Dairy production

Level-II

Learning Guide-30

Unit of Competence: Assist in Forage Development Activities

Module Title: Assisting in Forage Development Activities

LG Code: AGR DRP2 M08 LO1-LG-30
TTLM Code: AGR DRP2 TTLM 1219v1

LO1: Prepare for forage Development

Instruction Sheet	Learning Guide -30

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

- Following organizational health and safety rules and regulations
- Using appropriate personal protective equipment's
- Recognizing forage development options
- Identifying hazards and risks associated with forage development.
- Identifying materials, tools, equipment and machinery forage development.
- Setting site selection criteria for forage development
- Carrying out forage production land preparations

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

follow

- organizational health and safety rules and regulations
- use appropriate personal protective equipment's
- recognize forage development options
- identify hazards and risks associated with forage development.
- identify materials, tools, equipment and machinery forage development.
- set site selection criteria for forage development
- carry out forage production land preparations

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information sheet (1, 2, 3,4,5 and 6) in page 3,6,8,10,15 and 19
4. Accomplish the Self-check 1, 2, 3, 4, 5 and 6 **in page 5, 7, 9, 14, 18 and 21** respectively.
5. If you earned a satisfactory evaluation from the "Self-check" proceed to "Operation Sheet 1, **in page -22.**
6. Do the "LAP test" **in page – 22** (if you are ready).

Information Sheet-1	Following organizational health and safety rules and regulations

1.1. Following OHS Hazards in forage development

Personnel working in forage development are permanently exposed to hazards. These have either a physical, chemical or biological nature. Proper management is needed to avoid accidents and to keep the staff motivated.

According to the International Labor Organization (ILO), health hazards in working environments are categorized as accidental, physical, chemical, and biological. Here are just a few examples for each category mentioned by this organization

Physical

- Exposure to high levels of noise.
- Long-time exposure to heat and cold.
- Skeletal problems resulting from lifting and moving of animals, feed bins (bags), Heavy materials while preparing land for forage development

Chemical

- Respiratory problems resulting from exposure to dust, which is composed of residue of chemicals, dander, micro-organisms, etc.
- Respiratory, skin, and eye diseases due to exposure to gaseous chemicals.(e.g. NH3, H2S, CO2, CO, and CH4.
- Exposure to disinfectants, detergents, formaldehyde and pesticides.

Biological

- These include infective agents such as viruses, bacteria, fungi and other soil born microbes as well as endotoxins

Ergonomic, psychosocial and organizational factors

- Back pains and other musculoskeletal problems resulting from overexertion and wrong postures during working on forage development site and feed bags, shoveling of wastes, etc.
- Although work provides many economic and other benefits, a wide array of workplace hazards also present risks to the health and safety of people at work. These include but are not limited to, "chemicals, biological agents, physical factors, adverse

ergonomic conditions, allergens, a complex network of safety risks," and a broad range of psychosocial risk factors.

Controlling risks and hazards

Some controls which could be put into place in your workplace for the above hazards are:

Slips and Trips

- Don't leave things lying on the ground where someone could trip over them.
- Have signage up if floor surface is wet to prevent slips.
- Cover over cords etc. on floors so people don't trip.

Lifting

- Never try to lift anything that is too heavy.
- Always ask for assistance.
- Plan your lift, particularly if item is large, awkward or possibly unstable.
- Be shown the correct procedure for lifting anything.
- Bend from the knees, not your back

OHS requirements

Work task is provided according to Occupational Health and Safety (OHS) requirements. This may include:

- Using of relevant protective clothing and equipment,
- Use of materials, tools and equipment,
- Creating conducive working environment and safety handling of material,
- Using First aid kit to provide aid services
- Hazard control and hazardous materials and substances.etc,
- Following Occupational health and safety procedure designated for the task
- Checking and fulfilling required safety devices before starting operation

Self-Check -1	Written Test

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

1. List down the types of hazards (4pts)
2. Write the Occupational Health and Safety (OHS) requirements in work place.(6pts)

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

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date _____

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Information Sheet- 2	Using appropriate personal protective equipment's

Select suitable personal protective equipment (PPE).

There are different types of materials, tools and equipments and supplies to perform different activities in forage development activity. Therefore, identifying, selecting, using and preparing facilities, supplies according to the working activity are very important aspect during forage development work.

Personal protective equipment include

No	Materials	Description
1		**Body safety cloth (tuta): -** This cloth is a type of cloth which covers all the body part except the head and the fingers**.** Itis used to protect the body from dirty.
2		**Sun hat:-** is the material, that is used to protect head from direct sun radiation
3		**Eye protecting device: -** it is used to protect the eye from different damage
4		**Boot:-** it is used to protect leg from sharpen and other damaging
5		**Hand glove: -** which is made of leather or strong flexible plastic rubber, it used to cover fingers to protect from sharpen materials**.**

Training Employees in the Proper Use of PPE

Employers are required to train each employee who must use PPE. Employees must be trained to know at least the following:

- When PPE is necessary.
- What PPE is necessary?
- How to properly put on, take off, adjust and wear the PPE.
- The limitations of the PPE.
- Proper care, maintenance, useful life and disposal of PPE.

Protective clothing should be selected to prevent skin contact with contaminated materials or environments. Consideration should be given to the type of work being performed by the worker when selecting personal protective clothing.

Self-Check -2	Written Test

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

1. List down PPE used in forage development (6pts)
2. Mention why employees must be trained in using suitable PPE.(4pts)

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

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

Answer Sheet

Score = _____

Rating: _____

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Information Sheet-3	Identifying hazards and risks associated with forage development

Hazard identification and risk control in forage development activities

HAZARD: is defined as a biological, chemical, or physical agent that is reasonable likely to cause illness or injury in the absence of its control.

Risk control in forage development activities

Risk: is a likely hood of hazard /or the possibility of loss or injury.

Risk factors considered during forage development may include

- Fire
- Vermin/pests,
- Flood
- Over matured of pasture/lignified
- Overgrazing especially when the stocking rate is greater than the carrying capacity of land
- Weeds during un wanted weeds invade the forage site
- Losses due to shattering, leaching, bleaching, moulds, etc.

Measures to reduce or control Risks are:

- Select a mixture of species for each agro-ecological zone to ensure biodiversity and thus minimize the risks from pests and climatic extremes.
- Utilization of developed foraged at optimum time and stage.
- Balancing between nutrient content and yield of forage.

According to forage development enterprise every activities starting from site selection until supply to animals as feed requires professional attendant. Types of forage and ways of utilization of developed forage (grass only, grass-legume mix, legume only, legume-fodder trees, etc.) are one of the methods to be used as animal productivity improvement.

Harvesting at optimum time and using different feeding or grazing methods or otherwise storing in clean and dry places reduce risks. Harvesting forages at early stage leads in to an increment of yield but reduces in nutrient contents and similarly harvesting at late stage causes reduces nutrient content but increase in quantity.

Self-Check -3	Written Test

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

1. Mention the risk factors considered during forage development. (**6 points**)
2. Describe the measures to be taken to reduce or control Risks (3 points)

Note: **Satisfactory rating – 7 points** **Unsatisfactory - below 7 points**

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

Answer Sheet

Score = _____

Rating: _____

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Information Sheet-4	Identifying and preparing materials, tools, equipment and machinery for forage development.

Identifying and preparing required materials, tools and equipments

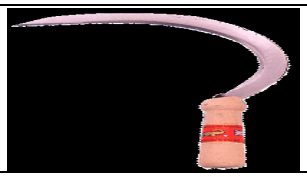
There are different materials, tools and equipment used for forage development may include:-

- **Tools** are objects designed to do a specific kind of work such as cutting or chopping by directing manually applied force or by means of a motor.
- **Equipment** is necessary items such as the tools, clothing, or other items needed for a particular activity or purpose.
- **Materials** are something used in making items or things

The following tools & equipment are used for pasture establishment and preservation work:-

- **Barrel** is a material used for caring of liquid and solid materials
- **Silo** is the air tight structure or container where silage is prepared. They can be classified as tower silos, pit silos, trench silos

Tools, equipment and machinery

Item	Image	Use
Machete		a large heavy knife with a broad blade used as a tool for cutting through vegetation
Axe		: a tool consisting of a flat heavy metal head with a sharpened edge attached to a long handle, used to chop wood or fell trees
Sickle		a short-handled implement with a curved blade used for cutting tall grass or grain

Weighing scale		an instrument or machine which is used to find how heavy something is:/to have specific weight
Tractor		farm vehicle (a motor vehicle)used for pulling heavy loads, especially on farms, where its large rear wheels enable it to move in fields
Picks		a tool used for breaking up hard surfaces, consisting of a long handle and a curved metal head that is pointed at one end and either pointed or like a chisel at the other
Shovel/spade		a hand tools consisting of a broad, usually curved blade attached to a long handle, used for lifting and moving loose material
Plough		a heavy farming tool with a sharp blade or series of blades for breaking up soil and making furrows, usually pulled by a tractor or draft animal
Sprayer		device that is capable of spraying liquid over an area. An atomizer or pressurized container that releases fine particles of a liquid
Watering can:		is a material used to spray/ water seedling during forage development
Water pump		is a motorized device that can draw water from its source and pushes through pipe

Mower		a machine, often power-operated, that cuts grass with rotating blades
Baler		is a farm machine used to compress a cut and dried crop (hay, cotton or straw) in to compact bales that are easy to handle, transport and store
Hay fork		is a grapple device used for moving and turning hay
Plastic sheet		is a sheet of plastic used to cover and pack something. It can be used to cover inner surface of pit silo to prevent moisture and air from entering in to the silage.
Sacks		a large bag, especially one that is made from coarse cloth or thick heavy-duty paper used to hold grain and other similar products
Wheel barrow		a small cart used to transport things, usually in the form of an open container with a single wheel at the front and two handles at the bac
Tape measure		a long roll or strip of fabric, plastic, paper, or thin metal that is marked off in inches or centimeters for measuring the length of something

Melcher		is a specialized rotary cutter used to cut grass , mulches and spreads it evenly over the cutting width, encouraging quick re-growth.

Materials includes the following

Rope, Standing hay, Hay, Silage, Urea/ fertilizer, Molasses; Salt, Fuel, Feeds, Seed, Seedling, Grass cut, Empty sack, Plastic sheet

Self-Check-4	Written Test

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

1. List at least 10 tools and materials that used for forage development. (10 points)
2. mention 4 equipment and write their advantages (4 points)

Note: Satisfactory rating – 14 points unsatisfactory rating –below 14 points

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

Answer Sheet

Score = _____

Rating: _____

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Information Sheet 5	Setting site selection criteria for forage development

Introduction

Most of the feed for livestock production in tropical countries basically comes from natural pastures. Natural pasture management & improvement techniques in the last chapter are mainly aimed at increasing production of forage from these lands. In addition to increasing production & productivity of natural pastures, forage production from improved forage species has been part of the livestock extension services in Ethiopia.

Different strategies have been designed towards improved forage development. Among others, over sowing & introduction of forage legumes to natural pastures, establishment of brand new artificial pastures by reseeding of natural pastures are just the few. Other strategies include backyard forage development, under sowing, alley cropping & establishment of forage strips along contours of soil conservation structures

For successful establishment of improves forage species in any one of these strategies an appropriate technical skill & knowledge of the individual species, and its development under various environmental conditions will be very much essential.

Preparation for pasture establishment needs to begin at least one full year before the seed is actually sown. Basically the establishment of forage crops begins with the proper soil environment. Soil test indicate whether the PH of the soil is suitable for maximum production. Under most situations, the optimum PH value should fall between 6.5 and 7.5. In addition to the PH value the availability of elements such as phosphorous, potassium, calcium, magnesium and other trace elements in the soil are needed for proper growth.

Pasture establishment procedures may include in developing a pasture establishment program requires evidence that a person can assess site factors, select suitable pasture species and cultivars, determine resources and equipment for planting and post-planting care, and prepare pasture establishment plans to meet livestock production plans and schedules.

Setting site selection criteria

Site selection- Forage seed production sites must be accessible and as much as possible located in lands suitable for cultivation, irrigation, and fertilizing. Other ecological requirements for a suitable site include:

- A climate and soil suitable to most elite forage species or at least the target species.
- Soil fertility: Improved forages can behave as food crops in soil-fertility requirements.
- The area must be free of noxious, weeds, pest and diseases.
- Adequate space to make isolation possible for multiplying cross-pollinated species.
- Adequate growing season with ample rainfall.
- Access to irrigation to make multiple harvests possible and guarantee against fluctuating rain distribution.
- Topography: Must be convenient for easy farm operation (cultivation, fertilizing, spraying, harvesting, etc.), and convenience for grazing animals (if grazed pasture).Free from frost: ensure the site is not located in a frost-pocket in the landscape.
- Sunny weather during flowering to initiate reproductive development, flower opening, pollination and facilitate seed harvesting.

When assessing a locations potential for pasture production, it is important to consider the following site selection characteristics:-

- **Annual precipitation;-** Available soil moisture is the limiting factor for plant growth and establishment .sites with less precipitation have limited productivity and may not provide the site should adequate economic return. Therefore the site with adequate annual precipitation should be selected. Most dry land forage species require at least twelve inches of annual precipitation for adequate growth and long term survival.
- **Soil depth; -** To provide sufficient water holding capacity for productive plant growth, the soil depth must be at least eighty inches.
- **Soil texture; -** Soil texture and depth determine a soil's water holding capacity and therefore strongly influence a site's potential for forage production. Soil texture ranging from a sandy loam to silt or clay loam is most suitable for plant growth.
- **Drainage; -** well-drained soils that have no shallow sub surface restrictive layers.
- **Salt accumulation; -** Salt affected soils present several problems for pasture establishment. The accumulation of salt in soils has negative influences on several soil properties, including soil structure, water infiltration and nutrient availability.
- **Freedom from rocks;-** The presence of large rocks in the soil rules out most cultivation and planting options and significantly reduces the potential for success in establishing pasture.
- **Slope; -** Slopes should be less than 15% in order to accommodate planting and soil preparation equipment and minimize the potential for erosion.

Self-Check -5	Written Test

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

1. List requirements in site selection for forage development (4 points)
2. Mention site selection characteristics for forage development (6 points)

Note: Satisfactory rating – 10 points unsatisfactory rating –below 10 points
You can ask you teacher for the copy of the correct answers.

Answer Sheet

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Information Sheet 6	**Carrying out land preparations for forage production**

Carrying out land preparations for forage production

Preparation of a good seedbed (the smaller the seed the finer the seedbed), sown grasses and legumes require a finely granulated soil surface which is firm and free from weeds. Sowing shortly after the rains begin takes advantage of soil nitrogen made available by mineralization. However, it also coincides with the period of heavy downpours and strong weed competition. Excessive downpours may wash seeds away or cover them too deeply. Also the first rains may be intermittent and unreliable and resulting short drought periods may affect seedling survival. Tree or shrub removal is always one of the first steps. However trees should not be removed if the trees are important as browse species or needed for shade, if the land is sloping and there is a danger of erosion and if they are protecting water courses.

Land preparation activities include **land clearing** and **seed bed preparation**:-

A. Land clearing; - It refers to the activities to remove all unwanted plant materials and other things from the land which includes cutting all undesirable, trees, bush, grass and any other waste materials from the selected site.

The main methods of land clearance include:

- Mechanical movement of trees and shrubs - manually by knives and saws or by machine.
- Chemical treatments (2,4,5-T or 2,4-D, mixtures of these, picloram, fenuron, arsenic, etc. can all be useful herbicides for killing tree stumps. Chemicals can be injected into the tree by using an axe with a cylinder attached which delivers herbicide to the axe blade. Aerial herbicide spraying is also possible.
- A combination of mechanical and chemical or mechanical and burning
- Regular burning (if allowed by law).

B. Seed-bed preparation

Pastures usually require a well- prepared seed –bed for good germination and establishment. Good seed-to-soil contact is essential to maintain adequate moisture near the seeds. A clean fine & firm seed bed promotes germination and minimizes weeds infestation. Seed beds must be watered just before sowing or the sowing time must well be adjusted to

the on set of the rainy season This moisture is necessary for germination and for the small root systems of young grass seedlings. The type of seedbed preparation that is chosen will depend on the type of equipment available and whether a new pasture is being established (conventional tillage) or an existing pasture is being renovated (no-till drill). Two methods of seed –bed preparation are recommended.

Soil tillage: consists in breaking the compact surface of the earth to the certain depth and to loosen the soil mass, so as to the roots of the crops to penetrate and spread in the soil. Tillage may be called the practice of modifying or mechanical manipulation of the status of soil to provide favourable condition for plant growth. Soil tillage also helps to control weeds, soil borne pests & diseases.

Tillage operation is most labour consuming and difficult operation, as compared to all subsequent operations in the field.

Self-Check - 6	Written Test

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

1. List methods of land clearing for forage development (4 points)
2. Write the importance of soil tillage (2 points)

Note: Satisfactory rating – 6 points unsatisfactory rating –below 6 points
You can ask you teacher for the copy of the correct answers.

Answer Sheet

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Name: _____ Date: _____

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Operation sheet -1	Setting site selection criteria and carrying out land preparations for forage production

Techniques to select and prepare land for forage development as follows:-

Step 1: Select site / area
Step 2: Clean & prepare land for pasture establishment
Step 3: prepare seed bed

LAP Test	Practical demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

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

Task. Select site and prepare land for forage development

Reference

AN INTRODUCTION TO COMMUNITY ASSET MAPPING. Available on: https://www.countyofsb.org/ceo/asset.c/400

Community Asset Mapping. Available on: http://www.sustainablejersey.com/actions certification/actions/?type=1336777436&tx_sjcert_action%5BactionObject%5D=90&tx_sjcert_action%5Baction%5D=getPDF&tx_sjcert_action%5Bcontroller%5D=Action&cHash=d8896df5ca9909fc37fd61db1c3b38da

Community Needs Assessment. Available on: https://www.cdc.gov/globalhealth/healthprotection/fetp/training_modules/15/community-needs_pw_final_9252013.pdf

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Information Gathering. Available on: http://www.teamreporterapp.com/information-gathering/

Medical Advice Disclaimer (2005-2019). The Importance of Using Community Resources in Treatment. Available on: https://www.eatingdisorderhope.com/recovery/self-help-tools-skills-tips/the-importance-of-using-community-resources-in-treatment

https://www.youtube.com/watch?v=XOdPJDSTvjM

Dairy production

Level-II

Learning Guide-31

Unit of Competence: Assist in Forage Development Activities

Module Title: Assisting in Forage Development Activities

LG Code: AGR DRP2 M08 LO2-LG-31

TTLM Code: AGR DRP2 TTLM 1219v1

LO 2: Support forage development activities

Instruction Sheet	Learning Guide 31

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

- Following instructions and directions and seeking clarification.
- Undertaking forage development activities.
- Recording seasonal growth pattern of forage crop.
- Undertaking seed treatment techniques
- Carrying out pests, weeds and diseases controlling methods.

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

- follow instructions and directions and seeking clarification.
- undertake forage development activities.
- record seasonal growth pattern of forage crop.
- undertake seed treatment techniques
- carry out pests, weeds and diseases controlling methods.

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information Sheet (1, 2, 3, 4 and 5) in page 3, 5, 13, 16 and 21 respectively.
4. Accomplish the Self-check (1, 2, 3, 4 and 5) **in page 4, 12, 15, 20 and 23** respectively.
5. If you earned a satisfactory evaluation from the "Self-check" proceed to "Operation Sheet 1 **in page -24.**
6. Do the "LAP test" **in page – 24** (if you are ready).

Information Sheet-1	Following instructions and directions and seeking clarification

Following Instructions and directions provided by supervisor

Instructions and directions provided by supervisor are followed and clarification is Sough when necessary. Any employee who works in forage development or any farmer who establish Pasture must follow the following instruction and direction:-

Forage enterprise policies and procedures

Manufacturer instructions

Material safety data sheets (MSDS)

The MSDS is a detailed informational document prepared by the manufacturer or importer of a hazardous chemical. It describes the physical and chemical properties of the product.

MSDS's contain useful information such as:

- Flash point,
- Toxicity,
- Procedures for spills and leaks and
- Storage guidelines.

Information included in a Material Safety Data Sheet aids in the selection of safe products, helps you understand the potential health and physical hazards of a chemical and describes how to respond effectively to exposure situations

OHS standards and procedures

Specifications for tools, equipments and materials

Standard Operating Procedures (SOP)

It is a set of step-by-step instructions compiled by an organization to help workers carry out complex routine operations. SOPs aim to achieve efficiency, quality output and uniformity of performance, while reducing miscommunication and failure to comply with industry regulations

Verbal directions from manager or supervisor

Work instructions and standards

Work notes.

Instructions and directions provided by supervisor must be followed and if we have any question we can ask when necessary. And also employee must observe and follow Enterprise policies and procedures in relation to workplace practices in the handling and disposal of materials

Self-Check -1	Written Test

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

1. List down 5 instructions and directions provided by supervisor to be followed by an expert in poultry raising (5pts)
2. Write the useful information contained in material safety data sheet.(5pts)

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

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date _____

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Information Sheet-2	Undertaking forage development activities

Undertaking forage development activities may include determining seeding rate, maintaining forage, land preparation, seed selection, seed treatment, mulching, sowing, ploughing, furrowing, weed control, transplanting, fertilizer application and irrigation /watering, etc.

Ploughing

A **plough** or **plow** is a tool or farm implement used for initial cultivation to loosen or turn the soil in preparation for sowing seed or planting. Ploughs were traditionally drawn by working animals such as oxen and horses, but in modern farms are drawn by tractors. A plough may be made of wood, iron, or steel frame with an attached blade or stick used to cut and loosen the soil. It has been a basic instrument for most of history, and is one of the most significant inventions.

The primary purpose of ploughing is to turn over the upper layer of the soil, bringing fresh nutrients to the surface, while burying weeds and the remains of previous crops and allowing them to decay. As the plough is drawn through the soil, it creates long trenches of fertile soil called furrows. In modern use, a ploughed field is typically left to dry out, and is then harrowed before planting. Ploughing and cultivating a soil homogenises and modifies the upper 12 to 25 centimeters (5 to 10 in) to form a plough layer, where the majority of fine plant feeder roots grow.

Ploughs were initially human-powered, but the process became considerably more efficient once animals were pressed into service. The first animal-powered ploughs were undoubtedly pulled by oxen, and later in many areas by horses and mules, although various other animals have been used for this purpose. The industrial revolution brought steam engines to pull ploughs, ploughing engines or steam tractors, which were gradually superseded by internal-combustion-powered tractors. Use of the plough has decreased in some areas, often those significantly threatened by soil damage and erosion, in favour of shallower ploughing and other less-invasive conservation tillage techniques.

Mulching

Mulch is a layer of material applied to the surface of soil. Reasons for applying mulch include conservation of soil moisture, improving fertility and health of the soil, reducing weed growth and enhancing the visual appeal of the area. Mulch is usually, but not exclusively, organic in nature. It may be permanent (e.g. plastic sheeting) or temporary (e.g. bark chips). It may be

applied to bare soil or around existing plants. Mulches of manure or compost will be incorporated naturally into the soil by the activity of worms and other organisms. The process is used both in commercial crop production and in gardening, and when applied correctly, can dramatically improve soil productivity.

Transplanting

Transplanting or replanting is the technique of moving a plant from one location to another. Most often this takes the form of starting a plant from seed in optimal conditions, such as in a greenhouse or protected nursery bed, then replanting it in another, usually outdoor, growing location. This is common in market gardening and truck farming, where setting out or planting out are synonymous with transplanting. In the horticulture of some ornamental plants, transplants are used infrequently and carefully because they carry with them a significant risk of killing the plant.

Transplanting has a variety of applications, including:

- Extending the growing season by starting plants indoors, before outdoor conditions are favorable;
- Protecting young plants from diseases and pests until they are sufficiently established;
- Avoiding germination problems by setting out seedlings instead of direct seeding.

Different species and varieties react differently to transplanting; for some, it is not recommended. In all cases, avoiding *transplant shock*—the stress or damage received in the process—is the principal concern. Plants raised in protected conditions usually need a period of acclimatization, known as hardening off (see also frost hardiness). Also, root disturbance should be minimized. The stage of growth at which transplanting takes place, the weather conditions during transplanting, and treatment immediately after transplanting are other important factors.

Applying different forage seed sowing methods

Sowing practice

a) Timing: The most desirable time to seed non-irrigated areas is immediately before the season of the most reliable rainfall, and when temperature is favorable. Sow perennial species at the onset of the longest wet season when the soil has received sufficient

moisture to support germination and establishment. The best seeding date depends on the area of the state, soil moisture and whether grasses or legumes are being seeded.

- **Grasses**: sown after the rainy season because grasses need continuous soil moisture for optimum development and do not have storage organs to stay any longer.
- **Legumes:** sown within one month before the small rainy season because they have got storage organs.

b) **Spacing:** Generally, spacing between rows should not exceed 25–45 cm and within-row plant spacing should be 5–15 cm.

c) Sowing depth: Generally, the smaller the seed the shallower the depth of planting. Usually, grasses are sown at the depth of 1–1.5 cm, while medium-sized legume seeds are sown at a 2.5 cm depth. This is usually related with seed size, seeding emergency, and survival of small seeded species. The optimum depth of:

- Most grasses and small-seeded legumes lie between 1 to 3cm, but varies according to species or cultivars and care should be taken.
- The largest seed of legume placement between 3-5cm below the soil (like leuceanea, susbania, cowpea, lablab) and
- The smallest seed not more than 0.5cm.

Method of sowing

1. Row-sowing
2. Broadcasting
3. Spot seeding

Row-sowing is preferred because it offers the following advantages:

- Low seed rate is required, which is important in view of seed scarcity and cost.
- Better establishment than by broadcasting in case of poor weather conditions.
- Easy weeding and fertilizer application.
- Better exposure of plants to sunlight.

Common establishing methods of establishing forage plants are:

- Direct seeding (Broadcasting, Spot seeding, Row seeding)
- Seedlings
- Cutting &Splits

The choice for these methods of establishment is determined by plant species, planting material availability &environmental conditions.

Generally, the following guide can be used:

- **Tree legumes**: seedlings, cuttings, and direct seeding
- **Herbaceous legumes**: Direct seeding

- **Grasses**: Direct seeding, cuttings, and splits

Identifying and applying fertilizer and irrigation/watering

Fertilizing and manure application

For grass-seed crops, nitrogen is the most limiting soil nutrient. Generous amounts of nitrogen, often in combination with phosphorus, substantially increase seed yield of grasses (100–150 kg/ha diammonium phosphate). Nitrogen application varies with soil fertility, moisture level and the type of species sown. Legume seed crops are independent of soil N levels as long as they effectively fix atmospheric nitrogen.

Improved pastures require fertile soils for optimal herbage production.

Fertilizers should be applied according to the fertility status of the soil. To determine what nutrients are needed:

- Observe characteristic symptoms, e.g., leaf yellowing is likely a nitrogen deficiency.
- Undertake soil and plant tissue analysis.
- Know the characteristics of the plant, e.g., tall and rank-growing grasses such as elephant grass and *Panicum* species are heavy feeders and require more frequent fertilizer applications than thinner and shorter stature grasses.

Generally, legumes have a high requirement for phosphorus (P), sulphur (S) and Molybdenum (Mo); grasses have a high requirement for nitrogen (N), P, and Potassium (K). Levels of nutrients used will depend on soil type, species used, level of production required, and production system (cut-and-carry systems require greater maintenance inputs than grazing systems). Typical levels of nutrients required for annual maintenance are 50–300 kg/ha N; 10–20 kg/ha P; 25–50 kg/ha K; 30 kg/ha S; and 100–200 kg/ha Mo. Nitrogen is often applied at each grazing or cutting. Phosphorus should also be applied especially if the legume component loses vigor due to grass dominance. Manipulating the ratio of application of nitrogen and phosphorus is a useful management technique to maintain a desirable balance between the grass and legume components.

Nitrogen fertilization increased yield, rate of growth and improved CP content during the earlier part of growth. Additionally, DMY and sward quality can be increased through means of fertilizer application, resulting in an abundant feed stuff. After fertilizer N is applied, N is rapidly absorbed in to plants and growth, while stimulated via improvement of root systems and photosynthetic activity.

Applying irrigation/watering

Irrigation schedules, where required, are determined for each soil and crop/pasture type based on assessed water requirements, rainfall and evapo-transpiration data. All plants require water. Some are more drought tolerant than others. Some can survive on rainfall alone, whereas others have very high demands for water at specific times in the growing cycle. These plants require an irrigation system to provide water at the right place, at the right time and in the right quantities. The use of natural resources in the agricultural sector is coming under increasing scrutiny by regulators and the community.

There are a number of irrigation methods used, including flood, hand line, wheel line, gated pipe, little and big gun, linear, and pivot irrigation systems. The method of choice depends on the system that came with the farm, the size of the farm and the amount of labor, time and money available.

Do not leave large livestock in the pasture while irrigating; they may damage equipment. To avoid plant damage and soil compaction, wait 3 or 4 days after irrigating before turning large livestock back onto pastures. As always, wait until the pasture is above 6 to 8 inches in height before grazing, and graze no shorter than 3 inches.

Irrigation is artificial watering of land to sustain plant growth.

It is practiced in all parts of the world where:-

- Rainfall does not provide enough ground moisture
- In areas of irregular rainfall
- During dry spells to ensure harvests and to increase crop yields

It has greatly expanded the amount of arable land and the production of food throughout the world.

Irrigation methods:-

- Sprinklers
- Flooding
- Furrow irrigation
- Drip or trickle irrigation

Improved Forage Production Strategies/options

On Farm Strategies	**Common Land Strategies**
• Backyard Forage Production • Under sowing and Inter planting • Contour Forage Strips • Agro forestry	• Over sowing Common Grazing Areas • Stock Exclusion Areas/Forage Banks • Permanent Pastures

Self-Check -2	Written Test

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

1. Reason out why mulching carry out in forage development? (4 point)
2. List methods of sowing forage seed (3 point)
3. List different types of irrigation methods for forage development (4 point)

Note: Satisfactory rating – 11 points unsatisfactory rating –below 11 points
You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

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Information Sheet-3	Recording seasonal growth pattern of forage crop.

Seasonal growth patterns of forage may include annual and perennials based on life forms. Annuals complete their life-cycles in one year while perennials survive for more than two growing seasons. Each stem of annual grasses bears an inflorescence. Perennial grasses also bear inflorescences but may also produce vegetative tufts which may flower within two or more years. In the tropics grasses and legumes tend to be annual or perennial. The growth of an annual starts and finishes within one year while perennials exhibit cyclic patterns of growth.

- **Annual**
  - Life duration is < 1 year (one season)
  - Good seeder (produce abundant seed),
    - ✓ survival mechanism
    - ✓ Overcome hard season.
  - Fast establishing
  - Low persistence (do not stay productive for long period)
  - Best utilized as fodder crops, i.e. crops grown for one season & harvested for hay or silage.
  - Low level of nutrition, but depends on type of species
  - Are pioneers in degraded land (the 1st in plant succession)

    Examples;

    - ✓ Oats (*Avena sativa* L.)
    - ✓ Vetch (*Vicia dasycarpa* L.)
- **Perennials**
  - Survive from 1-3 years or more
  - have long life span (are more persistence, give production for longer time)
  - seed production- low when compared to annuals
    - ✓ Cocks foot (Orchard grass) (Dactylis glomerata L.)
    - ✓ White clover (Trifolium repens L.)
    - ✓ Buffel grass (Cenchrus ciliaris L.)
    - ✓ Colored Guinea grass (Panicum coloratum L.)

- ✓ Elephant grass (Napier grass, English or Zihone sar, Amharic) (Pennisetum purpureum)
- ✓ Rhodes grass (Chloris gayana)
- ✓ Para grass (Brachiaria mutica (Forsk.) Stapf)
- ✓ Guinea grass (Panicum maximum)
- ✓ Green leaf (Desmodium intortum)
- ✓ Common stylo (Stylosanthes guianensis (Aublet) Swartz)
- ✓ Lucerne (alfalfa) (Medicago sativa L.)

When selecting plant species for seed production it is important to consider their life cycles (annuals vs. perennials)

- ➢ Annual legume have a better chance of growing in drier climates than perennial legume species as long as the wet season is sufficiently long and reliable to complete seeding
- ➢ In annual species seeding is synchronized and hence easy to manage and harvest
- ➢ Annuals are suitable where there is a distinct wet and dry season
- ➢ Perennials cannot survive in drier environments with short growing seasons
- ➢ However, annuals cannot respond to out of season precipitation as the moisture may not be reliable and long lasting
- ➢ Perennials give a longer sequence of seed production than annuals.

Self-Check -3	Written Test

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

1. List characteristics of annual and perennial forage development (5 points)
2. Give an examples for perennial grass species (5 points)

Note: Satisfactory rating – 10 points unsatisfactory rating –below 10 points

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

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Information Sheet-4	Undertaking seed selection and treatment techniques

Before sowing it is useful to determine the viability of the seeds (if not commercial and guaranteed) by carrying out a germination test. Some seeds may also require seed treatment and inoculation (only legume seeds).

4.1. Seed quality test

There is a need to use high quality seed to establish the pasture. Quality is measured in terms of purity and germination. Purity is expressed in terms of the percentages of seed of the sown variety, other crops and weeds, of inert matter (including pieces of straw, soil etc.), and of broken seed. Special attention must be given to the weed seed in the sample so as not to introduce new, potentially serious weeds into the pastureland.

Seed quality is an important parameter to look into before sowing of seeds. This seed quality is defined first by the proportion of seeds which will germinate and secondly by the freedom of the seed from contamination by seeds of different genetic constitution, by inert material or by pests and diseases. Other considerations before sowing of a seed include viability, longevity in storage, vigour, germination rate, dormancy, origin and size of the seeds.

- **Viability**

Is the capacity of the seeds to germinate after sowing. When the seed (comprising an embryo and endosperm energy reserves, surrounded by a seed coat or test and other outer coverings) is placed in a moist environment falling within a specific temperature range, it absorbs moisture and various biochemical changes begin. Clearly a high content of dead seed which will not germinate represents a loss to the purchaser and many countries lay down minimum standards of seed viability which the supplier of the seed is required to meet. For this reason a simple germination test is necessary.

- **Rate of seed germination**

A rapid rate of seed germination is often beneficial to field establishment. Competition with fast germinating weeds or survival before soil drying are both favored if the seeds sown germinate quickly. This can be considered as the probability of a proportion of seeds in a seed lot germinating in a given period of time and should not be confused with the total viability of the seed lot. Rate of germination may be broken up into two independent periods: the latent period from the onset of imbibition's to the visible bursting out of the radicle in the first germinating seeds, and the subsequent germ ability of the sample. Therefore, seed

testing data which give an indication of the rate of germination will help the seed user buy seed with good establishment prospects.

Germination test procedures

- Place the blotting paper in the germination tray (shallow dish) and moisten it. Do not wet the paper;
- Place 100 seeds in the tray, scattering them evenly along the shallow dish;
- Keep the tray at room temperature;
- Keep the blotting paper moist all the time
- Check the seeds once a day and count the germinated ones
- Continue this for a week
- Express the number that sprouted on percentage basis
- Make three replications or repeat it three times

Contamination (purity) analysis-The forage seeds that are used for sowing should not have materials that are not needed for the purpose. This contamination can occur in two ways:

1. 'off types' in which within a seed lot of one cultivar and another cultivar can be mixed. Such contamination reduces the superiority of the genotype sown and restricts the possibility of using the pasture for further seed production
2. Inclusion of inert material - chaff, dust, pieces of straw, soil, etc. in the seed lot. The amount of this inert material is measured by the analysis for 'purity'. When determining seeding rates or comparing prices of seed lots it is useful to calculate the pure live seed (**PLS**) content of a seed lot, which is the product of percentage viability and percentage purity.

When determining seeding rates or comparing prices of seed lots it is useful to calculate the pure live seed (**PLS**) content of a seed lot, which is the product of percentage viability and percentage purity.

For example, if the seeding rate required is 100 medium sized seeds per m^2.

And that 1 kg is equivalent to 300,000 seeds in number, then to sow 100 ha grazing land we need to have 333 kg PLS.

Therefore, an estimated 544 kg seeds are required to obtain 333 kg PLS.

- ***Seed longevity*** -Viability is the first criterion of quality. However, the maintenance of this viability for long time periods may be an important consideration for the seed user who stores seed for sowing in a subsequent year. In these circumstances dormant seeds

(legume seeds) will maintain viability. The death of seeds is increased by high seed moisture content (which is influenced by the relative humidity of the storage atmosphere), by high temperature, and a high oxygen content of the storage atmosphere.

- ***Seed Vigorousity-*** it implies that ability to germinate over a wider range of environmental conditions, reliable establishment in the field and higher yields.
- ***Seed dormancy***- This is a natural protective phenomenon which prevents all the seeds of a population from germination on one occasion (hence minimizes risks in uncertain habitats).

Under taking Seed treatment

Seed treatments techniques:-

- Chemicals
- Physical
- Biological

Different types of seeds require different treatments for optimal germination. The main purpose is to break their dormancy in order to improve seed flow characteristics, allow rhizobium inoculation and protective chemicals to surround the seed. There are different methods of reduction of seed hardness. These include:

- Hot water treatment or scarification
- inoculating legumes
- Acid treatment

Methods of breaking seed dormancy

Storage: Holding freshly harvested seed in storage will overcome dormancy problems since dormancy declines with time. Storage is often applied to grass seeds

Scarification: Scarification treatments are employed prior to sowing to abrade the seed coat and improve permeability.

Seed rates

Seed rate depends primarily on the viability and purity of the seed. Furthermore, seed rate depends on seed size, pure stand or mixture, amount of rainfall the purpose of the crop (herbage or seed), pattern of planting and soil fertility. As a general guideline, for row planting, sow grasses at 6–8 kg/ha, legumes at 3–4 kg/ha, and fodder shrubs at 10–15 kg/ha. When broadcasting seed, sow at double the rate recommended for row planting.

Self-Check -4	Written Test

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

1. What are the essential criteria's to select quality seed of forage? (4 points)
2. List methods of forage seed treatment (3 point)

Note: Satisfactory rating – 7 points unsatisfactory rating –below 7 points

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date _____

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Information Sheet-5	Carrying out pests, weeds and diseases controlling methods

1.1. Weed control

Weed reduces the yield of seed by competing for:-

- Soil moisture
- Nutrients
- Sunlight
- Seed quality by contamination with weed seeds

Production of high quality seed requires a weed free pasture. Grower should never rely on seed cleaning as a means of overcoming weed contamination. Weeds especially broad leaved once can be dangerous, leading to partial or complete failure. Legume seed forage is particularly vulnerable to weed invasion.

Weeds affect seed yields and quality. Efficient weed control reduces contamination with weed

seeds during harvesting.

- Thorough and repeated cultivation, hand weeding, use of herbicides, crop rotations, etc., offer a reasonable degree of weed eradication.
- Weed control methods are chemical, physical and biological.

1.2. Pest and Disease control

- Birds are the most damaging pest for grass and seed crops
- Insect pests including moth caterpillars, sucking bags and butterflies are more severe pests for legumes, often seen feeding on pods and flowers.
- Diseases are generally more severe with legumes than with grasses.
  - ✓ The more important legume diseases are rhizoctonia leaf bright, anthracnose in stylos, and rust on siratro viruses on many species.
  - ✓ Grass suffers mostly from fungal disease like ergots and smuts.
- Pests like mole rats, porcupines, wild herbivores and insect pests can be a threat to pasture seed crops.
- Insect larvae of the Sesbania beetle (*Mesoplatis orchoptera*), for example, can devastate plots of stands overnight.

- Control measures against such serious insect pests could be expensive at an advanced level of infestation and thus prompt spot-spraying at the earliest detection with recommended chemicals is necessary.
- Diseases, especially fungal, are more serious in grasses than in legume seed crops.
- Disease-control measures in forage crops are based on the use of resistant crop varieties and employing pre-emptive cultural practices such as:
    - crop rotations
    - burning of infected plants
    - solar treatment of soil
    - use of clean and treated seed

Self-Check -5	Written Test

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

1. List ways of forage weed control (4 points)
2. What are pests that affect forage/pasture in your district? (4 points)
3. By what mechanisms disease control taken measures from forage crops? (5 points)

Note: Satisfactory rating – 13 points unsatisfactory rating –below 13 points
You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions:

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Operation sheet -1	Procedures in forage seed germination test

Techniques to test germination of forage as follows:-

Step 1: Place the blotting paper in the germination tray (shallow dish) and moisten it. Do not wet the paper;

Step 2: Place 100 seeds in the tray, scattering them evenly along the shallow dish;

Step 3: Keep the tray at room temperature;

Step 4: Keep the blotting paper moist all the time

Step 5: Check the seeds once a day and count the germinated ones

Step 6: Continue this for a week

Step 7: Express the number that sprouted on percentage basis

Step 8: Make three replications or repeat it three times

LAP Test	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

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

Task. Test seed germination rates of forage seeds

REFERENCE

- www.https:// articles. Extension.org. Nutritional requirements of livestock
- Duguma Gemeda. 2010. Participatory definition of breeding objectives and implementation of community based sheep breeding programs in Ethiopia. PhD Thesis, University of Natural Resources and Life Sciences, Vienna, Austria.
- Muhammad, R. 2016. Elephant grass as forage for ruminant animals. Department of Forage Crops and Grassland Management, Faculty of Animal Science, Hasanuddin University, Indonesia

Dairy production

Level-II

Learning Guide-32

Unit of Competence: Assist in Forage Development Activities

Module Title: Assisting in Forage Development Activities

LG Code: AGR DRP2 M08 LO3-LG-32

TTLM Code: AGR DRP2 TTLM1219v1

LO3: Support harvesting operations

Instruction Sheet	Learning Guide 32

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

- Determining harvesting time and stage
- Storing harvested forage
- Determining utilization of developed forage

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

- determine harvesting time and stage
- store harvested forage
- determine utilization of developed forage

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information Sheet (1, 2 and 3) in page 3. 5 and 7
4. Accomplish the "Self-check 1, Self-check 2 and Self-check 3" page 4. 6 and 13 respectively.
5. If you earned a satisfactory evaluation from the "Self-check" proceed to "Operation Sheet 1" **in page - 14.**
6. Do the "LAP test" **in page – 15** (if you are ready).

Information sheet – 1	Determining harvesting time and stage

1.1. Effect of Stage Harvesting on Forage Quality and yield

Pasture quality (irrespective plant species) can be affected by the harvesting days of first date of cut and frequency of harvesting which consequently reduces the nutritive value. As pastures mature they are characterized by high content of fiber with a higher grade of lignification and low protein content. Most improved grasses fed at early stages of maturity are more digestible and are eaten in larger quantities than at more mature stages. Leaf to stem ratio is used as an index of quality, the quality of herbage depends on the proportions of stem and leaf in the particular plant species. Early harvesting had significantly higher leaf to stem ratio as compare late harvesting days. The leaf to stem ratio decreased as the plants advanced in maturity. The presence of an increased proportion of plant stems, typical of older plants, may restrict access to leafy parts and force animals to consume lower quality herbage. Digestibility of stem is much lower than leaf, digestibility of old grass is much lower than young grass while protein content also decreases as the plant ages, particularly in grasses. The aging of forage is frequently associated with a decrease in leafiness and an increase in stem to leaf ratio.

Stage of harvest influence the herbage dry matter yield, crude protein concentration and other chemical constituents. Changes in leaf number are themselves associated with changes in the number of internodes, and thus length of stems. Internodes length of elephant grass increased significantly with increased days of harvesting. Length of internodes per plant was affected significantly by harvesting days. Late harvesting significantly produced longer internodes as compared to early and intermediate harvestings.

Harvesting at the Right Stage of Maturity

Harvesting at the right stage of maturity is one way of enhancing crop residue yield and quality. Early harvesting immediately after physiological maturity of the crop was found to improve the crop residue yield and quality without adverse effects on the grain yield and quality.

Self-Check-1	Written Test

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

1. List conditions that indicate maturity time of forage. (3 points)
2. At what time forage harvested? (4 points)

Note: Satisfactory rating – 7 points unsatisfactory rating –below 7 points
You can ask you teacher for the copy of the correct answers

Answer Sheet

Score = _____

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Information sheet – 2	Storing harvested forage

Proper Handling and Storage

Loss of leaves due to shattering, during harvesting, drying, transport, storage, and feeding of cereal crop residues to livestock feeding may be high due to the losses and inefficiencies associated with these operations. Straws and stovers should be stored only after they are dried to moisture content of less than 10-15%. Rain or moisture during harvest of straw can also cause fungal growth or loss of nutrients due to leaching prior to storage. In order to minimize spoilage, straws or Stover's should be stored in well ventilated sheds or in well-staked open heaps. In general, efforts should be made to minimize deterioration of the straw due to shattering of leaves, leaching and microbial attack during storage. Wastage should be minimized during feeding as well. Straws and stovers are offered on a feed trough or on a clean ground to minimize feed wastage due to trampling and soiling with dung.

Hay must be stored in a dry environment. Good quality hay should never be poorly stored. The type of storage may vary from area to area. A good stack of loose or baled hay will provide satisfactory storage in arid areas where there is little rainfall. More expensive shelters may be required for high rainfall areas. It is advisable to store hay by kinds and grades in case variable qualities are stored. Hay can also be stored by creating hay stacks. Stacks may be covered by plastic sheets to keep out rain. The surface layer of a stack may also be "thatched," in the same manner as a thatched roof to a house.

Hay of higher moisture content should not be stored because its nutritive value may be greatly lowered. It is generally the most convenient form of stored fodder and an appropriate forage conservation method for small-scale farmers and pastoralists with limited resources. Proper drying is essential so that the hay can be stored safely without heating excessively or becoming moldy. Maximum leafiness, green color, nutrient value and palatability can also be retained. The grass should be dried quickly and not unduly exposed to the sun to maintain these characteristics. Hay must be stored in a dry place. Hay can be bailed and stored under cover. Hay can also be store by creating hay stacks or hay store. These may be created in a field near the source, or close to where the hay will be required later in the year. Stacks may be covered by plastic sheets to keep out rains. The surface layer of a stack may also be thatched, in the same manner as a thatched roof to a house

.

Self-Check -2	Written Test

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

1. In handling of developed forage, list cause of loss of forage leaves (4 points)
2. Is that possible to store hay without bailing? (2points)
3. List materials that used for covering and stack making in hay storage (4 points)

Note: Satisfactory rating – 10 points unsatisfactory rating –below 10 points

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

Answer Sheet

Score = _____

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Information sheet-3	Determining utilization of developed forage

Systems of forage utilization fall into **two** major categories:

A. Immediate use

- ✓ Grazing
- ✓ green chop

B. Conserved forage

- ✓standing hay
- ✓hay
- ✓silage

The objective is to maximize the utilizable yield of the forage crop. In deciding the usage system, one has to consider the following:

- Type and persistence of the forage: Species with persistent and strong root systems are preferred for grazing while fast-regenerating and erect-growing ones are suitable for haying.
- Type of the farm enterprise: e.g., green chop/cut-and-carry systems are suitable for dairying and fattening.
- Potential maximum forage yield versus expected loss in the type of usage

A. **Grazing**

Grazing is the most common and the cheapest utilization method for both natural and sown pastures. In the case of sown pastures, prior to establishment, species have to be selected for palatability, accessibility, nutritive value and their ability to tiller profusely, resist defoliation and trampling, and respond to fertilization,.

Advantages.

- Requires less labor and is less time-consuming
- Animals can select their diet in both quality and quantity and etc

Limitations of grazing

- Loss of material due to trampling, fecal contamination.
- Selective grazing.
- Requires controlled grazing — fencing or shepherding and the like

Green chop/cut-and-carry system

Green chop is cutting green forage in the field and transporting it to the livestock (also called cut-and carry system). It is a common practice in areas where grazing land is limited.

Advantages of cut-and-carry system

- ✓ High recovery of plant material as it is not lost by trampling and contamination.
- ✓ Little selectivity because the system allows for rationing of animal intake.
- ✓ Feeding can be arranged at a convenient site.
- ✓ The excreta can be utilized as farm yard manure and applied where it is most required or composted.

Limitations of cut-and-carry system

- ✓ The continued removal of plant material could lead to deficiencies of soil nutrients, particularly potash.
- ✓ Requires high labor for cutting, chopping and transporting

Standing hay (deferred feed)

Deferred feed is the cheapest and easiest way of conserving forage, as it does not require machinery or physical handling. It is a common traditional practice in rural areas of Ethiopian highlands where certain village communities by common consent defer the bottomland communal grazing lands for use during the dry season.

Limitations

- ➢ High risk of fire hazard.
- ➢ Leaves become moldy, called "blackening", due to slight rain occurrence.

Stored fodder/conservation

Storing fodder is an important operation in livestock farming to bridge the gap in feed supply during dry seasons, recurrent drought hazards, and during the cropping season when grazing land becomes scarce. There are d/t types of conservation techniques but the most mainly utilized ones are hay & silage making

A. Hay making

Hay is feed produced by drying green forage to a moisture content of 15% or less/ stored at about 85% DM content.

Crops suitable for hay making

Forage crops having **soft and thin stems** are generally believed to be more suitable for hay making. Green oat is said to be the excellent one. Cow pea and lablab are best for hay making from among the legumes.

Grass species like Bermuda and buffle grass are also among the most suitable for hay making.

Stage of harvesting the crops for hay making

The feeding value of crops decline or drop shapely with advancement in age of the crop

At early stages of the crop:

- The protein, vitamin, & energy contents of the forage crop are very high
- Water content &digestibility of different nutrients are also higher
- But the dry matter yield of the crop per unit area is considerably low

At the later stages of the crop

- The value of d/t out &officers the portion value of the crop will decrease sharply
- But the dry matter yield per unit area will increase to a large extent
- So that to get more digestible productions per unit area, the forage crops for hay making must be harvested just at about their early flowering stage this is the time when about 10-20% of the crop is at its full bloom

Curing /drying /of hay

In curing hay the main objective is to remove moisture sufficiently and to preserve maximum nutrients while removing moisture sufficiently will prevent mouldness and spoilage during storage

Curing is done either is the field or under a shad in a barn. But under practical farm condition curing is practiced in the filed

Procedure of hay making

- Harvest the crop after the dew is dried up /as the condition may be
- Turn over the fodder with the help of a rake after 4-5 hours in case good sunshine is available. Turning 2-3 times a day is essential
- Dry the fodder for 3-4 days until the moisture content is below 13%
- Roll the crop in to smaller heaps at more time under the sun and to avoid leaf shading
- Cure the crop for the whole day after rolling it in to smaller heaps
- Finally store as loose bundles or keep in balled forms with the help of bailer

Characteristics of good quality hay

The characteristics of good quality hay are:

1. It should be green & leafy
   - Look in to the hay, if it is more of leafy and green in colour, then it is of very good quality
   - Leaves are parts of the hay richer in carotene, protein, mineral &nutritive value in general as compared to other parts of the crop

2. Good quality hay should be soft &pliable with less amount of moisture

- Take the stem of the hay plant &scratch its epidermis or top layers, if it can be peeled of this show that the hay is not properly cured

3. It should have the characteristics aroma & smell of the crop from which it is prepared



fig.1.Good quality hay stored


fig. 2. alfalfa

Precaution in hay making

- Crops should be cut at the right stage of maturity during sunny days
- Shattering and loss of leaves should be restricted to minimum
  - ✓unsafe & over extended exposure to sun light & heat should be avoided so that to preserve carotene & green pigment
- Hay should not be stacked on damp temperature

B. **Silage making**

Silage is moist forage that is the product of acid fermentation of green forage crops that have been compressed and stored under anaerobic conditions in air tights container called a silo.

Advantages of silage making

- Where the production of high quality hay is not possible due to weather conditions.
- Silage saves feed that would be inedible in the dry state or would be damaged by rains
- It is quite palatable and has a high content of carotene.
- It clears the ground early and completely for another crop.
- Storing a crop as silage instead of hay

Limitations of silage making

- It requires additional outlay for structures, equipment and power.
- It concentrates the labor of harvesting into a few days since the silo has to be filled quickly (in 1–3 days).
- Most silage has a low content of minerals and protein and is not suitable for use as the sole ration.
- If it is fed in place of legume hay in the ration, more expense must be incurred for high-protein feed.

Fig. 3 silage making steps and how to make silage.

Self-Check -3	Written Test

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

1. List methods of utilization of developed forage (4 points)
2. What are the disadvantages of cut and carry system? (3 point)
3. Mention the characteristics of good quality hay (3 points.)

Note: Satisfactory rating – 10 points unsatisfactory rating –below 10 points
You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions:

1.
   - _____
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   - _____
   - _____
2.
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   - _____
3.
   - _____
   - _____
   - _____

Operation sheet -1	**Procedures in harvesting time and stage of forage**

Techniques to harvest forage as follows:-

Step 1: prepare materials for mowing
Step 2: mow at early stage
Step 3: mow/cut at dry time/day
Step 4: carryout wilting of harvested forage (if you use as hay)
Step 5: make ready for storage under roof that have cover
Step 6: protect risk factors like fire, pests, etc. from stack hay
Step 7: feed animals

LAP Test	Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 5hour.

Task1; perform forage harvesting and hay making

REFERENCE

https://www.bing.com/videos/search?q=quality+hay+and+feed&&view=detail&mid=6744FAE26C9167F08AF16744FAE26C9167F08AF1&&FORM=VRDGAR&ru=%2Fvideos%2Fsearch%3Fq%3Dquality%2Bhay%2Band%2Bfeed%26FORM%3DHDRSC3

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Dairy production

Level-II

Learning Guide-33

Unit of Competence: Assist in Forage Development Activities

Module Title: Assisting in Forage Development Activities

LG Code: AGR DRP2 M08 LO4-LG-33

TTLM Code: AGR DRP2 TTLM 1219v1

LO4: Clean up on completion of work

Instruction Sheet	Learning Guide 33

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

- Returning and disposing materials
- Cleaning, maintaining and storing tools and equipment
- Reporting difficulties in completion and work outcomes

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

- return and disposing materials
- clean, maintain and store tools and equipment
- report difficulties in completion and work outcomes

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 4.
3. Read the information written in the information Sheet 1,2 and 3 in page 3,7 and 10
4. Accomplish the Self-check 1, Self-check 2 and Self-check 3" **in page - 6, 9 and 13** respectively.

Information sheet – 1	Returning and disposing materials

All tools and equipment as well as materials and machinery necessary for Pasture Establishment and Preservation of feeds should be handled and transported in safe and appropriate way.

Handling waste materials produced during work

Proper handling: includes the collection, transport, processing, recycling or disposal of waste materials produced by human activity in order to reduce the negative effect on the environment.

Waste: is unwanted material or substance produced by human activity, which is usually referred to as rubbish, trash, garbage or junk. Plant debris and waste materials produced during supporting Pasture Establishment and Preservation of feeds activities should be identified, separated and stored safely for further processing.

The major waste materials include

- Plant debris,
- manure and broken components,
- plastic used for chemicals and other seed packing
- Paper-based materials

Storing produced waste material during work should be safe from a health and safety point of view, the material should bear clear identification, and should be standardized and reusable. Chemical reaction of the material with the environment (rust is a very common one) should be avoided, as well as leaks and spillages.

There are **two** types of disposing materials such as:-

1. Solid Waste Disposal

Improperly disposed of waste attracts rodents and insects, contaminates water and air, increases fire hazards, creates unpleasant odors and causes the area to look unattractive. Insects will always be with us but we can reduce our exposure to them by taking simple, yet effective steps. Insects require food to live and most require a moist habitat to breed. Many

types of solid waste, especially garbage, provide these two items. We are most concerned about flies due to their ability to transmit organisms from an infected source to humans. If solid waste is disposed of properly, the fly will have to search elsewhere for its food and breeding area.

2. Excretal Disposal

There are many different ways to dispose of excrete, and, to be effective, they all should adhere to the following requirements:

- The surface soil should not be contaminated.
- There should be no contamination of ground water that may enter springs or wells.
- Excreta should not be accessible to flies or animals.
- There should be freedom from odors or unsightly conditions.
- The method used should be simple and inexpensive in construction, operation and maintenance.
- The excrete use for agricultural or other uses only after it has been treated.
- In the installation of excrete disposal facilities, a safe distance from water sources should be maintained (at least 30 meters or 96 feet).

Materials will be stored for varying periods of time before an entry control is performed or at different stages of the production process and after completion of work. Stores should be safe from a health and safety point of view, the material should bear clear identification, and should be standardized and reusable.

Generally there are different ways of avoiding those waste materials from our farm area.

- The first way is recycling/decompose that waste material in a usable form.
  For example the manure and left over of leaves can be used as fertilizer.
- The second way is that of returning waste material such as old iron, thin, metal and plastic to manufacturers.
- The third way is that of re using waste material.
- **N.B. Never dispose waste materials everywhere.**

Self-Check-1	Written Test

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

1. List two types of disposing materials in forage development (3 points)
2. List waste materials that produced during forage development. (4 points)

Note: Satisfactory rating – 7 points unsatisfactory rating –below 7 points
You can ask you teacher for the copy of the correct answers

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions:

1.
   - _____
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   - _____

2.
   - _____
   - _____
   - _____
   - _____

Information sheet – 2	Cleaning, maintaining and storing tools and equipment

Tools and equipment's should be properly maintained and kept clean after completion of work and stored at convenient place. When equipment's are not functional it should be get maintenance services.

Cleaning

After completion of any work in during forage development activities, including land clearing, ploughing, sawing, weeding and harvesting the materials should be thoroughly washed and cleaned. If not thoroughly washed they becomes a source of microbial contamination and exposed to rust and shorten the life span of the materials and the equipment.

The routine cleaning process during forage development activities include: -

- The plough equipment should be clean
- Proper handling protective cloths
- Wash and brush in hot water the seed storing materials
- Allow to dry in a dust-free surrounding;

This eases cleaning and minimizes the risk of contamination.

Maintenance is the preservation or safeguarding of machinery, property & equipment's according to the manufacture's manual so that the service life of machineries & equipment's is prolonged and operate in environment friendly condition.

The importance of maintenance

Maintenance is important to make sure the constant production of high quality of production.

You can take the regular maintenance services from your service supplier.

A regular maintenance service will reduce production losses and increase constant production.

Maintenance Procedure:-

In order to maintain any given machinery one has to know the procedures to be performed during maintenance.

The maintenance process involves:

- Identifying the main parts of machines & equipment's

- Identifying machines & equipment's which need maintenance
- Prepare tools & equipment's needed for maintenance
- Identify OHS, hazards &risks involved during maintenance
- Prepare personal protective equipment's to avoid or minimize those risks

Materials will be stored for varying periods of time before an entry control is performed or at different stages of the production process. Materials management, often called logistics, holds the responsibility for the transport of materials in many companies. Transport distances depending on the more or less favorable layouts of plants, number of handlings of a material in successive production stages, means of transport (energy consumption, noise and exhaust emissions, electric fork-lift versus diesel fork-lift) and type of transport containers play an important role in environment-friendly materials management. A relatively new task for materials management is the handling of all kinds of wastes and not just the traditional selling.

Self-Check -2	Written Test

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

1. What is the importance of maintenance of tools and equipment? (5 point)
2. List maintenance process of tools and materials (5 points)

Note: Satisfactory rating – 10 points unsatisfactory rating –below 10 points
You can ask you teacher for the copy of the correct answers.

Answer Sheet

Name: _____ Date: _____

1

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- _____

2

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- _____
- _____

Information sheet – 3	Reporting difficulties in completion and work outcomes

Reporting is an integral part of monitoring and evaluation. Reporting is the systematic and timely provision of essential information at periodic intervals. The quality of organizational decision depends on the quality of information reported and organized. Report should be objectively and timely. Because, report enable managers to evaluate progress and plan the future. Detailed report is precious formal document prepared and presented by the workers to the higher management concerning the works on operation or completed

Report may be defined as a formal statement describing a state of affairs or what has happened. It has detailed description of a problem or a situation, findings of an investigation and recommendations or actions taken. The quality of organizational decision depends on the quality of information reported and organized.

The report may contain the following.

- The report that represents the result of technical, economic and financial feasibility of the program or project.
- Report serves as the basis on the basis of which the concerned government body gives clearance /sanction of the planned works.
- Report serves as guide for the starting and implementation of the planned activities.
- Report is helpful in achieving the time and cost limits in the completion of the planned activities.
- Report is helpful in obtaining technical and financial assistance from different cooperative organizations and bodies.
- Report reflects commitment of the organization /group of the planned work performers.

Report includes:-

- General information about the work
- Background of the participants of the work
- Details of the work Capacity
- Process Technical arrangement
- Raw materials and tools used in forage development
- Schedule of implementation
- Attitude of beneficiaries
- Participation of stakeholders
- Cost estimated and used
- Means of finance
- Cash flow details

- Economic consideration
- Local, regional and federal government clearance.

Types of Reports

Reports could be oral or written. On which oral report is face to face communication which is informal and time saving. On the other hand, written report is formal and relatively more accurate and precise. On the basis of format and procedure; adopted reports may be formal or informal.

- **Informal report** is report of person to person communication where as
- **Formal report** is presented in prescribed form and procedures.

Characteristics of Good Report

- Simplicity: - simple and lucid language
- Clarity: - proper arrangement of facts
- Accuracy: - unbiased information
- Precision: - conciseness or coherence
- Completeness: - complete in all respect
- Relevance: - to the purpose it prepared
- Cross-reference:- making and mentioning
- Objectivity: - impartial and free from prejudice
- Brevity: - brief without being incomplete
- Reader oriented: - for specialist is not appropriate for layman

Steps in Report Writing

Step one:-collect the material (notes, documents etc.)

Step two:-Plan the report

- Define purpose of report
- Determine the information it should contain
- Arrange the information in a logical order
- Prepare an outline of the report subject:
- Decide where illustrations of diagrams are required

Step 3:- Draft the report

- Introduction/purpose, reading, summery,
- Body of the report
- Conclusions and recommendations

Step four:-edit the report

- Examine the draft (serve the purpose)
- Check grammar, spelling, punctuation etc.

- Check illustrations,

Step five: - Reporting to the concerned body

- *Formats of Report Writing*
- Date and title
- Introduction
- Body of report (planned, implemented and how is implanted)
- Conclusions and recommendations
- Contribution of every involved body in the implementation of the plan
- Challenges and solutions for the challenges
- Signature
- Appendices

Self-Check -3	Written Test

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

1. What are the characteristics of report writing? (3 points)
2. List steps in report writing (5 points)
3. Mention types of report. (4 points)

Note: Satisfactory rating – 12 points unsatisfactory rating –below 12 points
You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____ Date: _____

Short Answer Questions:

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- _____

3.

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- _____
- _____

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