Animal Production

Level II

Learning Guide # 51

Unit of Competence: Assist Crop Residues Treatment and Urea Molasses Block Preparation

Module Title: Assisting Crop Residues Treatment and Urea Molasses Block Preparation

LG Code: AGR APR2 M15 0919 LO1- 51

TTLM Code: AGR APR2 TTLM 0919V1

LO4: Complete treatment and store

Instruction Sheet	Learning Guide # 51

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

- ✓ performing treatment of the crop residue
- ✓ Maintaining a clean and safe working area
- ✓ Storing the treated crop residue
- ✓ Determining targeted animals to be fed according to treatment types

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 –

- ✓ perform treatment of the crop residue
- ✓ maintain a clean and safe working area
- ✓ store the treated crop residue
- ✓ determine targeted animals to be fed according to treatment types

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information “Sheet 1, Sheet 2, Sheet 3, and Sheet 4.
4. Accomplish the “Self-check 1, Self-check 2, Self-check 3 and Self-check 4” **in page 5, 8, 10 and 13** respectively.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1” **in page - 14.**
6. Do the “LAP test” **in page – 16** (if you are ready).

Information sheet – 1	Performing treatment of the crop residue

There are many variations in the methods of treatment of low quality roughages with urea. However, the principal method consists of dissolving urea in water and sprinkling it on layers of straw. The level of urea used varies, but it is commonly between 4 - 5% of air dried mass of the straw/stover, and the amount of water used also varies from as low as 0.2 liters per kg of straw to as high as 1 liter per kg of straw. The treated straw can be stored in various ways. However, airtight storage produces the best result. The treatment of the straw can be done in pits, using polyethylene sheets as inner linings. Airtight conditions are important during the treatment period, especially for small quantities of straws. Polyethylene sheet is very effective for excluding air, but a number of locally available materials such as banana leaves, soil, jute bags and cow dung are also used. The treatment period depends on the temperature of the surrounding and may be as low as 1 week in warm areas and up to 8 weeks in cold environment. Treatment time and temperature are inversely correlated and more time is required in colder climate. Once treated and if properly covered to preserve anaerobic conditions, the urea-ensiled material can be stored for several months. The pit shouldn't be opened before it is necessary to use the treated feed.

Table. Time required for urea treatment of crop residues over different temperature ranges

Temperature (^{0}C)	Treatment time
<5	> 8 weeks
5-15	4-8 weeks
15-30	1-4 weeks
>30	<1 week
>90	< 1 day

Procedures of crop residue treatment

1. Determine the amount of crop residues to be treated. This depends on:
   - ✓ The type and number of animals
   - ✓ Daily crop residue intake of animals
   - ✓ Body weight of the animal/s
   - ✓ Duration of feeding period

2. Prepare crop residues for treatment. This includes chopping the residues into pieces to about 2-10 cm long.
3. Determine the amount and size of packaging material requirement
4. Determine the amount of ingredients and prepare for crop residue treatment

   The standard procedure in the urea treatment is to use:

   - ✓ 4% urea (4Kg urea/100 kg straw)
   - ✓ Maximum of 1:1 = water: straw ratio
   - ✓ A treatment duration= Minimum 14 days and maximum 28 days

The standard procedure in the urea-molasses treatment is to use:

- ✓ 4% urea (4Kg urea/100 kg straw)
- ✓ Urea: molasses: water ratio= 4kg urea: 10kg molasses: 80kg water
- ✓ A treatment duration= Minimum 14 days and maximum 28 days

5. Properly stack or store the treated crop residue

Self-Check-1	Written Test

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

1. Discuss the difference between straw and stover (3 points)
2. What is the relationship between temperature and time for treatment of cop residue? (3 points)

Note: Satisfactory rating – 3 points unsatisfactory rating –below 3 points

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

Answer Sheet

Score: _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions:

1._____

2._____

Information sheet – 2	Maintaining a clean and safe working area

1.1. Cleaning and maintaining working area

Effective workplace housekeeping can help get the job done safely and properly. Workplace housekeeping includes keeping the work area neat and tidy, keeping slip and trip hazards off of the travel area, removing fire hazards from the work area and maintenance of buildings, equipment and vehicles.

A good workplace housekeeping system will provide for proper inspection, maintenance, upkeep and repair of tools, equipment, machines and processes. Tasks and the equipment required to carry them out should also be set up in a fashion that minimizes the number of times items have to be handled.

Common Hazards

Poor workplace housekeeping can often lead to workplace injuries from:

- ✓ Being hit by falling objects
- ✓ Tripping over objects on the floor, stairs and platforms
- ✓ Slipping on wet, greasy, dirty or icy surfaces
- ✓ Hitting projecting items and stacked materials
- ✓ Cutting, puncturing or tearing the skin on projecting nails, wire, etc.

Safe Procedure

- ✓ Flammable, combustible, toxic and other hazardous materials should be stored in approved containers in designated areas.
- ✓ Materials are to be stored in a safe and orderly manner. If materials are to be piled ensure that the stacking (height, placement) doesn't render the pile unstable.
- ✓ Waste should be regularly collected and disposed of in an approved manner. Place clearly labeled containers in suitable locations for the easy collection of recyclable materials and wastes.
- ✓ Clean spills as they happen and properly dispose of any absorbent material immediately.
- ✓ Replace or fix broken or damaged items at the earliest opportunity.
- ✓ Keep areas well lit and replace or clean light fixtures as required.

- ✓ All tools should be returned to the designated storage area after use. Do not place any tool or object where it may pose a hazard.
- ✓ Where practical, provide/use mechanical appliances for carrying materials and supplies.
- ✓ Keeping the work site tidy, wearing the proper footwear and working at the appropriate pace are all critical for preventing any injuries in workplace and making the area safe.

Self-Check-2	Written Test

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

1. List common hazards that occur at poor workplace housekeeping (5 points)

Note: Satisfactory rating – 4 points unsatisfactory rating –below 4 points

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

Answer Sheet

Score: _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions:

1._____

Information sheet – 3	Storing the treated crop residue

After treatment the treated crop residue has to be stored properly. It has to be protected from flood.

In the selection of crop residue storage and packaging materials the advantages and disadvantages of each method should be considered.

- ✓ If durable and long lasting storage method that can be used for several years, the pit/bunker with concrete walls should be constructed. However, it is expensive.
- ✓ Less expensive but that can last longer can be constructed by digging the pit and covering the walls with plastic sheet.

Selection of plastic film/sheet

The basic requirements for plastic film are that it is non-toxic, durable and suitable for sealing. The plastic often used is polyethylene.

Thickness, width and colour of polyethylene plastic sheet are determined by practical situations.

- ✓ Thick film (about 0.12 mm) is used for maize and sorghum stover; thin film (less than 0.12 mm) for barley, teff and wheat straw.
- ✓ Width of film is determined by the size of stack and market availability.

Color of plastic sheet- If used in the open air, black colour should be preferred, because it is durable and absorbs solar energy, which heats the stack and shortens treatment time. If used indoors, film colour has no obvious influence on treatment, sunlight, rainfall, contaminated substances/any foreign bodies.

Self-Check-3	Written Test

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

1. By what problems stored treated crop residue may be affected? (3 points)
2. Mention advantages of plastic film or sheet in sealing treated crop residues (3 points)
3. Why black color of plastic sheet is selected at open air in crop residue treatment? (4 points)

Note: Satisfactory rating – 6 points unsatisfactory rating –below 6 points

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

Answer Sheet

Score: _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions:

1. _____
2. _____
3. _____

Information sheet – 4	Determining targeted animals to be fed according to treatment types

4.1. Quality evaluation of urea treated crop residues

There are three methods to evaluate quality of ammoniated straw: sensory evaluation, chemical analysis and biological tests.

Sensory evaluation

Properly ammoniated straw is soft, brownish yellow or light brown, and with a light fragrance after excess ammonia has evaporated. If straw appears white or grey and is sticky or clumps, it means that it has been attacked by mould. This damaged straw should not be used as feed. Of course, this situation seldom occurs if treatment is correct. Mould normally results from high moisture content, defective sealing or delayed ventilation after opening. If, after ammoniation, straw colour is nearly the same as before treatment, it means that ammoniation did not go very well, but it can still be used as feed.

Chemical analysis

By chemical analysis, the components of straw such as fiber component (NDF and ADF) and crude protein (CP) can be measured, but by itself it cannot give an estimate of overall nutritive value and animal intake.

Biological evaluation

The most reliable method of evaluation of straw quality is through biological tests such as feeding the treated straw and measurement of digestibility, feed intake animal performance.

4.2. Incidence of Fungi or moulds development

Sometimes fungi or moulds will develop in the heap. This is mainly due to poor compaction; too much water or an initial poor straw quality the pattern of occurrence is not always predictable. Incidence of mould increases when the duration of treatment extends Better sealing and compaction certainly reduces the incidence of moulds of different kind occur both in too moist and too dry heaps. The moulds of different kind occur both in too moist and too dry heaps. The

moulds can have either beneficial or negative effects. Generally speaking one should avoid feeding moldy straw.

4.3. Feeding treated crop residue

Aeration

After opening the pit of ammonia treated straw, the treated crop residue has a strong smell of ammonia. This strong smell of ammonia reduces the appetite of the animal therefore it should be aerated for a time before feeding.

Class of animals that treated crop residues can be feed

Ammoniated cereal straws and stover can be offered to beef cattle, heifers, sheep (ram and ewe), goats (bucks and does), and lactating cows as sole roughage or as large proportion of the diet. However, do not feed urea treated crop residue to young calves, lambs, kids, pregnant cows that are at the last stage of pregnancy (7 months pregnancy). And also do not fed urea treated crop residue to monogastric animals such as poultry (chicken), swine (pigs).

Supplementation

In addition to treated crop residues animals should be supplemented with grass, tree levees and concentrate to improve the productivity of the animals. Basically the treated straw should be fed and considered as medium quality grass. Feeding of minerals is necessary. The constant supply of plenty of clean drinking water and common salt should be given.

Self-Check-4	Written Test

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

1. List methods of evaluation quality treated crop residues (3 points)
2. Why molds or fungi develop in the heap of crop residues? (3 points)
3. List animals that do not allowed to feed urea treated crop residues. (5 points)

Note: Satisfactory rating – 6 points unsatisfactory rating –below 6 points

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

Answer Sheet

Score: _____

Rating: _____

Name: _____ Date: _____

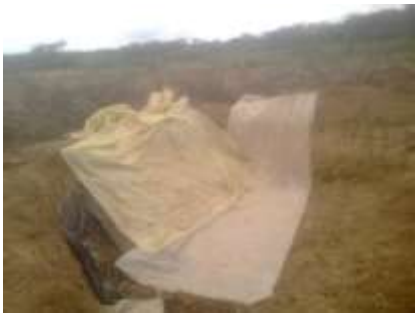
Short Answer Questions:

1. _____
2. _____
3. _____

Operation sheet -1	Procedures in performing crop residue treatment

Steps **Procedures**

Step- 1 **Pit/bunker method-**Build the pit, cover the floor and sides of the pit with plastic sheet



Stalk method- Select an area with an elevated, dry and even surface, then covered it with plastic sheet.

Step -2 Weight the crop residue using weighing scale

Step -3 Spread the chopped crop residue on the floor

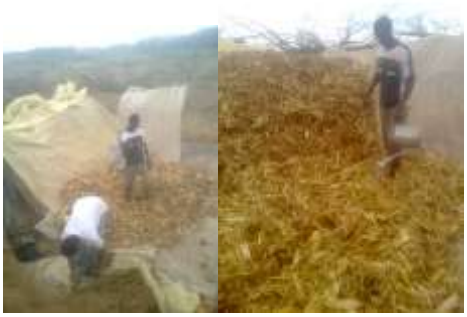
Step -4 Fill water can with water

Step -5 Measure and take urea, pour in to water container

Step -6 Mix the urea and the water thoroughly using wooden stirrer to make urea solution

Step -7 Sprinkle the urea solution on the crop residues and then thoroughly mix the solution and the straw/stover

Step- 8 Compact the straw/stover by trampling with your foot to remove air as much as possible



Step -9 Repeat step 2, 3, 4, 5, 6, 7, and 8 until enough straw has been treated to suite the requirement

Step- 10 **Pit/bunker method** -Cover the pit with polyethylene sheet and load it with stones, woods or soil to prevent ammonia escaping

Stalk method- Seal the top and the sides by rolling them with the bottom plastic sheet to prevent ammonia escaping

LAP Test	Practical demonstration

Task. Perform crop residue treatment

REFERENCES

Alemayehu Mengistu, 1997. Conservation-based forage development for Ethiopia. Self help Development International Institute for Sustainable Development. Berhanena Selam Printing Enterprise. Addis Ababa, Ethiopia. 1p.

Azage Tegegne, Workneh Ayalew, Berhanu Gebre Medhin and Salvador Fermandez-Rivera, 2002. Opportunities for improved dairy production in Ethiopia. In: Resource Management for Poverty Reduction. Approaches and Technologies. Ethio-forum 2002. 118p.

Daniel Kiftassa, 1988. Role of crop residues as livestock feeds in Ethiopian Highlands. pp. 430-439. In: B.H. Dzzowela (eds.). Proceedings of a Workshop on African Forage Plant Genetic Resources, Evaluation of Forage Germplasm and Extensive Livestock Production Systems. Arusha, Tanzania, 27-30 April 1987.

Getachew Eshete, 2002. An assessment of Feed Resources, Their Management and Impact on Livestock productivity in the Ginchi Watershed Area. MSc. Thesis. Alemaya University of Agriculture, Alemaya. Pp 171.

Ibrahim, M.N.M. and J.B. Schiere, 1989. Feeding of urea-ammonia treated rice straw. A compilation of miscellaneous reports produced by the straw utilization project (Sir Lanka). Pudoc. Wageningen. pp. 1-28.

Lulseged Gebrehiwot and Jamal Mohamed, 1989. The potential of crop residues, particularly wheat straw, as livestock feed in Ethiopia. p. 144. In: A.N. Said, B.H. Dzowela (eds). Overcoming constraints to the efficient utilization of agricultural by-products as animal feed. International Livestock Center for Africa (ILCA). Addis Ababa, Ethiopia