CORN SILAGE RESOURCE GUIDE

Eastern Canada

Bayer and the DEKALB® brand provide seed with the potential to produce high quality corn silage and high milk yield potential per acre. You can expect hybrids with excellent agronomic characteristics, high yield potential, very good fibre digestibility, very high energy levels and the potential for very good milk per tonne and milk per acre.

This guide has been developed to provide you with some best practices and tips to help you maximize the silage quality and milk yield potential of your crop.

Best management practices for quality silage includes corn product selection, planting date, fertility, pest management, fungicides, harvest height, delivery rate and harvest dry matter (DM) content. This is not a complete list of best management practices but covers some of the important practices needed to consider when planning a successful silage program.

BEST MANAGEMENT TIPS FOR SILAGE CORN PRODUCTION

Field Selection and Soil Preparation

It is important to leave the soil surface smoother after fertilizer has been applied and prior to planting in order to plant at as even a depth as possible. Try to avoid planter bounce as the row units go over furrows in the field. As row units bounce, it affects seed depth, seed spacing and packing. Also, try to limit planter speed as higher speeds hurt seed placement, population and depth.

Soil Fertility[1]

Corn is a high user of fertilizer and responds very well to proper application. Soil testing is recommended to ensure you only apply what is needed versus spending more if not required.

Proper fertility plays a large role in achieving desired yields, but it can also shorten maturity and reduce stress on plants if it turns dry or wet in season.

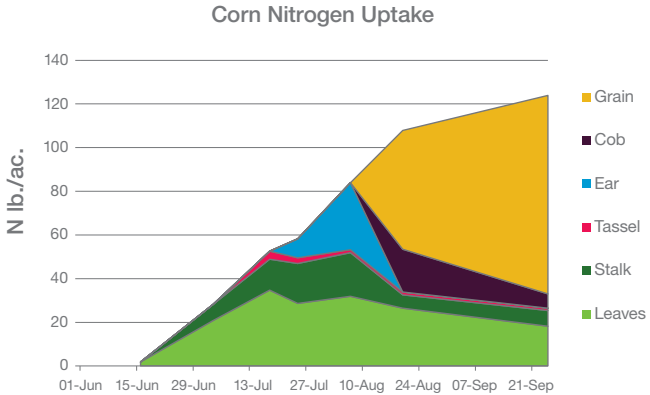
Corn produced for silage generally requires higher fertility compared to corn produced for grain.

- Soil nutrient removal for potassium and phosphorus will be higher for silage than for grain production, due to the removal of crop residue
- The protein content of corn silage increases as the availability of nitrogen increases
- Nitrogen rates for silage production should be increased by about 20 pounds per acre (22 kg/ha) compared to grain production based on the feed value of corn silage
- A yield goal of 25 tons per acre (61.75 tonnes per hectare) will need a total of 250 pounds of nitrogen per acre (280 kg per hectare) of nitrogen available to grow a crop that is comparable to a 200-bushel per acre (12.5 tonnes per hectare) corn crop

Nitrogen (N):

Corn uses more N than most crops and requires it for a longer period in the summer. (See Corn Nitrogen Uptake graph on next page)

The general recommendation is to target 0.544 kg (1.2 lb.) of N for every bushel you expect to achieve for your area. This is based on applying the majority of N fertilizer prior to planting. If you use slow-release forms of N fertilizer, you can reduce the N rate to 0.45 kg (1 lb.) actual N/bu. target. A good recommendation would be to use 50% of N requirements in a slow-release form of N.



Source: Nutrient uptake and partitioning in corn and potatoes in Manitoba. 2004. Manitoba Agric. Food and Rural Initiatives. https://nue.okstate.edu/Nitrogen_Uptake.htm

There are options to top dress N in season as well. The use of Y-Drop applicators or coulter disc applicators between the corn rows make it possible to apply a portion of the total N needs early in-crop if there are favorable growing conditions or concerns about having lost N to leaching earlier in season. Be careful applying N onto the corn plant itself as leaf burn damage and injury can set the plant back.

Corn is different than cereals when it relates to fertility applied and the effect on maturity. Corn will mature faster if fertility is kept up, whereas an overapplication of N would lengthen maturity in wheat for example. Higher N rates will also increase yield, reduce drydown time and increase test weight.

Phosphorus (P):

Phosphorus is very important in getting the crop off to a good start. Phosphorus is essential in corn as it helps root growth, improves stalk strength and increases grain production and fill.

Corn is a high user of phosphorus and removes more than what is applied, leading to mining the soil. You need to be aware that corn has a harder time establishing good early growth when planted into worked summerfallow. Corn uses mycorrizhae to help take up nutrients early in spring and summerfallow doesn't provide a host to support mycorrizhae. This means corn will struggle for nutrients, especially phosphorus. In these situations, higher rates of phosphorus will help offset this, but you have to pay attention to safe application levels and proximity to the seed to avoid fertilizer burn. The safe nitrogen rates will determine how much phosphorus can be applied.

Banding the phosphorus in a 2 x 2 band to the side of the seedrow is a safer recommendation to apply higher rates yet have it closer to the growing plant to access it earlier.

A good recommendation is minimum rates of 25 to 27.2 kg (55 to 60 lb.) of actual P for most situations. Even a 100 bu./ac. crop of corn will use at least 20.4 kg (45 lb.) of P. Keeping the rates of P up also help reduce days to maturity and so can lessen production risk if pushing maturities in lower heat unit areas.

Purpling of young plants can be an indication that a field is lacking P. However, it can also be a trait of some hybrids to show some purple colour so check with the seed company to determine if that hybrid demonstrates that characteristic.

Note that 45% of phosphorus is taken up before R1.

Potash (K):

Potash plays a large role in plant health and yield. It helps with root development, maintains stalk quality and reduces lodging and ear drop. It also helps the corn plant reduce the effects of drought or excess moisture by regulating stomata opening/closing to regulate water loss.

Coarser soils are the spot where K levels need to be monitored closer to prevent lodging issues and poor plant health, especially in drought conditions.

- Recommendation is nothing above 160 PPM K soil levels
- K is largely immobile
- Banding increases efficiency

Sulfur (S):

Sulfur recommendations in corn usually follow rates used for soybeans in a local region. Example: If you apply 9 kg (20 lb.) on a field for soybeans then do the same for corn. If you apply 4.5 kg (10 lb.) for soybeans, then use 4.5 kg for corn in that field.

Micronutrients:

Zinc is the micronutrient that is generally recommended. Recommended application rates for zinc are at least 1.11 kg/ha (1 lb./ac.) for all corn acres.

Planting Date and Soil Temperature

For good germination and even emergence, soil temperature should be 8 to 10C when starting to plant corn. It will take longer to germinate and emerge if soil temperatures are cooler. Make sure that the field is fit for planting and isn't too wet as that may cause planter discs to smear the sidewall and cause sidewall compaction.

If the soil is warm enough, it is recommended to plant corn at the end of April or the beginning of May depending on where you farm. Corn requires approximately 150 CHU to germinate and emerge after planting. There is normally around 100 to 150 CHU accumulated between May 1 to May 15th in most years so try and take advantage of that by planting earlier. Planting earlier can also reduce the risk of fall frost shutting down the plant before it is mature and may allow you to try a later maturing hybrid on a few acres to increase yield potential.

The growing point on a corn plant is under the ground until the 6 leaf stage so frost isn't as much of a concern until then. Frost is more common in low areas, higher crop residue areas and in lighter soils. If the top growth is hit by frost before the five leaf stage, it usually turns the leaves brown/black and regrows from below the soil surface within a week of the frost. Check the mesocotyl for new growth seven days after and before considering to replant. Rarely would you need to replant corn from spring frost.

Reminder to plant slower to reduce planter bounce. This will help maintain even seed depth and packing for more even emergence and higher yield potential.

Planter Set Up and Maintenance

Corn has the best yield potential when care is taken to ensure all plants are planted at the same depth and accurately spaced. Thus, it is very important to make sure that the planter has been correctly set up and checked for worn parts.

a) Check that the hitch is level from front to back when hitched to the tractor and when lowered to the height it will be when planting. Also check that the toolbar is level from side to side to ensure proper placement and packing pressure across the machine. If the machine isn't level, then the row units will be cutting at different depths and have inconsistent packing pressure.

b) Check that all parts are moving freely (metering wheels, chains, drives, discs, etc.)

c) Check for wear. As discs wear down over time, it is common to see them with a smaller diameter behind wheel marks so they aren't cutting the same depth. Worn discs should be replaced to keep the cutting depth consistent.

d) Make sure airlines, vacuum lines, hydraulic lines and wiring aren't pinched or have leaks

e) Field conditions will vary based on the previous crop, residue, compaction, soil type and moisture conditions so set depth, downforce on row units and packing pressure for each individual field. Adjust residue/trash cleaners (if equipped) to gently move trash out of the way without moving dry topsoil. If set too deep they can move soil leaving wetter soil exposed that will then build up on gauge wheels and change seed depth.

Plant Date and Seeding Rate[2,3]

With better plant health, disease protection and lodging resistance modern corn hybrids generally respond well to higher plant populations than hybrids developed 10 years ago.

Silage quality and yield potential are substantially affected by seeding rate. If plant densities are pushed too high, then the starch content of the silage can decrease. As plant densities increase, ear size decreases and vegetative plant parts increase, leading to a percent starch drop in the silage.

Some of the important practices to consider include:

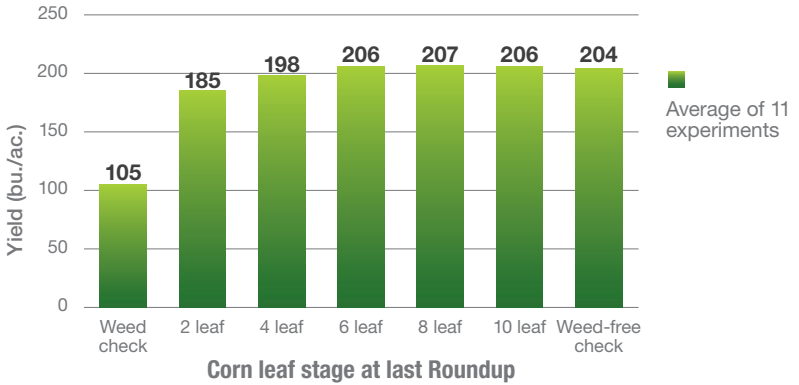
- Full season corn products can be planted in the same planting window as corn planted for grain
- Corn products planted for silage can be longer season than those planted for grain. A silage crop needs to reach whole plant moisture level around 65%, or around one-half milk line, to reach correct harvest maturity. A grain crop will need to reach black layer before frost to reach correct harvest maturity.
- Plant early to optimize crop utilization of water, nutrients and sunlight
- Delayed planting of a full season corn product may cause higher plant height
- A planting window that follows a small grain silage crop can be a viable cropping option in areas where the growing season is long enough to get a shorter season silage crop to maturity

Check with your seed company or agronomist to see if a corn hybrid has a fixed ear characteristic or has more flex capability. If a hybrid has a 'fixed ear' it usually responds to higher populations to increase yield as long as moisture, fertility, etc. aren't limiting yield. If a hybrid has more 'flex' capability, it usually can react to spacing around it and doesn't always increase yield with higher populations like a fixed ear.

Weed Control and Timing

Early weed control is extremely important as corn suffers from weed competition more than most crops. Also, as corn is such a large user of fertility, letting weeds remove fertility can really reduce final yield potential. The chart below highlights the need to start with a clean field and eliminate any weed competition before the corn emerges. Then keep the field clean until the 6 leaf stage to maximize yield.

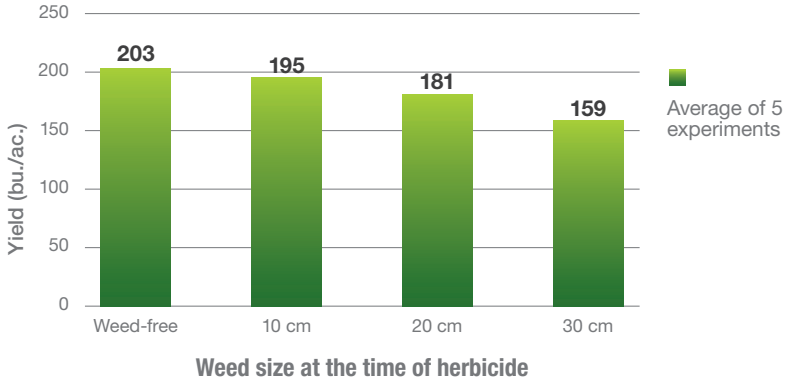
Keep corn weed-free until at least the 6 leaf stage



Source: Nurse, AAFC, Sikkema, UG, Eveman, MSU, Sprague, Southwest Agricultural Conference Presentation, January 2016. Your results may vary depending on agronomic, environmental and pest pressure variables.

Yield will also decrease as weed size gets larger, as shown in the chart below.

Corn yields decrease as weed size increases at time of application



Source: Nurse, AAFC, Sikkema, UG Southwest Agricultural Conference Presentation, January 2016. Your results may vary depending on agronomic, environmental and pest pressure variables.

To obtain higher yields and capture the full potential of your corn crop the following general application guidelines are recommended:

First Pre-seed Roundup® herbicide application with a rate set to target the toughest weeds already emerged plus the appropriate tank-mix partner to help manage/prevent herbicide resistance and control any volunteer weeds.

Second First in-crop application of Roundup and tank-mix partner as soon as you can see corn rows (V1-V2). There may not appear to be much weed pressure, but a lot of yield loss happens at this stage. Do not wait to spray the first in-crop application.

Third Last Roundup application should be targeted from V4-V6 stage as maximum yield potential will be determined at that stage. Waiting until later will reduce yield potential. Coverage starts to be tougher to obtain as corn hits V7-V8 stage and doesn't help yield potential.

Residual herbicide tank-mix partners are a good idea to include with early Roundup applications to keep weed pressure down and to help manage weed resistance. Make sure the herbicide you choose won't impact crop plans for that field for the following year.

Some herbicides can be really hard on corn if applied "out of leaf stage" or under adverse conditions so read product labels and watch the forecast to avoid hot weather when applying them. Always read and follow label directions.

Insect Management and Corn Traits

Above-ground pests can be more of a problem if the silage crop is planted significantly later than most of the corn planted in an area. Later planted corn can attract high populations of corn borers, Western bean cutworms, and other above-ground caterpillar (lepidoptera) corn pest adults, and damage may be substantially higher than early planted corn.

- Corn rootworms – Corn rootworms (Western, Northern) are a significant corn pest especially where continuous corn is grown and in fields with confirmed resistance to corn products with below-ground Bt traits. Crop rotation is an important tool used to reduce rootworm populations. Additionally, corn planted later or later maturing corn is attractive to females as the silks may still be “green” when other corn fields in the area are in the brown silk stage. Therefore, silage fields may act as magnets to females increasing the number of eggs deposited in those fields.
- Corn borers – European corn borers are significant pests that are typically controlled by use of above ground genetically modified Bt corn.
- Ear feeding caterpillars – Western bean cutworm and corn earworm can be difficult to control due to correctly timing insecticide applications. Resistance to some Bt traits has been documented for Western bean cutworm and corn earworm.
- Early season corn insects – Black cutworms and seed-feeding soil insects like wireworms, seed corn maggots and white grubs tend to be a problem in corn during a cool, wet spring. The seed treatment used on Bayer corn products should provide control to these insects.

Bayer has several corn trait options to help control weed and insect pests in corn.

VT Double PRO® RIB Complete®
delivers two modes of action for above-ground stalk and ear protection from European corn borer, corn earworm and fall armyworm. VT Double PRO contains Roundup Ready® 2 Technology, which allows the corn plant to withstand Roundup herbicide applications. Choose this trait when European corn borer is a concern.

SmartStax® RIB Complete® Technology
offers control of above- and below-ground feeding insects, helping protect from roots to stalks to ears. SmartStax hybrids are an ideal choice for corn-on-corn areas, with multiple modes of action against black cutworm, corn earworm, corn rootworm, European corn borer and fall armyworm. The SmartStax trait includes Roundup Ready® 2 and LibertyLink® technologies for herbicide tolerance. Choose this trait for corn rootworm control.

Trecepta® RIB Complete® Technology
reduces yield loss by protecting your corn crop from a wide range of pests. Three different modes of action give you more complete control against above-ground pests including Western bean cutworm, black cutworm, corn borer, corn earworm and fall armyworm that can inflict serious crop damage. Trecepta contains Roundup Ready® 2 Technology, which allows the corn plant to withstand Roundup applications. Choose Trecepta for Western bean cutworm control.

All of these hybrids have automatic refuge compliance, which is a blend of 95% insect protected and 5% refuge seed in every bag. The reduced refuge of just 5% of planted acres allows for higher whole-farm yield potential.

Disease Management and Fungicides[4]

When a fungal pathogen infects a plant, often a natural response to the disease is an increase in lignification in the plant, which results in a decrease in neutral detergent fibre (NDF) digestibility. Various fungal pathogens that infect the ear, may or may not result in a mycotoxin in the silage; however, if it is a concern samples should be sent to a laboratory that can assess if a mycotoxin is present.

- A fungicide application may increase feed efficiency by lowering dry matter intake
- A fungal infection may affect both the ear and the stalk, and the level of infection can vary from corn product to corn product and year to year
- Fungal infections may bring high levels of mycotoxin into the feed
- Milk production may not be affected by a fungicide treatment

Corn silage quality and yield is generally obtained by targeting an average of 65% plant moisture for horizontal piles or bunks. Producers should be targeting:

- Maximum dry matter accumulation
- Maintain maximum feed ability/palatability
- Best moisture for upright silo 58 to 64%
- Best moisture for bunks 64 to 68%

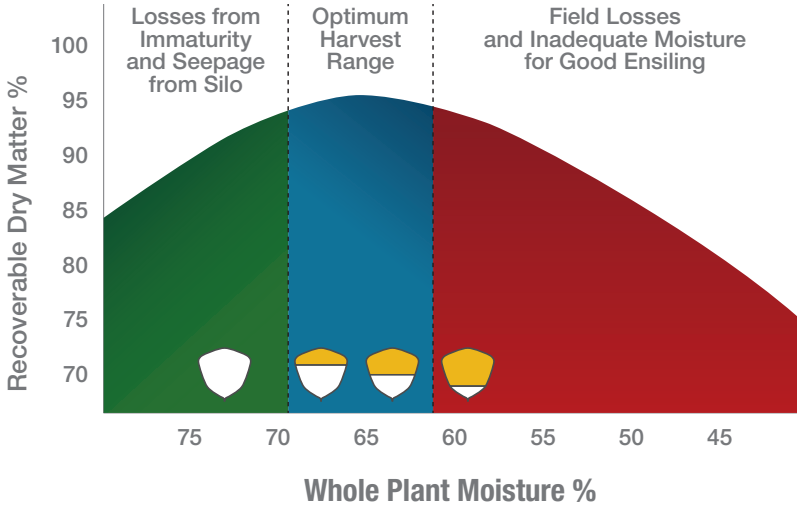
Gibberella ear mould displaying typical pinkish kernels

Source: OMAFRA. 2014. Identifying corn moulds. Crop Talk. http://www.omafra.gov.on.ca/english/crops/field/news/croptalk/2014/ct-1114a9.htm.

Silage Harvest Management and Optimal Timing

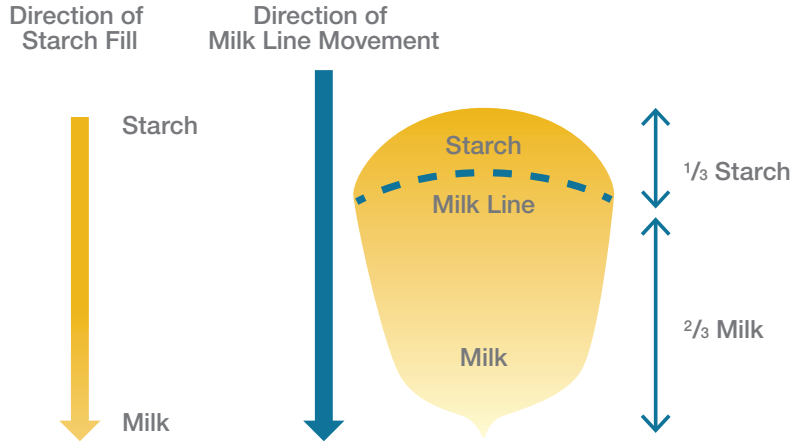
One method commonly used to target 65% plant moisture is to check the “milk line” on the corn kernels on the corn ear. Check representative areas of the field (off headland) and collect several ears. Break the ear in half and look towards the “tip end” of the ear.
As corn matures, the milk from blister stage of the corn is replaced by starch and the kernel starts to develop a yellow hard cap on the outside of the kernel. As maturity progresses, the line of starch (yellow) moves down towards the centre of the kernel. Generally, 65% plant moisture occurs when most hybrids’ kernel milk line is between halfway to two-thirds up the corn kernel as in the illustrations on the next page.

Monitor Milk Line to Guide Harvest

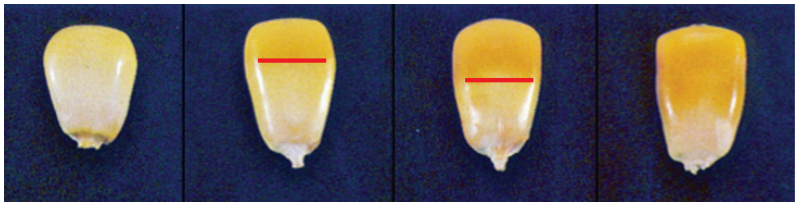


Source: http://cestanislaus.ucanr.edu/files/152283.pdf

65% whole plant moisture → approximately 1/2 to 2/3 milk line



Source: https://www.corsonmaize.co.nz/Harvesting-and-Storage/When-to-Harvest



Harvesting Height[5]

Increasing the cutting height 15 to 30 cm (6 to 12 inches) higher than the traditional cutting height of 15 to 23 cm (6 to 9 inches) can increase silage quality. Not all corn products respond to changing the chop height the same and will not have the same response year to year, but it is important to chop all the silage at the same height when filling a silo.

- NDF can decrease by 7 to 10%
- Starch levels can increase by 6%
- Milk production per ton can increase by 5% and milk production per acre can decrease by 2%
- Yield per acre can decrease by 7%[5]

Good communication with the silage harvester is important. Check the maturity progress and letting the silage harvester know when you will need the fields to be chopped for best quality. Planting multiple hybrids with varying maturity is a good strategy to reduce risk and spread harvest if planting larger acres of silage.

Plan to take feed samples as you bring loads to the pile from the field. Take the sample from the side of each pile versus from the top of the load in the truck. Keep the samples cold by putting them in a cooler with ice packs and then make a composite sample for the lab when done. Ship the still frozen samples to the lab for analysis within a couple of days of harvest so you can have the results back before its time to work the silage into the ration. This also provides more time to build a feed plan with your nutritionist for best results.

Proper packing to remove oxygen is crucial and must begin as soon as silage starts being delivered to the pile. Packing only targets the top of what is being packed and so it isn't effective to start later with a large amount of loose silage. Target spreading and packing 10 to 25 cm (4 to 10 in.) of material at a time. Drier corn is also harder to pack, which is necessary to ensure good fermentation through the pile.

Using a tarp to cover the silage pile is essential to reduce waste. After you have spent the inputs to produce a high yielding, high-quality silage pile, don't waste the

top/sides by not covering the pile. The waste material is not effective feed and just fills livestock so that they aren't feeding/gaining the same as with good material.

Using an inoculant may also help the fermentation process.

Bacterial Inoculants[6]

Silage inoculants contain anaerobic (do not need oxygen) bacteria that produce lactic acid that when ensiling is complete will lower the pH of the silage to about four. The ideal result of silage fermentation is the production of higher levels of lactic acid and lower levels of acetic acid. Inoculants can be a tool used to improve the ensiling process for silage that has been chopped at less than optimum harvest dry matter content, but not all conditions are conducive for inoculation.

The success of an inoculant is determined by the size of the natural population of live lactic acid bacteria on the corn at harvest.

The bacteria in the inoculant have been selected to grow rapidly and efficiently resulting in an increased fermentation rate.

- The higher the natural population is, the more difficult it is for the non-native (added by inoculant) bacteria to dominate the crop and aid in fermentation
- Natural populations of lactic acid bacteria do not grow well under dry conditions, suggesting that inoculants may be more successful in drier crops
- Inoculants can reduce dry matter losses 2 to 3% in a well-managed bunker
- The shift in fermentation products (higher lactic acid and lower acetic acid) should increase animal feed efficiency since animals can utilize lactic acid more efficiently than acetic acid. Non-bacterial silage additives include sugars and enzymes. Another class of silage additives are inhibitors, which include propionates, Non-Protein Nitrogen (NPN) and acids. A commercial silage additive may contain several additive types with different functions. The value of an additive will vary depending on the situation and needs. Additives are not designed to compensate for poor silage management.

In-Season Stress Effects on Quality[7]

Corn silage grown under heat and moisture stress can increase the fibre content and raise concerns with nitrate content. Corn grown under cooler, lower stress environments can increase the grain production.

Abiotic stresses such as drought and heat stress can substantially affect corn silage yield potential and quality, although the mechanisms by which they act are different. Depending on the moment at which stress occurs, drought stress can have varying impact. If drought stress occurs only at vegetative stages, dry matter yields may be compromised but nutritional composition may not. Alternatively, if drought stress occurs during reproductive stages (i.e. silking), both dry matter yield and nutritional composition can be affected.

Heat stress, defined as temperatures above 35°C, during the initial stages of kernel development can have a major negative impact in both corn silage yield potential and nutritional composition. Select a corn product maturity and planting date to avoid silking and early kernel development during a time of very high environmental temperatures.

Nitrate Levels[8]

Nitrate levels can increase in the lower stalk during unfavourable conditions, especially drought. Nitrate levels increase when growth is slow, and nitrates are plentiful. There are many ways to reduce the negative impact of nitrates in corn silage.

- Raise the cutter to leave at least 15 to 30 cm (6 to 12 inches) of stubble
- Do not feed until the fermentation process is complete. Fermentation is complete under ideal conditions in three weeks.
- Fermentation will reduce nitrate levels by 30 to 50%
- Do not plant a silage field where high manure applications have been made or high rates of nitrogen fertilizer have been applied to a droughty soil
- Minimize plant stresses due to nutrient deficiencies
- Harvest on bright sunny days

- Do not harvest for at least three days following a soaking rain that comes after a period of dry weather
- Dilute a high nitrate feed source by feeding higher concentration grains or low nitrate hay in the ration
- Analyze silage for nitrates before feeding if there are concerns of elevated nitrate levels

Unstressed pollination on left, very stressed on right.

Silage harvest delivery rate for pile and bunker silos

- The quality of the silage can be greatly affected by the consistency and rate of delivery. The packing process is critical as silo is being filled to meet the desired final density.
- Create a constant flow of material. Ensure trucks are delivering forage at a constant rate to avoid piles that overwhelm the packing tractor.
- Adjust delivery rate to match the number and size of choppers to the packing capacity at the silage structure
- Ensure enough packing tractor time is available to pack the silage to the desired density of 275 kg of dry matter (DM) per cubic metre (16 lb. DM/ft^3)
- Silage cannot be overpacked

- Adding a packing tractor could allow the silage pile to reach desired density
- Maximize the efficiency of the packing tractor by always keeping the tractor on the silage face
- Keep packing tractor(s) constantly driving on the pile, and not merely pushing up feed and waiting for the next load to arrive
- Ensure tractor drivers compact the entire surface. Stagger the tractors as they push and pack the feed up the face of the pile. Pay special attention to the top half and side of the pile, where packing density tends to be the lowest. Researchers from Cornell University (Ruppel, 1992) studied the relationship of packing density and DM losses in alfalfa silage stored for an average of 96 days: % DM loss = 29.1 - 0.936 x DM density (kg DM/m^3). This relationship is shown in Table 1.

Table 1. Dry matter loss relationship to silage pack density

Density (lbs. DM/ft^3)	DM Loss (%)
10	10.4
12	8.0
14	7.6
16	6.2
18	4.8
20	3.4

Harvest Dry Matter (DM)[8]

When considering best management practices for silage production, the most important factor to manage is the correct DM level at harvest. The correct harvest DM varies depending on the storage structure used (Table 2). A DM content of 35% is the target for upright silos, drive over piles, bunkers and silage bags. 35% DM is too low for upright "oxygen limiting" silo structures which can vary from 40 to 50% DM depending on the size and construction of the silo. When corn is harvested at a low DM content seepage may occur. Seepage removes nutrients, particularly soluble nitrogen and carbohydrates, and can damage the silo. Silage that is harvested at a high DM content will have air pockets that prevents anaerobic fermentation and allows moulds to develop. In addition, the kernels become harder and less digestible. Silage that is stored at too low or too high DM content can cause poor ensiling, which can negatively impact silage quality.

Table 2. Silage moisture rates for various storage types.

Silo Type	Recommended DM Content (%)
Upright silo	35 - 40
Uplight "oxygen limiting"	40 - 50
Horizontal silos (piles or bunkers)	30 - 35
Bag silon	30 - 40

Hybrid Selection for Silage

Selecting the right corn product for silage begins with product maturity. Plant staygreen and quality characteristics are also important factors in product selection. Selection priorities will also depend on the type of feed required. Starch content is very important when selecting a product that will be fed to finish beef cattle. Starch content is also important for dairy production, but highly digestible fibre is a more important trait for high-producing dairy animals.

- Select a relative maturity that consistently reaches the correct harvest moisture before frost
- Select products well-adapted for the geographic region using multi-year local performance data whenever possible
- Select corn products that have good staygreen and disease tolerance characteristics
- Select corn products to meet specific needs for yield and quality. When comparing corn product ratings, it is recommended to compare ratings within a maturity group.

The main characteristics a producer should be looking for in a good hybrid for silage are grain production, feed quality and tonnage. The grain makes up 44% of the weight and combined with the husk, shank and ear, equal two-thirds of the weight and the majority of feed quality. Plant staygreen and quality characteristics are also important factors in product selection. Staygreen is the ability of the plant to stay green and healthy as it fills later in the season for higher yield. Plant health becomes even more important on a tighter rotation with corn. Other characteristics to consider are lodging resistance, plant health and corn traits to reduce the effects of insect pests.

The goal is to maximize the amount of grain developed so pay attention to the maturity compared to the local CHU accumulation that is normal for your area.

Silage corn doesn't need to hit full physiological maturity so you can choose a hybrid that is up to 150 to 200 CHU higher than is normal for your area. Again, it is a good idea to grow multiple hybrids in order to reduce risk and spread out harvest. Hybrids that are too late in maturity usually have higher fibre versus energy content. Producers may think they yield better but a large portion of the weight may

be simply water content as they aren't mature. In our DEKALB Market Development Silage Corn Trials, the feed samples and yields are corrected to 65% moisture for all hybrids. These trials are a great source of data to find locally tested hybrids in "apples to apples" comparisons to help you decide what would be the best hybrids to choose for your area.

Nutritional Analysis

DEKALB offers a range of dual-purpose corn hybrids with exceptional agronomic characteristics; the result of breeding efforts based on many plots. Hundreds of silage samples are sent each year for laboratory analysis using the MILK2006 model developed by the University of Wisconsin. The model provides a silage quality index (kilograms of milk per tonne of silage), as well as a silage quality index based on yield (kilograms of milk per acre).

Yield + Quality = Feed Value

Approximately 60% of yield is from the ear:

- 40 to 45% is from the grain
- 15 to 20% is from the rest (shank and husk)

The primary component of the ear is starch:

- Responsible for approximately 45% of all dispensable energy in silage
- Starch is 70 to 95% digestible

Approximately 40% of yield is from the stem and leaves:

- 20 to 25% is from the stem
- 15% is from the leaves

The primary component of the stem and leaves is digestible Neutral Detergent Fibre (dNDF)

- Responsible for approximately 25% of all dispensable energy in silage
- NDF is 40 to 70% digestible

A good silage corn product has:

- High milk per tonne (MPT)
- High milk per acre (MPA)
- High silage yield
- High NDF digestibility
- High starch digestibility

The MILK2006 Model

FROM TESTING TO MODELING – MILK2006

The MILK2006 model, developed at the University of Wisconsin, compares the silage yield and quality of corn products. The model evaluates silage corn products for digestibility, fibre, starch, crude protein and animal intake potential. It then converts these factors into milk per tonne (MPT), which is a measure of estimated intake of energy from corn silage. Milk per acre (MPA) is then calculated using the milk per tonne value and dry matter yield per acre. Therefore, MILK2006 provides an index of silage quality (milk per tonne) and silage quality by yield (milk per acre). This model is considered a good predictor of animal performance. Testing for DEKALB Silage Ready products is done across a large variety of management areas across Canada.

FROM MODELING TO SCREENING

After being evaluated using the MILK 2006 model, each hybrid is rated for MPT and MPA as a percentage of the plot index (grouped by maturity). Hybrid families are rated together and an overall rating is determined for each hybrid.

WHAT IS SILAGE READY™?

Dual Purpose Corn Hybrids

DEKALB offers a range of dual-purpose corn hybrids that can either be harvested for grain or silage, giving you great flexibility of use at the end of the season. It is not necessarily the best grain corn hybrids that make the best silage hybrids. But a good silage hybrid is often a product with a very good grain yield. In fact, grain accounts for nearly 60% of dry matter and it is grain where a large portion of energy comes from (45%). Hybrid size/height is also not necessarily related to final yield: a shorter hybrid with a larger ear can yield more silage than a larger, very leafy hybrid with a smaller ear.

DEKALB corn hybrids are bred for grain and tested for silage qualities after commercialization. As a result, all products in the DEKALB Silage Ready lineup are dual purpose.

The benefits of this include:

- Combining high digestibility with high energy content
- Allowing more flexibility to foster maximum whole-farm profitability
- Simplifying management
- Bayer traits offer insect and crop protection leading to higher yield potential

DEKALB Silage Ready hybrids offer:

- Strong agronomic traits
- High yield potential
- High NDF digestibility
- High starch (digestible starch)
- High milk per tonne and milk per acre potential

DEKALB Silage Ready hybrids are determined by:

- Evaluating experimental and commercial corn silage hybrids every year
- Taking a silage sample of each hybrid and testing for key information with a focus on milk or beef per acre for maximum return on your farm
- Predicting milk and meat production potential using tools such as MILK2006 model from the University of Wisconsin
- Undergoing testing for a minimum of two years over eight sites with demonstrated high yield and quality attributes in their respective growing zones

How do we rate DEKALB Silage Ready hybrids hybrid products?

- The rating for a given hybrid's attributes is determined through our Canadian Market Development testing program of randomized and replicated plots
- A hybrid needs to have demonstrated high yield attributes in its respective growing zone, measured as tonnage, corrected to 65% standard moisture (TM65%) and milk/acre measured as pounds of milk produced per acre
- Hybrids require a minimum of two years of testing to ensure consistency of performance

Scan for more information about DEKALB trial results and product performance.

The DEKALB Silage Testing Program

More research leading to better decisions

The agronomic traits of DEKALB hybrids are just as important for silage as they are for grain. The priority is to bring to market silage hybrids with superior qualities such as spring vigour, stem and root strength, staygreen and stress tolerance. More than 2,000 plots of grain corn and silage have been established in the last five years in Quebec and Ontario alone, to evaluate the performance of our hybrids and their agronomic strengths. These plots are established on farms locally to gain insight and meet the needs of farmers. Bayer agronomists use the plots to rigorously evaluate each hybrid throughout the season.

- The Bayer Market Development team plants hundreds of test plots annually, collecting specific silage data including dNDF, MPT and MPA data
- We work in partnership with Canadian testing facilities and communicate with US colleagues to make sure our testing program delivers relevant and accurate information
- Bayer continues to develop new and improved methods for analysis of higher quality silage products

Expert DEKALB support you can trust

- Silage products backed by dedicated agronomists, sales and support staff
- Researched and field-tested in local conditions, including MILK2006 nutrition tests
- Genetics sourced globally and tested locally for maturity, disease and insect resistance
- Hands-on agronomic advice for maximum yield potential

Sources

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Notes

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Planting Refuges, Preserving Technology

Before opening a bag of seed, be sure to read, understand and accept the stewardship requirements, **including applicable refuge requirements for insect resistance management,** for the biotechnology traits expressed in the seed as set forth in the Monsanto Technology Stewardship Agreement that you sign. By opening and using a bag of seed, you are reaffirming your obligation to comply with the most recent stewardship requirements.

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