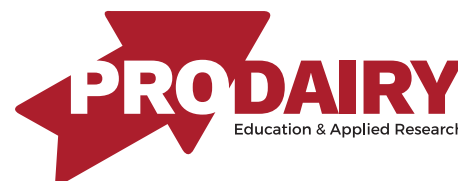


Efforts to Advance Corn Silage Hybrid Evaluation Trials in the Northeast

By Joe Lawrence, Heather Darby, Jessica Williamson and Thomas Overton



A number of independent Corn Silage Hybrid Testing Programs are conducted across the country. Over the past two years the hybrid evaluation trials conducted in New York, Pennsylvania and Vermont have come together to develop a unified testing network. These efforts have involved Cornell University, Penn State University, the University of Vermont, the Professional Dairy Managers of Pennsylvania (PDMP), and the Western New York Crop Management Association. All of these programs were offering valuable information on hybrid performance, and this new unified collaboration further enhances these programs by allowing for the evaluation of hybrids across more growing conditions, as well as consistent analysis and reporting across sites.

While yield performance is a common discussion topic, forage quality performance is a critical aspect of decision making for corn grown for silage. A growing number of traits available for corn targeted towards improvements in forage quality provide farmers with even more hybrid selection choices. In addition, recent advances in dairy nutrition related to fiber digestibility has necessitated a change in how forage quality is evaluated and what selection criteria offer producers the best insights for hybrids selection.

Recognizing the need for updated hybrid evaluation

criteria, and the opportunities of regional collaboration to enhance the value of individual program results, organizers see tremendous potential in bringing more uniformity to testing programs. In addition to providing producers with valuable information for selecting hybrid, this approach can also help corn breeders focus development efforts on characteristics that bring value to corn silage.

Research in Pennsylvania and New York both focus on digestibility, but of different components of the forage. Efforts in Pennsylvania have focused on improving understanding of starch digestibility, and work to update guidance on how to best test for and use this information in hybrid evaluation. Meanwhile, in New York, the program has focused on advanced evaluation of fiber digestibility, newer laboratory measurements of fiber, and use of nutritional modeling software (the Cornell Net Carbohydrate and Protein Synthesis or CNCPS Model) to better understand how hybrids should perform as part of a complete ration for dairy cows.

Researchers at Penn State have been working to identify the appropriate grind size to achieve the best repeatability and to sort out hybrid differences to better reflect in situ starch digestibility. Starch digestibility has been analyzed in several Pennsylvania trials using a 1 mm grind, based

on the results from a preliminary study conducted during the past two years. During the 2017 season, Pennsylvania trials saw an average of 57.1 percent and 60 percent starch digestibility in early and full season hybrids, respectively. Digestibility for early season hybrids ranged over 10 percent, from 51.8 percent to 62.5 percent, while full season hybrids ranged even more significantly, from 50.3 percent to 66.8 percent starch digestibility.

The understanding of neutral detergent fiber (NDF) and its role in forage quality is not new. However, the ways we measure, interpret and value NDF in a feeding program continues to evolve. For many years NDF digestibility (NDFd) has been a key parameter used to benchmark forage quality and understand how a forage would perform in an animal's diet. NDFd can be measured at different time points and is commonly reported at 24 and 30 hours for corn silage.

It has also long been recognized that the portion of indigestible fiber in a forage impacts dry matter intake and production potential. For many years the multiplication of percent lignin by 2.4 was used to characterize indigestible fiber. In recent years the measurement of undigested NDF (uNDF) at a series of time points (30, 120 and 240 hours) has been shown

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to be a better indicator, leading to its adoption by forage testing laboratories and incorporation into nutritional modeling software. It is important to distinguish undigested fiber from indigestible fiber as uNDF is reporting the pool of fiber undigested at the specified time point.

As overall forage quality is a combination of numerous parameters, evaluation systems that can incorporate multiple parameters offer many benefits. Common examples include the milk per ton equation from the University of Wisconsin (shaverlab.dysci.wisc.edu/spreadsheets), and more recently, total tract neutral detergent fiber digestibility (TTNDFD), also developed at University of Wisconsin and licensed to Rock River Laboratories (rockriverlab.com/file_open.php?id=119). In an attempt to incorporate numerous parameters of quality, including uNDF, as well as how the corn silage performs in the context of a complete ration, hybrids in the New York and Vermont trials are entered into a base ration (typical of a high corn silage diet fed to lactating dairy cows) in CNCPS, which provides predictions of dry matter intake and predicted energy (ME) and protein (MP) allowable milk yield.

For factors such as yield it

has long been advised to look for consistent performers across a range of growing environments. Advanced fiber digestibility measurements are shedding new light on how growing conditions, from soil drainage to rainfall, influence digestibility. In some cases greater differences are seen in the same hybrid grown under different environments than in different hybrids grown at the same location. This information increases the value of tracking the performance consistency of a hybrid grown across a range of conditions.

Collaborators are hopeful that results from both of these efforts will eventually be incorporated into enhanced silage comparison reporting used across programs. In the interim, steps have already been taken to bring consistency to the forage quality parameters reported that allow producers to better compare information on hybrids present in the various trials. The 2017 trial summaries report common parameters, including NDFd at multiple time points, and uNDF at 240 hours.

A complementary initiative in progress, intended to facilitate hybrid comparisons across programs, is the development of a searchable database that will compile results from all the programs and allow users to search the database by a number of search criteria to key in on hybrids and performance parameters important to their operation. This effort includes

collaboration with the farmer-owned Western New York Crop Management Association, in Warsaw, New York, which also conducts annual corn silage hybrid evaluation trials.

As new forage quality traits are introduced, and the understanding of key forage quality factors continue to evolve, hybrid evaluation programs offer important information to producers. Building more unified collaboration among testing programs, both regionally and nationally, is a great opportunity to enhance the information generated by this work. ■

2017 New York and Vermont Corn Silage Trial results are at:

- **Cornell:** scs.cals.cornell.edu/extension-outreach/field-crop-production/variety-trials#corn-silage
- **University of Vermont:** uvm.edu/extension/cropsoil/research
- **Penn State/PDMP:** extension.psu.edu/2017-results-pa-commercial-grain-and-silage-hybrid-corn-tests-report

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