



Republic of Rwanda
Ministry of Education



RTB | RWANDA
TVET BOARD

ANHCF302

FODDER CROPS CONSERVATION AND DISTRIBUTION

Conserve and distribute fodder crops

Competence

RQF Level: 3

Learning Hours



50

Credits: 5

Sector: Agriculture and Food processing

Trade: : Animal health

Module Type: Specific

Curriculum: AFPANH3002- TVET Certificate 3 in Animal health

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Purpose statement	This module covers the knowledge; skills and attitudes required to manage livestock feeds by conserving and distributing fodder crops in an optimum manner. It is intended for learners who have successfully completed ordinary level, level II in animal health or its equivalent and pursuing TVET level III and related qualification. Upon completion of this module, the trainee will be able to: Identify tools and Equipment for fodder crop conservation, Identify fodder crops and methods of fodder crops conservation, perform silage making, perform hay making and storage and distribute silages and hays					
LEANING ASSUMED TO BE IN PLACE	Applied biology, Applied chemistry					
Delivery modality	Training delivery		100%	Assessment		Total 100%
	Theoretical content		30%	Formative assessment	30%	50%
	Practical work:		70%		70%	
	• Group project and presentation	20%				
	• Individual project /Work	50%				
			Summative Assessment		50%	

Elements of Competency and Performance Criteria

Elements of competency	Performance criteria
1. Identify tools and Equipment for fodder crop conservation	1.1. Fodder harvesting and conservation materials, tools and equipment are properly identified as per their types
	1.2 Fodder harvesting and conservation materials are properly selected by their size, cost, availability and efficiency.
	1.3.Silage additives are properly identified as per their weight balance and their nutritional standards
2.Select fodder crops and their conservation	2.1.Conservable fodder crops are properly identified according to the fodder species
	2.2. Conservable fodder crops are properly selected according to their stages,

methods	and nutritional values
	2.3. Fodder crops conservation methods are properly selected as per their technical requirements and palatability.
3.Perform silage making	3.1.Silo site is properly selected according to soil structure and land slope
	3.2. silo is properly identified and selected according to their types and capacity
	3.3Silo is properly prepared as per their volumes and types as per their water concentration requirement
	3.4.Fodder crops are properly wilted as per their water concentration requirement
	3.5.Fodder crops for silage making are properly chopped as per their piece length.
	3.6.Silage additives are properly selected as their types and nutritional requirements
	3.7Silage additives are properly utilized as per their concentration and weight balance requirements
	3.8. Proper silo is properly filled and compressed as per their density
	3.9.silo is properly covered and sealed according to the types of silo
4. Perform hay making and storage	4.1. Fodder crop to dry are properly collected as per their botanical pattern
	4.2. Fodder crops are properly dried as per their Dry Matter content, temperature, humidity requirements
	4.3. Stored hays are properly ventilated according to the relative humidity and fodder species
	4.4Hay store is properly protected as per their safety standards
5. Distribute Silage and Hay	5.1. Silage and hay quality to feed is selected as per their physical and biochemical standards
	5.2. Bad quality silage is properly disposed as per their safety standards
	5.3.Quantities of silage and hays are properly calculated according to the animal requirements
	5.4 Silage and hays are treated and distributed as per their bromatological composition and palatability.

Course content

Learning outcomes	At the end of the module the learner will be able to: 1. Identify tools and Equipment for fodder crop conservation 2. Select fodder crops and their conservation methods 3. Perform silage making 4. Perform hay making and storage 5. Distribute Silage and Hay
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Learning outcome 1: Identify tools and Equipment for fodder crop conservation		Learning hours: 5
Indicative content		
• Identification of Fodder harvesting and conservation materials, tools and equipment ✓ Types of Fodder Harvesting materials, tools and equipment ✓ Conservation materials, tools and equipment • Selection of Fodder harvesting and conservation materials ✓ Selection criteria for fodder harvesting materials ✓ Selection criteria for fodder conservation materials • Identification of silage additives ✓ Types of Silage additives ✓ Functions of silage additives ✓ Advantages and disadvantages of silage additives		
Resources required for the learning outcome		
Equipment	Audiovisual materials, cutters, scales, Warehouse, Chaff cutter	
Materials	Sheeting plastic, Fodders, urea, molasses, salt, Polyethylene bags barrel, Water, Flip chart, markers, Internet	
Tools	Scythes, sickles, hoes, Picks, shovels, axes,	
Facilitation techniques	Demonstration and simulation, individual and group work, practical exercise, trainer guided, group discussion, field visits, brainstorm ,	
Formative assessment methods	Written assessment, Oral presentation, Performance assessment	

Learning outcome 2: Select fodder crops and their conservation methods		Learning hours: 5
Indicative content		
• Identification of Conservable fodder crops ✓ Types of fodder species + Legumes/Leguminous + Grasses + Cereal plants • selection of conservable fodder crops ✓ Fodder crops Selection criteria: • Fodder crops conservation methods ✓ Types of fodder conservation methods + Wet method + Dry method + Conservation on foot/Fodder banks + Factors affecting palatability of conserved fodder crops + Factors affecting digestibility of conserved fodder crops		
Resources required for the indicative content		
Equipment	Projector, scale, PPEs, motor or manual chopper, chaff cutter	
Materials	Fodders, sheeting plastic, woods, polyethylen bags, barrel, water, pen, flip chart, markers, internet, botanical and agrostological gardens, research canter	
Tools	Machete, knife	
Facilitation techniques	Demonstration and simulation, individual and group work, practical exercise, trainer guided, group discussion	
Formative assessment methods	Written assessment, Oral presentation, Performance assessment	

Learning outcome 3: Perform silage making	Learning hours: 30
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Indicative content

- **Selection of silo site**
 - ✓ Silo site selection criteria
 - ✚ Soil structure
 - ✚ Land slope
 - ✚ Methods of conservation
- **Identification and selection of silo**
 - ✓ Types of silos
- **Preparation of silo**
 - ✓ Silo construction materials
 - ✓ Calculation of forage volume
 - ✓ Parameters influencing forage volume calculation
 - ✓ Calculation of the dimensions of a silo
 - ✓ Construction of a silo
- **Wilting fodder crops**
 - ✓ Definition of fodder Wilting
 - ✓ Objectives of fodder Wilting
 - ✓ Techniques of fodder Wilting
 - ✓ Characteristics of good wilted fodder crops
- **fodder crops chopping for silage making.**
 - ✓ Fodder crops chopping techniques
 - ✚ Manual chopping:
 - ✚ Mechanical chopping
- **Selection of silage additives**
 - ✓ Selection criteria of silage additives
- **Utilization of silage additives**
 - ✓ Objectives of silage additives
 - ✓ Calculation of silage additives amount
- **Filling and compress silo**
 - ✓ Steps of silo filling
 - ✓ Techniques of silo filling
 - ✓ Techniques of silo compression
- **Covering and sealing of silo**
 - ✓ Materials for silage silo covering and sealing

Resources required for the indicative content	
Equipment	Projector, PPEs, wheelbarrow, Motor-driven choppers,
Materials	Land,farms, pen, flip chart, markers, Internet, silo, sheeting plastic, woods,Polyethylene bags, Tarp, bricks, cement, board, chalk, homofermentative inoculants, heterofermentative inoculants, combination products, acids and acid salts, molasses and sugars, silage additives, stones, soil ,ropes.
Tools	Hoes, machetes, picks, axes, spades ,
Facilitation techniques	Demonstration and simulation, individual and group work, practical exercise, individualized, trainer guided, group discussion, brainstorming, individual research
Formative assessment methods	Written assessment, Oral presentation, Performance assessment, Product based assessment

Learning outcome 4: Perform hay making and storage	Learning hours: 5
Indicative content	
• Harvesting fodder crop to dry ✓ Selection of fodder crops to harvest ✓ Harvesting techniques ✓ Characteristics of good fodder crops for hay making ✓ Types of fodder crops to dry ✚ Grasses and cereal plants ✚ Leguminous fodder crops: • Drying of fodder crops ✓ Methods of fodder crops drying: ✚ Sun drying ✚ Oven drying	

✚ Chemical drying

- ✓ Steps of drying
- ✓ Drying conditions

- **Ventilation of stored hays**

- ✓ Advantages of hay ventilation
- ✓ Types of hay ventilation
- ✓ Techniques of hay ventilation

- **Protection of hay store**

- ✓ Tips of Planning and Design of hay store
- ✓ Site selection criteria of hay store
- ✓ Types of hay building Design
- ✓ Protection of hay store

Resources required for the indicative content

Equipment	Projector, scale, PPEs, motor or manual chopper, chaff cutter Audiovisual, Wheelbarrow, Air dehumidifier, Dry air, Ventilators, oven, Computer Cooling fan, hay box, Air heater, solar panel, Fire extinguishers
Materials	Sheeting plastic, woods, polyethylen bags, barrel, pen, flip chart, markers, internet, herbarium, oats, desmodium, sorghum, maize, Millet, Lucerne, napier grass, rhodes grass, cajanuscajan, calliandra sp. desmodium sp, leucaena, leucocephala, medicago sativa, mucuna sp, trifolium repens, pen, flip chart, markers, fodder crops, Fire extinguishers, poles, Iron sheets
Tools	- machete knife, Sickle, Moisture meter
Facilitation techniques	Demonstration and simulation, individual and group work, practical exercise, trainer guided, group discussion
Formative assessment methods	Written assessment, Oral presentation, Performance assessment

Learning outcome 5: Distribute Silage and Hay

Learning hours: 5

Indicative content	
• Selection of the silage and hay quality to feed ✓ Characteristics of a good silage ✓ Characteristics of good hay ✓ Steps of silo unloading • Disposing of the bad quality silage ✓ Causes of bad silage ✓ Characteristics of bad silage ✓ Methods of bad silage disposal • Calculation of the quantities of silage and hays ✓ Tips to calculate amount of silage and hays to feed animals ✓ Calculation of silage amount to feed animals ✓ Calculation of hays amount to fed animals • Treating and distribution of silage and hays ✓ Importance of silage and hay treatment ✓ Methods of silage and hays treatment	
Resources required for the indicative content	
Equipment	- Projector, PPEs,
Materials	Urea, molasses, Concentrate feeds, markers, timber pieces, board, Hays, Silages, sheeting plastic, woods, pen, Flip chart, , Internet
Tools	Machete knives
Facilitation techniques	• Demonstration and simulation, individual and group work, practical exercise, trainer guided, group discussion, individual research, brainstorming
Formative assessment methods	• Written assessment • Oral presentation • Performance assessment

Integrated/Summative assessment (For specific module)

A farmer of Bugesera District grows the leguminous fodder (Cajanus cajan, Calliandrops, Desmodium sp, Leucaena leucocephala, Medicago sativa) and, Pennisetum for cattle feeding and wants to keep the

forages that will be used in Dry season where there is a scarcity of fresh fodder crops. He has also the silage and hay to feed after to conserve the existence fodder. As Animal care technician you are called to help him in 5 hours to:

- a) Conserve the fodder that should be used in dry season by silage and hay marking
- b). Distribute the silage and hay.

Available tools and material : Fodder crops, Machetes, Picks, Spade, Barrel, Wheelbarrow, Polyethylene bags, Sheeting plastics, Water, Molasses, Urea, Tape measure, silage, and hay.

Assessable outcomes	Assessment criteria (Based on performance criteria)	Indicator	Observation		Marks allocation
			Yes	No	
Learning outcome 1: Identify tools and Equipment for fodder crop conservation (15%)	1.1 Fodder harvesting and conservation materials, tools and equipment are properly identified	Ind.1 Harvesting materials, tools and equipment are identified			2
		Ind.2. Conservation materials, tools and equipment are identified			2
	1.2. Fodder harvesting and conservation materials are properly selected	Ind.1 Conservation materials, tools and equipment are selected			3
		Ind.2 Criteria to select harvesting materials and tools are respected			2
		Ind.3 Criteria to select conservation materials and tools are respected			2
	1.3 Silage additives are properly identified	Ind.1 Types of silage additives are identified			2

		Ind.2 Types of silage additives are selected			2
Learning outcome 2: Select fodder crops and their conservation methods (20%)	2.1.Conservable fodder crops are properly identified	Ind.1Types of conservable fodder crops are identified			2
		Ind.2Leguminous plants are identified			2
		Ind.3 Grasses for conservation are identified			3
	2.2Conservable fodder crops are properly selected	Ind.1 Criteria to select fodder crops for conservation are identified			3
		Ind.2Criteria to select fodder crops for conservation are respected			2
	2.3 Fodder crops conservation methods are properly selected	Ind.1: Fodder conservation methods are identified			2
		Ind.2: Fodder conservation methods are selected			2
		Ind.3.Factors affecting palatability of conserved fodder crops are respected			2

		Ind.4.Factors affecting digestibility of conserved fodder crops are respected			2
Learning outcome 3:Perform silage making (25%)	3.1.Silo site is properly selected	Ind.1 Silo site is selected			2
		Ind.2Silo site selection criteria are respected			2
		Ind.1: __Types of silos are identified			2
	3.2. silo is properly identified and selected	Ind.2.silo is selected			2
		Ind.1type of silo is identified			1
	3.3Silo is properly prepared.	Ind.2silo construction materials are identified			2
		Ind.2 calculation of dimension of silo is done			1
		Ind.1.silo is prepared			1
	3.5.Fodder crops for silage making are properly chopped.	Ind.2Size of chopped fodder are respected			1
		Ind.1. Selection criteria of silage additives is respected			1
	3.6.Silage additives are properly selected	Ind.2.silage additives are			1

		selected			
		Ind.1.Calculation of additive is done			1
	3.7Silage additives are properly utilized	Ind.2.silage additives are utilized			1
		Ind.1. Steps of silo filling are respected			1
	3.8. Proper silo is properly filled and compressed.	Ind.2.Techniques of silo filling are applied			1
		Ind.3.Techniques of silo compression are applied			1
		Ind.1.Materials for silage silo covering and sealing are identified			1
	3.9.silo is properly covered and sealed	Ind.1 Covering steps are respected			1
		Ind.2. Techniques of silage silo protection are applied			1
		Ind.3.Fodder harvesting for hay making are			1

		identified			
Learning outcome:4 Perform hay making and storage (20%)	4.1. Fodder crop to dry are properly collected	Ind.1.harvesting materials are identified			2
		Ind.2 Harvesting techniques are applied			2
		Ind.3.Fodder crop to dry are properly collected			2
		Ind.4.Methods of fodder drying are identified			2
	4.2. Fodder crops are properly dried	Ind.1.Methods of fodder drying are applied			2
		Ind.2.Advantages of hay ventilation are identified			2
	4.3. Stored hays are properly ventilated	Ind.1.Techniques of hay ventilation are applied			2
		Ind.2.Site selection criteria of hay store are identified			2
	4.4Hay store is properly protected	Ind.1. Protection of hay store is applied			2
		Ind.2.Characteristics of good silage are identified			2
Learning outcome:5	5.1. Silage and hay quality to feed is selected	Ind.1 Characteristics of			2

Distribute Silage and Hay (20%)		good hay are identified			
		Ind.2.Characteristics of bad silage are identified			2
	5.2. Bad quality silage is properly disposed	Ind.1. Methods of bad silage disposal are identified			2
		Ind.2.Bad quality of silage is disposed			2
	5.3. Quantities of silage and hays are properly calculated	Ind.1. Tips to calculate amount of silage and hays to feed animals are identified			2
		Ind.2. Calculation of silage amount to feed animals is done			2
		Ind.3. Calculation of hays amount to fed animals is done			2
		Ind.4.Methods of silage and hays treatment are identified			2
	5.4 Silage and hays are treated and distributed	Ind.1. Site selection criteria			1

		of hay store are respected			
		Ind.2. Silage and hay Supplementation are used			1
		Ind.3Methods of silage and hays distribution are respected			1
		Ind.4.Methods of silage and hays distribution are respected			1
Total marks		100			
Percentage Weightage		100%			

References:

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