The "Normal" Pattern of Corn Forage and Grain Development

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Corn is a high yielding, high energy, low protein forage commonly used for growing and finishing beef cattle, in cow-calf production systems, for growing dairy heifers, and for lactating dairy cows. Corn grown as a forage and fermented in a storage structure preserves the silage for subsequent feed-out. Understanding yield and quality changes during the life cycle of corn is critical for timing harvest of a field.

The "Double Peak" of Corn Silage Quality

Corn exhibits a "double peak" for corn silage quality during its life cycle (Figure 1). The first peak is related to energy derived from stover fiber (NDFD) and water-soluble carbohydrates, while the second peak is derived from NDFD and starch content of grain. Forage quality as measured by Milk per Ton is at the first quality peak just prior to silking (R1). Like all forages, Milk per Ton decreases following flowering (VT-R1). Unlike other forages, corn silage Milk per Ton after the kernel blister stage (R2), steadily increases to a maximum second quality peak around 50% kernel milkline development (R5.5) due to grain yield development.

Forage yield and Milk per Acre

One of the unique aspects of corn as a forage crop is that yield and quality reach maximum values at nearly the same time. Forage yield increases steadily through its life cycle. At R1 all the plant photosynthetic "machinery" is produced on the plant. For most hybrids grown commercially in Wisconsin the grain filling period (R1-R6) is about 55-60 d. Following pollination, grain develops in a sigmoidal fashion with a 7-10 d lag period, followed by a 40 -44 d linear phase, and ending with a 7-10 d maturation phase. Starch content increases as grain develops and matures.

Multiplying corn forage yield by Milk per Ton results in Milk per Acre. Milk per acre peaks at R5.5. Then due to leaf senescence and loss, yield and quality tends to decrease slightly.

Using Forage and Grain Moisture for Harvesting

At some point forage yield is no longer as important as timing harvest at the correct moisture for the storage structure to ensure proper fermentation and preservation. The wettest plant part on corn is the lower stalk, which is also of poor quality (low NDFD) and is high in nitrates. The driest plant part is grain. By raising the chopper cutter bar 12 inches, forage moisture decreases 3- 4% points. Also, the wettest, poorest quality plant part is left in the field. Forage yield is decreased about 10 to 15%, but forage quality increases 8 to 12%, so that overall Milk per acre is only reduced about 3 to 4%.

The effect on forage moisture is significant when the field is scheduled to be harvested by a custom chopper. By adjusting cutting height, the operator can better achieve the optimum moisture for the storage structure. About a one-week shift in harvest timing can be achieved (assuming 0.5% per day drydown rate).

The Kernels

- Corn exhibits a "double peak" for corn silage quality during its life cycle with the first NDFD peak at R1 and the second starch content peak at R5.5.
- Corn as a forage crop reaches maximum yield and quality values at nearly the same time (R5.5).
- At harvest (R5.5), the wettest plant part is the lower stalk, while the driest plant part is the grain. Adjusting the cutter bar can change forage moisture 3 to 4% points to better target the recommended moisture for the storage structure.

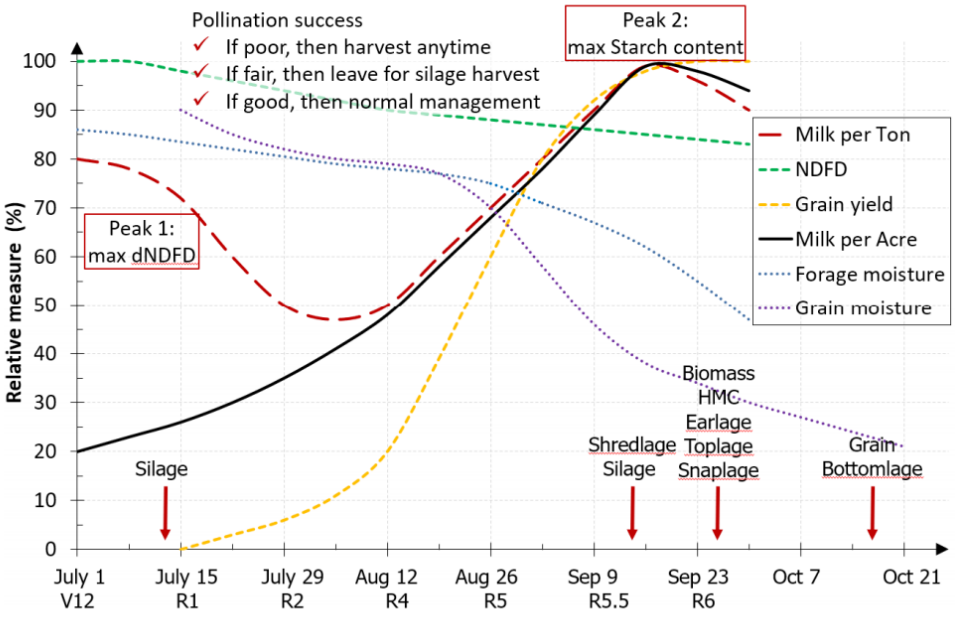

Figure 1. Normal Pattern of Corn Forage and Grain Development in Wisconsin.