Theme 2: Forage conservation

MAKING UREA/MOLASSES/MINERAL LICK (Level 3)

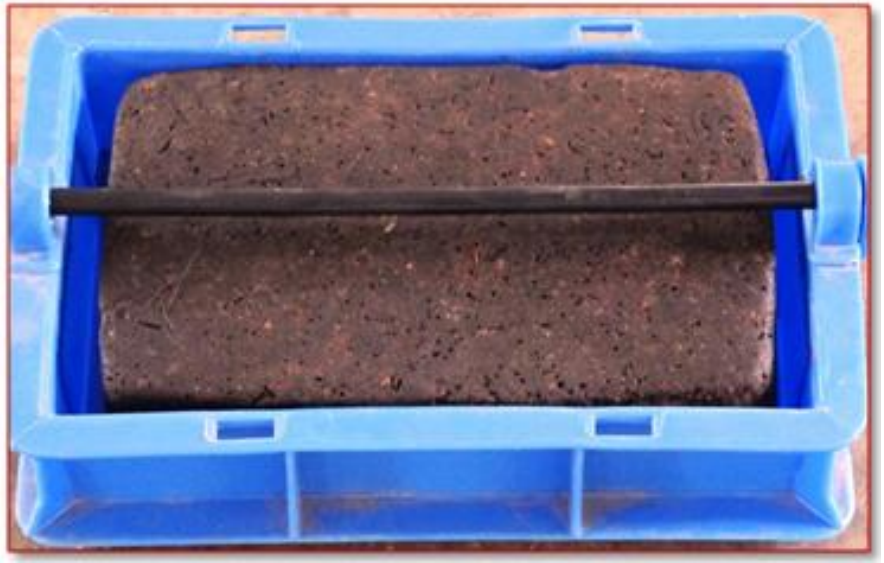
Topic	Training & information Content
2.1	Fodder conservation and storage
2.2	Estimating ideal time of harvesting
2.3	Guideline for silage making
2.4	Fermentation process in silage
2.5	Treatment of straw with Urea
2.6	Making of urea/molasses/mineral lick
2.7	Management of silage pit (feed out)
2.8	Estimating fodder supplies for dry season feeding & planning of feeding management

1. You will learn about (learning objectives):

- ❑ How to identify molasses urea mineral lick/block.
- ❑ How to make molasses urea mineral lick, liquid mixture and mineral block.
- ❑ Know the importance of molasses urea mineral block.

2. Introduction

- During dry seasons, the quality of available forage may not be sufficient to meet the nutritional requirements of the cow. This requires supplementation with other feed resources.
- Molasses urea mineral block (MUMBs) can be one way to supplement dairy cows fed on low quality forages.
- The molasses urea mineral block can be readily bought or mixed on farm. Farmers can buy feed ingredients and produce tailor-made molasses urea mineral that meet the needs of their herd.



3. Ingredients

- Molasses is a substance which is produced as a by product when processing sugarcane or sugar beet to make sugar.

- Urea is a white crystalline solid inorganic chemical compound, widely used as a nitrogen fertilizer.

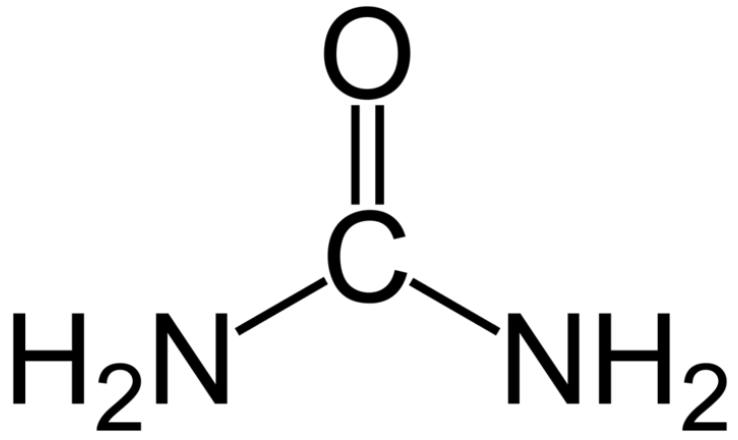
- Minerals are inorganic elements needed by the cows body to support some of its body function.

- Molasses urea mineral block (MUMBs) is a lick block with molasses, urea, minerals, vitamins and other multi-nutrients.

- MUMBs provide constant source of fermentable nitrogen to the cow throughout the day to promote growth of rumen microbes.

4. Urea

- Urea (fertilizer) is an inorganic compound also known as carbamide.
- The chemical formula for urea is $CO(NH_2)2$.
- Urea is a colorless and odorless solid.
- It is widely used as an agricultural field fertilizer, which contains about 46% of nitrogen.
- Urea is also used as a feed supplement, as a source of non-protein-nitrogen (NPN) and has an important role in metabolism of nitrogen-containing compounds by animals.



4.1 Urea as feed ingredient for cows

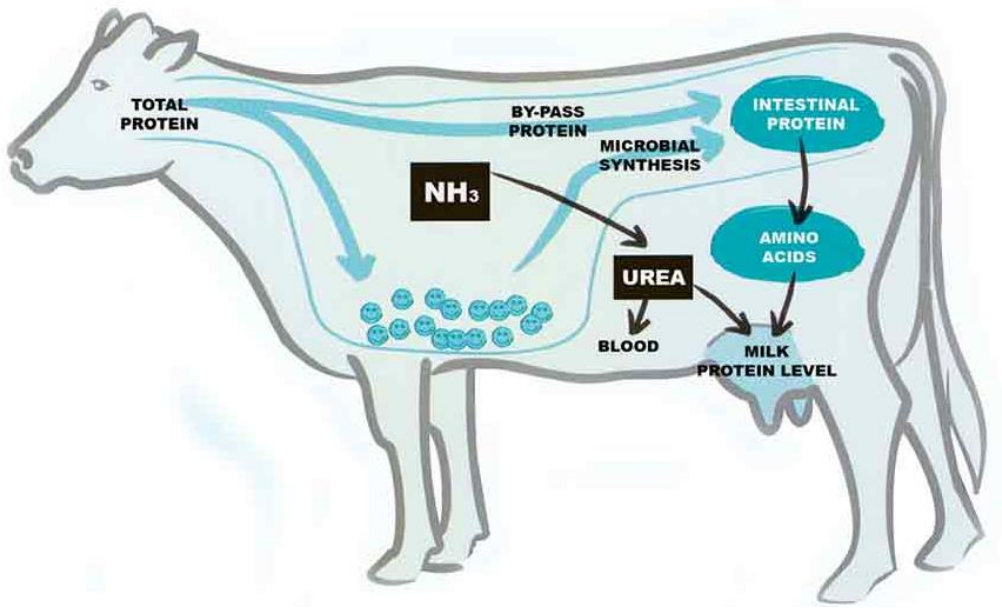
- Urea can be a feed ingredient when mixed in compound feeds, total mixed rations or during ensiling processes.
- Compound feeds can be mixed with urea as an ingredient to replace, partly, protein-rich pulses or agro-industrial by products.
- For example, a compound feed containing 12-20% crude protein, may contain 1.0-2.0% urea to replace an equal (on nitrogen, N basis) amount of other protein sources.

4.2 Feeding urea

- Urea is harmful to animals if fed in excess. Do not feed urea to animals below 3 months of age.
- It is recommended to feed urea in combination with highly digestible carbohydrates (sugars).
- Microbes utilize volatile fatty acids (VFA) from carbohydrate digestion and ammonia from urea to make amino acids.
- Urea feeding is done to replace protein in feeds partly because it is a source of nitrogen just like proteins.
- Dietary protein (crude protein [CP]) is calculated based on the amount of nitrogen in feed (CP%=N% x 6.25).
- Urea is a low cost source of non-protein nitrogen (NPN). When feeding it can increase animal productivity and health status.

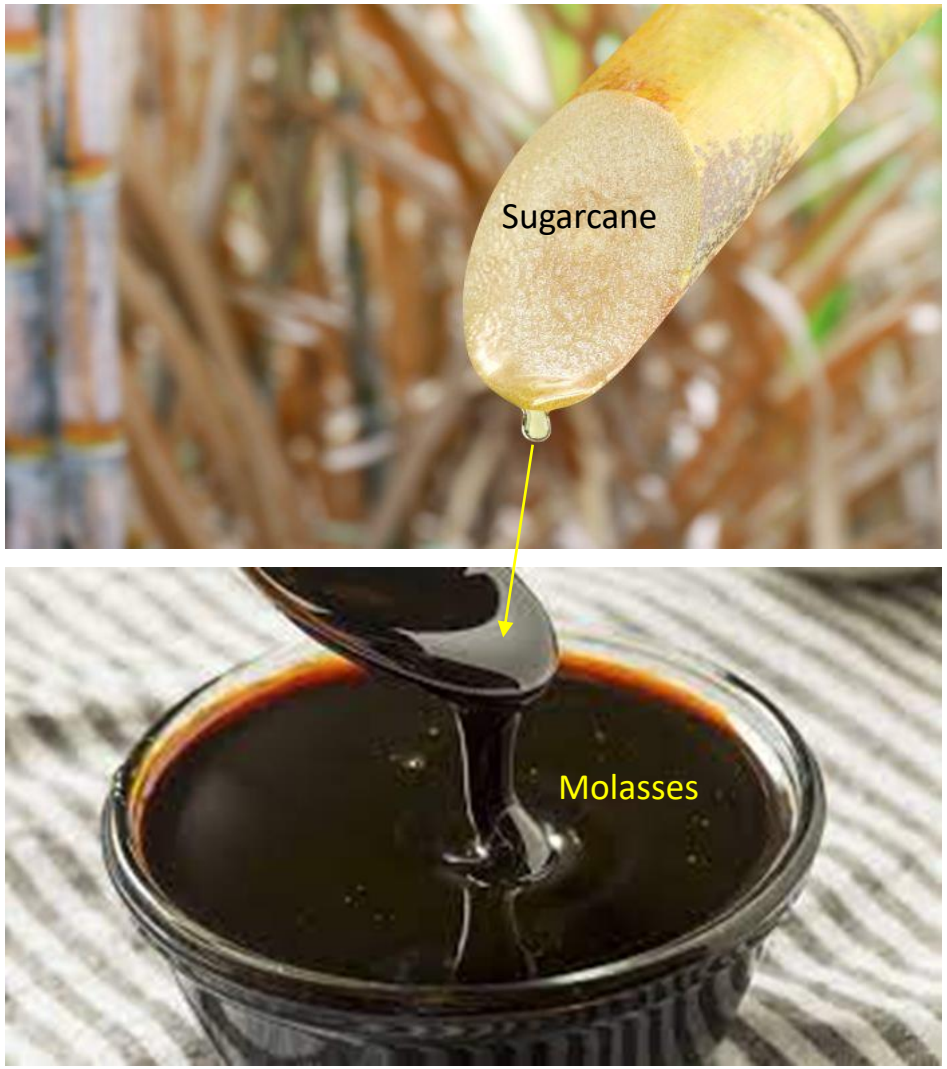
4.3 How urea is utilized by cows

- Microbes in the rumen of cows have the ability to utilize urea (nitrogen) and convert it into microbial protein which is digested into amino acids and converted into protein for the cow.
- That is, the rumen microbes convert non-protein nitrogen (NPN) such as urea to ammonia through urease (enzyme) to form amino acids; and any excess is detoxified by the liver.
- During dry seasons when protein is unavailable in the forages and true protein sources are expensive, urea can be fed as an ingredient in molasses urea mineral blocks or to treat straws and other fibrous crop residues to supply dairy cows with an alternative source of nitrogen.



5. Molasses

- Molasses is a viscous, dark and sugar-rich agro-industrial by-product.
- Molasses can be fed directly to cattle or used to create molasses urea mineral blocks as an energy source cattle.
- Molasses can also be used in small quantities in compound feeds or during the ensiling process of grasses and legumes.



6. Minerals

- Minerals are found in feeds, however the amounts in the feeds are normally inadequate for high milk production and growth.
- Mineral are divided into two categories; Macro and micro minerals.
- Macro minerals are needed by cows in bigger quantities as compared to microminerals.
- Micro minerals are fed at the rate of milligrams per Kg per day while macro minerals are fed at a rate of grams per animal per day.

Further reference: See module on Mineral & vitamin requirement guidelines.

7. Mineral licks

- Mineral licks contain mineral nutrients from deposit of salts and other minerals.
- Mineral licks can be naturally occurring or artificial like salt blocks.
- Farmers can make mineral licks at the farm. This helps in formulating blocks with specific minerals that are inadequate in a cows diet.

7.1 Mineral lick ingredients

- Mineral licks contain mineral and vitamins in varied quantities to meet livestock requirements.
- To make a mineral salt lick you will need:
  - 6 Kgs of mineral salt
  - 2 kgs of bonemeal
  - 1 kg of lime
  - 2 kgs of clay
  - Water
  - Bowl/tub/trough
  - Spoon for mixing
  - Wooden box

7.2 Why the ingredients are used

1. Water

- Used as the main solvent to facilitate even mixing of ingredients.

2. Agricultural by-products

- Added to increase nutritive value of the block especially cereal brans.
- Microbes utilize volatile fatty acids (VFA) from carbohydrate digestion and ammonia from urea to make amino acids in the cows body.

Wheat bran

3. Clay

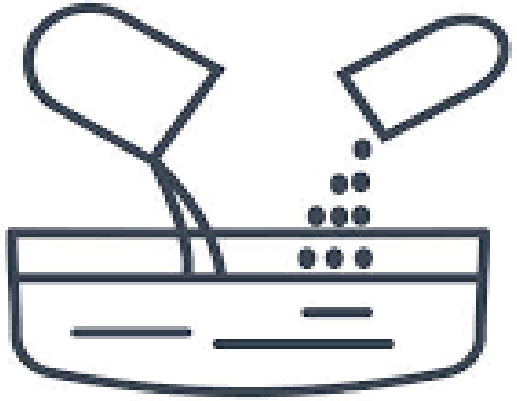
- Works as a pH buffer as it helps reduce sub-clinical ruminal acidosis. It is also known to reduce aflatoxin toxicity.

4. Salt, lime/cement

- They provide macro mineral needed by the cow.
- Cement/quick lime is used as a binding agent/holds the block in shape and makes it hard for easier licking by cows.

7.3 Procedure for making mineral licks

- Pour mineral salt, bonemeal, lime and clay into a large bowl/tub.
- Mix these ingredients using a large spoon and add water while mixing until they are blended.
- The water is to help in easy blending of the ingredients.
- Once the mixture is well blended, drain off excess water by using a strain or old cloth to strain the mixture. Do this until you cannot get any more water out.
- In case the mineral mixture strained is a lot, place it in an empty bowl before transferring into a wooden box.
- Place the mixture in a wooden box and place in a cool shaded area so that it can harden.



8. Molasses urea mineral liquid

- Molasses urea liquid mixture is a nutritious feed mix that farmers can make at the farm.
- It contains a variety of ingredients carefully blended together to offer cattle with the nutrients they need for their body requirements.
- Some of the ingredients found in molasses urea liquid mix are for example:
  - Molasses
  - Urea
  - Water
  - Common salt
  - Mineral premix (mixture).

8.1 Composition of Molasses urea mineral liquid

- The urea molasses mineral block should have a composition as follows to guide on variety of quantities of production at the farm level.
- Composition differs depending on the ingredients being used .
- Ingredient composition:
  - Molasses (sugarcane) – 92%
  - Urea – 2.5%
  - Water – 2.5%
  - Common salt – 2 %
  - Mineral premix (mixture) – 1%


Mineral & vitamin premix

8.2 Making molasses urea mineral liquid

- Dissolve urea in water and pour gradually into a tank containing molasses.

Pay attention to ensure even mixing of urea solution!

- Stir continuously using a large wooden rod or shovel depending on quantity, while pouring the urea solution into the tank for an even mix.
- Pour in common salt and the mineral premix while stirring the mixture for an even mix.
- Heating may be done only when the climate is cold as this affects the viscosity (increases) of molasses making it difficult for mixing.

9. Molasses urea mineral block (MUMB)

- To make a 100 kg MUMB (sufficient for 25 – 30 blocks of 3.5 - 4 kg each) you will need:
  - Molasses - 38 kg (38% as fed)
  - Urea - 12 kg (12% as fed)
  - Mineral mixture/DCP/bone meal - 2 kg (2% as fed)
  - Salt - 3 kg (3% as fed)
  - Cement - 13 kg (13% as fed)
  - Agricultural by products (wheat bran/maize bran) - 32 kg (32% as fed)

- You will also need a wooden frame to set the ready paste of molasses urea mineral block in shape.
- The wooden frame can have dimensions of 10 cm x 20 cm x 5 cm.

9.1 Procedure for making molasses urea mineral block (MUMB)

- Pour molasses in a trough and add 1-3% water if it is too dry and mix evenly.
- Add urea and mix until it dissolves completely.
- Add mineral mixture and salt while stirring evenly.
- Add cement to the uniform mixture and mix until the paste solution is evenly mixed together.
- Finally add the agricultural by product of choice (e.g. wheat bran) and mix evenly.
- Place the evenly mixed paste into the wooden frame giving it a rectangular shape.
- Allow the block to dry in open air under a shade for 3-4 days before feeding to animals.

9.2 Feeding molasses urea mineral liquid and blocks

- Molasses urea mineral liquid/block should not be fed alone. Their purpose is to improve utilization of roughage and not substitute it.
- A minimum roughage amount is needed to avoid over feeding cows and causing urea poisoning.
- Avoid feeding urea molasses mineral liquid & block to young calves since their stomachs are still developing.
- Growing calves past 6 months can be fed urea molasses liquid and block for free choice consumption.

9.3 Feeding molasses urea mineral liquid and blocks Cont'd…

- Introduce the feed gradually within 1-2 weeks.
- Recommended quantities of urea molasses mixture to feed per cow per day:
  - Large cows (more than 400 Kg) - 2 kg
  - Small cows (less than 400 Kg) - 1 kg

  If provided as a block, a mature dairy animal will consume (lick) up to 0.5 kg per day.

9.4 Advantages of molasses urea mineral blocks

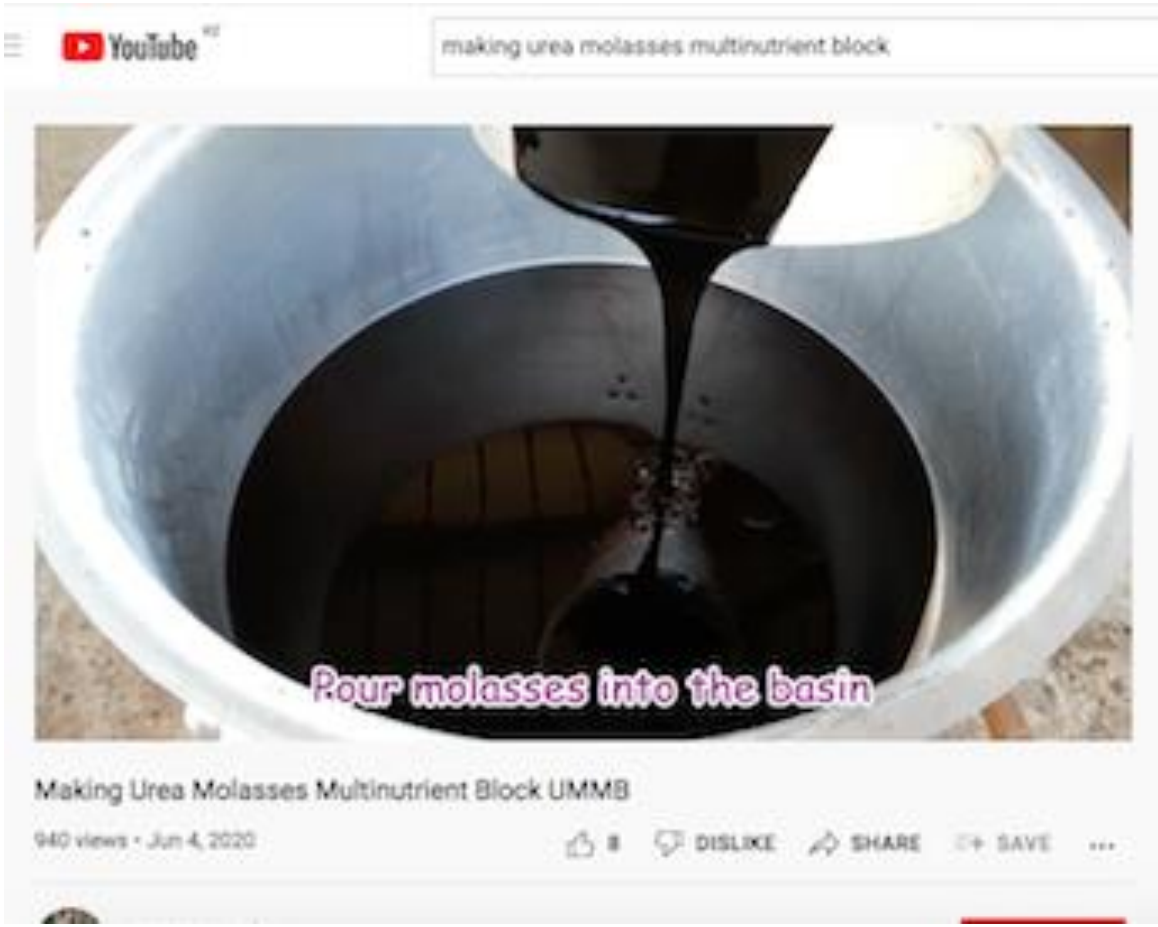
- MUMBs;

i. supplements deficient nutrients in the main feed for cows especially during the dry season.
ii. are easy to transport and store.
iii. are cost-effective and in the long run increases farmers income by utilization of locally available resources.
iv. urea molasses mineral liquid/block has reduced toxicity as compared to sprinkling urea in drinking water.
v. increase milk productivity and reproductive efficiency in dairy cows.

10. Summary

Making molasses/urea/mineral block

Watch video:
https://www.youtube.com/watch?v=wf0hT1SJkl0



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