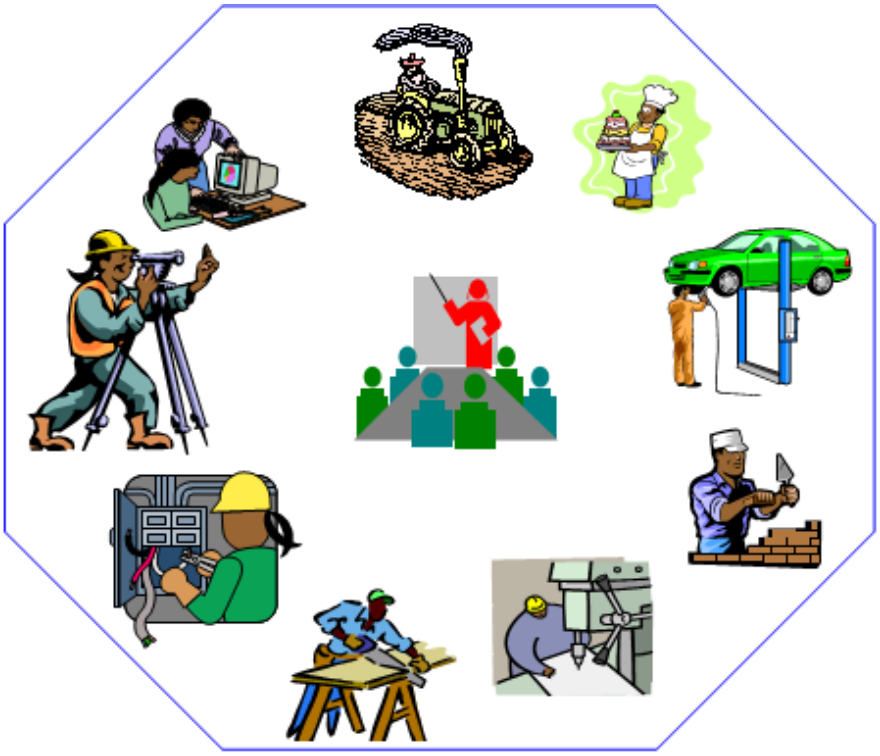
Animal production Level III

Based on **March 2018**, Version 3 OS and March. 2018, V3 Curriculum



Module Title: Participating in Livestock Breeding Activities

LG Code: AGR APR3 M10 LO (1-6) LG (36-41)

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Table of Contents page

L #36	LO #1 Assess breeding requirements

Instruction sheet

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

- Assessing and clarifying breeding requirements.
- Identifying and arranging resources required for breeding
- Selecting breeding options.
- Determining livestock mating plan and artificial breeding.
- Undertaking Economic assessments of breeding
- Formulate breeding program

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

- Assess and clarify breeding requirements.
- Identify and arrange resources required for breeding
- Select breeding options.
- Determine livestock mating plan and artificial breeding.
- Formulate breeding program
- Undertaking Economic assessments of breeding

Learning Instructions:

Read the specific objectives of this Learning Guide.

1. Follow the instructions described below.
2. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
3. Accomplish the “Self-checks” which are placed following all information sheets.
4. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
5. If you earned a satisfactory evaluation proceed to “Operation sheets
6. Perform “the Learning activity performance test” which is placed following “Operation sheets” ,
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Information Sheet 1. Assessing and clarifying breeding requirements

1.1 Introduction

Livestock commonly defined as domesticated animals raised in agricultural setting to produce labor and commodities such as

- Meat like Beef, Sheep, goat, poultry and Fish
- Eggs like Poultry
- Milk like dairy animal
- Fur
- Leather
- Wool and also used for transport, decoration and guarding

Example of livestock farming includes both beef and dairy cattle, pigs, sheep, goats, horses, mules, asses, buffalo, and camels; the raising of birds commercially for meat or eggs (i.e., chickens, turkeys, ducks, geese, guinea fowl, and squabs) treated separately.

In animal breeding potential parents, selected traits and the best ones indeed used as parents. The next generation will genetically improve for the desired traits. For the long term, the subsequent breeding activities carried out in a breeding program

Animal breeding is the process of selective mating of animals with desirable genetic traits, to maintain or enhance these traits in future generations. For livestock, this involves estimation of the genetic value of individuals for traits including

- Growth rate
- Yield of products such as:
    - ✓ Eggs
    - ✓ Milk or meat

The aim of a particular mating (breeding) system are either:

- To increase, or decrease, the homozygosity of the progeny, compared with the parents or in some cases
- To maintain the degree of homozygosity unchanged.

Breeding objective describes characteristics that affect profit the most, as well as how important each trait is to profit and should be specific, measureable and attainable

Animal breeding means a planned genetic alteration of the population so that the animals can better fulfill the demands dictated by production requirements. In breeding, one must, as a rule combine a suitable method of breeding with effective selection. It must also realized that natural selection is always at work, especially when inbreeding is applied.

1.2 Assessing and clarifying breeding requirements

A breeding strategy implemented with the objective of creating genetic change in the livestock population in order to benefit livestock keepers and wider groups of stakeholders. Such benefits will realized only if the desired changes are consistent with other trends affecting the livestock production systems targeted and if the resources are available to deliver the planned improvements.

Strategies may based on the use of:

- Locally available breeds
- introduced breeds (exotic)
- Both. The breeds chosen may provide the basis for straight or crossbreeding schemes.

Animal production potential

Animal production emphasizes the scientific application of genetics, reproduction physiology, nutrition, health herd, waste management and business economics in the production of beef and dairy cattle, swine, sheep and goat.

Animal production potentials can be increase through improvement of genetic makeup of animals. Know day animals can play a big role by provide main food, income generation and the main resources for the developing countries

In developing countries animal kept for multiple purpose

- To produce food
- Labor (traction power)
- Warmth

- For their hide and skin/wool
- Manure for fertilizing soil and fuel
- Wealth

Breeding can play a big role in improvements of animal production trough changing production ability and performance.

Role of breeding in animal production can be

- Increasing production performance of animal's e.g. production milk, meat and wool
- Improve reproduction performances e.g. improve fertility,
- Increasing disease resistant ability
- Increasing adaptability harsh environment condition
- Changing the characters of animals

For good achievements of production potential through breeding are need breeding requirements. From breeding requirement, breeding and production records are the most important one.

Breeding record important for measure the productive efficiency of herd and enable selection. It can be includes

- Pedigree/ parentage(dam name, grand dam, sire name, grand sire)
- Growth (date of birth, birth weight, date of weaning, weaning weight, sale weight, and sale date)
- Fertility (age at first service, age at first calving, date of calving and number of services per conception)

Production records includes birth date, id number, dame and sire name, milk production, lactation length, weaning age, parity number and etc

Self-Check -1	Written Test

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

Fill the blank space

1.__domesticated animal raised in agriculture setting to produce labor and commodities (2%).

2.___is the process of selective mating animal with of animals with desirable genetic traits, to maintain or enhance these traits in future generations (2%)

3. List down the purpose of animal in developing country! (5%)

_____,_____

_____,_____

_____,_____

4. Write the requirement of breeding strategies implementing assessing and clarification in livestock production (3%)

_____,_____

_____,_____

5. List down the role of breeding in animal production! (5%)

_____,_____

_____,_____

Answer the following question!

Note: **Satisfactory rating - 9 and 17 points Unsatisfactory - below 9and 17 points**

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

Answer Sheet

Score = _____

Name: _____ Date: _____

Short Answer Question

Information Sheet 2. Identifying and arranging resources required for breeding

2.1 Resources required for supporting livestock breeding system

To perform dairy animals breeding activities, different resources are required to facilitate breeding activity effectively and efficiently. This resource include:

2.2.1 Genetic resource for livestock breeding

- Different genetically potential of livestock breed
- Size of the herd / livestock breed

2.2.2 Technical supporting resources for livestock breeding

I. Human resource required for livestock breeding

The Trained man (breeder) and labors required for the following activists like:

- Providing Feed and water for breeding animals
- Preparing shelter and Identifying breeding animals
- Performing husbandry practice, identification, dehorning, castration and etc..
- Working daily activities in the farm like cleaning
- Following health status of breeding animals, vaccination and treatments
- Checking estrus for mating and supporting mating activity
- Performing AI , Checking pregnancy diagnosis and Facilitate animals at calving time and calf rearing

II Materials tools and equipment

A. PPE

Important to controlling direct contact with breeding animals and hazard for workers

B. Artificial insemination materials, tools and equipment

C. Dairy animals handling materials and equipment

- Rope/ ring chain
- Bull nose ring/ bull holder
- Cattle crush
- House/shelter

- Fence
- Weighing
- Testing equipment

D. Other facilities of farmstead structures like

- Spraying race
- Dipping path
- Feed, drug and equipment storages
- Record keeping equipment like
  - ✓ Manual e.g. Record book
  - ✓ Computer
- Types records include:
  - ✓ Production record it show production (milk, meat and wool) potential of individual animals.
  - ✓ Reproduction record: -reproduction performances of animals.
  - ✓ Health record: - show health status of animal in the farm.
  - ✓ Breeding record
  - ✓ Buying and selling

Self-Check 2	Written Test

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

Fill the blank space

1. Mention the source required facilitate animal breeding activity effectively and efficiently (3%)

_____

_____

2. List down the dairy animals handling materials and equipment used for livestock breeding. (6%)

_____,_____

_____,_____

_____,_____

3. Write the Genetic resource used for livestock breeding (3%)

_____

_____

Answer the following question!

Note: **Satisfactory rating - 7 and 12 points Unsatisfactory - below 7and 12 points**

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

Answer Sheet

Score = _____

Name: _____ Date: _____

Short Answer Question

Information Sheet 3. Selecting breeding options.

3.1 Introduction

Breed refers to group animals within the same species, which have a certain characteristics in common which make the individual of breed. The types of breed are

a) Local /indigenous/ breed

b) Exotic breed

c) Cross breed

a) Local /indigenous/ breed

Native (local in Ethiopia)) breed adapted the soil and climate conditions and sanitary environment of its own defined geographical area breed like:

- Borena
- Arsi bale
- shako
- fogera
- Horo
- Kereyu
- Barka

b) Exotic breeds are a breed originated from Europe breed and the most popular in Ethiopia are:

- Holstein Frisian
- Jersey
- Simental
- other Europe breed are
    - ✓ Brown-Swiss
    - ✓ Guernsey
    - ✓ Red Dane

c. Cross breed are breed crosses of two different breeds. E.g., local crossed with exotic breed. They have hybrid vigor.

3.2 Breeding option

Breeding: is a process of mating selected males and females to produce offspring with the desired characteristics.

Reasons of breeding:

- To expand the inherited potential of the animal.
- To improve production by introducing new genes.
- To overcome production problems created by the environment.
- To satisfy consumers taste.

For economic reasons, e.g. fast growth rate to reach the market early manner in which the selected individuals (males and females) mate.

Breeding of animals classified under two broad breeding options depends on the closeness of the biological relationship between mates

- Inbreeding
- Outbreeding

3.2.1 Inbreeding (increase homozygosity)

Mating closely related animals than the average relationship within the breed or population concerned (e.g. parent and offspring, full brother and sister, half brother and sister mattings).

The three main types of inbreeding systems distinguished are:

3.2.1 Close inbreeding

Mating between sibs or between parents and progeny (incest), in order to achieve inbred lines with a relatively high degree of homozygosity e.g. full-sib mating for many generations or consistently back crossing the progeny to the younger of the parents.

3.2.2 Strain formation: Considerably milder form of inbreeding leading to increased homozygosity within the strains in the end.

3.2.3 Line breeding

Inbreeding within an ancestral line with object of increasing a particular male or female ancestor's proportion of the genetic constitution of the progeny. Usually a much milder (serious) form of inbreeding (e.g. mating a female with a grandsire, or uncle who will carry half of the grandsire's genes) employed. The most intensive form of line breeding is backcrossing to the same parent for several generations in succession.

A. Advantages of inbreeding:

- Enables the breeder to uncover and eliminate harmful recessive genes within the population.
- Essential for development of proponent (follower) animals.
- Develops distinct families or inbred lines.
- To increase genetic uniformity in a herd.
- To increase phenotypic uniformity.
- etting proven sires.
- To fix required characteristics when developing a new breed.
- used in animal of higher prepotency (stud Bulls)

B. Inbreeding depression (Disadvantage)

In livestock, first generation inbred individuals are more likely to show physical and health defects (traits concerned with reproduction and survival), including:

- Reduced fertility both in terms of litter size and sperm viability
- Increased genetic disorders
- Lower birth rate
- Higher infant mortality
- Slower growth rate
- Smaller adult size
- Loss of immune system function

3.3 Outbreeding (increase heterozygosity)

The relationship of the animals, which mated together, is less close than the average relationship within the population e.g. mating between inbred lines or strains within the same breed, crosses between different breeds.

The following types of cross breeding distinguished:

1. Single two-way crosses

Two different populations (inbred lines, strains or breeds) can be crossed to produce F1 generation (usually show hybrid vigour, especially when inbred lines are crossed) which is used only for production purposes and not for breeding.

2. Three-way crosses

The first generation crossbred females crossed with males of a third line, strain or breed, thus utilizing the hybrid vigour of the dams. Especially important in the crossing of inbred lines.

3. Four-way or double crosses

Populations A and B are crossed and so are C and D, to obtain F1 generations F_{AB} and F_{CD}. These are then crossed together to give the 'double hybrids', $F_{(AB.CD)}$ (have normal viability). Used extensively in poultry breeding for crosses between inbred lines which have low viability and which maintained in small numbers.

4. Back-cross

F1 females are back-crossed to males of one of the parental populations e.g. by the combination of $F_{(AB.A)}$ for the production of commercial animals. Advantageous especially when the F1 females, because of their hybrid vigour (maternal influence), are better mothers than females from either of the parent populations e.g. in pig breeding (for economic reasons planned rotational crosses are preferred).

5. Rotational crossbreeding

Crossbred females mated with males from either of the parent populations with the provision that the mattings altered (rotated) for each new generation. Types of rotational crossbreeding are:

A. Crises-crossing

Breeds A and B are crossed to produce an F1 generation. Then F_{AB} females backcrossed to males from breed B, the $F_{AB.B}$ females then mated back to males from breed A and so on. The advantage of this method over the two-way cross is that one

can continue to use the crossbred females for breeding and only “purebred” males needed to purchase.

B. Three-way rotation

F_{AB} females are mated with males from a third breed C. Males from breed A are used on the next generation of females and males from breed B on the following generations of females and so on.

C. Four-way rotation

Males from a fourth breed D used on females of the combination $F_{AB.C}$. Thereafter males from breeds A, B, C and D used in succession for each generation.

Note: After a number of generations of rotational crossing, a situation of equilibrium (in two-way crosses, 67% genes from the breed to which backcrossing last took place, and 33% from the other breed) reached with respect to the proportions of the different breeds in the genetic constitution of the crossbreds.

6. Top crossing

Mating of inbred males to females of non-inbred populations. Greater homozygosity of inbred males may not compensate for thier lower fertility and vigour.

7. Crossing with recurrent reciprocal selection

In each of two breeds and strains, progeny testing carried out by crossing with the other breed or strain (reciprocal crossing). Those animals, which produce the best progeny from such crosses, then used for multiplying their own breed or strain. The object is to change both populations gradually, so that they give better results in crosses with each other.

8. Grading up

Backcrossing to the same bred takes place generation after generation. The object is to change a mixed population to a ‘pure breed’. With each new generation, the proportion of genes from the original mixed population decreases to half the proportion present in the previous generation, so that after 4 generations it has decreased to 6.25% and after 5 generations to 3.125% at which time the resulting progeny can be accepted as ‘pure

bred' of the sire breed used in grading up. Tried in many tropical countries to change cattle of mixed ancestry to a recognized breed type such as Ayrshire or Friesian.

9. Crossing for the production of a new breed

Most of the present day breeds of farm animals have been founded by crossing different breed types to combine their desirable traits in the new breed.

Note: No 8 and 9 methods of crossbreeding increases heterozygosity of the population in the initial stages; with continued crossbreeding the heterozygosity will generally begin to decline again.

Advantages

- The desirable characters of the exotic parents like
  - ✓ high milk yield
  - ✓ early maturity
  - ✓ higher birth weight of calf
  - ✓ better growth rate
  - ✓ better reproductive efficiency
- Desirable indigenous parent characters like
  - ✓ heat tolerance
  - ✓ disease resistance
  - ✓ ability to thrive on scanty feeding and coarse fodder etc. are transmitted to the progeny
- It helps to evolve new breeds with desirable characters.
- The progeny exhibits hybrid vigour
- Benefits of crossbreeding are available more quickly compared to selection
- To develop a new breed or a grade animal

Disadvantages

- The breeding merit of cross breed animals compared to purebreds reduced
- Cross breeding requires maintaining of two or more pure breeds in order to produce the crossbreds
- Lack of uniformity in animals that result from out breeding.
- Desirable characteristics may be lost due to variation

Self-Check -3	Written Test

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

Fill the blank space

1. Write the types of livestock breed! (3%)

_____,_____,_____

2. List down the types of native breed in Ethiopia! (3%)

_____,_____,_____

_____,_____,_____

3. Write the types of breed originated from Europe breed and mostly distributed in the Ethiopia. (2%)

_____,_____,_____

4. What are the two broad breeding option depending on the closeness of the biological relationship between mates? (2%)

_____,_____

5. Write the three main types of inbreeding systems (3%)

_____,_____,_____

6. ___the breeding between less close than the average relationship within the population (2%)

7.____ mating closely related animals than the average relationship within the breed or population concerned (2%) = Inbreeding

Answer the following question!

Note: **Satisfactory rating 9 and 17 points** **Unsatisfactory below 9 and 17 points**

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

Answer Sheet

Score =

Name: _____ Date: _____

Short Answer Question

Information Sheet 4. Determining livestock mating plan and artificial breeding

4.1 Livestock mating/breeding system

Mating is the act of pairing a male and female for reproductive purposes or producing of offspring.

There are two types of mating

4.1.1 Natural mating

- Use of bull
- It is the most efficient in small herd but not in large herd

Advantage of natural mating/ breeding

- Conception is the most successful
- No need for heat spotting
- It is more accurate
- require less laborious

Disadvantage of natural mating / breeding

- Not efficient in large herd
- Spread of disease
- High chance of dystocia
- May promote in breed

4.2.2 Artificial mating/ artificial insemination

AI is introduction of male reproductive cell/semen/ in to the female reproductive tract by artificial means.

Advantage of AI

- Decreases chances of injury/ the mating different size of animals without difficulty
- Evaluated semen can be used
- Semen can be collected from bull with problems like injury
- It helps to prevent the spread of contagious diseases ot genital organ

- Enhance the rate of conception
- The semen of elite bull can be used even after the death of sire

Disadvantage of AI

- Specialized equipment needed
- Technical expertise is needed
- In correctly practiced AI can cause problem

Self-Check -4	Written Test

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

Fill the blank space

1 _____ is the act of pairing a male and female for reproductive purposes or producing of offspring (2%)

2. Write the two types of mating (2%)

_____,_____

3. Write the Advantage of natural mating/ breeding (4%)

_____,_____

_____,_____

_____,_____

4. Write the Disadvantage of AI (3%)

_____,_____

_____,_____

Answer the following question!

Note: **Satisfactory rating 7 and 13 points** **Unsatisfactory below 6 and 13 points**

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

Answer Sheet

Score = _____

Name: _____ Date: _____

Short Answer Question

Information Sheet 5. Undertaking Economic assessments of breeding

5.1 Undertaking Economic assessments of breeding

A. Check the feasibility of the breeding program planned

Define reasons and benefits for attempting a program. Consider whether these achieved more easily and cheaply than other methods.

B. Determine the best time to attempt breeding program

Consider the availability required resources cost like:

- Feed and labor
- The farm work load
- Existing animal husbandry practices cost such as:
  - ✓ Calving patterns
  - ✓ weaning times, etc
- Compatible with the program's implementation
- Avoid times of environmental stress such as periods of extreme heat or cold
- Determine the type of program to be undertaken like:
  - ✓ observed natural heats
  - ✓ Synchronized program
- Make provision for suitable paddocks to house the breeding herd for observation
- Consider paddock location and size, shade, feed and water
- If supplementary feeding is needed, order it or provide it ahead of time
- Cows should fed sufficiently so that they are gaining weight for six weeks before and six weeks after the program
- Ensure maximum calf drop
- Select and identify cows to be included in the program and Work them through the yards to get them into a routine
- Tag cows before commencing the program. Only those with maximum conception chances should include.
- Select the cows and plan the feed up to one-year ahead and maiden heifers are most suitable for many beef programs

- Check the restraint facilities before the program starts.
- Order equipment, semen and nitrogen before it is required
- Leave precise delivery instructions with the animal breeding center, Delays can be costly
- Ensure that sufficient equipment, semen and nitrogen are on hand for artificial insemination and make provision for rapid re-supply if necessary
- Have cleaned up bulls on hand (one bull per 100 cows) at the completion of the program if required.

An AI program will require significant input before, during and after the actual insemination procedure. Such programs should not be undertaken unless there are well-defined benefits and foreseeable outcomes. While there are many factors that can limit the success of any program, there is no compromise for good planning, preparation and adherence the guidelines for good heat detection and insemination technique

Self-Check -5	Written Test

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

Fill the blank space

1. List down at least eight the economical resource required iteming breeding program! (8%)

_____

_____

_____

_____

_____

_____

_____

_____

2. .list down the **feasibility must cheeked before planning breeding program (4%)**

_____,_____

Answer the following question!

Note: **Satisfactory rating 7 and 12 points** **Unsatisfactory below 7 and 12 points**

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

Answer Sheet

Score = _____

Name: _____ Date: _____

Short Answer Question

Information Sheet 6.Formulating breeding program

6.1 Introduction

Breeding program is the planned breeding of a group of animals, usually involving at least several individuals and extending over several generations. It commonly employed in several fields where human wish to change the characteristics of their animals' offspring through careful selection of breeding partners.

The challenge to increase food production in developing countries lies in efficient exploitation of genetic diversity among and within breeds of different species. The most productive and adaptive animals for each environment must be identified for breeding purpose. Many breeding programs for different species have shown the opportunities increase the output per animal after few decades of selection. For the long term subsequent breeding activities carried out in a breeding

Breeding program characterized by a series of subsequent activities (successive) that defining:

6.2 Animal breeding program producer

Breeding program is the organized structure that set up to genetically improve livestock population that include the schism:

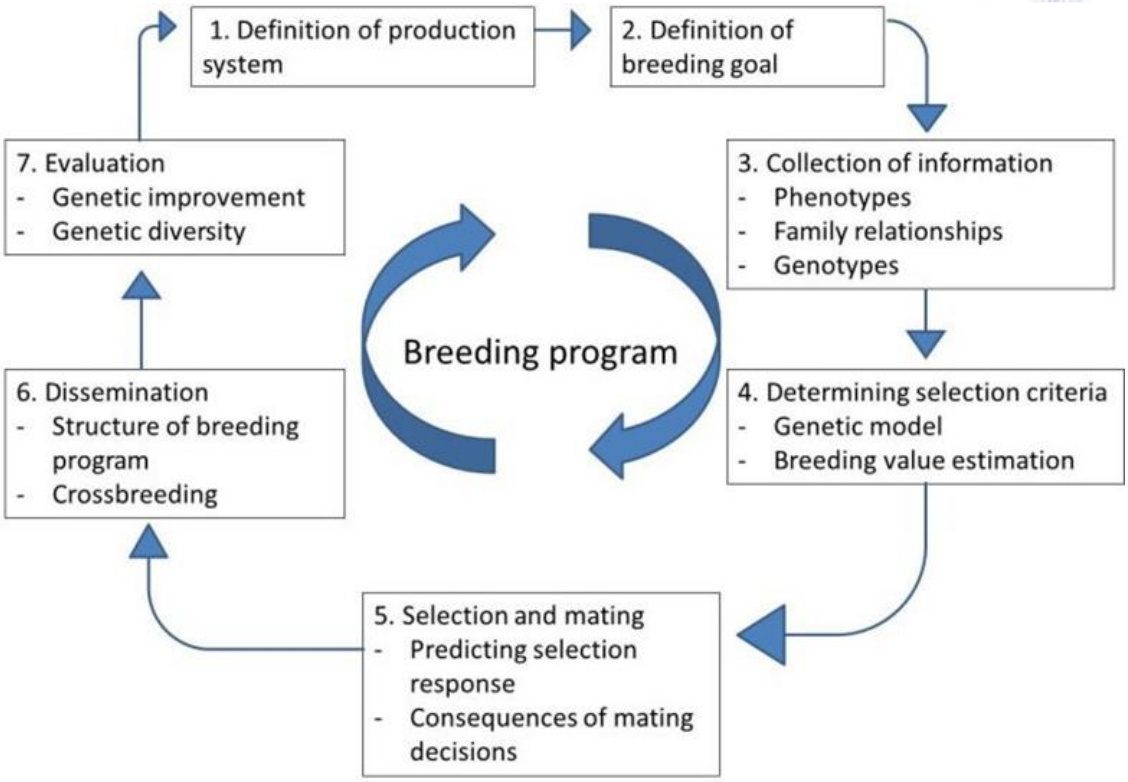

Figure 1: Breeding program scheme

1. Production system

Starts with a description of the production system.

In more general terms the analysis of the way keep the animals and for which purpose.

What is relevant in this respect?

Production system (type) describe the following points

- The type of animals keeping the like:
  - ✓ Intensive
  - ✓ Extensive
  - ✓ Semi intensive
- The purpose breeding program organized like;
  - ✓ Milk
  - ✓ meat
  - ✓ wool
  - ✓ Egg
- What is relevant in this respect? Important resources availability.

2. Breeding goal

Breeding goals defined for improvements of traits like:

- Production
- product quality
- Health and welfare traits
- conformation traits
- sport performance
- Fertility etc.
- Breeding is only effective when a breeding goal consequently maintained for many generations
- It can be answers
    - ✓ Which traits should improve in the next generations?
    - ✓ What will be the goal(s) for breeding

3. Collection of information

- Relevant information should be collected
    - ✓ like pedigree, parent-offspring relationships records
    - ✓ individual performance records
    - ✓ Fertility and litter traits record
- Animal identification
    - ✓ Phenotypes
    - ✓ Family relationships
    - ✓ Genotypes
- Phenotype = Genotype + environment

4. Determining selection criteria

The choice has to make which animals will indeed selected as parents and which animals excluded for reproduction. Based on a genetic model, a statistical model including pedigree Information, a breeding value for a trait estimated.

5. Selection and mating

The parents with a higher than average estimated breeding value will improve the breeding goal traits in the next generation. For example, a group of dairy sires with the highest breeding value for milk yield selected as sires for the next generations.

- Genetic model
- Breeding value estimation
- Proportion of selected
- Natural or AI
- Genetic gain (response to selection)
- Consequences of mating decision

6. Dissemination

In cattle breeding artificial reproduction techniques, in particular artificial insemination techniques, give the opportunity to produce high numbers of offspring, disseminating the genes of the superior animals widely. Selection of a small number of animals may have a large impact on the traits of a population.

- Structure of breeding program
- Crossbreeding

7. Evaluation

- Genetic improvement
- Genetic diversity
- It can be answers
  - ✓ Did we reach what we wanted?
  - ✓ Is the new generation of animals better with respect to the breeding goal traits?
  - ✓ Do we observe unwanted effects of selection?
  - ✓ What has happened with the relatedness among the animals of the new generation?
  - ✓ Are they more related to each other than their parents,
  - ✓ Did we decrease the genetic diversity of the population?
  - ✓ Do market requirements change, e.g. for pork of a different quality?
  - ✓ Do production circumstances change, e.g. are milk production quota for dairy farms expected to be abolished in the next future

Self-Check -6	Written Test

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

Fill the blank space

1. List down the seven breeding program scheme (7%)

_____,_____

_____,_____

_____,_____

_____,_____

2. Write the types of livestock production (3%)

_____,_____,_____

3. List down the trait used to success breeding goals (4%)

_____,_____

_____,_____

Answer the following question!

Note: **Satisfactory rating 7 and 12 points** **Unsatisfactory below 7 and 12 points**

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

Answer Sheet

Score = _____

Name: _____ Date: _____

Short Answer Question

LG #38	LO #2 Select livestock for breeding

Instruction sheet

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

- Determining Selection criteria of livestock
- Establishing Culling and replacement practices in livestock breeding
- Checking and monitoring selected livestock condition and welfare

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

- Determine Selection criteria of livestock
- Establish Culling and replacement practices in livestock breeding
- Check and monitor selected livestock condition and welfare

Learning Instructions:

Read the specific objectives of this Learning Guide.

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Information Sheet 1. Determining Selection criteria of livestock

1.1 Introduction

Selection a processes in which a certain individual in a population are preferred than other for production of next generations. Selection is tools in the hand of breeder to improve the performance of animal. Selection helps improve characteristics, which are highly heritable

Heritability is the likelihood of a particular trait transmitted to the offspring and strongly inherited. A character like milk yield is lowly heritable, i.e. it is weakly inherited and a bigger percentage of the character is affected by the environment.

1.2 Selection criteria for livestock breeding

In commercial farm selection of the best animals followed by more or less random mating

Selective breeding (also called artificial selection) is the process by which humans use animal breeding and plant breeding to selectively develop particular phenotypic traits (characteristics) by choosing which typically animal or plant males and females will sexually reproduce and have offspring together.

The Objective and subjective selection criteria of livestock breeding include:

1. Age

- Young animals,
- Those that have not parturated for more than 3-times should be selected.
- They have a longer productive life.
- Old animals are poor breeders and low producers.
- Production and breeding efficiency decline with age.

2. Level of performance

- Animals with highest production level selected.
- Best Performance indicated by records.

3. Good production and reproduction performance of animal indicated by;

- High milk, wool and egg production,
- Good mothering ability
- High prepotency, which is the ability of a parent to pass good qualities to their offspring's.
- The animals with poor performance should culled.
- Good records kept and used by the farmer for this purpose.

4. Physical fitness Animals selected should be free from any physical defect e.g.

- mono-eyed,
- limping,
- irregular number of teats,
- scrotal hernia,
- defective and weak backline

5. Health

- Sick animals do not breed well and are expensive to keep.
- Animals that are resistant to diseases pass these characteristics to their offspring's

6. Body Conformation

- Animals for breeding selected according to proper body conformation.
- A dairy cow should be wedge-shaped with a large udder, thin legs and long neck.

7. Temperament or Behaviors

- Animals with bad behaviors should culled. e.g. Cannibalism, egg eating, aggressiveness, kicking

8. Quality of products

- Select animals that give products of high quality such as meat, wool, eggs, milk.

9. Mothering Ability

- Animals selected should have a good mothering ability,
- That is animals with good natural instinct towards their young ones.

- This will enable them to rear the young ones up to weaning.

10. Adaptability

Animals selected should be well adapted to the prevailing climatic condition in the area e.g Arid and semi-arid areas.

11. Prolificacy

- Animals selected should be highly prolific.
- That is, animals with the ability to give birth too many offspring are at a time (larger litter).
- The quality that should considered when selecting pigs and rabbits.
- The ancestry records assist to choose the prolific breeds for mating

1**.2.1. Selection criteria of bovines include**

- Presence or absence of hair whorl
- Udder and teat length
- Length of the legs
- Body length.
- Level of Performance like:
  - ✓ Milk yield and fat content.
  - ✓ Length of lactation period
  - ✓ Calving Intervals
  - ✓ Age of the Animal
  - ✓ Fertility
  - ✓ physical Fitness
  - ✓ Health of the animal
  - ✓ Body conformation
  - ✓ suitability of the enterprise-milk or beef

Selection criteria of Bull

a. General physical examination of bull like:

- general body condition
- feeding condition
- Sense organ etc.

b. Special physical examination: focus on reproductive organ Like:

- The scrotum checked for size, symmetry, circumference, elasticity
- Palpation of prepuce and penis for deformities and infection
- Locomotors system and body condition hook, bowling leg, sickle etc
- Serving behavior libido, erection, mounting and dismounting etc

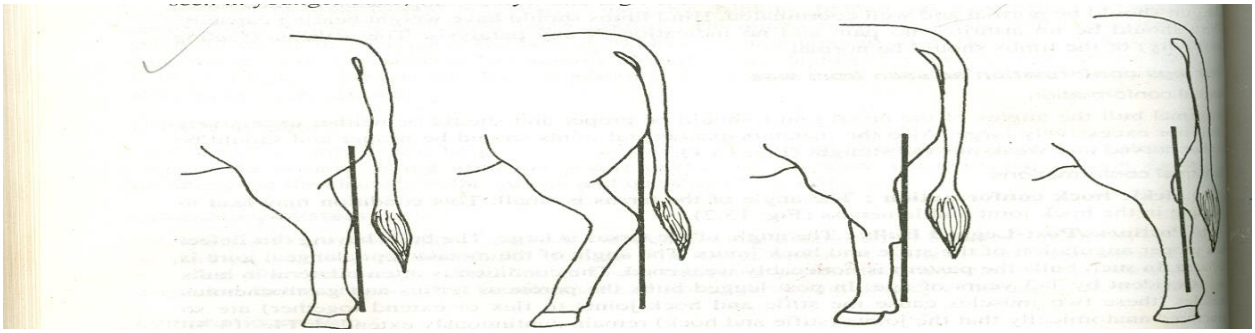

Figure 2: sickle hook bocow hooor post-legged (postiness) Normal

1.2.2 selection criteria of small ruminants include:

- Tail type
- Presence of wattles
- Leg length and coat colour
- Prolificacy
- Level of performance which includes;
  - ✓ Mothering ability
  - ✓ Growth rate
  - ✓ Wool quality
  - ✓ Carcass quality
  - ✓ Twining rate Age
  - ✓ wool or mutton
  - ✓ Flocking instinct Health of the animal
  - ✓ Physical fitness
  - ✓ Inheritable defects
  - ✓ Fertility

A. Selection criteria of ram/buck for breeding purposes

- Health history, physical fitness, particularly of feet and legs, eyesight, etc.
- Pedigree, i.e., ensuring the sire is free from known hereditary defects.

- Evaluating the smoothness of the hair coat for evidence of malnutrition or chronic infection.
- Body condition scoring and noting of the score.
- Checking for and noting any defects that could interfere with the breeding process.
- A thorough examination of the scrotum, palpation of testicles, and examination of sheath and penis
- **Testes:**

B. Scrotal circumference and diameter

The scrotal circumference measured with a specially designed tape or with any other measuring tape or even a cord whose length compared with a ruler. The circumference measured at the widest part of the scrotum with both testes held at the same level. A male with large testicular size at a given age is likely to produce better quality semen.

Figure 3: Scrotal circumference and diameter.(Adabted from ESGPIP,2009)

Present and sperm production is normal.

Figure 4 a, Single scrotum b, partially split scrotum split scrotum

1.2.3. Selection criteria of Chickens include

- Comb type (Comb single are preferred over the other types)

1.2.4 Selection criteria of Camels

- Health of the animal.
- Age.
- Temperament.
- Foraging ability.
- Fertility.
- Level of performance-milk, meat, fur and transport.

Criteria for evaluating crossbreeding program:

- Level of hybrid vigor (heterosis)
- Merit of component breeds
- Complementarity
- Consistency of performance
- Deals with genetic antagonisms
- Meets end-product targe

1.3 Selection method

The method of breed selection include:

- individual performance
- pedigree
- progeny
- family selection

A. Mass selection

Animals with superior characteristics (highly heritable breeds) selected from a herd and then allowed to mate among each other at random. The offspring's will show higher performance than their parents will. This is because mass selection increases the occurrence of the desirable genes in a population.

B. Progeny testing

The offspring resulting from selected parents (Family selection).In this method a group of progenies (offspring's) are used as an aid to increase accuracy in the selection of a breeding stock. This is method used when the character selected is of low heritability and expressed by one sex only. This method takes up to nine years for the results seen

C. Contemporary comparison

Contemporaries refers to other heifers in the herd sired by the same bull. This is a progeny tasting method, which involves comparison of average production of daughters (Heifers) of each bull with that of the other heifer referred to as contemporaries.

In these methods, it assumed that the differences between the herds of the same breed are non-genetic in origin.

Advantages

- It is possible to compare heifers of different ages in different locations worldwide.
- It eliminates difference brought about by the environment.
- It is possible to make direct comparison of stut bulls at different artificial insemination centers.
- It is accurate since we are using a large herd of animals.

Factors considered when choosing breeds for crossbreeding system:

- Individual breeding goals
- Environment
- Quantity and quality of feeds available
- Cost and availability of good seed stock
- How breeds will complement each other in the crossing program
- Market-specific breed combinations may knowledge market rewards.

In parts of the world where breeding used effectively, genetic improvement of farmed animals has contributed to increasing the availability and affordability of highly nutritious food, and contributing to the global food security challenges and it has improved resource-use efficiency per unit of product.

Self-Check -1	Written Test

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

Fill the blank space

1_____ is the likelihood of a particular trait transmitted to the offspring and strongly inherited (2%)

2. Mention the main Objective and subjective selection criteria of livestock breeding! (6%)

_____,_____,_____

_____,_____,_____

_____,_____,_____

3. Write the Selection criteria of bovines (5%)

_____,_____

_____,_____

_____,_____

4. List down the valuation criteria of crossbreeding program (4%)

_____,_____

_____,_____

_____,_____

Answer the following question!

Note: **Satisfactory rating 9 and 17 points** **Unsatisfactory below 9 and 17 points**

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

Answer Sheet

Score =

Name: _____ Date: _____

Short Answer Question

Information Sheet 2. Establishing Culling and replacement practices in livestock breeding

2.1 Culling: Practice

It is the process of removing unproductive animals from the flock or herd. Unproductive animal like:

- Old dairy
- Animals with poor mothering abilities
- Poor reproductive performance
- Animals with chronic sicknesses
- It is of removal dairy animal from the main herd by:
  - ✓ Sale
  - ✓ Slaughter
  - ✓ Death.

Culling decisions are important to maintain the productivity and profitability of the beef cowherd.

Culling unproductive cows from the herd eliminates

- poorly performing cows
- inferior genetics
- cows with quality defects that would limit short and long term productivity

2.2 Reasons to culling the livestock in the herd

A. Any cow that does not get pregnant

The primary productive objective of any cow in the herd is to produce a live calf on an annual basis. Therefore, any cow that does not get pregnant or wean a calf should be a primary candidate for culling from the cowherd. Annual production of a calf provides revenue to offset yearly expenses related to cow maintenance, heifer development, and initial cow purchase, and ultimately increases profits for the beef cattle enterprise. Signs of reproductive failure cow culling triggers

Other culling decisions made based on additional undesirable cow characteristics or financial and environmental reasons.

Approximately 41% of beef cattle operations reported that they culled a cow for non-pregnant status, which is the primary determinant of beef cow profitability.

B. Due to age or bad teeth

Fifty-five percent of beef cattle operations culled a cow due to age or bad teeth, which is an issue that can lead to long-term concerns regarding to:

- Cow nutrition
- body condition score
- Reproductive success.

C. combined of reproduction and age of cows

The combined reasons of reproduction and cow age dominated the culling decision for any beef cattle enterprise.

- Cow temperament , it contribute (16%) for culling activity
- reproductive issues it contribute (13%) for culling activity
- Economic reasons (10.9%) included
    - ✓ The negative effect of drought on enterprise
    - ✓ Stocking capacity
    - ✓ Need for additional income
    - ✓ Planned herd reduction.

D. physical issues, such as

- ✓Poorly performing calves
- ✓Physically unsound cows
- ✓Udder issues
- ✓Poor eyes, and disease

The age of cull cows is an important consideration. Cow age at culling is reflective of the overall cow longevity within the herd and the opportunity to recoup development costs.

Cows that culled at a young age have not produced enough calves to recover development costs or reached peak calf weaning weight to evaluate genetic quality.

Cows culled at a young age reflect a potentially poor match of cow genetics to the production environment, primarily because cow nutrient requirements not met by the nutritional resources. In addition, other reasons are:

- Poor production
- Very poor reproductive ability
- With sterility problem and breeding
- Very poor condition
- Stunted growth
- Suffering from incurable illness or diseases animal found to be positive serious infection tuberculosis, brucellosis

2.3 Replacement of practice

Cow culling necessitates replacement of those animals in order to maintain the herd population. Replacements can potentially found among the heifer calves born from the cowherd. Assuming that heifers retained from the cowherd, the number of replacement females needs to be determined. The number of heifer calves that must kept varies from herd to herd and depends on a number of factors.

The primary factors that determine the number of heifers needed as replacements include

- The reproductive rate in the herd,
- Future herd size plans,
- Age and status of the cows in the herd, and
- The cowherd-culling rate.

Cowherd dynamics such as age, death, infertility, and productivity result in a culling rate of 15 to 20% in any year.

The percent of heifers to retain for replacement can be determined

- By knowing the culling rate
- Knowing the weaned calf crop.

Low cowherd culling rates allow cowherd managers to be more selective in choosing from the heifer calves available. However, greater cowherd culling rates or lower calf

crop weaning percentages result in a greater percentage of heifers that must retained as replacements.

The heifer selection and development program is not a one-time evaluation and selection process. Post-weaning growth and reproductive performance of developing heifers must considered while determining the percentage or number of heifers that need to retained

The percentage of heifer calves retained must exceed the actual need, because not all retained heifers will meet growth goals or become pregnant.

Rearing replacement heifers not always seen as a fundamental part of the dairying enterprise, but when correctly planned and when specific, feeding programmers have used overall improvement in herd longevity and farm profitability results.

Feeding and managing replacement heifers must given as much priority as dealing with the milking cow. Rearing heifers must seen as an investment in to morrows profit generators.

The progress of the herd depends largely on the way in which heifers raised for replacement purposes. A sound herd cannot establishment by the continual purchased of new heifers of whose history not much known. The costs are relatively low when compared with prices at which heifers sold.

The ultimate aim of dairy heifer rearing is to produce well-developed heifers able to express full yield potential at the desired calving age, with minimum costs, losses and health problems, and with the potential to milk for at least six lactations.
Rearing replacement heifers allows for -

- Replacement of culled cows
- Increase in herd size
- Introduction of new blood lines
- Increase of genetic base
- Improvement of disease control

Self-Check -2	Written Test

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

Fill the blank space

1. List down Unproductive animal that removed from the farm. (4%)

_____,_____

_____,_____

2. _____ process of removing unproductive animals from the flock or herd (2%)

3. Write the reasons to culling in dairy production (4%)

_____,_____

_____,_____

4. _____practiced to maintain the herd population in livestock production (2%)

Answer the following question!

Note: **Satisfactory rating 7 and 12 points** **Unsatisfactory below 7 and 12 points**

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

Answer Sheet

Score = _____

Name: _____ Date: _____

Information Sheet 3 Checking and monitoring livestock condition and welfare

3.1 Monitoring body condition

When selecting dairy cattle used certain mating in a breeding program, breeder usually rates a bull based on milk production of the dam of the bull type and pedigree.

In determining the overall value of the animal, the importance attached to each trait depends on breeders experience and what tries accomplishing:

- Provision of feed based requirement
- Regular health checking
- Segregation ward for sick breed animals
- Ringing the bull
- Keeping the body condition

Over-conditioning or fatness may result from poor nutrition or reproduction management. A fat cow is more susceptible to metabolic problems and infections and more likely to have difficulty at calving

Over-conditioning usually begins during the last three to four months of lactation, when milk production has decreased, but grain and total nutrient levels not reduced accordingly. Other causes of over-conditioning are prolonged dry periods or overfeeding during dry periods.

Under-conditioning, or thinness, can frequently lower production and milk fat levels because of insufficient energy and protein reserves. Thin cows often do not show heat or conceive until they start to regain or at least maintain body weight.

In feeding these animals, care must taken to maintain production while increasing body reserves.

Cows monitored closely through the dry period and into the following lactation. It find that Group 3 cows, the fattest, had a longer interval to first ovulation, a higher number of days to first heat and conception, and the lowest first-service conception rates

3.2 Checking and monitoring welfare status of animals

Animal welfare is the well-being of nonhuman animals. The standards of "good" animal welfare vary considerably between different contexts.

Animal welfare refers the state of the animal; the treatment that an animal receives covered by other terms such as animal care animal husbandry and humane treatment

Protecting an animal's welfare means providing for its physical and mental needs. Conducting welfare assessments not only enables a farmer to determine the welfare status of individual animals and herds, but it can also help by informing management decisions through the identification of risk and problem areas and the development of solutions.

Welfare assessment is also a useful way of providing assurances to consumers that high welfare achieved.

Most welfare standards for farm animals, including those used by farm assurance schemes, are based on 'inputs', in that they describe the physical conditions and resources that are provided to animals that are likely to influence welfare, for example ,feeding, housing, management and veterinary care.

The five need of animal welfare

1. Need for a suitable environment.
2. Need for a suitable diet.
3. Need to exhibit normal behavior patterns.
4. Need to be housed with, or apart, from other animals
5. Need to protect from pain, suffering, injury and disease.

Identifying welfare indicators

- **Appearance**: including body, coat and skin condition; for example unkempt coat, porphyry staining
- **Body functions**: such as reduced food intake, changes in body temperature

- **Environment**: within the enclosure; for example, nest quality, consistency of faces
- **Behaviors:** including social interaction, posture, gait, and undesirable behaviors such as stereo types
- **Procedure-specific indicators**, for example, tumor size in cancer studies
- **Free observations**, for observers to enter their own text should they see an indicator of suffering that was not predicted

When defining suitable indicators for each procedure, a good starting point is to consider the whole procedure, identifying different types and sources of suffering that may occur. This includes anxiety and distress as well as physical pain, and the effects of handling, restraint, any husbandry restrictions and humane killing, in addition to direct effects of scientific procedures.

Self-Check -3	Written Test

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

Fill the blank space

1. What are the overall values experienced breeder accomplish to Monitoring body condition of the animal? (5%)

_____,_____

_____,_____

_____,_____

2.____ is the well-being of nonhuman animals (2%)

3. Write the five needs of animal welfare (5%)

_____,_____

_____,_____

_____,_____

Answer the following question!

Note: **Satisfactory rating 7 and 12 points** **Unsatisfactory below 7 and 12 points**

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

Answer Sheet

Score =

Name: _____ Date: _____

Short Answer Question

LG #38	LO #3. Facilitate natural breeding

Instruction sheet

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

- Determining livestock mating plan
- Selecting and stocking paddocks or yards.
- Carrying out estrus inducement and detection procedures
- Securing mating areas
- Carry out Natural mating

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

- Determine particular livestock mating plan
- Select and stock paddocks or yards.
- Carry out estrus inducement and detection procedures
- Secure mating areas
- Carry out Natural mating

Learning Instructions:

Read the specific objectives of this Learning Guide.

1. Follow the instructions described below.
2. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them
3. Accomplish the “Self-checks” which are placed following all information sheets.
4. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
5. If you earned a satisfactory evaluation proceed to “Operation sheets
6. Perform “the Learning activity performance test” which is placed following “Operation sheets” ,
7. If your performance is satisfactory proceed to the next learning guide,
8. If your performance is unsatisfactory, see your trainer for further instructions or go back to “Operation sheets”.

Information Sheet 1. Determining livestock mating plan.

1.1 Determining livestock Mating ratio

Mating plan ratio determining factors includes:

- The required number of bulls
- Service interval
- Service length and replacement rate
- Heat detection skills, times of service, system of breeding used and mating record keeping.

The size of the herd, amount of money available, and goals of the farmer are other factors considered when selecting a of breeding system

The Importance of mating plan are:

- Used for managements mating animals
- Used for feed and
- preparation appropriate space and shelter for breeding animals
- Balancing mating ration
- Used to appropriate animals
- Used to keeping body condition of mating animals

1.2. Mating ratio of sires to dams

Under traditional method, in which dairy bulls run with the cows in one herd **30-40 cows** per bull recommended

In temperate climates, dual-purpose bull serves on average **12 times** a day over a period of several weeks. For hand, mating system in which a bull kept separated from the cows and mating done at owner's discretion e.g.

- Bull to dairy cow ratio of 1: 50-60 recommended
- In case of beef cattle the bull mate with 25 estrus synchronized cows or
- Non-synchronized beef cow's 35 to 40, under range condition, many ranchers use four bulls per 100cows.

1.3 Rams/bucks to ewes/does ratio

The correct ratio of sheep and goat are:

- Fertile rams/bucks to ewes/does (one ram/buck to 20–25 ewes/does ratio or
- Three per 100 ewes/does in a year-round mating) important as it can affect the overall reproductive efficiency.
- The age of the breeding ram/buck, the length of the mating season and the environment in which the animals kept may influence the ratio.

Self-Check -1	Written Test

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

Fill the blank space

1. List down the factors determine mating plan ration of livestock (2%).

_____,_____

_____,_____

2. What are Importance of mating plan? (6%)

_____,_____

_____,_____

_____,_____

3. What is the mating ratio of bull to cows under traditional dairy production? (2%)

_____

Note: **Satisfactory rating 6 and 10 points** **Unsatisfactory below 6 and 10 points**

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

Answer Sheet

Score =

Name: _____ Date: _____

Information Sheet 2. Selecting and stocking paddocks for natural mating

2.1selecting paddock

Paddock is a field or enclosure near a stable, in which animals are exercised and grazing. While may instinctively (unconsciously) know best and worst paddocks, without measuring or assessing pasture growth in paddock and cannot accurately ranked to identify worst performance

Paddock selection based on the:

- Vegetative cover of the pasture land
- Pasture land security
- Potential of paddock
- Remains weed-free
- Has stable pastures
- Entrance of water way

2.2 Stocking paddock

Knowing the amount of dry matter forage a pasture produce is only part of the equation. The amount of forage required over the grazing season by each animal and the herd as a whole is what determines stocking density.

The overall goal is to define the proper combination of land, time and number of animals to ensure the sustained, long-term productivity of the pasture.

The optimum number of animals on the pasture makes efficient use of the forage without waste but still leaves enough forage to allow quick and complete plant recovery.

The stocking rate of a pasture depends upon the:

- Vegetative cover of the pasture land
- Rainfall amount and distribution
- Fertility level and moisture-holding capacity of the soil
- Grazing system used (rotational versus continuous' grazing)

- Size and type of animal to be grazed

2.3 The effect of stocking on Utilization of pastureland/ paddock

2.3.1 under stocking

- Setting the stocking rate too low will result in wasted forage and lost profit potential.
- Long term under stocking (under grazing) can result in a less productive pasture as more woody plants take up residence.

2.3.2 Overstocking

- Setting the stocking rate too high for too long will result in lowered intake, lowered animal growth and diminished profits.
- Overstocking (overgrazing) leads to a reduction in desirable plant species and an increase in less desirable plants.
- Overuse also means that livestock must forage for longer periods to meet their needs and that results in decreased average daily gain.

2.3.3 Stocking rate

Stocking density (head/ha) refers to the number of stock per hectare on a grazing area or unit at any one time

Usually used to describe the number of stock per unit area in a high-density grazing situation. For improved pastures, there are a range of grazing strategies to meet different animal and pasture objectives at various times

E.g., set stocking and rotational grazing. Using a range of grazing techniques and varying the approach according to the needs of the animals and the pastures referred as tactical grazing.

Self-Check -2	Written Test

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

Fill the blank space

1. Write the effect of stocking on Utilization of pastureland/ paddock (3%)

_____,_____

_____,_____

2. List down the Paddock selection criteria's (6%)

_____,_____

_____,_____

_____,_____

3. List down factor determining the stocking rate of a pasture (5%)

_____,_____

_____,_____

_____,_____

Note: **Satisfactory rating 8 and 14 points** **Unsatisfactory below 8 and 14 points**

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

Answer Sheet

Score = _____

Name: _____ Date: _____

Information Sheet 3. Carrying out estrus inducement and detection procedures

3.1 Introduction

Heat or estrus is the period when the female will accept the male and mate.

Estrus/heat defined as a period when the female are:

- Shows characteristic sexual behavior
- The average heat interval is 21 days with a range of 18 to 24 days
- Duration of heat is 24 to 36 hours in exotic and crossbred cows
- Several methods used to detect heat
- The most commonly used by farmers are behavioral signs and physical changes.

Heat detection in cattle

Early heat	**Standing heat**	**After heat**
• Increased nervousness/ restlessness	Standing to be mounted	Dried mucus on the tail
• Mounting other cows	Clear mucus discharge	Roughened tail head
Swollen vulva	Sharp decline in milk production	The animal refuses to be mounted
Licking other cows	Tail bent away from the vulva	Streaks of saliva or signs of leaking on her flanks
Sniffing other cows and being sniffed	The animal may stop eating	
Reduced feed intake		
Early sing: Watch the cow closely	**Best signs**: Take the cow for service	**Late signs**: Keep record

When do animals come into heat for the first time?

Animals come into heat when they reach puberty. This occurs at different ages in the different ruminants:

- Well-fed cows come into first heat at 10 -20 months of age.
- Sheep and goats come into first heat between 6 - 12 months of age.

The duration of heat is very short.

- In cows, it lasts for less than a day.
- In goats, heat lasts for 1 - 3 days.
- In sheep, heat lasts for 1 - 2 days.
- In pig, heat lasts for 1-3 days.

A healthy animal, which do not mounted by male or given artificial insemination, will come back into heat.

Cattle will come into heat after 3 weeks (give or take a day or two), and female goats and sheep will come back into heat after 17 days (give or take a day or two).

The methods (Aids) of estrus detection:

I. Vasectomies' or teaser bulls

These are surgically prepared bulls which are intact but will not impregnate the cow (teaser bulls have their penis deviated such that they will mount but cannot deposit semen in the cow).

Animal with nutritional Deficiencies (e.g. Calcium and Phosphorous mainly during the dry season) may exhibit silent heat (no behavioral signs), which can be detected by Vasectomies bulls.

II. Records

Used to predict date of expected heat.

III. Pressure sensitive (commercially available) mount detectors.

The glued to the rump (back) of the cow suspected to be on heat and activated by pressure of mounting of the cow by others.

IV. Detection of ovarian changes:

Use commercial kits to detect fall in progesterone

Self-Check 3	Written Test

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

Fill the blank space

1. What is the most common estrus/heat detection method used by farmer? (4%)

_____

_____

2. _____ is when animal came to heat for first time. (2%)

3. Write the methods (Aids) of estrus detection. (4%)

_____

_____

_____

Note: **Satisfactory rating 8 and 14 points** **Unsatisfactory below 8 and 14 points**

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

Answer Sheet

Score = _____

Name: _____ Date: _____

Information Sheet 4. Securing and providing mating areas

4.1 Introduction

The date of joining the sire to the breeding herd/flock determined by

- The cycle of estrus in female
- Sometimes by breeding season planned in the year.

Before selecting certain area for mating services facilities should 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 primarily considered.

Area with primitive farm management a change in attitudes management practice required before AI introduced successfully. Field service organized in several ways.

Mating place/ area/ should be:

- Free from any injury and injury cause materials
- Free from any disturbances
- Safe and clean
- Roads and accessibilities such as telephone
- Feed availability
- Free from any contaminated area

Self-Check 4	Written Test

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

Fill the blank space

1. Write the factors that determine the joining of sire for breeding the herd/flock (2%)

_____

_____.

2. Write factors should facilitated in mating place/area (6%)

_____

_____

_____

_____

_____

_____

Note: **Satisfactory rating 5 and 8 points** **Unsatisfactory below 5 and 8 points**

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

Answer Sheet

Score = _____

Name: _____ Date: _____

Information Sheet 5. Carrying out natural mating

5.1. Carrying out natural mating

Natural mating using bulls to service the heifers. The choice of bull depends on many factors, such as:

- The heifer's age
- The heifer's size or live weight
- The heifer's stage of development
- Farmer's requirement for extra heifer replacements to increase herd size or achieve
- Desired culling rates
- Availability and cost of bulls.

The advantages of natural mating method are:

- The cow has an opportunity to serve more than once, this increase the chance of conception.
- The semen is fresh and of good quality since there is no handling.
- Where the farmer does not own a bull, cost of service lower compared to A.I.

The disadvantages natural service are:

- Rearing a bull is not economical especially to a small holder farmer
- There is risk of spreading breeding diseases.
- There is risk of inbreeding if the bull is not changed frequently
- There is no opportunity to select the type of bull the farmer wants.

Natural mating done in two ways (methods):

I. Free/pasture mating:

This method of mating practiced by farmers who own bulls, which run full time with the cows. One bull can serve 20-25 cows.

Advantage

- No heat detection required

Disadvantage

- Lack of accurate records
- Possibility of transmission of reproductive diseases e.g. brucellosis.

II. Hand mating

Producer include:

- The bull enclosed in its pen and the cows brought when they show signs of heat
- Most small-scale farmers will practice this method since bulls owned by few farmers
- Others bring their cows for service at an agreed fee
- Using beef sires over replacement heifers a common practice on many dairy farms.

The argument in favor of using beef bulls has been that small poorly developed dairy heifers are not big enough at **15 months** to service by dairy bulls (except in the case of Friesian heifers, other than by Jersey bulls).

Problems occur with physical damage when small heifers mated with large bulls, because calving difficulties frequently occur with large calves being born to small heifers. However, heifers that have achieved minimum target live weight generally capable of successfully mated and calved to the larger dairy breeds. With the recent influx of large-framed

Overseas genetics into what previously considered small and safe, easy calving beef breeds, such as Angus, many producers now experience calving difficulties through mating their smaller heifers with these beef bulls. If newborn ‘bobby calf’ prices are low, the value of a beef cross calf minimal compared with the potential cost of a dystocia and the resultant loss of milk production

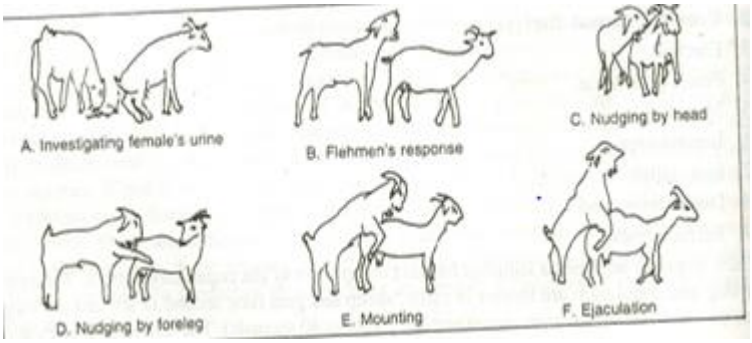

Figure 5: Natural mating methods in goat

Self-Check 5	Written Test

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

Fill the blank space

1. Write the factor considered to choice/ select bull for natural mating. (6%)

_____,_____

_____,_____

_____.____

_____,_____

2. List down the disadvantages natural service (5%)

_____

_____

_____

_____

_____

3. Write the methods of natural mating (2%)

_____,_____

Note: **Satisfactory rating 7 and 13 points** **Unsatisfactory below 7 and 13 points**

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

Answer Sheet

Score = _____

Name: _____ Date: _____

LG #39	LO #4. Facilitate artificial breeding

Instruction sheet

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

- Preparing the necessary materials and equipment
- Facilitating heat detection
- Preparing animals for insemination
- Carrying out artificial insemination techniques

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

- Prepare the necessary materials and equipment
- Facilitate Heat detection
- Prepare animals for insemination
- Carry out artificial insemination techniques

Learning Instructions:

Read the specific objectives of this Learning Guide.

1. Follow the instructions described below.
2. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them
3. Accomplish the “Self-checks” which are placed following all information sheets.
4. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
5. If you earned a satisfactory evaluation proceed to “Operation sheets
6. Perform “the Learning activity performance test” which is placed following “Operation sheets” ,
7. If your performance is satisfactory proceed to the next learning guide,
8. If your performance is unsatisfactory, see your trainer for further instructions or go back to “Operation sheets”.

Information Sheet 1. Prepare necessary materials and equipment for AI

1.1 Introduction

Artificial insemination (AI) the process of collecting sperm cells from a male animal and manually depositing them into the reproductive tract of a female by the help of instruments

In this process, semen inseminated into the female reproductive tract by placing a portion of it either in a collected or diluted forms into the cervix or uterus by mechanical methods at the proper time and under most hygienic conditions.

1.2 Prepare necessary materials and equipment for artificial breeding

Insemination kits contain

1. **Full hand Gloves**: is important to keep hands clean and protects the cow from some infection and diseases
2. **Insemination gun (AI Rod):** used to implant the semen into the cow or heifer
3. **Semen Straws**: - straws contain valuable semen
4. **Liquid nitrogen Containers:** This refrigerator contains all of valuable semen that need to inseminate cow or heifer. The 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
5. **Thermos flask**: equipment that can hold warm water and keep the water for long time as warmed.
6. **Scissors or Cito Cutter**: Used to cut the melted end of the straw off. It gives you a square cut so that you can see the straw more secure into the sheath
7. T**weezers**: It is an easier way to get the straws out of the goblets and it also makes it quicker.
8. **Cotton Glove**: A cotton glove used to protect your hand when you get the semen out of the liquid nitrogen refrigerator.
9. **AI 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
10. **Thermometer**

11. **Paper towels**
12. **Soap**
13. **Record books**
14. Inseminators require protective clothing
15. watch suitable for controlling thawing time (

There must be always adequate liquid nitrogen in the tank. Preferably, the tank should kept full

1.3 Personal protective equipment (PPE)

Material that gives protection against hazard or risk while conducting a given activity.

Personal protective clothes and equipment:

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

1.4 Facilities used for AI

- Cattle crush
- Restraining materials
- Shed/house

Self-Check 1	Written Test

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

Fill the blank space

1. _____ process of collecting sperm cells from a male animal and manually depositing into reproductive tract of a female by the help of instruments (2%)

2. .Write At least 10 material and equipment used for **artificial breeding (8%)**

_____,_____,_____

_____,_____,_____

_____,_____,_____

_____,_____,_____

3. Writer the facilities used for AI (3%)

_____,_____

_____,_____

Note: **Satisfactory rating 7 and 13 points** **Unsatisfactory below 7 and 13 points**

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

Answer Sheet

Score =

Name: _____ Date: _____

Information Sheet 2. Facilitating heat detection

2.1 Introduction

Heat (Estrus) is a fairly well defined period that occurs in non-pregnant cows once each 19 to 23 days/month and time during female animal will accept the male for copulation or breeding.

Heat period: A time when the animal shows estrous signs or need to serve by bull or artificially

Estrus must detected accurately because it 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 usually inseminated that evening, and cows in heat in the evening inseminated the following morning. Because ovulation occurs 24-30 hours after the onset of heat, insemination should occur near the end of estrus.

2.2 Heat detection Methods

The common heat detection methods are:

1. Visual observation. Despite the rise of automatic **heat detection** systems, a large number of heats still spotted visually
2. Mount **detectors**
3. Activity monitors
4. Milk progesterone
5. Fixed-time artificial insemination synchronization programs.

2.2.1 Visual observation

Detection usually depends up on observation of standing response when ridden. 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 torus behavior.
- A record of all estrus periods even before the earliest service date

The common visual heat detection method are:

- 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 the 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 extremely important when observing for estrus activity.
- Behavioral heat activity usually seen in the early morning between 2:00 and 6:00.

Sign of heat observed include:

- mounting other cow
- Mucus discharge from vulva
- Swelling and reddening of vulva
- Standing to be mounted
- Frequent urination, tail rising and shaking
- Sniffing genital
- Decrease feed intake and milk yield
- Frequent bellowing, restlessness and trailing

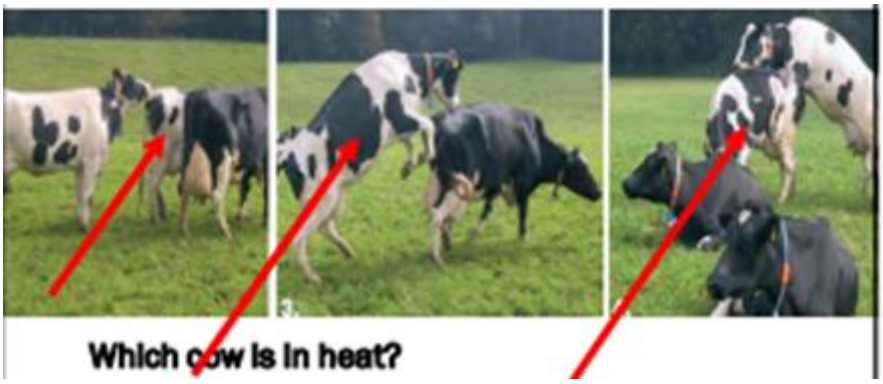

Figure 6: Sign of heat

2. Mount detectors

Useful addition to observed estrus as they give information on activity, which occurs at times when the cows not observed.

Mount detectors come in a variety of forms including:

- tail paint
- scratch cards
- ink pockets

3. Activity monitors

There are various systems available, with sensors/accelerometers placed on the neck or the foot of dairy cows.

4. Milk progesterone

The gold standard heat detection by testing a cow's milk for progesterone.

During most of her cycle, this hormone remains high in the body and milk.

When cow comes bulling, progesterone drops meaning a low concentration in milk indicates cow ready to serve.

Using milk progesterone reduces the amount of false positive heats by 6% and has an overall HDR of nearly 100%. It will also allow detection of other problems such as cystic ovaries.

New technology allows on milk progesterone samples to taken in the parlour, particularly in robots; however, uptake has been slow, mainly due to the high expense involved

5. Fixed-time artificial insemination synchronization programs

The herds turning to fixed-time AI synchronization protocols to eliminate the need to detect heats.

Blanket use of synchronization protocols unlikely popular with consumers and already outlawed in some dairy contracts due to the use of synthetic hormones in clinically normal animals.

Synchronizing cows not overtly expressing heats an important part of a herd's reproductive management, as well as treating those with abnormal ovarian activity, such as anestrus or cysts, additional bonus of synchronizing cows creates bulling group

which encourage more estrous behavior in cohort cows that improving overall heat detection.

2.3 Factors affecting rate of conception

2.3.1 The fertility chain

The fertility chain producers are:

- Heat detection
- Semen handling
- AI techniques
- Nutrition
- Herd health and record.

2.3.2 Heat detection and time of service

This depends on whether natural service or artificial insemination used. A cow in 'standing heat' stands for mounting by bull or another cow. In practice, a cow showing heat in the morning should inseminated in the afternoon

2.3.3 Semen quality and handling

To maintain a good dairy herd, the farmer must use

- Semen of proven bulls
- The semen obtained from agents or service providers registered by the veterinary department
- AI spread disease if attention not paid to the health status of the bull.
- All bulls at approved AI centers constantly screened for any disease to ensure semen collected from them safe and disease free
- The spermatozoa should fertile, good concentration, high motility and normal morphology (structure).

Self-Check 2	Written Test

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

Fill the blank space

1. _____ time when the animal shows estrous signs or need to serve by bull or artificially. (2%

2. List down the common heat detection methods! (5%)

_____,_____

_____,_____

_____,_____

3. List down factors affecting of conception rate. (2%)

_____,_____

_____,_____

4. Write the Sign of dairy cows on the heat/estrus (4%)

_____,_____

_____,_____

_____,_____

_____,_____

Note: **Satisfactory rating 7 and 13 points** **Unsatisfactory below 7 and 13 points**

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

Answer Sheet

Score = _____

Name: _____ Date: _____

Information Sheet 3. Preparing animals for insemination

3.1 Preparing animals for insemination

The essential information to prepare female animal for insemination includes:

- Identifying cow on heat
- Dates of observed estrus
- 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 advised to observe cows for heat signs at least three times in day (20 minutes of visual observation each time: morning, afternoon and late evening). This should done at times other than during feeding and milking. It may conveniently done during communal grazing.

Body condition at calving and at the subsequent insemination influence the interval from calving to first estrus and conception rate

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 minimize loss of score between calving and insemination.

- Cows that are too fat at calving likely to have calving difficulties and more prone to early fetal death.
- Cows, which too thin, especially losing condition delayed estrus and poor conception rates
- Cows should at least 42 days after calving (open day), before they served again.
- For high yielding cows, a longer period of open days necessary
  - ✓ To obtain good conception rates
  - ✓ To reduce embryo and early fetal losses.
- The cow should in good health
- Free of any evidence of infection reproductive tract.
- Particular attention paid to cows that have had abnormal calving like: Dystocia Retained placenta, Prolapsed of the uterus. The required a longer period after calving for involution of the uterus and to return to normal fertility.

Self-Check 3	Written Test

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

Fill the blank space

1. List down the essential information considered to prepare female animal for Artificial insemination (5%)

_____,_____

_____,_____

_____,_____

_____,_____

2 What is the average body condition score productive cows? (2%)

_____

- between 2.5 and 3.5 (based on the scale of 1-5)

3 Why long open day recommended for high producer dairy cows? (3%)

_____,_____

4. List down the example of abnormal calving of dairy cows (3%)

_____

_____

_____

Note: **Satisfactory rating 7 and 13 points** **Unsatisfactory below 7 and 13 points**

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

Answer Sheet

Score = _____

Name: _____ Date: _____

Information Sheet 4. Carrying out artificial insemination techniques

4.1 Semen Handling Techniques

Semen Handling producer include the following principle:

- Always adequate liquid nitrogen must in the tank
- The tank should kept full liquid nitrogen
- Transferring of semen from the tank to the thawing water must done quickly.
- Canisters should remain in the neck of the tank less than 10 seconds and preferably no longer than five seconds
- Frequent opening of semen containers is to be discouraged (not more than 10 seconds in any 10 minute period)
- When transferring frozen straws the canister should not brought beyond the neck of the container

4.2 Preparing semen for AI services

Steps to prepare **semen straw for** artificial **insemination services** include:

Steps 1.The taking out semen straw from nitrogen tank in 10 second

Step 2. Thawing (semen straw) should be in warm water at 35oC for a minimum of 20-30 seconds

Step 3. The straw should cleaned by paper towel (wiped) to dry)

Step 4. Cut semen straw at right angles

Step 5. Properly loaded into the insemination gun (pistolette) prior to loading, the gun should briskly rubbed with a piece of paper towel to warm it. This helps to prevent sudden changes in temperature, which are detrimental to the semen

Step 6.Holding the loaded AI gun by mouth

Step 7. Remove faces from the rectum

4.3 Deposition of semen in the female

There are differences between species in the site of semen deposition during **natural mating**. In ruminants and primates, semen deposited in the **vagina** whereas in pigs, dogs, camels and horses, semen deposition **intrauterine**.

In most species of livestock, it is possible to pass an insemination catheter through the cervix and enabling semen to deposit in the **uterus** during AI. Exceptions are sheep and goats, where the tightly folded nature of the cervix does not permit easy passage of an insemination catheter

The advantages of depositing the semen in the uterus are that the spermatozoa have less far to travel to reach the oviducts and fewer spermatozoa are lost through back-flow. A smaller volume of semen used per insemination dose than for intravaginal deposition, and the cervix, which can act as a barrier to the passage of spermatozoa,

Other techniques like unicornual or bicornual insemination where semen deposited into one or both uterine horns, and intraperitoneal insemination have been investigated But, could not replace the trans cervical intrauterine AI with semen deposition into the uterine body.

4.4Carrying out Artificial insemination

Step #1: Restrain the animal to inseminate.

Several things should 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 backside 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

Figure 7: 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

Figure 8: Cleaning the manure from vulva and vagina

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.

The walls of the vagina consist of thin-layered muscle and loose connective tissue. The insemination gun easily felt with the left hand in the rectum.

As the breeding gun 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 occasionally 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 not passed through the cervix.

- Excessive movement or probing with the insemination gun during this step is hardly ever productive.fa

The key to mastering this step of the insemination process 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 thumb and forefingers just in front of the gun tip and re-grasp the cervix.

Cervix is composed of dense connective tissue and muscle. It is difficult to distinguish the gun tip when it is located within this structure.

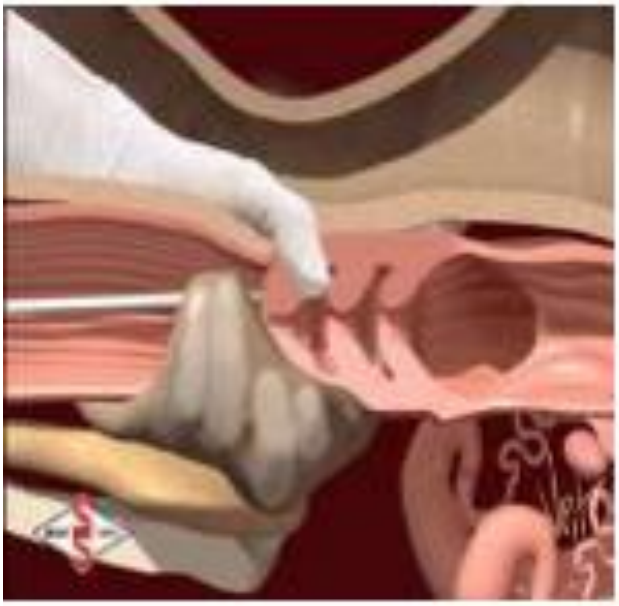

Figure 9: Gun tip and re-grasp the cervix

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 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 more than 1 inch through the cervix, all the semen will 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

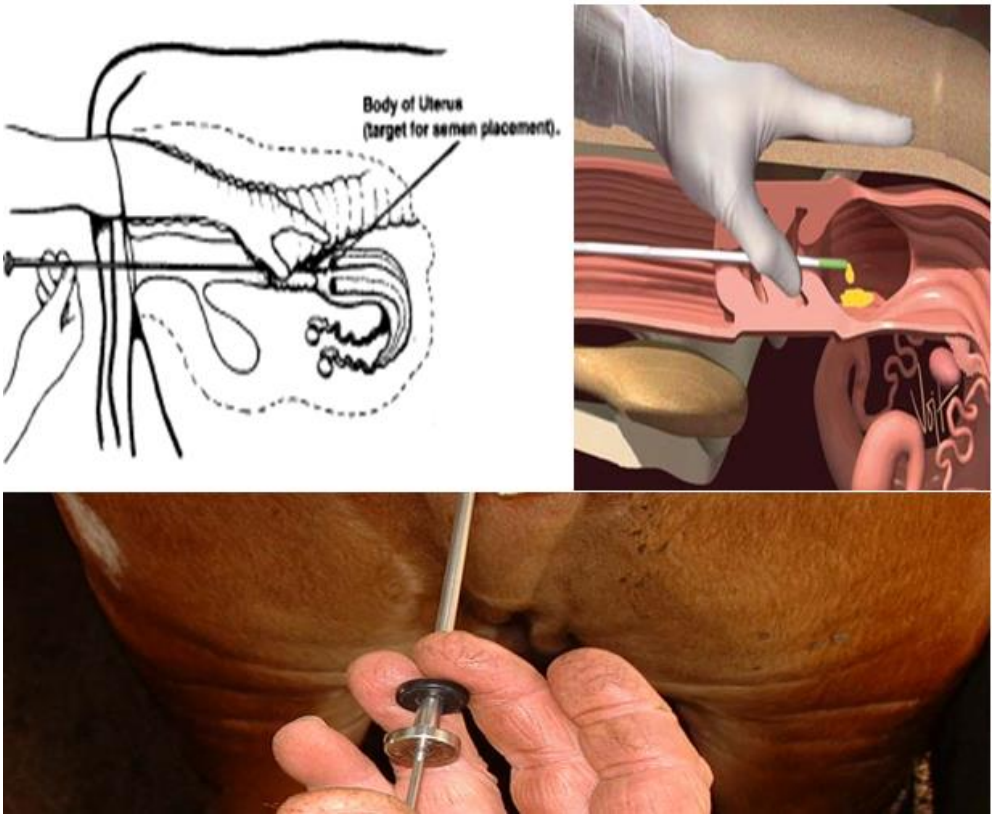

Figure 10: semen deposited

Step 9: 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.

Disposable materials

- Full arm glove
- AI sheath
- Semen straw
- Clean paper

A factor affects success of artificial insemination in Animals

- Species
- Milk production
- Body condition
- Lactation status
- Heat sign
- Uterine tone effects
- Quality of bull semen
- Inseminator experiences

Self-Check 4	Written Test

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

Fill the blank space

1. List down the Steps to prepare semen for artificial insemination services (5%)

_____

_____

_____

_____

_____

_____

_____

2. List down the principle of semen handling techniques (4%)

_____

_____

_____

_____

_____

3. During natural mating semen deposited in ruminant and primates is_____ and for pigs, dogs' camels and horses semen deposed in_____ (2%)

4. For AI practice the semen deposited_____ in most livestock except sheep and goat (2%)

5. List down the factors affect the success of artificial insemination in Animals (4%)

_____,_____,_____

_____,_____,_____

Note: **Satisfactory rating 9 and 17 points** **Unsatisfactory below 9 and 17 points**

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

Answer Sheet

Score =

Name: _____ Date: _____

Operation sheet 1

Operation title: **Carrying out semen preparation for artificial insemination**

Purpose	To acquire the trainees with preparation of semen for artificial insemination practice
Equipment ,tools and materials	• Thermometer • Timer • Straw-cutting device • Insemination rod • Plastic sheaths • Plastic obstetrical sleeves • Obstetrical lubricant • Paper towels • Record-keeping supplies • Cattle handling facilities (including breeding box or squeeze chute with head catch and palpation cage and protection from weather,
Conditions or situations for the operations	Practice according to inseminator procedure Follow the instruction correctly and the ends must be safe.
Procedures	1-Wear personal protective clothes. 2. Taking out semen straw from nitrogen tank 3- Thawing (semen straw 4. Semen straw cleaned by paper towel 5. Cut semen straw at right angles 6. Properly loaded into the insemination gun 7. Cover the AI gun by plastic sheath 8. Holding the loaded AI gun by mouth.
Precautions	Care should take to Strictly following the semen preparation for AI procedure
Quality criteria	• Semen straw should take in 10 seconds from the nitrogen tank • Did semen straw cut at right angle? • Did semen straw loaded and covered by plastic sheath and prepared to inseminate? • -Did AI **records** are kept?

LAP Test	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions:

1. You are required to perform of the following:

1.1. Preparing semen for artificial insemination

2. Request your teacher for evaluation and feedback

L #40	LO #5. Monitor breeding program

Instruction sheet

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

- Monitoring implementation of the breeding program.
- Conducting pregnancy diagnosis.
- Prioritizing and implementing changes
- Monitoring and controlling allocated resources.
- Maintaining safe workplace and environmentally responsible practices
- Observing and complying with Relevant legislative requirements

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

- Monitoring implementation of the breeding program.
- Conducting pregnancy diagnosis.
- Prioritizing and implementing changes
- Monitoring and controlling allocated resources.
- Maintaining safe workplace and environmentally responsible practices
- Observing and complying with Relevant legislative requirements

Learning Instructions:

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1. Follow the instructions described below.
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4. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
5. If you earned a satisfactory evaluation proceed to “Operation sheets
6. Perform “the Learning activity performance test” which is placed following “Operation sheets” ,
7. If your performance is satisfactory proceed to the next learning guide,
8. If your performance is unsatisfactory, see your trainer for further instructions or go back to “Operation sheets”.

Information Sheet 1 Monitoring implementation of the breeding program

1.1 Introduction

In a successful artificial breeding program, a dose of fertile semen placed in the correct position of reproductive tract of

- Normal cow
- Healthy cow in good nutritional condition
- At the right stage of the breeding cycle.

Failure of an artificial breeding program usually due to:

- Lack of preparation
- Poor management
- Lack of inseminating ability of a technician

The first step to determine type of artificial breeding program attempted.

1.2 Determination of Artificial breeding program

I. Continuous observation

This is the type of program for dairy farmers on a 'year round' calving pattern. The cows observed twice daily for most of the year. A beef breeder would not normally consider this type of program.

II. One cycle program (21 to 28 days)

One cycle program breeding program include:

- Twenty one to 28 days the time necessary to allow each cow in the program to cycle once
- The cows observed twice daily for 21-28 days
- The programs conducted mainly in beef areas where feed and/or labor a limiting factor, and in some dairy herds with strictly seasonal calving.

III. Two cycle program (42 to 45 days)

This system requires:

- Twice-daily observations for 42-45 days so that all cows have the chance to cycle twice
- It allows some cows to given a repeat insemination
- It used sometimes for beef herds and often for seasonally calving dairy herds.

IV. Part herd program

This type of program implemented when only a portion of the herd to inseminated.

- For instance may have only 40 doses of semen, but a herd of 200 breeding cows
- The first 40 cows demonstrating estrus will inseminated
- In this case, the program should take only four to five days
- It is this type of program, which most common in very extensive beef situations if herd bulls bred.

V. Synchronized programs

These make it possible to inseminate large numbers of cows in a short time.

1.2Successful Artificial Breeding Programs

The success of an artificial breeding program expressed theoretically in the result of this formula

Heat detection efficiency	X Cow Fertility	X Insemination Efficiency	Bull Fertility	=Calves on ground

The success of an artificial breeding program expressed theoretically by:

- Heat detection efficiency
- Breeding soundness of the cow, i.e. cow fertility
- Efficiency of the inseminator
- Fertility of the semen, i.e. bull fertility.

1.2.1 Heat Detection Efficiency

This is the critical factor in most AI programs. The most skillful inseminator in the world using the most fertile semen available cannot get cows in calf unless the cows presented at the correct time for insemination. It is in this area and in the area of cow fertility that most of the advanced planning must done.

Heat detection efficiency depends on

1. Skill and experience

Normal cow behavior known so that small changes in behavior can be recognized and interpreted.

2. Time spent

A minimum of one hour per 100 cows per day spent on estrus detection. Early morning and late afternoon are the best times, as cows do not demonstrate signs of estrus as strongly in the hotter parts of the day. Because they concentrate the timing of heat detection, synchronized programs are very useful in most beef situations

3. Size of the herd

In all situations, the accuracy of detection declines as cow numbers increase. This is especially so when more than 100 cows are in a program. For this reason, it is better to run a number of smaller concise programs than one large unwieldy program. Synchronized programs are ideal in this respect

4. Facilities and paddock yard

Small paddocks are preferable to large one to avoid:

- Heavily timbered, hilly or rough paddocks
- The ideal number of smaller open paddocks with adequate shade and water, used in rotation.
- Paddocks should as close as possible to the yards and insemination area
- Synchronization programs again every useful because they reduce the time during which cows have to be fed.

5. Ease of identification of cows

All cows must be ear tagged or have large visible fire, freeze or paint brands.

Poor identification is the most common reason for:

- cows missed or the wrong cows presented for insemination
- Each cow must be easily identifiable from a distance
- Tag or brand cows before commencing the program

6. Heat detection aids

The closest observation, some cows will not demonstrate estrus visibly

- Heat detection aids such as
- Heat mount detectors
- Tail paint may assist in identifying them, but this \ only aids and not used instead of observation. In managed program, 80-90% or more of the cycling cows detected.

7. Cow fertility

The organization and selection of cows to include in an artificial breeding program must planned in detail for all types of programs except those utilizing continuous observation, i.e. dairy farms calving all year round. Only cows, which capable of going into calf should selected for a program.

Self-Check 1	Written Test

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

Fill the blank space

1. Write the main causes of an artificial breeding program failure (3%)

_____,_____

_____,_____

2. Determination of Artificial breeding program (3%)

_____,_____

_____,_____

_____,_____

3. Write theoretically expression of success full artificial breeding program (3%)

_____

_____

_____

_____

4. List down factor determine heat Detection Efficiency (5%)

_____,_____

_____,_____

_____,_____

_____,_____

Note: **Satisfactory rating 8 and 14 points** **Unsatisfactory below 8 and 14 points**

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

Answer Sheet

Score = _____

Name: _____ Date: _____

Information Sheet 2 Conducting pregnancy diagnosis

2.1 Importance of conducting pregnancy diagnosis

The importance **of conducting pregnancy diagnosis** in livestock breeding used management farm properly

Importance of conducting pregnancy diagnosis in livestock breeding are:

- To make timely culling decisions
- Used for focusing on resources operation soundly
- To use reliable breeders with experience
- To determine the age of the fetus
- To predict expected
  - ✓ calving dates
  - ✓ Plan for the necessary labor at calving time.
- To manage nutritional demands of gestation, calving, lactation, and rebreeding dairy cows

2.2 Methods pregnancy diagnosis of cow/heifer

Pregnancy diagnosis in cow classified into

- direct method
- Indirect methods.

2.2.1 Direct methods of pregnancy diagnosis include

A. Trans rectal palpation
B. Ultrasonography

A. Trans-rectal palpation

Rectal palpation made by inserting the arm into the rectum and feeling the reproductive tract for pregnancy indications.

Rectal examination usually carried out between **35 and 50 days post AI**.

Some important equipment used to perform rectal palpation are:

- Protective plastic sleeve that covers the arm and hand up to the shoulder. The sleeve guards against disease and prevents irritation of the arm.
- A rubber band on your upper arm to hold the plastic sleeve in place
- An obstetrical lubricant or mineral oil to make entry into the rectum easier.

Rectal palpation alone takes only a few seconds. The speed of pregnancy determination depends on the:

- Management of the cows come through the chutes
- The stage of pregnancy
- The palpation's experience

To ensure the safety of the animals and the placatory certain precautions are:

- Restrain the animal so she cannot jump over the side of the chute or kick the palpator.
- Prevent other cattle from coming up behind the palpator as he or she attempts to determine pregnancy.
- Replace broken boards in the chute that could injure the animal's legs, and check for exposed nails.
- Place cleats across the floor if it is slick to help stabilize the animals' footing.

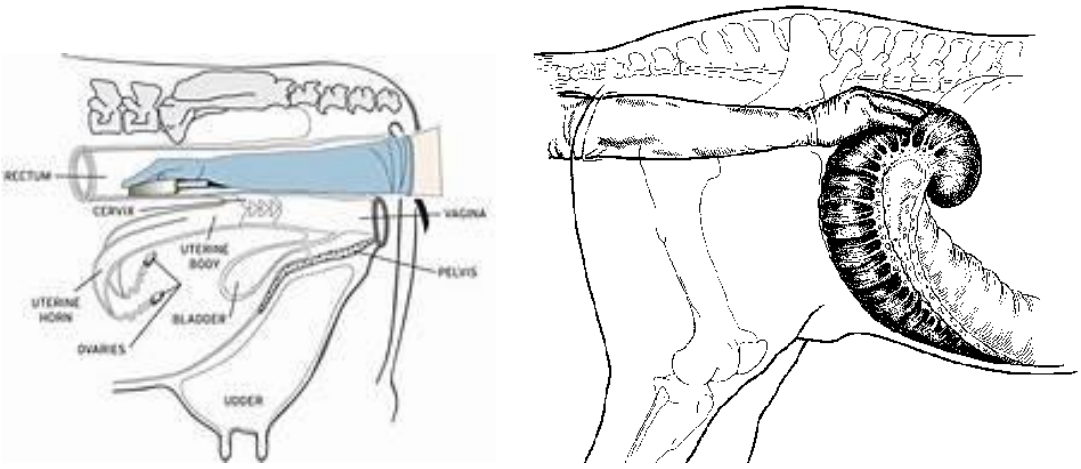

Figure 11: Rectal palpation of fetus

Advantages of rectal palpation pregnancy diagnosis:

- Immediate determination (usually): Allows sorting, separation, assessment on the spot
- Little equipment needed
- Staging of pregnancy
- Some assessment of viability
- Good to fair assessment of normality of fetus, dam
- Cheap to moderate cost

Disadvantages of rectal palpation:

- Invasive
- Long learning curve
- Potential for damage to dam, fetus?
- Availability of veterinarian. Technician
- Potential for error

B. Ultrasonography pregnancy diagnoses

Tran-rectal ultrasonography is:

- Accurate and rapid
- The outcome of the test known immediately at the time the test of conducted
- On-farm conditions, pregnancy diagnosis rapidly and accurately diagnosed using ultrasound as early as 26-30 day post of AI
- Early pregnancy diagnosed

Trans-rectal ultrasonography information gathered using the technology useful for reproductive management include evaluation of ovarian structures, identification of cows carrying twin fetuses, and determination of fetal sex

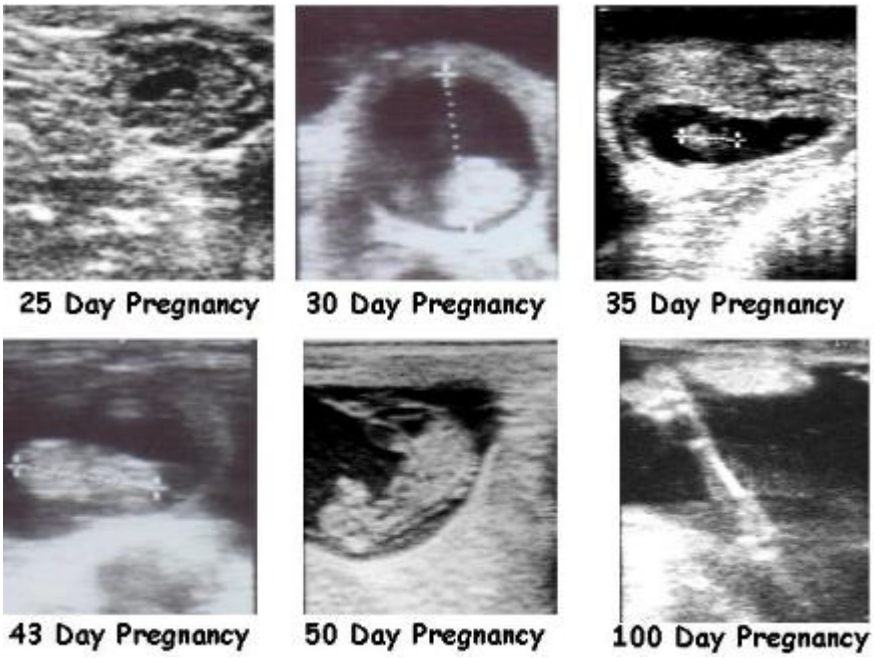

Figure 12: Ultrasonography pregnancy diagnoses picture and ages of fetes

2.2.2 Indirect methods for early pregnancy diagnosis include

A. measurement of endocrine hormones

B. B. pregnancy specific proteins.

A. Measurement of endocrine hormones

Progesterone is a naturally occurring hormone in non-pregnant as well as pregnant cows.

The progesterone concentrations in serum and milk related to ovarian luteal activity elevated during the luteal phase of the ovarian cycle but low (< 3 nmol/l) for approximately 4–5 days around the time of estrus. Estrus occurs approximately every 18–24 days in cycling and non-pregnant cows. Therefore, detection of low progesterone levels in samples obtained 18–24 days after insemination provides evidence that the corpus luteum has regressed and that a pregnancy has not occurred.

Progesterone-based testing is therefore a secondary indicator of pregnancy with diagnosis requiring interpretation of carefully timed or serial samples obtained from individuals. This combined with the low sensitivity of the test has not resulted in widespread adoption

B. pregnancy specific proteins.

Pregnancy associated glycoproteins are produced by the placenta and trophoblast that direct indicators of pregnancy. These molecules appear in the circulation of pregnant cows from around 15 days after conception

Self-Check 2	Written Test

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

Fill the blank space

1. Write the Importance of conducting pregnancy diagnosis in livestock breeding (5%)

_____

_____

_____

_____

_____

2. **List down the classification pregnancy diagnosis of cow/heifer (2%)**

_____

_____

3. Write the **direct methods of pregnancy diagnosis (3%)**

_____

_____

4. Write the disadvantages of rectal palpation (4%)

_____,_____

_____,_____

_____,_____

Note: **Satisfactory rating 9 and 17 points** **Unsatisfactory below 9 and 17 points**

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

Answer Sheet

Score =

Name: _____ Date: _____

Information Sheet 3.Prioritizing and implementing changes to achieve breeding aim

3.1 Introduction

Breeding goal is the specification of the traits to improve including the emphasis given to each trait. It gives the direction in which want to improve the population.

Breeding program aiming at defined breeding objectives for the production of a next generation of animals.

The main objectives of animal breeding are:

- To increase growth rate
- To maximize Production like:
  - ✓ Milk, meat, egg, wool etc.
- To maximize Rate of reproduction higher or optimum
- To change breeding program for good achievement

Selecting the method of breeding, from breeding method like natural and artificial methods select best for effectiveness.

The best method to carryout animal breeding artificial method of breeding, which includes artificial insemination technology. These technologies are scientific in nature. They help overcome problems of normal mating and have a high success rate of crossing between mature males and females.

Selecting good bull based on requirement of they need like:

- For dairy production select good dairy bull and select good dam
- For beef production, select good beef bull for good improvement
- Selecting breeding program for achievements of the breeding objective, it play a big role for good achievements of breeding objective for improvement
- Identifying correct breeding season or time, it too important specially season breeding animals like sheep and goat
- Prioritize breeding objective based on production need

- Monitoring the breeding program and each processes for well performance of the events
- Checking breeding facility performance ability

Prioritize breeding aim

- Assessment of potential existing breeding program objective
- Checking what are the needs of farmers.
  - ✓ Are they needs to improve milk production?
  - ✓ Are they needed improvement meat production and quality?
  - ✓ Are they needs for mutton production?
  - ✓ Are they needs for good quality wool?
- Check what resources available
- Give ranking for breeding objective after assessment
- Start with prioritize objective

After identify breeding objective, the needs of farmers on the ground the next give prioritizing the breeding aim according to farmers needs and objective.

Prioritizing done by answering the important question of breeding objective. In the first rank what is the farmers' needs? It can be answer well and can proceed to the next objective.

Self-Check 3	Written Test

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

Fill the blank space

1. Write the main objectives of animal breeding (5%)

_____

_____

_____

_____

_____

2. Mention the aim breeding Prioritize **(5%)**

_____

_____

_____

_____

_____

Note: **Satisfactory rating 6 and 10 points** **Unsatisfactory below 6 and 10 points**

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

Answer Sheet

Score =

Name: _____ Date: _____

Information Sheet 4. Monitoring and controlling allocated resources

4.1 Monitor and control is a process of measuring performance and taking corrective action to assure the breeding program is on track to meet its goals.

The purpose of **Monitor and control** are:

- To develop control process
- To take advantage of opportunities
- Decreasing crisis of management.

Resource monitored and controlled in livestock breeding program are:

- Breeding animals
- Breeding materials
- AI materials, tools and equipment's
- Facilities like animal handling, restraining and infrastructure
- Budget and finance

The requirement of Monitoring and controlling resource in livestock breeding processes are:

- To review and regulate the progress and performance of a resources,
- To identify deviations from the planning of used facilities
- To bring activities back into alignment with the plan when appropriate and update the plan as required.
- To monitor and control the work
- To perform integrated and control change
- To verify scope and control
- To control schedule and cost
- To control quality and monitor risk
- To administer procurement and report performance.

All departments required to regularly monitor actual activity planned and control their expenditure to ensure that it is in line with available funds.

The financial jargon for this process of monitoring income and expenditure to take corrective action budgetary control.

A budget is a key management tool for planning, monitoring, and controlling the finance of an organization. It estimates the income and expenditures for a set period.

4.2 Controlling a budget

- Make sure the budget prepared includes all the key indicators to control.
- Use budgeting software to set realistic budgets based on historical data.
- Give responsibility for budget items only to individuals with the authority to control the outcome.
- Schedule regular reviews of budget performance.

Advantages monitoring budget

- Sometimes detect underlying problems before they have an adverse effect.
- Detect problems that affect a user's productivity.
- Collect data when a problem occurs for the first time.
- Allow you to establish a baseline for comparison.

Three basic types of control systems

- Output control
- Behavioral control
- Clan control

Self-Check 4	Written Test

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

Fill the blank space

1. Write the purpose of **Monitor and control livestock breeding** program (3%)

_____,_____

_____,_____

2. Mention the resource monitored and controlled in livestock breeding program (5%)

_____,_____

_____,_____

_____,_____

3. Write the Advantages of budget monitoring (4%)

_____

_____

_____

_____

4. Write the three basic types of budget controlling systems (3%)

_____,_____

_____

Note: **Satisfactory rating 8 and 15 points** **Unsatisfactory below 8 and 15 points**

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

Answer Sheet

Score = _____

Name: _____ Date: _____

Information Sheet 5.Maintaining safe workplace and environmentally responsible practices

5.1 Carry out work following OHS requirements

OHS requirements kept in a location central to the work being performed and readily available to the work force

Some safe work practices will require for specific job procedures, which clearly set out in a chronological order of each step in a process.

Safe work procedures in the company included

- Worker orientation program
- Effective communication between those involved in occupational health and safety worker
- Profession Safety and other professions common words such as
  - ✓ Accident
  - ✓ Injury
  - ✓ Hazard
  - ✓ Health safety

5.2 The safe Working place of veterinarians and livestock breeder include:

- 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.

The 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.

Self-Check 5	Written Test

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

Fill the blank space

1. List down the Safe work procedures in the company (3%)

_____

_____

_____

2. Write the safe Working place of veterinarians and livestock breeder (7%)

_____

_____

_____

_____

_____

_____

_____

_____

Note: **Satisfactory rating 6 and 10 points** **Unsatisfactory below 6 and 10 points**

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

Answer Sheet

Score =

Name: _____ Date: _____

Information Sheet 6. Observing and complying relevant legislative requirements

6.1 Occupational health and safety regulation

The Occupational Health and Safety Regulations 2017 (OHS Regulations) build on the OHS Act.

They set out how to fulfil duties and obligations, particular in Processing Company that support the OHS Act.

The OHS rule in processing company include:

- Safe operation of major hazard facilities and mines
- Training for high risk work
- Managing and removing asbestos
- Licenses for specific activities

6.2 Animal Welfare Act and Regulations

The Animal Welfare Act (AWA) minimum standards of care and treatment provided animals bred for commercial sale, used in research, transported commercially, or exhibited to the public. Not intended to regulate how animals used for research purposes, but only to set standards for how they obtained and maintained at a facility.

Some of animal welfare act and regulation are:

- Animals shall treated well and protected from unnecessary suffering and disease.
- Animals used as laboratory animals shall not deemed to have been subjected to unnecessary suffering or disease where approved by an ethical committee on animal experiments.
- Animals shall give sufficient food and water and adequate care. Feeding stuffs and water must good quality and appropriate for the species of animal that fed.
- Livestock buildings and other holding rooms of animals must provide sufficient space
- Shelter of animals shall kept clean.
- The Government or the authority designated by the Government may issue further regulations concerning: feeding and watering of animals;

- Animals shall accommodated and handled in an environment that is appropriate for animals that promote their health and permit natural behavior
- Severed animal must killed immediately.
- All animals delivered for transportation, transported, purchased, or sold, in commerce, by a dealer or exhibitor shall marked or identified at such time and in such humane manner as the Secretary may prescribe

6.3 Environmental protection act

The **Environmental Protection Act** deals with issues relating to waste on land, defining all aspects of waste management and places a duty on local authorities to collect waste. Environmental Protection Act duties are:

- Protect and improve environmental quality,
- control and reduce pollution from all sources
- prohibit or restrict the setting and /or operation of any industrial facility on environmental grounds

Environmental law the collection of laws, regulations, agreements and common law that governs how humans interact with their environment

Laws may regulate pollution, the use of natural resources, forest protection, mineral harvesting and animal and fish populations.

Environmental protection laws

- The Clean Air Act.
- The Clean Water Act.
- The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)
- The Emergency Planning & Community Right-to-Know Act (EPCRA)
- The Endangered Species Act.

Self-Check 6	Written Test

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

Fill the blank space

1. List down OHS rule in processing company (4%)

_____

_____

_____

_____

2.____minimum standards of care and treatment provided animals bred for commercial sale, used in research, transported commercially, or exhibited to the public (2%)

The Animal Welfare Act (AWA)

3. Write the environmental Protection Act/management duties (3%)

_____

_____

_____

_____

_____

4. Write the **act environmental protection laws (4%)**

_____

_____

_____

_____

_____

Note: **Satisfactory rating 7 and 13 points** **Unsatisfactory below 7 and 13 points**

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

Answer Sheet

Score =

Name: _____ Date: _____

L #41	LO #6. Monitor breeding program

Instruction sheet

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

- Reviewing and evaluating breeding program processes and outcomes
- Evaluating performance of facilities, resources and equipment
- Evaluating effectiveness of selection and mating criteria
- Documenting relevant information

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

- Review and evaluate breeding program processes and outcomes
- Evaluate performance of facilities, resources and equipment
- Evaluate effectiveness of selection and mating criteria
- Document relevant information

Learning Instructions:

Read the specific objectives of this Learning Guide.

1. Follow the instructions described below.
2. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
3. Accomplish the “Self-checks” which are placed following all information sheets.
4. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
5. If you earned a satisfactory evaluation proceed to “Operation sheets
6. Perform “the Learning activity performance test” which is placed following “Operation sheets” ,
7. If your performance is satisfactory proceed to the next learning guide,
8. If your performance is unsatisfactory, see your trainer for further instructions or go back to “Operation sheets”.

Information Sheet 1. Reviewing and evaluating breeding program

1.1 Introduction

Breeding program evaluation is a systematic examination of breeding project performance and delivery of its goals, objectives and targets.

The best evaluations look at project performance in terms of relevance, effectiveness efficiency and expected outputs; outcomes and impact have been or will achieved on time and on budget.

1.1 Evaluating breeding program out comes

When evaluating breeding program outcome, use the following question

The first question is:

- Did we reach what we wanted?
- Is the new generation of animals better with respect to the breeding goal traits?
- Do observe unwanted effects of selection?
    - ✓ E.g. realized a better growth of our meat producing animals, but they have more problems with their legs than their parents do.

The second question is:

- What has happened with the relatedness among the animals of the new generation?
- Are they more related to each other than their parents, due to the fact that selected only a few heavily related animals as parents for this generation?
- Did we decrease the genetic diversity of the population?

Then, the breeding circle starts again with a critical review of changes in the production system.

Questions must answered are:

- Do market requirements change, e.g. for meat of a different quality?
- Do production circumstances change, e.g. are milk production quota for dairy farms expected to abolished in the next future?

1.2 Review the breeding program processes

After evaluating the breeding program outcome, the results may not satisfy the breeding program objective and may not answer the breed improvement question, reviewing the breeding program to answer two-evaluation question and to meet the objective and Based on objective reviewing the breeding program or processes.

Self-Check 1	Written Test

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

Fill the blank space

1. _____is a systematic examination of breeding project performance and delivery (2%)
2. Write the **first question of** breeding program outcome evaluation (3%

_____

_____

_____

_____

3. Write the **questions** breeding program outcome evaluation **must answered (3%)**

_____

_____

Note: **Satisfactory rating 5 and 8 points** **Unsatisfactory below 5 and 8 points**

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

Answer Sheet

Score = _____

Name: _____ Date: _____

Information Sheet 2. Evaluating performance of facilities, resources and equipment

2.1 Evaluating performance of facilities, resources and equipment

In livestock breeding activities breeding facilities are the most important to carry out each task performance. Without breeding facilities, breeding activities cannot effective. So before starting breeding work check the facilities that enough to work and after completion of work checking their performance in order to achieve breeding program.

A. Require resources to perform livestock breeding activities are:

- Documents
- Records
- Trained labor
- Time etc. the resource more serious to completing the activity of breeding.

B. The important of resource evolution are:

- To check time used
- To check right person for right place and effectively usage.

NB If the performance of resource lower than expected, it is better to make a measurement or correction for efficient work

Similarly, equipment's are also need evaluation of their performance after completion of breeding program that used for future correction and used.

The General objective of facilities, resources and equipment evaluation are:

- checking strength of facilities for next use like fence, shelters, crush
- observe each equipment working
- check weightier broken or mal-functionality of equipment
- checking records, document and other written information
- management of human power

Self-Check 2	Written Test

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

Fill the blank space

1. Write the important of resource evolution (3%)

_____

_____

2. List down the required resources to perform livestock breeding activities (5%)

_____,_____

_____,_____

3. List down the objective of facilities, resources and equipment evaluation (4)

_____,_____

_____,_____

_____,_____

Note: **Satisfactory rating 5 and 8 points** **Unsatisfactory below 5 and 8 points**

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

Score = _____

Answer Sheet

Name: _____

Information Sheet 3. Evaluating effectiveness of selection mating criteria

3.1 Evaluating effectiveness of selection mating criteria

After estimating the breeding values and predicting the influence of selection decisions on the genetic response to selection

Ready for action: actual selection and mating of the animals! Like many aspects of animal breeding, mating can have a different effect on individual mating decisions as compared to the overall population.

The breeding goal for the overall population may differ from the breeding goal of the individual breeder. However, to achieve genetic improvement at population level, it is essential that selection decisions made at population level.

Individual breeders, subsequently apply their selection criteria to select the mate for their animal from the selection candidates that identified at population level.

Mate selection criteria depend on a number of aspects such as

- The intended use of the offspring
- The quality (or lack of quality) of the female
- The price of the desired mating, or
- The distance to the mate (in case of natural mating).

The aim is to find a suitable mate and produce good offspring, given the limits that you set yourself with respect to mate choice. Mating decisions at the level of individual breeder may have consequences for the rate of inbreeding at population level. Because if your mate choice is the same as the mate choice of many other breeders, than the mate of your choice will have many offspring in the next generation, whereas others may have none. Desired mate choice at individual level and consequences of individual mate choices at population level, therefore, may conflict with each other.

The evaluation criteria of selection and mating program

- Available EBVs are used to select animals or farmers use other methods to select animals
- Selection of breeding candidates is done in due time (e.g. before major marketing events)
- Documentation of each selection event, how many and which animals are selected, selection intensity
- Selected animals are indeed being used for breeding purposes as was planned
- Management of unselected males such as by castration, fattening for sale etc. Control of inbreeding (mating of related animals avoided)

Self-Check 3	Written Test

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

Fill the blank space

1. Write selection criteria of mating animal (4%)

_____
_____
_____
_____

2. Write the evaluation criteria for selection and mating program (5%)

_____
_____
_____
_____
_____

Note: **Satisfactory rating 5 and 9 points** **Unsatisfactory below 5 and 9 points**

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

Answer Sheet

Score =

Information Sheet 4.Documenting relevant information

.4.1. Documenting relevant information

A dairy farm record are a document or a file that used to keep explain different activities like:

- Artificial insemination procedures carried out
- Health and condition status of livestock
- Preventative and health treatments
- Administered preventative health treatments
- Culled and replaced livestock
- Events and materials required for farm operations
- Record of materials or machines

Record keeping are necessary element for

- To identify good livestock production
- Livestock breeding and business management
- Assisting livestock breeding to provide:
  - ✓ Financial planning decisions
  - ✓ Data for government administrative and extension purposes
  - ✓ Livestock management decisions
  - ✓ Evaluating overall activities of the dairy farm
- To carried out the correct artificial insemination procedures

Self-Check 4	Written Test

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

Fill the blank space

1. Write the function of assisting livestock breeding records 9(4%)

- Financial planning decisions
- Data for government administrative and extension purposes
- Livestock management decisions
- Evaluating overall activities of the dairy farm

2. Mention the uses of record keeping for livestock production (5%)

- To identify good livestock production
- Livestock breeding and business management
- Assisting livestock breeding
- To carried out the correct artificial insemination procedures

Note: **Satisfactory rating 5 and 8 points** **Unsatisfactory below 5 and 8 points**

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

Answer Sheet

Score = _____

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Answer key

Module Title: Participating in Livestock Breeding
LO #1 Assess breeding requirements
Self-check1
1. **Livestock**
2. **Animal breeding.**
3. List down the purpose of animal in developing country! (5%)
   - To produce food
   - Labor (traction power)
   - Warmth
   - For their hide and skin/wool
   - Manure for fertilizing soil and fuel
   - Wealth
4. Write the requirement of breeding strategies implementing assessing and clarification in livestock production (3%)
   - Locally available breeds
   - introduced breeds (exotic)
   - Both. The breeds chosen may provide the basis for straight or crossbreeding schemes.
5. List down the role of breeding in animal production! (5%)
   - Increasing production performance of animal's
   - Improve reproduction performances e.g. improve fertility,
   - Increasing disease resistant ability
   - Increasing adaptability harsh environment condition
   - Changing the characters of animals

Self-check. 2

1. Mention the source required facilitate animal breeding activity effectively and efficiently (3%)
   - Genetic resource
   - Technical supporting resources
2. List down the dairy animals handling materials and equipment used for livestock breeding. (6%)
   - Rope/ ring chain
   - Bull nose ring/ bull holder
   - Cattle crush
   - House/shelter
   - Fence

- Weighing
- Testing equipment

3. Write the Genetic resource used for livestock breeding (3%)
   - Different genetically potential of livestock breed
   - Size of the herd / livestock breed

Self-check3.

1. Write the types of livestock breed! (3%)
   a. Local /indigenous/ breed
   b. Exotic breed
   c. Cross breed

2. List down the types of native breed in Ethiopia! (3%)
   - Borena
   - Arsi bale
   - shako
   - fogera
   - Horo
   - Kereyu
   - Barka

3. Write the types of breed originated from Europe breed and mostly distributed in the Ethiopia. (2%)
   - Holstein Frisian
   - Jersey
   - Simental

4. What are the two broad breeding option depending on the closeness of the biological relationship between mates? **(2%)**
   - Inbreeding
   - Outbreeding

5. Write the three main types of inbreeding systems (3%)
   - Close inbreeding
   - Strain formation
   - Line breeding

6. ___the breeding between less close than the average relationship within the population (2%) = **Out breeding**

7.____ mating closely related animals than the average relationship within the breed or population concerned (2%) = **Inbreeding**

Self-check4.

1 _____ is the act of pairing a male and female for reproductive purposes or producing of offspring (2%) = **Mating**

2. Write the two types of mating (2%)
   - Natural mating
   - Artificial mating/ artificial insemination
3. Write the Advantage of natural mating/ breeding (4%)
   - Conception is the most successful
   - No need for heat spotting
   - It is more accurate
   - require less laborious
4. Write the Disadvantage of AI (3%)
   - Specialized equipment needed
   - Technical expertise is needed
   - In correctly practiced AI can cause problem

Self-check5

1. List down at least eight the economical resource required iteming breeding program! (8%)
   - Feed and labor
   - The farm work load
   - Existing animal husbandry practices cost such as:
   - Compatible with the program's implementation
   - Check the restraint facilities before the program starts.
   - Order equipment, semen and nitrogen before it is required
   - Leave precise delivery instructions with the animal breeding center, Delays can be costly
   - Avoid times of environmental stress such as periods of extreme heat
   - Ensure maximum calf drop
2. .list down the feasibility must cheeked before planning breeding program (4%)
   - Reasons
   - Benefits f

Self-check6

1. List down the seven breeding program scheme (7%)
   - Production system
   - Breeding goal
   - Collection of information
   - Determining selection criteria
   - Selection and mating
   - Dissemination

- Evaluation

2. Write the types of livestock production (3%)
   - ✓ Intensive
   - ✓ Extensive
   - ✓ Semi intensive

3. List down the trait used to success breeding goals (4%)
   - Production
   - product quality
   - Health and welfare traits
   - conformation traits
   - sport performance
   - Fertility etc.

Module Title: Participating in Livestock Breeding
LO #2 Select livestock for breeding

Self-check1

1_____ is the likelihood of a particular trait transmitted to the offspring and strongly inherited= Heritability

2. Mention the main Objective and subjective selection criteria of livestock breeding!
   - Age
   - Level of performance
   - Good production and reproduction performance of animal
   - Physical fitness
   - Health
   - Body Conformation
   - Temperament or Behaviors
   - Quality of products
   - Mothering Ability
   - Adaptability
   - . Prolificacy

3. Write the Selection criteria of bovines
   - Presence or absence of hair whorl
   - Udder and teat length

- Length of the legs
- Body length.
- Level of Performance

4. List down the valuation criteria of crossbreeding program:

- Level of hybrid vigor (heterosis)
- Merit of component breeds
- Complementarity
- Consistency of performance
- Deals with genetic antagonisms
- Meets end-product target

Self-check2

3. List down Unproductive animal that removed from the farm. (4%)

- Old dairy
- Animals with poor mothering abilities
- Poor reproductive performance
- Animals with chronic sicknesses

2. _____ process of removing unproductive animals from the flock or herd= culling practice (2%)

3. Write the reasons to culling in dairy production (4%)

- Any cow that does not get pregnant
- Due to age or bad teeth
- combined of reproduction and age of cows
- physical issues,

4. _____practiced to maintain the herd population in livestock production = Replacement (2%)

Self-chek3

1. What are the overall values experienced breeder accomplish to Monitoring body condition of the animal? (5%)

- Provision of feed based requirement
- Regular health checking
- Segregation ward for sick breed animals

- Ringing the bull
- Keeping the body condition

2.____ is the well-being of nonhuman animals= Animal welfare (2%)

3. Write the five needs of animal welfare (5%)

1. Need for a suitable environment.
2. Need for a suitable diet.
3. Need to exhibit normal behavior patterns.
4. Need to be housed with, or apart, from other animals
5. Need to protect from pain, suffering, injury and disease.

Module Title: Participating in Livestock Breeding
LO #3. Facilitate natural breeding

Self-check1.

1. List down the factors determine mating plan ration of livestock (2%).

- The required number of bulls
- Service interval
- Service length and replacement rate
- Heat detection skills, times of service, system of breeding used and mating record keeping.

2. What are Importance of mating plan? (6%)

- Used for managements mating animals
- Used for feed and
- preparation appropriate space and shelter for breeding animals
- Balancing mating ration
- Used to appropriate animals
- Used to keeping body condition of mating animals

3. What is the mating ratio of bull to cows under traditional dairy production? (2%) = 1 herd **30-40 cows** per bull

Self-check2

1. Write the effect of stocking on Utilization of pastureland/ paddock (3%)

- Under stocking
- Overstocking

- Stocking rate

2. List down the Paddock selection criteria's (6%)
   - Vegetative cover of the pasture land
   - Pasture land security
   - Potential of paddock
   - Remains weed-free
   - Has stable pastures
   - Entrance of water way

3. List down factor determining the stocking rate of a pasture (5%)
   - Vegetative cover of the pasture land
   - Rainfall amount and distribution
   - Fertility level and moisture-holding capacity of the soil
   - Grazing system used (rotational versus continuous' grazing)
   - Size and type of animal to be grazed

Self-check3

1. What is the most common estrus/heat detection method used by farmer?
   - Behavioral signs
   - physical changes
2. _____ is when animal came to heat for first time. Puberty
3. Write the methods (Aids) of estrus detection
   - Vasectomies' or teaser bulls
   - Records
   - Detection of ovarian changes:

Self-check4

1. Write the factors that determine the joining of sire for breeding the herd/flock (2%)
   - The cycle of estrus in female
   - Sometimes by breeding season planned in the year.
2. Write factors should facilitated in mating place/area (6%)
   - Free from any injury and injury cause materials
   - Free from any disturbances
   - Safe and clean
   - Roads and accessibilities such as telephone
   - Feed availability
   - Free from any contaminated area

Self-check5.

1. Write the factor considered to choice/ select bull for natural mating. (6%)
   - The heifer's age
   - The heifer's size or live weight
   - The heifer's stage of development
   - Farmer's requirement for extra heifer replacements to increase herd size or achieve
   - Desired culling rates
   - Availability and cost of bulls.
2. List down the disadvantages natural service (5%)
   - Rearing a bull is not economical especially to a small holder farmer
   - There is risk of spreading breeding diseases.
   - There is risk of inbreeding if the bull is not changed frequently
   - There is no opportunity to select the type of bull the farmer wants.

3. Write the methods of natural mating (2%)
   - Free/pasture mating:
   - Hand mating

Module Title: Participating in Livestock Breeding
LO #4. Facilitate artificial breeding

Self-check1

1. _____ process of collecting sperm cells from a male animal and manually depositing into reproductive tract of a female by the help of instruments (2%)=

Artificial insemination

4. .Write At least 10 material and equipment used for artificial breeding (8%)
   - Full hand Gloves
   - Insemination gun (AI Rod)
   - Semen Straws
   - Liquid nitrogen Containers
   - Thermos flask
   - Scissors or Cito
   - Tweezers
   - AI Sheath
   - Thermometer
   - Paper towels
   - Record books

3. Writer the facilities used for AI (3%)

- Cattle crush
- Restraining materials
- Shed/house

Self-check2

1. _____ time when the animal shows estrous signs or need to serve by bull or artificially. (2%) **Heat period:**

2. List down the common heat detection methods! (5%)

- Visual observation
- Mount detectors
- Activity monitors
- Milk progesterone
- Fixed-time artificial insemination synchronization programs.

3. List down factors affecting of conception rate. (2%)

- The fertility chain
- Heat detection and time of service

4. Write the Sign of dairy cows on the heat/estrus (4%)

- mounting other cow
- Mucus discharge from vulva
- Swelling and reddening of vulva
- Standing to be mounted
- Frequent urination, tail rising and shaking
- Sniffing genital
- Decrease feed intake and milk yield
- Frequent bellowing, restlessness and trailing

Self-check3

1. List down the essential information considered to prepare female animal for Artificial insemination (5%)

- Identifying cow on heat
- Dates of observed estrus
- 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.

2 What is the average body condition score productive cows?

- between 2.5 and 3.5 (based on the scale of 1-5)

3 Why long open day recommended for high producer dairy cows?

- To obtain good conception rates
- To reduce embryo and early fetal losses

4. List down the example of abnormal calving of dairy cows

- Dystocia
- Retained placenta
- Prolapsed of the uterus

Self-check4

1. List down the Steps to prepare **semen for** artificial **insemination services (5%)**

Step 1.The taking out semen straw from nitrogen tank in 10 second

Step 2. Thawing (semen straw) should be in warm water at 35oC for a minimum of 20-30 seconds

Step 3. The straw should cleaned by paper towel (wiped) to dry)

Step 4. Cut semen straw at right angles

Step 5. Properly loaded into the insemination gun (pistolette) prior to loading, the gun should briskly rubbed with a piece of paper towel to warm it. This helps to prevent sudden changes in temperature, which are detrimental to the semen

Step 6.Holding the loaded AI gun by mouth

Step 7. Remove faces from the rectum

2. List down the principle of semen handling techniques (4%)

- Always adequate liquid nitrogen must in the tank
- The tank should kept full liquid nitrogen
- Transferring of semen from the tank to the thawing water must done quickly.
- Canisters should remain in the neck of the tank less than 10 seconds and preferably no longer than five seconds

- Frequent opening of semen containers is to be discouraged (not more than 10 seconds in any 10 minute period)
- When transferring frozen straws the canister should not brought beyond the neck of the container

3. During natural mating semen deposited in ruminant and primates is_____ and for pigs, dogs' camels and horses semen deposed in_____ (2%)

- **Vagina**
- **Intrauterine**.

4. For AI practice the semen deposited_____ in most livestock except sheep and goat (2%)

- **Uterus**

5. List down the factors affect the success of artificial insemination in Animals (4%)

- Species
- Milk production
- Body condition
- Lactation status
- Heat sign
- Uterine tone effects
- Quality of bull semen
- Inseminator experiences

Module Title: Participating in Livestock Breeding
LO #5. Monitor breeding program

Self-check1

1. Write the main causes of an artificial breeding program failure (3%)

- Lack of preparation
- Poor management
- Lack of inseminating ability of a technician

2. Determination of Artificial breeding program (3%)

- Continuous observation
- One cycle program (21 to 28 days)

- Two cycle program (42 to 45 days)
- Part herd program
- Synchronized programs

3. Write theoretically expression of success full artificial breeding program (3%)
   - Heat detection efficiency
   - Breeding soundness of the cow, i.e. cow fertility
   - Efficiency of the inseminator
   - Fertility of the semen, i.e. bull fertility.
4. List down factor determine heat Detection Efficiency (5%)
   - Skill and experience
   - Time spent
   - Size of the herd
   - Facilities and paddock yard
   - Ease of identification of cows
   - Heat detection aids
   - Cow fertility

Self-check2

1. Write the Importance of conducting pregnancy diagnosis in livestock breeding (5%)
   - To make timely culling decisions
   - Used for focusing on resources operation soundly
   - To use reliable breeders with experience
   - To determine the age of the fetus
   - To predict expected
   - To manage nutritional demands of gestation, calving, lactation, and rebreeding dairy cows
2. List down the classification pregnancy diagnosis of cow/heifer (2%)
   - direct method
   - Indirect methods.
3. Write the direct methods of pregnancy diagnosis (2%)
   A. Trans rectal palpation
   B. Ultrasonography

4. Write the disadvantages of rectal palpation (4%)

- Invasive
- Long learning curve
- Potential for damage to dam, fetus?
- Availability of veterinarian. Technician
- Potential for error

Self-check3

1. Write the main objectives of animal breeding (5%)

- To increase growth rate
- To maximize Production
    - ✓ Milk, meat, egg, wool etc.
- To maximize Rate of reproduction higher or optimum
- To change breeding program for good achievement

2. Mention the aim breeding Prioritize **(5%)**

- Assessment of potential existing breeding program objective
- Checking what are the needs of farmers.
- Check what resources available
- Give ranking for breeding objective after assessment
- Start with prioritize objective

Self-check4

1. Write the purpose of Monitor and control livestock breeding program (3%)

- To develop control process
- To take advantage of opportunities
- Decreasing crisis of management.

2. Mention the resource monitored and controlled in livestock breeding program (5%)

- Breeding animals
- Breeding materials
- AI materials, tools and equipment's
- Facilities like animal handling, restraining and infrastructure
- Budget and finance

3. Write the Advantages of budget monitoring (4%)

- Sometimes detect underlying problems before they have an adverse effect.
- Detect problems that affect a user's productivity.
- Collect data when a problem occurs for the first time.
- Allow you to establish a baseline for comparison.

4. Write the three basic types of budget controlling systems (3%)

- Output control
- Behavioral control
- Clan control

Self-check5

1. List down the Safe work procedures in the company (3%)

- Worker orientation program
- Effective communication between those involved in occupational health and safety worker
- Profession Safety and other professions (3%)

2. Write the safe Working place of veterinarians and livestock breeder

- 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.

Self-check6

1. List down OHS rule in processing company (4%)

- Safe operation of major hazard facilities and mines
- Training for high risk work
- Managing and removing asbestos
- Licenses for specific activities

2.___ minimum standards of care and treatment provided animals bred for commercial sale, used in research, transported commercially, or exhibited to the public (2%)
The Animal Welfare Act (AWA)

3. Write the environmental Protection Act/management duties (3%)

- Protect and improve environmental quality,
- control and reduce pollution from all sources
- prohibit or restrict the setting and /or operation of any industrial facility on environmental grounds

4. Write the **act environmental protection laws (4%)**

- The Clean Air Act.
- The Clean Water Act.
- The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)
- The Emergency Planning & Community Right-to-Know Act (EPCRA)
- The Endangered Species Act.

Module Title: Participating in Livestock Breeding
LO #6. Monitor breeding program

Self-check1

1. ___is a systematic examination of breeding project performance and delivery (2%) =

Breeding program evaluation

2. Write the **first question of** breeding program outcome evaluation (3%

- Did we reach what we wanted?
- Is the new generation of animals better with respect to the breeding goal traits?
- Do observe unwanted effects of selection?

3. Write the **questions** breeding program outcome evaluation **must answered (2%)**

- Do market requirements change
- Do production circumstances change

Self-check2

1. Write the important of resource evolution
   - To check time used
   - To check right person for right place and effectively usage.
2. List down the required resources to perform livestock breeding activities
   - Documents
   - Records
   - Trained labor
   - Time
3. List down the objective of facilities, resources and equipment evaluation
   - checking strength of facilities for next use like fence, shelters, crush
   - observe each equipment working
   - check weightier broken or mal-functionality of equipment
   - checking records, document and other written information
   - management of human power

Self-check3

1. Write selection criteria of mating animal (4%)
   - The intended use of the offspring
   - The quality (or lack of quality) of the female
   - The price of the desired mating, or
   - The distance to the mate (in case of natural mating).

2. Write the evaluation criteria for selection and mating program(5%)
   - Available EBVs are used to select animals or farmers use other methods to select animals
   - Selection of breeding candidates is done in due time (e.g. before major marketing events)
   - Documentation of each selection event, how many and which animals are selected, selection intensity
   - Selected animals are indeed being used for breeding purposes as was planned
   - Management of unselected males such as by castration, fattening for sale etc. Control of inbreeding (mating of related animals avoided)

Self-check4

1. Write the function of assisting livestock breeding records 9(4%)

- Financial planning decisions
- Data for government administrative and extension purposes
- Livestock management decisions
- Evaluating overall activities of the dairy farm

2. Mention the uses of record keeping for livestock production (5%)

- To identify good livestock production
- Livestock breeding and business management
- Assisting livestock breeding
- To carried out the correct artificial insemination procedures