



# **Animal Production**

## **Level II**

# **Learning Guide # 52**

**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- 52**

**TTLM Code: AGR APR2 TTLM 0919V1**

**LO5: Prepare urea-molasses Block (UMB)**



## Instruction Sheet

## Learning Guide # 52

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

- Preparing Ingredients and materials
- Undertaking calculation of the proportion
- Mixing the proportion of ingredients
- Undertaking Molding and storing
- Carrying out Feeding

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 –

- prepare ingredients and materials
- undertake calculation of the proportion
- mix the proportion of ingredients
- undertake molding and storing
- carry out feeding

### 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, Sheet 4 and Sheet 5.
4. Accomplish the “Self-check 1, Self-check 2, Self-check 3, Self-check 4 and Self-check 5” **in page - 5, 8, 12, 16 and 19** respectively.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1” **in page – 20.**
6. Do the “LAP test” **in page – 20** (if you are ready)



## Information sheet – 1

## Preparing Ingredients and materials

### 1.1. Urea supplement as a block lick

Mixtures of liquid molasses and urea, which provide fermentable nitrogen, and are a good source of minerals, have been used for many years. Molasses in the liquid form is difficult to transport (requiring expensive tanker trucks), to store (requiring storage tanks), to handle (is highly viscous) and to distribute to animals (troughs or other receptacles needed). The “solidification” of molasses is a way of solving the difficulties encountered in distributing and feeding molasses and also allows for the incorporation of various other ingredients. As the name suggests, these are lick blocks that contain urea, molasses, vitamins, minerals and perhaps other nutrients. The feeding of the blocks is a convenient and inexpensive method of providing a range of nutrients, which may be deficient in the diet, that are required by both the rumen microbes and the animal. The ingredients are designed to provide a wide range of nutrients to cover all potential deficiencies. Urea molasses blocks (UMB) have proven to be an excellent tool for the improvement of ruminant feeding. They are cheap, relatively safe and a practical means of supplying nutrients. They create an efficient rumen ecosystem which favors the growth of young animals and milk production. They also improve conception rates and the size of offspring. The urea molasses block technology should be encouraged in Ethiopia to make better use of available feed resources at the small farmer level.

The common ingredients used in making feed blocks are:

- ✓ Molasses
- ✓ Urea
- ✓ Fibrous feeds such as wheat bran
- ✓ Salt
- ✓ Cement (a binding agent).

Molasses is used to induce animals to eat the block drawn by its sweet taste. It also provides energy and some other nutrients such as minerals like sulphur. The block should not contain more than 40–50% molasses or it will break too easily and take too long to dry. Urea, known to farmers as fertilizer for crop production, is used to make the blocks. It is advisable that the amount of urea be limited to 10% to avoid poisoning. Urea is essential in improving digestibility and providing protein. Cereal bran is the most common fibrous feed used. The bran provides protein and helps hold the block together. Finely chopped straw, bagasse, or finely ground leaves from leguminous shrubs (*leucaena*, *calliandra*, etc.) can substitute for cereal bran.



## 1.2. Stages of urea-molasses block (UMB) preparation

Urea molasses blocks (UMB) can be manufactured on the farm. Manufacture is easy and simple and different processes exist which may be used according to local conditions. The manufacturing can be divided into four stages:

1. Preparing the components
2. Mixing
3. Molding
4. Dryin



<b>Self-Check-1</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. List difficulties of molasses in the liquid form (4 points)
2. Mention common ingredients used in making feed block (5 points)
3. Discuss advantages of urea in making urea molasses block. (2 points)

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

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

### Answer Sheet

Score: _____
Rating: _____

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

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

### Short Answer Questions:

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_



## Information sheet – 2

## Undertaking calculation of the proportion

### 1.1. Block Formulation

The blocks can be made from a variety of components depending on their availability locally, nutritive value, price, existing facilities for their use and their influence on the quality of blocks. They can also include specific components.

- **Molasses** provides fermentable substrate and various minerals and trace elements (but low amounts of phosphorous). Because of its pleasant taste and smell, it makes the block very attractive and palatable to animals. The degree Brix of the molasses should be as high as possible as and preferably higher than 85, to ensure solidification.
- **Urea**, which provides fermentable nitrogen, is the most important component of the block. Urea may increase the intake of straw by cattle by about 40 percent and its digestibility by 8 units (or 20 percent). The intake of urea must be limited to avoid toxicity problems but sufficient to maintain ammonia levels in the rumen consistently above 200 mg N/l for growth of microorganisms and high rates of degradation of fibre. Blocks are an excellent way of controlling intake and allow continual access.
- **Wheat or rice bran** has a multiple purpose in the blocks. It provides some key nutrients including fat, protein and phosphorus; it acts as an absorbent for the moisture contained in molasses and gives structure to the block. Wheat bran may be replaced by other fibrous materials such as dry and fine bagasse or groundnut hulls which are finely ground but some loss of nutritive value occurs.
- a. **Minerals** may be added where appropriate. Common salt is generally added because this is often deficient in the diet and it is inexpensive. **Salt** in the range of 5–10% is added to blocks to supply **minerals** & to **control the rate of consumption**. Calcium is supplied by molasses and by the gelling agent, calcium oxide or cement. Although phosphorus is deficient, there is no evidence that its addition is beneficial where animals are at below maintenance when grazing on dry mature pastures or fed low-quality forage. Mineral requirements are reduced at maintenance or survival levels. Deficiencies will generally become a problem only when



production is increased, particularly when a bypass protein supplement is given and in these cases phosphorus should be included in that supplement.

- A **gelling agent** or **binder** is necessary in order to solidify the blocks. Although the mechanism of gelling is unknown, various products have been tried successfully: magnesium oxide, calcium oxide, calcium hydroxide and cement.

## 1.2. Proportion of components

The amount of the different ingredients depends on the size of the block to be manufactured and the formula to be used. Below table shows the amount of ingredients to be mixed to make 1, 5, or 15 kg of block based on formula alternative.

Table. Amounts of ingredients to mix to make different sizes of UMB

No	ingredients	%	Size of block to be made		
			1kg	5kg	15kg
1	Molasses	40	0.4	2	6
2	Urea	10	0.1	0.5	1.5
3	Bran	25	0.25	1.25	3.75
4	Cement	10	0.1	0.5	1.5
5	Oil cake	10	0.1	0.5	1.5
6	Mineral mix	1	0.01	0.05	0.15
7	Salt	4	0.04	0.2	0.6
	Total	100	1	5	15
8	Water (to mix cement)		40g (0.04kg)	0.2	0.6



<b>Self-Check-2</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. List on what blocks can be made from a variety of components depend (4 points)
2. Fill each blank space below in the table amounts/proportion of ingredients that required to do urea molasses block (UMB) (24 points)

No	ingredients	%	Size of block to be made		
			1kg	5kg	15kg
1	Molasses	35			
2	Urea	8			
3	Bran	30			
4	Cement	10			
5	Oil cake	10			
6	Mineral mix	1			
7	Salt	6			
	Total	100			
8	Water (to mix cement)				

Note: Satisfactory rating – 20 points    unsatisfactory rating –below 20 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 – 3

### Mixing the proportion of ingredients

Salt in the range of 5–10% is added to the blocks to supply minerals and to control the rate of consumption. Calcium carbonate and dicalcium phosphate can be added to provide additional calcium and phosphorus. Cement is used to make the block hard. About 10–15% is sufficient. Higher levels make the blocks too hard. Cement also provides calcium. Clay such as that used in brick-making can be mixed with cement to improve block hardness and reduce drying time. It can also reduce cost of making the block. Other ingredients can be added to provide additional nutrients. Oilseed cakes or brewery by-products can be added to supply protein. Trace mineralized salt can be used to provide additional minerals that may be lacking. Use of trace mineralized salt is recommended in the Rift Valley area.

Good mixing is crucial for good block-making. Urea must be mixed thoroughly by breaking up lumps to avoid pockets of high concentration that could harm animals.

Do the following to mix the ingredients.

- ✓ Weigh the amount of ingredients needed based on the formula of the block.
- ✓ Add urea to the molasses while continuously mixing.
  - Mix the urea with molasses thoroughly by stirring for about 20 minutes
  - The molasses can be heated in the sun to improve handling and mixing.
  - Never add water to molasses. It has to be thick.
- ✓ Add bran and any other fibrous material such as *noug seed cake*, if it is part of the formula, and mix thoroughly.
- ✓ Make the cement into a paste with water prior to adding to the rest of the ingredients.
- ✓ Mixing the salt with cement accelerates hardening.

High levels of molasses and urea tend to decrease block hardness. Check block hardness after drying and make the following adjustments to the formula. If the block is too hard, reduce the proportion of cement or clay and slightly increase the proportion of molasses. If too soft, increase cement or clay and reduce molasses



**Fig.** Mixing urea, molasses and bran



<b>Self-Check-3</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is the main advantage of adding salt in to urea molasses block? (3 points)
2. What is the problem of adding high level of molasses to urea molasses block? (3 points)
3. What do you do if the block is too hard in urea molasses block? .(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

## Undertaking Molding and storing

### 4.1. Casting and molding

Once the ingredients are thoroughly mixed, place the mixture into molds. Any local container, such as tin cans or small buckets can be used as a mold. Using a plastic sheet to line the molds will make block removal from the mold easier.



Wooden mold – Debre Zeit  
Research Center



PVC tube mold – Debre Zeit  
Research Center



Mold made of metal  
sheets – Holeta  
Research Center



Machine for making solid  
construction blocks

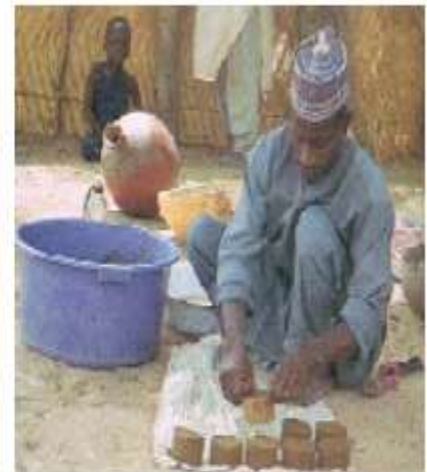
Fig. Different types of molds



Molding using wooden bars



Molding using small tin cans



Removing molded blocks for drying

Fig. Molding UMB



The mold



Step 1. Filling the mold



Step 2. Compacting



Step 3. Opening the mold



Step 4. Removing block from the mold



Step 5. UMB ready for drying

Fig. Steps of UMB

#### 4.2. Drying and storage of urea molasses blocks

Remove the blocks from the molds after 24 hours and place on racks to dry. Leave the blocks to dry for at least 5 days depending upon the weather condition.



Fig. Drying UMB



#### **4.3. Characteristics of a good urea molasses block**

A block is considered good when it fulfills the following:

- ✓ Ingredients are well-distributed throughout the block.
- ✓ It does not have lumps of urea and lime.
- ✓ It is hard enough to resist being squashed between fingers or breaking when a person steps on it.
- ✓ The sticky molasses can be felt when holding the block. The amount of molasses needs to be increased if the block doesn't feel sticky.



<b>Self-Check-4</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write consecutively time of removing block from molds and left blocks to dry on rack. (3 points)
2. Mention good characteristics of urea molasses block (4 points)

Note: Satisfactory rating – 5 points    unsatisfactory rating –below 5 points

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

### Answer Sheet

Score: _____
Rating: _____

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

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

### Short Answer Questions:

1. \_\_\_\_\_

2. \_\_\_\_\_





### 1.1. Feeding and intake of urea molasses blocks

Blocks should be fed as a lick so that only the top surface is accessible to animals. This prevents animals from pushing the blocks around, breaking them up and consuming large chunks that could cause urea toxicity. Blocks should be introduced to animals slowly and should be fed after animals have consumed adequate forage. This prevents animals from consuming too much at any one time. Urea molasses blocks should never form the main diet. They are meant to be a supplement to a basal diet of forage. Allow access by animals for one hour per day during the first week of adaptation, two hours during the second week and free access after the third week. Some animals may need to be forced to consume the blocks by preventing access to lush feed other than dry roughage during the adaptation period. Block hardness will affect its rate of intake. If too soft, it is consumed too rapidly and there is the risk of toxicity. If too hard, intake may be too little. Urea at high levels is unpalatable. High levels of urea in urea molasses blocks may reduce intake of the block as well as of straw due to the bitter taste. High levels or imbalances in minerals may result in excessive consumption in a short time, also leading to urea poisoning. Precautions should be taken to avoid this problem of over-consumption in drought prone areas, particularly towards the end of the dry season when feed is scarce.



Fig. Feeding UMB



## 1.2. Precautions while supplementing with urea molasses blocks

It is essential to note the following while supplementing urea molasses blocks.

- ✓ Feed to **ruminants only** (sheep, goats, cattle, camels).
  - Do not feed to monogastrics, i.e., horses, donkeys, or pigs
  - Do not feed to young ruminants less than six months of age (lambs, kids).
- ✓ Blocks should be used as a supplement and not as the basic ration.
  - A minimum of coarse forage in the rumen is essential.
  - Never give blocks to an emaciated animal with an empty stomach. There is the risk of poisoning due to excessive consumption.
- ✓ The amount of blocks fed to sheep and goats should be limited to 100 g/day.
- ✓ Blocks should never be supplied in ground form or dissolved in water as this can result in overconsumption.
- ✓ Supply sufficient amount of water



<b>Self-Check-5</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. List ways of introducing urea molasses block to animals (2 points)
2. Mention precautions while supplementing urea molasses block (4 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. \_\_\_\_\_



<b>Operation sheet -1</b>	<b>Procedures in making urea molasses block (UMB)</b>
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Techniques to prepare and make urea molasses block as follows:-

**Step 1:** Identify and prepare required ingredients

**Step 2:** weigh amount of ingredients based on the formula of block

**Step 3:** Add urea to molasses while continuously mixing

**Step 4:** Add cereal bran

**Step 5:** make cement in to paste with water prior to adding rest ingredients

**Step 6:** mix salt with cement

**Step 7:** Feed to livestock depending animal body condition and species

<b>LAP Test</b>	<b>Practical Demonstration</b>
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**Task.** Prepare and make urea molasses block



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