



# **Basic Agricultural Production and Natural Resources Conservation Level-I**

**Based on Version-3 March 2018 OS.**

**Training Module –Learning Guide 47-50**

**Unit of Competence: Support Pasture Establishment and  
Preservation of Feeds**

**Module Title: Supporting Pasture Establishment and Preservation of  
Feeds**

**TTLM Code: AGR BAN1 M11 TTLM 0919v1**

**October 2019**



## **Module Title: Supporting Pasture Establishment and Preservation of Feeds**

### **TTLM Code: AGR BAN1 M11 TTLM 0919v1**

**This module includes the following Learning Guides**

**LG 47: Prepare For Pasture Establishment and Feed Preservation**

**LG Code:-AGR BAN1 M11 LO1-LG-47**

**LG 48:** Undertake pasture establishment and preservation activities

**LG Code:-AGR BAN1 M11 LO2-LG-48**

**LG 49:** Clean up and store materials and equipment

**LG Code:-AGR BAN1 M11 LO3-LG-49**

**LG 50:** Record and report work activities

**LG Code:-AGR BAN1 M11 LO4-LG-50**

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<b>Instruction Sheet</b>	<b>Learning Guide #47 Prepare For Pasture Establishment and Feed Preservation</b>
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This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics

- Identifying and Checking all materials, tools and equipment.
- Using correct manual handling techniques for loading and unloading materials
- Selecting and checking suitable personnel protective equipments.
- Supporting OHS requirement and work place information.
- Identifying and providing OHS hazards

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**


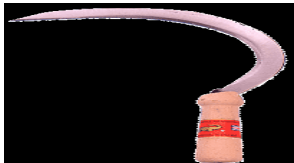





- Identify and Check all materials, tools and equipment.
- Use correct manual handling techniques for loading and unloading materials
- Select and check suitable personnel protective equipments.
- Support OHS requirement and work place information.
- Identify and provide OHS hazards

**Learning Instructions:**




1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described
3. Read the information written in the information “Sheet
4. Accomplish each “Self-check respectively.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to the next or “Operation Sheet
6. Do the “LAP test”

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<b>Axe</b>		<p>: 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</p>
<b>Sickle</b>		<p>a short-handled implement with a curved blade used for cutting tall grass or grain</p>
<b>Mattock</b>		<p>tool like a pickax with one end of its blade flattened at right angles to its handle, used for loosening soil and cutting through roots</p>
<b>Tractor</b>		<p>farm vehicle ( a motor vehicle )used for pulling heavy loads, especially on farms, where its large rear wheels enable it to move in fields</p>
<b>Picks</b>		<p>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</p>
<b>Shovel/spade</b>		<p>a hand tools consisting of a broad, usually curved blade attached to a long handle, used for lifting and moving loose material</p>
<b>Plough</b>		<p>a heavy farming tool with a sharp blade or series of blades for breaking up soil and making</p>



<b>Wheel barrow</b>		<p>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</p>
<b>Tape measure</b>		<p>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</p>
<b>Melcher</b>		<p>is a specialized rotary cutter used to cut grass , mulches and spreads it evenly over the cutting width, encouraging quick re-growth.</p>

Checking machinery, tools and equipments refers to the process of examining their parts to ensure their normal functioning

### **Importance conducting pre-operational checks on Machinery, Tools and Equipments**

- To identify the problems (defects, damages) of the Machinery, Tools and Equipments and take actions to correct or change them before using them
- To identify any hazards and risks that can be raised from using of the Machinery, Tools and Equipments and take minimization action timely

### **The causes of risks associated with machinery equipments and tools**

- Using wrong equipment or/and tools for a job
- Not fitting adequate guards on machines leading to accident caused by entanglement, shearing crushing and trapping
- Not fitting adequate controls or wrong type of controls so that equipment cannot be turned off quickly and safely, or starts accidentally



- Not providing right information, instruction and training for those using the equipment
- Not maintain work equipment or carrying out regular inspections and thorough examinations
- Not providing the personal protective equipments needed to use certain equipments and machinery

### **Guidelines to conduct pre-operational checks on equipments and tools**

You should make sure that the equipments and tools used for work are safe to use .Here is a list of actions that should be taken to ensure this is so.

- Perform a risk assessment to identify the hazards , the risks arising from those hazards and the control measures you should use
- Check that the equipment/tool is suitable for work and way in which it is going to be used
- Check that the equipment/tool is in good condition
- Make sure that the user knows which personal equipment to use and how to use it
- Think about who will use the equipment/tool including experienced workers, workers with language difficulties, new starter

<b>Self-Check -1</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below

1. **Identify tools and equipments for pasture establishment?**
2. **What are the causes of risks associated with machinery equipments and tools?**

**Note:** Satisfactory rating **3** points      Unsatisfactory - below **3** points

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

### **Answer Sheet**

Score = _____
Rating: _____

Name: \_\_\_\_\_

Date: \_\_\_\_\_





<b>Information Sheet-2</b>	<b>Using correct manual handling techniques for loading and unloading materials</b>
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## **Definitions**

**Loading:** refers to putting of the load (anything) on to the ship, truck or pack animal

**Unloading:** removing cargo from carrier or taking the load off a ship, truck, or pack animal

## **Guidelines to load and unload equipments and tools**

- Load/unload the material in required order taking care to avoid damage
- Use manual handling techniques of loading /unloading throughout the process to avoid injury or damage
- Install the material in appropriate work or storage area in accordance with direction
- Identify any hazardous items and load /unload these in a manner that minimizes health and safety risks.
- Inspect load prior to transportation to ensure that all items are loaded appropriately and make adjustments as required
- Secure package against shifting within a vehicle during transportation though tying ,blocking and bracing the load
- Load packages with orientation marks (up arrow ) so that the marks remain pointed up
- Do not allow any smoking or any source of ignition on or near the vehicle when loading flammable
- Always load materials having high weight at the bottom
- Always load similar materials in one side during loading of different types of items

## **Techniques of correct manual handling**

Manual handling refers to any activity that requires the use of force to lift, lower, push, pull, carry or move a person, animal or object. By observing simple, safe manual handling methods, you can avoid manual handling injuries. Since manual handling is intensively used in pasture

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establishment site practically cannot be free from harms and injuries on the job condition at work place. Through training and risk assessment we aim to eliminate hazardous manual handling activities as far as it is reasonably practicable.

### Manual Handling Procedure

In order to reduce the risk of injury from manual handling operations, pasture will ensure them:-

- Assess the risks associated with those manual handling activities that cannot be avoided.
- Eliminate hazardous manual handling activities, so far as is reasonable practicable.

### Employee's duties

Employees should ensure that they:-

- Comply with any instruction and training provided in safe manual handling techniques
- Don't put their own health and safety or that of others at risk by carrying out unsafe manual handling activity

Report problems including physical and medical conditions, which may affect their ability to undertake manual handling activities to their line manager

<b>Self-Check -2</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below

3. **What is loading?**
4. **What is unloading?**
5. **What are the guide lines of loading and unloading?**

**Note: Satisfactory rating - 3 points**

**Unsatisfactory - below 3 points**

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

### Answer Sheet

Score = \_\_\_\_\_

Rating: \_\_\_\_\_

Name: \_\_\_\_\_

Date: \_\_\_\_\_

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<b>Information Sheet-3</b>	<b>Select and check suitable personnel protective equipments</b>
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**Definition**

Personal protective equipment is equipment that protects workers from different damages and injuries.

Therefore when we select these equipments we should conduct process of selecting suitable PPE because:

- PPE is very important when building and maintaining structures.
- Where appropriate clothes for working outdoors, i.e. long trousers and a hat etc.
- Where thick protective gloves when required.
- Solid steel capped working boots will be essential to prevent any crushing injuries to the feet. Joggers are not suitable footwear unless they have steel caps.

*The following are some of personal protecting materials*

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



<b>Self-Check -3</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below

1. **What is PPE?**
2. **What are PPE?**

**Note:** Satisfactory rating - 3 points      Unsatisfactory - below 3 points

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

**Answer Sheet**

Score = _____
Rating: _____

Name: \_\_\_\_\_

Date: \_\_\_\_\_



<b>Information Sheet-4</b>	<b>Supporting OHS requirement and work place information</b>
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**Occupational Health and Safety (OHS):** Any occurrence which results in personal injury, disease or death, or property damage

Occupational Health & Safety (OH&S) legislation requires businesses to provide employees and visitors with safe premises. This means having properly functioning machinery, as well as a suitable working environment with training and supervision. Many companies are searching for solutions that can provide effective communications to meet the monitoring and audit processes required to gain OH&S certification and comply with regulations.

There are many different situations where an incident may affect safety in the workplace and needs to be quickly and effectively communicated to the correct response teams. Perhaps you have personnel who handle dangerous chemicals and need to raise alarms when a leak or spill occurs.

Likewise, production companies have to monitor the product through every stage of the process. Notifications need to be in place to report any equipment failures, downtimes, or out-of-tolerance conditions that occur during these steps especially if your company is spread over multiple buildings and sites, and management needs to be informed when any safety or production incident occurs in another location

**Hazard:** is a situation that has the potential to harm a person, the environment or damage property.

**Risk:** is the probability (likelihood) of harm or damage occurring from exposure to a hazard, and the likely consequences of that harm or damage

**Risk Assessment:** is the process of evaluating the probability and consequences of injury or illness arising from exposure to an identified hazard.

**Hazard Control:** is the elimination or minimization of risk associated with an identified hazard. Related to pasture establishment identification of expected hazards are by most caused by using unsafe hand tools and equipment, plant allergy, insects, spiders, snakes, poor manual handling ... therefore the process of hazard identification should be guided by taking in to consideration of the above and other related situations.



During the operation of conservation work the workers use different tools, which are sharpen. To keep their health the workers are expected to fulfill the following requirements;

- Provide first aid kit
- Before starting their work, the workers check the arrangement of the tools
- Pickup the tools with great care
- Take care of sharpen tools
- Use these tools properly
- Identify rusted tools
- If they are reusable use them for other purpose

Before beginning their activities the workers be aware about the work place. This awareness may help the workers about what they will do, which instruments they will use, and what type of conservation mechanism they will apply and so on.

During these activities different occupational health hazards may occur. From these hazards some of them may be; erosion, slip, injury and others damages are expected.

<b>Self-Check -4</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below

1. **What is hazard?**
2. **What is OHS?**
3. **What is hazard control?**
4. **What are OHS requirement and work place information?**

**Note: Satisfactory rating – 3 points**

**Unsatisfactory - below 3 points**

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

### **Answer Sheet**

Score = \_\_\_\_\_

Rating: \_\_\_\_\_

Name: \_\_\_\_\_

Date: \_\_\_\_\_

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<b>Information Sheet-5</b>	<b>Identify and provide OHS hazards</b>
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Hazards are risks that occur when providing pasture establishment support that could affect our health or our safety.

In the different activities there could happen different hazards to our health and safety this could be identified as

Solar radiation, dust, noise, air- and soil-borne micro-organisms, fire hazard, chemicals and hazardous substances, sharp hand tools and equipment, manual handling, holes, and slippery and uneven surfaces

The hazard identification process is designed to identify all the possible situations where people may possibly be exposed to injury, illness and disease arising from all sources including the above.

Prior to the introduction of any plant, substances, processes or work practices in the workplace, it is essential for the hazard identification process to be carried out to identify whether there is any potential for injury, illness or disease associated with such introduction. This will assist you to take the necessary actions for what may otherwise be extremely costly further down the track if no action is taken at this early stage.

Carrying out hazard identification for all existing plant, substances, processes and work practices in your workplace may require some effort. If you have a large workplace, it is a good idea to split it into several discrete areas for the hazard identification process, and to tackle one area at a time. Priority should be given to areas with hazardous plant, substances, processes or environment.



<b>Self-Check -5</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below

**1. Identify OHS hazards for pasture establishment?**

*Note:* Satisfactory rating - 3 points      Unsatisfactory - below 3 points

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

**Answer Sheet**

Score = _____
Rating: _____

Name: \_\_\_\_\_

Date: \_\_\_\_\_





<b>Instruction Sheet</b>	<b>Learning Guide #48 Undertake pasture establishment and preservation activities</b>
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This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics

- Providing instructions and directions.
- Undertaking pasture establishment activities and preservation methods
- Undertaking work *task* in a safe and environmentally appropriate
- Carryout interactions with other staff, farmer and customers.
- Observing enterprise or cooperative policy and procedures

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**

- Provide instructions and directions to pasture establishment
- Undertake pasture establishment activities and preservation methods to pasture establishment
- Undertake work *task* in a safe and environmentally appropriate pasture establishment
- Carryout interactions with other staff, farmer and customers to pasture establishment
- Observe enterprise or cooperative policy and procedures to pasture establishment

### **Learning Instructions:**

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the information “Sheet 1, Sheet 2, Sheet 3, Sheet 4”and Sheet 5
4. Accomplish the “Self-check 1, Self-check t 2, Self-check 3, Self-check 4”and Selfchek”5 in page 24,46,48, 50and 52 respectively.
5. If you earned a satisfactory evaluation from the “Self-check” If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1, Operation Sheet 2 , Operation Sheet 3 ” and Operation Sheet 4 **in page -,54,55,and 56**
6. Do the “LAP test” **in page – 57**(if you are ready).

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<b>Information Sheet-1</b>	<b>Provide instruction and direction</b>
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Instruction is a statement of principles that the organization prepare to manage their employees, the work activities and environmental issues. Instruction gives a clear direction to the members of the entire organization. It will also be the basis for any occupational health and safety decisions and action.

Prior to undertaking tasks it is essential to obtain and confirm your work instructions and quality requirements. When you have your work instructions, make sure you understand what is required of you so you can apply them effectively.

### Sources of Work Instructions

Instructions may come from a variety of work site sources including

Source	Types
<b>Plans</b>	<ul style="list-style-type: none"> <li>• Schedules.</li> <li>• Work plans.</li> <li>• Environmental plans.</li> <li>• Safety plans.</li> <li>• Task procedures.</li> <li>• Safe Work Method Statements (SWMS).</li> </ul>
<b>Specifications</b>	<ul style="list-style-type: none"> <li>• Task specifications.</li> <li>• Machinery specifications.</li> <li>• Equipment specifications.</li> <li>• Material specifications.</li> <li>• Site-specific instructions</li> </ul>
<b>Operational Details</b>	<ul style="list-style-type: none"> <li>• Timeframes.</li> <li>• Material availability.</li> <li>• Weather conditions.</li> <li>• Prior task completions.</li> </ul>
<b>Quality Requirements</b>	<ul style="list-style-type: none"> <li>• Detail what is to be done and to what standards,</li> <li>• which may be from:</li> <li>• Dimensions.</li> <li>• Tolerances.</li> <li>• Work standards.</li> <li>• Material standards from:</li> <li>• Project drawings.</li> </ul>



	<ul style="list-style-type: none"> <li>• Specifications.</li> <li>• Project documentation.</li> <li>• Client standards.</li> </ul>
<b>On Site Meetings</b>	<ul style="list-style-type: none"> <li>• These allow you to give suggestions, make comments and assist in decision processes</li> </ul>
<b>Supervisors and/or managers</b>	<ul style="list-style-type: none"> <li>• Written</li> <li>• Verbal</li> </ul>

Your work instructions could be in the form of:

- Written documents.
- Drawings.
- Sketches.
- Maps.
- Plans.
- Specifications.
- Reports
- Verbal from supervisor/manager



It is important for you to follow directions and work instructions provided by your supervisor when you are working. If you don't follow instructions and directions, you will not be successful at your job and you will result in loss of materials and product, customer complaints, or liability issues. You have to listen to your supervisor's verbal or written directions and follow them for your job to be complete

<b>Self-Check -1</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below

**1. What is instruction?**

**Note:** Satisfactory rating - 3 points      Unsatisfactory - below 3 points

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

**Answer Sheet**

Score = _____
Rating: _____



Name: \_\_\_\_\_

Date: \_\_\_\_\_

<b>Information Sheet-2</b>	<b>Undertake pasture establishment activities and preservation methods</b>
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## **Definitions**

**Pasture:** is a land which is enclosed and separated from surrounding areas by fence or other barriers and devoted to the production of forage for harvest primarily by grazing

**Forage:** herbaceous plants or plant parts consumed by animals

**Forage crop:** plants grown primarily for livestock feeding and either used for grazing or harvested for green chop feeding, silage or hay

**Browse:** leaf and twig growth of shrubs, woody vines trees cacti and other non-herbaceous vegetation available for animal consumption

### **1. Types of pasture**

The most widespread forage resource in the world is the natural vegetation in its various forms, including range; forest .Natural vegetation can be a main source of forage for the animals kept not only by pastoralists but also by smallholder farmers. Pasture is grazing land under relatively intensive management, usually supporting introduced forage species and receiving periodic cultural treatment, such as tillage, fertilization, mowing and irrigation. Pasture can be natural or improved pasture, which is artificially established.

#### **1.1. Natural pasture**

Natural grasslands extending over a wide area and composed of native grasses, herbs and shrubs valuable for forage and in sufficient quantity to justify grazing use are referred as rangeland or natural pasture. Natural pastures include annual and perennial species of grasses, forbs and trees (Masiwa, 1998). The Natural forage resource, although found in a wide varieties of Agro ecological zone, have several common characteristics.

- Depends on natural plant growth without cultivation , sowing or application of fertilizer or other agrochemicals

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- Opportunities to change the composition and structure of the vegetation are limited (manipulating the way it is used ,adjusting stocking or setting or excluding fire )
- The possibilities of increasing vegetation yield and animal production are very limited
- The forage is produced with minimal expenditure.

### **Classification of natural forage**

The wide diversity of natural vegetation used as forage can be classified as Geo-ecological or in functional terms. These are:

1. **Savannas** in the tropics and sub tropics, essentially grassland either without trees or shrubs or with a crown of woody species covering up to 40% of the area.
2. **Steppes** in Mediterranean and highland areas and in central Asia, normally with dry summers and rainfall in winter, when low temperature can severely limit plant growth. The vegetation consists mainly of perennial grass growing in tussocks, with some short lived annuals in the space between them.
3. **Semi-desert and desert vegetation**, where rainfall is low and very irregular and plant growth is often confined to favorable sites, such as where run-off water flows in.
4. **Woodland and forests** which have denser tree /shrub cover than tree savanna. The herbaceous undergrowth can be grazed, while the tree leaves, fruits, pods and seeds provide further important source of forage.
5. **Mountain vegetation**, consisting of forest and meadows, and grassland above the limit of tree growth. Winter precipitation is often in the form of snow, both temperature and rainfall can limit plant growth.

### **1.2. Improved pasture**

Improved pastures have been reseeded, fertilized or fenced to improve productivity and utilization. This term is usually applied to rundown fields that have been renovated or rejuvenated. Areas seeded for pastures have several advantages over natural, unimproved pastures. They are higher yielding, with a better distribution of that yield over a longer grazing season. Usually newly established pastures have a good legume content and therefore do not require nitrogen fertilization for good productivity.

Pastures can be established with the intention of supplying a grazing area for a short period of time or permanently. In long term pastures the plant composition will change with time.

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Improved pasture may be annually or permanently sown improved grasses and legumes. The utilization of improved pasture is properly controlled.

For successful pasture and fodder crops establishment, thorough land preparation is essential. In Ethiopia, large-scale pasture development requires at least two field operations, ploughing and harrowing. Depending on the soil type, more than two operations may be required in some areas.

Improved pastures are not usually grazed during first year. However, in the humid warmer areas the growth of the tropical pasture species such as Rhodes grass is very fast and, therefore, they can be cut for hay or silage in the year of establishment. In the highlands of Ethiopia pasture species grow slowly and need the first year for establishment. Established pasture stands are either harvested for conserving in the form of hay or silage or grazed in situ. Species such as Rhodes grass, Panicums, and alfalfa are highly productive. Under rain fed conditions, two harvests are quite common and the first harvest after mid July is used for making silage. During this time, weather conditions make it impossible to make hay. The regrowth is then harvested for hay making, sometimes in October. The total yield for two harvests is 10-12 t DM/ha. Following hay making, the pasture fields provide considerable grazing for about 2 months (November and December). In the irrigated lowlands, alfalfa and Rhodes grass are very important. About eight harvests from Rhodes grass and 8-10 harvests from alfalfa are common per year. Their yield range is 45-55 t DM/ha/year. This yield is about four times higher as compared to the yield under rain fed conditions. In these areas, the cut and carry technique is used in combination with grazing and hay making. In the highlands, oats and vetch are very useful for green feeding, hay, and silage. Some small-scale farmers have realized the feed value of oats and vetch and have started these in their own fields. Annual yield of oats/vetch mixtures is 6-10 t DM/ha. Another high yielding and popular annual crop for the high-altitude areas is fodder beet. Beet is usually planted directly during the light rains or seedlings are raised in a nursery and transplanted during the main rains. In suitable and fertile areas, tuber yields of some 15-20 t DM/ha can be achieved.

**Establishing a new pasture** or renovating an existing pasture usually requires some management to get the forage growing quickly and vigorously. Here are some of the steps involved in establishing or renovating a pasture:

1. Soil testing and correcting soil nutrient deficiencies,

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2. Selecting species adapted to the specific area,
3. Implementing the correct seeding method and rate,
4. Implementing a weed control program,
5. Using proper management to maintain a productive stand.

### **1. Site selection**

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

#### **i. 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 12 inches of annual precipitation for adequate growth and long term survival.

#### **ii. Soil depth**

To provide sufficient water holding capacity for productive plant growth, the soil depth must be at least 18 inches.

#### **iii. 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.

#### **iv. Drainage**

Most forage species thrive in well-drained soils that have no shallow sub surface restrictive layers. The common types of restrictive layer are clay lenses and volcanic ash layers.

#### **v. Salt accumulation**

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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.

**vi. 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.

**vii. Slope**

Slopes should be less than 15% in order to accommodate planting and soil preparation equipment and minimize the potential for erosion.

**viii. Freedom from over story vegetation**

Dense over story vegetation should be removed or thinned both to decrease competition for moisture and light and to reduce the potential for soil erosion.

**2. Forage species selection**

Selecting appropriate forage species is one of the most important and fundamental in establishing pasture.

When selecting forage species consider the following things

**i. Land use objective**

It is important to choose forage species that are capable of meeting your specific land use objectives of land use pasture.

The use objective may include:

- Increasing forage production
- Controlling erosion
- Reducing weed infestation
- Restoring the native forage community

✚ If land use objective is increasing forage production, look for forage species that respond well to grazing and are productive and palatable to the animals.





- ✚ If weed suppression is a concern, consider species with good seedling vigor, high yield potential and herbicides that are commonly used on the site.

**ii. soil and climatic characteristics of the site**

It is critical that you select species that are adapted to the soil and precipitation characteristics of the chosen site. Annual precipitation is the most common determining factor for which species will successfully establish and persist on a give site. Do not select species that require more annual precipitation than a typical for the site.

**iii. Availability and cost of seed**

Seed prices and seed supplies vary from year to year depending on production and demand. The forage species that can be obtained in least cost should be chosen.

**3. Selection of seed**

Selection of quality seed is the important aspect towards the success in the establishment of pasture. Seed quality can be determined by proportion of seed that would germinate to form in to healthy plants. The following points should be considered while selecting a seed for pasture establishment.

**i. Seed viability**

The viability of any seed is its capacity to germinate when it is sown under suitable conditions for germinations. The purchased seed should contain only minimum quantity of dead seeds

**ii. Purity**

The seed should be free from contamination due to the seeds of other species, inert material, pests and disease infestation, soil straw and the like

**iii. Seed size**

Seed size is another aspect of quality seed and important component of seedling vigour. In germination stage seedlings are dependent of food stored in the seed. If the seed are bold and similar in the shape and size, then seedlings emerging from these will also likely to be similar in vigor and growth.

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#### iv. Seed dormancy

Seed dormancy is the resting period and a natural phenomenon which prevent seed germination. The reason for seed dormancy may be due to:

- ✓ Premature harvest
- ✓ Thick seed coat
- ✓ Chemicals which inhibit seed germination

### 4. Land preparation

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. The land can be cleaned by hand cutting, by fire and by using land clearing machines like dozer. Which type to use depends on the negative impact on the bio –diversity of the area and cost.

#### B. Seed-bed preparation

Seedbed preparation in farm fields often involves secondary tillage via harrows and cultivator

#### Procedures of seed bed preparation

1. The removal of debris. Insect eggs and disease spores are often found in plant debris and so this is removed from the plot. Stones and larger debris will also physically prevent the seedlings from growing.
2. Leveling. The site will have been leveled for even drainage.
3. Breaking up the soil. Compacted soil will be broken up by digging. This allows air and water to enter, and helps the seedling penetrate the soil. Smaller seeds require a finer soil structure. The surface the soil can be broken down into a fine granular structure using a tool such as a rake.
4. Soil improvement. The soil structure may be improved by the introduction of organic matter such as compost or peat.
5. Fertilizing. The nitrate and phosphate levels of the soil can be adjusted with fertilizer. If the soil is deficient in any micro nutrients, these too can be added

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Pastures usually require a well- prepared seed –bed for good germination and establishment. Two methods of seed –bed preparation are recommended.

**i. Land tilling**

- Refers to plowing (turning over) of the soil. After the tillage operation is completed, the land should be smoothed and firmed.
- Tillage is not recommended for saline soils. It brings the salt to the surface and change soil structure.

***Advantages of land tillage***

- Allows the seed bed to warm quicker( allowing for better germination at cooler temperatures )
- Controls weeds ( reduce weed infestation )
- Aerate the soil

***Disadvantages of land tillage***

- Loss of moisture through evaporation
- High potential of erosion
- Higher oxidation of organic matter

**ii. Zero-tillage ( no- tilled seed bed )**

- It involves using of herbicides to kill existing vegetation and seeding directly in to the residue. No –tilled seed bed can also be prepared by reducing surface residue prior to seeding by hard grazing or removal. The advantages of zero- tillage are:
  - The reduction of soil erosion
  - Improves moisture conservation
- Slower and less uniform seedling emergence is the disadvantages of zero-tillage.

**❖ Fertilizing and manuring**

Improved pasture requires fertile soils for optimal herbage production. Basal application of the macronutrient especially nitrogen (100-150kg/ha urea) and phosphorus ( 50kg/h TSP) are helpful for successful establishment. However, considering the economic status of farmers, it is advisable to use farmyard manure, as much as possible, at the rate of 5-10 tons/ha.

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## ❖ Sowing practice

**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.

**Spacing.** Generally spacing between two rows should not exceed 25-45cm and about 5-15cm between two plants in the row

**Depth:** Generally the smaller the seed the shallower the depth of planting. Usually, grasses are sown at the depth of 1-1.5 cm depth, while the medium sized legumes seeds are sown at 2.5cm depth.

## 2. Pasture Management practices

Pasture management is the science or art of securing maximum sustained use of improved grazing land, forage crops with animal grazing without being detrimental or without any serious damage to the resources or use of the land. Grazing management is the manipulation of grazing animals to accomplish desired results in terms of animal, plant or economic response. The main aim of grazing management practices are.

1. To provide a supply of nutritious herbage over the growing season at low cost
2. To avoid physical waste of herbage and inefficient utilization by the animal
3. To maintain the productive capacity of the sward.

Grazing management should: balance livestock demand with forage availability, promote rapid pasture regrowth during the grazing season and promote long-term pasture persistence. The art of grazing management is to ensure that there is sufficient pasture in a stage suitable to graze at all times throughout the grazing season. Several grazing management systems define different methods of harvesting the forage. Therefore, knowing the decisive factors of stocking rate per a given pasture is important.

### Determining the optimum stocking rate

Proper stocking rate refers to limiting of the number of animals, which can be grazed in a given area of pasture or range. There are six main factors influencing optimum stocking rate.

#### 1. The rate of forage growth

The amount of forage growth depends on where there is favorable climate present or not. Where there is favorable climate, high stocking rate may be employed consistent with improved pasture management practices that result in high rate of forage growth and dry matter accumulation

#### 2. Accessibility of forage to animals

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This may be limited by

- problem of predators and theft
- distribution of watering points in the pasture

### 3. The nutritive value of pasture

If high stock rate is employed on pasture with poor nutrient value, animals ingest high proportion of stem which cause a reduction in their performance

### 4. Botanical composition and ground cover

- heavy grazing due to use of high stocking rate may result in the following consequences :
  1. favor shade intolerant species
  2. cause invasion of weed
  3. cause erosion hazard

### 5. Seasonal variation in feed supply

Pasture growth varies with climatic especially rainfall. Thus, when deciding optimum stocking rate, consideration must be given to:

- the period of lower feed supply
- the amount of surplus feed for conservation

### 6. Nature of animal product

- the sensitivity of the output to nutritional stress determines stocking rate  
e.g milk is more sensitive than beef

### 3. Pasture improvement strategies

Deterioration of pasture begins when undesirable species replace the valuable forage plants. Improvement of such deteriorated pasture includes protection of land for optimum period to allow establishment of new seedling, control of animal number and relief from overgrazing. Desired vegetation can also be restored by seeding degraded pasture with suitable grass and legume species. Protection of pasture and controlled grazing alone increase the carrying capacity of pasture almost two to three times. Pasture can be improved by adopting the following techniques:

1. fencing
2. adoption of soil and water conservation measures
3. re-seeding of pasture
4. proper fertilization
5. use of legumes
6. weed and bush control
7. proper grazing management
8. pest control

### 5. Sowing

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The principles of pasture establishment are similar to those for establishing crop. Generally there are two methods of sowing namely line sowing and broadcasting. The type of sowing method to use depends on the type of equipments available and whether sowing is carried out on no-till or tilled seed bed.

**I. Line sowing:** - is the dropping of seeds into the soil in line.

**Drilling:** -involves cutting of a thin furrow in the soil, depositing the seed and then covering it with the soil.

**Cultic- packing:** - the seed is dropped from a hopper of the cultic- packer (sowing machine) on to the soil and pressed below the surface of the soil by toothed rollers fitted on the machine.

**II. Broad- casting:** - The broadcast method involves scattering seeds at random on the seed bed and then covering it lightly with soil.

The most important forage species used for sown pasture establishment of improved pasture ; Rhodes, Green panic, Desmodium, Siratro, Stylo, Phalaris, Setaria, Trifolium, Cocksfoot, Tall fescue, Vetch .

#### 1. Fundamental consideration for sown pasture establishment

- **Make** sure there is better chance of success where the rainfall is about 600mm or more
- Improved forage can behave as food crop in soil fertility requirements
- Topography must be convenient for easy farm operation and convenience of grazing animals
- Presence of power supply water , communication and road
- Make sure that the natural pasture has lost all the native desirable species and no future potential that replacing with improved species is absolutely necessary.

#### 2. Agronomic procedures of establishing sown (cultivated) pasture.

##### ❖ Selection of pasture mixture

Mixed pasture composed of grasses and legumes are preferred to solid stand for the following advantages

- More rapid establishment of the sward and better land use
- Better seasonal distribution of growth. the grazing season may be extended by the inclusion of both early-and late maturing species
- Increased production with greater palatability
- Leguminous components increase the nutritive value of the sward
- Legume fix atmospheric N and improve the nitrogen status of the pasture and soil

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The advantage of establishing perennial mixed improved pasture on prepared seedbed for utilization by controlled grazing are:

- It produce a high yielding , high quality forage
- The legumes improve or maintain soil fertility
- It allows a high stocking rate, and high level of animal production with relatively low labour inputs

❖ The role of the legume in a mixed pasture sward

1.legume have high protein content .they improve the palatability of a mixed grass-legume pasture by keeping the CP level above the critical level (7% of tropical species, 8.5% of temperate species) below which voluntary intake declines.

2. Dry matter digestibility and voluntary intake of legume is generally higher than the grasses

3. Legumes have high content of the mineral: calicum, sulphate, and phosphures , thus they provide stock with more balanced diet

4. Legumes play an important role through symbiotic N fixation and the cycling of this nitrogen in to the pasture system

### Seed treatment

The purpose of seed treatment is to break dormancy and improve seed germination. Seed treatment is also done for protection of seeds from seed borne diseases. To break dormancy, the common methods of treating the seed are hot water method, mechanical method and chemical method. A widely accepted and most suitable method is treating with hot water. The temperature of water is kept according to the recommendations for that particular seed.

### Time of sowing

- Sowing time of the forage species is influenced by a number of factors. Among these factors, the important ones are the temperatures and moisture.
- The best recommended sowing time of forage species is just early as possible in the rainy season to obtain maximum growth.

## 5. Management

### Weeding

Weeding of pasture is essential for proper growth and development of forage, because weed compete with the sown grasses and legumes for moisture, nutrients, space and light. In the first

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year the first year of pasture establishment one weeding is required after 10 – 15 days of germination.

### **Fertilizer application**

In areas receiving average annual rain fall up to 30mm, 20kgN AND 20KG P/ha should be applied as a basal dose at the time of sowing. But in the areas receiving average rainfall more than 30mm, this quantity can be increased by 40kg N and 20 kg P /ha. In case of more than one cutting, 20kgN/ha per cutting may be applied.

### **Grazing management**

#### **2.1. Types of grazing**

Objective of proper grazing system are:

- to maintain a favorable balance between herbage species
- to maintain high production of good quality forage for the longest possible period
- to achieve efficient utilization of the forage produced
- to achieve high animal production

**Grazing system** refers to manner in which grazing and non grazing periods are arranged within the maximum feasible grazing season, either within or between years. The grazing system selected must be adapted to the forage plant species being grazed, the grazing season, the physiographic of the grazing land, the nutritional needs of the kind and class of livestock to be grazed, and to the management objectives.

**For a grazing system to be effective and practical, the following characteristics are commonly suggested.**

1. it is based on and suited to the physiological requirements and life history of the primary forage plant
2. it will improve vegetation low in vigor or maintain vegetation already in high condition
3. it is adapted to existing soil condition so erosion and puddling will not result from livestock trampling
4. it will favor the desirable plants and promote high forage productivity
5. it is practical to implement and reasonably simple to operate

Utilization of pasture is one of the most important aspects of pasture land management. For proper utilization the entire area should be divided in to number of blocks based on its carrying capacity and rotational grazing system should be applied. In this system of grazing, the sequence of grazing is changed in the way that each block is grazed for specific period and protected for the rest.

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There are different systems of grazing like controlled, continuous, deferred, rotational, periodic grazing and etc. each of these has its merits and demerits. However, control of the number of animals grazing under any system is of prime importance. Grazing system in practices are as follows:

### ***1. Continuous grazing***

This grazing type is an extensive system of grazing in which the stock remains on the same pasture area for prolonged periods. Continuous grazing has often been criticized as detrimental to the vegetation. However; the cause of deterioration commonly has been due to rather heavy grazing and poor distribution of grazing. Systems of grazing in which animals are allowed to graze freely over a particular area continuously is referred as continuous grazing. If number of animals allowed to graze is higher than the carrying capacity of grassland, there is fast depletion of desirable species and deterioration of grassland in due course of time.

***2. Rotational grazing:*** is an intensive system of grassland management practiced on improved permanent or lay pasture. Rotation grazing is a generic term applied to moving grazing animals recurrently from one grazing unit (paddock) to another grazing unit in the same rotation series (group); in this regards, it is the opposite of continuous grazing.

In this type of grazing method the grazing area is subdivided into a number of paddocks, usually at least six, and the animals are moved systematically from one to another of these in rotation. Each paddock is grazed for a period of 3 to 7 days, the length of the grazing period depending on stocking rate and herbage growth rate.

Rotational grazing involves fencing a pasture into several small paddocks. Subdivision is a useful way to balance livestock needs with forage supply. Livestock graze the paddocks in sequence, moving to a new paddock when the forage is ready for grazing. In general, put livestock into a paddock when the forage is 25–30 cm tall; remove livestock when the pasture is grazed down to 8 cm. A relatively high stocking rate for the size of the paddock forces the animals to be less selective in their grazing and to graze the paddock off evenly. The animals are removed before they start to graze new plant growth and the paddocks are rested.

Dividing the fields allows some of the paddocks to be harvested for hay early in the season. This hay can be fed back if and when the pastures do not produce enough forage for the livestock. When planning the area to be cut, consider how much will be needed to support the livestock until

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the hay aftermath is ready to be grazed. The later the first cut, the slower the regrowth. This delays putting the cut area back into pasture rotation and puts extra pressure on the grazed area.

The following terms are pertinent for describing and discussing rotation grazing, by definition a basic component of each grazing system:

**Paddock:** One of the grazing units or subunits included in a rotation group

**Grazing period:** One of a series of uninterrupted occupancies within a paddock

**Non grazing period:** A period of rest (i.e., grazing animals are prevented access to a specific area, ranging from a short period of a few days to a year or more.

**Grazing period cycle:** The sum of one grazing period and the following non-grazing  
**Grazing system cycle:** The length of time required for all grazing methods

According to Matches and Burns (1985), three major advantages of rotation grazing over continuous grazing on improved pasture are

- i. improved plant persistence,
- ii. Opportunities to conserve (mechanically harvest) surplus forage, and
- iii. More timely thus more efficient utilization of forage.

With rotation grazing, excess forage can be harvested as hay or silage for feeding during periods of low forage production; losses due to herbage trampling, fouling, and senescence are reduced by more timely utilization. On the other hand, continuous grazing has the advantage of lower input costs such as fencing and water facilities; also, management decisions are simplified because livestock are not being managed using high density and restricted area which require frequent moves from grazing unit to grazing unit.

### **Designing a Rotational Grazing System**

To design a rotational grazing system, inventory the:

- state of your pastures
- layout of current fences
- Location of watering and handling facilities.

To keep costs reasonable, incorporate the existing fencing into the scheme. All paddocks must have access to water and the layout must accommodate this. An alley system is useful for moving livestock back and forth to a common destination. Estimate the productivity of the pastures. Paddocks do not have to be the same size, but it makes it easier to manage them if they have a similar degree of productivity. Divide extremely productive pastures into smaller areas than poorly producing pastures. Set up paddocks on hills to run across the field, rather than up and down. This eliminates the selective grazing that normally takes place on slopes. If given the opportunity, livestock will camp on the top of hills and reject the forage at the bottom.

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## Number of Paddocks

The number of paddocks required is based on the length of time it takes for the pasture to recover after being grazed. This is essential for keeping the pastures productive. A French scientist, André Voisin, devised the following simple formula to calculate the number of paddocks required for efficient grazing:

Number of paddocks required = (days of rest period / days of grazing in one paddock) + 1

## Length of Rest Period

The number of days required for rest differs over the grazing season. In the spring cool season forages grow at twice the rate than they grow in summer. A good working guideline is that it takes 15–20 days in the spring and 30–40 days in the summer for most forage species to recover after grazing. However, recovery rate is influenced by the individual species, how they have been grazed and the weather. The required rest period fluctuates not only within the season but also from year to year. A good rotational system must be flexible to handle these changes.

## Days of Grazing per Paddock

The time the animals spend in a paddock must be long enough to graze the pasture off evenly but short enough to prevent grazing of new regrowth. The faster the animals are in and out of a pasture the better in terms of forage production. Seven days is the maximum time that animals should remain in a paddock. The animals should be moved on to the next paddock when it is ready to be grazed even if they have not finished grazing the first. This is to prevent the next field from becoming too mature and being largely wasted by the animals. If the animals cannot keep up to forage production, a hay or silage crop, if possible, should be taken.

Because of the differences in recovery rates in the spring and summer, only half the number of paddocks needed in the summer are required in the spring. Hay or silage with half of the spring production is one solution to balancing the forage supply with livestock demand. The other option is to expand the land base for summer grazing by incorporating the aftermath of hay fields. Most pasture systems are more effective if they include grazing hay aftermath, reducing stocking rates in midsummer.

## Paddock Shape

Paddocks work best if they are square, rather than rectangular or irregularly shaped. Long, thin paddocks tend to encourage livestock to graze at the end nearest water, minerals or shade, and to avoid grazing the distant end. Square corners are easier to hay or clip. Design your paddocks to allow access to machinery for carrying out these operations as well as fertilizing.

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**3. Strip grazing:** is a more intensive method of rotational grazing based on the use of electric fence, which is moved forward once or twice a day. In this system the animals are given just enough pasture to supply 1/2 to 1 day's requirements. The fence is moved once or twice daily to provide fresh forage. A second wire can "follow" the animals to prevent movement back onto grazed areas. While this is the most labour intensive method of grazing, it results in the highest quality feed, the least waste and least damage to a pasture

Strip grazing also known as ration-grazing or formerly the hohenstein system which involves moving livestock every 1 to 3 days or every half day to a new grazing unit of fresh herbage. Movable front and back fence often consisting of a single stand of electric fence\ divide off long strip of pasture into small paddocks to ensure complete forage harvesting, the front fence keeps the animals from advancing until the planned move while the back fence keeps animals of the previously grazed strip to allow undistributed pasture regrowth.

Strip grazing is generally limited to intensive, land-limited, high production enterprise to justify the high degree of management and investment required. It is used primarily on short-term improved pasture, particularly with dairy cattle, but is also adapted to pasture finishing of lambs or feeder cattle.

**Advantage:** selective grazing is minimized resulting in more uniform consumption

**Applicability:** a, highly productive and nutritious pasture

**4. Deferred grazing** is the setting aside of certain pasture paddock for use at later stage eg. Standing hay

Deferment, early season non grazing |delayed grazing| and rest treatment are based on providing non grazing within the feasible grazing season during periods that are expected to enhance the forage stand.

Deferment provides for nongrazing from the breaking of dormancy until after seed set or equivalent vegetative reproduction is meaningful only when applied to perennial forage plant species and is best adapted to areas where both growth and grazing are seasonal. Forage quality is seldom directly enhanced by deferment from grazing, although it may be indirectly enhanced if deferment induces a desirable qualitative change in species composition over time. However, in order to maximize nutritive value of the forage consumed, deferment should not be applied to improved, intensively management pasture. Deferment is generally unnecessary to maintain vigor in improved pastures, shortens the green growth period, and reduces nutritive quality by advancing forage maturity.

The objective of deferment are to increase seed production, enhance seedling establishment , protect plants susceptible to trampling damage and defoliation in early spring and to prevent overgrazing during low forage availability during early spring.

**Advantage:** A. plants vigor is built up

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B. enables self –regeneration from fallen seed

**5. Soiling or zero grazing:** is the feeding of cut crops to housed stocks. Bringing forage to animals has the advantages that animals can be tightly controlled, farmers can determine what the animals are offered to eat, manure can be collected easily, and the animals have less contact with certain biting flies and ticks. The soiling includes a wide variety of arable and forage crops. Zero grazing relates to feeding of crops which are normally grazed. There is higher production in zero grazing but the heavy labor demand makes it too expensive. Zero grazing is more suitable for all forage species where there can be excessive damaged by trampling and fouling of crop used in situ. It is also suitable for intensive production and for keeping animals in densely populated areas such as large villages or cities. However, it is very labour intensive: a cow may eat 40 or more kg of fresh forage daily, all of which must be brought to it.

**Advantage:** a/efficient herbage utilization

b/ no loss due to trampling

c/ uniform herbage intake

d, control bloat through wilting

**Disadvantage:** a, high cost for labor or machinery

b, bedding required for housed stock

c, manure disposal is laborious

### **6. Forward Grazing**

This is a variation of rotational grazing where the pasture is grazed by 2 groups of animals. The first groups into a paddock are those with the higher nutritional needs. They graze the tops of the plants — the most nutritional — and are not forced to graze forage of lower quality. The second group, with lower nutrient requirements, grazes the forage left by the first group. This system works well where milking cows are the first to graze a paddock, with dry cows or heifers used to clean up the pasture. Young animals are allowed access to pastures ahead of their dams.

### **7. Mixed Grazing**

This approach to grazing management takes advantage of the fact that different types of livestock like to graze different plants. Two or more types of animals graze the paddock at the same time or follow one another through the paddocks. Sheep and cattle make a good combination. Do not graze sheep with horses.

## **6. Feed preservation methods**

**Feed preservation:** is keeping green animal feed (without very much loss of its quality) to use it during deficiency of green feed. Conservation of forage to bridge the gap in the supply and

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quality of fodder between wet and dry seasons is an applicable method of efficient utilization of feed resources.

**Hay:** is grass, legumes or other herbaceous plants that have been cut dried and stored for use as animal feed particularly for grazing animals

**Silage:** is fermented, high-moisture fodder that can be fed to ruminants.

**Fodder** is any agricultural foodstuff used specifically to feed domesticated animal such as cattle, goats, sheep, horses, chickens and pigs and legumes.

## 1. Hay making

Hay is the most common and important conserved fodder used to maintain feed supplies throughout the year. Hay is produced by dehydrating green forage to a moisture content of 15% or less. 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.

### Steps of hay making

#### I. *Harvesting*

Stage of maturity is the most important factor that influences chemical composition and quality.

#### II *Drying*

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

#### Iii *Storing*

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.

## 2. Silage making

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Silage making is the best method of fodder conservation. Making silage involves cutting fodder at the optimum stage of development, chopping to the right size and proper compaction to create an air-tight condition.

### **Steps of Silage Making**

#### **i. Harvesting fodder to be ensiled**

The forage crop going to be made in to silage should be harvested at the right stage of maturity. The quality of silage depends upon the stage of harvesting. The stage of plant growth at harvest mainly affects the amounts of digestible protein and energy. Recommended stages of harvest are: Legumes and grass legume mixtures, when legumes reach the 10% bloom stage.

**In general**, grasses should be harvested just before flowering.

#### **ii. Wilting**

The crops should contain about 30-35% dry matter at the time of ensiling. If moisture content is high, first wilt the crop to 30-35 % dry matter content by spreading the fodder under shade and frequently checking the drop in the moisture content so that the material will not be too dry.

#### **Iii Chopping**

Chop the fodder into small pieces (1-3cm) before ensiling. Chopping makes it easy to compact the silage and to remove the air. The fodder can be chopped by hand, with a large knife / guillotine, or using a chaff-cutter with a rotating blade if available.

#### **Iv Filling and compacting**

Fill the chopped fodder into one of the silo layer by layer and compress and compact in such a manner that no air pockets are left. After the silo is filled in such manner it should be packed in the way that rain water or flood and air is not entered to it.

- 3. Green chopping:** is the machine harvested forage is fed to the livestock in self feeding wagons or conventional feed in bunks in dry lot.

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<b>Self-Check -2</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below

1. \_\_\_\_ is grass, legumes or other herbaceous plants that have been cut dried and stored for use as animal feed particularly for grazing animals  
**A . Hay B . Silage C. forage D. legume**
2. \_\_\_\_ is fermented, high-moisture fodder that can be fed to ruminants  
**A . Hay B . Silage C. forage D. legume**
3. *What is feed preservation?*
4. *What are sowing methods?*
5. *What is green chopping?*
6. *What are the characteristics of seed quality?*

**Note: Satisfactory rating - 3 points      Unsatisfactory - below 3points**

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

### **Answer Sheet**

Score = _____
Rating: _____

Name: \_\_\_\_\_

Date: \_\_\_\_\_





<b>Information Sheet-3</b>	<b>Undertake work <i>task</i> in a safe and environmentally appropriate</b>
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The operation of pasture establishment need care to protect the environment from different problems like Plant debris, Litter and broken components, Plastic, Metal, paper-based materials.

These may be recycled, re-used, returned to the manufacturer or disposed of according to enterprise work procedures.

During work operation the workers keep the working environment neat or clean by accumulating the generated wastes at the time of preparation of work place. In the other way before starting the work, the working environment should be ready to operate or begin the work. This situation initiates the workers to perform their work properly and accurately. Sometimes unsafe work place may discourage the workers and delay the work activities. To prohibit this condition the workers perform their work in a safe and environmentally sound manner without polluting the environment.

<b>Self-Check -3</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below

**1. Identify problems of environment in pasture establishment?**

**Note: Satisfactory rating – 3 points**

**Unsatisfactory - below 3 points**

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

**Answer Sheet**

Score = _____
Rating: _____

Name: \_\_\_\_\_

Date: \_\_\_\_\_



<b>Information Sheet-4</b>	<b>Carryout interactions with other staff, farmer and customers</b>
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Interaction is very important to understand the overall activities of conservation works with other staffs. The interaction may create some impression between the workers and other staffs about the significance of pasture establishment and environmental importance. In addition to these the interaction also develops positive relationship among the industry, staff and customers in order to protect the pasture establishment from different damaging agents.

<b>Self-Check -4</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below

*1. What is the advantage of work with other staff?*

**Note: Satisfactory rating - 3 points**

**Unsatisfactory - below 3 points**

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

**Answer Sheet**

Score = _____
Rating: _____

Name: \_\_\_\_\_

Date: \_\_\_\_\_



<b>Information Sheet-5</b>	<b>Observe enterprise or cooperative policy and procedures</b>
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Any enterprise has its own policy and procedures that helps to guide the work operators how to use their time, how to perform their work, how to handle their tools, materials and equipments and other activities. Therefore, the employee before starting their work, they should know or understand the enterprise policies and procedures to perform their work properly with in proposed time. Knowing the policy and procedures of the enterprise may support the employee from doing wrong things.

<b>Self-Check -5</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below

**1. Why observe enterprise or cooperative policy and procedures?**

**Note: Satisfactory rating - 3 points**

**Unsatisfactory - below 3 points**

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

**Answer Sheet**

Score = _____
Rating: _____

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Operation Sheet-1****Undertake pasture establishment activities and preservation methods****Title: Undertake pasture establishment activities and preservation methods**

**Purpose:** procedures of establishing pasture

**Condition:** Safe and good working environment

**Supplies & Materials** Machete axe, sickle, picks, hay fork, shovel/spade

**Procedure:**

- .1. Soil testing and correcting soil nutrient deficiencies,
2. Selecting species adapted to the specific area,
3. Implementing the correct seeding method and rate,
4. Implementing a weed control program,
5. Using proper management to maintain a productive stand.

**Precautions:**

- Safety first (for yourself, friends, tools & equipment's)
- Use right equipment for the right purpose
- Strictly follow the given procedures
- Put each tools and equipment and work shop after the session

**Criteria:**

- All steps were completed in the correct sequence.
- All precautions were followed



**Title: Undertake pasture establishment activities and preservation methods**

**Purpose:** procedures of seed bed preparation

**Condition:** Safe and good working environment

**Supplies & Materials** Machete axe, sickle, picks, hay fork, shovel/spade

**Procedure:**

Step1 The removal of debris.

Step2 Leveling

Step3 Breaking up the soil

Step4 Soil improvement

Step5 Fertilizing

**Precautions:**

- Safety first (for yourself, friends, tools & equipment's)
- Use right equipment for the right purpose
- Strictly follow the given procedures
- Put each tools and equipment and work shop after the session

**Criteria:**

- All steps were completed in the correct sequence.
- All precautions were followed



\Operation Sheet-3	Undertake pasture establishment activities and preservation methods
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**Title:** Undertake pasture establishment activities and preservation methods

**Purpose:** prepare hay making

**Condition:** Safe and good working environment

**Supplies & Materials** Machete axe, sickle, picks, hay fork, shovel/spade

**Procedure:**

**Step1** *Harvesting*

Step2 *Drying*

**Step3** *Storing*

**Precautions:**

- Safety first (for yourself, friends, tools & equipment's)
- Use right equipment for the right purpose
- Strictly follow the given procedures
- Put each tools and equipment and work shop after the session

**Criteria:**

- All steps were completed in the correct sequence.
- All precautions were followed.



<b>Operation Sheet-4</b>	<b>Undertake pasture establishment activities and preservation methods</b>
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**Title:** Undertake pasture establishment activities and preservation methods

**Purpose:** prepare silage making

**Condition:** Safe and good working environment

**Supplies & Materials** Machete axe, sickle, picks, hay fork, shovel/spade

**Procedure:**

**Step1 Harvesting fodder to be ensiled**

**Step2 Wilting**

**Step3 Chopping**

**Step4 Filling and compacting**

**Precautions:**

- Safety first (for yourself, friends, tools & equipment's)
- Use right equipment for the right purpose
- Strictly follow the given procedures
- Put each tools and equipment and work shop after the session

**Criteria:**

- All steps were completed in the correct sequence.
- All precautions were followed.



<b>LAP Test</b>	<b>Practical Demonstration</b>
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Name: \_\_\_\_\_ Date: \_\_\_\_\_

Time started: \_\_\_\_\_ Time finished: \_\_\_\_\_

**Instructions:** Given necessary templates, tools and materials you are required to perform the following tasks within 2 hour.

**Task1. Prepare hay making**

**Task2. Prepare silage making**

**Task3 prepare seed bed**

**Take 4 procedures of establishing pasture**





<b>Instruction Sheet</b>	<b>Learning Guide # 49 Clean up and store materials and equipment</b>
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This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics

- Storing waste materials in a designated areas
- Handling and transporting materials, equipments and machinery
- Returning materials
- Cleaning, maintaining and store tools and equipment.

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**

- Store waste materials in a designated areas
- Handle and transport materials, equipments and machinery
- Return materials
- Cleaning, maintaining and store tools and equipment.

**Learning Instructions:**

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described
3. Read the information written in the information “Sheet
4. Accomplish each “Self-check respectively.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to the next or “Operation Sheet
6. Do the “LAP test”

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<b>Information Sheet-1</b>	<b>Store waste materials in a designated areas</b>
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The law says you must keep every part of your construction site in ‘good order’ and every place of work clean”. The objective is to achieve what is usually called a good standard of working site. In addition, all contractors must plan, manage and monitor their work so it is carried safely and without risks to health and environment. This includes careful planning on how the site will be kept tidy and work operation actively managed.

Safe and efficient waste materials storage depends on good co-operation and co-ordination between everyone involved including, client, contractors, suppliers and the residents.

**Storage areas-** designate storage areas for Plant debris, Litter and broken components, Plastic, Metal, paper-based materials.

These may be recycled, re-used, returned to the manufacturer or disposed of according to enterprise work procedures.

**Pedestrian routes-** do not allow storage to ‘spread’ in an uncontrolled manner on to footpaths and other walkways. Do not store materials where they obstruct access routes or where they could interfere with emergency escape;

- **Flammable materials-** will usually need to be stored away from other materials and protected from accidental ignition;

Storing of plants and materials involve diverse operations; such as hosting tone of cut wooden materials, piece of irons, destroyed seedlings, surplus plant and materials and others should be collected and stored properly during cleaning. The efficient storing of materials is vital to industry. In addition to raw materials, these operations provide a continuous flow of parts and assemblies through the workplace and ensure the materials are available when needed. Unfortunately, the improper handling and storing of materials often result in costly injuries.

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<b>Self-Check -1</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below

***1. Why store waste materials in designated area?***

**Note: Satisfactory rating – 3 points**

**Unsatisfactory - below 3 points**

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

**Answer Sheet**

Score = _____
Rating: _____

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Information Sheet-2****Handle and transport materials, equipments and machinery**

To operate these work activity different materials, equipments and machinery are very important component of the work. These mentioned materials, equipment and machinery needs great care during handling and transportation. During handling and transportation the users of these materials, equipment and machinery should give great emphasis to sustain their durability unless they may be exposed for different damage and for unexpected expense.

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

**Directions:** Answer all the questions listed below

**1. Why Handle and transport materials, equipments and machinery?**

**Note:** Satisfactory rating - 3 points      Unsatisfactory - below 3 points

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

**Answer Sheet**

Score = \_\_\_\_\_

Rating: \_\_\_\_\_

Name: \_\_\_\_\_

Date: \_\_\_\_\_



<b>Information Sheet-3</b>	<b>Cleaning, maintaining and store tools and equipment.</b>
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The work place should be clear and safe always, this favorable situation encourages the workers to perform their task properly. To sustain clean and safe work site, this place should be cleaned before starting and after finishing their work.

Regular maintenance is essential to keep equipment, machines and the work environment safe and reliable. Lack of maintenance or inadequate maintenance can lead to dangerous situations, accidents and health problems. Maintenance is a high-risk activity with some of the hazards resulting from the nature of the work. Maintenance is carried out in all pasture establishment and all workplaces.

<b>Self-Check -3</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below

### 1. Why cleaning, maintaining and store tools and equipment

**Note: Satisfactory rating - 3 points**

**Unsatisfactory - below 2 points**

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

**Answer Sheet**

Score = _____
Rating: _____

Name: \_\_\_\_\_

Date: \_\_\_\_\_



<b>Instruction Sheet</b>	<b>Learning Guide #50 Record and report work activities</b>
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This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics

- Recording activities accomplishment and incidences
- Reporting problems or difficulties in completing work
- Reporting 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**

- Record activities accomplishment and incidences
- Report problems or difficulties in completing work
- Report work outcomes

**Learning Instructions:**

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described
3. Read the information written in the information “Sheet
4. Accomplish each “Self-check respectively.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to the next or “Operation Sheet
6. Do the “LAP test”

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<b>Information Sheet-1</b>	<b>Recording activities accomplishment and incidences</b>
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These are the things to be considered when:

### **A. Receiving Materials**

1. Match the packing slip to the items received and ensures that the materials are destined on tour department.
2. That you are receiving the materials indicated on the purchase order with regard to quantity and discount.
3. That the materials are in acceptable condition.
4. That terms regarding installation and/or set-up of equipment are met.

### **B. Receiving Reports**

Whenever goods are received:

1. The person receiving the goods must document, using the administrative software, that all goods were received for each requisition before any payment can be made to the vendor.
2. Any exceptions must be noted so that partial payments can be processed or defective goods can be returned.

### **C. Return of Merchandise**

- When merchandise is received which is incomplete or defective, the supervisor will return the materials to the supplier or to the store where it was bought and make arrangements with the vendor for replacement.

### **D. Make an Inventory Report of the Materials**

- All materials received must be listed and be reported to monitor how many materials are already on hand, purchased or damaged.
- Effective management checks are an important means of providing assurance of the integrity and security of the benefit processes.
- They are also useful in identifying training needs; indicating and other activities record.

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<b>Self-Check -1</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below

**1. When recording activities accomplishment and incidences**

**Note: Satisfactory rating - 3 points      Unsatisfactory - below 3 points**

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

**Answer Sheet**

Score = _____
Rating: _____

Name: \_\_\_\_\_

Date: \_\_\_\_\_





<b>Information Sheet-2</b>	<b>Report problems or difficulties in completing work</b>
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During the process of pasture work operation, the workers and the working environment may face certain challenges; to tackle these challenges reporting of problems and difficulties is very important. This is because inconvenient situations may face the workers and the people those settled around the working environment.

Related to the above conditions and performance to achieving the goal of the task, problems and difficulties are practically expected to be seen. These situations should be immediately reported to directly concerned bodies to correct and retain the work functional, productive and safe.

<b>Self-Check -2</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below

1. *Why* report problems or difficulties in completing work

**Note: Satisfactory rating – 3 points**

**Unsatisfactory - below 3 points**

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

### Answer Sheet

Score = _____
Rating: _____

Name: \_\_\_\_\_

Date: \_\_\_\_\_

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<b>Information Sheet-3</b>	<b>Report work outcomes</b>
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During the completion of pasture establishment we should report to the concerned body about all performance of activities and their outcomes. It will be better if the report reflects the target and its achievement on percent base. Concerning tools, equipments and materials, inventory results of all items can be taken as report; especially the condition of all tools, equipment and pasture establishment should be reported

<b>Self-Check -3</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below

**1. What items are report outcomes in pasture establishment?**

**Note: Satisfactory rating – 3 points**

**Unsatisfactory - below 3 points**

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

**Answer Sheet**

Score = _____
Rating: _____

Name: \_\_\_\_\_

Date: \_\_\_\_\_



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