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Can We Manage Corn Silage Stover Quality?

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Summary

- Forage quality improvement in corn is due to increasing starch content as maturity approaches.
- Hybrid selection and harvest date affected corn stover quality as measured by neutral detergent fiber digestibility (NDFD).
- Plant density, planting date, and row spacing had no effect on corn stover quality (NDFD).
- Not much can be done with harvest date as a management option due to the yield-quality trade-off.
- Hybrid selection is the only practical option for managing NDFD.

Keywords: corn, silage, NDFD, starch, management

The dairy cow is 'built' for digesting cell walls. Current guidelines (National Research Council, 2001) for feeding corn silage are based upon numerous components including neutral detergent fiber digestibility (NDFD). For most forages, there is a trade-off between NDFD and yield. As a crop matures NDFD decreases and yield increases. Optimum harvest time is usually around flowering.

Corn is somewhat unique in the world of forages. The same yield and NDFD relationship holds for corn around flowering, but OVERALL quality is optimized later near maturity due to an increase in grain content which is highly digestible.

Our objective was to determine whether corn silage NDFD (cell wall digestibility) could be influenced by various agronomic management decisions.

Between 1997 and 2002, corn silage management trials were conducted at numerous locations in Wisconsin. Management factors included plant density, planting

date, row spacing and harvest date. Treatments changed over years as new hybrids and technology advances became available. For all plots near infrared spectroscopy (NIRS) scans of forage were collected and archived.

The UW NIRS global equation for corn forage was updated for the 2002 UW Corn Hybrid Performance Silage Trials. All data points used in the global equation were analyzed by the Marshfield Plant and Soil Analysis Lab. The NIRS global equation was used to determine the forage quality components of crude protein (CP), acid detergent fiber (ADF), neutral detergent fiber (NDF), *in vitro* true digestibility (IVTD), and Starch content. NDFD was calculated (Van Soest, 1982).

Harvest date

Like other forages, corn yield is greatest after flowering near maturity (Darby and Lauer, 2002). NDFD decreases after flowering and is lowest near maturity (Figure 1). Early harvest dates have greater NDFD. Starch content increases after flowering. Quality (milk per ton) decreases after flowering. Unlike other forages, quality (milk per ton) increases as maturity approaches. Thus, yield and quality are optimized near maturity when nearly half of the forage dry matter is grain.

Plant density

Plant density did not affect corn NDFD. Corn forage quality increases observed with increasing plant density are due to increases in starch content. Forage yield increases with increasing plant density. But, forage quality (milk per ton) decreases. Thus, an optimum plant density exists for milk per acre. The current recommendation for corn forage production is to plant at a density similar to grain production and err on the high side (~1000-2000 more plants/A). Recent work indicates that optimum plant densities may be increasing.

Planting date

Planting dates after May 20 had lower forage yield, milk per ton (quality) and milk per acre than earlier planting dates. Many late-planted fields are used for corn silage production in Wisconsin. Planting date had no effect on corn NDFD. Delayed planting dates lower starch content, which is largely responsible for decreases in forage yield, milk per ton and milk per acre.

Row spacing

Row spacing did not affect forage NDFD or starch content. The small increase in stover yield due to narrower row spacing is balanced by a small increase in grain yield, so overall forage quality does not change.

Conclusions

Plant density, planting date, and row spacing had no effect on NDFD. Most quality changes are due to changes in starch content as the plant matures. Hybrid selection and harvest date are the only two management factors evaluated that affected NDFD. Not much can be done with harvest date due to the yield-quality trade-off. Hybrid selection is the only practical option for managing NDFD.

References

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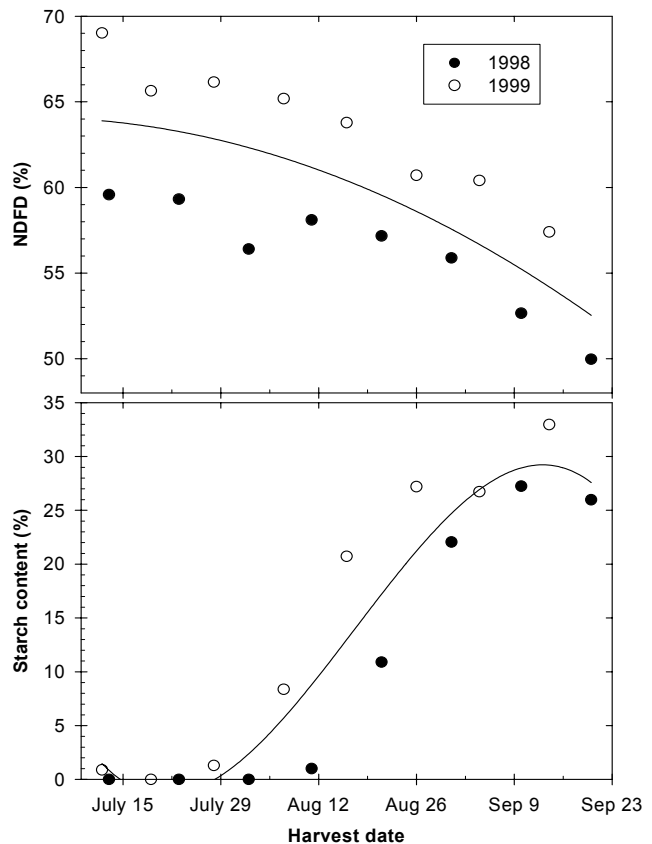


Figure 1. Change in NDFD and starch content of corn silage on various harvest dates at Arlington, WI. Silking occurred between July 16 and 24 in each year.