



SILAGE Matters

***“Feed costs are the
largest single cost in
livestock production,
making up 55 to 70 per
cent of the total.
Every dollar spent
has to count.”***

Doug Alderman
Vice President, Sales & Marketing
PRIDE Seeds



Seed selection is crucial

You have a lot to think about when you're deciding which silage hybrid(s) to invest in.

You can do a number of things to safeguard their seed investment and ensure maximized performance:

Selecting hybrids that vary in maturity minimizes the risk of plant stress during pollination and expands your harvest window. The greatest silage yields are usually achieved with full season hybrids.

It's important to plant hybrids based on growing conditions, your storage method(s) and

your overall feed requirements.

It's imperative to plant when the soil is fit. Soil that is too wet can decrease yields and diminish feed quality. Remember that the rate of whole-plant drydown varies by hybrid.

Full season hybrids should usually be planted first to take advantage of their higher yield potential, although some producers like to plant 'ultra' short season hybrids early to provide fermented feed during the early fall. You should manage corn silage the same way you manage grain hybrids.



PRIDE Seeds' ongoing Total Ration Solutions program has been helping producers maximize their silage investments with both dairy and beef cows for a number of years.

Through extensive research, product development and rigorous testing PRIDE Seeds has developed top performing Effective Digestible Fibre (**EDF**) and Effective Dual Purpose (**EDP**) silage hybrids.

Combined with alfalfa varieties and forage mixtures PRIDE's silage hybrids are able to meet all of the energy, digestibility and protein needs of dairy and beef operations today. PRIDE Seeds has established one of the largest on-farm silage testing programs in Canada to evaluate the whole plant yield and feed quality of its silage hybrids.

At each location, hybrids are harvested from

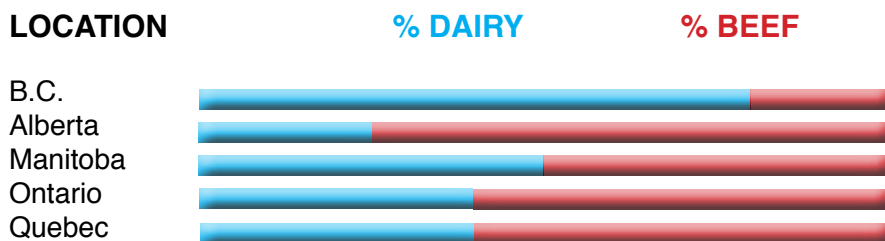
field scale trials measuring a minimum 1/3 of an acre. Representative samples are sent immediately to a fully accredited, independent lab to measure quality factors such as energy (starch), crude protein, acid detergent fibre (**ADF**), neutral detergent fibre (**NDF**), total digestible nutrients (**TDN**) and milk (lbs/acre).

The analysis provides a complete picture of the silage quality produced, enabling producers to select specific hybrids that will best meet their individual needs.



Dairy vs beef cattle...

The percentage of dairy and beef cattles varies depending on which part of Canada you're from.



Dairy Cows are on a negative energy balance, resulting in weight loss, in early lactation. To counter this, the ration needs to be balanced for energy with minimum effective fibre requirements in order to maintain optimal rumen function and animal health.

Fibre digestibility is extremely important because it allows higher forage intake and more digestible energy. One way to increase energy and fibre requirements, is to increase dry matter intake (**DMI**). It is important to maintain energy and minimize negative energy balance (**NEB**) for three weeks prior to calving. Producers should optimize DMI three weeks into lactation in order to minimize the negative energy balance.

High producing dairy cows receiving inadequate digestible energy are subject to many problems, including lower milk production, diminished body condition, metabolic issues and problems getting in calf.

Feedlot Cattle are on a positive energy balance, which means that the energy from the feed is correlated to weight gain.

They are fed to achieve high daily gains and therefore require a balance ration that results in a favourable feed conversion. Corn silage with a high grain content and digestibility is recommended to reduce the grain component required in the ration.

With feedlot rations, often grain is added to further increase the energy component.

DMI is used to measure performance and help maximize average daily gain of feedlot cattle.

Energy balance and why it matters

In order to understand the differences between the nutritional needs of both dairy and beef, it is important to understand the relationship between energy requirements and energy expenditure.

Energy balance refers to the relationship between energy-in (feed consumption) and energy-out (production).

Negative energy balance (**NEB**) is defined as being where energy expenditure from physical activity i.e. milk production exceeds feed intake (resulting in weight loss).

Positive energy balance (**PEB**) refers to a situation where energy intake from feed exceeds energy expenditure from activity (resulting in weight gain).

Corn silage management

Staggering planting dates can help you extend the silage harvest window. Full-season hybrids should usually be planted first to take advantage of their higher yield potential.

Some producers like to plant 'ultra' short-season hybrids early to provide fermented feed during the early fall.

Generally speaking, the population that allows for optimal grain yield also equates to the optimal population for silage yield and quality.

Predicting a harvest date

The silking date can be used as an 'approximate indicator' of harvest date. The dent stage occurs about 35 to 42 days after silking, which is when fields should first be checked for kernel milk stage development.

Kernels reach their final size within two weeks after silking and then begin to fill. During the filling period, as dry matter accumulates and moisture drops, a white line appears near the top of the kernels (100% milk-line).

Fifty per cent milk-line in dual-purpose corn hybrids generally indicates that 65% whole-plant moisture and over 85% of maximum yield has been reached.

NOTE: *The heat unit system cannot predict moisture content of the crop because of the influence of genetics, population/density and the weather, particularly rainfall or lack thereof.*

Extending the harvest window

When planning silage harvest, keep in mind the length of time required to harvest the field. Harvesting may need to start on the early side to ensure the field does not get overly dry by the time harvesting is complete. It is often better to err a little on the early (wet)

side rather than to be too late, unless kernel processors are used. Hybrid selection and planting date can be used to influence the timing and length of the harvest window.

Managing for corn silage quality

If you are producing feed for cattle with high nutritional requirements (such as for production dairy cows), and using dual-purpose hybrids, you should select your best cornfields for silage. Grain corn can more easily be replaced than high quality silage. It is difficult to balance rations and achieve desired milk production out of cows when using poor quality corn silage.

There is a definite advantage to dual purpose hybrids when compared to the various silage-specific hybrid types when discussing harvest timing. If something happens to a silage-specific field of corn there is no option to leave it for grain - it has to be used for silage.

Best practices at harvest

Determining the proper time to harvest corn for silage is critical because it influences the overall quality of the product that is ensiled and stored.

The most important maturity factor for silage quality is moisture content. Silage harvest timing should be based as a result on the whole-plant silage moisture.

The moisture content critically affects silage fermentation and preservation.

Generally, the best time to harvest is when whole-plant moisture content is between 62% and 72% (28%-38% DM).

Corn silage preserved between 30% and 38% DM (62% to 70% moisture) generally provides good silage fermentation and animal performance.

Once the target milk stage is approaching and whole-plant % DM is determined, an average drydown rate of 0.5% per day can be used to estimate the number of days until harvest. For example, if a given field measures 30% DM at the early sampling date, and the target harvest DM content is 35%, then the field must gain an additional 5% units of DM requiring an estimated 10 days (5% units divided by 0.5 unit change per day).

While kernel milk stage cannot be relied upon to gauge optimal harvest timing, it can be a useful indicator of when to begin measuring whole-plant DM content.

The relationship between kernel milkline and plant moisture content varies by hybrid type (i.e. silage specific hybrids) and weather conditions.

If you harvest corn too wet (low DM content) it results in souring, seepage of the silage and reduction in animal intake, as cows don't like the smell or taste of this.

If you harvest too dry (high DM content), it promotes mould development because the silage cannot be adequately packed to exclude oxygen. Harvesting too dry also results in lower digestibility & protein content.

Predicting when to harvest corn to achieve the proper % DM for ensiling is difficult because there is no easily identifiable plant trait that can be used to reliably and accurately estimate the whole-plant % DM. That means sampling is critical to feed quality.

Sampling fields to measure whole-plant dry matter content should be done well before the anticipated harvest date in case corn is drying down faster than expected.

Harvesting corn at the proper dry matter content will result in better animal performance and lower feed costs.

Another thing to remember is that your desired fibre digestibility can be obtained through chop height.

Set theoretical cut (**TLC**) or 'chop' length to 3/8"-3/4" for processed corn silage.

Set theoretical cut (TLC) length to 3/8"-5/8"

for unprocessed silage.

For each 4" of increased cutting height, yield is reduced by 1 wet silage ton/acre, but remember, what is left in the field are stalks, not high-starch corn silage.

Check cut length using a particle separator, like the Penn State Shaker Box.

Microbial inoculants (dry or liquid application) can improve silage fermentation and nutrient retention.

It's crucial to harvest at optimum maturity since cutting at the right stage of maturity has a large effect on both the quality and the quantity of corn silage.

Always fill and pack your silos quickly and efficiently as this results in more dry matter and nutrient preservation. And, obtain a representative sample of forage for nutrient analysis.

Allow silage to ferment for two to three weeks before feeding.

Avoid abrupt changes in feeding new forages as consistency is important, so adapt cows to new silage through a gradual changeover.

Feeding large amounts of uncured silage can result in production losses.

You should always remove four to six inches of silage from cement stave, bag and bunker silos each day to prevent spoilage and prevent aerobic deterioration of silage.

Proper sealing of a bunker to reduce losses associated with aerobic respiration (at filling) is very important. The use of plastic/silage film are imperative to ensure a good seal, coupled with sand bags and tires or straps to quickly eliminate and maintain an anaerobic state.

The optimal DM content varies with type of storage structure:

Corn Silage (Processed)

Bunker	Stave	Sealed	Bagged
62-72%	60-68%	60-70%	60-70%

Corn Silage (Unprocessed)

Bunker	Stave	Sealed	Bagged
62-72%	62-70%	60-70%	62-70%

Understanding a silage analysis and what it means

What do nutritionists look for in lab results?

MOISTURE

Dry-Matter (DM): Dry-matter is the moisture-free content of the sample. Because moisture dilutes the concentration of nutrients but does not have a major influence on intake, it is important to consistently evaluate rations on a dry-matter basis.

PROTEIN

Crude Protein (CP): Crude protein measures the nitrogen content of corn silage, including both true protein and non-protein nitrogen.

Insoluble Crude Protein (ICP): This is nitrogen that has become chemically linked to carbohydrates. This linkage is mainly due to overheating when hay is baled or stacked with greater than 20% moisture, or when silage is harvested at less than 65% moisture. Forage or silage with high ICP are often discoloured and will often have distinctly sweet odours. When the ratio of ICP to CP is more than 10% of the unavailable CP, the crude protein value is adjusted. Adjusted crude protein values should be used for ration formulation.

Adjusted Crude Protein (ACP): This is the crude protein value corrected for ICP content. In most nutrient analysis reports, when ACP is greater than 10% of CP, the adjusted value in formulating rations is reported.

FIBRE

Acid Detergent Fibre (ADF): This is a chemical analysis that determines the amount of residue or the least digestible plant components (primarily cellulose & lignin) remaining after boiling a feed sample in an acid deter-

gent solution. The ADF value is used to predict the energy content (TDN) or net energy (NE) of forages. Forages with low ADF concentrations are usually higher in energy.

Neutral Detergent Fibre (NDF): This is the insoluble fraction containing all plant cell wall components left after boiling a feed sample in a neutral detergent solution.

NDF has low digestibility but can be broken down to some extent by the digestive tract micro-organisms in the cow. The NDF value is the total cell wall, which is comprised of the ADF fraction plus hemicellulose.

NDF values are important because they reflect the amount of forage the animal can consume. As NDF percent increases, the dry matter intake generally decreases.

Neutral Detergent Fibre Digestibility (NDFD): This is a measure of the digestibility of neutral detergent fibre. Understanding this measure allows nutritionists to formulate better rations as a result of more accurate energy prediction. That in turn leads to achieving the desired dry matter intake.

Kernel processing

Today's cows produce higher volumes of milk and can therefore consume more dry-matter. Cows can consume a dry matter intake of >60 lbs/cow/day. This means feed passes through the rumen much faster.

Kernel processing allows faster microbial access – allowing cows to get the most out of their feed.

The industry weighs in

Q. What are the main differences between dairy and beef and what are the priorities for each?

A. Most of the nutritionists we questioned were dealing primarily with the dairy sector. They are looking at sugar, dry matter, lignin, NDFD and starch level NEL - going outside of the ADF-NDF relationship that they previously focused on. Even NEL is becoming antiquated for individual feeds. These producers or nutritionists are looking at ME (metabolizable energy) and MP (metabolizable protein).

Q. What is trending up or down in terms of corn silage and/or forage use in rations?

A. The trend is to increase corn silage in the ration compared to forage components, with a recommended ratio of 60% corn silage and 40% forage. Corn silage is more consistent throughout the year so it has a better impact on productivity and calving, possibly due to improved fibre and starch digestibility. The maturity rating of the grain is very important to the process.

Q. What goes in a typical ration?

A. Corn silage, forage and high moisture or dry corn is typically used in most rations. High moisture corn is more digestible than dry corn. One example is 17-18 kg of corn silage, 17-18 kg of forage silage, 5-6 kg of humid or dry corn and 2Kg of dry forage.

Q. What impact does corn silage and forage have on the overall ration?

A. Corn silage is easier to manage within a ration and with better performance. It's easier to make good corn silage vs. forage silage because of harvest consistency. Therefore, the ration is more consistent throughout the year with corn silage as haylage is more variable in the silo – especially with respect to DM.

Q. How important is silage hybrid consistency and what do producers look for from a corn silage company?

A. Hybrid consistency is important from the standpoint that performance in the field and ration are predictable. However, it's vitally important to have both high yield and maximum performance. Farmers should take advantage of new hybrids that are introduced showing superior agronomic and feed characteristics. Nutritionists will work with your lab analysis to formulate an operation-specific preferred ration. Seed companies can provide you with crucial information on their hybrids with respect to agronomic characteristics in the field.

Q. What are some of the industry recommendations with respect to harvest?

A. This really depends on the storage system. **Bunker:** Harvesting between 30% and 35% dry matter is recommended. **Silo:** 38% dry matter.

Generally speaking, chop length should be at 1/2" to 3/4", with the majority of industry experts agreeing that 3/4" is most common. Generally, kernel milkline is between 50% and 70% at harvest. Most nutritionists surveyed recommend an analysis of the silage be done at least four times per year (silo) and once a month in a bunk scenario to monitor quality and analysis.

Q. What percentage of customers are running processors on their harvesters? What advantage do processors have? Are there certain types of hybrids these are more effective with?

A. Eighty to 90% of the growers are using processors. The advantage is digestibility. With a processor, it does not matter whether you are growing a dent or flint corn. Without a processor it is better to have a dent grain.

Q. What effect does chop length have on the sample and overall performance of the silage? Does this recommendation vary with the type of hybrid used?

A. Chop length influences the amount the cow chews and the microbial activity of the rumen. It is also an important harvest management consideration in ensuring a tight pack so that air is excluded from the silage mass. Most agree that 3/8"-3/4" theoretical length of cut is near ideal for minimizing storage losses. Extremely fine chopped corn silage (1/8" or less), such as that produced by using a recutter screen, is undesirable.

Finely chopped material is known to reduce milk fat test with dairy cows due to a decrease in effective fibre in the ration. A practical rule of thumb is that most of the silage particles should be about 1/2" long, with 15% to 20% of the particles being 1" in length. If the silage is too dry, i.e., below 60% moisture, the chop length should be reduced to near 1/4" so that the silage can be adequately packed.

Q. What is the experts' opinion of BMR hybrids? Leafy Hybrids? Dual purpose hybrids?

A. BMR is seen as a high management feed crop that requires more specific analytical information to successfully build it into a ration. Some nutritionists or growers prefer to work with leafy or silage specific hybrids i.e. PRIDE Seeds EDF hybrids. Attention should be given to starch content and fibre digestibility of leafy hybrids. It is important that dual purpose hybrids i.e. PRIDE Seeds EDP hybrids possess excellent plant health characteristics and have a grain drydown window that allows for silage harvest.

Q. What do the experts look for in hay or forage for their producers i.e. mixes, pure alfalfas? What role does forage play in the ration vs. corn silage or high moisture corn?

A. Many nutritionists presently look for an approximate 75% alfalfa and 25% grass mix in the forage component. Hay is a very important source of fibre that activates the rumen. If pure alfalfa is selected for the ration, fibre is generally increased through the use of straw. Low lignin alfalfa in the future will have better fibre digestibility than conventional alfalfa.

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