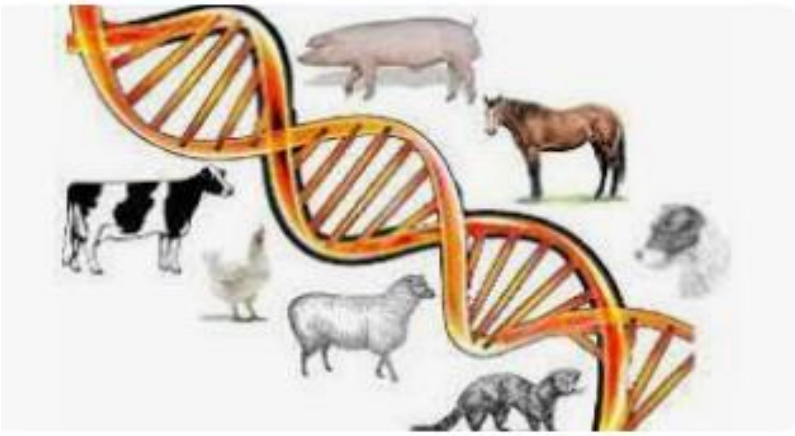
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Ministry of Labor and Skills

Animal Production

Level IV

Based on March 2022, Version-4 Occupational standard



Module Title: - Undertaking Livestock Breeding

LG Code: AGR APN4 M03LO (1-5) LG (8-13)

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Introduction to the module

This module covers the knowledge, skills and attitude required to develop and implement a livestock breeding program that requires skills and knowledge to assess breeding requirements, select livestock for breeding, facilitate natural breeding, monitor and evaluate breeding program to meet the breeding aims of the industry. It requires skills and knowledge to select breeding options and resources appropriate to meet the breeding aims of the enterprise. It also requires skills to evaluate the strategy in terms of costs and benefits to the enterprise.

Animal breeding is the application of genetics and physiology of reproduction to animal improvement. The purpose of animal breeding is not only to genetically improve individual animals but to improve whole animal population than to improve future generations of animals. To achieve this, the breeder is provided with two important tools: Selection and Breeding. These two tools are the decision making in livestock improvement. Selection decides which animals are going to become parents to produce offspring for the future generation and breeding decides which males should be mated with which females. Therefore improvement in type, production, longevity, regularity of breeding and the ability to transmit these desirable qualities to many progenies can be expected through application of proper selection and systems of breeding.

LG#9	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:

- Identifying and clarifying breeding requirements
- Identifying and arranging resources
- Selecting breeding options
- Undertaking economic assessments
- Prioritizing and implementing breeding aims
- Breeding programs formulation

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:

- Identify and clarify breeding requirements
- Identify and arrange resources
- Select breeding options
- Undertake economic assessments
- Prioritize and implement breeding aims
- Formulate breeding programs

Learning Instructions

1. Read the specific objectives of this learning guide.
2. Follow the instructions described below and read the information sheets
3. Accomplish the self-checks
4. Perform operation sheets
5. Do the “LAP test”

Information sheet-1

1.1. Identifying and clarifying breeding requirements

Animal breeding programs require careful planning and consideration of several key requirements to ensure success and the achievement of breeding goals. Here are some important requirements to consider:

- Breeding Objective: Clearly define the breeding objective, which outlines the specific traits or characteristics that are desired in the offspring. This could include:
  - ✓ Traits related to productivity
  - ✓ Health, conformation
  - ✓ Behavior or any other relevant attribute
- Selection Criteria: Determine the criteria for selecting breeding animals based on the breeding objective. Identify the specific traits that will be used to evaluate animals and make informed decisions about which individuals should be chosen as parents.
- Genetic Evaluation: Develop a system for evaluating the genetic merit of animals. This may involve:
  - ✓ Collecting data on performance traits
  - ✓ Conducting genetic testing or genomic evaluations
  - ✓ Using statistical methods to estimate breeding values or genetic potentials
- Pedigree and Record Keeping: Maintain accurate pedigree records that trace the ancestry of each animal in the breeding program. This information is crucial for understanding genetic relationships, identifying potential mates, and managing inbreeding levels.
- Breeding Stock: Select and maintain a high-quality pool of breeding stock that possesses the desired traits. Regularly evaluate and update the breeding stock to ensure genetic progress and prevent the loss of valuable traits.
- Reproductive Management: Implement effective reproductive management practices to maximize breeding success. This may involve controlled:
  - ✓ Mating

- ✓ Artificial insemination
- ✓ Estrus synchronization
- ✓ Other techniques to optimize breeding efficiency

- Genetic Diversity: Monitor and manage genetic diversity within the breeding population. Maintain a balance between selection for desired traits and the preservation of genetic variation to avoid inbreeding depression and maintain long-term adaptability.
- Health and Disease Management: Establish effective health and disease management protocols to minimize the impact of genetic disorders and maintain the overall health of the breeding animals.
  - ✓ Regular veterinary care
  - ✓ vaccination programs
  - ✓ insecurity measures are essential
- Selection Intensity and Generation Interval: Consider the balance between selection intensity and generation interval. Higher selection intensity allows for faster genetic progress but may limit genetic diversity. Shorter generation intervals increase the rate of genetic improvement by reducing the time between generations.
- Ethical Considerations: Ensure that the breeding program adheres to ethical guidelines and animal welfare standards. Treat animals with care and respect and prioritize their well-being throughout the breeding process.
- Resources and Expertise: Allocate sufficient resources including:
  - ✓ Financial, personnel, infrastructure and access to knowledgeable experts, such as animal geneticists or breed specialists, can also be valuable in guiding the breeding decisions. It is important to note that these requirements can vary depending on the species, breeding goals, and specific circumstances of the breeding program.

1.2. Identifying and arranging resources

Identifying and arranging resources for an animal breeding program involves assessing and acquiring various types of resources to support the program's objectives. Animal breeding

resources refer to the various elements and inputs required to support and facilitate the breeding process in animals. These resources are the following:

- Breeding Stock: Breeding stock refers to the selected individuals with desirable traits
- Breeding Facilities: Adequate housing and infrastructure are essential for breeding animals.
- Feed and Nutrition: High-quality feed and balanced nutrition are crucial for the health and reproductive performance of breeding animals.
- Water Supply: Access to clean and abundant water is essential for the well-being and reproductive success of breeding animals.
- Genetic Resources: Genetic resources play a vital role in animal breeding. This includes maintaining a diverse gene pool, preserving rare or endangered breeds, and utilizing advanced breeding techniques such as artificial insemination or embryo transfer.
- Reproductive Technologies: Assisted reproductive technologies (ARTs) can significantly impact breeding programs. These may include
    - ✓ Artificial insemination (AI)
    - ✓ in vitro fertilization (IVF)
    - ✓ embryo transfer (ET), and other advanced reproductive techniques
- Healthcare and Veterinary Services: This includes:
    - ✓ Routine vaccinations
    - ✓ De worming
    - ✓ Disease prevention measures
    - ✓ Access to veterinary expertise
- Record Keeping and Data Management: Effective record keeping is crucial for tracking breeding performance, pedigree information, health records, and other relevant data. Utilizing digital tools and software can streamline data management, allowing for better analysis, decision-making, and the identification of trends or patterns.

- Human Resources and Expertise: Breeding programs require skilled personnel with knowledge and expertise in animal husbandry, genetics, reproductive management, nutrition, and health care.
- Financial Resources: Adequate financial resources are necessary to support the breeding program.
- Materials, tools and equipments

Table 1 Materials, tools and equipments used for livestock breeding

Materials/tools/equipment	**Function**
Breeding records and documentation	Track breeding information, including parentage and dates
Artificial insemination (AI) equipment	Collect and deposit semen for insemination
Semen collection and storage apparatus	Collect, evaluate, and store semen for future use.
Estrus detection aids	Identify when females are in heat for optimal breeding
Ultrasound machines	Diagnose pregnancy and monitor fetal development
Breeding cages or pens	Provide controlled environments for mating or separation
Breeding mats with scales	Measure animal weight during breeding for monitoring
Livestock handling equipment	Safely restrain and handle animals during breeding
Embryo transfer equipment	Collect, evaluate, and transfer embryos between animals
Freezing equipment	Preserve and store semen or embryos at ultra-low temperatures
DNA testing kits	Verify parentage or assess genetic profiles
Microscopes	Evaluate semen quality and sperm characteristics.
Thermometers	Monitor body temperature for determining

	reproductive status
Estrus synchronization drugs	Regulate and synchronize estrus cycles in females.
Incubators	Provide controlled conditions for hatching eggs
Milk replacers or nursing bottles	Hand-rear newborn or orphaned animals
Weighing scales	Monitor growth and determine weights of animals
Feeding equipment	Provide nutrition to animals during breeding
Vaccination equipment	Administer vaccines for disease prevention

1.3. Selecting breeding options

Animal breeding encompasses a wide range of practices and objectives, depending on the specific species and desired outcomes. Here are some common animal breeding options:

a. Selective Breeding

This involves selecting animals with desirable traits, such as high milk production in dairy cows or docile temperament and breeding them to pass those traits on to the next generation.

b. Crossbreeding

It involves mating animals of different breeds or species to combine their desirable characteristics.

c. Inbreeding

- It involves mating closely related animals, such as siblings or parent-offspring, to concentrate desirable traits.
- However, it can also increase the risk of inherited disorders and reduce overall genetic diversity.

d. Line breeding

- It is a less extreme form of inbreeding

- It is a selective breeding technique that focuses on maintaining a particular line or family of animals while avoiding the potential negative consequences of excessive inbreeding.
- Line breeding involves mating individuals who are more distantly related, such as cousins or more distant relatives, while still maintaining a level of genetic similarity within the line.

e. Out crossing

- It involves mating unrelated animals within the same breed to introduce new genetic material and increase genetic diversity.
- It can help improve overall health and vigor but may also dilute specific breed characteristics.

f. Genetic engineering

It is techniques, such as gene editing, allow for precise modifications of an animal's DNA to introduce or remove specific traits. This technology is still in the early stages and raises ethical and regulatory considerations. Various machines and laboratory equipment are used in animal genetic engineering to manipulate and modify the genetic information of animals. Here are some of the commonly used machines and tools:

- DNA Sequencer: DNA sequences are used to determine the precise sequence of nucleotides in a DNA molecule.
- Polymerase Chain Reaction (PCR) Machine: Is machines are used to amplify specific DNA sequences by replicating them in large quantities.
- Gene Editing Tools: are used to precisely modify the genetic material of animals
- Electroporation Equipment: Is used to introduce foreign DNA into animal cells by applying an electric pulse.
- Genetic Analyzers: Genetic analyzers are used to separate and analyze DNA fragments based on their size and charge.

- Cell Culture Equipment: In animal genetic engineering, cell cultures are often used to propagate and modify animal cells in vitro.
- Microinjection Systems: Microinjection systems are used to introduce foreign DNA or specific genetic modifications into the embryos of animals.

g. Assisted reproductive technologies

- Various assisted reproductive technologies, such as:
  - ✓ Artificial insemination
  - ✓ Embryo transfer, and in vitro fertilization, can be used to manipulate breeding outcomes and infertility issues, or conserve endangered species.

h. Marker-assisted selection

- Marker-assisted selection involves using genetic markers to identify animals with desirable traits or specific genetic variations.
- It enables breeders to make more informed decisions about breeding pair selection and helps accelerate the breeding process.
- It's important to note that animal breeding should be carried out responsibly, considering the welfare of the animals involved and the long-term sustainability of the population.

1.4. Undertaking economic assessments

Undertaking economic assessments for animal breeding involves evaluating the financial implications and profitability of breeding decisions. Here are some key steps and considerations for conducting economic assessments in animal breeding:

a. Define the breeding objective

Clearly define the specific goals and objectives of the breeding program. This could include traits such as improved growth rate, increased milk production, enhanced carcass quality, or disease resistance. The breeding objectives should align with market demands and the overall business strategy.

b. Identify relevant economic variables

Determine the economic variables that will impact the profitability of the breeding program. This may include factors such as market prices for animals or their products, input costs (e.g., feed, healthcare), breeding stock acquisition costs, and the value of improved traits in terms of increased production or market premiums.

c. Estimate costs and benefits

Assess the costs associated with the breeding program, including expenses related to animal management, breeding stock acquisition, genetic testing, labor, and any other relevant inputs. On the benefit side, estimate the potential improvements in productivity, performance, or market value resulting from the selected breeding objectives.

d. Quantify genetic improvement

Use available data, such as performance records, pedigree information, or genomic evaluations, to estimate the genetic progress that can be achieved through the breeding program. This can be done through statistical modeling or by consulting with geneticists or breed associations.

e. Conduct financial analysis

Use financial analysis techniques, such as cost-benefit analysis, net present value (NPV), or return on investment (ROI), to evaluate the financial viability of the breeding program. Compare the estimated costs and benefits over a defined time horizon, considering discount rates and other relevant financial parameters.

f. Sensitivity analysis

Perform sensitivity analyses to assess the impact of different scenarios or uncertainties on the economic outcomes. This can involve evaluating the effects of varying market prices, changes in input costs, or different adoption rates of improved genetics.

g. Monitor and evaluate

Continuously monitor and evaluate the actual performance and financial results of the breeding program. Compare the observed outcomes with the initial economic assessments to identify any discrepancies or areas for improvement.

It is important to note that economic assessments should be tailored to the specific context and objectives of the breeding program. Consulting with experts in animal breeding, genetics, and

agricultural economics can provide valuable insights and guidance for conducting robust economic evaluations.

1.5. Prioritizing and implementing breeding aims

When prioritizing and implementing animal breeding aims, it's important to consider the specific goals and objectives of your breeding program. Animal breeding is a long-term endeavor that requires careful planning, record-keeping, and adherence to ethical considerations.

1.5.1. Prioritizing breeding aims

Prioritizing breeding aims involves determining which traits or objectives are most important to your breeding program. Here are some steps to help you prioritize your breeding aims effectively:

a. Define your overall goals

If you aiming to improve specific traits enhance productivity, increase disease resistance, or achieve other objectives; start by clarifying your overarching goals for your breeding program. Understanding your overall goals will provide a framework for prioritizing specific breeding aims.

b. Assess market demands

Consider the demands and preferences of your target market. Are there specific traits or characteristics that are highly valued or in high demand? Understanding market trends and consumer preferences can help you prioritize breeding aims that align with market needs.

c. Evaluate economic impact

Assess the economic impact of different breeding aims. Consider the potential return on investment associated with improving specific traits. For example, if you're breeding livestock for meat production, traits that enhance growth rate or carcass quality may have a higher economic impact.

d. Consider genetic improvement potential

Evaluate the potential for genetic improvement in different traits. Some traits may have a higher heritability, meaning they are more influenced by genetics and can be improved more rapidly through selective breeding. Prioritize traits that have a higher genetic improvement potential.

e. Assess current stock and weaknesses

Evaluate the strengths and weaknesses of your current breeding stock. Identify the areas where improvement is most needed or where there is room for enhancement. Prioritize breeding aims that address the weaknesses or limitations in your current stock.

f. Evaluate health and welfare considerations

Consider breeding aims that promote the overall health and welfare of your animals. Traits that enhance disease resistance, reduce susceptibility to common health issues, or improve overall well-being should be given priority.

g. Consider long-term sustainability

Prioritize breeding aims that contribute to the long-term sustainability of your breeding program. This includes maintaining genetic diversity, avoiding excessive inbreeding, and promoting traits that support adaptation and resilience in changing environmental conditions.

h. Seek expert advice

Consult with experts in the field, such as breeders, geneticists, or industry professionals, to gain insights and guidance on prioritizing breeding aims.

i. Rank and prioritize

Once you have considered all relevant factors, rank and prioritize your breeding aims based on their importance and alignment with your overall goals. Create a clear hierarchy of traits or objectives to guide your breeding decisions

1.5.2. Implementing breeding aims

It requires a systematic approach and careful execution. The following actionable steps help you to implement your breeding aims effectively:

a. Select breeding stock

Identify individuals that possess the desired traits you want to improve or introduce.

b. Establish a breeding program

Develop a structured breeding program that outlines the specific mating plans and breeding strategies. Consider factors such as:

- ✓ Inbreeding coefficients
- ✓ Genetic diversity, and any potential genetic disorders

c. Utilize breeding technologies

Take advantage of modern breeding technologies to assist in achieving your aims. Genetic testing, such as DNA analysis and marker-assisted selection

d. Track and record data

Maintain comprehensive records of your breeding program. Record information such as individual performance, pedigree data, mating records, and any observed traits.

e. Evaluate offspring

Regularly assess the offspring produced from your breeding program. Monitor their performance, health, and the presence of desired traits.

f. Implement selection criteria

Select offspring that exhibit the desired traits and demonstrate improvement based on your breeding aims. Cull or remove individuals that do not meet the criteria or display undesirable traits.

g. Maintain genetic diversity

To avoid the negative effects of inbreeding and maintain genetic diversity, periodically introduce unrelated individuals or new bloodlines into your breeding program.

h. Continuously review and adjust

Assess the progress made towards your goals and adjust your breeding strategies if necessary.

1.6. Formulate breeding programs

An animal breeding program is a systematic approach to selectively mating animals in order to achieve desired traits in future generations. These programs are commonly used in agriculture, zoos, and conservation efforts to improve the quality and productivity of animal populations. Animal breeding programs can have significant impacts on the productivity, adaptability, and overall quality of animal populations. They require expertise in genetics, reproductive management, and data analysis. Additionally, ethical considerations, animal welfare, and sustainability should be taken into account when designing and implementing breeding programs. Here are some key aspects of an animal breeding program:

- Goal Setting

- Selecting desired traits
- Selecting Breeding Systems
- Genetic Evaluation
  - ✓ Genetic evaluation involves the use of statistical models and genetic data to estimate an animal's genetic merit for specific traits.
  - ✓ This information helps in identifying superior animals for breeding purposes.
- Reproductive Management
- Record Keeping
- Genetic Diversity and Health

Developing breeding plan (https://www.youtube.com/watch?v=naa-dVE_2ns)

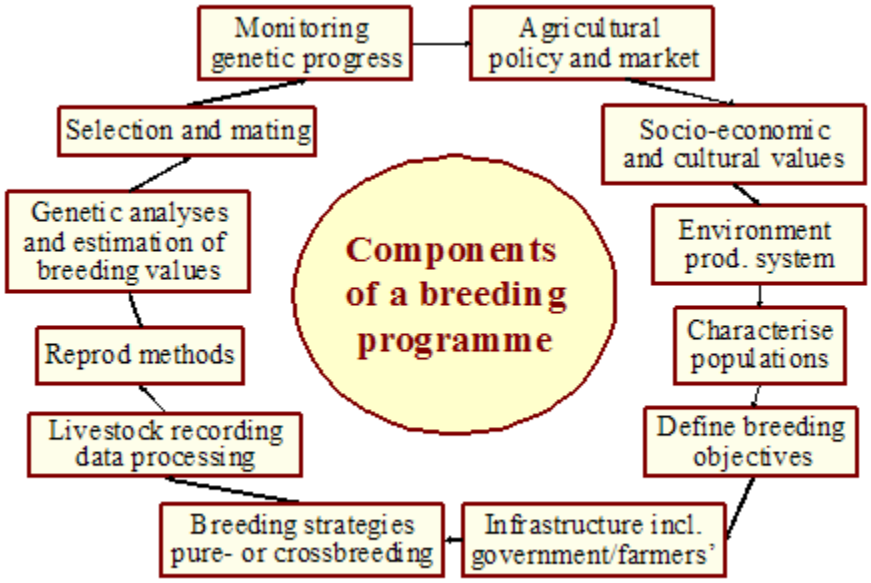


Figure 1 Components of a breeding program

Self-check-1

Name…… ID…… Date…….

Directions: Answer all the questions listed below

Part II. Choice the correct answer (2 pts each)

1. The breeding objective in an animal breeding program is:

a) To maximize genetic diversity

b) To select animals randomly

c) To define the specific traits desired in the offspring

d) To minimize selection intensity

2. Genetic evaluation in animal breeding programs involves:

a) Selecting animals based on their physical appearance

b) Collecting data on performance traits

c) Conducting random mating

d) Avoiding pedigree and record keeping

Part I. Short answers

1. Write at list 7 resource that used for breeding practice (7 pts)

2. Write at list 6 common breeding option (6 pts)

4. Write at list 3 common objective and economic importance of breeding (3 pts)

Note: Satisfactory rating - 10 points **Unsatisfactory - below 10 points**

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

Operation sheet-1

1. 1. Developing animal breeding program

I. Materials, tools and equipments

- Computer software
- Flip chart
- Pen
- Marker
- Ruler
- Calculator

II. Techniques/procedure

a. Prepare materials, tools and equipments
b. Create a template on paper or use software to write the program
c. Write breeding program name
d. Write breeding goals and objectives
e. Write types of animal breeds that you want to improve such as sheep, goat , dairy cow and etc
f. Write the traits or characteristics you aim to improve
g. Write the selection criteria based on the breeding objectives
h. Write number of animals that selected with desirable traits aligned with your breeding goals
i. Select and write the breeding methods you plan to implement
j. Write specific time for mating
k. Specify and write the heat detection methods to be used
l. Write the genetic evaluation tools and technologies to be utilized if possible
m. Set and write the requirements needed for disease prevention and control measures

n. Specify and write the performance parameters to be evaluated for the improved breeds
o. Specify and write how to evaluate and review for the continuous improvement and adaptation
p. Identify and write the name of collaboration opportunities with breeders, geneticists, and industry professionals

LAP test-1	

Name…… ID…… Date……

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within **4** hour. From each student the task is expected to do it.

Task-1. Develop breeding program

Notes: you can create templates on your paper or use software to write the above procedure for developing the breeding program.

LG#10	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's
- Establish culling and replacement practices
- Checking and monitoring selected livestock

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's
- Establish culling and replacement practices
- Check and monitor selected livestock

Learning Instructions

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below and Read the information Sheets
3. Accomplish the Self-checks
4. Perform Operation Sheets
5. Do the "LAP test"

Information sheet-2

2.1. Determine live stock selection criteria for breeding

Livestock selection criteria for breeding can vary depending on the specific goals of the breeding program and the type of livestock involved. Here are some examples of both objective and subjective criteria:

A. Objective selection criteria

- Growth rate: Animals with higher growth rates are typically favored for breeding, as they can reach market weight or productive maturity faster.
- Reproductive efficiency: Traits such as fertility, conception rate, calving ease, and litter size are important for efficient reproduction and increasing the productivity of the herd or flock.
- Milk production: In dairy cattle or goats, selecting for higher milk production is crucial for maximizing milk yield and improving the profitability of the operation.
- Carcass quality: For meat-producing animals, traits like muscle development, marbling, tenderness, and fat distribution can influence the quality and value of the meat.
- Feed efficiency: Animals with better feed conversion ratios, meaning they require less feed to produce a unit of output (e.g., weight gain), are desirable for efficient production and reduced input costs.

B. Subjective selection criteria

- Conformation and phenotype: Visual assessment of an animal's body structure, soundness, muscling, balance, and breed conformation can be subjective criteria used to select individuals that conform to breed standards and exhibit desirable physical traits.

- Temperament and behavior: Animals with calm and docile temperaments are often preferred due to ease of handling, reduced stress levels, and improved safety for both animals and handlers.
- Mothering ability: In breeding females, the ability to provide good maternal care, including nurturing, protecting, and successfully raising offspring, is important for the long-term success of the breeding program.
- Aesthetic traits: In some cases, aesthetic qualities, such as color patterns, coat texture, or horn shape, may be considered desirable for specific breeds or for marketing purposes.
- Environmental adaptability: Animals that demonstrate adaptability to local climatic conditions, resistance to diseases or parasites, or suitability to specific production systems (e.g., extensive grazing) may be preferred in certain breeding programs.

It's important to note that the selection criteria used will depend on the specific breeding goals, market demands, and production objectives of the livestock operation. A balanced approach that combines objective and subjective criteria can help achieve a breeding program that considers both measurable traits and qualitative characteristics relevant to the desired outcomes.

2.2. Establish culling and replacement practices

Animal culling and replacement practices for breeding involve the selective removal of certain animals from a breeding population and replacing them with animals that possess desirable traits or genetic characteristics. These practices are aimed at improving the overall quality and genetic diversity of the breeding population.

2.2.1. Culling animal for breeding practices

Culling animals for breeding is a practice that involves selectively removing certain animals from a breeding population in order to improve the overall genetic quality and characteristics of the subsequent generations. The goal of culling is to eliminate individuals with undesirable traits or genetic abnormalities, allowing the breeding program to focus on animals that possess desirable traits and are more likely to produce offspring with those traits. Culling decisions are typically based on a variety of factors, including:

- Conformation to breed standards
- Health
- Temperament
- Productivity and genetic diversity

When it comes to culling animals for breeding, the specific procedure can vary depending on the species, breed, and the goals of the breeding program. Steps involved in the culling process are:

- Define breeding goals
- Establish selection criteria: This selection criteria could include:
  - ✓ Physical evaluations
  - ✓ performance records
  - ✓ genetic testing, or other relevant factors
- Identify candidates for culling: Animals that do not meet the desired standards or have undesirable traits or genetic abnormalities will be considered as potential candidates for culling.
- Determine the culling method: Select an appropriate culling method based on the species, size, and temperament of the animals. It's important to choose a method that minimizes pain and distress for the animals. Common methods include humane euthanasia performed by a veterinarian, slaughter for human consumption (in the case of livestock)
- Implement the culling: Carry out the culling process following established protocols and in compliance with relevant regulations or guidelines.
- Monitor and evaluate: Continuously monitor the breeding program and evaluate the outcomes of the culling process.

2.2.2. Animal replacement practices

Animal replacement practices in breeding involve the intentional selection and introduction of new animals into a breeding program to enhance desired traits, improve genetic diversity,

or address specific breeding goals. Things that should considered related to animal replacement practices are:

- Breeding Goals: Clearly define the breeding goals and objectives of the program. This could include the following:
  - ✓ Improving specific traits
  - ✓ Enhancing performance
  - ✓ Addressing health concerns, or preserving breed characteristics
- Selection Criteria: Establish specific selection criteria based on the breeding goals. These criteria may include
  - ✓ Physical attributes
  - ✓ performance records
  - ✓ health evaluations
  - ✓ temperament, genetic markers, or pedigree analysis

- Identification of Replacement Animals: Identify potential replacement animals that meet the established selection criteria.
- Evaluation: Thoroughly evaluate potential replacement animals to ensure they possess the desired traits and genetic characteristics.
- Genetic Diversity
- Introducing Replacements: Integrate the selected replacement animals into the breeding program. This may involve:
  - ✓ Natural breeding
  - ✓ artificial insemination
  - ✓ advanced reproductive technologies such as embryo transfer or genetic cloning
  - Monitoring and Evaluation: Evaluate if the desired traits are being passed on to subsequent generations and if the breeding goals are being achieved.
  - Record-Keeping: Maintain accurate and detailed records of the replacement animals, including pedigree information, genetic data, health records, and performance data.

2.3. Checking and monitoring selected livestock

Checking and monitoring selected livestock for breeding is an essential aspect of maintaining the health, performance, and genetic integrity of the breeding population. Here are some key considerations and practices for checking and monitoring livestock in a breeding program:

- Regular Health Examinations: This includes physical assessments by a veterinarian to check for signs of disease, lameness, reproductive health, or other health issues that may affect breeding performance.
- Reproductive Evaluations: This may involve regular assessments of estrus cycles, semen quality (in males), pregnancy checks, or monitoring breeding success.
- Performance Tracking: This can include measurements of weight, growth rates, milk production (in dairy animals), or other performance indicators depending on the specific breeding goals.
- Genetic Testing: Genetic testing can help inform breeding decisions and reduce the risk of passing on genetic abnormalities.
- Pedigree Verification: Verify parentage through DNA testing or other methods to confirm lineage and maintain the integrity of the breeding program.
- Record-Keeping: This includes pedigree information, health records, reproductive history, performance data, and any genetic test results.
- Performance Evaluation: Evaluate the offspring produced by the selected breeding animals. Assess their conformation, performance, health, and adherence to the desired breeding goals.
- Environmental Monitoring: Ensure appropriate nutrition, housing, and management practices to support their health and well-being.
- Continuous Selection: Continuously assess and re-evaluate the selected breeding animals based on their performance, offspring quality, and genetic merit.

Self-check-2

Name…… ID…… Date…….

Directions: Answer all the questions listed below

Part I. Multiple choose (2 pts each)

1. Which methods used to confirm lineage and maintain the integrity of the breeding program?

A) Regular Health Examinations

B) Genetic Testing

C) Reproductive Evaluations

D) Pedigree Verification

E. All

2. Which of the following is **NOT** a consideration related to animal replacement practices in breeding?

A) Breeding Goals

B) Selection Criteria

C) Genetic Diversity

D) Nutrition and Feeding Practice

3. Which of the following factors are typically considered when making culling decisions in a breeding program?

A) Coat color and markings

B) Age and size

C) Conformation to breed standards

D) Dietary preferences

Part II .Short answers

1. Write at list 5 breed selection criteria for breeding (5 pts)
2. Write at list 3 factors used for live stock culling decisions (3)
3. Write at least 5 key practices for checking and monitoring selected livestock (5pts)

Note: Satisfactory rating - 9 points Unsatisfactory - below 9 points

Operation sheet-2

2.1. Live stock selection for breeding

I. Resource, materials, tools and equipments

- Animals' pedigree, performance, health, and reproductive history recorded data
- Breed standards and guidelines
- Genetic testing result
- Breeding software and tools
- Pens, chutes, and sorting systems
- Weighing scales
- Reproductive examination equipment
- Ultrasound scanners, reproductive tract scoring tools, and semen evaluation tools
- Data collection tools (electronic data recorders, tablets, or smart phones equipped with data collection software)
- Genetic testing Equipment
- Livestock identification systems (ear tags, tattoos, microchips, or electronic identification)
- Laboratory facilities
- Breeding management software
- Comprehensive data analysis device

II. Procedure

a. Prepare material and resource required
b. Specify breeding goals
c. Set selection criteria
d. Make selection decisions
e. Apply identification systems to selected animals

f. Keep record about selected live stock

LAP test-2

Name…… ID…… Date……

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within **2** hour. From each student the task is expected to do it.

Task-1. Perform best dairy breed selection

LG#11	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 mating plan
- Selecting and stocking paddocks and yards
- Carrying out heat detection
- Securing and providing mating areas
- Carrying 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 plan mating
- Select and stock paddocks and yards
- Carry out Detect Heat
- Secure and provide mating areas
- Carry out natural mating

Learning Instructions

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below and Read the information Sheets
3. Accomplish the Self-checks
4. Perform Operation Sheets
5. Do the “LAP test”

Information sheet-3

3.1. Determining mating plan for natural breeding

Developing a natural mating plan for animals involves allowing them to mate naturally without the use of artificial reproductive techniques. The following are the points to consider when creating a natural mating plan:

- Understand species-specific mating behavior: Research and understand the natural mating behavior of the specific animal species you are working with. Different species have unique mating behaviors, courtship rituals, and reproductive cycles. This knowledge will help you determine the appropriate timing and conditions for natural mating.
- Select compatible breeding pairs: Choose animals that are genetically compatible and suitable for mating. Consider the factors such as:
  - ✓ Breed characteristics
  - ✓ Health status
  - ✓ Temperament
  - ✓ Overall conformation
  - ✓ Physically mature and in good reproductive condition
- Provide a suitable breeding environment: Create conducive environment for mating to occur. This may involve separating the chosen breeding pairs from other animals and providing them with adequate space, privacy, and appropriate facilities for mating. Ensure that the environment is clean, safe, and free from stressors that could inhibit successful mating.
- Observe and monitor mating behavior: Monitor the animals closely for signs of mating readiness.
- Allow natural mating to occur: Once you have observed mating behavior and are confident that both animals are ready, allow them to mate naturally.

- Monitor post-mating behavior: After mating, continue to monitor the animals for any signs of discomfort, injury, or reproductive problems. Provide appropriate post-mating care, including proper nutrition and veterinary attention if necessary.
- Pregnancy confirmation: Conducting pregnancy checks using appropriate techniques such as ultrasound or rectal palpation.
- Adjust the mating plan: Evaluate the success of the natural mating plan by assessing pregnancy rates and the quality of offspring produced. Based on the outcomes, make any necessary adjustments to your future mating plans. For Adjusting the mating plan analyze factors such as
    - ✓ Fertility rates
    - ✓ genetic diversity
    - ✓ The achievement of breeding objectives.

3.2. Selecting and stocking paddocks and yards for breeding

When selecting and stocking paddocks and yards for natural animal breeding, it's important to create an environment that promotes successful mating while ensuring the safety and well-being of the animals involved. Here are some considerations to keep in mind:

- Paddock selection: Choose paddocks that provide sufficient space for the animals to move, graze, and exhibit natural mating behavior comfortably. During selection consider factors such as:
    - ✓ Paddock with adequate forage and water sources to meet the animals' nutritional needs.
    - ✓ Size, terrain and fencing suitability of the paddock
- Fencing: Ensure that the paddocks and yards are properly fenced to contain the animals and prevent them from escaping or accessing areas where they shouldn't be.
- Separation of breeding pairs: If you have specific breeding pairs in mind, consider separating them from the rest of the herd or flock. This separation allows for better control and monitoring of mating behavior and prevents unwanted mating

- Provide shelter: Offer suitable shelter options within the paddocks or nearby to protect the animals from extreme weather conditions. Shelters can include natural features like trees or man-made structures such as sheds or windbreaks.
- Observation points: Set up observation points or elevated areas from which you can monitor the animals during mating.
- Safety considerations: Take steps to minimize potential hazards or risks within the paddocks and yards. Remove any toxic plants, sharp objects, or potential entanglement hazards.
- Consider herd dynamics: Ensure that the breeding pairs are compatible and that dominant animals are not overly aggressive or disruptive during mating. If necessary, separate animals that show aggressive behavior or pose a risk to others.
- Rotation and rest: Implement a rotational grazing system to prevent overgrazing and maintain optimal pasture conditions.
- Regular maintenance: Regularly maintain and inspect the paddocks and yards to ensure they remain in good condition. Repair fences, clear debris, and address any drainage or erosion issues promptly.



Figure 2. Fenced paddock for natural mating

3.3. Carrying out heat detection

Heat detection is an important aspect of reproductive management in many animals, particularly in livestock such as cattle, sheep, and goats. It involves identifying when a female animal is in estrus (heat) and receptive to mating. Common methods used for heat detection are:

- Visual Observation: This is the simplest and most basic method. The most common sign of heat are:
    - ✓ Increased Restlessness and Agitation
    - ✓ Vocalization
    - ✓ Seeking Mates or Mounting Behavior
    - ✓ Swelling and Redness of Reproductive Organs
    - ✓ Changes in Urination Patterns: For example, they may urinate more frequently, mark their territory with urine, or display urinary behavior that attracts males.
    - ✓ Changes in Behavior or Attitude
- Heat Mount Detectors: These are devices or tools attached to the animal's back or tail head that are activated when another animal mounts the female. When the female stands to be mounted, the device is triggered and leaves a visible mark or changes color. This method provides a visual indication that mating activity has occurred.
- Electronic Heat Detection: This method uses electronic devices like pedometers or activity monitors. These devices are attached to the animal and can detect changes in activity levels, body temperature, or other physiological parameters associated with heat. Electronic heat detectors can be attached to different parts of an animal's body depending on the specific device and the species being monitored. The data collected by these devices is analyzed to determine when the animal is likely in heat.
- Hormone Monitoring: Hormone levels in the animal's blood, urine, or milk can be measured to determine the timing of heat. For example, in cattle, progesterone levels drop significantly when a cow is in heat. Hormone monitoring requires laboratory analysis and specialized equipment, so it may not be as practical for routine heat detection on a farm.

- Automated Heat Detection Systems: Automated heat detection systems typically combine different types of electronic heat detectors with advanced data processing techniques. These systems use advanced technologies such as computer vision, infrared cameras, or sensors to monitor animal behavior, body temperature, or other physiological indicators associated with heat. The data is analyzed by algorithms to detect signs of heat and trigger alerts for mating.

  Video heat detection in cattle (https://www.youtube.com/watch?v=UTn6Pd4DMC8)



Figure 3. Automated heat detector that tied on the neck

3.4. Securing and providing mating areas

When it comes to securing and providing natural mating areas for animals, there are several factors to consider ensuring a safe and conducive environment. Here are some guidelines:

- Secure fencing: Establish secure fencing around the mating area to prevent animals from escaping and to control their movement. The type of fencing will depend on the species of animals you are working with.

- Size and space: Provide ample space in the mating area to allow animals to move comfortably and exhibit natural mating behaviors.
- Privacy and seclusion: Create a secluded and private environment within the mating area to reduce stress and distractions. This can be achieved by using natural features like trees, shrubs, or hedges to create visual barriers.
- Terrain considerations: Take into account the terrain of the mating area.
    - ✓ Avoid areas with steep slopes, holes, or uneven ground that may pose a risk of injury during mating
    - ✓ Flat or gently sloping terrain is generally more suitable for natural mating.
- Safety hazards: Remove or secure any sharp objects, toxic plants, or hazardous materials that could harm the animals during mating.
- Adequate shelter: Provide suitable shelter options within or near the mating area to protect animals from extreme weather conditions. This can include natural features like trees or man-made structures such as sheds or windbreaks.
- Observation points: Set up observation points or elevated areas from which you can monitor the mating process.
- Access and logistics: Consider the ease of access for both animals and care takers. Design the mating area in a way that allows for convenient entry and exit, as well as efficient handling and management of the animals.
- Regular maintenance: Regularly maintain the mating area, including fencing, vegetation, and infrastructure.

3.5. Carrying out natural mating

Natural mating refers to the breeding process where animals are allowed to mate naturally without human intervention. It involves bringing a male and a female animal together during the female's fertile period to facilitate mating and reproduction. In natural mating, the animals are typically given the opportunity to engage in courtship behaviors, exhibit sexual behaviors, and mate in a way that closely resembles their natural reproductive instincts. The male animal is introduced to the female, and if she is receptive to mating (in estrus or heat), they will engage in

mating behaviors such as mounting, copulation, and ejaculation. Natural mating is commonly used in many livestock species, including cattle, horses, sheep, goats, pigs, and poultry.

Advantages of natural mating

- Simplicity: Natural mating is a straightforward method that does not require complex procedures or equipment, making it accessible and cost-effective for many farmers.
- Behavioral and Reproductive Health: Natural mating allows animals to express their natural mating behaviors
- Genetic Diversity: Natural mating allows for a broader gene pool as the animals have the opportunity to choose their mates based on natural preferences, resulting in increased genetic diversity within the population.

Disadvantages of natural mating

- Risk of Injury: In some cases, natural mating can pose a risk of injury to animals, particularly if they are aggressive or if there is a significant size disparity between the male and female.
- Limited Control: With natural mating, the farmer has limited control over the timing and frequency of mating, as it relies on the animals' natural reproductive cycles and behaviors.
- Disease Transmission: Natural mating may increase the risk of disease transmission between animals, especially if they are not properly screened or managed for reproductive health. General steps to consider when implementing natural mating are the following:

a. Select compatible breeding pairs

Choose male and female animals that are genetically compatible and suitable for breeding. To select male and female animals consider the following factors:

- Breed characteristics
- health status
- temperament, and overall conformation
- Ensure that the selected animals are sexually mature and in good reproductive condition.

b. Observe signs of heat or estrus

Monitor the females for signs of heat or estrus, which indicate their readiness to mate.

c. Introduce the male to the female

Bring the selected male and female animals together in a designated mating area or pasture. Ensure that the environment is secure and suitable for mating, providing enough space for the animals to move comfortably. If necessary, use visual barriers or partitions to provide privacy and reduce distractions.

d. Monitor mating behavior

Observe the animals closely during the mating process. Allow the male to mount the female naturally and complete the mating process without interference.

e. Allow for multiple mating attempts

In some cases, multiple mating attempts may be necessary to increase the chances of successful fertilization..

f. Separate animals after mating

Once mating has occurred, it is generally recommended to separate the male and female animals to avoid excessive mating or potential aggression. Depending on the species and circumstances, separation can range from a few hours to a few days.

g. Monitor post-mating behavior

After mating, continue to monitor the animals for any signs of discomfort, injury, or reproductive problems. Provide appropriate post-mating care, including proper nutrition and veterinary attention if necessary. Observing any physical an behavioral change

h. Confirm pregnancy

Monitor the female animals for signs of pregnancy following mating. This can include observing changes in behavior, physical appearance, or conducting pregnancy checks using appropriate techniques such as ultrasound or rectal palpation. Pregnancy confirmation helps determine the success of the mating process.

i. Adjust breeding plans

Evaluate the outcomes of the natural mating process, including pregnancy rates and the quality of offspring produced. Analyze factors such as fertility rates, genetic diversity, and the achievement of breeding objectives. Based on the outcomes, make any necessary adjustments to future breeding plans

Self-check-3

Name…… ID…… Date…….

Directions: Answer all the questions listed below

Part I. Multiple choose (2 pts)

1. How should animals be monitored after mating?

a) Ignoring any signs of discomfort or injury

b) Providing post-mating care only if necessary

c) Observing changes in behavior and physical appearance

d) Separating the male and female animals immediately

e. All

2. What adjustments can be made to breeding plans based on the outcomes of natural mating?

a) Ignoring the outcomes and continuing with the same plan

b) Evaluating fertility rates and genetic diversity

c) Increasing the risk of inbreeding

Part II. Short answers

1. List at least 3 advantages and disadvantage of natural mating respectively (6 pts)
2. Write at least 4 factors to consider when selecting male and female animals for natural mating (4 pts)
3. Write at least 6 factors to consider to ensuring a safe and conducive environment for natural mating (6 pts)

Note: Satisfactory rating - 10 points **Unsatisfactory - below 10 points**

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

Operation sheet-3

3. 1. Heat detection in livestock

I. Resource, materials, tools and equipments

- Heat Detection aids (heat detection patches or paints)
- Heat detection chin-ball markers
- Heat detection collars or pedometers
- Record-keeping and management Tools
- Heat detection record book or software
- Breeding pens or paddocks

II. Procedure

a. Prepare materials
b. Conduct visual observations
c. Use heat detection aids such as patches, paints, chin-ball markers, or activity monitoring devices
d. Check the aids for any indication of mounting or rubbed-off patches
e. Keep detailed records
f. Report to concerned body

3.2. Carryout natural mating for breeding

I. Resource, materials, tools and equipments

- Breeding Animals
- Secure and well-maintained breeding pens, pastures
- breeding books or software

- Equipment for handling and restraining animals during mating, if necessary (crush, chute and etc)
- Identification tags or markers for individual animals to ensure accurate record-keeping

II. Procedure

a. Prepare resource, materials, tools and equipments required
b. Select suitable site for mating
c. Select male and female animals that are compatible
d. Observe signs of heat or estrus
e. Introduce the male to the female
f. Allow them to interact and establish natural mating behavior
g. Observe the mating behavior between the male and female animals
h. Allow for multiple mating attempts to increase the chances of successful conception
i. Separate animals after mating
j. Apply identification systems
k. Record the date and breeds information
l. Provide post-mating care, including proper nutrition and veterinary attention if necessary

LAP test-3

Name…… ID…… Date……

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within **4** hour. From each student the task is expected to do it.

Task-1. Perform heat detection in live stock

Task-2. Carryout natural mating for breeding

LG#12	LO#4: Monitor breeding program

Instruction sheet

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

- Conducting pregnancy diagnosis
- Monitoring and controlling resources
- Maintaining safe workplace and environmentally responsible practices
- Observing 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:

- Conduct diagnosis pregnancy
- Monitor and control resources
- Maintain safe workplace and environmentally responsible practices
- Observe legislative requirements

Learning Instructions

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below and Read the information Sheets
3. Accomplish the Self-checks
4. Perform Operation Sheets
5. Do the “LAP test”

Information sheet-4

4.1. Pregnancy diagnosis

Pregnancy diagnosis in animals involves determining whether a female animal is pregnant or not. Accurate pregnancy diagnosis is important for managing reproductive programs, monitoring fertility, and providing appropriate care. The choice of pregnancy diagnosis method depends on the species, availability of equipment and expertise, and the stage of pregnancy. The following are some common methods for pregnancy diagnosis in animals:

a. Physical examination

A skilled veterinarian or experienced breeder can perform a physical examination to assess signs of pregnancy. This may include palpation of the reproductive tract to feel for changes in the uterus or the presence of fetal structures. Physical examination is more commonly used in larger animals such as cattle, sheep, and horses.

b. Ultrasonography

Ultrasonography, also known as ultrasound, is a common and safe diagnostic technique used in pregnancy to visualize and monitor the developing fetus. It is commonly used for pregnancy diagnosis in both humans and animals.

c. Hormone testing

Hormone levels can be measured in blood or urine samples to determine pregnancy. For example, in many species, the presence of the hormone progesterone is indicative of pregnancy. Hormone testing is particularly useful in animals that do not show clear physical signs of pregnancy or when early pregnancy detection is desired.

d. Rectal palpation

Rectal palpation involves inserting a gloved hand into the rectum of the female animal to manually assess the reproductive tract. This method is commonly used in large animals like cattle and horses. By feeling for changes in the uterus, ovaries, and other structures, a skilled practitioner can determine pregnancy status and sometimes estimate the stage of gestation.

Video that shows how to palpate cattle for pregnancy diagnosis

(**https://www.youtube.com/watch?v=6g27b0pW9kw**)



Figure 4. Crush that used to restrain animal for pregnancy diagnosis with rectal palpation

e. Radiography

Radiography, or X-ray imaging, can be used to detect pregnancy in animals. It is commonly employed in companion animals like dogs and cats. By capturing images of the abdomen, the skilled person can look for the presence of fetal skeletons or other signs of pregnancy.

f. Pregnancy-specific proteins

Some species have pregnancy-specific proteins that can be detected in the female's blood as an indication of pregnancy.

4.2. Monitoring and controlling resources

Monitoring and controlling resources in breeding animals is essential for maintaining their health, maximizing productivity, and ensuring efficient resource utilization. Controlling resources for breeding involves effectively managing and allocating various inputs to support the breeding process and optimize outcomes. Here are some key considerations for controlling resources in breeding:

- Resource Planning: Develop a comprehensive breeding plan that outlines the goals, objectives, and timelines of the breeding program.
- Genetic Selection: Implement a structured genetic selection program to identify and utilize superior breeding stock.

- Breeding Stock Management: Properly manage the breeding stock to ensure their well-being and reproductive efficiency..
- Feed Management: Optimize feed resources by developing a balanced and cost-effective feeding program.
- Reproductive Management: Implement effective reproductive management techniques to maximize breeding success.
- Facility Management: Monitor and control environmental factors such as:
  - ✓ Temperature
  - ✓ Ventilation
  - ✓ Lighting, and bedding
- Health and Disease Control: This includes regular vaccinations, parasite control, bio security measures, and monitoring for signs of illness.
- Record Keeping and Data Analysis: Maintain accurate records. These include:
  - ✓ Breeding activities
  - ✓ health status
  - ✓ reproductive performance and other relevant data
- Continuous Monitoring and Evaluation: Regularly monitor and evaluate the performance of the breeding program. This includes assessing reproductive efficiency, genetic progress, and resource utilization.
- Research and Innovation: Stay updated with the latest research, industry trends, and technological advancements in animal breeding. Explore innovative techniques, genetic tools, or management practices that can enhance breeding efficiency and genetic gain

4.3. Maintaining safe workplace and environmentally responsible practices

Maintaining a safe workplace and implementing environmentally responsible practices are essential aspects of running an animal breeding program. Guidelines to promote safety and environmental stewardship are the following:

- Develop safety protocols: Establish comprehensive safety protocols and guidelines for all aspects of your breeding program. These includes:
  - ✓ Handling animals
  - ✓ using equipment and working in breeding facilities
- Provide personal protective equipment (PPE): Ensure that all individuals working in the breeding program have access to and properly use appropriate personal protective equipment.
- Maintain clean and sanitary conditions: Implement proper sanitation practices to maintain a clean and hygienic environment for both animals and workers.
- Manage chemical and pharmaceutical substances: Properly store, handle, and dispose of chemical and pharmaceutical substances used in the breeding program.
- Minimize energy consumption: Identify opportunities to reduce energy consumption within your breeding program. This may include:
  - ✓ implementing energy-efficient lighting systems
  - ✓ optimizing ventilation and heating systems
  - ✓ using energy-saving equipment
- Water management: Implement responsible water management practices. This includes efficient water usage, proper drainage systems, and preventing water contamination..
- Genetic diversity and conservation: Promote genetic diversity and conservation within your breeding program. Avoid excessive inbreeding and implement appropriate breeding strategies to maintain genetic variability.
- Stays informed and comply with regulations: Stay updated on applicable local, regional, and national regulations related to animal breeding, workplace safety, and environmental protection.
- Continuous improvement and training: Foster a culture of continuous improvement and learning within your breeding program.

4.4. Observing legislative requirements

Observing legislative requirements is crucial for ensuring compliance with laws and regulations related to animal breeding. Legislation varies between countries and regions, so it is essential to familiarize yourself with the specific requirements applicable to your location. Things to be considered when observing legislative requirements for animal breeding are:

- Research and understand relevant laws: This includes:
  - ✓ Legislation related to animal welfare
  - ✓ Breeding practices
  - ✓ Genetic manipulation
  - ✓ Transportation, import/export, and any other relevant aspects.
- Obtain necessary permits and licenses: Determine if any permits or licenses are required for operating an animal breeding program.
- Comply with animal welfare regulations: Animal welfare is a significant aspect of breeding legislation. Understand the specific animal welfare standards and guidelines applicable to your breeding program.
- Maintain accurate records: Keeping detailed and accurate records is often a legal requirement for animal breeding.
- Adhere to breeding restrictions and limitations: Some jurisdictions have specific restrictions or limitations on certain breeding practices. This may include:
  - ✓ Regulations on breeding closely related animals
  - ✓ breeding for specific traits, or genetic modification
- Implement bio security measures: Including quarantining new animals, practicing good hygiene, and controlling access to breeding facilities.
- Stay informed and adapt to changes: Stay informed about any changes in the laws or regulations relevant to your breeding program.

Self-check-4

Name…… ID…… Date…….

Directions: Answer all the questions listed below

Part I. Multiple choose (2 pts each)

1. Which method is commonly used for pregnancy diagnosis in large animals like cattle and horses?

a. Ultrasonography
b. Hormone testing
c. Rectal palpation
d. Radiography

2. Which of the following guide lines are used to maintaining a safe workplace and environmentally responsible practices?

a. Develop safety protocols
b. Provide personal protective equipment
c. Genetic diversity and conservation
d. Stays informed and comply with regulations
e. All

Part II. Short answers

1. Write at list 4 examples of legislation related to animal welfare in breeding (4pts)
2. List at list 4 common methods used for pregnancy diagnosis in animals (4 pts)

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

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

Operation sheet-4

4. 1. Pregnancy diagnosis by rectal palpation

I. Resource, materials, tools and equipments required

- Crush or chute
- Coveralls or aprons
- A suitable lubricant
- Plastic glove or latex
- Lubrication Applicator
- Pregnancy diagnosis record book or software

II. Procedure to rectal palpation diagnosis

a. Prepare necessary materials
b. Restrain the animal in a safe and secure manner
c. Put on disposable gloves to maintain hygiene and prevent the transmission of diseases
d. Apply a generous amount of lubricant to your gloved hand or the palpation sleeve
e. Slowly and gently insert your lubricated hand or the palpation sleeve into the rectum of the animal
f. Maintain a relaxed and calm demeanor to help keep the animal at ease
g. Once your hand or sleeve is inserted, systematically explore the internal structures
h. Identify the uterus, ovaries, and uterine horns to determine pregnancy status
i. Assess the size, shape, and consistency of these structures to detect the presence of a fetus or other signs of pregnancy
j. After completing the palpation, slowly withdraw your hand or remove the palpation sleeve from the rectum
k. Document your findings, including the animal's identification, the date of examination, and the pregnancy status

l. Dispose of used gloves and properly clean and disinfect any reusable equipment
m. Wash your hands thoroughly with soap and water to maintain hygiene

LAP test-4

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within **2** hour. From each student the task is expected to do it it.

Task-1. Perform dairy cattle pregnancy diagnosis by rectal palpation

LG#13	LO#5: Evaluate 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
- 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
- Evaluate performance of facilities, resources and equipment
- Evaluate effectiveness of selection and mating criteria
- Document relevant information

Learning Instructions

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below and Read the information Sheets
3. Accomplish the Self-checks
4. Perform Operation Sheets
5. Do the “LAP test”

Information sheet-5

5.1. Reviewing and evaluating breeding program

Reviewing and evaluating an animal breeding program is essential to assess its effectiveness, identify areas for improvement, and make informed decisions for future breeding endeavors. Things to consider when reviewing and evaluating an animal breeding program are:

- Gather relevant data: Collect and analyze relevant data to evaluate the performance of the breeding program. This may include data on:
  - ✓ Breeding records
  - ✓ Pedigrees
  - ✓ performance traits
  - ✓ reproductive history
  - ✓ production or performance data
  - ✓ genetic evaluations and financial records
- Assess breeding goals and objectives: Evaluate whether the breeding goals and objectives set for the program are still relevant and aligned with market demands, customer preferences, or industry trends.
- Analyze genetic progress: Assess the genetic progress achieved in the breeding program. Analyze genetic trends and changes in performance traits over time. Consider using tools such as genetic evaluations or selection indices to quantify the genetic gains made in the breeding program.
- Evaluate reproductive performance: Examine the reproductive performance of the breeding animals. Identify any issues or challenges affecting reproductive efficiency and explore potential solutions or improvements. Assess parameters such as:
  - ✓ Conception rates
  - ✓ Calving/lambing percentages
  - ✓ Litter sizes, or hatchability rates.

- Review health management: Evaluate the health management practices implemented within the breeding program. Assess disease prevention measures, vaccination protocols, bio security procedures, and overall animal health status.
- Assess financial performance: Evaluate revenue generation, production costs, and profitability. Analyze the return on investment for breeding stock, breeding technologies, or other resources allocated to the program.
- Seek feedback from stakeholders: Gather feedback from various stakeholders, including customers, industry experts, veterinarians, and employees involved in the breeding program.
- Identify strengths and weaknesses: Based on the evaluation, identify the strengths and weaknesses of the breeding program.
- Develop an action plan: Based on the evaluation findings, develop an action plan to address the identified weaknesses and capitalize on the program's strengths. Set specific, measurable, achievable, relevant, and time-bound (SMART) goals for improvement.
- Monitor and adjust: Continuously monitor the breeding program's performance and progress towards the identified goals.

5.2. Evaluating performance of facilities, resources and equipment

Evaluating the performance of facilities, resources, and equipment is crucial for maintaining the efficiency and effectiveness of an animal breeding program. Here are some points to consider when evaluating these aspects:

- Conduct a physical inspection: Begin by conducting a thorough physical inspection of the facilities, resources, and equipment used in the breeding program.
- Review facility design and layout: Evaluate the design and layout of the facilities to ensure they are optimized for the specific needs of the breeding program. Consider factors such as animal flow, segregation of different groups or species, ease of cleaning and disinfection, ventilation, lighting, and space requirements.
- Assess resource availability and adequacy: This includes resources such as:

- ✓ Water supply
- ✓ feed storage
- ✓ bedding materials
- ✓ waste management systems

- Evaluate equipment functionality: Assess the functionality and condition of equipment used in the breeding program.
- Consider efficiency and productivity: Assess factors such as labor requirements, time management, workflow, and overall operational performance. Identify any bottlenecks, inefficiencies, or areas where improvements can be made to enhance productivity and reduce operational costs.
- Review bio security measures:
  - ✓ Assess protocols for disease prevention
  - ✓ Quarantine procedures
  - ✓ Pest control and cleaning
  - ✓ Disinfection practices
- Seek feedback from staff: Gather feedback from staff members who work with the facilities, resources, and equipment on a daily basis.
- Consider safety measures: Assess whether facilities are designed to minimize safety hazards, such as sharp edges, slippery surfaces, or inadequate lighting.
- Identify areas for improvement: Based on the evaluation, identify areas where improvements can be made in the facilities, resources, and equipment. Prioritize the most critical issues that require immediate attention or investment.
- Develop an action plan: Develop an action plan that outlines specific steps, timelines, responsibilities, and resources required to address the identified areas for improvement.

5.3. Evaluating effectiveness of selection and mating criteria

Evaluating the effectiveness of selection and animal mating criteria is essential for assessing the genetic progress and overall performance of an animal breeding program. Here are some points to consider when evaluating these aspects:

- Collect relevant data: This may include data on breeding records, pedigrees, performance traits, genetic evaluations, or any other relevant information.
- Assess genetic progress: Consider using tools such as genetic evaluations, breeding values, or selection indices to quantify the genetic gains made in the breeding program.
- Review trait selection: Assess whether the selected traits align with the breeding program's objectives and market demands. Consider using tools such as:
  - ✓ The heritability of traits
  - ✓ Genetic correlations
  - ✓ Economic values when determining trait priorities.
- Evaluate genetic diversity: Consider the use of tools such as:
  - ✓ Effective population size
  - ✓ Inbreeding coefficients, or measures of genetic variation to assess diversity levels.
- Analyze production performance: Evaluate the production performance of the selected animals. Assess parameters such as
  - ✓ Growth rates
  - ✓ Reproduction rates
  - ✓ Milk production or meat quality.
- Seek feedback from stakeholders: Consider their feedback when evaluating the program's performance and identifying areas for improvement.
- Conduct genetic evaluations:. These evaluations can provide insights into the accuracy of genetic predictions and the impact of selection decisions on genetic progress.
- Identify strengths and weaknesses: Consider factors such as genetic gains, trait selection effectiveness, genetic diversity preservation, or production performance.
- Develop an action plan: Based on the evaluation findings, develop an action plan to address the identified weaknesses and capitalize on the strengths of the selection and mating criteria.
- Monitor and adjust: Regularly review and adjust the criteria as needed based on new data, market trends, or emerging breeding objectives.

5.4. Documenting relevant information

Documenting relevant information for animal breeding is crucial for maintaining accurate records, tracking performance, making informed breeding decisions, and ensuring the overall success of the breeding program. Relevant information that should be documented:

a. Identity and Pedigree

Record the unique identification number or name of each animal, along with its pedigree information. This includes:

- The names of the parents
- Grandparents and further lineage when available and so on

b. Physical Characteristics

Document the physical characteristics of each animal, including: color, markings, body conformation, and any distinguishing features. This information helps assess the animal's phenotype and aids in making breeding decisions based on desired traits.

c. Health Records

Maintain comprehensive health records for each animal. This includes:

- Vaccinations
- De worming treatments
- Veterinary examinations, disease testing results
- Any medications administered.

d. Reproductive History

Record the reproductive history of each animal, including

- Breeding dates

- Mating methods
- Pregnancy checks
- Reproductive outcomes (such as successful pregnancies or instances of infertility).

e. Performance Data

Document performance-related data, such as

- Weight records
- growth rates
- Milk production (in dairy animals), or any specific performance measurements.

f. Breeding and Mating Plans

Maintain records of breeding and mating plans, including the selection of sires and dams, mating methods (natural breeding or artificial insemination), and anticipated breeding outcomes.

g. Genetic Testing Results

If genetic testing is conducted, document the results for each animal. This includes information:

- On genetic abnormalities
- Carrier status for specific traits
- Any other relevant genetic markers.

h. Offspring Records

Keep records of offspring produced by each animal. Including: birth dates, parentage, and any relevant performance data.

i. Breeding Notes and Observations

Include any relevant notes, observations, or comments regarding the behavior, temperament, or special considerations for each animal.

j. Dates and Documentation Sources

Document the dates of recording the information and the sources from which the information was obtained. This helps establish the credibility and reliability of the recorded data.

Self-check-5

Name…… ID…… Date…….

Directions: Answer all the questions listed below

Part I. Short answers

1. Write at least 7 relevant information that should documented for breeding practice (7)

2. Write at least 8 things to consider when reviewing and evaluating an animal breeding program (8)

3. Write 4 things that to consider during review and evaluate bio security measures (4)

Note: Satisfactory rating - 10 points **Unsatisfactory - below 10 points**

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

6. Reference

Reference books

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