

GUIDELINES TO MAIZE SILAGE MAKING (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
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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



Guidelines to Maize Silage making (Level 3)

1. You will learn about (learning objectives):

- ❑ The right steps for making maize silage:

Identifying the right stage of harvesting, using right machinery for best results and ensuring proper management of pit / clamp before and after feed out.



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2. Making Maize silage

- Maize silage is a way of preserving maize fodder for future use
- The silage provides low cost metabolizable energy (ME) for dairy cows and can be a key ingredient in a cow's daily feed ration/diet
- Maize silage is low in Crude protein (CP), Calcium and Vitamin D
- If prepared in enough quantity, it helps a farmer to counter seasonality in milk production



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3. Why make Silage?

- To make better use of the (genetic) potential of the dairy cow and enhance milk production
- To reduce the cost per unit of ME fed to the cows per every liter of milk produced
- To make feed management more flexible
- To balance feed requirements based on number of cows and expected milk production with acreage under forage production and/or purchased forages

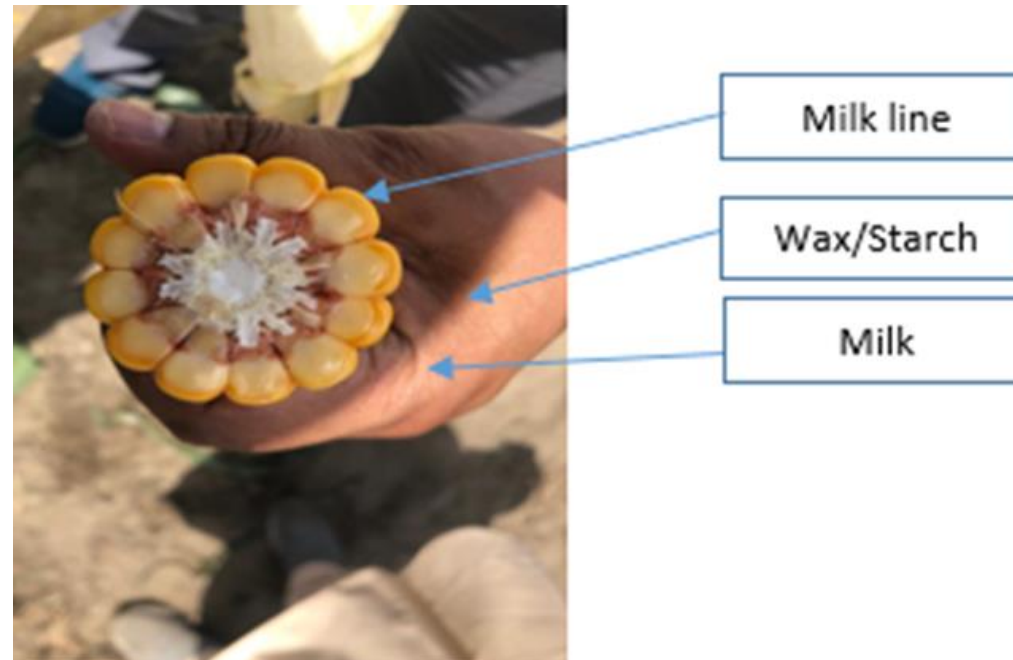
Note: Whether maize silage is cost effective depends on quality, cost of production (and price in the market if bought externally), vis-a-vis other available feed and forages in the market



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4. How to test dry matter in the cob?

- Dry matter content of maize cobs is an important consideration when making silage
- To test the dry matter, press the kernel in between 2 fingers. The content should be moist but firm and you can roll it between your fingers.



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5. Stage of harvesting maize fodder for silage

- The ideal stage of harvesting is when the kernel is dough-ripe / ripe
- That is, when twisting the stem, only few drops of moisture can still be seen coming out – see next slide
- The leaves below the cob are dry
- The milk line is at half to three quarters of the kernel
- Aim at a DM level of 30-35% for the whole crop



Leaves below the cob are dry

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5.1 Estimating the dry matter on the stem

- Take the maize stem, twist it on your knee as shown alongside

4 drops \leq 18 % DM 100 % green

3 drops \approx 21 % DM 75 % green

2 drops \approx 24 % DM 50 % green

1 drop \approx 27 % DM 25 % green

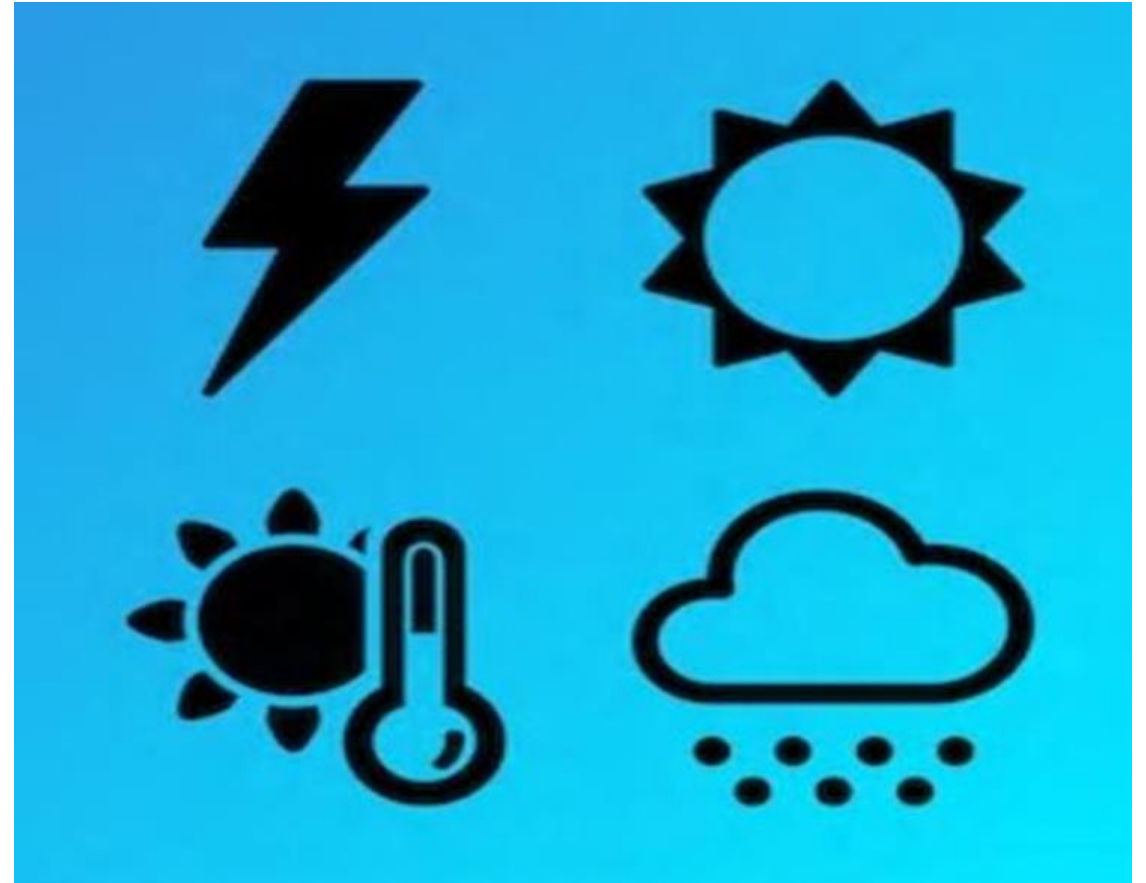
0 drops \geq 30 % DM 0 % green



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6. Weather conditions at harvesting

- Check the weather if appropriate for machines to enter the field and if right for harvesting
- Monitor weather pattern and forecast so as to bring machines at best field conditions. This will avoid machines to get stuck and delay the harvesting process as well as avoid contamination of silage with mud. It maintains silage quality.



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7. Chopping

- Chop length should be between 8 – 12mm
- Sharpen the knives at least every day
- When harvesting is done at dough-ripe stage the chopper needs a kernel crusher
- Preventive maintenance and servicing of the machines during harvesting should be done daily
- Chopping reduces leftovers in the feeding trough during feeding



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8. Harvesting using a Kernel crusher

- Harvester should be mounted with a kernel crusher
- This ensures that the kernel is crushed into four or more smaller pieces
- The starch in the kernel is now faster available for fermentation by bacteria which produce volatile acids, thus preserving the silage. Moreover, the starch from the crushed kernels will be better digested by the cows and whole grains will not be seen unutilized in the dung.



Kernel crusher

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8.1 Harvesting using a Kernel crusher, Cont...

- The kernel crusher allows for harvesting at a higher DM and starch content (dough-ripe stage) and silage with higher energy content per kg DM
- The rule is that in a liter of chopped maize silage there are NO whole kernels, less than 2 kernels that are only cracked and most kernels are broken 4-6 times at least
- Chaff cutters usually do not have a kernel crusher which forces the user to harvest at milk ripe stage. At this stage the total crop has not reached its maximum energy (i.e. starch) content, as sugars in the kernels have not yet converted into starch, the DM of the silage is too low, and nutrients will be lost through effluent wastage.



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9. Location of the pit

- The location of the silo (silage pit) should;
 - be dry with no stagnant water
 - be protected from animals and wildlife
 - have a high elevation or on a slope
 - be as close as possible to the cow or cow barn.



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10. Transportation

- The choice of means of transport is determined by the amount of harvested maize, distance and road network
- Motorized transport increases working speed
- The distance between the field and pit/clump must not be more than 3km, if motorized transport is available
- Plan in such a way that silage pit can be covered in 12 hours
- Seal the filled pit within 12 hours to ensure high quality silage



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11. Filling of the Silo: Pit / clamp / bag

- Fill the pit layer by layer. Make layers of 10 cm silage every time
- Additives such as molasses can be added at this stage
- Compact after every layer
- Prevent contamination with soil, dirt and manure.



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12. Silage pit dimensions and location

- The silage pit should be narrow and long
- Determine how far the clamp/pit is from the barn, how well-drained the location is, how safe from any other traffic and from birds, rodents and wild animals.



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13. Compacting

- Compaction is necessary to remove air (oxygen) from the chopped maize
- Tools used for compaction need to have enough weight for effective compaction
- Compact after every layer of silage brought on to the pit
- Ensure equal compaction of the silage surface.



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14. Sealing

- Ensure that the polythene sheet is not punctured and has a good overlap to cover the silage pit / clamp completely
- Ensure that the thickness of polythene is >500 gauge
- Seal silage pits or clamps within 24 hours after starting to make the pit



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14. Sealing Cont'd...

- Care needs to be taken that the polythene is not damaged
- An airtight plastic prevents oxygen from entering the pit. One sheet plastic is best because there are no uncovered edges that can allow penetration of air into the silo. The economic value of well-preserved silage is high, and it can be cost-effective to invest in a heavy-duty outer sheet.



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15. Covering with soil

- Soil cover of at least 20-30cm is important for four reasons:
 1. Continuously compacts the silage
 2. Protects the polythene sheet against direct sunlight
 3. Protect the polythene sheet from being damaged by birds and small wildlife
 4. Protect the silage underneath the polythene sheet from heating up.



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15.1 Covering with soil Cont...

- Soil or sand bags keep the polythene sheet tighter and continue exerting pressure on the silage pit
- Tires are not preferred; they do not keep out the heat. Tires can also puncture polythene.



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16. Silage making in transportable bales

- Baling eases transportation of the ready-made silage from one location to another
- This can be useful for farmers with dairy cows and not enough land to plant their own fodder crops
- Also, farmers in dry or very dry areas where rainfall pattern does not support the growth of forages can benefit from this technology.



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17. Fermentation

- Sometimes circumstances for ensiling may not be very ideal, for example; the maize is too wet or too dry. To enhance fermentation, additives may be added during filling of the pit
- Ensure regular and equal application of the additive over the silage surface
- After closing the pit / clamp, it should stay closed for 6 weeks before opening
- Making a narrow pit / clamp will ensure feeding speed on feed out.



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18. Feed Out

- The feeding speed should be 1.5 - 2 meters per week based on the feed planning tool; to prevent heating, moulding and rotting at the face of the silo
- Make sure the silage can be removed easily and is accessible. If silage removal takes great effort, staff will attempt to remove less than necessary. Make sure to remove corners every day and keep the face of the silage clamp straight and tight



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18.1 Feed Out Cont...

- Remove all loose materials from the open side (face) of the pit and feed immediately. Loose materials in front or on the bottom of the silage pit or clamp cause moulds and rotting bacteria to grow. From here moulding and rotting will spread to the good parts of the clamp
- Clean the open silage face from all rotten and loose materials daily. This removes moulding and rotting materials therefore preventing contamination of good feed.



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18.2 Feed Out Cont'd...

- Well prepared silage, sealed and kept closed can be stored for several years.
- Once you open the silage pit continue to feed daily until the pit is empty.
- The feeding speed should be at least 1.5 meter per week
- The rule of thumb is the narrower the better
- Make sure that all the silage is removed from the face of the pit to avoid heating up. This will save the farmer a lot of costs as loses will be reduced



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19. Feeding

- A mature cow can consume between 15-35 kg of maize silage per day
- Feed the maize silage fresh and cold (room temperature)
- Feed more maize silage in the early lactation period when the cows milk production is highest
- Maize silage contains very little protein, supplement milking cows with high protein feeds.



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19.1 Feeding Cont'd...

- Maize silage is moist, clean the feeding trough once per day
- When clearing feeding trough from the previous feeding, the leftovers should not be more than 5% of the weight when fed
- Provide fresh feed at least twice per day. Ensure the feeds in front of the cow are always fresh
- Feeding trough should never be empty. Turn feed over occasionally
- Provide enough feeding space at the feed fence (65-70 cm/cow).
- All these will ensure a high feed intake.



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