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Corn Silage Performance, 2004; Cache County, Utah

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This report summarizes on-farm performance of irrigated silage corn hybrids in Cache County in 2004. The site is at 4480 ft elevation and has a long-term average of 2696 corn growing degree days (GDD, 50/86° F) per year. Hybrids from breeding programs and seed marketers were seeded with a farm planter on May 14 at a target rate of 36,000 seeds/ac. Pivot-irrigated plots were six rows wide at 30-in row spacing by 750 ft long in three randomized complete blocks. Nutrient and pesticide applications are indicated in Table 1. Previous crops were corn in 2003 and alfalfa in 2002. Soil fertility levels were within recommended ranges with possible exceptions of low zinc (0.4 ppm), iron (3 ppm), and sulfur (5 ppm SO_4-S).

Hybrids had relative maturity (RM) ratings of 103-116 days and included some with Roundup Ready®, Bt, and LibertyLink® traits. Plots were harvested with a silage chopper equipped with kernel processor on October 5-6 to target whole-plant moisture concentrations of 65-70%. Weights were obtained with a dump wagon equipped with load cells. Samples were dried at 55º C (131º F) for forage quality analyses and 105º C (221º F) for dry matter (DM) determination. Plot weights were expressed as tons/ac of oven-dry and 70%-moisture silage. Forage crude protein (CP), neutral detergent fiber (NDF), in vitro true DM digestibility (IVTDMD), neutral detergent fiber digestibility (NDFD), and starch levels were determined via

near-infrared reflectance spectroscopy (NIRS). The University of Wisconsin MILK2000 spreadsheet (www.wisc.edu/dysci/uwex/nutritn/nutritn.htm) was used to calculate energy and potential milk production levels from forage quality constituents for three replicates of each hybrid.

Hybrids ranked in decreasing order of forage production and quality (Tables 1-2) may be compared in terms of the least significant difference (LSD). This is the minimum difference required between entries in a column for significance at a given level of confidence. Values of LSD are shown for 5 and 30% probabilities that observed differences among entries are merely due to chance, rather than to variety effects. For example, in Table 1, DM yields of the top 10 hybrids are not different at the 5% probability level, because they vary by

less than the LSD of 0.50 ton/ac. Yields of the first- and eleventh-ranked hybrids are different at the 5% level because they vary by at least the LSD. At 30% probability that yield variations are due to chance, smaller differences become significant. The coefficient of variation (CV) describes the extent of variability among replications of the same hybrid; values below 10% suggest good precision for detecting entry differences.

Forage production at 70% moisture differed by 3.6 tons/ac among hybrids (Table 1). Differences were not strongly associated with varying population densities and RM ratings. Hybrids with longer RM ratings tended to be wettest at harvest. In some cases, harvest moisture concentrations exceeded 70%, which can lead to energy loss via seepage of soluble dry matter and impaired silage fermentation. Moisture concentrations were otherwise appropriate for excellent silage fermentation. Excessive moisture at harvest can be avoided by selecting hybrids that perform well at shorter RM ratings and permit adequate grain filling and field drying prior to harvest.

Although CP and NDF did not differ significantly among hybrids (Table 2), rankings for other quality traits were different than those for forage production. Hybrids that were highest-ranked for TDN had some combination of low NDF, high NDF digestibility, and high starch, which all contribute to energy density. Hybrids that were highest-ranked for potential milk production/ac tended to be those with highest forage production rankings, but they were not necessarily those with highest quality rankings. Differences in rankings for DM production and nutritional value point to the need to clearly define end-use requirements that hybrids should fulfill.

Table 1. 2004 silage corn production at Wellsville (Cache Co.), UT (Utah State University).
Planted May 14, harvested Oct. 5-6. Elevation 4480 ft, 2696 corn GDD, Greenson loam. Applications: 194 lb N/ac; Dual® and atrazine herbicides; and Lorsban™ granular insecticide at planting. Previous crop: corn.

Brand	Hybrid	Relative maturity	Population density	Silage moisture	Silage yield	
					DM (105 C)	70% moist.
		days	plants/ac	% fresh wt.	ton/ac	
DEKALB	DKC64-07 (YGRW)	114	36061	72.7	8.46	28.20
Asgrow	RX715RR2	111	37656	69.8	8.41	28.02
Grand Valley	SX1450	116	37337	71.2	8.37	27.90
Asgrow	RX752YG (CB)	112	36699	69.0	8.24	27.48
Hyland	HL S072	107	36061	71.7	8.20	27.34
Grand Valley	SX2248RR	105	38614	68.7	8.19	27.29
HYTEST	TNT-106RR	105	37656	71.2	8.06	26.86
DEKALB	DKC61-50	111	38295	70.4	8.04	26.79
DEKALB	DKC61-45 (RR2/YGCB)	111	36699	72.4	8.01	26.71
Grand Valley	SX8709	109	37337	71.3	8.00	26.67
HYTEST	HT7710Bt/LL	111	39252	71.9	7.93	26.43
Grand Valley	SX1445	115	38295	72.3	7.82	26.05
Grand Valley	SX8703RR	103	35742	68.6	7.71	25.71
Helena/Dahlco	X3101	110	37656	68.8	7.42	24.75
Helena/Dahlco	X3106	106	32550	68.4	7.39	24.62
Mean		**110**	**37061**	**70.6**	**8.02**	**26.72**
Significance of F test (P)			0.02	<0.01	<0.01	<0.01
LSD (0.05)			2926	1.3	0.50	1.66
LSD (0.30)			1509	0.7	0.26	0.85
CV (%)			4.7	1.1	3.7	3.7

Table 2. 2004 silage corn forage quality at Wellsville, UT, ranked by TDN.

						MILK2000 outputs[b]			
				NDFD[a]		TDN, 1x	NEL, 3x	Milk per	
Brand	**Hybrid**	**CP**	**NDF**	**48 hr**	**Starch**	**mtnce.**	**mtnce.**	**Ton DM**	**ac**
		% DM		% NDF	% DM		Mcal/lb	lb	
Helena/Dahlco	X3106	8.4	46.7	59.3	26.4	69.3	0.72	3412	25210
Helena/Dahlco	X3101	8.0	44.9	56.2	30.4	68.7	0.71	3343	24825
Asgrow	RX715RR2	8.3	46.1	57.1	26.9	68.6	0.71	3338	28074
DEKALB	DKC61-50	8.1	47.5	57.5	26.1	68.1	0.71	3312	26611
DEKALB	DKC61-45 (RR2/YGCB)	8.4	46.1	56.1	25.2	68.1	0.70	3294	26414
DEKALB	DKC64-07 (YGRW)	8.5	49.5	58.6	23.5	67.9	0.70	3299	27909
HYTEST	TNT-106RR	8.2	49.7	58.7	20.9	67.8	0.70	3295	26561
Grand Valley	SX1450	8.4	48.4	57.5	24.9	67.8	0.70	3284	27482
Asgrow	RX752YG (CB)	8.0	49.3	58.0	23.5	67.7	0.70	3280	27069
HYTEST	HT7710Bt/LL	8.4	45.7	54.6	27.3	67.6	0.70	3249	25728
Grand Valley	SX1445	8.7	48.8	57.4	22.5	67.5	0.70	3265	25510
Grand Valley	SX2248RR	8.6	46.9	55.3	27.9	67.4	0.70	3237	26503
Grand Valley	SX8709	8.6	48.4	55.3	24.1	66.7	0.69	3189	25535
Hyland	HL S072	8.6	50.5	57.0	19.7	66.5	0.69	3187	26149
Grand Valley	SX8703RR	8.6	50.0	54.7	23.1	65.7	0.68	3111	24000
Mean		**8.4**	**47.9**	**56.9**	**24.8**	**67.7**	**0.70**	**3273**	**26239**
Significance of F test (P)		0.28[c]	0.14	<0.01	0.01	0.08	0.08	0.05	0.03
LSD (0.05)		NS[c]	NS	2.2	4.9	1.9	0.02	148	2142
LSD (0.30)		NS	NS	1.1	2.5	1.0	0.01	76	1104
CV (%)		4.3	5.0	2.3	11.9	1.7	1.9	2.7	4.9

[a]NDFD=neutral detergent fiber digestibility in rumen fluid, expressed as a percentage of fiber.
[b]TDN=Total Digestible Nutrients at 1x maintenance level of intake; NEL=net energy for lactation at 3x maintenance intake (DM basis). Both are calculated from summation of digestibilities of individual constituents.
[c]No significant differences among hybrids.