



Key Management Practices That Make Corn Forage Production Profitable

- 1) Hybrid selection
- 2) Proper timing of harvest
- 3) Remembering that a trade-off exists between yield and quality for management decisions
- 4) Cutting height
- 5) Slightly higher plant populations than what is normally used for grain production
- 6) Early planting date
- 7) Adequate soil fertility – predicted by soil sampling
- 8) Narrower row spacing increases yield
- 9) Pest control
- 10) Crop rotation



What Do We Want in Grain versus Forage Hybrids?

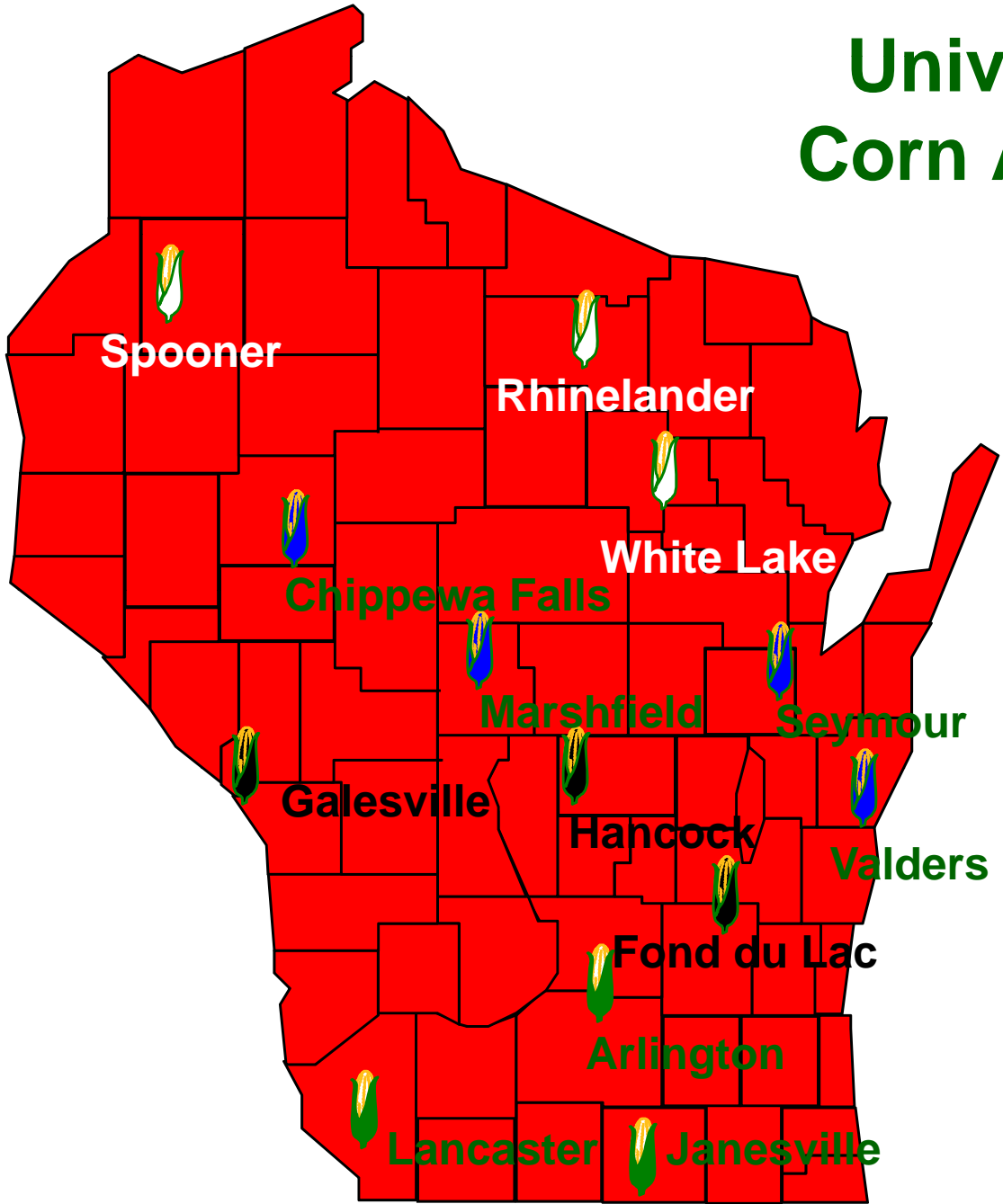
Trait	Grain	Forage
Grain yield	High	Adequate
Forage yield	Adequate	High
Hybrid range	60 bu/A	8,000 lb Milk/A
Stalks	Standability	Digestibility
Leaves	Unknown	Digestibility
Kernel hardness	Hard	Soft
Plant drydown	“Stay-green”	Synchronous
Plant maturity	“Full-season”	5-10 d longer



Desirable Forage Characteristics

- What makes a good forage? (Carter et al., 1991)
 - ✓ High yield
 - ✓ High energy (high digestibility)
 - ✓ High intake potential (low fiber)
 - ✓ High protein
 - ✓ Proper moisture at harvest for storage
- Ultimate test is animal performance
 - ✓ Milk2000 is our best predictor for performance (Schwab - Shaver equation)

University of Wisconsin Corn Agronomy Program





2002 Wisconsin Corn Performance Trials Silage Summary

Location	<u>1992-2001</u>		<u>2002</u>		Percent change
	N	Yield	N	Yield	
Arlington	438	9.4	56	8.8	-7
Lancaster	386	7.8	56	8.6	10
Fond du Lac	352	8.6	65	8.7	1
Galesville	352	8.3	65	9.8	18
Chippewa Falls	4	7.3	53	8.0	8
Marshfield	408	6.8	53	8.0	18
Valders	387	6.7	53	5.5	-18
Rhineland			17	7.0	
Spooner			34	8.3	



2002 Wisconsin Corn Hybrid Performance Trial Results

Table 13. South Central Zone - Early Maturity Silage Trial.

100 DAY RELATIVE MATURITY OR EARLIER, BASED ON COMPANY RATING (FOND DU LAC = FON, GALESVILLE = GAL)

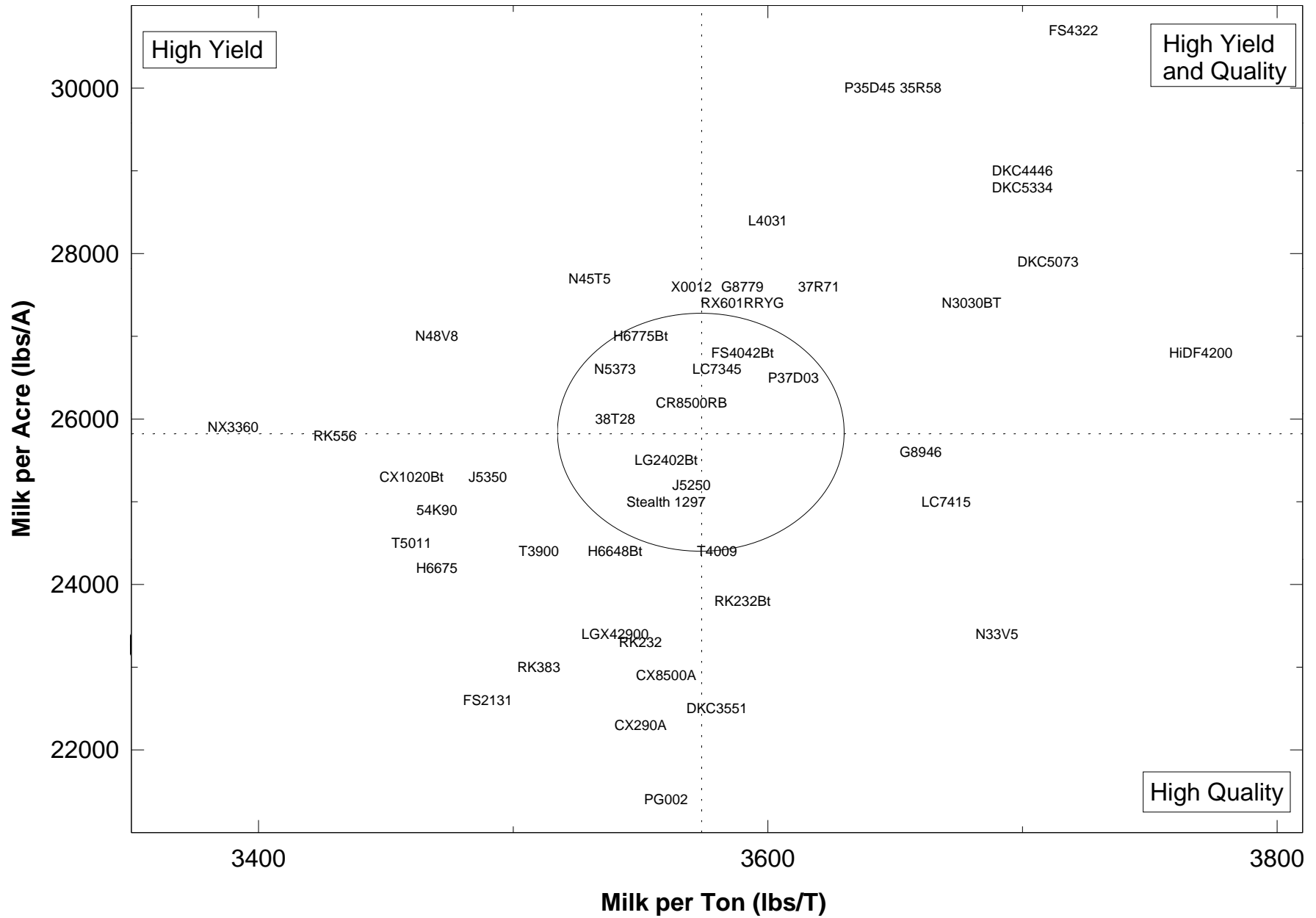
BRAND	HYBRID	2002											2001				2 Year Average Yield T/A				
		AVERAGE											AVERAGE								
		Yield T/A	MILK PER TON	ACRE	Moist %	Kernel Milk %	CP %	ADF %	NDF %	IVD %	NDFD %	Starch %	FON Yield T/A	GAL Yield T/A	Yield T/A	MILK PER TON		ACRE	FON Yield T/A	GAL Yield T/A	
Dekalb	DKC4446	8.8	3380	30000	48.1	20	6.6	25	49	82	63	37	7.5	10.2 *							
Golden Harvest	H2387	8.9	3440	30900 *	54.7	20	7.5	23	46	82	62	37	7.3	10.5 *							
Dairyland	HiDF3300	8.9	3440	30800 *	55.7	20	7.2	24	46	83	62	37	8.0	9.8 *							
Golden Harvest	H6775Bt	8.8	3350	29800	57.0	20	7.2	25	47	81	60	35	7.5	10.1 *							
100-DAY HYBRID TRIAL AVERAGE##					58.7																
Growmark	FS4042Bt	9.7 *	3400	33100 *	58.9	30	7.0	25	47	82	61	37	9.3 *	10.2 *							
La Crosse Forage	LC7415	8.8	3380	29900	59.2	40	7.6	25	47	81	60	35	8.3	9.3	8.1	2870 *	23400	7.7	8.5	8.5	
Garst	8779	9.2	3430	31600 *	59.3	30	6.9	25	47	82	61	36	8.3	10.0 *	9.0	2770	24900	7.7	10.2	9.1	
Battleground	3195	7.8	3370	26500	59.4	30	7.3	25	48	81	61	34	7.1	8.6							
LG Seeds	LG2488	8.6	3320	28700	61.5	30	7.4	26	50	80	60	32	7.8	9.4							
Dekalb	DKC5073	8.7	3340	29000	62.0	40	7.1	25	47	81	59	35	8.5	8.9							
NK Brand	N48V8	10.7 *	3380	36100 *	63.2	40	7.1	28	52	80	62	27	10.2 *	11.1 *	10.6 *	2720	29000 *	9.7 *	11.6 *	10.7 *	
Battleground	3203	8.9	3330	29700	63.9	50	7.4	27	50	80	60	32	8.9	8.9							
MEAN		9.0	3380	30500	58.6	30	7.2	25	48	81	61	34	8.2	9.8	8.9	2720	24100	8.0	9.7	9.4	
LSD(0.10)**		1.2	NS	5800	5.2	10	0.5	3	5	2	2	5	1.0	1.4	0.7	130	2700	1.0	1.1	0.6	

Average whole plant moisture of all hybrids in the trial as rated by the Minnesota Relative Maturity Rating System. Ratings are rounded to 5 day increments.

* Hybrids that performed statistically similar to the highest hybrid in the trial.

Shaded results provide the best estimate of relative hybrid performance.

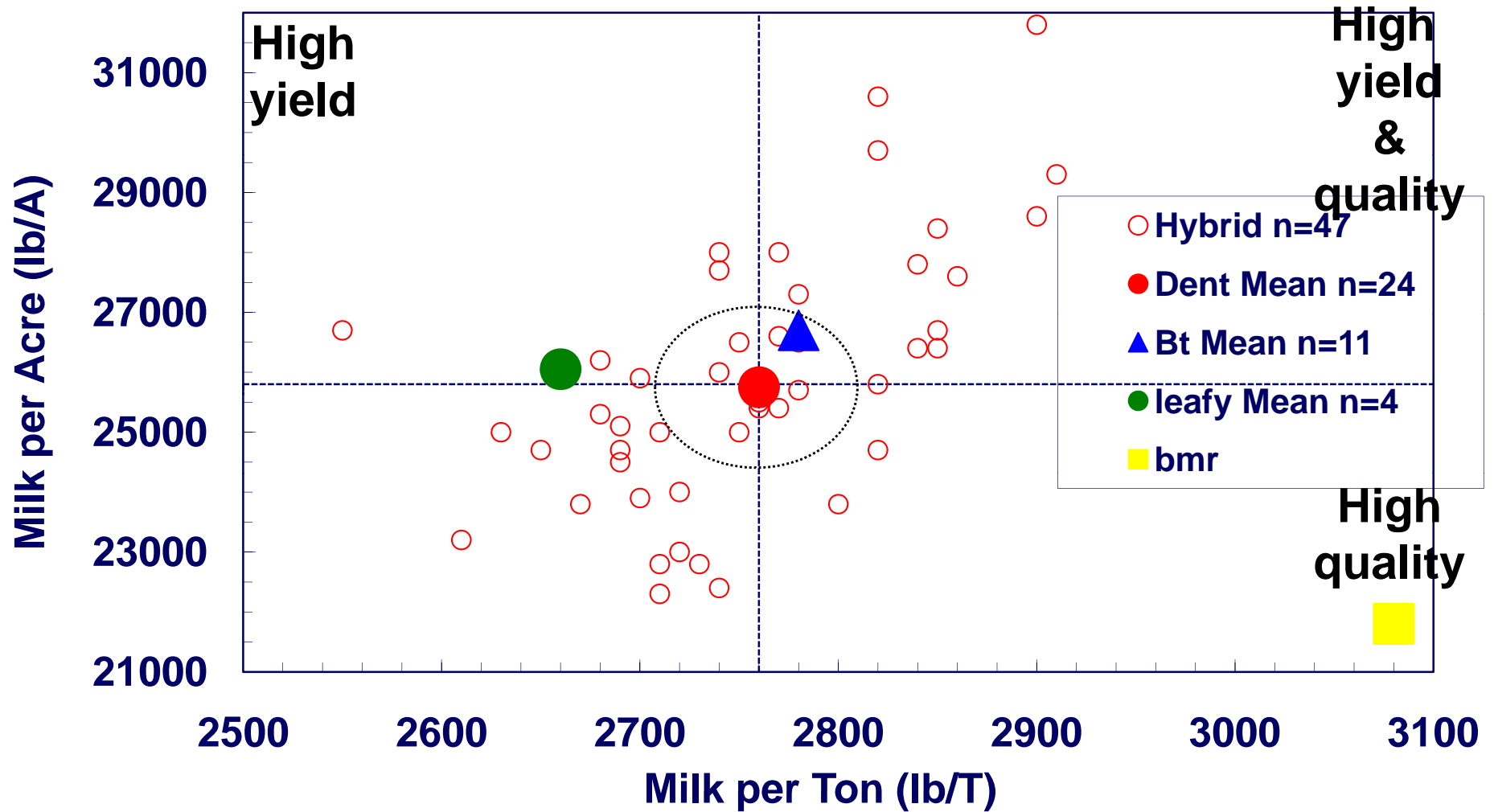
Relationship between Milk per Acre and Milk per Ton of corn hybrids in the North Central Zone during 2002.





2001 Wisconsin Corn Hybrid Performance Trial Results

Table 12. Southern Zone, Late Maturity Trial at Arlington and Lancaster





2002 Wisconsin Corn Performance Trials Silage Summary

Location	<u>1992-2001</u>		<u>2002</u>		Percent change
	N	Yield	N	Yield	
Arlington	438	9.4	56	8.8	-7
Lancaster	386	7.8	56	8.6	10
Fond du Lac	352	8.6	65	8.7	1
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Valders	387	6.7	53	5.5	-18
Rhineland			17	7.0	
Spooner			34	8.3	



Top 10 Corn Silage Hybrids in the Southern Production Zones during 2002

Hybrid	Yield	Hybrid	Yield
<u>Southern zone</u>	T/A	<u>South central zone</u>	T/A
Pioneer 34M95 *	10.7	Pioneer 34M95 *	11.0
Cornelius C590YG	10.3	NK Brand N48V8 *	10.6
Golden Harvest H8662Bt	10.0	Carharts Blue Top CX1020B *	10.5
Spangler LFT61	9.9	Pioneer 35R58 *	10.4
High Cycle HC540	9.9	Garst 8523IT	10.3
NK Brand N65Y3	9.9	Lemke 6068Bt	10.2
NK Brand N48V8	9.8	Dahlco 2660	10.2
Spangler 7558G	9.8	Trelay 7095	10.2
Growmark FS6533Bt	9.7	NK Brand N59Q9	10.2
Asgrow RX708YG	9.5	Brunner S6408Bt	10.2



Top 10 Corn Silage Hybrids in the Northern Production Zones during 2002

Hybrid	Yield	Hybrid	Yield
<u>North central zone</u>	T/A	<u>Northern zone</u>	T/A
Pioneer 35R58	8.4	Pioneer 38T28	9.0
Growmark FS4322	8.3	Pioneer 37D03	8.7
Pioneer 35D45	8.3	Carharts Blue Top CX8500A	8.3
Lemke 4031	7.9	Pioneer 37R71	8.3
Dekalb DKC4446	7.9	Geertson GS961	8.3
NK Brand N45T5	7.8	Kaltenberg K2727Bt	8.1
NK Brand N48V8	7.8	Ragt Semences RH0027	8.0
Dekalb DKC5334	7.8	Carharts Blue Top CR8500R	8.0
Dahlco X0012	7.7	Golden Harvest H6355	7.8
NK Brand NX3360	7.7	NK Brand N2555BT	7.8



<http://corn.agronomy.wisc.edu/>

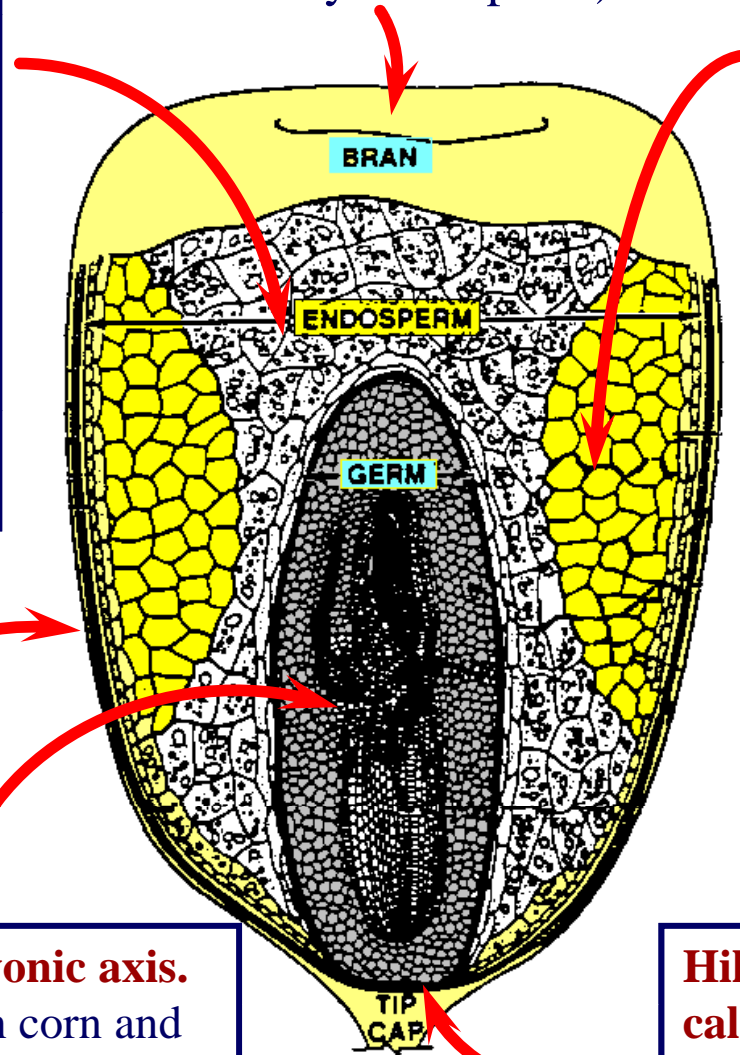
Dent (due to soft
floury endosperm)

Floury endosperm.

- ✓ More “open” in structure yet opaque in appearance.
- ✓ Dent corn has about equal proportions of horny to floury starch (vs popcorn w/ mostly vitreous starch).

Vitreous endosperm.

- ✓ Also called horneous, corneous or hard endosperm.
- ✓ Primary starch in flint corn.
- ✓ Source of dry milling grits.
- ✓ Tightly compacted and translucent.
- ✓ Higher in CP than floury starch.
- ✓ More of this starch in mature, high test weight kernels.
- ✓ The last starch laid down in the kernel during the last few weeks of development.



Pericarp(bran)

Germ scutellum and embryonic axis.

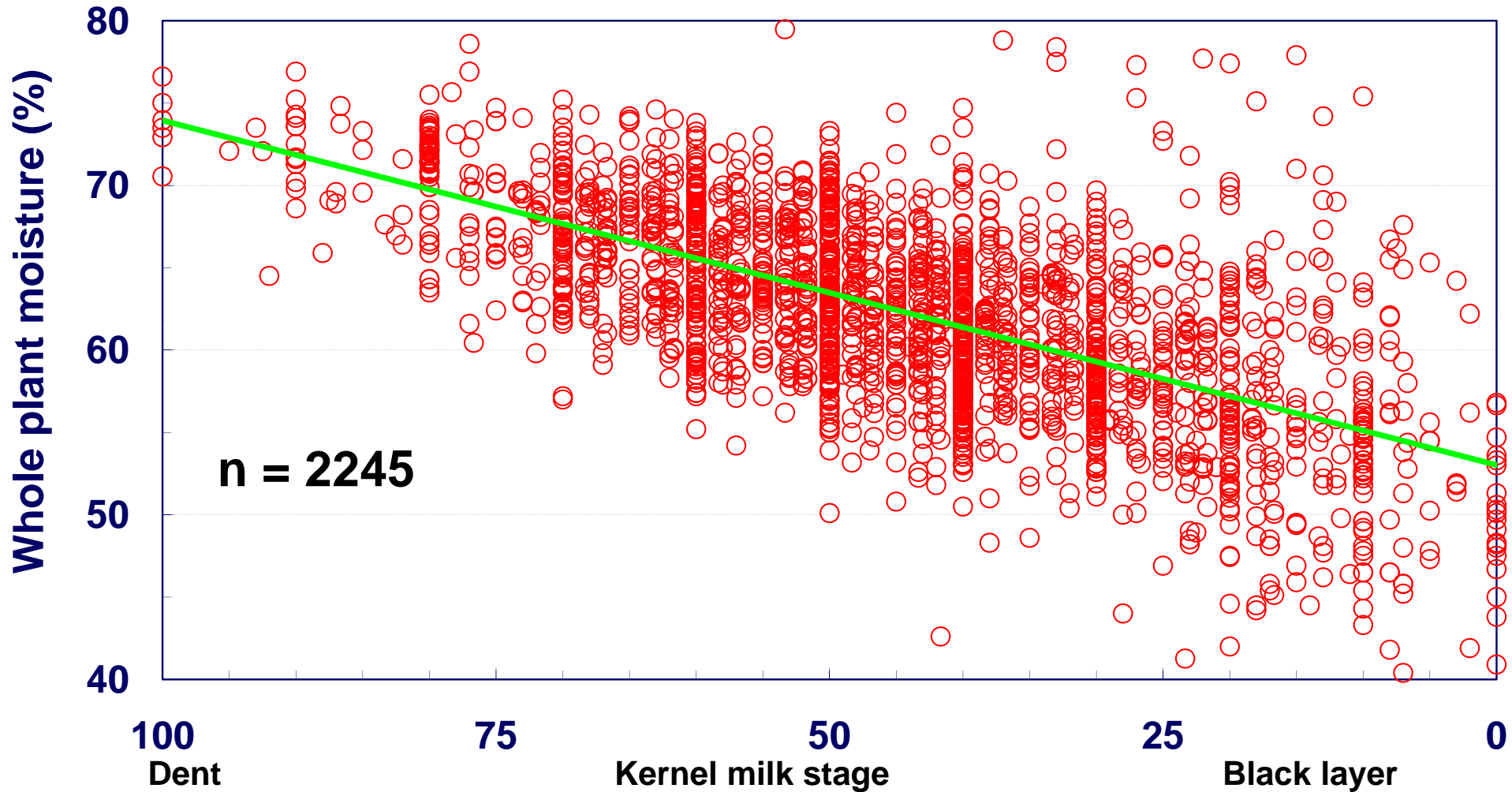
- ✓ Germ larger in short season corn and in HOC (at the expense of starch).
- ✓ In HOC, each 1% unit increase in oil, expect 1.3% unit lower starch.

Hilum or abscission layer. Also called black layer.

- ✓ Caused by collapse and compression of several layers of cells at physiological maturity.
- ✓ Cool weather can cause premature BL.

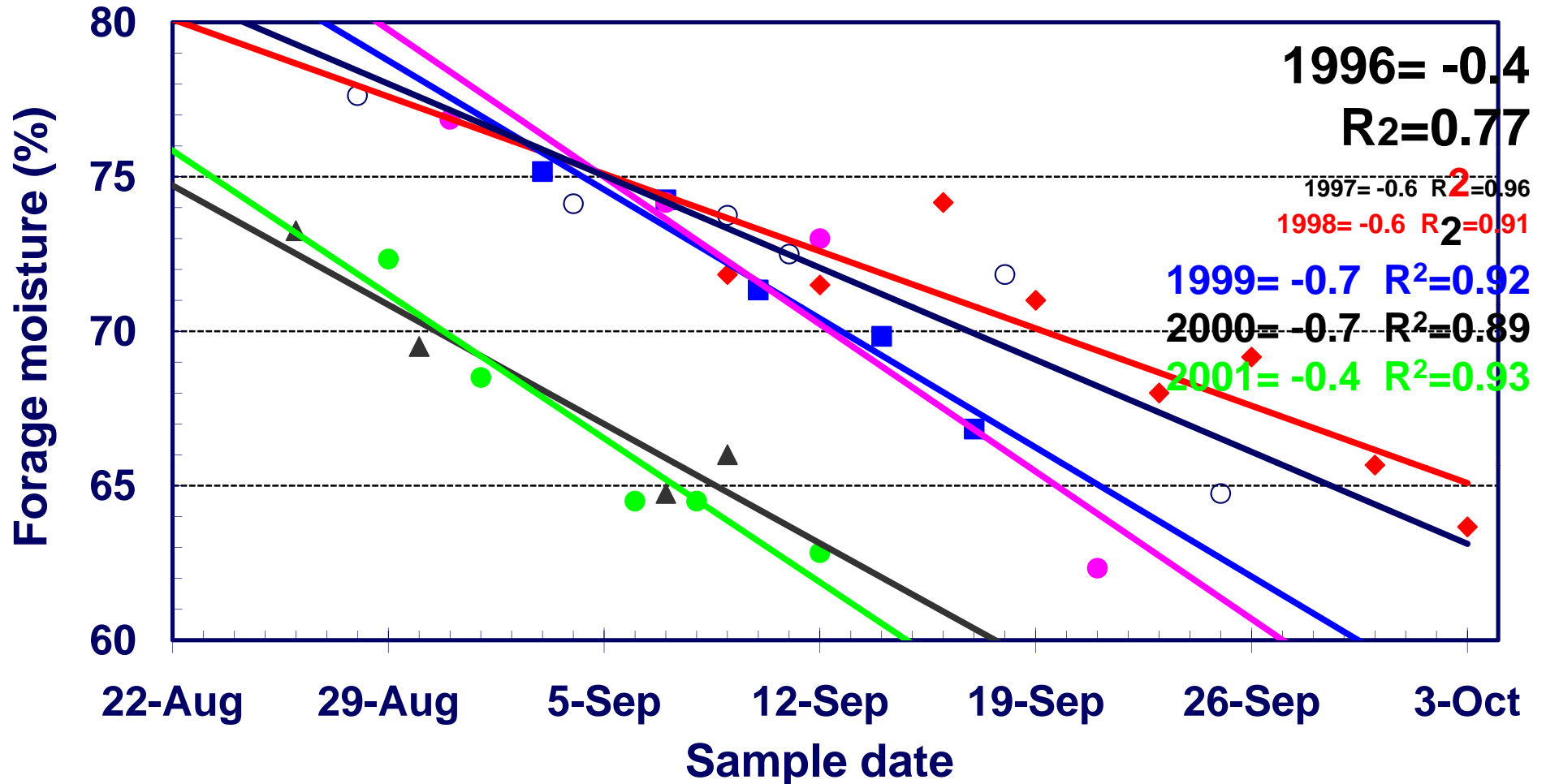


Relationship Between Forage Moisture and Kernel Milk Stage (1990 - 2000)





Corn Silage Drydown Rate in Manitowoc County, WI.





Kernel Milk Stage “Triggers” for Timing Silage Harvest

Silo structure	Ideal moisture content	Kernel milk stage "trigger"
	%	%
Horizontal bunker	70 to 65	80
Bag	70 to 60	80
Upright concrete stave	65 to 60	60
Upright oxygen limiting	60 to 50	40

"trigger": kernel milk stage to begin checking silage moisture
Silage moisture decreases at an average rate of 0.5% per day during September

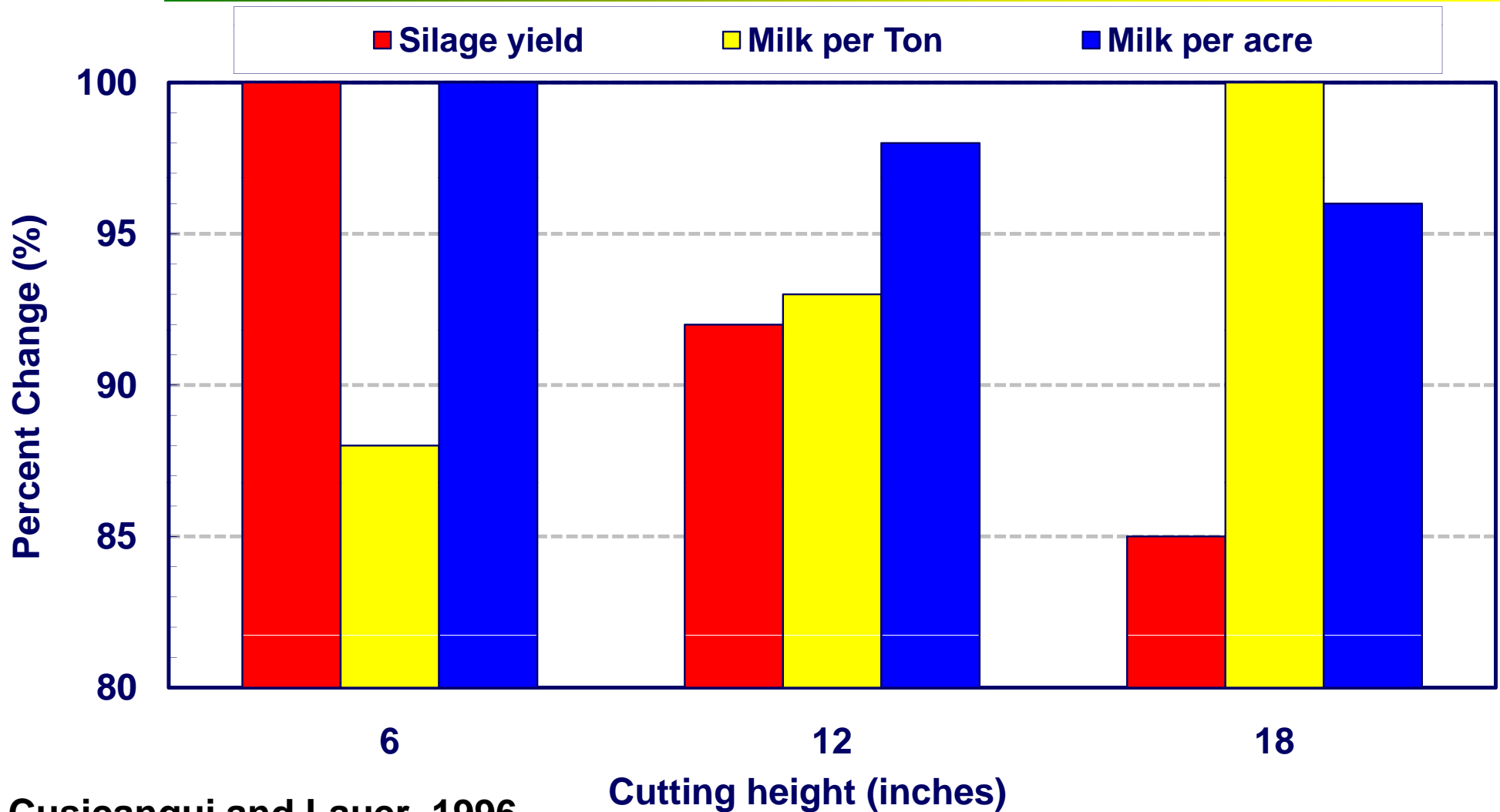


In-season Guidelines for Predicting Corn Silage Harvest Date

- Note hybrid maturity and planting date of fields intended for silage.
- Note tasseling (silking) date.
 - ✓ Kernels will be at 50% kernel milk (R5.5) about 42 to 47 days after silking.
- After milkline moves, use kernel milk triggers to time corn silage harvest.
 - ✓ Use a drydown rate of 0.5% per day to predict date when field will be ready for the storage structure.
 - ✓ See <http://cf.uwex.edu/ces/ag/silagedrydown/>
- Do final check prior to chopping.



Relative change in silage yield & quality at different cutting heights during 1996



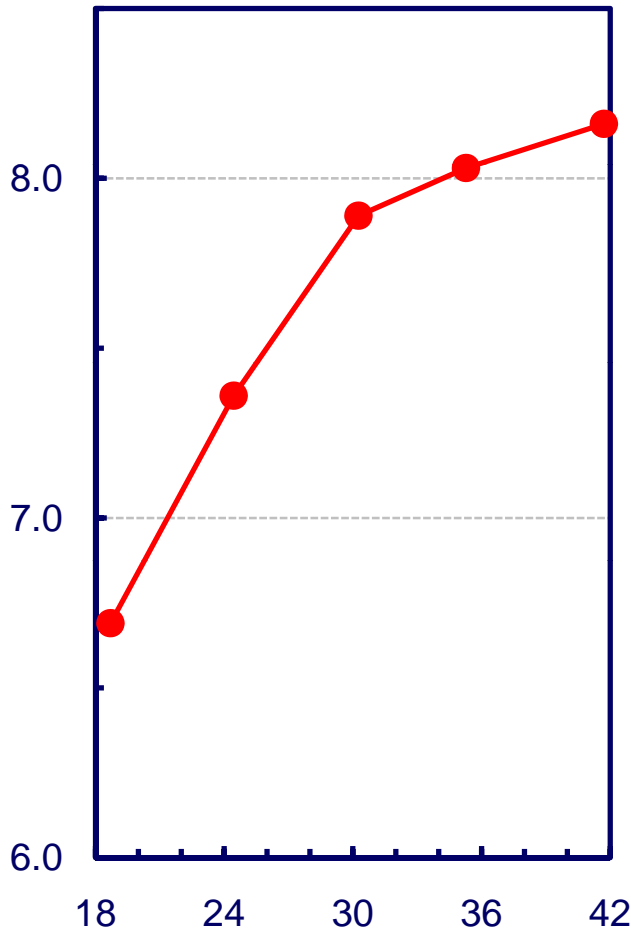
Cusicanqui and Lauer, 1996



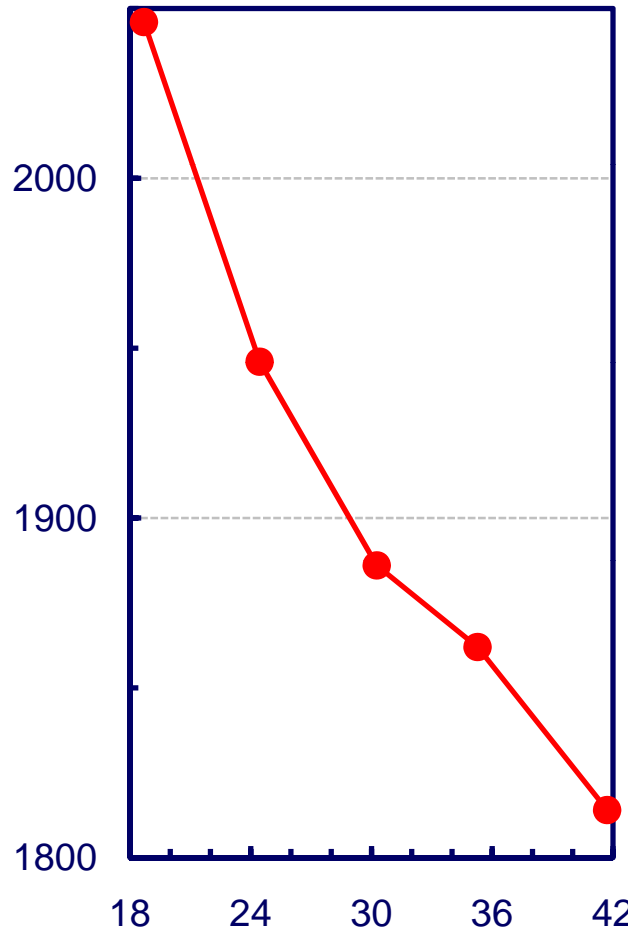
Relationship between corn silage yield, Milk per ton, Milk per acre and plant density in Wisconsin

Average of six locations 1994-1996

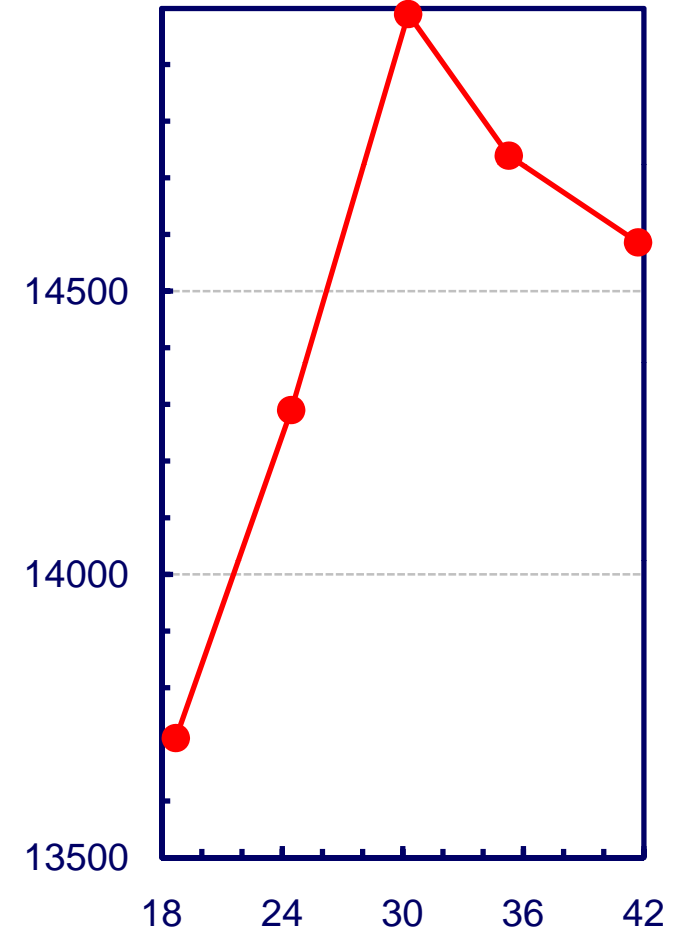
Silage Yield (T/A)



Milk per Ton (lb/T)



Milk per Acre (lb/A)

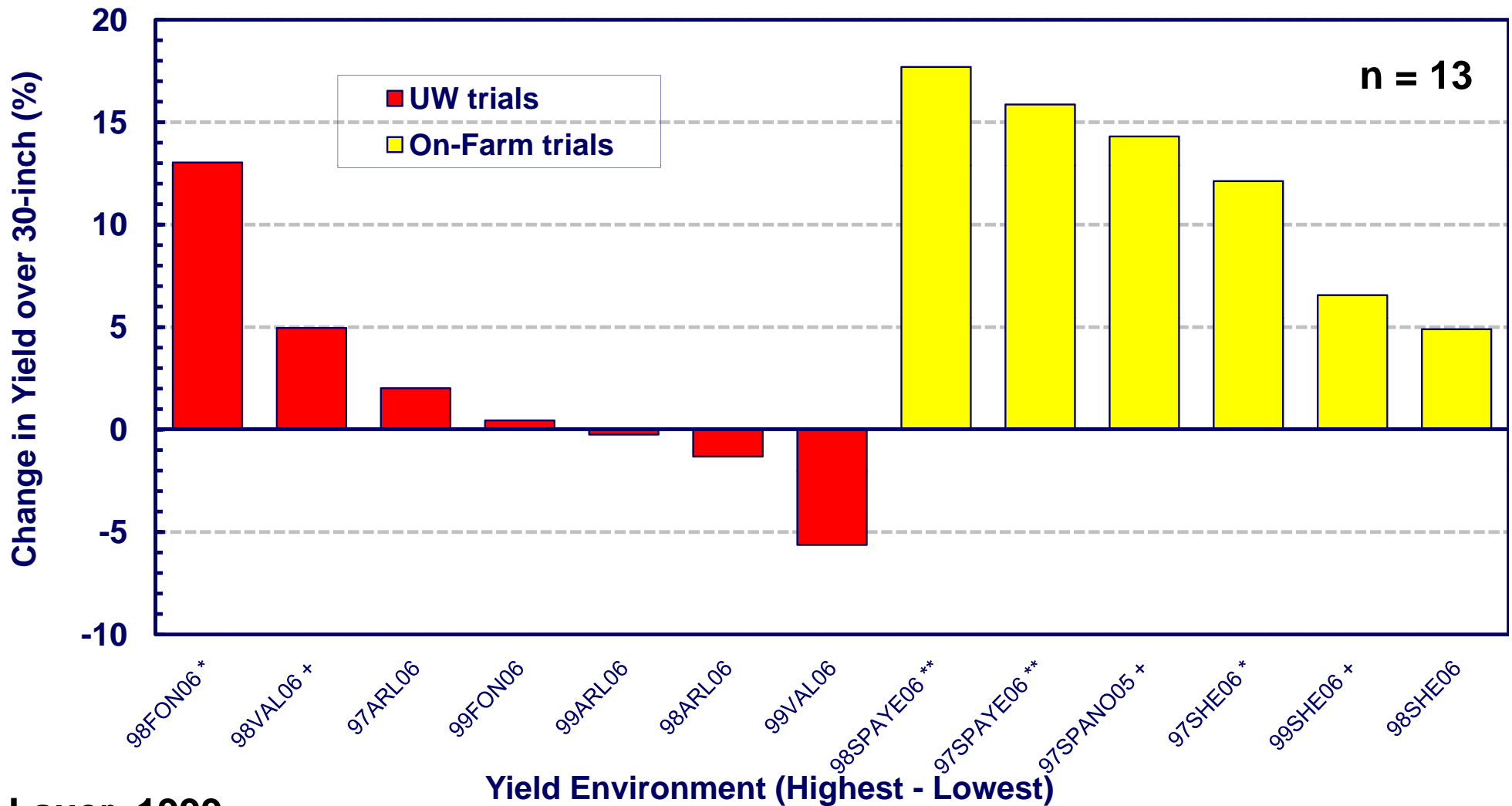


Harvest plant density (x1000/A)

Cusicanqui and Lauer, 1999



Corn Silage Yield Response to Row Spacing in WI (UW and On-Farm trials)



Lauer, 1999



How Should We Manage Corn Grown for Grain versus Silage?

Trait	Grain	Silage
Plant population	26,000-30,000	2,000-3,000 more
Planting date	Early	Early to 7 d later
Row spacing	3-5% w/ narrow	7-9% w/ narrow
Soil fertility	Adequate	Greater
Pest resistance	Important	More important
Cutting height	Ear	Yield v Quality
Harvest timing	Drying cost	Sour v Moldy