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TECHNICAL BULLETIN No.1
HOW TO MAKE UREA MOLASSES
BLOCKS (UMB) AND FEED TO SHEEP
AND GOATS



ESGPIP

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FOREWORD

This fact sheet No.1 titled “How to make Urea Molasses Blocks (UMB) and feed to sheep and goats” is the first fact sheet produced by the Ethiopia Sheep and Goat Productivity Improvement Program (ESGPIP). The ESGPIP is a USAID funded Project with the objective of improving the productivity of Ethiopian sheep and goats.

The fact sheet is intended to serve as an extension aid for Kebele Development Agents (KDA's) to promote the manufacture and use of Urea Molasses blocks in areas where there is access to molasses. It is believed that the information contained in this fact sheet is also useful for those who want to manufacture and supply to other users as a business venture

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HOW TO MAKE UREA MOLASSES BLOCKS (UMB) AND FEED TO SHEEP AND GOATS

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1. Why supplement with Urea Molasses Blocks?

Sheep and goat diets in Ethiopia are based on fibrous feeds like mature pastures and crop residues. These feeds are deficient in protein, minerals and vitamins and are poorly digestible. Both these characteristics keep intake and productivity low. Supplementation with Urea Molasses Blocks (UMB) can increase digestibility of fibrous feeds by up to 20%, increase the nutrients the animal receives and can increase feed intake by 25 to 30%. If another good quality protein source such as cottonseed cake or nougseed cake is added to the block, the animal will grow faster. Animals also benefit if other feedstuffs such as vitamins, minerals, medicines, etc. are added to the block.

Blocks are a convenient way to make and store molasses and urea and also feed to animals. They can easily be made and used in villages. A person may make and sell blocks to farmers as a source of income.

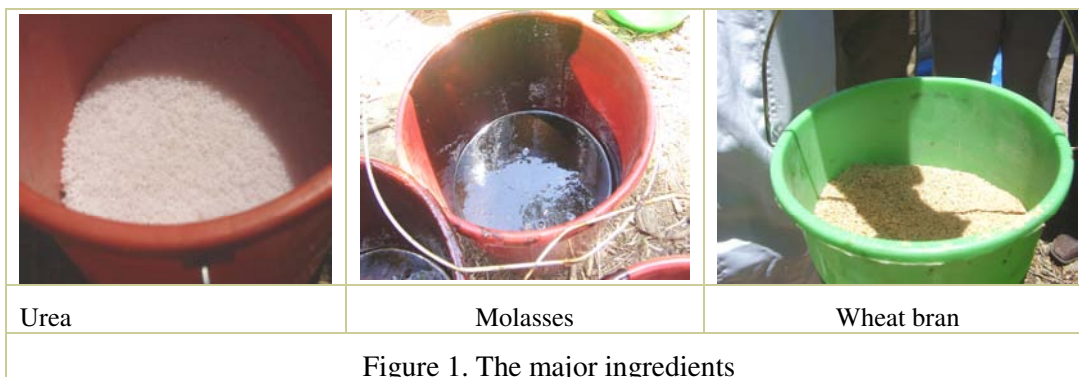
2. Ingredients

The common ingredients used in making feed blocks are:

- molasses,
- urea,
- fibrous feeds like wheat bran
- salt, and
- Cement (a binding agent).

Molasses is used to induce animals to eat the block due to its sweet taste. Molasses provides energy and some other nutrients and minerals like sulfur. The block should not contain more than 40 to 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.



Salt in the range of 5 to 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 to 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 reduce cost of the block.

Other ingredients can be added to provide additional nutrients. Dried poultry litter, 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.

Alternative ratios of combining the ingredients to constitute various formulations of blocks are shown in Table 1.

Table 1. Practical examples of formulae for making Urea Molasses blocks (composition in %)

Ingredients	Alternative Formulae												
	A	B	C	D	E	F	G	H	I	J	K	L	M
Wheat bran	25	25	27	35	40	40	23	25	23	25	25	35	22
Molasses	40	50	10	20	10	5	50	45	50	31	34	39	50
Urea	10	10	8	8	10	10	5	15	10	10	10	10	9
Salt	4	5	5	8	5	5	5	5	5	3	3	5	5
Quick lime		5	5	5	7	7	5	0	10			6	
Cement	10	5	10	5	5	10	10	10	10	15	15	5	14
Triple phosphate							2	0	2				
Dicalcium phosphate	1		5		3	3				3			
Poultry litter			15										
Oilseed cake			15							13	13		
Clay				20	20	20							
Total	100	100	100	100	100	100	100	100	100	100	100	100	100

3. How to make Urea Molasses Blocks

Urea Molasses blocks 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. Preparation of the components;
2. Mixing;
3. Molding; and
4. Drying

3.1. Preparation of the components

The amount of the different ingredients depends on the size of the block to be manufactured and the formula to be used. Table 2 shows the amount of ingredients to be mixed to make 1, 5, 15 or 25 kilo grams of block based on formula alternative “A” in Table 1.

Table 2. Amounts of ingredients to mix to make different sizes of UMB

No.	Ingredient	%	Size of block to be made			
			1 Kg	5 Kg	15 Kg	25 Kg
1	Molasses	40	400 g	2Kg	6 kg	10 kg
2	Urea	10	100 g	0.5 kg	1.5 kg	2.5 kg
3	Bran	25	250 g	1.25 kg	3.75 kg	6.25 kg
4	Cement	10	100 g	0.5 kg	1.5 kg	2.5 kg
5	Oil cake	10	100 g	0.5 kg	1.5 kg	2.5 kg
6	Mineral mix	1	10 g	0.05 kg	0.15 kg	0.25 kg
7	Salt	4	40 g	0.2 kg	0.6 kg	1 kg
TOTAL		100	1000g	5000g	15000g	25000g
8	Water (to mix the cement)		40 g	0.2 kg	0.6 kg	1 kg

3.2. Mixing

Good mixing is a key 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 based on the formula of the block;
- add urea to the molasses while continuously mixing
 - The urea is mixed with molasses and thoroughly stirred 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 tick
- add bran and any other fibrous material like noug 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 used if necessary. 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.



Figure 2. Mixing urea, molasses and bran

3.3. Casting and Molds

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.

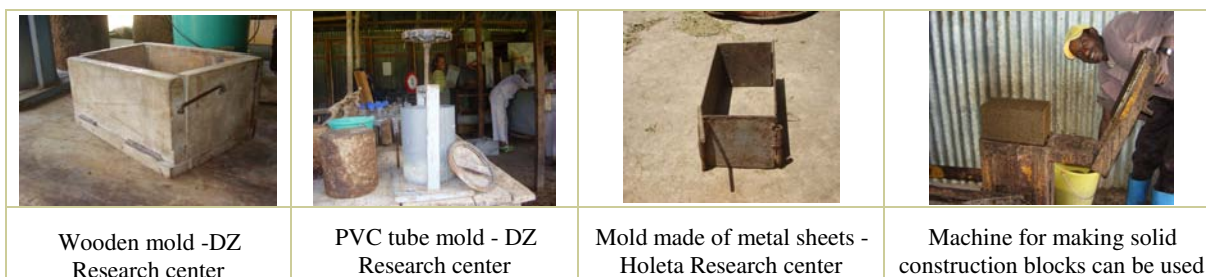


Figure 3. Different types of molds

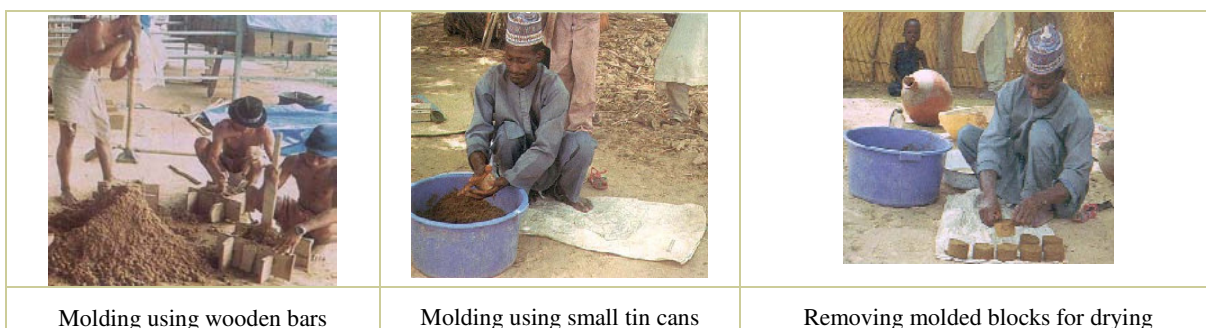
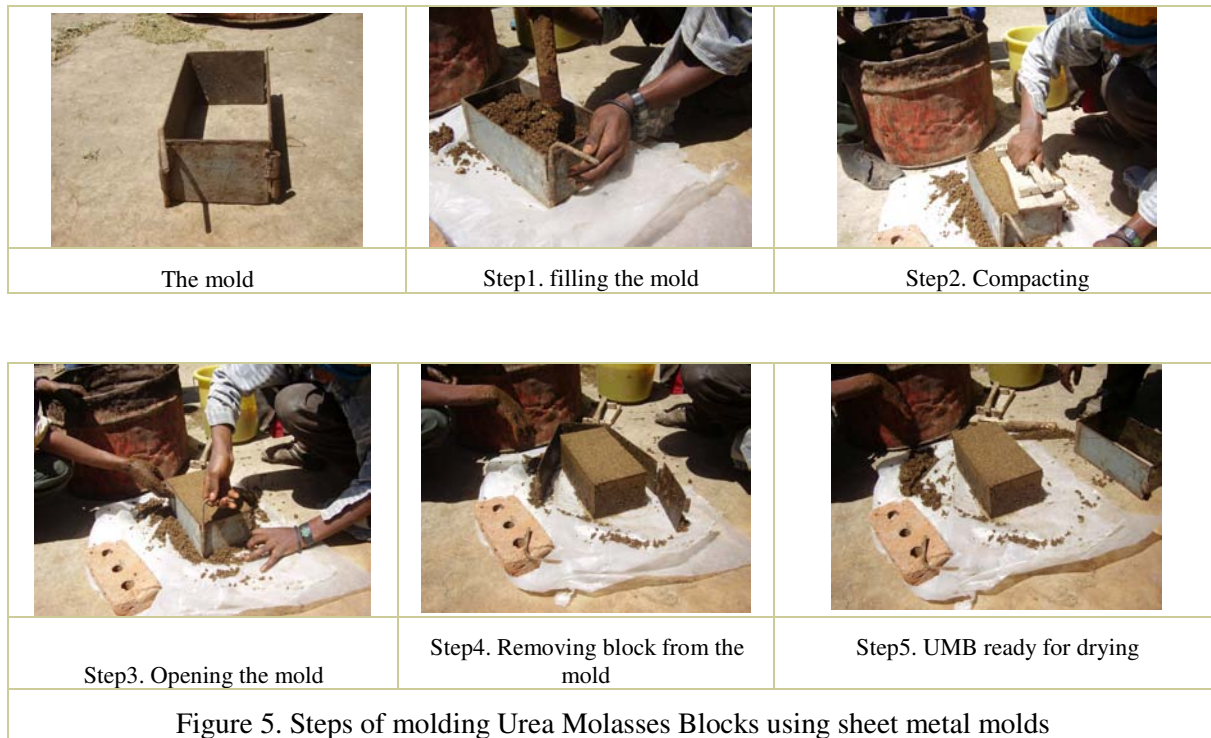


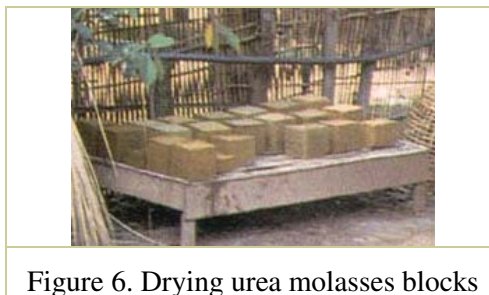
Figure 4. Molding Urea Molasses blocks

3.3.1. Example of steps of molding Urea Molasses Blocks using sheet metal molds



3.4. *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.



3.5. *Characteristics of a good Urea Molasses block*

A block is considered to be 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 not to be squashed between our fingers and should be resistant enough not to break when a person steps on it;
- Our hands should feel the sticky molasses when we hold the block. The amount of molasses needs to be increased the next time we make a block if it doesn't feel sticky.

4. Feeding and Intake of Urea Molasses Blocks

Blocks should be fed as a lick so that only the top surface is accessible to the 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. It is advisable to give access to sheep and goats for one hour 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 be accustomed to UMB consumption by preventing access to lush feed other than dry roughage during the period of adaptation.

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.

5. Precautions while supplementing 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 (kids, lambs).
- 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 grams/day;
- The blocks should never be supplied in ground form or dissolved in water as this can result in over consumption
- Supply sufficient amount of water

6. Summary

Urea Molasses Blocks can be an important source of supplement nutrition for sheep and goats to increase intake and increase productivity. They can be made from locally available materials with the main ingredients being molasses, urea, salt, cement, and wheat bran. Other ingredients such as minerals and vitamins can be added. Blocks must be mixed well to prevent the potential of urea poisoning. Feed blocks only to ruminant animals (sheep, goats, cattle). Feed

forage before the animal is supplied with the block. Blocks should be used as a supplement and not as the base ration.