



For Professional Dairy Farmers

Module 10 ENSILING OF FORAGE MAIZE



Module maize 2: Ensiling of forage maize

This training module is part of 8 training modules:

1. Calf rearing
2. Nutrition and feeding
3. Hygienic milk production
4. Housing
5. Management of Napier
6. Healthcare
7. Fertility and reproduction
8. Herd Record keeping
9. Maize growing and ensiling of forage maize
10. Pasture management

These modules have been developed through a collaboration between

G.A.D.
Foundation,
Netherlands

ProDairy LTD

SNV Kenya
Market-led Dairy
Program

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Maize management

Part 2: Ensiling of forage maize

Content

- Harvesting
- Ensiling
- Storage
- Feeding of maize silage



CHAPTER 1. HARVESTING

What to do?

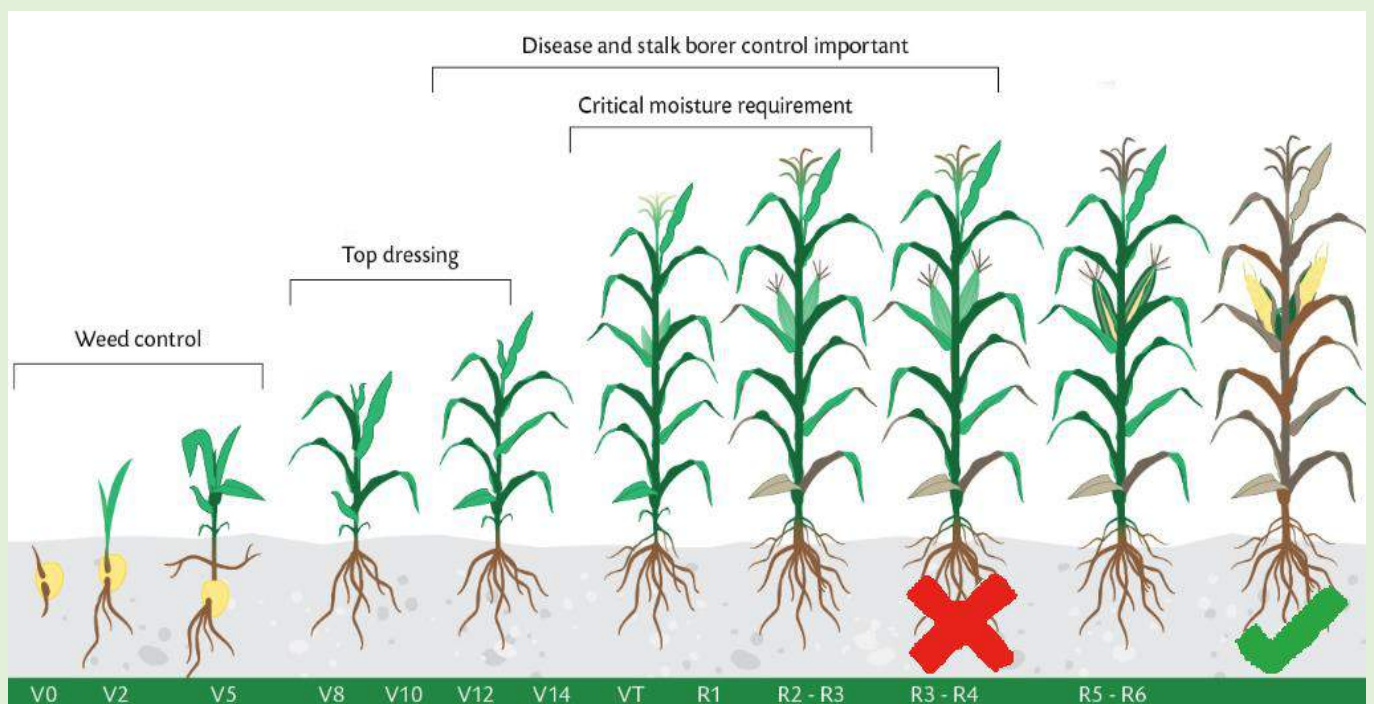
Cutting and chopping of the maize in the dough ripe stage

What do you need?

- Chaff cutter or stand-alone chopper if available trailer or truck
- Maize crop at dough stage
- Best is maize crop at dough ripe stage if the chopper can crush the kernels

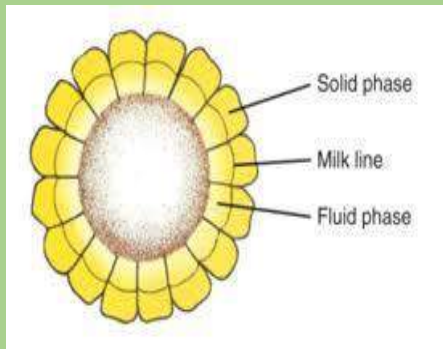
A. Stage of harvesting

- Dry matter of the chopped material 30-35%
- Dough ripe stage at 160 days (long season maize variety)
- Test the dry matter before harvesting:
- Dry matter of 30-35% gives better fermentation
- Aim at high starch content
- Leave a stubble (high in fibre) height of 15 cm in the shamba
- Higher stubble of 30-40 cm will result in better quality silage
- Stage R3-R4 is milk stage, not for harvesting, kernel is not hard enough



How to test dry matter

- Test the kernel by pressing it between 2 fingers
- The content is moist but firm like dough and you can roll it between your fingers



- Twist some maize stems in your hands
- If no drops of water from the stem, maize is ready for silage

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B. Chopping and kernel crushing

- With a machete, chaff cutter, chopper or forage harvester
- Length of 1-2 cm
- All the kernels should be crushed into 4 pieces or more
- Sharp knives give equal and small pieces
- better compaction and fermentation
- less leftovers in the feeding trough



C. Location of the pit

- Dry area, no stagnant water
- Protected/fenced from animals (birds, rodents and wild animals)
- Higher elevation or on a slope
- As close as possible to the cows/farm
- Narrow and long is better than a wide and short pit



E. Transportation

- As close to the cows/farm as possible
- Use a truck or trailer to work faster
- Seal the pit within 12 hours
Ensures a higher quality silage

CHAPTER 2. SILAGE MAKING

What to do?

Chopped whole plant maize is made into silage to be able to feed the cows with high quality feeds and store feeds for periods of scarcity

What do you need?

- Drum
- Polyethylene plastic sheet
- Additives
- Jembe
- Fork jembe

A. Prepare a suitable space for the pit

- Clean and dry underground
- If possible, make the pit on a slope
- Make straight, firm, sides
- Use plastic sheet along the walls and on the floor/bottom of the pit to avoid contact with the soil, moisture and air
- Long and narrow is better than short and wide
To achieve feeding speed of 15cm silage per day
- Dimensions of the pit need to be in line with feeding speed
- For losses to be minimal



Tip: Pit dimensions, dig a rectangular, shallow shaped pit with a jembe. Around the pit dig a small trench to prevent rainwater to run into the pit

B. Layering of the pit/clamp/bag

- Fill the pit layer by layer
- Make layers of 10 cm silage
- additives can be added at this stage
- Compact after every layer
- Prevent contamination with soil/dirt/manure
- Ensure good compaction



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C. Additives

- Lay out the first layer of silage on plastic sheet in the pit
- Adding lactic acid culture can improve fermentation process and/or avoid heating at feed out
- Use a watering can to distribute the solution evenly
- Sprinkle the additives over each layer of maize silage
- Additives will not compensate a poor crop or slow process of silage making
- Reduces losses



D. Compaction

- Press each layer of maize silage with a suitable weight
- Trample on the silage pit with people or roll a drum full of water up and down over the pit
- Forces out as much air as possible
- This will ensure good fermentation



F. Sealing and covering of pit/clamp

- Seal the silage
- Use a (new) polythene plastic sheet without holes
- Use the sheet in one piece if possible
- Pull plastic sheet tight over the silage
- Cover with soil, at least 15cm
- Seal silage pits within 12 hours after the start to fill the pit
- Start with a new pit the next day

G. Filling and sealing of bag

- Put the chopped maize in the bag layer after layer
- Compress by standing with clean gum boots in the bag
- Repeat the compressing for each layer until the bag is full
- A bag of soil of 40kg can be put on the top
- Tie the bag firmly with a sisal cord



CHAPTER 3. Storage

What to do?

Keep silage sealed until you start feeding, inspect the pit regular for possible damage.

What do you need?

- A dry and clean area
- A well-sealed silage pit/clamp or bag
- Fence to protect against rodents, birds and other farm animals

A. Leave silage closed for 4-6 weeks

- Maize silage needs 4-6 weeks to reach stable fermentation
- Once you open the silage pit continue to feed daily until the pit is empty
- When you stop feeding seal the pit completely with plastic sheet and soil again
- Well prepared silage, sealed and kept closed, can be stored for several years

B. Location of the pit

- Keep the pit covered with soil
- To protect against direct sunlight
- To protect against heating of the silage
- Protect from animals such as rodents, birds and other farm animals
- Avoid water (rain) entering the pit

C. Feeding out of silage

- Silage can be removed easily and pit/bag is accessible
- Open pit from the lower side
- Feed from the face of the pit as if you slice a loaf of bread
- Make a firm, straight cut
- Feed 15-20cm per day
- Remove all loose maize silage on the ground
- Don't close the pit
- Covering stimulates moulds
- To be able to feed high quality silage



CHAPTER 4. FEED OUT OF SILAGE

What to do?

- Remove enough feed per day;
15cm or more per day
- A mature cow can consume between
15 to 35 kg per day
- Feed cold and fresh

What do you need?

- Fork jembe
- Empty bag
- Feeding troughs



A. Rules of thumb

Depending on the weight, the cow can consume between 15-35kg of maize silage per day

Follow these feed suggestions per cow per day:

Calves and heifers:

- Calves from 3-4 months can be fed maize silage
- Feed heifers older than 17 months maize silage supplemented with high protein feeds

Milking cows:

- Depending on availability maize silage can be fed as follows:
 - Increase feeding during first week after calving
 - Up to 15 to 35kg per day depending on the weight of the cow
 - Increase amounts as milk production increases
 - According to the weight of the cow:
 - 16 - 24kg/day (Small Jersey)
 - 20 - 30kg/day (Jersey, Guernsey)
 - 24 - 36kg/day (Holstein Friesian)

* Feed **more** maize silage in the early milking period when the cow's milk production is **highest**

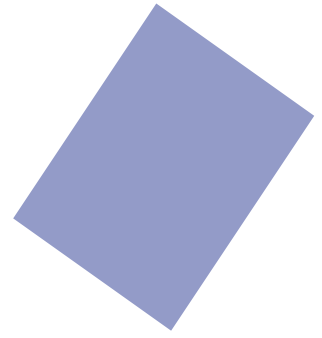
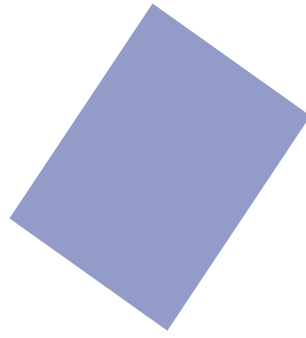
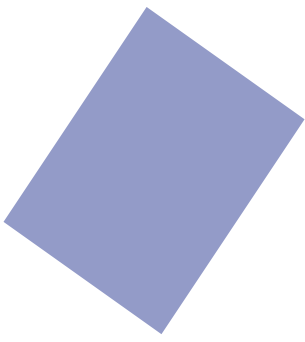
* Maize silage contains very little protein, supplement milking cows with high protein feeds

B. Feeding

Clean the feeding trough once per day

- Clean the trough before feeding again
- At cleaning leftovers from the previous feeding should not be more than 5%
- The feeding trough should never be empty!
- Turn feed over occasionally in the trough
- Provide fresh feed at least twice per day
- Keep feeds in the trough always fresh
- To maximize feed intake





To download the modular cow barn design book for smallholder dairy entrepreneurs and other SNV publications, visit:

www.cowsoko.com/kmdp