

# Factsheet

## DIRECTIONS FOR MAKING AND FEEDING MOLASSES-UREA FEED BLOCKS

Francis H. Asiedu, Albert L. Fearon, Aman A. Hosein and Ralston Barnes

The pioneering work with technical assistance from FAO in India and in Sahelian Africa has proven that molasses-urea feed blocks are a cost effective and convenient way of providing critical nutrients for the micro-organisms in the rumen (one of the stomach compartments) of ruminant animals (cattle, buffalo, sheep and goats) and to allow them to better utilise poor quality roughage. More recently scientists at CSIRO Division of Animal Health in Australia have demonstrated that molasses-urea blocks also provide a way to administer small daily doses of medication to treat animals against worm infestation.

### Ingredients Required to Make Molasses-Urea Blocks

Molasses-urea blocks are made using molasses, urea/sulphate of ammonia, salt/mineral mix, and quick lime or cement (as the binder or hardener) and fillers. The fillers may be any combinations of rice bran, wheat middlings, general purpose concentrate, ground poultry litter, legume leaf meal or other dried crop residues, e.g. the hauls and haulms of peanut, pigeon pea and beans.

The levels of ingredients used in making the blocks are as follows: Molasses 45-50%, urea/sulphate of ammonia 5-10%, salt/mineral mix 2-5%, quick lime or cement 10-15%, and fillers 20-30%. Examples of molasses-urea blocks formulae for both small ruminants Table 1 and cattle are shown in Table 2.

### Equipment

Equipment used to make the blocks include: mixing pan, e.g. half drum, fire wood and fire place (hot method), paddle, goggles, mask, moulds, e.g. bread pans or plastic buckets, lining for the moulds, e.g. paper bags, cement bags and old newspapers, and a tamper.

**Table 1.** Formulae for Molasses-Urea Feed Blocks for Feeding Small Ruminants

Ingredients	Level (% as fed)							
	45	50	50	50	50	50	50	50
Molasses	45	50	50	50	50	50	50	50
Urea	5	5	5	5	5	5	5	2.5
Sulphate of ammonia								4.5
Salt	5	5	5	5	5	5	5	2
Cement	15	10						
Quick lime		5	10	10	10	10	10	10
Concentrate feed/ Wheat middlings	30	25	30	10				10
Poultry litter				20	20	15	21	
Rice bran				30	10			
Leucaena leaf meal							15	
	100	100	100	100	100	100	100	100

**Table 2. Formulae for Molasses-Urea Feed Blocks for Feeding Small Ruminants**

Ingredients	Level (% as fed)						
	45	50	45	45	48	45	48
Molasses	45	50	45	45	48	45	48
Urea	10	10	10	10	5	4	4
Sulphate of ammonia					5	4	4
Salt	5	5	5	5	2	2	2
Cement	15						
Quick lime		10	10	10	10	10	12
Concentrate feed/ Wheat middlings	25	5	10	10	5	5	5
Poultry litter				10		15	10
Rice bran		20	20	10	25	15	15
	100	100	100	100	100	100	100

### How to Make the Feed Blocks

Molasses-urea blocks may be made using either the cold or hot method. CARDI research shows that the hot method produces blocks that are more than nine times as hard as those made by the cold method.

#### THE HOT METHOD

##### (i) Quick Lime as the Binder

- Weigh all the ingredients according to the selected formula.
- Heat the molasses and bring to a simmer (approximately 85°C).
- When the molasses is simmering uniformly reduce the heat or remove the pan from the fire.
- Add the urea (and sulphate of ammonia) to the hot molasses and stir vigorously to dissolve.



*The primary ingredients used to make molasses-urea blocks.*

- Add the salt and stir to dissolve.
- Add the quick lime and mix the mass to a uniform consistency. If the molasses is too hot there may be foaming when the quick lime is added to the mixture. If this happens allow the foam to settle before stirring the mixture. Ammonia may also be released when the lime is added to the mixture and for this reason it is recommended that the person stirring the mixture should wear a mask and goggles.
- Add the filler(s) and mix to a uniform consistency.
- Pour or shovel the mass into the moulds and compact it with the tamper

##### (ii) Cement as the Binder

- Weigh all the ingredients according to the selected formula.
- Heat the molasses and bring to simmer (approximately 85°C). While the molasses is heating up prepare salt water by mixing half of the amount of salt in water. The quantity of water used depends on the amount of cement in the formula. The ratio is 100 parts cement to 37 parts water by weight.
- When the molasses is simmering uniformly reduce the heat or remove the pan from the fire.
- Add the urea to the hot molasses and stir vigorously to dissolve.
- Add the remaining half of the salt to the mixture and stir to dissolve.
- Mix the cement with the salt water already prepared.
- Add the cement paste to the mixture of molasses, urea and salt.
- Add the filler(s) and mix to a uniform consistency.
- Pour or shovel the mass into the moulds and compact it.

Instead of adding and mixing the ingredients individually as described in the preceding steps, the urea (and sulphate of ammonia) and the salt can be pre-mixed, and the quick lime and the filler(s) also pre-mixed before adding to the molasses. Pre-mixing the ingredients reduces the chances of the lime foaming, and reduces the time to make the blocks (66 man-min./100kg vs 120 man-min./100kg). The pre-mixed feed blocks are also harder (4.76 vs 4.27kg/cm<sup>2</sup>).

## The Cold Method

For the cold method the ingredients are maintained and mixed at the prevailing air temperature. Urea does not dissolve readily in cold molasses. Therefore it should be dissolved in hot water (60°C) first at the rate of 1kg urea per 350ml of water. Where cement is used as the binder the water used to make the cement paste could be warmed first and both the urea and salt dissolved in it. The rest of the procedure is the same as for the hot method. However blocks prepared by the cold method may need to be put in the sun under a sheet of galvanized metal to aid in drying.

It normally takes between 1–3, depending on the method of preparation for molasses-urea feed blocks to dry sufficiently for feeding.

## Feeding the Blocks

Molasses-urea feed blocks may be fed free choice to both adult and young (post-weaned) ruminants either in the pen or at pasture/range. However, in order to avoid possible urea toxicity the immediate post-weaned ruminants should be introduced gradually to the blocks by offering them small quantities over a 14 day period.

The feed blocks may be fed as the sole supplement or in combination with other supplements. Table 3 shows some observed intake and the corresponding liveweight gains by different classes of ruminants fed molasses-urea feed blocks as: (a) the only supplement and (b) in association with other supplements.

**Table 3.** Effect of Molasses-Urea Feed Blocks (MUB) on the Performance of Ruminants

(a) MUB as the only supplement					
Class of ruminant	Body weight (kg)	Basal forage (free choice)	MUB intake (g/day)	Weight gain (g/day)	
Heifers	191	Native pasture	187	557	
Ram Lambs	19	King grass	200	88	
Ewe Lambs	17	Native pasture	85	65	
Doe Kids	20	King/Guinea grass	92	50	
(b) MUB plus other supplements					
Class of ruminant	Body weight (kg)	Basal forage (free choice)	Supplement intake (g/day)	MUB intake (g/day)	Weight gain (g/day)
Heifers	189	Native pasture	900 <sup>a</sup>	123	628
Doe Kids	20	King/Guinea grass	250 <sup>b</sup>	49	90
Bucklings	19.5	King grass	420 <sup>c</sup>	30	85

<sup>a</sup> Dairy ration; <sup>b</sup> Rice bran; <sup>c</sup> Agro by-products ration