

Artificial Insemination – Level-I

Learning Guide#32

**Unit of Competence: Support AI Technique and
Semen Handling**

**Module Title: Supporting AI Technique
and Semen Handling**

LG Code: AGR ATI1 M10 LO1-LG-32

TTLM Code: AGR ATI1 M10 TTLM 0919v1

**LO 1: Participate in a team of semen
production**

Instruction Sheet	Learning Guide #32
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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
- Processing Semen
- Selecting and checking Personal Protective Equipment (PPE
- Carrying out in a team

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:**

- Pre-collection works are done according to the enterprise guide lines.
- Semen is processed by following the enterprise guide lines.
- Suitable Personal Protective Equipment (PPE) are selected and checked prior to use.
- This work is likely to be carried out in a team

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 -6, 9, 12 and 14** respectively.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1, Operation Sheet 2 and Operation Sheet 3 ” **in page -15.**
6. Do the “LAP test” **in page – 16** (if you are ready).

1. Doing Pre-collection works

1.1 Definition of terms

- **Artificial insemination (AI)** is a reproductive technology by which semen is collected from male animal, processed, stored, and introduced in to the reproductive organ of female animal.
- **Personal protective equipment (PPE):** any material that gives protection against hazard or risk while conducting a given activity.
- **Heat period:** A time when the animal shows estrous signs or when shows the need to be served by bull or artificially.
- **Occupational health and safety (OHS):** actions to be taken to ensure safe operation and maintenance of machinery and equipment and safe human management.
- Artificial insemination (AI) is the most valuable management practice available to the cattle producer.
- A good AI program requires a well trained and experienced inseminator, good herd management, suitable handling facilities and a well-trained herd man. Without this AI becomes impractical.

1.1.1 Advantage and disadvantage of AI

- The major advantages of AI are;
 - ✓ Allows the producer to utilize a larger variety of genetically superior bulls even allowing its continued use after a bull's death. (Allows to use outstanding bulls extensively)
 - ✓ Improved record keeping on farms where used
 - ✓ Control venereal and other diseases

- ✓ Allows to improve the genetic potential through more accurate evaluation of transmitting ability of males
- ✓ Minimize the danger and expense of owning a herd bull.
- ✓ More economical than natural service when genetic merit is considered
- ✓ Enables to transport the superior genetic material from place to place easily.

1.1.2 Disadvantages of AI

- Trained and skilled man power is needed to perform the techniques at the exact time of the cow's cycle when conception is highest.
- It requires a special facility for semen collection, processing, storage, and transportation
- Causes the potential loss of genetic diversity
- Sometimes it can be a route for disease transmission if the semen is not properly processed and used for insemination

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 the advantages and disadvantages of Artificial insemination (5 points)
2. What are materials and equipment for Artificial insemination (5pt?)

Note: Satisfactory rating - 5 and 10 points

Unsatisfactory - below 5 and 10 points

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

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

2.1 Processing semen

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

Semen evaluation: it must be rapid and effective to reject poor quality semen. Minimum standard set to fertile bull sperm, over 500million sperm/ml, over 50% motile spermatozoa, more than 80% normal morphology.

- *Appearance and volume:* should relatively opaque, uniform and creamy appearance and 2 to 10 ml.
- *Motility and mass activity:* Minimum of 50% sperm move normal, you can check by degree of wave formation, and light microscope.
- *Concentration:* measured by electronic photometer. Eg. Bull 5-6ml/ejaculation, average concentration of sperm 800- 1200million/ml these can serve about 300-500 cows by means of AI.
- *Morphology:* abnormal morphology do not affect fertility unless it exceeds 20%. E.g of abnormality (detached head, coiled or bent tails).

Semen extender/diluents are used to increase livability in vitro (out of the body), increase volume of semen, and provide protection. Commonly used extenders for frozen semen are:

- ❖ Tris- glycerol diluents
- ❖ Glycerol egg yolk- citrate
- ❖ Milk glycerol
- ❖ Commercial diluents

Semen conservation: *freezing of semen:* semen is maintained at 34C before and after dilution.

- ❖ Every insemination dose contain at least 15-40 million
- ❖ Straw marked with bull ID and date of ejaculation
- ❖ Semen is frozen in liquid nitrogen at (-196c).

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

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

The selected animal must be restrained in prepared chutes.

Preparing Semen processing machineries and equipment

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

- ❖ Artificial vagina (AV)
- ❖ Electro ejaculator
- ❖ Conical centrifuge tubes with stoppers
- ❖ Thermos
- ❖ Pasteur, capillary and graduated plastic pipets
- ❖ Vortex mixer
- ❖ Microscope
- ❖ Microscope slides and coverslips

- ❖ Warmer tray
- ❖ Water bath
- ❖ Centrifuge
- ❖ Dead-Alive stain
- ❖ Sodium citrate solution (98.6 mm)

- ❖ Egg yolk extender (98.6 mm Na citrate; 20% egg yolk)
- ❖ Skim milk extender (98.6 mm Na citrate; 20% pre-heated skim milk)
- ❖ Spectrophotometer
- ❖ Frozen straws of bull semen
- ❖ 95oF water in container (thermos wide mouth)

2.1 Semen Analysis (processing)

- Sperm concentration(quantity); 5ml/bull
 - Sperm quality; white jelly color
 - Sperm motility -.
 - Sperm morphology
- ✓ **Hemocytometers'** :-Can be used to count blood cells and spermatozoa.
- A hemacytometer has two chambers and each chamber has a microscopic grid etched on the glass surface

2.1.2 Semen storage

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

2.1.3 Thawing

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

Processing the Semen

- After the semen sample passes a thorough evaluation, it must be processed using an extender.
- The extender dilutes the semen sample so it divided into several units for the fertilization of many eggs.

- The extender also dilutes the waste products produced by the sperm so the sperm remains viable.
- Extender also provides nourishment and protects the semen after it has been frozen
- Common **extenders** added to semen include
 - ✓ **Milk**
 - ✓ **Egg Yolk**
 - ✓ **Glycerine**
 - ✓ **Antibiotics**



- After the extender has been added to the semen, it is checked again for motility.
- The semen is then placed into straws.
- Each straw contains enough semen to artificially inseminate a female once (one-half cc).

2.1.4 Freezing the Semen

- Semen is frozen at a constant rate until it reaches a temperature of **(-196 c°) – 320 F°**.
- Semen is stored in liquid nitrogen tanks to preserve it.



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

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. Write Semen Analysis (processing)? (3 points)

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

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

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

Information Sheet-3	Selecting and checking Personal Protective Equipment (PPE)
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3. Selecting and checking Personal Protective Equipment (PPE)

3.1 materials and tools needed for animal handling and restraining

3.1.1 Restraining facilities and equipment's

- **Restraining** is technique of keeping animal under the control or within limit.
- In AI, cows must be adequately restrained to protect the inseminator and to allow proper placement of semen with a minimum of excitement and trauma to the cow.
- Those facility that are properly constructed and maintained in a good working order will enhance the producer`s time management and safety also provide safety for those working animals welfare, sensation of pain, psychological wellbeing and to prevent unnecessary excitement or stress or discomfort.
- While you are performing any management techniques the restraint method that you want to be used will:
 - Minimize danger to the handler
 - Minimize danger to the animal
 - Minimize the unnecessary pain or fright
 - Allow the management techniques completed as necessary
- There are different elaborate facilities to restrain animals such as chute, rope, crush, pen, etc. from these the common and easily affordable for our small scale farmers are cattle crush.

3.1.2 Cattle crush

- The use of crush is the most common ways of restraint for domestic animals.
- The design essential in a crush are that it should be sufficiently strong to restrain any cattle likely to be derived in to it; that cattle should not be able to damage themselves while in it; and that it should provide the necessary facilities for handling the animals, using the minimum labor.

- Average width of a crush for large tropical type cattle should be no more than 70cm, although the sides of the crush donot have to be vertical and it is desirable that the standing space in the crush should be narrower.
- Standing space doesn't need to be more than 53cm wide.
- The height of the crush doesn't have to be more than 1.5m.
- The length will depend up on how many cattle the operator wishes to retain in the crush at one time. Five or six are a suitable number.
- The crush may be constructed of tubular metal, swan timber or roughly dressed timber. Tubular metal is the most satisfactory.
- The whole lengths of the crush should be floored with concrete and where practicable the concrete should be built up to height of 0.6m on either sides of the race.
- This forms a supporting base for the uprights, a protection for the feet and legs of the
- Stock and a platform for the workers.

3.1.2.1 Procedures for Construction of cattle crush includes;

- Select appropriate site for construction
- Prepare all the necessary materials and equipments
- 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. Write Animal Restrain method for Artificial insemination? (3 points)
2. List the advantages of restraining animals? (3 points)

Note: Satisfactory rating – 3 and 6 points

Unsatisfactory - below 3 and 6 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

4. Carrying out in a team

4.1 Creating **community awareness on AI advantages**

The greatest advantage of AI is that it makes possible maximum use of superior sires. Natural service would probably limit the use of one bull to less than 100 mating per year. In 1968, AI usage enabled one dairy sire to provide semen for more than 60,000 services. Exposure of sires to infectious genital diseases is prevented by use of AI which reduces the danger of spreading such diseases. Time required establishing a reliable proof on young bulls is reduced through AI use. Other advantages include early detection of infertile bulls, use of old or crippled bulls and elimination of danger from handling unruly bulls.

There are a few disadvantages of AI which can be overcome through proper management. A human detection of heat is required. Success or failure of AI depends on how well this task is performed. AI requires more labor, facilities and managerial skill than natural service. Proper implementation of AI requires special training, skill and practice. Utilization of few sires, as occurs with AI, can reduce the genetic base. The AI industry and dairy cattle breeders should make every effort to sample as many young sires as possible.

3.1. 1. Advantages and disadvantages of artificial insemination

AI in animals was originally developed to control the spread of disease, by avoiding the transport of animals with potential pathogens to other animal units for mating and by avoiding physical contact between individuals. The use of semen extenders containing antibiotics also helped to prevent the transmission of bacterial diseases. The advantages and disadvantages of AI are as follows:

3.1.1.1. Advantages:

- AI helps prevent the spread of infectious or contagious diseases, that can be passed on

when animals are in close contact or share the same environment;

- The rate of genetic development and production gain can be increased, by using semen

From males of high genetic merit for superior females;

- It enables breeding between animals in different geographic locations, or at different

Times (even after the male's death);

- Breeding can occur in the event of physical, physiological or behavioral abnormalities;
- AI is a powerful tool when linked to other reproductive biotechnologies such as sperm
Cryopreservation, sperm sexing;

- AI can be used in conservation of rare breeds or endangered species.
- 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

E.g.: 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 refusing to stand 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.

3.1.1.2. Increased efficiency of bull usage: During natural breeding, a male will deposit much more semen than is theoretically needed to produce a pregnancy. In addition, natural breeding is physically stressful. Both of these factors limit the number of natural mating a male can make. However, collected semen can be diluted and extended to create hundreds of doses from a single ejaculate. Also, semen can be easily transported; allowing multiple females in different geographical locations to be inseminated simultaneously, and semen can be stored for long periods of time, meaning that males can produce offspring long after their natural reproductive lives end.

3.1.1.3. Increased potential for genetic selection: Because artificial insemination allows males to produce more offspring, fewer males are needed. Therefore, one can choose only the few best males for use as parents, increasing the selection intensity. Furthermore, because males can have more offspring, their offspring can be used in a progeny test program to more accurately evaluate the genetic value of the male. Finally, individual farmers can use artificial insemination to increase the genetic pool with which his or her animals can be mated, potentially decreasing effects of inbreeding.

3.1.1.4. Decreased costs: Male animals often grow to be larger than females and can consume relatively larger amounts of feed. Also, male animals are often more strong, powerful, and potentially ill-mannered and thus require special housing and handling equipment.

3.1.1.5. Increased safety for animals and farmers: As mentioned, male animals can become large and aggressive. These factors mean that maintaining a bull on a farm may be dangerous. Also, because of the relatively larger size of adult males than females, natural mating is more likely to result accidents and injury to either the cow or the bull than is artificial insemination.

3.1.1.6. Reduced disease transmission: Natural mating allows for the transfer of venereal diseases between males and females. Some pathogens can be transmitted in semen through artificial insemination, but the collection process allows for the screening of disease agents. Collected semen is also routinely checked for quality, which can help avoid problems associated with male infertility.

Artificial insemination has some potential drawbacks, however, that must be considered. First, it can be more laborious. Male animals instinctively detect the females that are in the correct status for conception. With artificial insemination the detection work falls on the responsibility of the farmer. Poor detection results in decreased rates of fertility. Also, increasing the number of offspring per male has selective advantages only if the best males can be accurately determined. Otherwise this process only decreases the genetic variability in a population. Increasing the number of offspring per male always reduces the gene pool. The benefits of more intense selection must be balanced against the negative effects of decreased variation.

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:

1. Writ creating community awareness on AI advantages? (4 points)

Note: Satisfactory rating – 3 points

Unsatisfactory - below 3 and 4 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

Operation sheet-1	Procedures for Construction of Cattle Crush
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Instructions:

1. You are required to construct cattle crush from simple available materials(stick) based on the given specification given bellow
Crush width =53cm wide.
The height crush =1.5m.
The length crush=2m/caw

Procedures for Construction of cattle crush includes;

- Select appropriate site for construction
- Prepare all the necessary materials and equipments
- 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

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 8-12 hours.

Task 1: Construction of cattle crush?

List of Reference Materials

Artificial Insemination In Dairy Cows Procedure And Facts For Improving Conception Rate

Artificial Insemination Techniques

GHILPA (2011) the Global Livestock Production and Health Atlas. Available:

<http://kids.fao.org/glipha/>. Accessed 2011 November 20.

[2] FAO (2011) Food and Agriculture Organization of the United Nations. Available:

<http://faostat.fao.org/site/569/default.aspx#ancor>. Accessed 2011 November 22

Artificial Insemination – Level-I

Learning Guide#33

**Unit of Competence: Support AI Technique and
Semen Handling**

**Module Title: Supporting AI Technique
and Semen Handling**

LG Code: AGR ATI1 M10 LO2-LG-33

TTLM Code: AGR ATI1 M10 TTLM 0919v1

LO 2: Handle semen

Instruction Sheet	Learning Guide # 33
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This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Using the required materials, tools and equipment
- Undertaking Work in a safe and appropriate environmentally
- Properly handling Semen during; processing, storage, distribution and at field levels.
- Assessing quality of semen through semen motility

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:

- The required materials, tools and equipment are used according to enterprise guidelines.
- Work is undertaken in a safe and environmentally appropriate manner according to enterprise guidelines.
- Semen is properly handled during; processing, storage, distribution and at field levels according to the enterprise guidelines.
- The quality of semen is assessed through observation of semen motility at field levels following the enterprise or supervisor guide lines

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, Sheet 4 and Sheet 5”.
4. Accomplish the “Self-check 1, Self-check t 2, Self-check 3, Self-check 4 and Self-check 5” in **page -22, 25, 27, 29 and 32** respectively.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1 and Operation Sheet 2” in **page -33**.
6. Do the “LAP test” in **page – 34** (if you are ready).

1.1 Using the required materials, tools and equipment

- Personal protective equipment provide protection for hand, arm, eye, and body, foot from chemicals, temperature extreme and abrasion.
- Store and wash used PPE separately from other clothing and laundry.
- If PPE will be reused, clean it before each day of re use, according to the instruction from the PPE manufacture unless the pesticides labeling specifies other requirements. If there are no other instructions, wash in detergent and hot water.
- Dry the clean PPE before storing
- Store PPE away from other clothing and away from pesticides areas.

1.1.1 Some of the important PPE's are

- Sun hat:
- Respirator:
- Eye Goggles:
- Protective gloves/Rubber gloves –
- Safety boots (steel capped boots/shoes)
- Over all jacket, shirts, and trousers
- Sun screen lotion
- Face mask.

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 the material, tools and equipment that are needed for handling of artificial inseminations (5 points)

Note: Satisfactory rating - 5 points

Unsatisfactory - below 5 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

Information Sheet-2	Undertaking Work in a safe and appropriate environmentally
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1. Undertaking Work in a safe and appropriate environmentally

- Procedure is a safe work procedure that must carried out in a given work place for effectiveness of work and manual handling. Some of these may include but not limited to:
 - ❖ Safe animal handling system and procedures
 - ❖ Identifying hazards and zoonosis
 - ❖ Safe system and procedures for outdoor work including protection from solar radiation
 - ❖ Appropriate use of PPE
 - ❖ Following work procedure for every activity

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 materials and equipment for Artificial insemination (10 pt.?)

Note: Satisfactory rating - 10 points

Unsatisfactory - below 10 points

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

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

Information Sheet-3	Properly handling Semen during; processing, storage, distribution and at field levels.
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3. Properly handling Semen during; processing, storage, distribution and at field levels

3.1 Handling of semen

For transport of liquid fresh semen to a farm or within a farm, it is necessary to have a thermos flask and ice cubes covered with cotton. During transportation the temperature of container in which the semen packed must be close to 5c. Semen can stored in liquid nitrogen container at (-196C) which is also known as deep- freezing. Immediately after collection the semen can placed in a water bath at 25C. Once semen is considered acceptable it is diluted at 34C. Generally AI requires preservation of semen outside the body for certain time or several years. Sperm survival prolonged by diluting semen with certain extenders. Commonly used extenders are tris- glycerol, egg yolk, milk glycerol etc.

- Transport of liquid semen

During transportation the temperature of semen should maintained between (0 to 5C). All containers used for semen transportation should be pre-cooled before using. The room temperature is maintained between (10- 25C

- Semen handling Sperm are motile and vigorous cells, but also fragile and susceptible to damage and killing by several environmental conditions
- It is vulnerable to miss handling when collecting, handling (storage), transportation, thawing and insemination.
- The semen may be of excellent quality when collected, but exposure to harmful conditions can lower the fertility considerably
- Therefore it is important that special consideration has to be given to proper semen handling and insemination technique to ensure optimum conception rate.

- general it is critically important to avoid exposing sperm to adverse conditions like:-
 - Thermal stress
 - Exposure to toxic chemicals
 - Air
 - Water
 - Sun light

Thermal stress:

- Sperm are sensitive to both heat and cold.
- Short periods of exposure to adverse temperatures just a few degrees will usually kill large numbers of sperm cells.
- The activity of sperm is increased at a body temperature ± 37 degree Celsius /. If semen is kept at this temperature for a long time the sperms are soon exhausted.
- Increasing environmental temperature damages or kills the sperm
- this also the case in the testicles if the bull has become febrile
- Lower temperatures are comparatively tolerated much better. But the temperature must be brought down gradually.
- Fluctuating temperature also more seriously affects and or kill the sperm and interfere with its fertility

Exposure to toxic chemicals:

- Keeping AI equipment clean and disinfected is important, but soap and disinfecting chemicals are quite potent spermicidal as to bacteria
- So it is not advisable to disinfect AI equipment at the time of insemination
- Somewhat it is recommendable to wash with soap and disinfect with antiseptics while the equipment are out of use

Water

- Water , even in small quantities, reduce sperm motility and kills the sperms

Sun light

Exposure of semen to sun light is harmful. Therefore; semen must be protected against the sun from the time of collection to insemination

Air

The presence of air especially oxygen increases sperm activity and soon exhausted them which would bring them to death

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 is field levels Handling of semen (9 points)

Note: Satisfactory rating – 9 points

Unsatisfactory - below 9 points

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

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

Information Sheet-4	Assessing quality of semen through semen motility
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4. Assessing quality of semen through semen motility

4.1 Semen quality:

Two major principal measures of semen quality are:-

- ☐ Motility and
- ☐ Morphology
- The most common quality measure at field level is sperm cells motility which, can be seriously affected if semen is not properly handled & thawed

Motility is the chief quality that can be affected due to mal-handling at all levels.
(Semen distribution centers and field level.)

Motility rating can be done by experience personnel based on the estimated percentage of spermatozoa and degree of motility.

Other Principal parameters /measures/ of semen quality are:-

- ☐ Freedom from diseases causing agents
- ☐ Concentration
- ☐ Fertility and
- ☐ Productivity
- Areas where Semen can be decreased its motility or damaged due to mal-handling:-
 - At storage
 - During transportation,
 - During transferring b/n containers
 - During removing for thawing,
 - During thawing
 - Prior to insemination and
 - During insemination.

- The following practices should help to minimize semen damage that occurs due to improper handling procedures:
- proper handling within the tank (periodically checking & top-up LN)
- Transfer of semen between tanks must be coordinated and rapid
- Safe and careful removal of straw Semen from the LN container during thawing. I.e. prepare to thaw semen by raising the canister into the lower portion of the neck of the container where the desired straw of semen can be grasped.
- Transfer the straw from the canister to the thaw bath using forceps rather than your hand
- Quickly lower the canister holding the rest into the tank body again
- Thaw at recommended temperature / i.e 34-35 degree celciouse for 15-30 seconds/
- Cleaning insemination equipments /i.e clean and disinfect with antiseptics while the equipments are out of use /

4.2 Semen handling within the tank

- In semen tank, dangerous temperatures exist in the upper half of the container.
- Exposure to these temperatures can occur when semen is transferred from tank to tank or when handling semen within the neck while trying to locate and thaw a specific unit of semen.
- Thermal injury to sperm is permanent and cannot be corrected by returning semen to liquid nitrogen.
- Methods of measuring the level of LN in the tank
- ☐ Use of detector Alarm and
- ☐ Measuring rod or wooden yardstick

(Insert the Measuring rod into the tank, keep for 10-30 sec. & wave it for 5 sec.)

Then read at what length it is on the rod

Degree Fahrenheit (°F)	(°C)
Top +36° to +54°	Top 2 to 12°C
1 inch from top +5° to -8°	2.5cm from top -15 to -22
2 inches from top -40° to -51°	5.08cm from top to -46
3 inches from top -103° to -116°	7.6cm from top -75 to -82
4 inches from top -148° to -184°	10.2cm from top -100 to -120
5 inches from top -220° to -256°	12.7cm from top -140 to -160
6 inches from top -292° to -313°	15.24cm from top -180 to -191

4.3 Transferring of semen between LN containers

- In the typical farm LN container temperature in the neck of container are warm enough to damage semen.
- The suggestions below are given to avoid semen damage when straw are retrieve from canisters or canisters are retransferred b/n tanks
- Locate the tank in a well-light room, or direct a light at the tank's mouth
- Maintain an accurate and organized written inventory record of the specific location (by canister) of semen within the tank.
- When transferring semen b/n tanks, place the thanks close together
- When transferring semen, all straws should be in a canister with goblets filled with LN, and exposed to the air no longer than three seconds

4.4 Removing Semen from the LN container

- Before removing semen from the container it is paramount important determining the type of breed and blood level of the semen that going to be used.
- Bellow listed semen bulls with corresponding code are currently used in Ethiopia:-

- Begaite-----code 02
- Boran-----code 03
- Fogera----- code 04
- Sheko----- code 05
- Horo-----code 06
- Frisian----- code 10
- Jercy----- code 11
- 50% cross----- code 50
- 75%cross----- code 75

4.5 Semen Evaluation

- After the semen has been collected, it is examined in the lab under a microscope for motility and morphology.
- Motility and Morphology
 - ✓ Motility is the activity of the sperm. Sperm must be able to travel directly to the egg for fertilization.
 - ✓ Morphology refers to the shape of the sperm. Sperm cells must be shaped normally without any defects for fertilization to occur
- In addition to correct motility and morphology, sperm cells have to be in sufficient quantity in the semen sample.
- Sperm quantity is determined by a trained professional who is able to estimate the number of active sperm in a millimeter of semen.
- Semen must contain at least 40 million cells per cc before freezing and 12.5 million cells per cc after thawing to be used for AI.



4.6 Processing the Semen

- After the semen sample passes a thorough evaluation, it must be processed using an extender.
- The extender dilutes the semen sample so it is divided into several units for the fertilization of many eggs.
- The extender also dilutes the waste products produced by the sperm so the sperm remains viable.

- Extender also provides nourishment and protects the semen after it has been frozen
- Common extenders added to semen include
 - ✓ Milk
 - ✓ Egg Yolk
 - ✓ Glycerine
 - ✓ Antibiotics



- After the extender has been added to the semen, it is checked again for motility.
- The semen is then placed into straws.
- Each straw contains enough semen to artificially inseminate a female once (one-half cc).

4.7 Freezing the Semen

- Semen is frozen at a constant rate until it reaches a temperature of $(-196\text{ }^{\circ}\text{C})$ – $320\text{ }^{\circ}\text{F}$.
- Semen is stored in liquid nitrogen tanks to preserve it.



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:

1. Writ the major principal measures of semen quality?(**10 points**)

Note: Satisfactory rating – 10 points

Unsatisfactory - below 10 points

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

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

Operation sheet-1	Procedures for cleaning tools and equipments
-------------------	--

Instruction:- perform the following task based procedures provided

1. Separate the materials, tools and equipment that need cleaning
2. Handle the contaminated with neoprene or rubber glove (use appropriate PPE)
3. Wash the materials
4. Handling them on a lineout side and housing them down with water
5. Be careful when disposing of rinse water. If it contains herbicides do not dispose of it on a garden or loan area.
6. Do not mix the contaminated materials with others in a washing machine.
7. Put only a few contaminated materials the same area at a time, grouping together those that are contaminated by the same chemical. And set the machines for full load.
8. Use hot water
9. Dry materials

LAP Test 1	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 10-20 hour.

Task 1. Perform Procedures for cleaning tools and equipment's?

List of Reference Materials

1. ARTIFICIAL INSEMINATION IN DAIRY COWS PROCEDURE AND FACTS FOR IMPROVING CONCEPTION RATE
 2. ARTIFICIAL INSEMINATION TECHNIQUES
 3. GHILPA (2011) the Global Livestock Production and Health Atlas. Available:
<http://kids.fao.org/glipha/>. Accessed 2011 November 20
- FAO (2011) Food and Agriculture Organization of the United Nations. Available:
<http://faostat.fao.org/site/569/default.aspx#ancor>. Accessed 2011 November 22

Artificial Insemination – Level-I

Learning Guide#34

**Unit of Competence: Support AI Technique and
Semen Handling**

**Module Title: Supporting AI Technique
and Semen Handling**

LG Code: AGR ATI1 M10 LO3-LG-34

TTLM Code: AGR ATI1 M10 TTLM 0919v1

LO 3: Collect History

Instruction Sheet	Learning Guide # 34
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This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Gathering production Information at field levels
- collecting Observable signs from history
- Doing Work based on OHS and workplace information

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:

- Information on production. Sign of heat, pregnancy, last calving date number and frequency /parity of calving and breed type at field levels are gathered following the enterprise or supervisor guide lines.
- Observable signs are collected separately from history
- Work is done according to Occupational Health and Safety (OHS) requirements and workplace information.

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, Sheet 4 and Sheet 5”.
4. Accomplish the “Self-check 1, Self-check t 2, Self-check 3 and Self-check 4” in **page -39, 42, 44 and 47** respectively.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1, Operation Sheet 2 and Operation Sheet 3 ” in **page -48**.
6. Do the “LAP test” in **page – 49** (if you are ready).

Information Sheet-1	Gathering production Information at field levels
----------------------------	---

1. Gathering production Information at field levels

1.1 Communicate ideas and information

- ✓ Everyone's idea to be valued
- ✓ The workload to be shared
- ✓ The project or activities to be appropriate any ones needs
- ✓ The outcome of the project or activities to be respted and valued within the community
- ✓ Greater inclusion among the community
- ✓ Different communication to pass information to the general public

1.1.1 Artificial insemination records

- There are many reasons for maintenance of farm records as they are of great value as aids to management and are necessary for financial analysis.
- Records are tools in monitoring progress and in identifying problems in the dairy farm operations.
- Accurate records are necessary for the following reasons:
 - ✓ To monitor yields and performance
 - ✓ To plan a breeding program
 - ✓ To monitor disease problems
 - ✓ To identify farm management problems

Records should be

- Simple to keep
- Act upon
- Easy to understand with all dates for reference.
- Farm records are of two types i.e. Technical Records (dealing with individual performance) and Business records (dealing with purchase / sales/ financial matters etc.)
- The record system should have - a Day book (all important events are recorded here), the cow record and the monthly reports.

- For maintaining animal records, all eateries are identifiable by ear tag number and date of recording.
- A complete set of recordis essential for good reproductive managementand should be kept on each female. The following parameters should be included in the record.

- ✓ Permanent identification
- ✓ Parturition date
- ✓ Date of first estrus after parturition and all subsequent estrus dates
- ✓ Breeding dates with identification of service sire
- ✓ Results of preliminary pregnancy check between 35-40 days of post breeding
- ✓ Results of final pregnancy check at 60 days
- ✓ Calculated due date

1.1.2 Financial record

- All incomes and expenses as well as materials procured and used should be recorded properly

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. Mention Communicate ideas and information? (10 points)

Note: Satisfactory rating - 10 points

Unsatisfactory - below 10 points

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

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

Information Sheet-2	collecting Observable signs from history
---------------------	--

2. collecting Observable signs from history

2.1 The physical observable signs of cow in estrous are :

- ✓ Riding other cows
 - ✓ Restlessness
 - ✓ Pacing over the fence
 - ✓ Redness of the vulva
 - ✓ Apatite loss
 - ✓ Sniffing and being sniffed by others
 - ✓ Moist and swollen vulva
 - ✓ Enlargement of cervix and uterine horn
 - ✓ Mounting other animals
 - ✓ Mucous discharge
 - ✓ Decreased milk yield
 - ✓ Preparing Artificial insemination Work
- The cow should inseminated in 12 hours after the first signs of estrous.
 - Different species of Animals have different length of estrous cycle, duration and ovulation

The Estrous length cycle and Duration of different special of Animals

Species	Length of Estrous	Duration of Estrus	Estrus to Ovulation
Cattle	21d	15 h	24-32 h
Pig	21 d	50 h	36-44 h
Sheep	17 d	30 h	24-30 h
Horse	7d	7 d	5d

Estrus is a period during the estrous cycle, when the female will allow breeding to occur. Insure that the cow to be bred is truly in estrus. Remember, research studies indicate between 7-20% of the cattle inseminated are not in estrus

1.1 Detecting Estrous (Heat) of livestock by:

- ✓ Physical Observation
- ✓ Laboratory test
- ✓ Computerized estrous detection
- ✓ Chin-ball marker

Estrus is a period during the estrous cycle, when the female will allow breeding to occur

- Prior to thawing the semen, restrain the cow in a familiar area free of stressful conditions. Unnecessary excitement may interfere with mechanisms important to achieving good conception rates.
- Keep inseminating supplies dry and clean at all times. Store breeding sheaths in the original package until used.
- Once the inseminating device assembled, protect it from contamination and cold shock temperatures.
- Do not allow materials used to lubricate the rectum to come contact with the vulva region. Lubricants are generally spermicidal.
- Avoid using irritating products.
- Thoroughly wipe the vulva region clean with a paper towel. This helps prevent the interior of the reproductive tract from becoming contaminated and possibly infected.
- Insert a folded paper towel in to the lower portion of the vulva.
- Place the inseminating rod between the folds of the towel and insert it into the vagina without contacting the lips of the vulva.
- Use protective rods or sheaths in herds or for specific cows where vulva vaginal infection is a problem. When this technique is used, the standard insemination rod and plastic sheath inserted into the larger protective rod or sheath.
- Pass this double rod combination through the vagina to the external cervical opening. At the cervix, puncture the tip of the protective device with the insemination rod and then thread it through the cervix. Only use this technique following the recommendations of a veterinarian, extension specialist or AI person, when specific diseases have been diagnosed or suspected
- Develop good sanitary procedures and insemination practices when learning to breed cows.

- Hope fully the good habits will be maintained.

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 Estrous (Heat) of livestock? (10 points)
2. Write the physical observable signs of cow in estrous? (5 points)
3. List out the Detecting Estrous (Heat) of livestock? (10 points)

Note: Satisfactory rating - 25 points

Unsatisfactory - below 25 points

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

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

3. Doing Work based on OHS and workplace information

3.1 Maintaining a safe working environment involves the following:

- Regular housekeeping
- Periodic inspection to detect and correct physical hazards
- Preventive maintenance of equipment, machinery and structures

Self Inspection checklists identify areas and items that need scheduled housekeeping, inspection and maintenance

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 are safe working environment? (5 points)

Note: Satisfactory rating – 5 points

Unsatisfactory - below 5 points

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

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

Operation sheet-1	Thawing semen
-------------------	---------------

Instruction: - perform the following task based procedures provided

1. Assure the water for thawing is at 34-35 °c
2. Choose the semen you want to use and remove it from the canister with forceps
3. Dry the Straw with towel or tissue paper.
4. Thaw the frozen semen at 34-35 °c for 15-30(40) seconds and.
5. Remove the straw from the water and dry it properly with towel or tissue paper.
6. (Do not thaw more than one straw at a time and take care to not elevate canister beyond the neck level of the container

LAP Test 1	Practical Demonstration
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Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions:

1. Given necessary templates, tools and materials you are required to perform the following tasks within 10-20 hour.

Task 1. Thawing techniques?

2. Request your teacher for evaluation and feedback

Operation sheet-2	<i>Sperm Motility Evaluation</i>
-------------------	----------------------------------

Instruction: - perform the following task based procedures provided

1. Place a small drop of sodium citrate solution on a clean glass slide warmed to 38°C. This drop should be of such size that placing a coverslip upon it (#3 below) will allow it to occupy all the space under the coverslip, but not flood out beyond it.
2. With a clean glass rod, place a very small dab of whole semen on the drop of buffer.
3. Cover the semen-buffer drop with a coverslip.
4. Examine the drop with low magnification (microscope). If the sperm are close together so as to make a motility estimate difficult, prepare a second slide.
5. Rate motility on a basis of 0 to 100% where 0 represents an estimated 0-5% progressively motile, 1 represents 5-15%, etc. Do not rate closer than the nearest 10%. Record motility.

LAP Test 2	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions:

1. Given necessary templates, tools and materials you are required to perform the following tasks within 10-20 hour.

Task 1. Perform *Sperm Motility Evaluation*?

2. Request your teacher for evaluation and feedback

Instruction: - perform the following task based procedures provided

1. Using the same slide prepared for the Dead-Alive evaluation, count 100 sperm under "high dry" magnification or oil immersion and record the number of sperm that have abnormal morphologies. Refer to the figure below for a description of the various sperm abnormalities encountered.
2. Record the percentage of abnormal sperm.

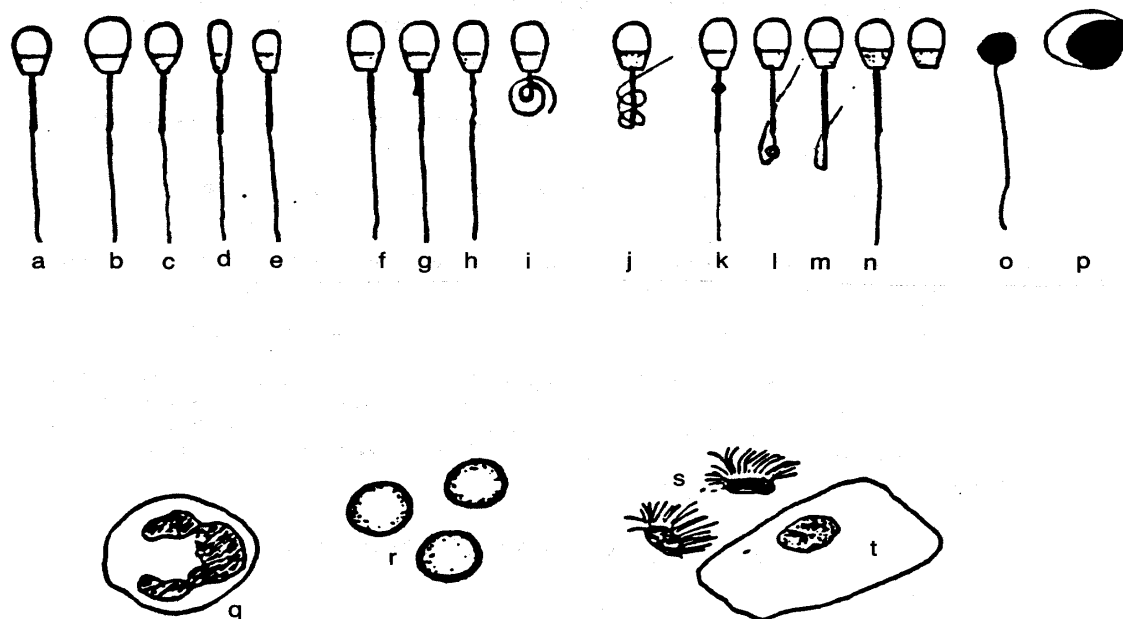


Figure 2

3. Normal bovine cell (a and n) and several abnormal cells appearing in bull semen. b-e, Head abnormalities; f-i, midpiece abnormalities; j, tail abnormality; k, proximal protoplasmic droplet; l, distal protoplasmic droplet and bent tail; m, bent tail; n, loose normal head; o, spermatid; p,

spermatogonium; q, neutrophilic granulocyte; r, erythrocytes; s, medusa cells; t, epithelial cell.

LAP Test 3	Practical Demonstration
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Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions:

1. Given necessary templates, tools and materials you are required to perform the following tasks within 10-20 hour.

Task 1. Perform *Abnormal Sperm Morphology Evaluation*?

2. Request your teacher for evaluation and feedback

Operation sheet-4	Semen Collection by Artificial Vagina
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Instruction: - perform the following task based procedures provided

1. Mount--female in estrus, teaser animal or dummy.
2. Restrain mount.
3. Clean bull's sheath and belly.
4. Lead bull to mount to tease and be teased.
5. As bull mounts, grasp sheath and direct penis into AV.
6. Hold AV near buttocks parallel to angle of vagina.
7. Let bull serve the AV (don't thrust AV on penis).
8. Do not touch penis.

LAP Test 4	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions:

1. Given necessary templates, tools and materials you are required to perform the following tasks within 10-20 hour.

Task 1. Perform Semen Collection by Artificial Vagina?

2. Request your teacher for evaluation and feedback

List of Reference Materials

4. ARTIFICIAL INSEMINATION IN DAIRY COWS PROCEDURE AND FACTS FOR IMPROVING CONCEPTION RATE
 5. ARTIFICIAL INSEMINATION TECHNIQUES
 6. GHILPA (2011) the Global Livestock Production and Health Atlas. Available: <http://kids.fao.org/glipha/>. Accessed 2011 November 20
- FAO (2011) Food and Agriculture Organization of the United Nations. Available: <http://faostat.fao.org/site/569/default.aspx#ancor>. Accessed 2011 November 22

Artificial Insemination – Level-I

Learning Guide#35

**Unit of Competence: Support AI Technique and
Semen Handling**

**Module Title: Supporting AI Technique
and Semen Handling**

LG Code: AGR ATI1 M10 LO4-LG-35

TTLM Code: AGR ATI1 M10 TTLM 0919v1

LO 4: Apply artificial insemination procedures

Instruction Sheet	Learning Guide # 35
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This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Identifying History of the animal
- Observing Animal for sign of heat
- Preparing Material, assembling and loading semen properly
- Depositing Semen in the uterine body
- Cleaning Material and Disposing waste

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

- History of the animal is identified
- Animal is observed for sign of heat
- Material is prepared, assembled and semen is load properly
- Semen is deposited in the uterine body safely
- Material is cleaned and waste disposed according to the enterprise guideline

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, Sheet 4 and Sheet 5”.
4. Accomplish the “Self-check 1, Self-check t 2, Self-check 3 and Self-check 4” **in page -55, 57, 60 and 62** respectively.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1” **in page -63.**
6. Do the “LAP test” **in page – 64** (if you are ready).

Information Sheet-1	Identifying History of the animal
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1. Identifying History of the animal

1.1 The History of Artificial insemination (AI)

- 14th century Arabs-Horses.
 - 18th century Italians-Dogs.
 - 1949 Way to freeze semen at -320°F
- Artificial Insemination is older than everyone in this room's ages combined. Documents state around 1322 A.D. an Arab chief wanted to mate his mare to a stallion owned by his rival. So he performed an amateur version of the artificial insemination we know today.
 - Then in 1780, Spallanzani in Italy successfully bred two dogs with the use of A.I. Leading to him being named the inventor of artificial insemination.
 - Over 100 years later, in 1890 it was used for horse breeding in Europe
 - It was in Russia ,however ,that the method was first taken up seriously as means of improving farm animals
 - The artificial vagina was developed in Italy in 1914 for semen collection from dog, and was modified by the Russians for the bull, sheep and horses.
 - The mass breeding of cattle however didn't come until later, in 1931. By an A.I. Cooperation in Denmark.
 - AI was introduced before the second world war by Italians in Asmara , which were been part of Ethiopia.
 - Having being abandoned during the war it was taken up again in 1952 with imported semen.
 - But was discontinued 5 years later for economic reasons
 - The former Asmara service started up again in the late 1960's and operated for years under the DDE / Dairy Development Enterprise /
 - An independent service was started in 1967 in Asella to serve the Arssi area under the Swedish International Development Agency /SIDA/ aided project.
 - A bull station and semen laboratory were opened at Asella in 1972

- The present service in Addis Ababa area started in 1968 under the DDE and served city cows; although DDE services continue they are directed to state farms only
- The AI service was recognized in 1981 under the ministry of Agriculture National Artificial Insemination Center / NAIC/which has its head quarter here in Kality

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. Write History of Artificial insemination? (10 points)

Note: Satisfactory rating - 10 points

Unsatisfactory - below 10 points

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

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

2. Observing Animal for sign of heat

2.1 Heat detection,

A number of both beef and dairy producers use Artificial insemination (AI). One of the major problems with these programs is heat (estrus) detection. An experienced observer with well trained eye can do a good job by observing the herd for ½ to 1hour early in the morning and 1/2to 1hour in the evening.

Heat detection is more an art than a science, and not everyone can do a good job of it. The observer must be taught to recognize the signs of estrus and must be aware that some cows show only abbreviated signs of estrus. If heat periods are missed or in correctly identified, increased calving intervals will result, with longer periods and reduce profits. It is extremely important that cows be inseminated at the proper time in relationship to ovulation.

Estrus (heat) is a fairly well-defined period that occurs in no pregnant cows once each 19 to 23 days, in other words estrus is the time during which the female will accept the male for copulation or breeding. The female mammal begins to have estrus period when it is old enough to be breed. The estrus cycle begins when a follicle on the ovary begins to develop. The hormone estrogen is produced and causes the animal to show the sign of estrus. This period is characterized by increased sexual activity and acceptance of the bull by caw. The period basically begins with the first acceptance of the bull and end with last acceptance. European cattle have a 12 to 18 hours heat period, while zebu cattle may exhibit estrus only for 3 to 6 hours.

2.2 Heat detection

- Estrus must be detected accurately because it signals the time of ovulation and determines the proper time of insemination.
- The proper time of insemination should occur 6-8 hours prior to ovulation because sperm requires 2-6 hours in the female tract before they are fully capable of fertilization.
- The cows found in estrus in the morning are usually inseminated that evening, and cows in heat in the evening are inseminated the following morning.
- Because ovulation occurs 24-30 hours after the onset of heat, insemination should occur near the end of estrus.

- Detection usually depends up on observation of standing response when ridden. Thus for good detection for large size herd there must be;

- ☞ Clear identification of individual animals with ear tags or other
- ☞ Adequate lighting to aid accurate identification
- ☞ A permanent recorded of the cow`s identify made at the time of observation
- ☞ Regular observation for 20-30 min three times per day other than milking or feeding observation
- ☞ Adequate area with enough space and a good floor surface to enables the cows to expresses trousbehavior.
- ☞ A record of all estrus periods even before the earliest service date

- ❖ The most commonly used method of heat detection is visual heat detection
- In most cases animal observed during normal activity or as they move to and from housing, feeding or pasture area.
- In diary operations caws can also observed as they are moved to and from the milking parlor but the animal must be observed Regular for 20-30 min three times per day to detection Heat.
- Timing is extremely important when observing for estrus activity.
- Behavioral heat activity is usually seen in the early morning between 2:00 and 6:00.

2.3 The sign of estrous in cattle include:

- Standing when mounted by another cow (best indicator for the time to breed).
- Nervousness/restlessness
- Redness and Swelling of the vulva
- Frequent urination
- Mucus discharge from the vulva
- Trying to mount other cattle (cattle not in estrous may do this).
- Bellowing when isolated
- The most reliable signs are standing to be mounted and head-mounting (in small percentage of cows that exhibit this).

2.4 The sign of estrous in goat include:

- Nervousness
 - Frequent urination
 - Mucus discharge from the vulva
 - Bleating
 - Ride other animals and standing when ridden
 - Shaking the tail
 - Swelling, red appearance of the vulva.



- Sheep do not show any visible sign of estrus.
- The only way to tell if the ewe is in estrous is if she accepts the ram.
- A ram with an apron to prevent breeding is sometimes used to see if the is in estrous.
- The apron prevents the ram from completing the act of copulation when mounting the ewe.
- Most sheep have seasonal estrous periods. They come in to estrous only in the fall.

Seasonal estrous in sheep seems to be the result of the shorter hours of day light and the cooler temperature in the fall.



Self-Check -2	Written Test
---------------	--------------

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

1. Define Heat detection? (5 points)
2. Write the sign of estrous in cattle? (5 points)

Note: Satisfactory rating - 10 points

Unsatisfactory - below 10 points

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

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions



Information Sheet-3

Material is prepared, assembled and semen is load properly

3.1 Material is prepared, assembled and semen is load properly

3.1 Materials needed for handling of artificial inseminations are including;

- Frozen semen filled straws in liquid nitrogen cylinder
- Scissors
- Full size arm length rubber hand glove
- Inseminating gun with syringe and catheter
- Thermometer
- artificial inseminations bag
- thermos flask(for boiling water)
- plastic sheath
- measuring rode
- protective garment cover
- cow in standing heat
- Soft soap and etc.

3.2 Semen preparing for insemination, assembling AI gun & semen loading procedures

3.2.1 These procedures incorporates

- semen thawing,
- bringing parts of AI gun (plunger & barrel) together,
- inserting semen straw into the barrel,
- cover the barrel with AI sheath and
- Fix the sheath with ring to the barrel.

3.2.2 Detail of the procedure includes the following steps:-

- Assure the water for thawing is at 34-35 o^c
- Choose the semen you want to use and remove it from the canister with forceps
- Dry the Straw with towel or tissue paper.



- Thaw the frozen semen at 34-35 °C for 15-30(40) seconds and.
- Remove the straw from the water and dry it properly with towel or tissue paper.

(Do not thaw more than one straw at a time and take care to not elevate canister beyond the neck level of the container)

3.3 Thawing Semen

- Comprehensive method of straw semen thawing is warm water.
- Thawing methods varied among AI organizations,
- each of which has a specific method for diluting,
- Cooling, packaging, and freezing semen in straws.
- Semen should be thawed according to the
- recommendations of the organization supplying that specific unit of semen
- One protocol for thawing semen is at about 34-35 °C for at least 15-30 seconds.
- Thawing semen between these temperatures allows more semen to survive the thawing process.
- Never thaw semen straws in your pocket or in the cow.

3.4 Assembling the AI gun and prepare for insemination Semen Loading to the AI Gun

- In very cold environment before loading the semen in the AI gun, warm the gun by rubbing it with a paper towel to avoid cold-shocking the semen.
 - withdraw the plunger of the A.I gun
 - placing cotton wool cork first while putting the straw in to the barrel,
 - Cut off the tip of straw from the sealed part straightly by straight scissors
 - □Cover the gun with sheath and fasten with the ring
 - Push the plunger slowly until the semen is visible at the opening and
 - Hold the gun with your teeth horizontally.
 - Now the straw is assembled and ready for use.



- Afterward keeping veterinary sanitation & all insemination procedures insemination can be instituted.
- It is recommended that cows should be inseminated as soon as possible after thawing semen



Self-Check -3	Written Test
---------------	--------------

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

1. List out the Materials needed for handling of artificial inseminations? (5 points)
2. Write assembling AI gun & semen loading procedures? (5 points)

Note: Satisfactory rating – 10 points

Unsatisfactory - below 10 points

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

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

Information Sheet-4	Deposing Semen in the uterine body
---------------------	------------------------------------

4. Deposing Semen in the uterine body

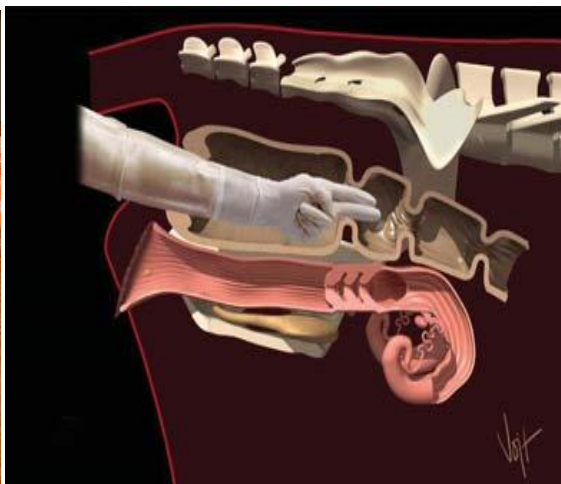
4.1. Massaging the Tract

- ✓ The technician may also massage the tract to ensure the semen reaches both uterine horns.
- ✓ The technician cannot be sure if the female will ovulate from the left or right ovary, so massaging the tract ensures that the semen reaches both uterine horns.
- ✓ Massaging the tract also causes the release of Oxytocin which aids in semen transport



4.2 Locating the Cervix

The technician should insert one hand into the cow's rectum to locate the reproductive tract and cervix.



4.3 Cleaning the Vulva

The skin around the vagina (the vulva) should be cleaned with paper towels to avoid





Contaminating the cow when inserting the AI rod into the vagina

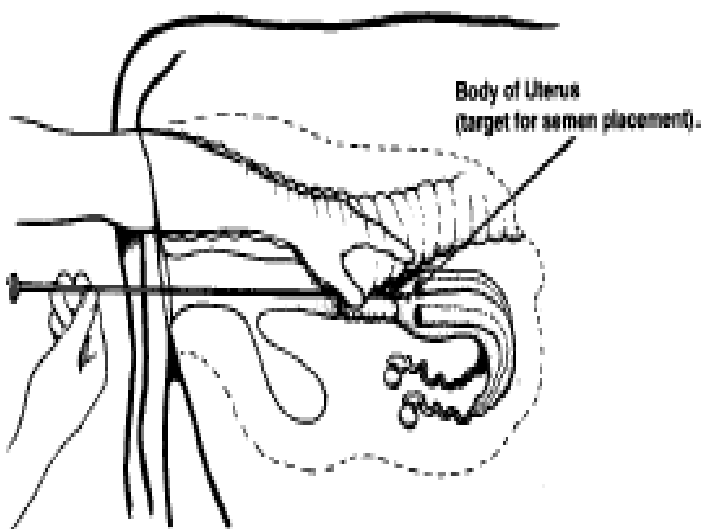
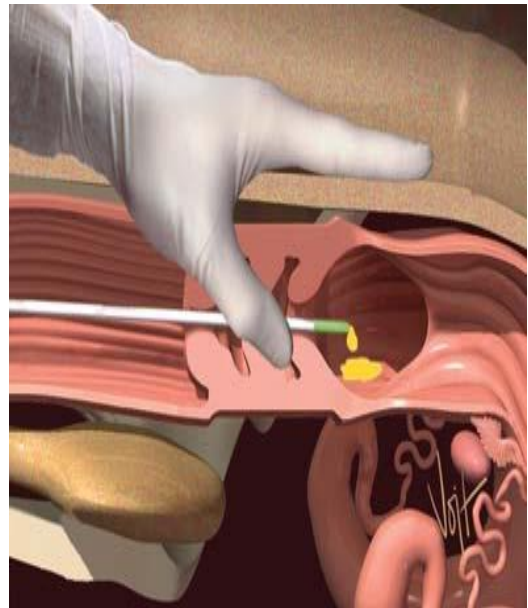
4.4 Inserting the Rod

Once the cervix has been located, the AI rod is inserted through the vagina into the reproductive tract.

The rod must be passed through the three muscular rings of the cervix and into the body of the uterus.

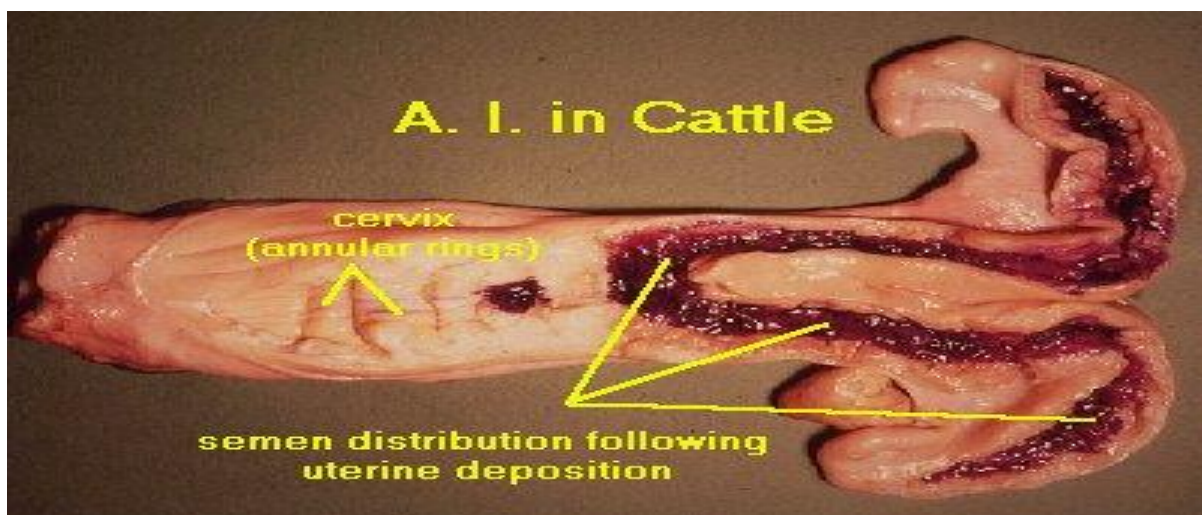
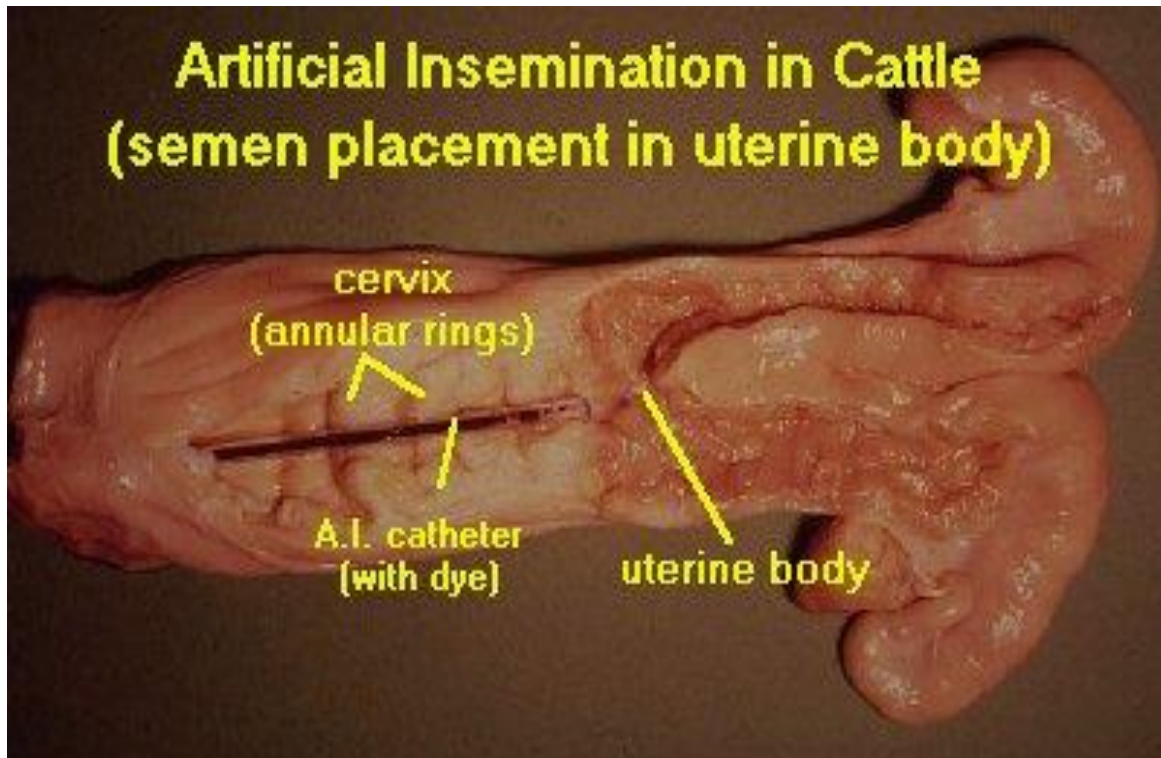
4.5 Depositing the Semen

Once the technician is sure the rod has passed through all three rings of the cervix, the semen deposited into the body of the uterus.



4.6 Removing the Rod

After the semen has been deposited, the rod should carefully be removed from the reproductive tract.



After AI is completed, normal fertilization will take place and a calf should be born in approximately 283 days.



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:

1. Write procedures of Depositing Semen in the uterine body (12 points)

Note: Satisfactory rating – 12 points

Unsatisfactory - below 12 points

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

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions



Information Sheet-5	Cleaning Material and Disposing waste
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5. Cleaning Material and Disposing waste

5.1 Cleaning Material

- After completion of the work all used AI materials, including protective Clothes should be cleaned, washed and necessary materials have to be disinfected.
- Disinfectants and soaps are lethal to semen and should not be used as lubricants or to clean equipment at time of insemination.
- Clean equipment after each use with 70% isopropyl alcohol to prevent spread of disease
- After thawing semen straw should be completely dry with a paper towel because water is lethal to sperm cells.
- Water used for thawing should also be clean to avoid bacterial contamination of the semen.
- The key to be precise for thawing is use of an accurate thermometer.
- Bred the cow as soon as possible after the semen is properly thawed and the inseminating equipment is assembled.
- Prepare insemination devices in a warm, clean environment near the breeding chute, but far enough away to avoid excessive dust and debris near the cattle. This will minimize the chance of contaminating the equipment and semen.
- Handle animals gently to avoid unnecessary excitement before, during, and after breeding.
- Under excitement may adversely affect sperm transport within the female reproductive system causing a lower conception rate.

5.2 Disposing of 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

Dead animals



❖ Mud or defecation

AI Sheath

❖ Paper based materials

Pipettes Packaging materials

5.3 Hygienic practice

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, equipment, and work site must clean up properly at end.



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

1. Cleaning Material? (6 points)
2. Write Waste materials? (6 points)

Note: Satisfactory rating – 12 points

Unsatisfactory - below 12 points

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

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions



Operation Sheet-1	Performing insemination
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Procedures

1. Check identity of cow
2. Check thermos temperature
3. Select semen not close to cow
4. Place straw in thermos for 15 second
5. Clean straw by tissue paper
6. Cut the plug at the end of straw
7. Put the straw in the insemination gun sealed end first
8. Push the plunger of insemination gun until the semen is visible
9. Keep the insemination gun in your hand or between your teeth
10. Clean the vulva
11. Put your hand in the rectum and remove manure
12. Locate the cervix and uterus with your hand in the rectum
13. Grasp the cervix with your hand and straighten any vaginal folds that encounter with tip of gun
14. Open the cervix in the center if not opened
15. Pass the gun in the cervixale folds
16. the gun Slip forwards easily and reach uterine body
17. make sure the semen is deposited in the uterine body



LAP Test	Practical Demonstration
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Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions:

1. Given necessary templates, tools and materials you are required to perform the following tasks within 10-20 hour.

Task 1- Perform insemination process?

2. Request your teacher for evaluation and feedback



List of Reference Materials

7. ARTIFICIAL INSEMINATION IN DAIRY COWS PROCEDURE AND FACTS FOR IMPROVING CONCEPTION RATE
8. ARTIFICIAL INSEMINATION TECHNIQUES
9. GHILPA (2011) the Global Livestock Production and Health Atlas. Available:
<http://kids.fao.org/glipha/>. Accessed 2011 November 20
- FAO (2011) Food and Agriculture Organization of the United Nations. Available:
<http://faostat.fao.org/site/569/default.aspx#ancor>. Accessed 2011 November 22



Artificial Insemination – Level-I

Learning Guide#36

**Unit of Competence: Support AI Technique and
Semen Handling**

**Module Title: Supporting AI Technique and
Semen Handling**

LG Code: AGR ATI1 M10 LO5-LG-36

TTLM Code: AGR ATI1 M10 TTLM 0919v1

LO 5: Record data and clean up on completion of work



Instruction Sheet	Learning Guide # 36
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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
- Disposing Waste
- Keeping clean Work site, reusable equipment and materials

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:

- Data on semen collection is recorded according to enterprise requirements.
- Information is supplied to relevant authorities to promote research and improvements in industry practice.
- Waste is disposed of according to recommended hygiene Standard Work site, reusable equipment and materials are kept clean up 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, Sheet 3, Sheet 4 and Sheet 5”.
4. Accomplish the “Self-check 1, Self-check t 2, Self-check 3 and Self-check 4” **in page -55, 57, 60 and 62** respectively.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1” **in page -63.**
6. Do the “LAP test” **in page – 64** (if you are ready).



Information Sheet-1	Recording Data on semen collection
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3. Recording Data on semen collection

Record keeping is the mirror of one farm in AI also it is very important to keep record, such as –

- ❖ Materials and how to use
- ❖ Animals and their Management
- ❖ Semen Collection
- ❖ Semen Quality
- ❖ Problem occurred
- ❖ Breed type
- ❖ Date of inseminate
- ❖ Date of birth
- ❖ Accuracy of insemination
- ❖ Semen storage
- ❖ Heat detection
- ❖ Insemination techniques



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:

6. Define Record keeping? (5 points)
7. List out Recording Data on semen collection? (5 points)

Note: Satisfactory rating - 10 points

Unsatisfactory - below 10 points

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

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions



Information Sheet-2	Supplying information to relevant authorities
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4. Supplying information to relevant authorities

2.1 Supplying information to relevant authorities

- ✓ Everyone's idea to be valued
- ✓ The workload to be shared
- ✓ The project or activities to be appropriate any ones needs
- ✓ The outcome of the project or activities to be respected and valued within the community
- ✓ Greater inclusion among the community
- ✓ Different communication to pass information to the general public



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. Write the Supplying information to relevant authorities? (5 points)

Note: Satisfactory rating - 5 points

Unsatisfactory - below 5 points

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

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions



Information Sheet-3	Disposing Waste
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3. Disposing Waste

3.1 Disposing of 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

3.2 Hygienic practice

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 at end.



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 Hygienic practice (10 points)

Note: Satisfactory rating – 10 points

Unsatisfactory - below 10 points

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

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions



Information Sheet-4	Keeping clean Work site, reusable equipment and materials
----------------------------	--

4. keeping clean Work site, reusable equipment and materials

4.1 Clean and maintain animals, materials and tools

4.1.1 Maintaining is repairing of the broken or damaged material or it is a way of giving an additional life or extending the serviceability of material

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

4.1.3 Safety refers to the condition of workers and animals being free from danger, harm, or risk

- Before and after doing Artificial insemination work care must be taken for not to damage or break any materials, tools, and equipment.
- The importance of Clean, Maintain and store tools and equipment are
- To clean work
- To save the work site environment
- It protect from chemical, accidental, body contact hazards
- It increases the duration of the materials, tools and equipment
- For future use

After maintaining and cleaning, return and store all the materials and equipment properly in their proper places.

4.2 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;

- 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 (these should 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 equipment safe and clean
- Use means of proper handling methods for equipment
- Never dispose waste materials every where

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:

1. Define the following term?,(10 points)

- Maintaining
- Cleaning
- Safety

Note: Satisfactory rating – 10 points

Unsatisfactory - below 10 points

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

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____



Short Answer Questions

Operation Sheet-1	Recording Insemination and breeding data
--------------------------	---

Techniques for preparing referral

1. Step 1- Put on required PPE
2. Step 2- Select required material and equipment
3. Step 3- Communicate with animal owner and refer the previous breeding data if there exist.
4. Step 4- Take major information to be recorded
5. Step 5- Put the already recorded data in appropriate place and manner



LAP Test	Practical Demonstration
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Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: 1. given necessary templates, tools and materials you are required to perform the following tasks within 20-30 hour.

Task 1- Recording Insemination and breeding data?

2. Request your teacher for evaluation and feedback



List of Reference Materials

10. ARTIFICIAL INSEMINATION IN DAIRY COWS PROCEDURE AND FACTS FOR IMPROVING CONCEPTION RATE

11. ARTIFICIAL INSEMINATION TECHNIQUES

12. GHILPA (2011) the Global Livestock Production and Health Atlas. Available:

<http://kids.fao.org/glipha/>. Accessed 2011 November 20

FAO (2011) Food and Agriculture Organization of the United Nations. Available:

<http://faostat.fao.org/site/569/default.aspx#ancor>. Accessed 2011 November 22