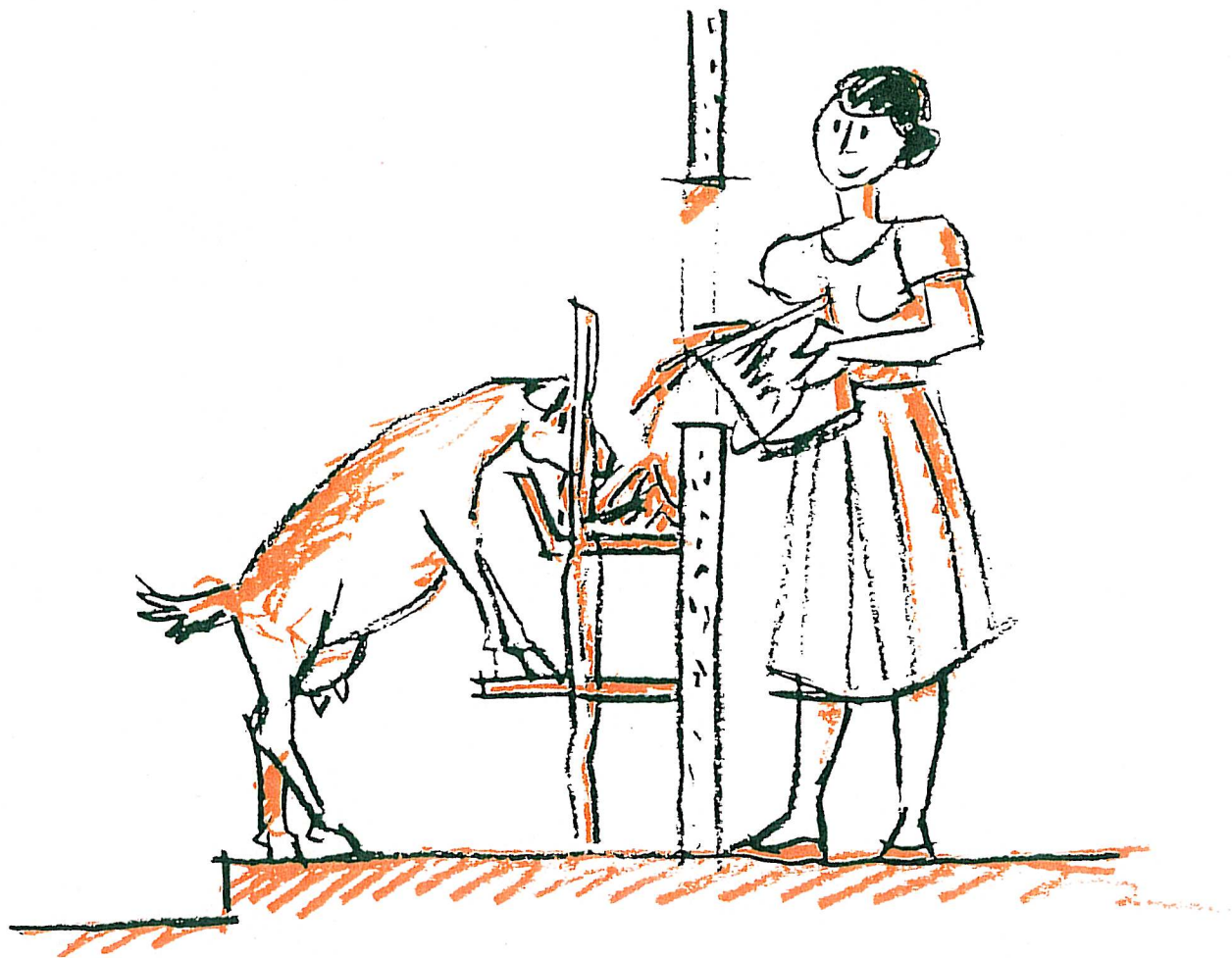


# multinutrient block handbook



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44. Processing of cassava and sweet potatoes for animal feeding
45. Multinutrient block handbook
46. Use of cassava and sweet potatoes in animal feeding

# **multinutrient block handbook**

by **L.O. García and J.I.R. Restrepo**

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## PREFACE

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The first 26 volumes in FAO's Better Farming Series were based on the **Cours d'apprentissage agricole** prepared in Côte d'Ivoire by the **Institut africain de développement économique et social** for use by extension workers. Later volumes, beginning with No. 27, have been prepared by FAO for use in agricultural development at the farm and family level. The approach has deliberately been a general one, the intention being to create a basic model that can be modified or expanded according to local conditions of agriculture.

Many of the booklets deal with specific crops and techniques, while others are intended to give farmers more general information that can help them to understand why they do what they do, so that they will be able to do it better.

Adaptations of the series, or individual volumes in it, have been published in Amharic, Arabic, Armenian, Bengali, Creole, Ewe, Gipende, Hindi, Igala, Indonesian, Kiswahili, Malagasy, Malaysian, Nepali, Oriya, SiSwati, Thai, Tschiluba, Turkish, Urdu and Vietnamese.

Requests for permission to issue this booklet in other languages and to adapt it according to local climatic and ecological conditions are welcomed. They should be addressed to the Director, Publications Division, Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, 00100 Rome, Italy.

# OUTLINE OF THE BOOKLET

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## **Acknowledgements**

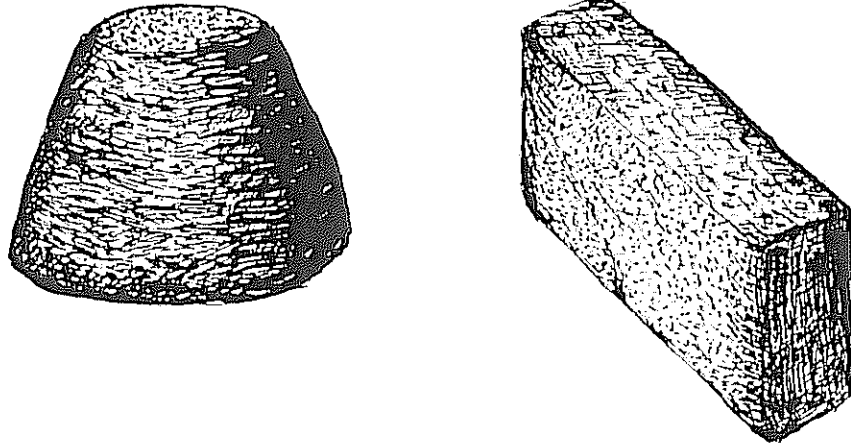
To CIPAV and staff members T.R. Preston and E. Murgueitio for their research work.

To the scientists R. Leng and R. Sansoucy for their advice and research on multinutrient blocks.

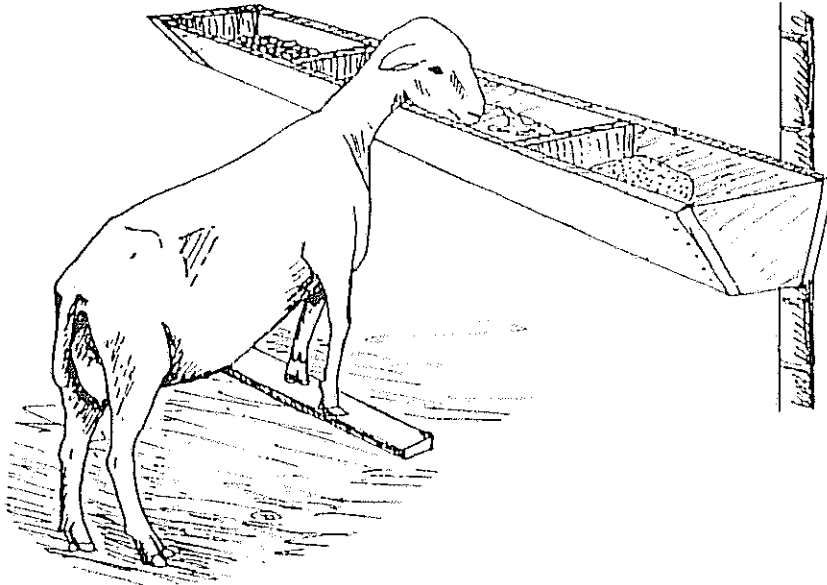
This booklet was written and designed by L.O. García and J.I. Restrepo R. with educational assistance from M.E. Carvajal de Guerrero of Carvajal Foundation, Cali, Colombia.

## WHAT ARE MULTINUTRIENT BLOCKS?

1. Multinutrient blocks are supplements for ruminants (goats, sheep, cattle and buffaloes) which contain energy, urea, essential minerals and vitamins.



2. Multinutrient blocks have been developed for housed ruminants or animals grazing on low-quality pastures.
3. Multinutrient blocks provide minerals, vitamins, energy and urea to ruminants.



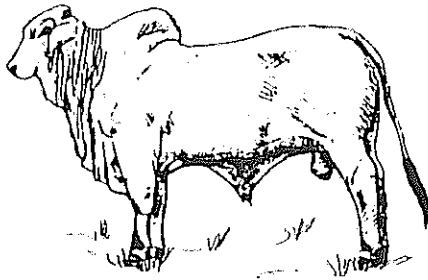
4. Multinutrient blocks are needed when animals are fed low-quality forages or when animals are kept in barns or stables.

# ANIMALS THAT CAN BE FED MULTINUTRIENT BLOCKS

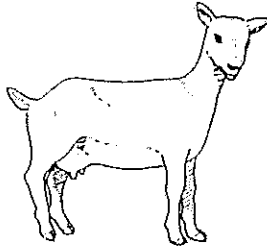
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5. Only these animals can be fed multinutrient blocks:

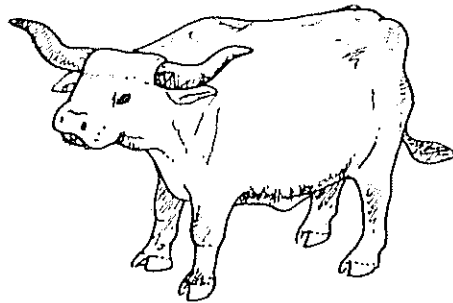
cattle;



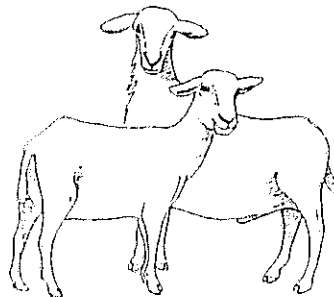
goats;



buffaloes;

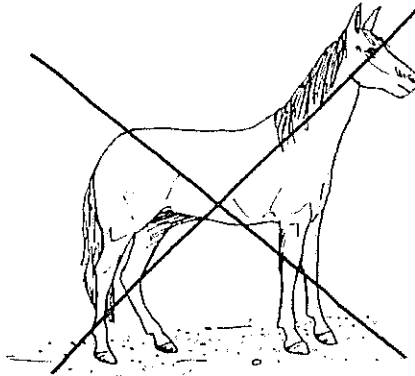


sheep.

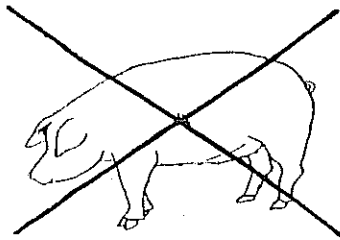


6. On the other hand, these animals should not be fed multinutrient blocks:

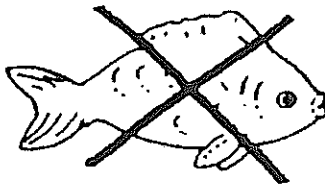
horses;



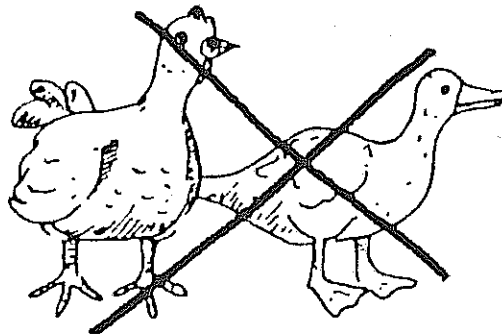
pigs;



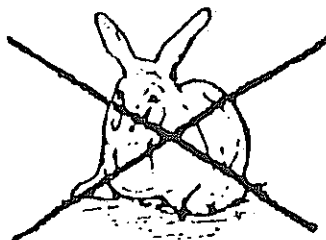
fish;



birds;



rabbits.



## **HOW TO MAKE MULTINUTRIENT BLOCKS**

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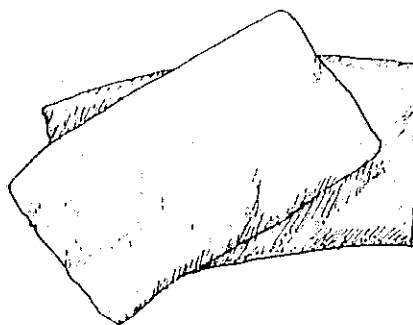
7. To make multinutrient blocks we need to go through the following steps.
8. **Collect what we need:**
  - moulds
  - ingredients;
  - mixing equipment;
  - weighing scales.
9. **Collect the following ingredients:**
  - sugar cane molasses;
  - urea;
  - salt;
  - lime;
  - cement;
  - fibre;
  - bonemeal.
10. **Make a test block.**
11. **Mix all the ingredients.**
12. **Pour the mixture into the moulds.**

### **COLLECTING WHAT WE NEED**

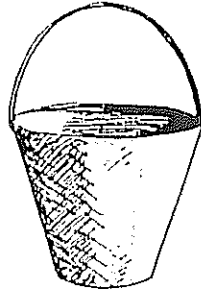
#### **Moulds**

13. As moulds we can use:

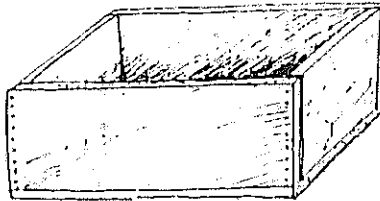
polypropylene sacks;



buckets;



wooden boxes.

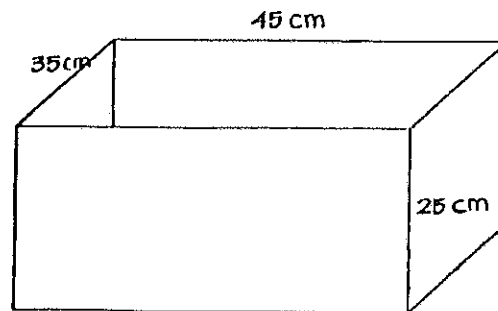


14. Polypropylene sacks have many advantages:

- They are inexpensive.
- They are easy to get.
- They can be used to store the multinutrient blocks.

15. Buckets can be used to make 10 to 12 kg blocks and can be made of wood, metal or plastic.

16. Wooden boxes are used to make blocks of 25 kg and up.

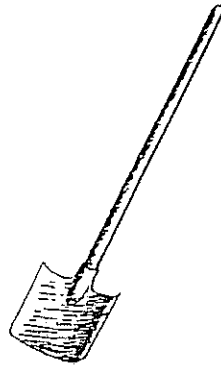


17. Moulds need to be lined with a plastic or paper liner to prevent the blocks from sticking to the wall of the mould.

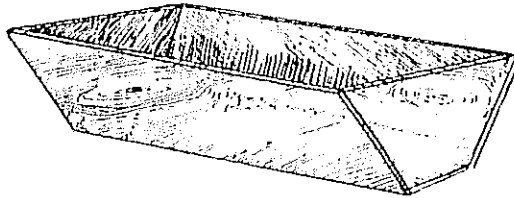
## Mixing equipment

18. As mixing equipment we can use:

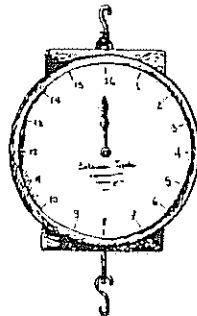
a shovel;



a feeding trough or canoe;



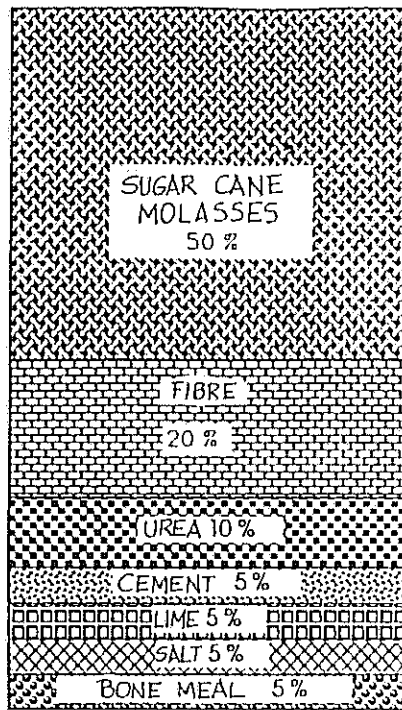
a spring scale.



## PREPARING THE INGREDIENTS

19. The ingredients should be mixed in the following proportions.

Sugar cane molasses	50 percent
Fibre	20 percent
Urea	10 percent
Cement	5 percent
Lime	5 percent
Salt	5 percent
Bonemeal	5 percent

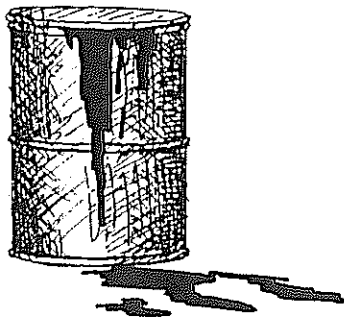


20. To make eight blocks of 10 kg each we need:

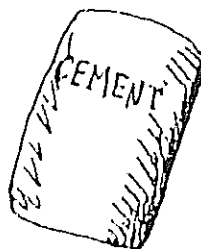
8 kg urea;



40 kg sugar cane molasses;



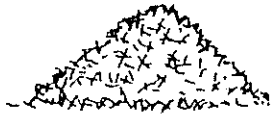
4 kg cement;



4 kg lime;



16 kg fibre;



4 kg salt;



4 kg bonemeal.



### **Sugar cane molasses**

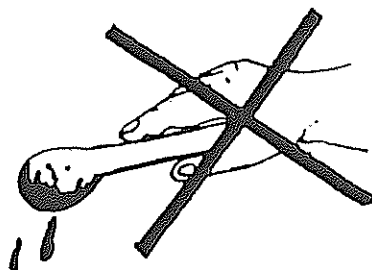
21. **Very important!** Never add water to sugar cane molasses. It has to be thick.

22. To check if the molasses is good, dip a spoon into it.

If the molasses stays on the spoon, it is good molasses.



But, if the sugar cane molasses runs off the spoon and leaves it clean, it is bad molasses.



## Urea

23. Urea is also used as a crop fertilizer.
24. **Warning!** Lumps of urea need to be broken up because if animals eat an entire lump they will get sick or even die.

## Salt

25. Mineral salt is better than common salt. But, if we cannot get mineral salt, we can use common salt. Common salt is inexpensive.

## Lime

26. It is better to use dolomitic lime. Dolomitic lime can be found as stones or ground. Dolomitic lime gets hot when water is added.

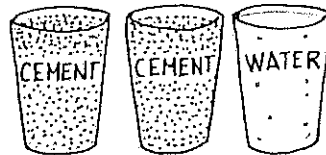


27. Calcium carbonate is not as good as dolomitic lime, but it can also be used.

## Cement

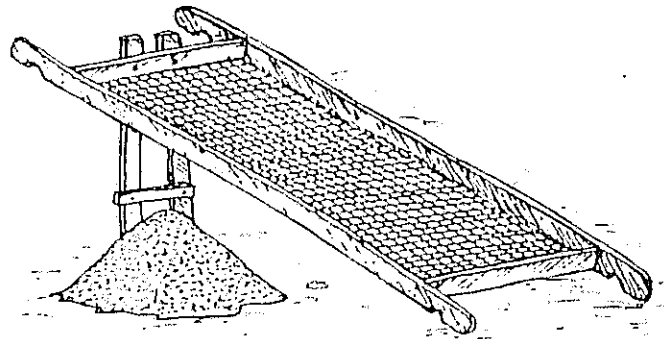
28. We use the same cement as is used in building construction.

Before using cement, it needs to be mixed with water in the ratio of two parts cement to one part water.



## Fibre

29. Fibre is very important because it absorbs water and binds the block together.



30. The best sources of fibre are dry leaves from forage trees. Cottonseed hulls and sugar cane bagasse are other good fibre sources.

31. Chopped hay or chopped rice straws can also be used.

32. Other sources of fibre are:

- wheat bran;
- chopped hay;
- soybean hulls;

- cottonseed hulls;
- coffee bean bran;
- chopped maize cobs;
- chopped rice straws.

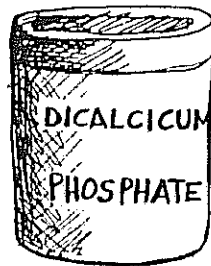
**Warning!** Rice hulls are not good for making multinutrient blocks.

33. Before using fibre it must be chopped into small pieces, dried and passed through a 1- to 2-cm screen.

### **Bonemeal**

34. Bonemeal is an ingredient used to make balanced animal feeds. It can be purchased in an animal feed store.

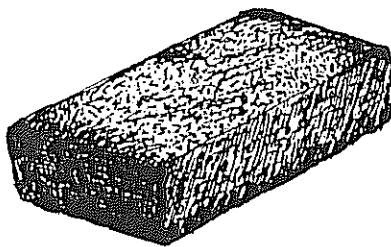
Bonemeal can be replaced by dicalcium phosphate.



35. Dicalcium phosphate is a mineral source extracted from phosphoric rock. It can be purchased in an animal feed store.
36. If we cannot get bonemeal or dicalcium phosphate, we can replace them with mineral salt.
37. If we are not using bonemeal or dicalcium phosphate, it is better to replace common salt with mineral salt too.
38. **Never** use phosphoric rock, it is toxic.

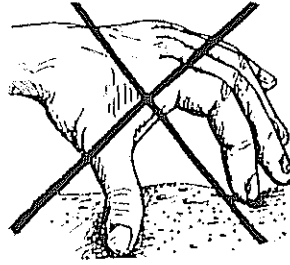
## MAKING A TRIAL MULTINUTRIENT BLOCK

39. Before making the whole batch of mix, we should make a trial multinutrient block.
40. To make the trial block add together:
- 5 kg sugar cane molasses;
  - 1 kg urea;
  - 500 g cement with 0.25 litre (250 g) water;
  - 500 g dolomitic lime;
  - 500 g common salt;
  - 330 g (one-third kg) bonemeal
  - 2 kg fibre.
41. Then, stir and knead all the ingredients until they look evenly mixed.
42. Last, pour the mixture into moulds and leave it for a day to let the multinutrient blocks harden.
43. Take the blocks out of the moulds and check them.

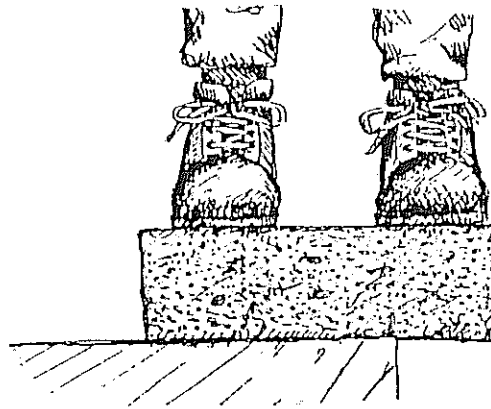


44. **A multinutrient block is good when:**
- The ingredients are very well-distributed throughout the block.
  - It does not have lumps of urea and lime.
  - It is hard.
  - It is resistant.
  - It is sticky.

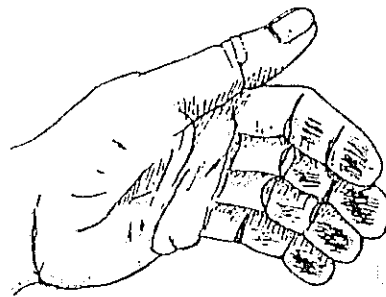
45. Blocks should be too hard to squash between our fingers.



46. Blocks should be resistant enough not to break when a person steps on them.



47. When we hold a block, our hands should feel the sticky sugar cane molasses.



48. **Attention!** When the blocks do not feel sticky, we need to increase the amount of molasses we put into the mixture.

## MAKING THE MULTINUTRIENT BLOCKS

49. Now that we have experience, we can make a bigger mixture of multinutrient block.

50. Weigh and prepare the ingredients:

- 40 kg sugar cane molasses;
- 8 kg urea;
- 4 kg cement;
- 4 kg dolomitic lime;
- 4 kg common salt;
- 4 kg bonemeal;
- 16 kg fibre.

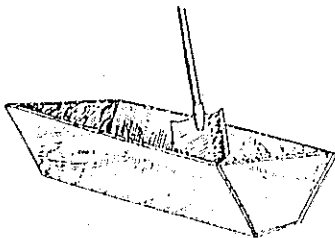


51. **Very important!** We have to break up lumps of urea, lime and salt.

Cement should be mixed with water; two parts of cement with one part of water.

52. Put the sugar cane molasses and urea into a feeding trough.

53. Stir them with a shovel until they look evenly mixed.

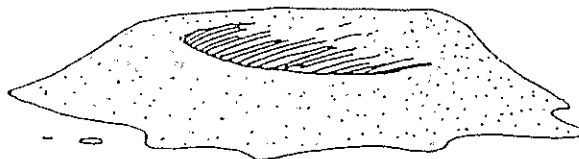


54. Then add:

- salt;
- cement;
- dolomitic lime;
- bonemeal.

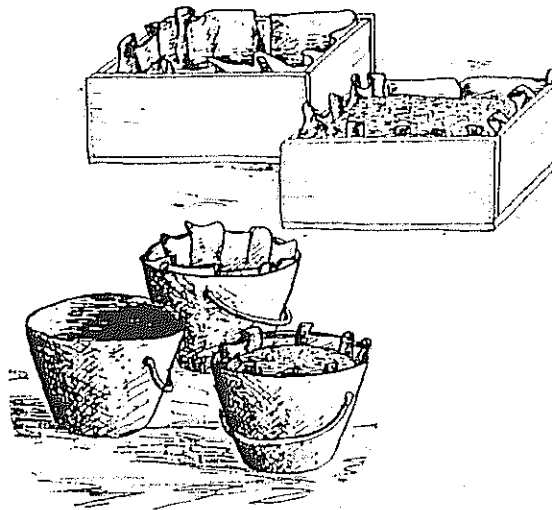
Keep mixing.

55. If the mixture becomes hot, do not worry, it means that it is being well mixed.
56. **Look out!** If the testing block was too hard, we need to decrease the proportion of cement in the mixture. If the testing block was too soft, we need to increase the amount of cement.
57. Pour the fibre onto a concrete floor, making a pile with a hole in the middle that resembles a volcano.



58. Pour the mixture little by little from the feeding trough into the hole in the middle of the pile of fibre. Then start to mix with a shovel.

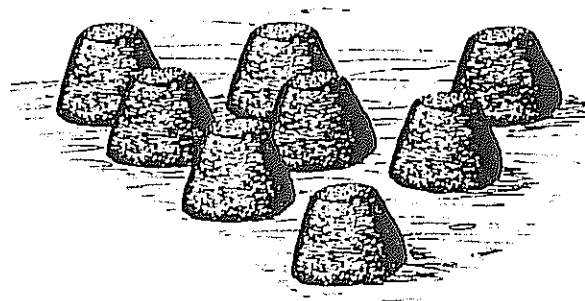
59. Keep on mixing until the mixture is even and without lumps.
60. Pour the complete multinutrient block mixture into the moulds.
61. **Remember!** Moulds should be lined with a plastic or paper liner to prevent the mixture from sticking to the wall of the mould.



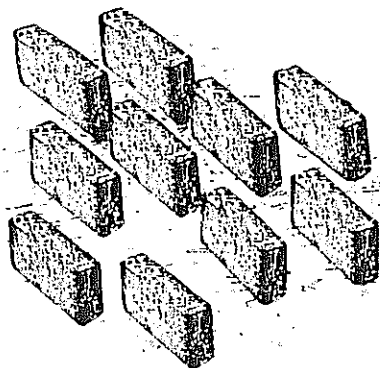
62. Store the multinutrient blocks under cover in a dry place.

Leave the multinutrient blocks to dry out for a day.

63. The next day take the blocks out of the moulds.
64. **It's easy!** Turn the moulds over and knock the bottom and the sides.



65. If the paper sticks to the blocks, it does not matter. Animals will eat the paper without any problem. But, if we used a plastic instead of a paper liner, we need to remove the plastic from the blocks before feeding the blocks to animals.
66. Both small blocks (10 to 12 kg) and big blocks (20 kg and more) can be taken out from the moulds after a day.



Store big blocks under cover in a dry place until they become hard.

67. To store blocks, we put them into individual plastic bags. If we used polypropylene sacks as moulds, we do not need to take the blocks out of the sacks. We can leave the blocks in the sacks instead of putting them into individual plastic bags.
68. Before storing multinutrient blocks, check them to make sure that they were well made.



69. **Remember!** Well-made blocks are:

- smooth and even;
- hard;
- resistant;
- sticky.

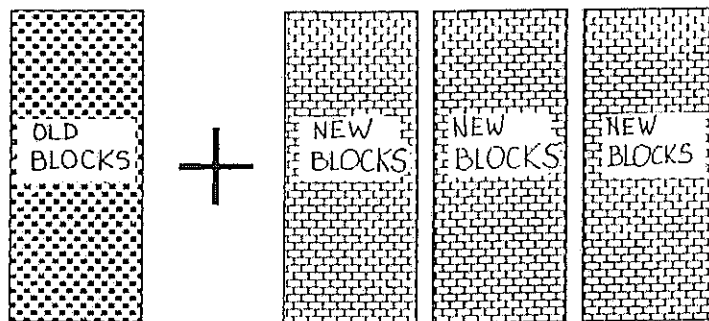
### USING SOFT AND BROKEN MULTINUTRIENT BLOCKS

70. How can we use broken and soft multinutrient blocks?

**It's easy!**

71. Take the blocks out of the plastic bags and leave them to dry for a few days.

72. Then, break and grind the blocks and mix them with new mixture to make more multinutrient blocks.



## FEEDING MULTINUTRIENT BLOCKS TO ANIMALS

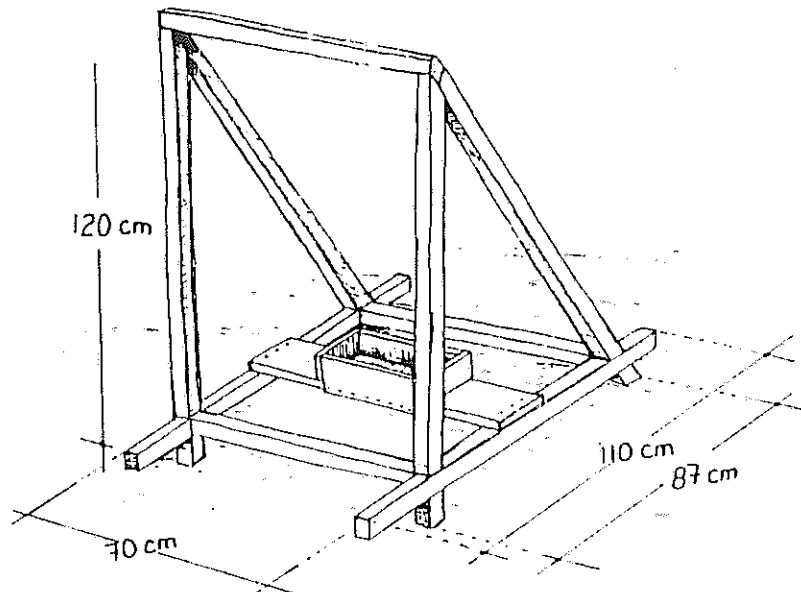
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73. Multinutrient blocks are needed especially during the dry season or when animals are grazing on low-quality pastures.
74. Animals can also eat multinutrient blocks during any season of the year.
75. Multinutrient blocks can be fed to cattle in:
- salting places;
  - feeding troughs;
  - multinutrient block feeders.
76. A multinutrient block feeder is specially designed to be handy and easy to make. It can be moved around the farm to follow the cattle grazing rotation.

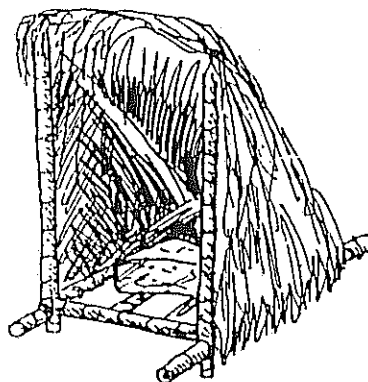


## BUILDING MULTINUTRIENT BLOCK FEEDERS

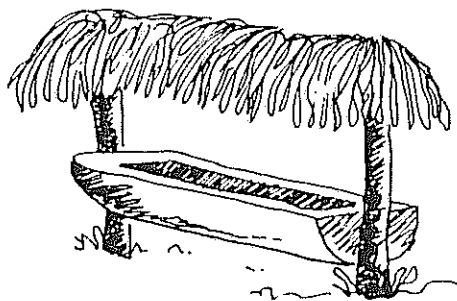
77. We can build a multinutrient block feeder ourselves using the following design and measurements.



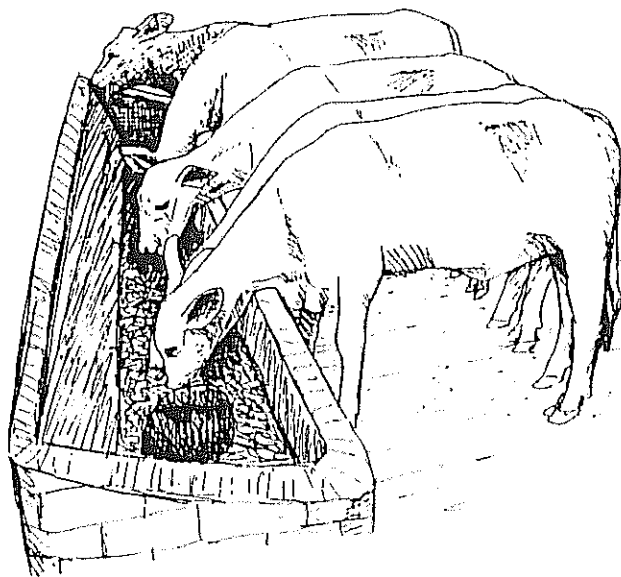
78. The block feeder is covered in a plastic or rubber fabric. It also has a curtain made of the same material, to prevent the blocks from getting wet when it rains.
79. We can also build a multinutrient block feeder using materials available on the farm, such as bamboo, palm leaves and straws.



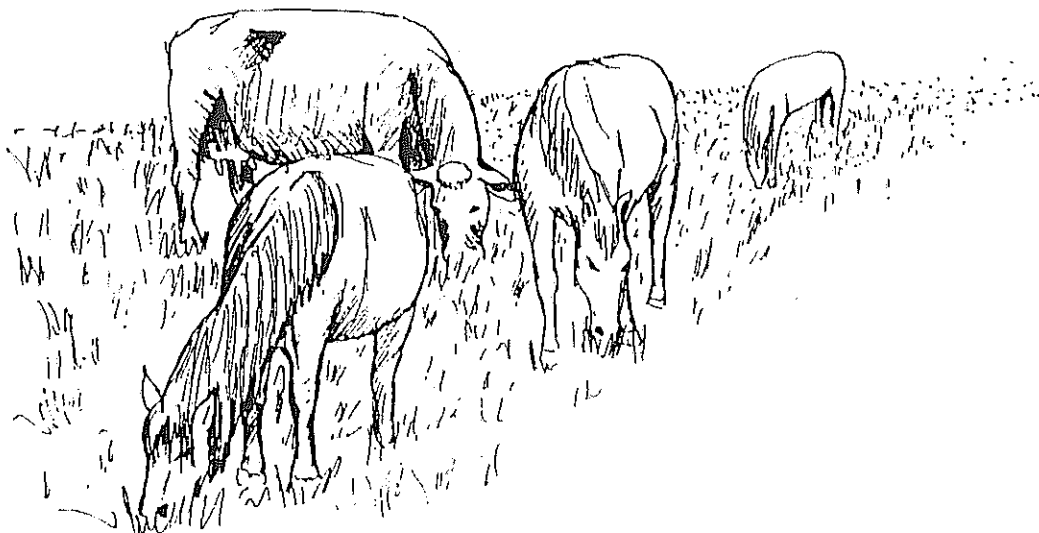
80. If there are salting places on the farm, we can place multinutrient blocks beside mineral salt.



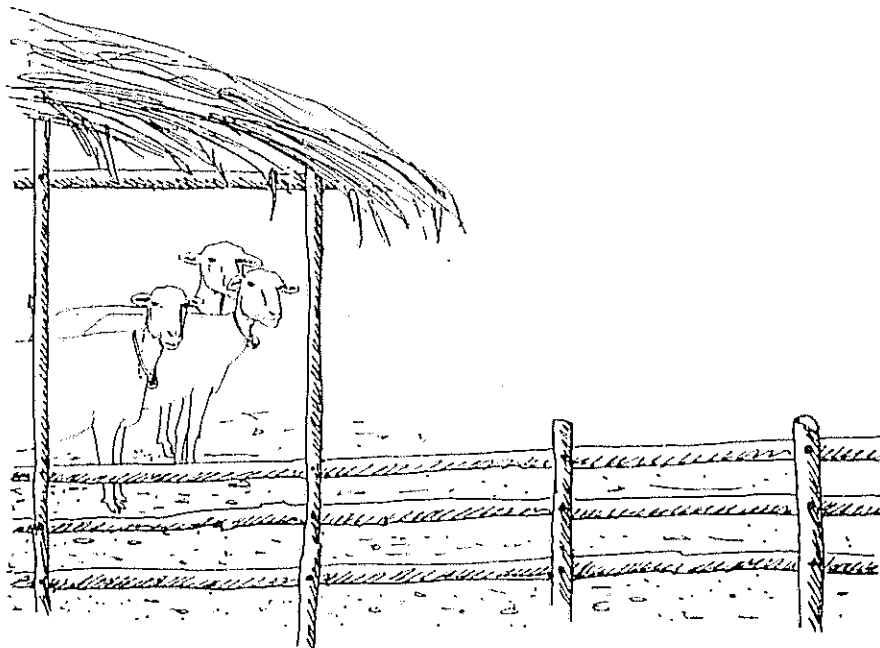
81. If we keep cattle in stables or barns, we can place multinutrient blocks beside the animals' feed.



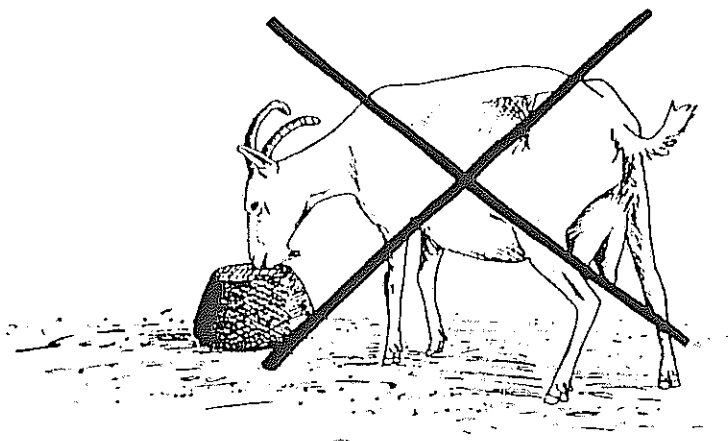
82. Horses do not need multinutrient blocks, but if they eat them it does not matter.



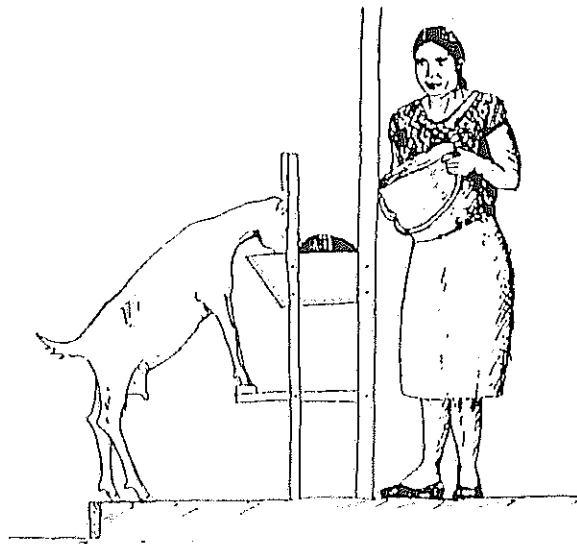
83. Horses and cattle can graze together when multinutrient blocks are fed to them.
84. Goats and sheep that graze together on range pastures can be fed multinutrient blocks at their pen.



85. Goats and sheep that are corralled in the afternoons can have multinutrient blocks at night.
86. Goats do not like dirty feed. They will not eat the multinutrient blocks if they are left on dirt.

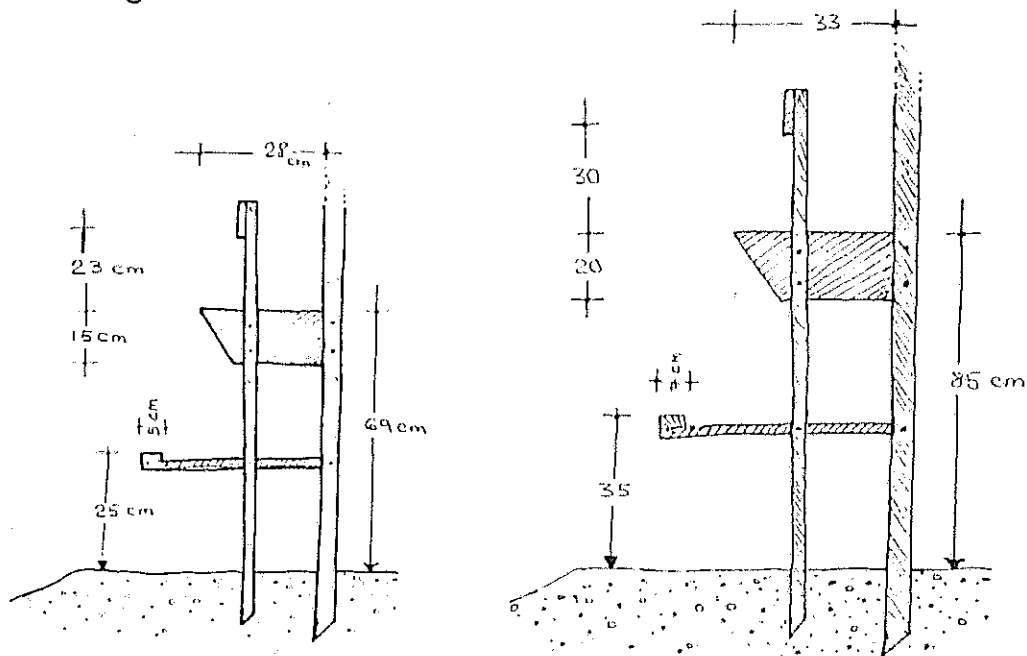


87. Goats need a goat feeder.



88. This feeder designed for goats is very practical. Goats can reach the feed and the multinutrient block without defecating in it.

89. We can build a goat feeder by using the following design and measurements.



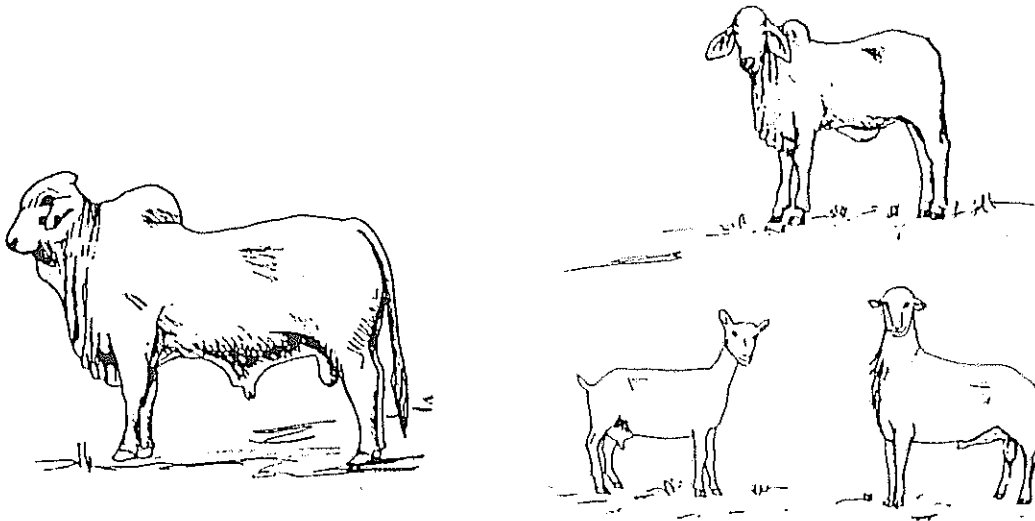
For young animals

For adult animals

90. Sheep feeders must be built half the height of goat feeders.

## HOW TO CALCULATE THE NUMBER OF MULTINUTRIENT BLOCKS TO MAKE

91. Animals know how much multnutrient block they need and they will eat this amount.



92. To calculate how many kilograms of multinutrient block we need to make we count:

- the number of days that the multinutrient blocks last;
- the number of animals there are on the farm.

Then we calculate:

- the daily consumption of blocks on the farm;
- the daily consumption of blocks per animal.

93. **To calculate the daily consumption of blocks on the farm**, divide the weight of the blocks by the number of days they last.

94. **To calculate the daily consumption of blocks per animal**, divide the daily consumption of blocks on the farm by the number of animals.

95. For example: A 20-kg multinutrient block lasts ten days on a farm with four cows.

$$20 \text{ kg} \div 10 = 2 \text{ kg (daily consumption of blocks on the farm)}$$

$$2 \text{ kg} \div 4 = 0.5 \text{ kg (daily consumption of block per animal).}$$

96. The following is the average consumption of multinutrient blocks of different animals.

Big ruminants	buffaloes cows bulls heifers steers	350 to 500 g daily
Calves	(from the time they start eating grass)	150 to 250 g daily
Small ruminants	goats sheep	70 to 150 g daily

97. **Warning!** Animals can become intoxicated if they eat too much multinutrient block.

98. This happens when:

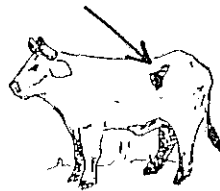
- The multinutrient block is too soft.
- The multinutrient block has lumps of urea in it.
- Animals are kept in stables or corrals with multinutrient blocks, but without other feed, and eat more blocks than they need.
- There is no transition period to let the animals get used to the multinutrient blocks.

99. Animals that have been intoxicated present these signs:

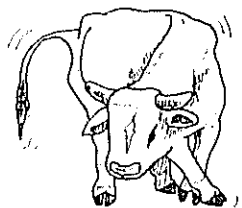
- They foam around the mouth.



- The rumen appears swollen on the left side.



- They seem to be drunk.



100. When the animals are intoxicated, we have to act as soon as possible to:

- Identify the sick animals.
- Remove the multinutrient block from the feeder
- Give vinegar and water to the animals. Calves, goats and sheep need half a litre of vinegar. Cattle and buffaloes need 2 litres of vinegar.

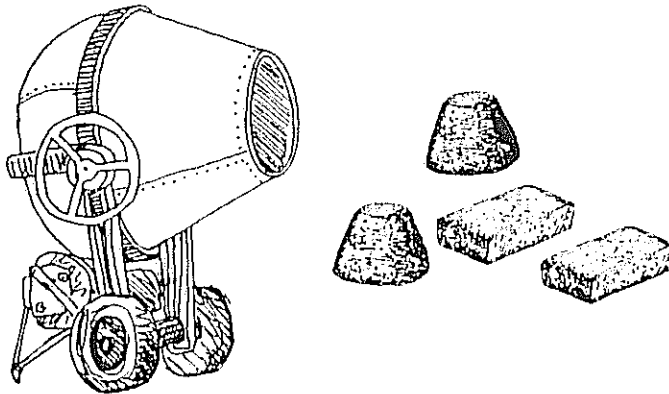


- Make the animals drink as much water as possible.

## USING A MIXER TO MAKE MULTINUTRIENT BLOCKS

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101. To prepare many blocks at the same time it is possible to use a concrete mixer or a regular feed mixer.



102. The concrete mixer is the same as that used in building construction.

In some places concrete mixers can be rented for a day.

103. To prepare eight multinutrient blocks of 25 kg each, we must do the following.

104. Get the ingredients ready:

- 100 kg of sugar cane molasses;
- 20 kg of urea;
- 10 kg of cement;
- 10 kg of dolomitic lime;
- 10 kg of common salt;
- 10 kg of bonemeal;
- 40 kg of fibre.

105. Start the concrete mixer with the cylinder in a horizontal position and at a slightly lower speed than that used for concrete so that the mixture does not come out of the mixer.

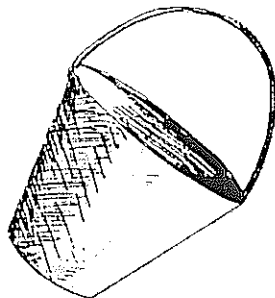
106. Pour the sugar cane molasses and the urea into the machine and let it run until the mixture looks even.

107. Add the:

- common salt;
- cement;
- dolomitic lime;
- bonemeal.

Then let the concrete mixer run for about five minutes until the ingredients are evenly mixed.

108. Now start pouring the fibre slowly into the mixer bucket by bucket and wait each time until the mixture looks even.



109. While the ingredients are being mixed, to save time, we can get the moulds ready.

110. When the mixture is smooth and even, pour it into the moulds.

111. Place the moulds under cover in a dry place, and let the blocks dry out for 24 hours.



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