

Forage maize is the cornerstone of dairy herd nutrition. When preserved as silage, it provides the animal with nearly 80% of its energy requirements and nearly 50% of its protein requirements.

Harvesting is a key stage in forage maize production. The objective of the harvesting operation is to preserve both the quantity and quality of the forage produced in the field.

Choosing the stage at which the plant reaches its optimum energy yield, chopping the crop to the appropriate particle size, and preparing a hermetically sealed silo are all essential operations.



Choose the harvest date by observing how well the grains have filled.

Whatever the sowing and growing conditions, harvest timing is critical to the success of forage maize production. Harvesting too early means a loss of yield and quality (starch content). Harvesting too late can lead to harvesting difficulties in colder areas and conservation problems when whole-plant dry matter exceeds 35%. Observing grain filling during the growing season helps predict the optimum harvest date.

The objective is to ensile forage maize at around 32% whole-plant dry matter (WPDM). At this stage, there is a good balance between yield, preservation, energy value, and forage digestibility.

To learn more about maize breeding and cultivation, visit **maize.seedsforfuture.eu/en/**

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Observing grain filling in the field is a good way to estimate plant and grain maturity.

At the optimum harvest stage, the three starch fractions—milk, doughy, and vitreous—are distributed in roughly equal thirds within the grains in the central rows of the ears. At 35–36% dry matter, the milky starch is reduced to just a drop at the base of the grain. For practical reasons related to harvest logistics, this stage must be anticipated. It is therefore recommended to visit fields three weeks to one month after flowering to observe grain filling and determine the optimum harvest date. It is recommended that harvesting operations be completed before October 15 to limit weather-related risks.

At harvest, the appearance of the vitreous starch layer at the tip of the grains in the central rows of the ears is easy to identify.

The vitreous layer is golden yellow and difficult to scratch with a fingernail; it corresponds to the accumulation of vitreous starch at the tip of the grain. At this stage, depending on plant size and leaf condition, whole-plant dry matter is between 24 and 26%. If the vegetative canopy is well developed and the leaves are green, the plant is between 23 and 25% dry matter. If the vegetative canopy is short and the leaves below the ear are dry, the plant is between 25 and 27% dry matter. From the appearance of the vitreous layer, the plant still needs to gain 6 to 8 percentage points of dry matter to reach the optimum harvest stage of 32% whole-plant dry matter. In terms of growing degree days, this represents 140 to 180 GDD, or 20 to 30 days depending on the region. To estimate field maturity, it is recommended to refer to the grain maturity chart published by the technical institute ARVALIS and included in this leaflet.

Control the quality of chopping.

Chopping has two seemingly contradictory objectives: chopping finely to facilitate silo compaction, while leaving particles long enough to support proper chewing by cows. A particle-size shaker sieve is an effective tool for assessing chop length. Large particles (>20 mm) are undesirable because they hinder silo compaction and cause feed refusals at the feed bunk, resulting in reduced cow intake. The presence of more than 1% large particles (equivalent to the contents of one cup in a 10-liter bucket) indicates **a problem with the adjustment or maintenance of the forage harvester.**

For medium-sized particles (10 to 20 mm), the target is 10% at the feed bunk. The fewer medium-sized particles there are, the better the compaction, particularly when maize dry matter exceeds 35%. In areas where the vegetative canopy remains green, there is no conservation disadvantage to increasing chop length (15 to 20% medium-sized particles). However, trials with dairy cows have measured a reduction in intake (-0.5 kg DM) with excessively coarse chopping, as well as a reduction in ration efficiency when maize contained less than 5% medium-sized particles (-5% UFL utilized).

Grain processing should be adapted to maturity. The vitreous starch in maize above 32% dry matter needs to be fractured to optimize its digestion: this is the role of kernel processors fitted to most forage harvesters. Finally, the cut should be clean and sharp, which requires regular sharpening of the forage harvester knives.

Plan for rapid advancement of the silo face.

In a forage maize silo, losses occur mainly at the silo face during silage removal. One of the conditions for limiting losses is to advance the silo face faster than fermentation resumes. The following minimum rates of silo-face advancement are generally recommended: 10 cm per day on average in winter and 20 cm per day on average in summer. The width and height of the silos should therefore be adapted accordingly.

Avoid soil contamination of the silo.

Soil brought in by tractor and trailer wheels is a source of clostridial spores that can compromise proper silo preservation. To avoid this risk, preferably use silos with concrete floors and ensure that traffic areas around the silo are on a stabilized surface.

