

## Using MILK2000 to Estimate Corn Hybrid Silage Performance

by Joe Lauer, Jim Coors, and Randy Shaver

### Introduction

Beginning with the 2000 Wisconsin Corn Hybrid Performance Trial, ranking of corn hybrid quality was estimated using MILK2000. In the corn silage hybrid trials, samples were analyzed using near infrared spectroscopy (NIR) equations derived from previous work of Jim Coors and Joe Lauer at UW-Madison. Plot samples were dried, ground and analyzed for crude protein (CP), acid detergent fiber (ADF), neutral detergent fiber (NDF), *in vitro* cell wall digestibility (CWD), *in vitro* digestibility (IVD), and starch content. Using these values and silage yield data, the MILK2000 spreadsheet was used to calculate corn silage performance indices (milk/ton and milk/ac). An example of the results is presented in Table 1 and Figure 1.

### How does MILK2000 differ from previous models?

Previously, MILK90 (Undersander et. al., 1993) and MILK95 were used to estimate silage dry matter intake (DMI) of a lactating dairy cow using neutral detergent fiber (NDF). These equations also estimated net energy for lactation ( $NE_L$ , Mcal/lb) using acid detergent fiber (ADF) or *in vitro* true digestibility (IVTD).

MILK2000 estimates silage DMI using NDF and cell wall digestibility (CWD). For the corn silage hybrid trials the base DMI is adjusted by 0.374 lbs per 1% unit change in CWD above or below the average CWD of the trial. MILK2000 also accounts for the effects of whole-plant DM content and kernel processing on starch digestibility.

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### How does MILK2000 calculate corn silage performance?

MILK2000 silage performance indices (milk/ton and milk/ac) are calculated using an adaptation of the MILK95 model (Schwab and Shaver, Dairy Science Dep., UW-Madison). In MILK2000, the energy content ( $NE_L$ ) of corn silage is estimated using a modification of a published summative energy equation (Weiss et. al., 1992). In the modified equation, CP, NDF, fat, starch, and sugar plus organic acid fractions are included along with their corresponding total-tract digestibility coefficients for estimating the energy content of corn silage.

Total tract starch digestibility is predicted from whole-plant DM content using a regression equation developed from previously published data. The NDF digestibility coefficient is based on a laboratory measurement of CWD. Digestibility coefficients constants are used for the CP, fat, and sugar plus organic acid fractions. Dry matter intake is estimated using lab values for NDF and CWD and assuming a 1350 lb cow consuming a 30% NDF diet. Using National Research Council (NRC, 1989) energy requirements, the intake of energy from corn silage is converted to expected milk per ton.

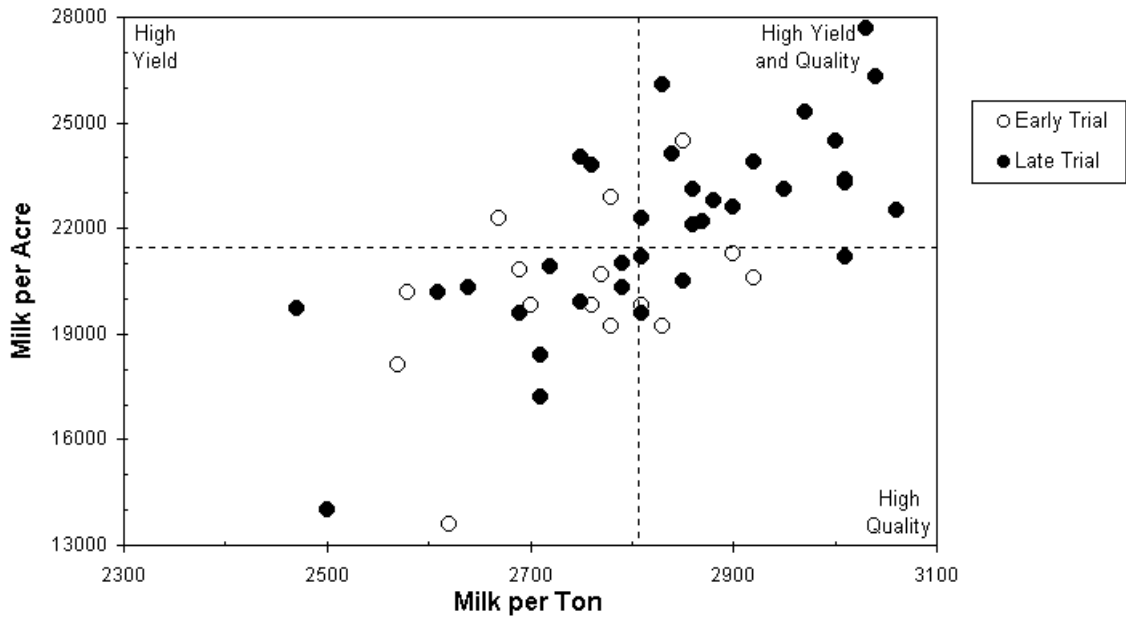
Because a dairy cow's maintenance energy requirements are partitioned against the total diet in MILK2000 rather than against only corn silage as was done in MILK95, there is a base increase in our estimate of milk/ton. This is of equal value for all hybrids and did not influence hybrid rank. Milk per acre was calculated using milk/ton and dry matter yield per acre.

A MILK2000 spreadsheet can be obtained at <http://www.wisc.edu/dysci>

**Table 1.** An example of the results from the UW Corn Silage Performance Trials for the North Central Zone - Early Maturity Silage Trial 2000.

BRAND	HYBRID	Kernel									-	
		Yield T/A	Moist %	Milk %	CP %	ADF %	NDF %	IVD %	CWD %	Starch %	MILK PER TON	ACRE
Trelay	2008	8.3 *	55.3	30	7.0	25	52	72	46	28	2670	22300 *
Carhart's Blue Top	CX8500A	7.4	58.7	50	7.3	24	49	73	46	29	2770 *	20700
NK Brand	N27-M3	7.0	59.2	30	7.1	24	48	74	45	31	2810 *	19800
Pioneer	39D81	5.2	59.6	10	7.1	26	53	71	45	26	2620	13600
Renk	RK394	7.8 *	59.6	30	7.0	28	55	70	46	24	2580	20200
Dairyland	Stealth 1280	7.7 *	59.9	30	7.1	25	52	72	45	28	2690	20800
85-DAY HYBRID TRIAL AVERAGE##			60.3									
LG Seeds	LG2367	7.3	60.4	30	6.9	26	53	72	47	27	2700	19800
Carhart's Blue Top	CX290A	7.4	60.6	40	7.2	22	46	75	45	34	2900 *	21300
Dairyland	Stealth 1289	7.0	60.7	20	8.1	28	55	70	46	24	2570	18100
Brown	2080	6.8	61.3	40	7.0	23	48	74	45	31	2830 *	19200
Carhart's Blue Top	CX1187A	6.9	61.4	30	7.2	25	51	73	46	29	2780 *	19200
90-DAY HYBRID TRIAL AVERAGE##			62.9									
Dekalb	DKC39-45	7.1	63.8	40	6.8	23	47	74	45	31	2920 *	20600
NK Brand	N2555BT	7.1	64.2	40	7.4	26	51	72	45	27	2760 *	19800
Ramy Seed	PG1455	8.6 *	64.6	60	7.3	25	50	73	46	28	2850 *	24500 *
Golden Harvest	H6675	8.2 *	66.4	40	7.7	25	50	72	44	26	2780 *	22900 *
MEAN		7.3	61.1	40	7.2	25	51	72	46	28	2750	20200
LSD(0.10)**		0.9	3.9	10	0.5	3	4	3	1	4	200	3100

**Figure 1.** Relationship between Milk per Acre and Milk per Ton for corn hybrids in the North Central Zone during 2000.



## References

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