Inside the ZONE® NEWSLETTER

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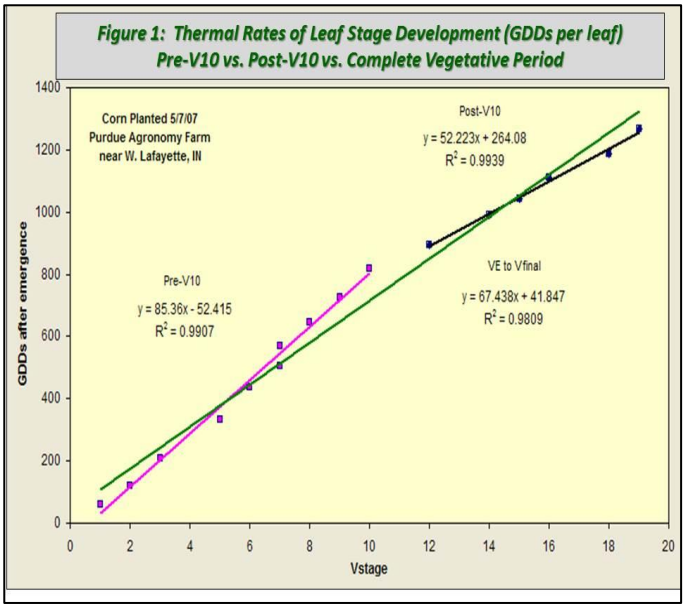
Starch vs Digestibility

Questions have risen regarding the value of starch vs digestibility of the plant. This is especially important when looking at longer season hybrids and these hybrids inability to put on starch prior to harvest or killing frost.

What Defines Corn Maturity?

Let's start at the beginning and look at what defines corn maturity. When breeding hybrids suited for western Canada we need to remove leaves in order to decrease maturity. In order to decrease maturity of a hybrid, corn breeders target less leaves on the pant when breeding for hybrids suited for western Canada. Typically, removal of one leaf amounts to 100 CHU as shown on Figure 1.



Should I Choose a Long Season Hybrid to Maximize Digestibility?

It is important to choose a hybrid that fits the maturity zone. This will maximize silage tonnage, quality and fermentation dynamics. Planting hybrids that are excessively longer than the maturity zone allows results in high tonnage of biomass, with minimal ear development.

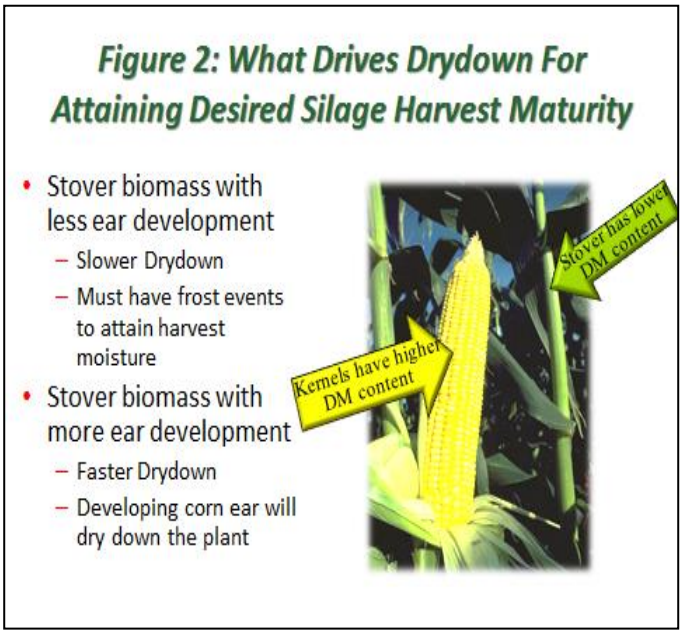
Half milkline corn, which usually is at 65% whole plant moisture is the ideal harvest maturity that can be successfully achieved for chopping corn in western Canada with Pioneer's short season hybrid options.

Silage Yield

Total ear development accounts for up to 60% of total tonnage produced, which is another reason to target good grain production in silage. Likewise planting an excessively longer hybrid will impede proper grain development and the producer will sacrifice yield, not just quality of his silage.

Ensiling Immature Corn

The developing corn ear is largely responsible for lowering plant moisture, because typically grain has much lower moisture content compared to wetter stover plant parts as shown in Figure 2.



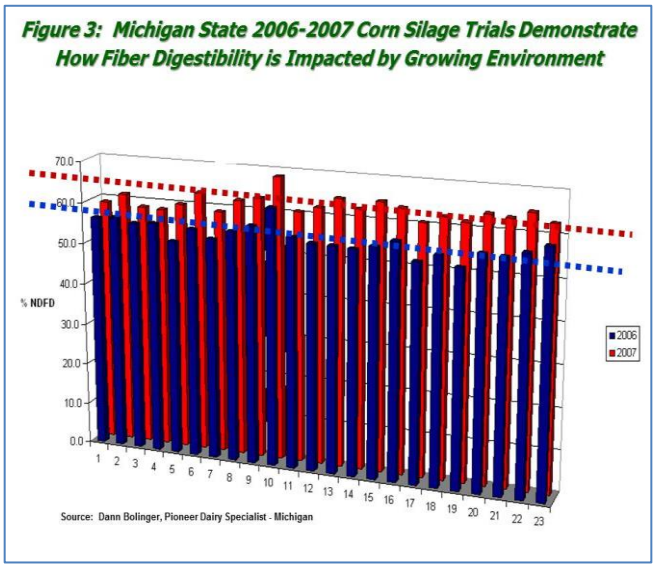
Plant dry-down will be delayed and producers will have to wait for 1-2 killing frosts to get the crop to dry down into the ensiling 65% moisture zone.

Harvesting the corn prior to a frost results in overly wet silage, where exudate will freely flow out from silos, increasing nutrient loss. A couple killing frosts may not jeopardize the NDF digestibility (NDFD) quality of the stalk material, but the leaves are going to severely decline in NDFD once killed off by frost events.

Fiber Digestibility

It is important to remember that fiber digestibility will be determined pre-silking, based on environmental conditions. The graph in figure 3 shows that hybrids grown in a drought year (2007) had higher NDFD, compared to the same hybrids grown in a normal year (2006).

Figure 3: Michigan State 2006-2007 Corn Silage Trials Demonstrate How Fiber Digestibility is Impacted by Growing Environment



Therefore, whether the plant is a long season or short season plant results in the same digestibility given similar environmental conditions. In other words, the growing season will dominate what the fiber digestibility will be, with genetics only playing a small (3-4%) role in digestibility.

Sugar vs Starch

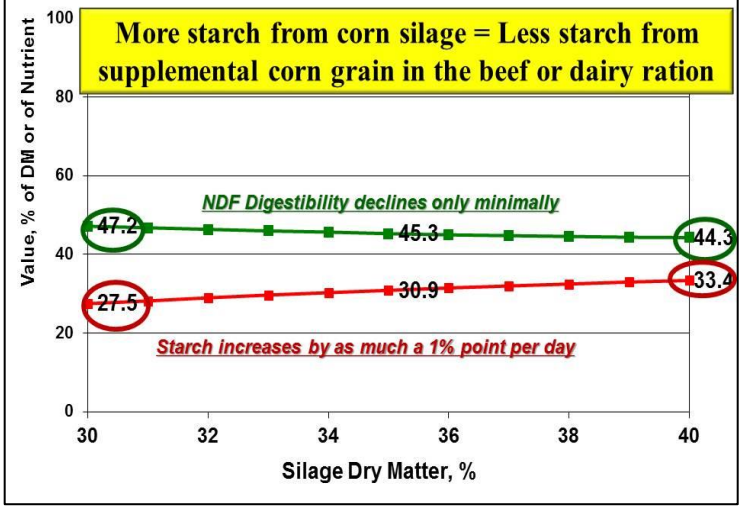
Corn is nature's most efficient cereal crop for being able to convert sugars from photosynthesis to storage vessels known as starch granules in the kernel. Although, starch and sugars are both fast release carbohydrates, one starch molecule is comprised of hundreds of sugar molecules.

Therefore, high starch silage will have more energy than high sugar silage. High sugar corn silage will have the energy available from the sugar concentration and minimal amount from any starch. However, ½ milk line corn silage will have the sugar energy, along with all the energy dense starch. Once the starch is exposed to amylase during the digestion process it is converted back to sugars.

Increased cattle productivity from high quality corn silage for both beef and dairy operations is driven by 1) the developing corn kernel and 2) the fiber digestibility of the crop at this stage of harvest maturity.

Figure 4 clearly shows that during desired corn silage harvest maturity, starch continues to accumulate in the plant while at the same time losing only minimal amounts of digestible fiber.

Figure 4: Healthy Plants Maximize Starch Content and Will Maintain Good NDFD



The Goals of Good Silage

The goal of good silage is to put up silage at ½ to ¾ milk line to maximize starch accumulation. An immature corn plant will have higher sugar content than a mature corn plant because it has not had time to convert the sugar to starch. A producer spends the same amount of money to grow, ensile, and feed high sugar corn silage as high starch silage, however high sugar corn silage contradicts the reason we grow corn for silage in the first place.

In the end, harvesting silage at ½ milk line accomplishes two goals:

1. Near maximum amount of starch with the rest being residual sugars as the rapid carbohydrate source.
2. Near maximum NDFD that was determined during the vegetative stages of plant growth (irrelevant of length of hybrid).

But Remind Me About Digestibility?

Digestibility does not decline as the plant matures, which is opposite to many forages, and only slightly declines once blacklayer is produced.