The Minnesota Hybrid Corn Silage Evaluation Program evaluates the silage potential of corn hybrids in Minnesota. The goal of the program is to provide unbiased forage yield and forage quality information for educational and marketing programs.

The program is financed in part by entry fees from private seed companies that choose to enter hybrids for testing, which are listed below. Results are presented from the two corn silage performance trials, Southeast (SE) located in Rochester; and Central (CE) located in Hutchinson. Entries from the southeast and central sites are also evaluated at Waseca in trials designated as Waseca SE and Waseca CE. Trials at each location were split into early and late corn hybrid maturities, to facilitate harvesting the corn silage at 65% whole plant moisture.

**Test Procedures**

Plots were established at each test site in a randomized complete block design with four replications.

<table>
<thead>
<tr>
<th>Location</th>
<th>Planting Date</th>
<th>Early Harvest</th>
<th>Late Harvest</th>
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</thead>
<tbody>
<tr>
<td>Rochester SE</td>
<td>May 18</td>
<td>Sept. 14</td>
<td>Sept. 24</td>
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<tr>
<td>Waseca SE</td>
<td>May 1</td>
<td>Sept. 11</td>
<td>Sept. 12</td>
</tr>
<tr>
<td>Hutchinson CE</td>
<td>May 14</td>
<td>Sept. 7</td>
<td>Sept. 7</td>
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<tr>
<td>Waseca CE</td>
<td>May 1</td>
<td>Sept. 10</td>
<td>Sept. 10</td>
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</table>

Hybrid entries were planted at 35,000 seeds per acre with 30-inch row spacing. Plant nutrients such as manure or inorganic fertilizer and herbicides, to control weeds, were applied according to University of Minnesota recommendations.

Plots were harvested and whole-plant herbage sampled for determination of dry matter content and forage quality. Test sites were normally harvested when the average whole-plant moisture across entries was estimated to be 65%.

**Results Provided**

Tables 1-8 summarize hybrid yield and forage quality results from Rochester, Hutchinson and Waseca. Moisture content, whole-plant dry matter (DM) yield and silage yield at harvest moisture are listed. Hybrids are ranked in descending order of milk yield per acre (Milk Yield, lb./acre). Genetic trait information is supplied by companies entered in the hybrid corn silage performance trials.

Whole-plant forage quality traits tested include crude protein (CP), neutral detergent fiber (NDF), 48-hour neutral detergent fiber digestibility (NDFD) and starch concentration. With the exception of NDFD, all forage quality traits are expressed as a percent of dry matter. NDFD is expressed as a percent of NDF.

Milk production potential per ton (lb. milk/ton forage) and per acre (lb. milk/acre) of forage was calculated using the MILK2006 spreadsheet developed by the University of Wisconsin. MILK2006 approximates animal performance based on a standard cow.
weight and milk production level (1,350 lb. body weight and 90 lb./day at 3.8% fat).

Field values for moisture and DM yield at harvest; laboratory values for CP, NDF, NDFD, starch, oil and ash concentration; and book values for NDFCP (1.3%) were used for spreadsheet calculations. For MILK2006 predictions, we assumed that kernel processing occurred. Milk production (lb. milk / ton and lb. milk / acre) values can be used as a quick reference for relative comparison of hybrids within test locations.

How to Use Results

NDF is a negative indicator of forage intake potential; higher NDF concentration generally implies lower intake potential. NDFD estimates digestibility of the fiber fraction. Starch concentration is positively associated with digestibility because of its high digestibility. Relatively higher NDFD and/or starch concentrations generally imply greater animal performance potential. Milk yield per acre represents the combined effects of silage yield and quality.

Corn hybrids differed in yield, forage quality and milk production potential at all sites. Means and least significant difference (LSD) values at the 5% probability level are shown for each parameter. Where the difference between two hybrids for a particular yield or quality trait is greater than the LSD value, there is a 95% probability that there is a statistically significant difference between the two hybrids for that parameter (i.e., moisture, yield, quality concentration or milk production). A difference less than the LSD value probably is due to environmental factors.

Figures 1-4 summarize the relationship between silage dry matter yield and milk per ton for test sites at Rochester, Waseca and Hutchinson. The figures also highlight those entries at each site that have a combination of high silage dry matter yields and milk production per ton.

Project Leaders

Craig Sheaffer, Jacob Jungers, Thomas Hoverstad and Wade Ihlenfeld.

Table 1. Relative maturity (RM), whole-plant moisture (Moist), dry matter and silage yield and quality traits for SE early corn hybrids planted at Rochester, MN (Olmsted County) in 2018.

<table>
<thead>
<tr>
<th>No.</th>
<th>Company</th>
<th>Entry</th>
<th>Traits</th>
<th>DM Moist, %</th>
<th>Yield, Tons/Acre</th>
<th>Quality (concentration), %</th>
<th>Milk Yield</th>
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<tr>
<td></td>
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<td></td>
<td></td>
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</table>

1 Bt, CRW, GLY, LL and LI traits contain genes for European corn borer tolerance, corn rootworm tolerance, glyphosate herbicide tolerance, Liberty (glufosinate-ammonium) herbicide tolerance and leaf trait, respectively.

2 DM yield is whole-plant corn yield at 100% dry matter; Silage yield is whole-plant corn yield at harvest moisture.

3 Quality concentration expressed as a % of DM, except NDFD which is expressed as a % of NDF. Refer to Results Provided text for additional information.

4 Milk production was estimated using spreadsheet MILK2006 developed at the University of Wisconsin. Refer to Results Provided text for additional information.
### Table 2. Relative maturity (RM), whole-plant moisture (Moist), dry matter and silage yield and quality traits for SE late corn hybrids planted at Rochester, MN (Olmsted County) in 2018.

<table>
<thead>
<tr>
<th>No.</th>
<th>Company</th>
<th>Entry</th>
<th>Traits¹</th>
<th>RM</th>
<th>Moist, %</th>
<th>Yield, Tons/Acre²</th>
<th>Quality (concentration), %³</th>
<th>Milk Yield⁴</th>
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¹Bt, CRW, GLY, LL and LI traits contain genes for European corn borer tolerance, corn rootworm tolerance, glyphosate herbicide tolerance, Liberty (glufosinate-ammonium) herbicide tolerance and leafy trait, respectively.

²DM yield is whole-plant corn yield at 100% dry matter; Silage yield is whole-plant corn yield at harvest moisture.

³Quality concentration expressed as a % of DM, except NDFD which is expressed as a % of NDF. Refer to Results Provided text for additional information.

⁴Milk production was estimated using spreadsheet MILK2006 developed at the University of Wisconsin. Refer to Results Provided text for additional information.

Figure 1. Relationship between silage dry matter yield and milk per ton for SE early and late corn hybrids planted at Rochester, MN (Olmsted County) in 2018.
<table>
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| Mean | 54.6 | 11.1 | 24.6 | 43.3 | 39.8 | 42.7 | 2,584 | 28,599 |

| LSD 5% | 5.2 | 1.6 | 3.2 | 1.0 | 6.2 | 3.0 | 7.3 | 223 | 4,679 |

1 Bt, CRW, GLY, LL and Lf traits contain genes for European corn borer tolerance, corn rootworm tolerance, glyphosate herbicide tolerance, Liberty (glufosinate-ammonium) herbicide tolerance and leafy trait, respectively.

2 DM yield is whole-plant corn yield at 100% dry matter; Silage yield is whole-plant corn yield at harvest moisture.

3 Quality concentration expressed as a % of DM, except NDFD which is expressed as a % of NDF. Refer to Results Provided text for additional information.

4 Milk production was estimated using spreadsheet MILK2006 developed at the University of Wisconsin. Refer to Results Provided text for additional information.
Table 4. Relative maturity (RM), whole-plant moisture (Moist), dry matter and silage yield and quality traits for SE late corn hybrids planted at Waseca, MN (Waseca County) in 2018.

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<th>Traits</th>
<th>RM</th>
<th>Moist, %</th>
<th>Yield, Tons/Acre&lt;sup&gt;2&lt;/sup&gt;</th>
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Mean: 55.6 | 12.3 | 27.9 | 6.8 | 46.3 | 38.9 | 39.8 | 2,490 | 30,550 |

LSD 5%: 5.2 | 2.2 | 4.8 | 0.8 | 6.7 | 2.5 | 7.6 | 252 | 6,849 |

<sup>1</sup>Bt, CRW, GLY, LL and LI traits contain genes for European corn borer tolerance, corn rootworm tolerance, glyphosate herbicide tolerance, Liberty (glufosinate-ammonium) herbicide tolerance and leafy trait, respectively.

<sup>2</sup>DM yield is whole-plant corn yield at 100% dry matter; Silage yield is whole-plant corn yield at harvest moisture.

<sup>3</sup>Quality concentration expressed as a % of DM, except NDFD which is expressed as a % of NDF. Refer to Results Provided text for additional information.

<sup>4</sup>Milk production was estimated using spreadsheet MILK2006 developed at the University of Wisconsin. Refer to Results Provided text for additional information.

Figure 2. Relationship between silage dry matter yield and milk per ton for SE early and late corn hybrids planted at Waseca, MN (Waseca County) in 2018.
Table 5. Relative maturity (RM), whole-plant moisture (Moist), dry matter and silage yield and quality traits for Central early corn hybrids planted at Hutchinson, MN (McLeod County) in 2018.

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Mean

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1Bt, CRW, GLY, LL and Lf traits contain genes for European corn borer tolerance, corn rootworm tolerance, glyphosate herbicide tolerance, Liberty (glufosinate-ammonium) herbicide tolerance and leafy trait, respectively.
2DM yield is whole-plant corn yield at 100% dry matter; Silage yield is whole-plant corn yield at harvest moisture.
3Quality concentration expressed as a % of DM, except NDFD which is expressed as a % of NDF. Refer to Results Provided text for additional information.
4Milk production was estimated using spreadsheet MILK2006 developed at the University of Wisconsin. Refer to Results Provided text for additional information.
### Table 6. Relative maturity (RM), whole-plant moisture (Moist), dry matter and silage yield and quality traits for Central late corn hybrids planted at Hutchinson, MN (McLeod County) in 2018.

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1Bt, CRW, GLY, LL and Lf traits contain genes for European corn borer tolerance, corn rootworm tolerance, glyphosate herbicide tolerance, Liberty (glufosinate-ammonium) herbicide tolerance and leafy trait, respectively.

2DM yield is whole-plant corn yield at 100% dry matter; Silage yield is whole-plant corn yield at harvest moisture.

3Quality concentration expressed as a % of DM, except NDFD which is expressed as a % of NDF. Refer to Results Provided text for additional information.

4Milk production was estimated using spreadsheet MILK2006 developed at the University of Wisconsin. Refer to Results Provided text for additional information.

Figure 3. Relationship between silage dry matter yield and milk per ton for Central early and late corn hybrids planted at Hutchinson, MN (McLeod County) in 2018.
Table 7. Relative maturity (RM), whole-plant moisture (Moist), dry matter and silage yield and quality traits for Central early corn hybrids planted at Waseca, MN (Waseca County) in 2018.

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| LSD 5% | 3.9 | 1.4 | 2.9 | 0.9 | 5.4 | 2.6 | 6.2 | 187.8 | 4,668 |

1Bt, CRW, GLY LL, and LF traits contain genes for European corn borer tolerance, corn rootworm tolerance, glyphosate herbicide tolerance, Liberty (glufosinate-ammonium) herbicide tolerance and leafy trait, respectively.  
2DM yield is whole-plant corn yield at 100% dry matter; Silage yield is whole-plant corn yield at harvest moisture.  
3Quality concentration expressed as a % of DM, except NDFD which is expressed as a % of NDF. Refer to Results Provided text for additional information.  
4Milk production was estimated using spreadsheet MILK2006 developed at the University of Wisconsin. Refer to Results Provided text for additional information.
Table 8. Relative maturity (RM), whole-plant moisture (Moist), dry matter and silage yield and quality traits for Central late corn hybrids planted at Waseca, MN (Waseca County) in 2018.

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<th>Traits</th>
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<th>Moist, %</th>
<th>DM</th>
<th>Silage</th>
<th>CP</th>
<th>NDF</th>
<th>NDF Starch</th>
<th>Starch</th>
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<th>lb/Acre</th>
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Mean | 54.3 | 11.8 | 26.0 | 6.9 | 46.1 | 38.4 | 40.5 | 2,459 | 29,036 |
LSD 5% | 3.9 | 1.7 | 3.9 | 1.0 | 7.3 | 3.4 | 7.9 | 280.2 | 5,799 |

1Bt, CRW, GLY, LL and LF traits contain genes for European corn borer tolerance, corn rootworm tolerance, glyphosate herbicide tolerance, Liberty (glufosinate-ammonium) herbicide tolerance and leafy trait, respectively.

2DM yield is whole-plant corn yield at 100% dry matter; Silage yield is whole-plant corn yield at harvest moisture.

3Quality concentration expressed as a % of DM, except NDFD which is expressed as a % of NDF. Refer to Results Provided text for additional information.

4Milk production was estimated using spreadsheet MILK2006 developed at the University of Wisconsin. Refer to Results Provided text for additional information.

Figure 4. Relationship between silage dry matter yield and milk per ton for Central early and late corn hybrids planted at Waseca, MN (Waseca County) in 2018.