pressure directed downwards and to the left. With some cows it may be necessary to draw the cervix back and/or stroke the wall of the rectum before applying wrist pressure.

These methods prevent introduction of the insemination gun into the suburethral diverticulum. If they don't work and no assistance is available, place a piece of paper or cotton wool into the vulva so that it remains open enough to allow clean entry of the gun.

Interference by pets or children. Take precautions to ensure dogs, cats and children will not interfere with insemination equipment that is left unattended.

Accidental contact. Avoid contact between the insemination gun and shed walls, posts, rails, switching tails, etc.

Dirty insemination guns. Clean insemination guns regularly. Dismantle them and wash them in methylated spirits or boil for 10 minutes. Reassemble only when dry. Do not simply wash in water or disinfectant as this will lead to gumming up or corrosion of the gun.

Dust. Avoid unnecessarily dusty conditions. Make sure the hammer mill or other dusty equipment are not going to be used during insemination times.

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

1. Write down hygiene precautions we take to minimize, if not eliminate, the physical transfer of infective disease agents. (5pt)

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

Information Sheet-2	Animal handling and restraining techniques and behavioral characteristics
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2.2. Animal handling and restraining techniques and behavioral characteristics

2.2.1. Identify Animal behavioral characteristics

The establishment of a firm relationship between the handler and the bull is essential and cannot be overemphasized. The bull should be at ease when he is handled and the handler should not feel threatened. The proper application of a bull nose ring is required as soon as the bull arrives at the center. The bull should be handled by both a halter and the bull ring. Care should be taken to use the ring only when the bull becomes unruly and difficult to handle by the halter alone. Bulls should be led by the halter and not by their nose. Bulls should always be handled in such a manner that semen production is optimized. This includes taking note of all aspects of the physiology of male sexual behaviour. Negative stimuli should be avoided in the collection area as far as possible. This includes pain delivered via the nose ring, which could lead to low libido (e.g. many of the difficult, slow, low libido Bos indicus bulls may have been made that way by poor training and handling techniques).

For semen collection the bull selected, the selected bull trained for semen collection procedures, after which semen is collected once or twice a week. Gentle and quiet treatment of bull is important. The bull must not become nervous by people clothes, by noise from dogs, motors cars, visitors or handlers.

Cattle have 360' wide angle vision. They can see behind themselves without turning their heads and are sensitive to harsh contrasts of light and dark in loading ramps, races and handling areas. To facilitate cattle movement, illumination should be even, and there should be no sudden changes in floor level or texture. Even though ruminant animals have depth perception their ability to perceive depth at ground level while moving with their heads up is probably poor. To see depth on the ground, the animal would have to lower its head. This would explain why cattle stop and balk at shadows.

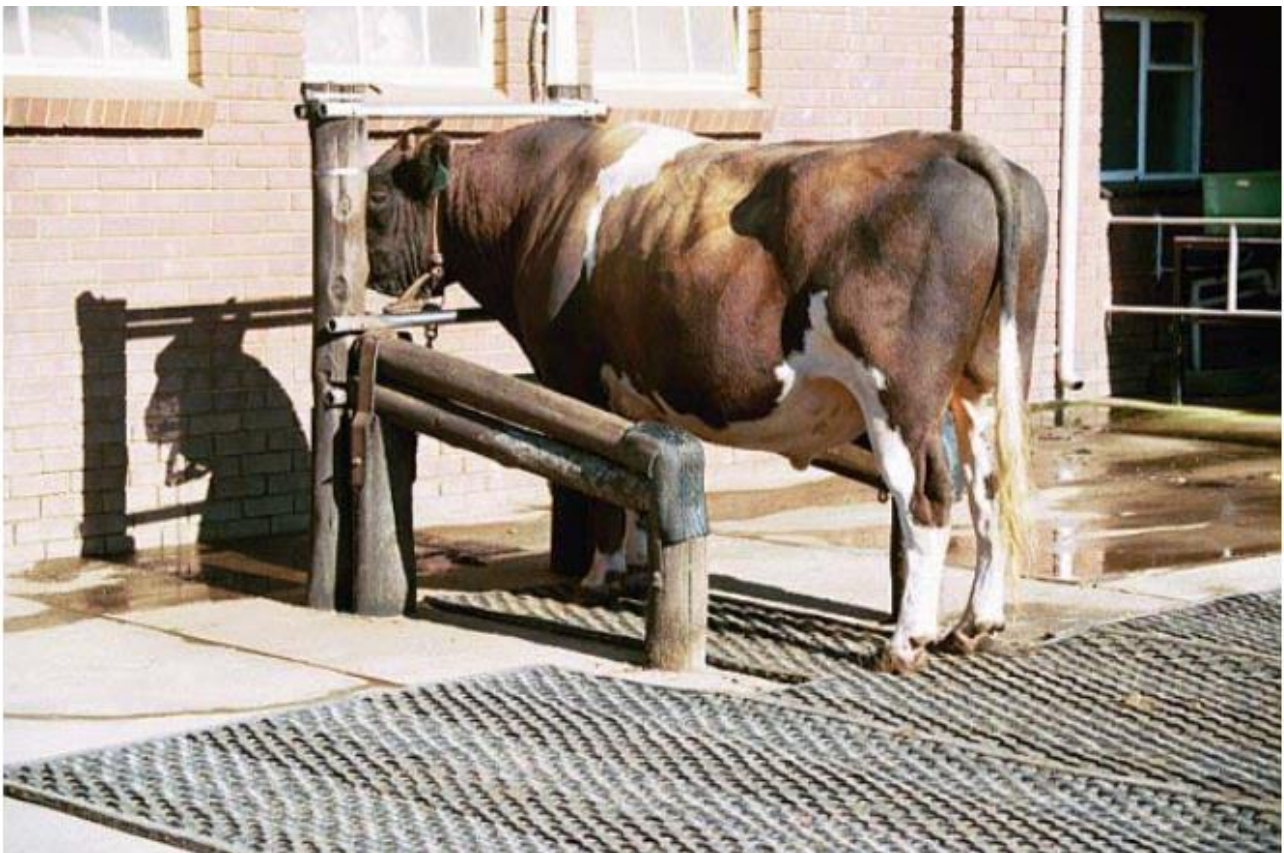
Cattle are more sensitive to high-pitch noises than people. The sound of banging metal can cause balking and agitation. Rubber stops on gates and squeeze chutes will help reduce noise. The pump and motor on a hydraulic squeeze chute (crush) should be located away from the squeeze. On pneumatically powered equipment, silencing devices must be installed. The sound of hissing air will agitate cattle.

2.2.2. Restraining animal for semen collection and production

The animal should be restrained systematically for efficient semen collection. Here besides to holding bull it must also trained and stimulated to mount teaser.

The semen collection area should be as close as possible to the semen evaluation laboratory (not more than 30 m). For teaser bull restraint a stanchion made from strong metal bars or smooth treated wooden poles and timber is recommended. The floor of the collection site should not be slippery. It can be made of rough concrete or a dug-out filled with sand and sprinkled with water to avoid dust. Rubber mats can also be used.

Facilities for the restraint of bulls awaiting their turn for semen collection should be near enough to enable them to see clearly the mounting bull and serving area. The collection area should be ringed with strong metal bars or timber for the safety of people and the bulls themselves. The construction should be high enough to protect the full height of an average person (1.75 m). Spaces between rails should be small enough to prevent a bull getting his head through. Escape spaces in the surrounding fences should be placed at regular intervals. The collection area should be sheltered and must have adequate ventilation and light.



Unless the semen donor bulls are housed under clean dry conditions and are clean when they arrive at the collection area, they should be washed and cleaned. The washing area should not be more than 20 m from the serving area and should be made of rough concrete

with a slanting floor to facilitate drainage of water, dung and urine. Adequate clean water with reasonable pressure should be provided through a hose pipe at this area. Prior to cleaning, the preputial hair should be cut short leaving a tuft of 2 cm length all round. Ordinary washing soap and a mild brush should be used to clean the bulls. During cleaning emphasis should be put on the lower abdomen and the preputial area. Disinfectants should not be used. Clean dry paper towels should be used after washing to remove excess water. If the teaser bull or steer is dirty he should be cleaned at the back with water and soap and dried thoroughly. There is little risk of contamination of the penis or the semen if the teaser is clean and collection technique is good, allowing no or little contact of the penis with the teaser. Equipment and materials in the laboratory for the whole production process should be thoroughly cleaned, rinsed with distilled water and sterilised in an autoclave or hot air oven.

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

1. What are the negative stimuli that disturb the bull? (5pt)
2. Write down the points we did during preparing bull for semen collection. (5)

Note: Satisfactory rating - 9points

Unsatisfactory - below 9 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

Reference

FAO, 2003. Guidelines and Recommendations for Improving Artificial Breeding of Cattle in Africa, Vienna, Austria.

T. Grandin.2001 The design and construction of facilities for handling cattle Animal Science Department, Colorado State University, Fort Collins, CO 80523, USA

Information Sheet-3	Preparing laboratory materials, equipments and tools needed for germ plasm
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2.3. Preparing laboratory materials, equipments and tools needed for germ plasm

Prior to start work the material which is required for the task must be available. Major laboratory equipments and Some important materials that used for semen collection include:

- ✓ Microscope
- ✓ Digital scale
- ✓ Semen cooling unit
- ✓ Warming cabinet
- ✓ Sperm counting equipment
- ✓ Extender.
- ✓ Straw
- ✓ Artificial vagina
- ✓ Towel
- ✓ Electro ejaculator
- ✓ Gloves
- ✓ Liquid nitrogen container

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. Write down the all material we used during preparing germ plasm(5pt)

Note: Satisfactory rating - 4points

Unsatisfactory - below 4 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

2.4. Providing work support according to OHS requirements.

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

Category	Threshold
Scrotum circumference	30cm at 15 month age
	31cm at 15-18 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

2.4.1. Collecting semen

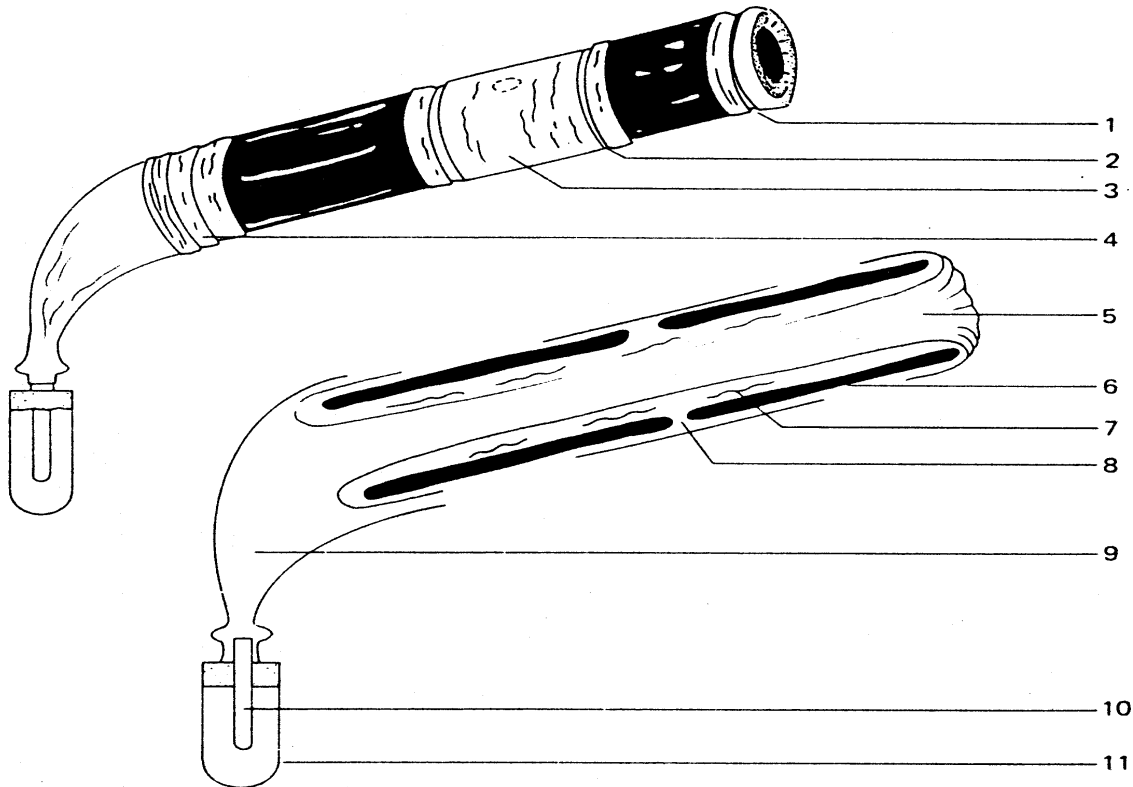
The most common semen collection methods are

- ✓ Artificial vagina
- ✓ Electro ejaculation
- ✓ Massage accessory sex glands method.

Artificial vagina: The best procedure for semen collection is with artificial vagina (AV). The AV is simple and stimulates natural mating. It should provide proper temperature, pressure, and lubrication for ejaculation. The temperature of AV should near 42-45 C°, and its pressure is maintained by water and air. A tube is attached to the other end of AV for semen collection. During collection AV is held near to the teaser. The bull is allowed to mount and the penis is guided in to AV by grasping the sheath of the penis with hand. Once the bull is ejaculated then the semen is taken to laboratory for evaluation and freezing.

Prior to semen collection all parts of AI should be cleaned, sterilized and assembled to AV. Mature bull require 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.

Artificial Vagina — Bull



- 1 Retainer band
- 2 Retainer band
- 3 Pressure sleeve
- 4 Retainer band
- 5 Inner liner
- 6 Casing

- 7 Water
- 8 Pressure valves
- 9 Funnel
- 10 Collecting tube
- 11 Insulator

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.

Bulls should be lead to the teaser in a gentle friendly manner by the handler paying attention to the temperament of the particular bull, preferably using a halter. The bull should be allowed to watch other bulls mounting before collection. He is lead around behind the teaser and may be allowed to mount other bulls. Two false mounts are given. These measures constitute good sexual preparation which increase sexual excitement and the amount of semen collected. The bull is then allowed to mount for the first collection.



Sexual preparation assists in improving the bull's serving behavior at collection. It helps to obtain more spermatozoa in the collected ejaculate. The bull at the top is a slow server and is being given a false mount in a different environment to the collecting area.

At this time the collector should gently grasp the prepuce behind its opening and direct the fully erect penis into the lubricated end of the AV. The handler may rest his shoulder against the bull's flank and move with the movement of the bull as he thrusts. The AV should be held so the bull withdraws as he dismounts.

The ejaculate should be taken immediately to the evaluation room. Handling of semen should be always done with great care to avoid cold shock, contamination, excessive agitation and direct sunlight.

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.

The method of semen collection in bull is as follows:

- ✓ At the beginning the rectum is washed with 6 per cent sodium chloride solution.
- ✓ The probe is then inserted up to about 12 inches and held in a position of rectal floor.
- ✓ Alternate current increasing in voltage gradually from zero to 5 volts and returning again to zero within every 5 to 10 seconds is initially –passed

- ✓ The subsequent stimulation made progressively higher so that at about fifth stimulus a maximum of 10-15 volts is reached. Erection and ejaculation occur at 10 to 15, volts when 0.5 to 1 ampere current is passed. The source of electric current is AC/220-250 volts/single phase/50 cycles.

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
- ✓ The methods are highly technical and need considerable skill and practice.
- ✓ The semen generally gets contaminated with urine.
- ✓ Some males resist too much to this method and refuse collection.
- ✓ Sciatic nerves are temporarily affected during the operation but is relatively minor if the electrodes are kept over the ampullar region.

Massage method: the simplest method of semen collection by massaging accessory sex glands such as: -

- ✓ Epididymis
- ✓ Ampullae
- ✓ Seminal vesicular glands
- ✓ Prostate gland
- ✓ Cowper's glands

This method commonly used to collect semen from turkeys, ducks and dog.

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:

2. Write down the most used methods of semen collection method. (5pt)
3. -----the simplest method of semen collection by massaging accessory sex glands. (2pt)
4. What is the right temperature of AV and what is the purpose of keeping the temperature? (3pt)
5. Discuss a measure steps that enables you to collect semen (4pt)

Note: Satisfactory rating - 9points

Unsatisfactory - below 9 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

Reference

Gaurang kumar Patel, 2017. Artificial insemination: A tool to improve livestock productivity. Journal of Pharmacognosy and Phytochemistry.

Information Sheet-5	2.5. Handling and distributing germ plasm
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2.5. Handling and distributing germ plasm

2.5.1. Processing semen

Semen processing includes:

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

I. Semen evaluation:

After examining a drop of raw semen under low power on a microscope to obtain an estimate of sperm concentration and activity, samples are taken for detailed assessment. One drop is placed in a test tube with a special stain to determine the percentage of the spermatozoa which were alive and of normal conformation at the time of staining. Another drop is used to ascertain the density of the raw semen the number of sperm per milliliter. A spectrophotometer measures the amount of light passing through the sample of semen diluted at a particular rate. Put simply, the more sperm in the sample, the less light that is transmitted. By multiplying the volume of the ejaculate by the density and the percentage of live sperm, the total number of live sperm in the ejaculate can be worked out.

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.

- ✓ *Morphology*: abnormal morphology does not affect fertility unless it exceeds 20%. Example of abnormality (detached head, coiled or bent tails).

II. 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

An average ejaculate may contain 5000 million sperm in 5 ml of raw semen. Super-fertile mature bulls may yield up to 12 000 million sperm per ejaculate. With natural service this could only produce one calf. By diluting the ejaculate, the raw semen can be extended to give 200 or more individual 0.25 ml doses each containing 25 million live sperm. While only 10 million sperm are required for conception, more than double this number are placed in the straw to allow for losses during freezing. Glycerol is the chemical added to protect the sperm during the freezing process. Diluents may be based on skim milk, egg yolk citrate or specially prepared chemical diluents such as TRIS with egg yolk. Antibiotics are added as a precautionary measure and most diluents have added fructose (fruit sugar) to supply energy to the sperm.

III. Semen Packing

More than 200 AB centres around the world use the Cassou or French straw system for packing semen. Glass ampoules were used originally but in most countries, these have been replaced by straws.

The medium straw (0.5 ml volume) was introduced in 1969 and the 'mini-straw' (0.25 ml volume) in 1972. Cassou straws are 133 mm long poly-vinyl chloride tubes. Medium straws have a 3 mm diameter and mini-straws 2 mm. They are plugged at one end (the double plug end) with a sealing powder which is retained between two cotton plugs. By applying a vacuum to this end of the straw, semen can be drawn up the tube and into contact with the sealing powder. As soon as the powder becomes wet it turns into a gel to provide a very effective seal. Automatic straw filling and sealing machines use an ultrasonic pulse to seal the other end (the laboratory end).

IV. Semen cooling and freezing

At body temperature sperm swim about very rapidly, exhaust their energy reserves in a relatively short time, and die.

The rate of a chemical reaction depends on the temperature at which the process is taking place. If the temperature is reduced, the rate of reaction is also reduced. Cooling semen to near freezing point slows the sperm down, by slowing their internal reactions, and extends their life for several days if they are protected by suitable chemicals. By further cooling, activity can be effectively stopped to give the sperm an almost indefinite life. Some of the sperm are killed in the freezing process but with correct processing, many survive and will revive on thawing.

The temperature at which semen must be held if it is to retain the ability to fertilise is below minus 70°C. (i.e. 70°C below the freezing point of water. This is called the critical temperature.) This is much colder than the temperatures maintained in domestic deep freeze refrigerators. Liquid nitrogen boils at a temperature of minus 196°C. (196°C below the freezing point of water), so it is the most suitable refrigerant available. Straws of semen are frozen by suspending them in the vapour above the surface of the liquid nitrogen, to give a controlled rate of cooling and freezing. They are then stored in the liquid nitrogen until use.

V. Quality control

Twenty-four hours after freezing, a portion of each batch of semen is thawed and examined under a microscope. If the batch meets prescribed minimum standards for survival and motility, it is packed into goblets and transferred to storage units. Periodically, straws from each batch are checked for signs of deterioration in storage.

VI. Storage

For ease of handling and to minimise the risk of damage to the sperm through exposure, straws are always packed in plastic goblets. Semen should only be transferred to and from liquid nitrogen containers in goblets, because there is no safe exposure time for individual straws. Goblets are usually marked with the bull's common name and the batch number.

2.5.2. Semen Handling

The quality of frozen semen when it arrives at your farm or ranch is determined by the bull and organization that processed it. But once it arrives, it is up to you to take proper steps to ensure its viability.

Frozen bull semen can be stored indefinitely, if it is maintained constantly at very low temperatures. The critical temperature is approximately -112 degrees. Semen which is exposed to temperatures warmer than -112° F (even for a short time) and then returned to the storage tank may be damaged.

The extent of damage depends upon how long the semen is exposed to the elevated temperatures. Although it is easy to maintain frozen semen at a safe temperature, it is also easy to destroy it in a few moments of carelessness.

Tank Management- The semen storage tank is a large vacuum-sealed metal bottle with an extremely efficient insulation system. Because of the vacuum bottle construction, the temperature can remain at -320° F (liquid nitrogen temperature) as long as at least two inches of liquid nitrogen is present. Technical advances in design and construction have produced storage tanks with a liquid nitrogen holding time of six to nine months.

Although semen storage tanks are well constructed, they still are susceptible to damage from mishandling. Semen tanks should be kept in clean, dry, and well-ventilated areas. Avoid excessive movement of the tank. The inner chamber, which contains liquid nitrogen, is suspended from the outer shell by the neck tube. Any abnormal stress on the neck tube, caused by sudden jarring or an excessive swinging motion, can crack the tube. This results in vacuum loss from the outer chamber.

To increase holding time, keep the tank in a cool location away from direct sunlight. Avoiding drafts from furnaces and outside air also helps prevent excessive nitrogen evaporation. However, make sure there is sufficient ventilation in the room to prevent possible suffocation which can be caused by excessive nitrogen gas in the air you breathe.

Protect the tank from corrosion by keeping it elevated above concrete or wet floors. Use boards or pallets. Pick a location that is safe from children and vandals, but do not hide the tank; it must be placed where it can be seen daily and where it can be monitored routinely for nitrogen level.

Finally, always be watchful for a lid that is left off and for frost or sweat on the tank. Give particular attention to the neck and vacuum fitting. Frost indicates that the vacuum insulation has been lost, and liquid nitrogen has been or is evaporating rapidly. If you suspect this has happened, use a wooden yardstick to measure the amount of liquid in the tank. If the tank contains liquid nitrogen, the semen must be transferred to a good tank immediately. Should the tank be empty of liquid nitrogen it is doubtful that the semen is viable; it should be evaluated before it is used.

Retrieving Semen- In the typical farm semen tank, dangerous temperatures exist in the upper half of the neck tube. Exposure to these temperatures can occur when trying to locate a specific unit of semen or when transferring semen from tank to tank (Figure 1). Thermal injury to sperm is permanent and cannot be corrected by returning semen to liquid nitrogen.

In order to minimize thermal damage:

Identify which canister contains the desired semen. A semen inventory which keeps track of the location of each bull prevents unnecessary searching.

Remove the canister from its storage position to the middle of the tank. Raise the canister just high enough in the neck region to grasp the desired cane of semen. Keep the canister tops no higher than the frost line, or keep the tops of the canes no higher than two to three inches from the tank's top.

Grasp the desired cane, and immediately lower the canister to the tank floor. Keep the cane as low in the tank as possible while removing the unit of semen. Use tweezers to remove the straw. If the straw is located in the upper goblet, bend back the top tab of the cane to a 45-degree angle. This will keep the straw from bending or breaking. The straw should be removed within 10 seconds from the time the canister is raised into position.

Immediately after the unit of semen is immersed in water, return the cane to the canister by raising the canister up over the cane. Return the canister to its storage position.

Any time it takes more than 8 to 10 seconds to locate a particular cane, the canister should be lowered back into the tank to cool completely. Never return a unit of semen to the tank once it has been removed from the cane.

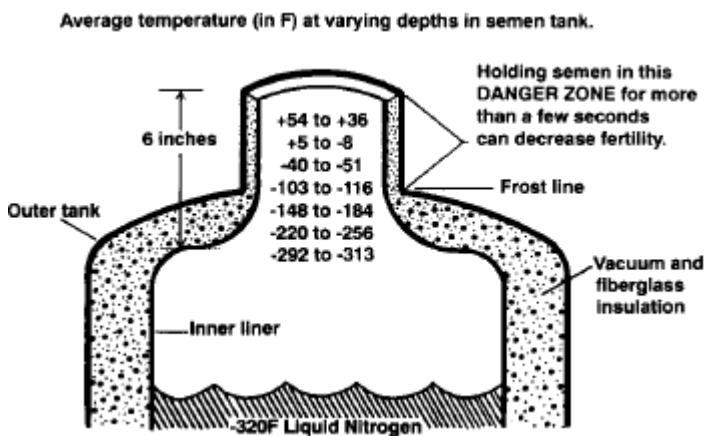


Figure 1. Cross-section diagram of liquid nitrogen tank used to store semen

Semen Transfer

When transferring semen between tanks, follow these tips:

- ✓ Have the tanks side by side and as close as possible.
- ✓ Fill the tanks with nitrogen before transfer, if possible.
- ✓ Have the appropriate canister in each semen tank in the center position.
- ✓ Transfer the canes quickly (within three to five seconds).
- ✓ Never touch the units of semen with bare fingers.

It is essential that frozen semen be handled and thawed carefully and properly in order to obtain anyone optimum results. It also is important to deal only with reputable, well-established AI organizations because their semen has been processed under standard, controlled conditions that are evaluated routinely.

Thawing Procedures- The correct thawing recommendation for semen in straws is not the same for all AI organizations. However, almost all organizations now recommend warm-water thawing of straws for 10 to 60 seconds. For optimum results, follow the specific recommendations of the semen processor. Breeders may use semen from various AI organizations, but practice only one thawing procedure. The National Association of Animal Breeders has recommended that, when in doubt, 90 degrees to 95 degrees for a minimum of 40 seconds should be used as a universal thawing recommendation.

A major concern with warm-water thaw is the danger of cold shock when the straw is mishandled after thawing. Cold shock is the permanent injury to sperm caused by a sudden decrease in semen temperature after thawing. It occurs when semen is thawed and then subjected to cold environmental temperatures before reaching the cow. The severity of damage depends on rate and span of temperature drop. If precautions are taken to prevent cold shock, the advantage of warm thaw will be realized.

Here are some thawing tips:

- ✓ Always keep insemination equipment clean, dry and warm.
- ✓ Use a thermometer; do not guess at the temperature. Check the thermometer for accuracy at least every six months with a reference thermometer.
- ✓ Use an insulated water bath designed for thawing semen or a one-pint wide-mouth thermos which is deep enough to immerse the entire straw. Recently, electronic thawing devices which maintain water temperature accurately between 95 degrees and 98 degrees have been developed. These are convenient to use when breeding many cows at one time.
- ✓ Never thaw more than one unit of semen at a time. You breed your cows individually, so you should thaw units of semen individually.

- ✓ Gently shake the straw as it is taken from the tank to remove any liquid nitrogen that may be retained in the cotton plug end of the straw. Time the thaw with a watch to avoid guessing. When possible or practical, use thawing recommendations of the AI organization from which the semen was processed. When not possible, use NAAB's recommendation for 90 degrees to 95 degrees for a minimum of 40 seconds.

During Insemination- One of the most frequent chances for semen damage is during transport to the cow. After thawing, the semen temperature must be maintained as close to 95 degrees as possible. Handling thawed semen and preparing the insemination rod should be done in a sheltered, heated area.

Proper steps for handling semen include: - While the semen is thawing, warm the insemination rod by rubbing it briskly with a paper towel. In cold weather, place the warm rod within clothing so it will be close to the body and maintain warmth.

After the semen is thawed for the required time, dry it thoroughly with a paper towel and protect it from rapid cooling.

Adjust the air space in the straw to assure that no semen is lost when the end of the straw is cut off. This can be done by slightly flicking the wrist while holding the straw at the crimp sealed end.

Transfer the straw to the rod and cut the tip of the crimp-sealed end of the straw squarely and through the air space. Only sharp scissors or a specially designed straw cutter should be used. Make sure to cut the straw "square" to achieve a good seal with the sheath.

Wrap the assembled insemination rod in a clean, dry paper towel, and tuck it within your clothing for transportation to the cow. Do not place the rod in your mouth or carry it uncovered in your hand.

Inseminate the cow within minutes after the semen has been thawed. The period of time between removing the semen from the tank and depositing the semen in the cow should not exceed 15 minutes.

Sanitary technique- Wash your hands. Inseminating cows is an invasion into the delicate uterine environment that is very conducive to growing bacteria. Bacteria on your hands could be transferred to your inseminating gun during the loading procedure. If carried into the uterus during insemination, these organisms could thrive and grow rapidly resulting in metritis and infertility.

Self-Check 5	Written Test
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Name: _____

Date: _____

1. Write semen storage temperature in liquid nitrogen container (3pt)
2. What are the tips you consider when transferring semen between tanks? (3pt)
3. What are Semen processing including? (4pt)

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

C. E. Knoop and W. D. Pouden. 1943. Artificial Insemination of Dairy Cattle
Michael W. DuPonte. 2007. Proper Semen Handling During an Artificial Insemination Program.
Tshewang Dorji. 2001. Collection of Semen.

Glenn Selk. 2003. Artificial Insemination for Beef Cattle. Extension Animal Reproduction Specialist, Oklahoma Cooperative Extension.

Operation sheet 1	Assisting in semen collection and handling
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Collecting semen using AV

Work steps

1. Schedule male for semen collection
2. Present and maintain temperature of (AV, electro ejaculator, thermos flask)
3. prepare male sexual
4. Live mount such as teaser bull or female
5. Held AV parallel to teaser bull and slant to the paths of bull penis
6. Allow bull to mount
7. Grasp the sheath of penis and guide to AV
8. Take semen immediately to lab after ejaculation

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 1 hours.

Task 1: collect semen using Artificial Vagina.

Learning guide #24

**Unit of Competence: Assist with Artificial
Insemination Procedures**

**Module Title: Assisting Artificial Insemination
Procedures**

LG Code: AGR ATI2 M07LO03 LG24

TTLM Code: AGR ATI2 TTLM 0919v1

LO3. Facilitate AI work

Instruction Sheet 03	Learning Guide #22
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This learning guide is developed to provide you the necessary information regarding the following content coverage and topics

- ✓ Creating community awareness on AI advantages.
- ✓ Preparing and using materials and tools needed for dairy handling and restraining.
- ✓ Preparing, restraining and managing female dairies for AI 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:

- Create awareness for the *community* on AI advantages.
- Preparing and using Materials and tools for handling and restraining of animals
- Prepare female *animals* for AI 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, Sheet 3”.
4. Accomplish the “Self-check 1, Self-check 2 and Self-check 3” in page -48, 51 and 58 respectively.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1” in page -59.
6. Do the “LAP test” in page – 60 (if you are ready).

Information Sheet-1	Creating awareness on AI advantages for Community
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3.1. Creating awareness on AI advantages for Community

There are several advantages by artificial insemination over natural mating or servicing.

Advantages of artificial insemination:

- ✓ There is no need of maintenance of breeding bull for a herd; hence the cost of maintenance of breeding bull is saved.
- ✓ It prevents the spread of certain diseases and sterility due to genital diseases. Eg: contagious abortion, vibriosis.
- ✓ By regular examination of semen after collection and frequent checking on fertility make early detection of inferior males and better breeding efficiency is ensured.
- ✓ The progeny testing can be done at an early age.
- ✓ The semen of a desired size can be used even after the death of that particular sire.
- ✓ The semen collected can be taken to the urban areas or rural areas for insemination.
- ✓ It makes possible the mating of animals with great differences in size without injury to either of the animal.
- ✓ It is helpful to inseminate the animals that are refuse to stands or accept the male at the time of oestrus.
- ✓ It helps in maintaining the accurate breeding and cawing records.
- ✓ It increases the rate of conception.
- ✓ It helps in better record keeping.
- ✓ Old, heavy and injured sires can be used.

Disadvantages of A.I.:

- ✓ Requires well-trained operations and special equipment.
- ✓ Requires more time than natural services.
- ✓ Necessitates the knowledge of the structure and function of reproduction on the part of operator.
- ✓ Improper cleaning of instruments and in sanitary conditions may lead to lower fertility.
- ✓ If the bull is not properly tested, the spreading of genital diseases will be increased.
- ✓ Market for bulls will be reduced, while that for superior bull is increased.

Self-Check 1	Written Test
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Name: _____

Date: _____

1. Write advantage of artificial insemination (3pt)
2. What are the disadvantages of AI (2pt)

Note: Satisfactory rating 3 points unsatisfactory-below 3 points.

3.2. Preparing, restraining and managing female animals for AI work

The essential information while preparing female animal includes identity of cow, dates of observed oestrus, dates of mating or insemination, pregnancy/non-pregnancy tests (e.g. progesterone assay and/or manual pregnancy diagnosis), date and result, date of calving and milk production.

Under herd conditions farmers should be advised to observe cows for heat signs at least three times in a day (20 minutes of visual observation each time: morning, afternoon and late evening). This should be done at times other than during feeding and milking. It may be conveniently done during communal grazing.

Body condition at calving and at the subsequent insemination influence the interval from calving to first oestrus and also conception rate, and are therefore important. Farmers should aim to have cows in a condition score between 2.5 and 3.5 (based on a scale of 1-5) and to minimise loss of score between calving and insemination. Cows that are too fat at calving are likely to have calving difficulties and are more prone to early foetal death. Cows which are too thin, especially if they are losing condition, will have delayed oestrus and poor conception rates. Cows should be at least 42 days after calving before they are served again. For high yielding cows a longer period may be necessary to obtain good conception rates and to reduce embryo and early foetal losses.

The cow should be in good health. Specifically, she should be free of any evidence of infection of the reproductive tract. Particular attention should be paid to cows that have had abnormal calvings (e.g. dystocia, retained placenta and prolapse of the uterus), as they may require a longer period after calving for involution of the uterus and to return to normal fertility.

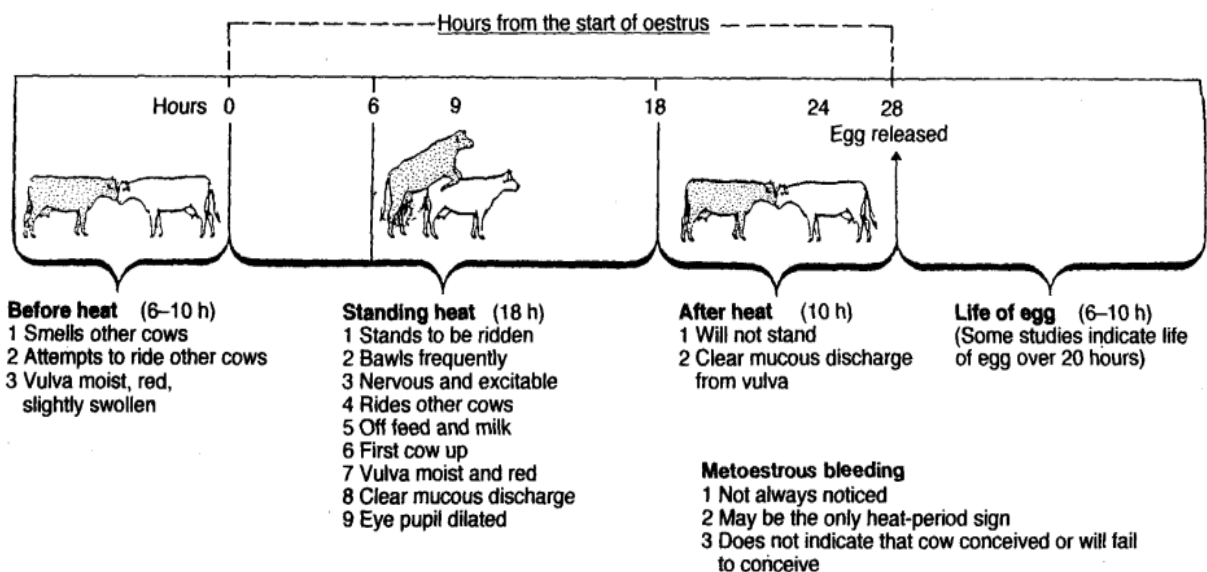
3.2.1. Heat

Heat is a period of intense sexual excitement by a cow and heifer. It occurs only in non-pregnant heifers and cows (not included parturated cow and heifer till 40 days). The period of receptivity lasts between 6 to 30 hours. The average interval between 2 heats is 21 days, but it can vary from 18 to 24 days. In non-pregnant cows, the ovaries are producing the eggs and sexual hormones. Every 21 days, a mature egg is released from ovaries. Just before releasing the egg, hormones are released that cause the heat signs. A hormone is a

substance produced by an organ in the body and released in the blood stream that gives signals to modify certain organs to increase or decrease a certain activity.

Heat detection: for proper conception there must accurate heat detection, these can be done through observation of heat sign

- ✓ The animal will be excited condition.
- ✓ The animal will be in restlessness and nervousness.
- ✓ The animal will be bellow frequency.
- ✓ The animal will reduce the intake of feed.
- ✓ Peculiar movement of limbo sacral region will be observed.
- ✓ The animals which are in heat will lick other animals and smelling other animals.
- ✓ The animals will try to mount other animals
- ✓ The animals will standstill when other animal try to mount. This period is known as standing heat. This extends 14-16 hours.
- ✓ Frequent maturation (urination) will be observed.
- ✓ Clear mucous discharge will be seen from the vulva, sometimes it will be string like the mucous will be seen stick to the near the pasts of vulva.
- ✓ Swelling of the valva will be seen.
- ✓ Congestion and hyperemia of membrane.
- ✓ The tail will be in raised position.
- ✓ Milk production will be slightly decreased.
- ✓ On Palpation uterus will be turgid and the cervix will be opened.



Self-Check 2	Written Test
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Name: _____

Date: _____

1. Define heat (3pt)
2. What are the sign of estrus? (2pt)
3. What is the right time to inseminate? (4pt)

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

Information Sheet-3	Observe Keenly and assist insemination processes
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3.3. Observe Keenly and assist insemination processes

3.3.1. Procedure of Insemination.

Step #1: Restrain the animal to be inseminated.

There are several things that should be kept in mind when choosing a location for inseminating cattle. Some of these include safety of both the animal and the inseminator, ease of use, and shelter from adverse weather. A gentle pat on the animal's rump or a soft spoken word as the inseminator approaches will help to avoid startling or surprising the cow.

Step #2: Raise the tail with the right hand and gently massage the rectum with the lubricated glove on the left hand.

Place the tail on the back side of the left forearm so it will not interfere with the insemination process. Cup the fingers together in a pointed fashion and insert the left hand in the rectum, up to the wrist.



Step #3: 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 the 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.



Step #4: Insert the gun at a 30° 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.

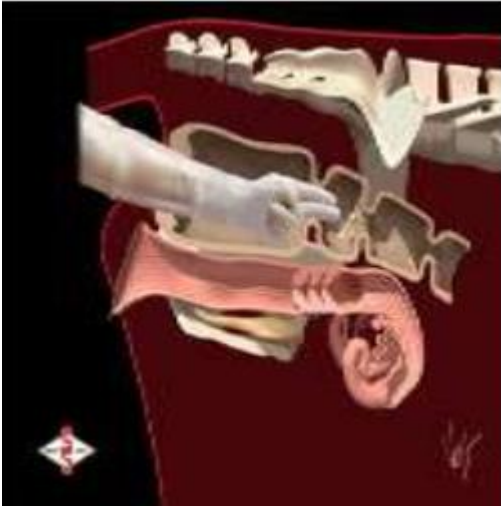


To become a successful inseminator, it is very important to always know where the tip of the insemination gun is located.

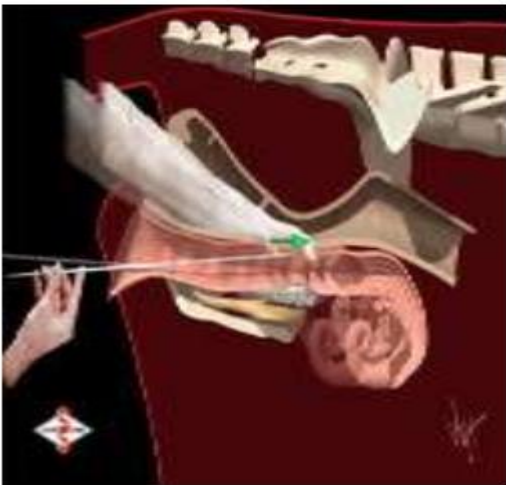
The walls of the vagina consist of thin layered muscle and loose connective tissue. The insemination gun can be easily felt with the left hand in the rectum. As the breeding gun is inserted into the vagina, keep the gloved hand even with the gun tip. Manure in the rectum can often interfere with the inseminator's ability to palpate the cervix and gun tip. However, it is seldom necessary to remove all the manure from the bowel. Instead, keep the open hand flat against the floor of the rectum, allowing the manure to pass over the top of the hand and arm.

- ✓ 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 can get caught in these folds and little or no progress will be made until they are removed.
- ✓ If the cervix can be located, grasp it and gently push it forward.
- ✓ This will straighten the vagina and the gun should pass freely up to the cervix.

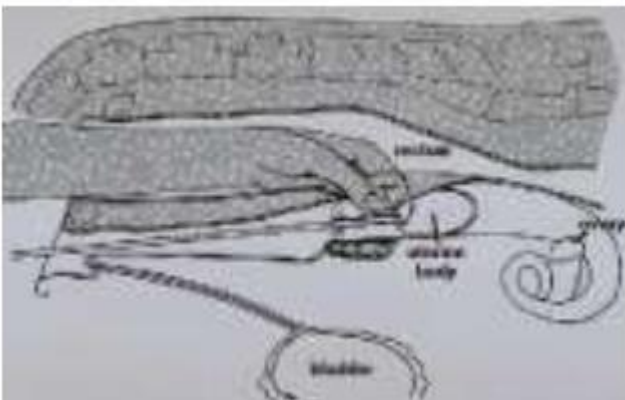
- ✓ The inseminator will note a distinct gristly sensation on the gun when it contacts the cervix.



The cervix consists of dense connective tissue and muscle and is the primary landmark for inseminating cattle. The cervix usually has three or four annular rings or folds. The opening into the cervix protrudes back into the vagina.

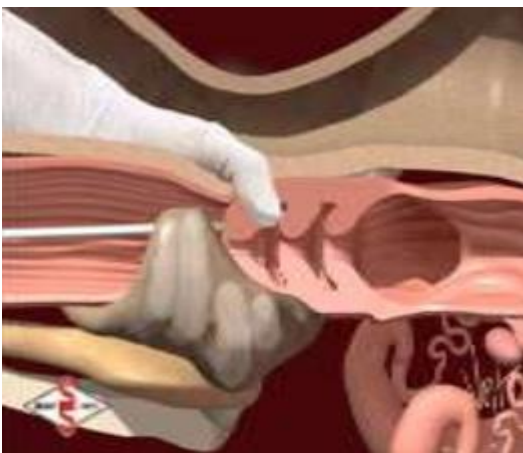


Try to access when the pipette passes the last cervix ring



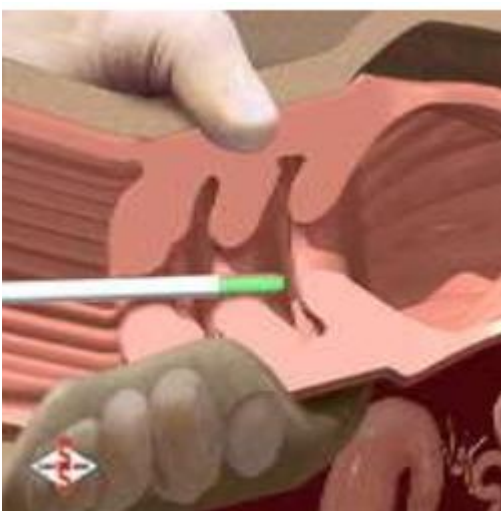
Step #5: Once the gun is in contact with the external surface of the cervix, the inseminator is ready to begin threading the cervix over the end of the gun.

- ✓ Place the cervix on or over the insemination gun; the gun is not passed through the cervix.
- ✓ Excessive movement or probing with the insemination gun during this step is seldom productive.
- ✓ The key to mastering this step of the insemination process is knowing 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, the inseminator will usually find that the tip is in the fornix area directly over the top of the opening of the cervix.



Step #6: Maintain gentle but steady forward pressure on the gun and slide the thumb and forefingers just in front of the gun tip and re-grasp the cervix.

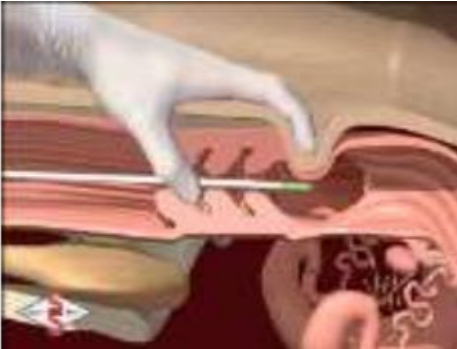
- ✓ Because the cervix is composed of dense connective tissue and muscle, it is difficult to clearly distinguish the gun tip when it is located within this structure.



Step #7: It is now time to check the gun placement and deposit the semen.

- ✓ Rotate the gloved hand until it lies on top of the cervix.

- ✓ With the index finger of that hand, locate the far end of the cervix. Pull back on the gun until the tip of it is directly underneath the index finger near the internal opening of the cervix. Raise the finger and slowly deposit the semen. Push the plunger slowly so that drops of semen fall directly into the uterine body.

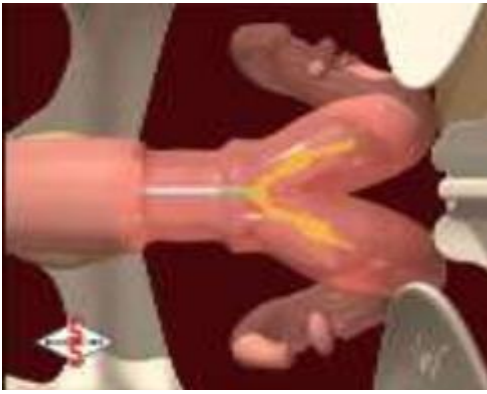


Step 8: With proper AI technique and gun placement, semen will be deposited in the uterine body.

- ✓ 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 inch through the cervix, all the semen will be deposited in only one horn.
- ✓ Be sure to raise the index finger after checking gun placement. Not doing so may obstruct one horn, 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, potentially causing infections and reduced fertility.



- Good distribution of the semen to both uterine horns.



Step # 10: After properly depositing semen, slowly pull the gun from the reproductive tract. Remove the gloved hand from the rectum. Check the gun tip for signs of blood, infection or semen leakage inside the sheath.

Some of the most important aspects to remember when inseminating a cow include the following:

- ✓ Be gentle (do not use too much force)
- ✓ Insemination is basically a two-step process: get the gun to the cervix, then place the cervix over the gun.
- ✓ Deposit the semen just through the cervix into the uterine body
- ✓ Take your time
- ✓ Relax

Self-Check 3	Written Test
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Name: _____

Date: _____

Answer the following question

1. What is temperature of water used for thawing semen? (4pt)
2. What is the use of thawing semen? (3pt)
3. How many cervix ring are there in cattle? (3pt)
4. What are the most important aspects to be remembered when inseminating a cow?
(3pt)

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

Reference

www.selectsires.com

Ulfina Galmessa.2017. Artificial Insemination Techniques

Procedure of insemination

Step #1: Restrain the animal to be inseminated.

Step #2: Raise the tail with the right hand and gently massage the rectum with the lubricated glove on the left hand.

Step #3: Gently wipe the vulva with a paper towel to remove excess manure and debris.

Step #4: Insert the gun at a 30° upward angle to avoid entering the urethral opening and bladder located on the floor of the vagina.

Step #5: Once the gun is in contact with the external surface of the cervix, the inseminator is ready to begin threading the cervix over the end of the gun.

Step #6: Maintain gentle but steady forward pressure on the gun and slide the thumb and forefingers just in front of the gun tip and re-grasp the cervix.

Step #7: It is now time to check the gun placement and deposit the semen.

step 8: With proper AI technique and gun placement, semen will be deposited in the uterine body.

Step # 10: After properly depositing semen, slowly pull the gun from the reproductive tract. Remove the gloved hand from the rectum. Check the gun tip for signs of blood, infection or semen leakage inside the sheath.

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 1 hours.

Task 1: Restrain the animal.

Task 1: Assist Artificial Insemination work.

Learning guide #25

Unit of Competence: Assist with Artificial

Insemination Procedures

Module Title: Assist Artificial Insemination

Procedures

LG Code: AGR ATI2 M07 0919 LO4-LG-25

TTLM Code: AGR ATI2 TTLM 0919v1

**LO4. Record data and clean up on
completion of work**

Instruction Sheet 04	Learning Guide #04
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This learning guide is developed to provide you the necessary information regarding the following content coverage and topics

- ✓ Maintaining and reporting data on artificial breeding
- ✓ Disposing Waste materials produced during work in a designated area.
- ✓ Cleaning and maintaining dairy's materials and tools.
- ✓ Maintain, clean and safe work site.

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 :

- ✓ Maintain and report data on artificial breeding
- ✓ Dispose Waste materials
- ✓ Clean and maintain animal's materials and tools
- ✓ Maintain a clean and safe work site

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, Sheet 3 and Sheet 4".
4. Accomplish the "Self-check 1, Self-check t 2, Self-check 3 and Self-check 4" in **page -66, 68, 71 and 73** respectively.

4.1. Record

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

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

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

a) The insemination ticket

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

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

b) The cow card

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

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

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

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

Remember: no insemination without prior identification!

INDIVIDUAL COW AI RECORD

Farmer: _____ Farm: _____

Address: _____

Cow ID: _____ Breed: _____

Breed of Sire: _____ Breed of Dam: _____ Milking only: Yes/No

Birth Date: _____ Lactation No.: _____ Suckling: for letdown
only/once per day/twice per day/

Last Calving date: _____ Remarks: _____ Ad libitum/other _____

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

(*U=uterus=cervix=vagina)

Name of Inseminator: _____ Signature: _____ Date: _____

Laboratory Interpretation and Recommendations:

Name: _____ Signature: _____ Date: _____

Heat Calendar record

It is a simple tool and can prepare a three week to see easily when a cow expects the next heat calendar in the below table. This three-week calendar is a simple tool to improve your fertility management. Other systems you can use are a fertility health chart or a cow calendar. Fertility health is attached to this module in an excel file.

Table Three weeks heat calendar

5	26	17	7	28	19
6	27	18	8	29	20
7	28	19	9	30	21
8	29	20	10	1	22
9	30	21	11	2	23
10	1	22	12	3	24
11	2	23	13	4	25
12	3	24	14	5	26
13	4	25	15	6	27
14	5	26	16	7	28
15	6	27	17	8	29
16	7	28	18	9	30
17	8	29	19	10	31
18	9	30	20	11	1
19	10	31	21	12	2
20	11	1	22	13	3
21	12	2	23	14	4
22	13	3	24	15	5
23	14	4	25	16	6
24	15	5	26	17	7
25	16	6	27	18	8

How to prepare three-week Heat Calendar?

You make columns with 21 rows next to each other. You start with writing down the first day on your calendar and you continue to write down the first 21 days on the calendar, then you go to the top of the next column and continue writing down again. When you see a cow in heat, you write down her name or number in the cell with the date you saw the cow in heat. For example, on day 9 of the month. Then three weeks later on day 30 you look to the left column and you see which cattle were in heat three weeks ago, so you can give extra attention to these cattle when observing them.

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

1. Define record. (3pt)
2. Write down the benefit of records(2pt)
3. Prepare three-week heat calendar(3pt)
4. Prepare individual cow record(2pt)

Note: Satisfactory rating - 7points

Unsatisfactory - below 7 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

4.2. Disposing Waste materials

Waste materials should be disposed properly in a designated place. You can dispose by burning or by collecting and placing a waste material in designated pit. Waste materials may include:

- ❖ Gloves
- ❖ AI Sheath
- ❖ Pipettes
- ❖ Packaging materials
- ❖ Dead animals
- ❖ Mud or defecation
- ❖ Paper based materials

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

- 1. Write down the waste produced during AI work. (5pt)

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

Reference.

SNV, 2017. Breed Improvement and Fertility Management. Training manual, Addis Abeba Ethiopia.

4.3 Cleaning and maintaining Animals, materials and tools

Hygienically: With care to keep free of germs. After proper accomplishment of a given activity it is essential to manage working environment and equipment properly. Animals, equipments, and work site must clean up properly.

Cleaning: is the processes of removing dirt, grime, scraps and grease from all Surfaces, equipment, etc.

Cleaning is important not only from an appearance point of view, but also in the Interests of hygiene to reduce the chances of pathogen growth and cross contamination. Before and after doing Artificial insemination work care must be taken for not to damage or break any materials, tools, and equipment.

The successful breeding of dairy cattle by artificial means requires that all equipment which comes in contact with bulls, cows, and semen be clean and sterilized.

Rubber equipment cleaning

1. Flush with warm or cold water immediately after using.
2. Immerse in or fill with hot water and scrub the inside surfaces with a round brush. Do not use soaps regularly, because they are detrimental to rubber. Traces of soap are also sufficient to kill spermatozoa and, consequently, must be carefully removed.
3. Rinse thoroughly "with clean hot water, 85° C. (185° F.).
4. Rinse twice with distilled water.
5. Rinse with grain alcohol (not rubbing alcohol). This helps remove vaseline and water and kills bacteria.
6. Suspend in air and allow to dry before using again.

All newly constructed funnels or new rubber equipment which is to come in contact with semen should be scrubbed with hot soapy water and then rinsed with water from a faucet for 30 to 60 minutes in order to remove all traces of soap.

Glass and metal equipment cleaning

1. Flush with warm or cold water immediately after using.
2. Scrub and clean the outside portions with a good washing powder.
3. Flush the inside and outside several times with hot water, 85° C. (185° F.)
4. Rinse the inside with distilled water, grain alcohol, and finally distilled water.

5. Place in a covered pan or tray and heat until dry.

When possible, sterilization of equipment can be done by boiling in water or steaming for 5 minutes or more. All equipment which comes in direct contact with undiluted semen must be dry. After sterilization, equipment must be kept covered until used. Glassware which remains cloudy after it has been cleaned as previously explained should be cleaned with some kind of cleaning solution. Forcing a hot lye solution or a hot 2 to 5 per cent solution of sodium phosphate through the equipment several times will usually be sufficient. When alkali solutions are insufficient for cleaning glass, a cleaning solution prepared by pouring 1 liter of concentrated sulfuric acid into 35 cubic centimeters of a saturated sodium dichromate solution can be used. This cleaning solution must be stored in crockery or pyrex glass and not allowed to come in contact with the skin or clothing. Extreme care should be used in removing any cleaning solution, because foreign materials of this kind kill spermatozoa.

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

2. Write down the use of cleaning material and equipment. (5pt)

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

Information Sheet-4	Maintaining a clean and safe work site
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4.4. Maintaining a clean and safe work site

Basically maintaining clean and safe work site and clean, and dispose material tools and equipment are inseparable it is two sides of coin therefore if you clean reusable materials well and dispose the unwanted properly and based on General occupational hazard safety precautions you are already strike to maintain a safe work site.

Disposable materials properly buried in deep enough trench and should be covered with quicklime and then with soil or use Burning. But Burning is the most difficult because the Fumes and smoke may be a problem to the surrounding environment. Mud holes should be frequently filled or exclude the animals away from it quickly.

To maintaining clean and safe work site Apply the following safe operating procedures and OHS requirements are: -

- ✓ Immediately after use, you should sort the disposable materials like AI glove, AI sheath, mud, paper based materials and other materials that may cause dirtiness of the AI service site must be disposed of according to enterprise /work procedures and reusable one should be Thoroughly cleansed, and sterilized by boiling in clean water
- ✓ Handle all AI equipments safe and clean
- ✓ Use means's of proper handling methods for equipments
- ✓ Never dispose waste materials every where

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

1. what are the safe operating procedures and OHS requirements to maintaining clean and safe work site? (5pt)

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions