CORN SILAGE & GRAZING RESOURCE GUIDE

Corn acreage has been expanding rapidly across Western Canada over the last decade as producers are recognizing the yield potential and quality of feed that corn silage produces. The ability to produce higher tonnage off less acres in less time makes corn silage an attractive alternative to other feed sources. This has opened opportunities for producers to achieve better weight gains with corn, open up acres for other crops or expand their herds, all while saving time in the summer putting up other winter feed sources.

Bayer Crop Science, through DEKALB®, has invested heavily in breeding corn hybrids suitable for most areas of Western Canada. With breeding stations and Market Development testing locations across Western Canada, we can confidently recommend the right hybrids for success on your farm.

This guide has been developed to provide you with some best practices and tips to help you maximize your corn production and the quality of feed while reducing risk.

What are the benefits of corn silage?

- Corn silage is easily ensiled and results in palatable forage
- Corn can produce higher silage yields than other forages
- Can put up a large amount of winter feed requirements very quickly
- Relatively consistent quality and higher energy content than other forages
- Corn is a good crop to recycle nutrients from manure and maintain water quality

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GRAZING CORN PRODUCTION

Field Selection and Soil Preparation

Corn responds best on fertile soil that has been pre-worked ahead of planting.

Best results can be found planting corn on a previous year's pulse crop fields with higher nitrogen levels. Cereal crops planted the previous year are also a good choice. If planting corn on canola stubble, corn will be slower to establish as canola does not support mycorrhizae and the corn stand can't take up nutrients as fast, early in the season. This also applies to worked summerfallow. It is important to keep phosphorous levels higher if planting on last year's canola fields. Rotating crops will help mitigate both insect pests and disease issues.

Bayer Crop Science has compared various levels of tillage prior to planting corn to test the effect of tillage and crop residue on establishment, yield, harvest moisture, and other variables.

Trials found that both conventional tillage and strip tillage out-yielded zero-till corn production by an average of 6.3 bushels per acre at Bayer Market Development Research Farms across Western Canada.* The yield difference was even higher if it was in stubble from a higher residue crop like cereals or canola.

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.

*Source: 2014 - 2016 Bayer Crop Science small-plot trials (n=12). Your results may vary depending on agronomic, environmental and pest pressure variables.

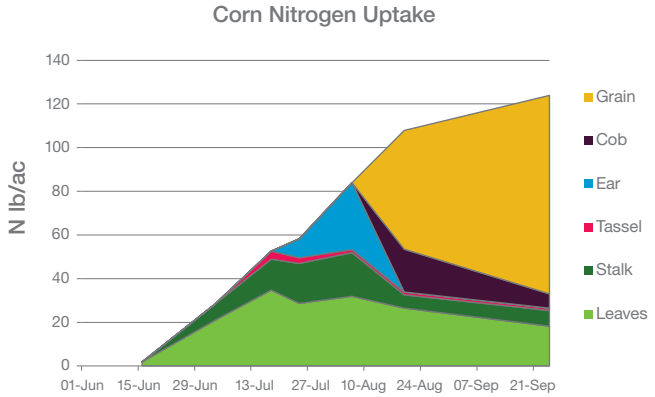
Corn Fertility

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 vs. 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.

Nitrogen (N):
Corn uses more N than most crops and requires it for a longer period in the summer. (See figure)

The general recommendation for new growers is to target 1.2 lb. of N for every bushel they expect to achieve for their area. This is based on applying the majority of N fertilizer prior to planting. If growers use slow release forms of N fertilizer, they can reduce the N rate to 1 lb. actual N/bushel 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 or canola when it relates to fertility applied and the effect on maturity. Corn will mature faster if fertility is kept up, whereas an over application 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. Phosphorous 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 producers apply, leading to mining the soil. Producers need to be aware that corn has a harder time establishing good early growth when planted into the previous year's canola stubble or into worked summerfallow. Corn uses mycorrizhae to help take up nutrients early in spring and canola or 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 on the prairies. 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 canola in a local region. Example: If you would apply 9 kg (20 lb.) on a field for canola then do the same for corn. If you apply 4.5 kg (10 lb.) for canola, then use 4.5 kg for corn in that field.

Micronutrients:

Zinc is the micronutrient that is generally recommended. Recommended application rates are at least .45 kg (1 lb.) of zinc/ac. for all corn acres.

Planting Date and Soil Temperature

For good germination and even emergence, soil temperature should be 8˚ to 10˚ C 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 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 5-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 5-leaf stage, it usually turns the leaves brown/black and regrows from below 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

For more even emergence and higher yield potential, plant slower to reduce planter bounce while maintaining even seed depth and packing.

Planter Set up and Maintenance

Corn has the best yield potential when care is taken to ensure all the 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 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 Populations

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.

For silage or grazing end uses, plant populations can be 10% higher than for grain corn to achieve higher plant mass accumulation (tonnage) as well as grain production. Plant populations on the prairies usually range from 30,000 plants/ac. in drier areas and up to 35-36,000 plants/ac. in areas with better moisture and fertility.

When deciding on a plant population, always keep in mind:

a) **Soil quality:** If planting in highly fertile soil you can increase the population

b) **Moisture conditions at present and historical patterns:** If you anticipate good moisture conditions then you can plant higher populations. If you expect drier conditions or lighter land, then plant lower populations.

c) **Fertility:** If you are fertilizing adequately for 32,000 plants/ac. and want to increase populations to 35,000 plants/ac., you need to fertilize at 10% higher rates to support that. If you aren't fertilizing heavy enough to begin with, there is no point increasing populations for higher yields.

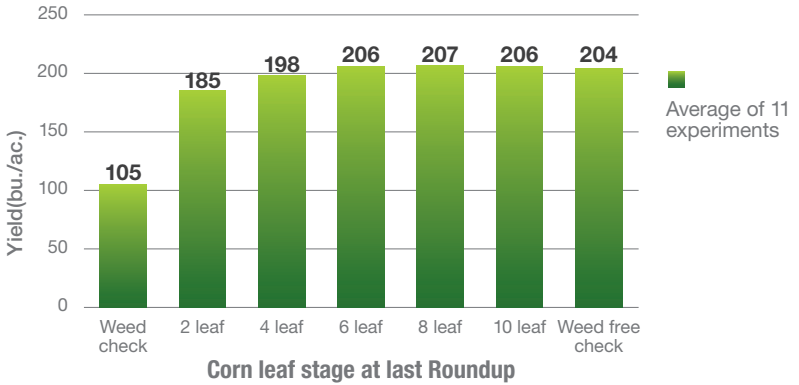
Check with your seed company or agronomist to see if a corn hybrid has a fixed ear characteristic or has more flex capability.
If a hybrid has a 'fixed ear", it usually responds to higher populations to increase yield as long as moisture, fertility, etc., aren't limiting yield.
If a hybrid has more 'flex'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

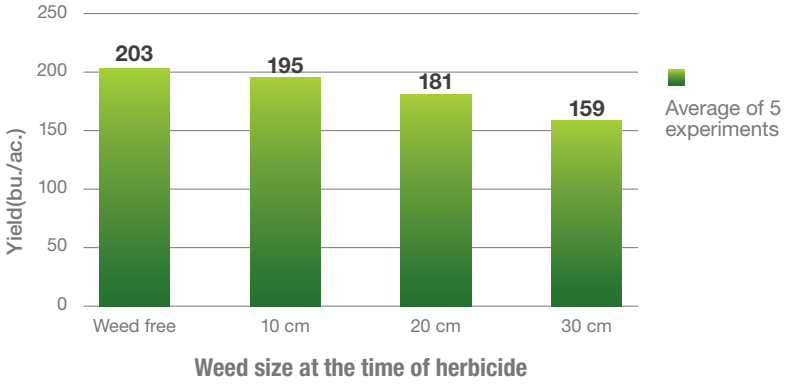
Keep corn weed-free until at least the 6-leaf stage



Source: Nurse, AAFC, Sikkema, UG, Eveman, MSU, Sprague, MSU, 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.

Corn Traits

There are numerous options to help control weed and insect pests in corn.

For up-to-date corn trait information refer to the current DEKALB® Seed Guide or visit **DEKALB.ca**

One of the more common corn pests on the prairies is European corn borer (ECB). ECB can cause a lot of damage to the crop, cutting yield and hurting standability. As ECB blow in from the south, it is hard to anticipate what levels may be found in your fields from one year to another. The moth lays eggs on the underside of the leaves in summer. When they hatch the larvae crawl down the leaf and tunnel or “bore” (hence the name) into the corn stalk at the base of the leaf. They then tunnel up and down through the stalk as well as into the ear. This hurts the movement of water and nutrients within the stalk and reduces ear fill as well as increases stress on the plant. Corn traits such as **VT Double PRO® RIB Complete®** help by stopping feeding on the plant so the plant grows and fills normally with no need for an application of insecticide. Insecticides are not as effective on this type of insect once they hatch and move inside the plant. Damaged plants do not stand as well with weaker stalks which can reduce yield and make for more losses before the crop can be silage or grazed.

Optimize Silage Harvest Timing

Corn silage quality and yield is generally obtained by targeting an average of 65% plant moisture for horizontal piles or bunks used on the prairies.

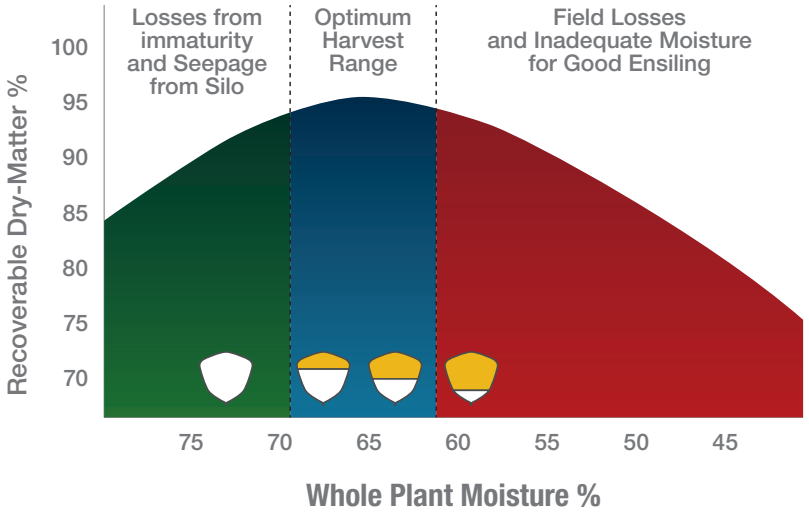
Producers should be targeting:

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

Monitor Milk Line to Guide Harvest

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 the 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 shown in the following illustrations.

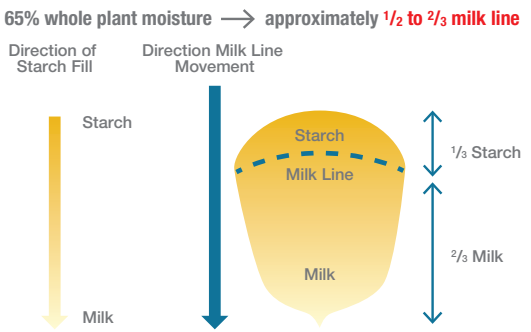


Source: http://cestanislaus.ucanr.edu/files/152283.pdf

Good communication with the silage harvester is important. Check the maturity progress and let 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 the material being packed, 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 5 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.

Hybrid Selection for Grain, Silage or Grazing

Silage: 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 cob, equal two-thirds of weight and the majority of feed quality.

Other characteristics to consider are lodging resistance, plant health, corn traits to reduce the effects of insect pests and staygreen. 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. The goal is to maximize the amount of grain developed so pay attention to the maturity compared to the local Crop Heat Unit (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 to reduce risk and spread out harvest. Hybrids that are too late in maturity usually have higher fibre vs. 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 Bayer 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.

Grazing: A good hybrid for grazing would have similar characteristics as a hybrid used for silage. However, as maturity and plant size increases, the hybrids may have larger stalks than desirable. If stalk size becomes too large, livestock won't clean up the paddocks as well, due to the stalks becoming very hard and full of fibre necessary to hold up the larger plants. Talk to your Bayer sales representative or Market Development Agronomist to determine the best choices for your area. Again, you can choose a hybrid that is up to 150 to 200 CHU later than your normal CHU accumulation as a guideline, but only to the point that the hybrids get too large.

Nutritional Analysis

DEKALB® offers a range of dual-purpose corn hybrids with exceptional agronomic characteristics, the result of breeding efforts based on many plots. We are continually working to develop products with better starch and neutral detergent fibre (NDF) digestibility combined with higher yield potential. 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 (NDF)

- Responsible for approximately 25% of all dispensable 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 Neutral Detergent Fiber (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 the grower 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 most of the energy comes from the grain (45%). Hybrid size 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 cob.

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

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 meat 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 five 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

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. DEKALB's priority is to bring to market silage hybrids with superior qualities such as spring vigour, stem and root strength, staygreen and stress tolerance. Approximately 38 silage plots have been established each year in Western Canada 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 growers. DEKALB agronomists use the plots to rigorously evaluate each hybrid throughout the season.

- Bayer Market Development team plants hundreds of test plots annually, collecting specific silage data including NDF, MPT and MPA data
- We work in partnership with Canadian testing facilities and communicate with U.S. 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

Grazing Corn Cuts Feed Costs

DEKALB® corn for fall and winter grazing

In the never-ending drive to reduce costs, grazing corn as a winter-feeding practice has emerged as a viable option in Western Canada. DEKALB corn hybrids deliver low cost and high value compared to other fall and winter-feeding systems. With exceptionally high yield potential and excellent nutritional value, the DEKALB brand corn grazing system also offers low machinery, labour, feeding, and manure handling costs.

Fall/Winter Grazing: Cattle are pastured in fields of standing corn after the ground has frozen, late in the fall. Cattle often consume the entire plant – kernels, cobs and stalks.

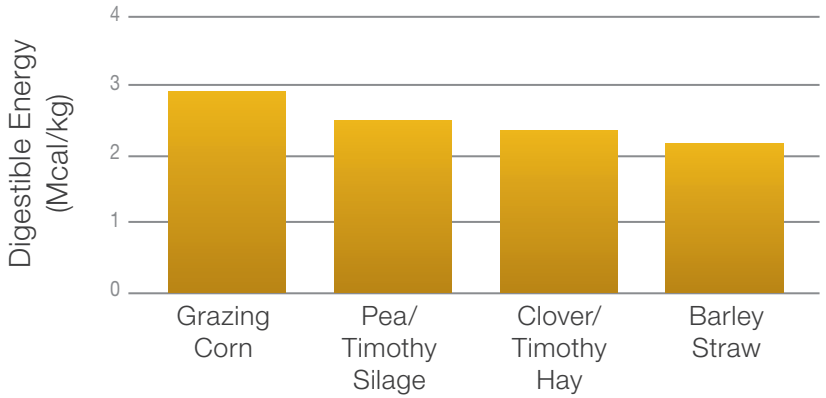
Lower feed costs

Research by the Western Beef Development Centre (WBDC) at Lanigan, Saskatchewan shows that grazing cattle on early maturing corn in late fall and into winter is a viable feeding option on the Prairies. WBDC research from 2001 to 2005 shows that grazing corn costs ranged from $0.46 to $1.34 per animal per day. The variation in costs per day result from differences in corn yield and growing conditions. Additionally, the cost of grazing corn compares well with traditional alfalfa hay bales and swath grazing cereals according to Manitoba Agriculture, Food and Rural Initiatives (MAFRI) and the WBDC.

High nutritional value

For winter feed rations, grazing corn provides nutritional value that is high in Total Digestible Nutrients (TDN) and energy. Research by the Gateway Research Organization at Westlock, AB in 1998 compared the feed value of several common winter feeds. The research highlights the high-energy value of grazing corn.

GRAZING CORN IS HIGH IN DIGESTIBLE ENERGY



Source: Gateway Research Organization, 1998.

Better balance for maintenance rations

Common winter rations that are based on alfalfa hay or brome/alfalfa hay often over-feed protein. However, the nutrient profile of grazing corn, with good energy value and a lower protein content of 7 to 10%, matches the nutritional needs of a dry cow in her second and third trimester.

Using controlled access to grazing corn, cows can be brought back to an optimum body condition score of 5 (based on a 1 to 9 scale). The key is to bring the cow back to the ideal body conditions score during the cheapest part of the year – in the late fall and early winter. Grazing corn provides the lowest cost ration to bring cows back into shape, and to maintain them economically throughout the winter.

Subsequently, when the coldest weather hits during the winter, grazing corn can continue to supply a balanced maintenance ration that helps cattle maintain their body condition score, without the need for additional energy sources.

Corn Grazing Cost Calculator

STEP 1		DEKALB® Corn Example	Your Costs (DEKALB Corn Alternative)
Calculate Seed Costs			
A. **Cost of Seed** ($ per bag)*		$299.00	
B. **Seeding Rate** (acres per bag)	÷	2.5	x
C. **Total Seed Cost Per Acre** ($ per bag/# of acres)	=	$119.60	=

STEP 2			
Calculate Total Input Costs			
C. **Total Seed Cost** (per acre)		$119.60	
D. **Total Fertilizer Cost**** (per acre)	+	$150.00	+
E. **Total Herbicide Cost** (per acre)	+	$33.00	+
F. **Total Input Costs** ($ per acre)	=	$302.60	=

* Seed costs are based on the 2023 Suggested Retail Price (SRP) of DKC24-06RIB assuming a seeding rate of approx. 32,000 seed per acre (about 2.5 acres per bag). SRP does not include rebates and growers may purchase for less.

** Fertilizer costs are based on applying 150N, 60P, 30K, 20S + 1 16ZINC., herbicide costs based on two .07 L/ac applications of Roundup WeatherMAX® with Transorb® II Technology + tank mix in burn off and in-crop of cow grazing days/acre is a conservative estimate of the grazing potential that has been achieved by farmers growing corn under dryland conditions. Your results may vary depending on agronomic, environmental and pest pressure variables.

STEP 3

Calculate Total Cost	DEKALB Corn Example	Your Costs (DEKALB Corn Alternative)
F. **Total Input Costs** ($ per bag)*	$293.00	
G. **Total Acres**	÷ 50	x
H. **Total Costs** (F x G)	= $14,650.00	=

STEP 4

Grazing Cost Calculation		
I. **# of Cow Grazing Days** (per acre)	200	
J. **Total Acres**	x 50	x
K. **Total Cow Grazing Days Available** (I x J)	= 10,000.00	=
L. **# of Cows in Herd to Graze**	÷ 100	÷
M. **# of Grazing Days for Cow Herd** (K ÷ L)	= 100	=
N. **Total Cost Per Cow Per Day** [(H ÷ M) ÷ L]	= $1.46/cow/day	=

Grazing Corn Benefits

Harvesting costs greatly reduced

The costs associated with harvesting winter feed is essentially eliminated with grazing corn. Mower/ conditioning, baling, silaging, trucking and storage costs are not incurred with grazing corn. And these costs can be high.

Frees up your time

Labour costs, both your time or hired, are high with traditional forage crops. Anyone who has tried to get the hay crop in between rain showers, keep an eye on the cattle, haul all those bales to storage and get the feeding corrals ready for winter knows that there just aren't enough days in the summer and fall. By eliminating harvesting activities with grazing corn, you can put your efforts into other farm activities to maximize the production from other sectors of the farm.

Winter machinery costs reduced

Utilizing livestock to graze corn is a simple and cost-effective approach to late fall and winter feeding without all the associated machinery costs of winter feeding of hay or silage. It eliminates the need to start the tractor, tub grinder or hay processor.

With grazing corn, an economical electric fencing system can be utilized for small paddock grazing. As a result, the labour and capital costs during winter feeding are greatly reduced with grazing corn.

Manure handling eliminated

An added benefit of grazing corn is that livestock spreads their manure, naturally. Rather than concentrating the manure buildup in winter feeding areas, the manure from cattle is spread uniformly throughout the field while feeding.

Grazing corn helps to reduce manure handling costs and the wear and tear on winter corrals that comes from cleaning out feed bunks and feed yards. This will reduce yardage costs.

Land productivity increased

Corn grown for grazing can free up land for other uses. With yields ranging from 4 to 6 tonnes/acre dry matter on average (13 to 18 tonnes/acre wet yield), corn often produces up to twice the forage as other annual or perennial hay crops. Where you might have used 100 acres for an annual greenfeed, grazing corn might only require 50 acres of land to winter a similar number of livestock. The other 50 acres can then be used to grow a high-value cash crop for greater profitability.

Better nutrient management

Many cattlemen struggle with nutrient management problems that result from high rates of manure applied to land close to feedlots and over-winter grounds. The high application rates result in soil fertility that is very high in nitrogen and phosphorus content. Grazing corn, though, has a high nutrient requirement and can be used to draw down nutrient loads in heavily manured fields. For example, a 6 tonne/acre dry matter grazing corn yield (17 tonne/acre wet yield) withdraws 150 pounds of nitrogen and over 60 pounds of phosphorus from the soil per acre.

Getting Started

How much land is needed?

In a corn grazing system, the number of acres seeded depends on the number of grazing animals and the length of time they will be left on the land. Based on grower experience, Bayer research, third party research, and normal growing conditions, you can achieve 200 cow days/acre.* From 200 to 300 cow days/acre is common, depending on growing conditions and management practices. Another way to look at the acreage is to determine the desired grazing period and number of cows to calculate the total number of corn acres required.

* Can vary depending on body condition, score, size of cow, body weight, management strategy, breed of cow and stage of pregnancy.

For example, assuming you want to graze your cattle for three months (about 90 days) and you have 150 cows:

90 days x 150 cows
= 13,500 cow grazing days

Then, assuming an estimate of 200 cow days/acre that can be achieved with DEKALB® corn, you can calculate the number of acres of corn to be planted.

13,500 cow grazing days ÷ 200 cow days/acre
= 67.5 acres DEKALB corn

While growing conditions will determine the final stocking rate, this rule of thumb provides a good starting point.

Seed selection

Research from Bayer shows that a product that grows aggressively with early maturity provides the best grazing corn. Yield and nutritional value come from the plant stalks as well as fully developed ears filled with seed at the soft dough stage (about 65% moisture) prior to the killing frost.

Selecting a hybrid with a lower CHU rating increases the likelihood of getting a corn field with filled ears. Average CHU is a good indicator of the risk of reaching grain maturity. Typically, 200 fewer CHUs are required for grazing or silage corn to reach 65% whole plant moisture.

Choose a hybrid that is rated at up to 200 CHU higher than your area average for silage or grazing. However, for grazing you have to keep in mind that stalk size normally increases with later maturity hybrids, so don't choose later than 2450 CHU in most cases.

"We have been grazing and silaging DEKALB corn for the past few years and have found it works really well into our feeding program. In 2020, we averaged 260 cow days on our grazing corn. We have used a corn planter to seed with which has helped us to get a good plant stand, and has resulted in more tonnes/acre. Along with a good fertility program and early season weed control, growing DEKALB corn has been successful for our operation and we will continue to use this product in the future."

Norman King, Wainwright, AB

Grazing Strategies

Timing

Cattle are generally turned out for grazing once the ground freezes up. Waiting until freeze-up reduces ground compaction and rutting. Feed spoilage is also reduced since the corn isn't as easily trampled into the ground.

Intensive grazing strategies

Using controlled access and intensive grazing is the best way to optimize economics. Use electric fencing that controls access to only a small portion of the corn field. Once that section is cleaned up, the fence is moved to allow access to the next section.

Always have two paddocks fenced already in case the cattle get past one wire.

Uncontrolled access has more wastage and the cows feed on the cobs first, then the leaves and finally the stalks. Uncontrolled access is not recommended, as it is not the most efficient or economical way to graze corn.

Using controlled access is more efficient:

- Feed wastage is minimized
- Nutrient value is maximized
- Body condition is more easily controlled

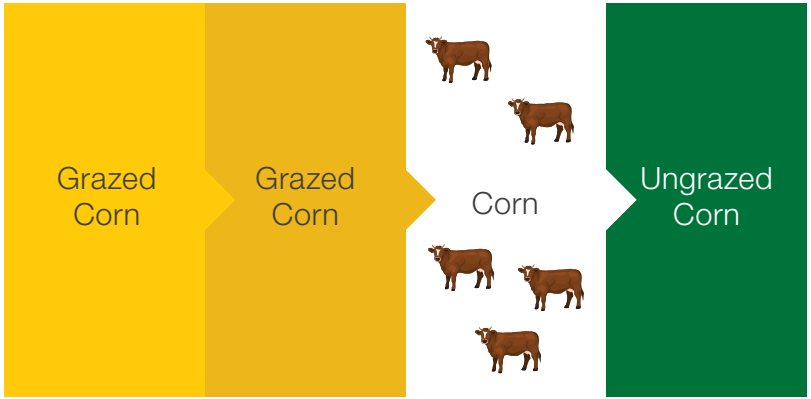
Grazing research suggests that the optimum grazing efficiency is achieved when fences are moved every 3 to 7 days. For example, assume you want to move your fence every 5 days and you have 150 cows. Using the estimate of 180 cow days/acre, you can calculate the paddock size required:

- 150 cows x 5 days ÷ 180 cow days/acre = 4.2 acres
- Monitor fields to ensure fences are moved when feeding is complete

Additional tips for success

The key to success when using corn for winter grazing is ensuring cattle have a high quality, uniform, and balanced diet. In addition to the timing and intensive grazing strategies mentioned earlier in this section, the following practices are recommended:

- Monitor the cattle and paddocks regularly to ensure cattle are grazing the entire corn plant including leaves and stalks, along with the cobs. To reduce wastage, the corn should be strip grazed and the electric fence moved every 3 to 5 days. This will also promote a more balanced usage of the corn parts – corn (grain), leaves and stalk. If the cobs contain more mature grain that may be high in energy, the grazing intensity should be increased to force the cattle to graze more leaves and stalks with the high energy cobs. This will reduce grain overload and acidosis. This may mean moving the fence daily or every second day.
- Ensure an adequate supply of clean, fresh water or uncrusted snow is nearby and available
- Corn is a great source of energy, but it can be low in protein and some other essential nutrients. To ensure a high-quality diet, submit a whole plant sample to a lab for quality analysis. Additional sources of roughage, such as hay and mineral supplements may be required as well.



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Insect Resistance Management
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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