Corn Silage Hybrid Selection

by Jeff Coulter, University of Minnesota

Hybrid selection is a critical step for profitable production of corn silage and milk, as silage yield and quality can differ greatly among hybrids. For example, in the 2010 corn silage hybrid trials conducted by the University of Minnesota, the difference in silage DM yield between the highest and lowest yielding hybrids ranged from 2.6 tons/ac at Ottertail to 4.3 tons/ac at La Crescent (Table 1). In comparison, the difference in overall silage quality (milk/ton) among hybrids ranged from 290 lbs/ton at Ottertail to 650 lbs/ton at Underwood.

Obtain Hybrid Trial Information

Select hybrids that perform well over multiple sites in a region. Consistent performance over multiple trials with different soil and weather conditions is critical because next year's growing conditions cannot be predicted and a hybrid that performs well over multiple environments will have a high potential of performing well next year. In the past, the performance of a given set of hybrids could be evaluated over multiple years at a given location, but that is less realistic now because today's lifespan for a typical corn hybrid is just a few years.

To reduce risk, hybrid selection should be based on information from multiple sources, including universities, seed companies and on-farm strip trials. Results from unbiased and replicated trials that include multiple hybrids from different companies are of particular importance. Results from the University of Minnesota corn silage hybrid trials are available at www.extension.umn.edu/corn/trials.html, at Extension offices and as a special report published annually in Agri-News. The corn silage hybrid trial results from the University of Wisconsin are also a great resource: http://corn.agronomy.wisc.edu/HT/Default.aspx.

Test Hybrids on Your Farm

While most farmers are not looking for additional work, testing corn hybrids on your own farm, as part of a corn hybrid testing group, can produce a significant economic return for the amount of time invested. For example, a small group of farmers could get together and form a hybrid testing group, which evaluates a set of potential hybrids for the subsequent year. This same set of hybrids could be planted by each farmer, with each hybrid planted side-by-side in one or two strips in a given field. This would allow hybrids of interest to be evaluated over multiple farms, while allowing farmers to learn from each other and have actual experience with a hybrid before planting it on hundreds of acres. Interested farmers should consider working with their local Extension Educator, crop consultant and seed suppliers to get started in such a program.

Table 1. ***Summary of the 2010 University of Minnesota corn silage hybrid trials.***

MN Location	Number of Hybrids Evaluated	Range in Silage Yield Among Hybrids Evaluated *(ton DM/ac)*	Range in Silage Quality Among Hybrids Evaluated *(lb milk/ton of silage)**
La Crescent	60	10.4-14.7	3,010-3,650
Rochester	60	7.5-11.1	2,940-3,480
Hutchinson	48	8.7-11.7	3,030-3,550
Melrose	48	6.3-9.0	3,050-3,520
Underwood	22	7.3-10.7	2,650-3,300
Ottertail	22	9.9-12.5	3,120-3,410

**Milk production estimated using MILK2006 spreadsheet developed at University of Wisconsin.*

Hybrid Maturity

One of the first things to consider when selecting hybrids is maturity. Longer-season hybrids typically have higher silage yields. A general guideline is that hybrids planted for silage should be 5-10 days longer in relative maturity than the hybrids planted for grain. However, these later-maturing hybrids may not be the best choice for a producer wanting early silage or the option to harvest the corn for grain.

Select hybrids that have a range in relative maturity, as this widens the harvest window. Harvesting at the correct moisture level is critical for producing high quality silage, and if missed, can negate the benefits of good hybrid selection. The importance of widening the harvest window was seen across Minnesota in 2010, as corn matured so rapidly under warm air temperatures that many growers had difficulty getting their corn chopped before it was too dry. Planting hybrids with a range in maturity also widens the pollination window, thereby reducing the risk that one's entire crop will experience hot and dry conditions during pollination.

Yield and Quality

Selecting hybrids that produce high corn silage yields is important. For example, assume that a farmer has a 4,000 ton corn silage feed requirement. If Hybrid A yields 33 tons/ac and Hybrid B yields 28 tons/ac, this farmer would need to harvest 143 acres for silage if planting Hybrid B, but only 121 acres if planting Hybrid A. In this simplified example, the selection of Hybrid A over Hybrid B would have allowed this farmer to have an extra 22 acres for grain harvest. At 190 bushels/ac, this would be 4,180 bushels of extra corn to feed or sell, with a value of $20,900 at $5.00/bushel. While this example demonstrates the importance of yield, it does not take into account silage quality. Since corn silage is an energy source for animal performance, producers should evaluate both silage yield and quality when selecting hybrids. Silage yield is commonly presented on both a DM and wet (65% moisture) basis. Dry matter yield allows fair comparisons among hybrids harvested at different whole-plant moisture levels.

The numerous variables representing silage quality can make hybrid selection a little overwhelming. Consulting with a livestock nutritionist during the hybrid selection process helps to ensure that selected hybrids have the necessary nutritive value for your herd. Overall silage quality is commonly summarized in a single variable known as milk/ton, which is calculated using the MILK2006 spreadsheet that was developed at the University of Wisconsin. Milk/ton is an overall indication of silage quality, and it is estimated from forage analyses for crude protein (CP), neutral detergent fiber (NDF), NDF digestibility (NDFD), starch and non-fiber carbohydrate.

Milk/ton (silage quality) is typically shown along with milk/ac (silage yield x quality). Milk/ac is calculated by multiplying milk/ton by silage DM yield. Thus, milk/ac is largely influenced by silage yield, making it possible for a hybrid to have high milk/ac with low milk/ton. However, since milk/ac is a combination of both yield and quality, and because silage quality is so important, many people look at milk/ac as an indication of silage yield rather than silage yield itself. When selecting hybrids based on milk/ton and milk/ac, consider the following:

- The goal is to identify hybrids with high values for both milk/ton and milk/ac. These hybrids produce high quality forage and high silage yield, and are thus most profitable.
- Hybrids with a low value for milk/ton and a high value for milk/ac have below-average quality but high yield. Silage from these hybrids may be better suited for livestock with lower nutritive requirements than lactating dairy cows.
- Hybrids with a high value for milk/ton and a low value for milk/ac have above-average quality and low yield. The gains in forage quality with these hybrids must offset the reduction in yield for these hybrids to be profitable.
- Hybrids with low values for both milk/ton and milk/ac should be avoided. They have relatively low quality and low yield.

Once a suitable group of hybrids has been identified based on milk/ton and milk/ac, further selection within this group can be based on specific forage quality and agronomic traits. In general, higher NDF values indicate lower intake and animal performance; while higher values for CP, starch, NDFD and in vitro digestibility imply greater performance potential. While small changes in forage quality can greatly impact milk production, differences in individual quality traits between hybrids that are <5% are probably not statistically significant or worth worrying about, especially since overall forage quality is summarized by milk/ton.

Transgenic and Agronomic Traits

When selecting hybrids, it is important to remember that transgenic insect resistance traits do not increase yield potential. Instead, they protect yield potential in the presence of pressure from the target pest. Paying extra for transgenic insect resistance when it is not needed reduces economic return. For example, in Minnesota, corn for silage is often planted after alfalfa, but pressure from corn rootworm is typically minimal in the first year after alfalfa. This is because in Minnesota, the majority of corn rootworm eggs are laid in corn and the larvae generally hatch within two years. At the same time, consider the need for transgenic resistance to European corn borer in your fields. Also consider the herbicide resistance traits needed for your cropping system.

Other important agronomic considerations include tolerance to drought and disease. Selecting a hybrid with a high rating for drought tolerance may be useful on droughty soils, in dry regions, or in a lower-rainfall area where a previous crop of alfalfa has depleted subsurface soil moisture. Standability, however, is less important for silage hybrids than grain hybrids due to the earlier time of harvest. Think carefully about corn hybrid selection to manage risk and to maximize silage quality, yield and overall economic return.