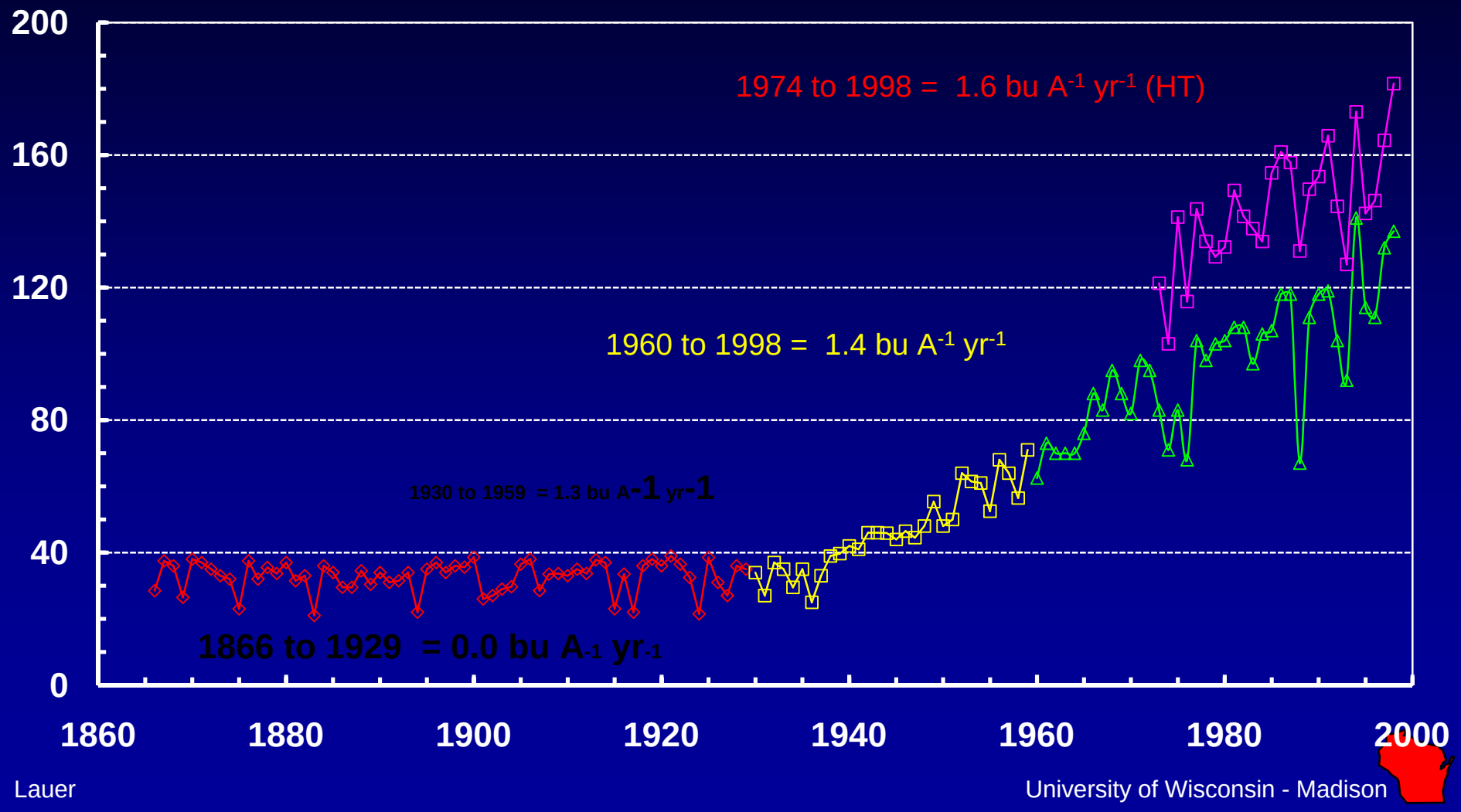
2000 Regional Corn Conferences

1999 Review
Reducing Cost of Production
GMO
Narrow Rows
Managing Risk
Silage

Joe Lauer

University of Wisconsin

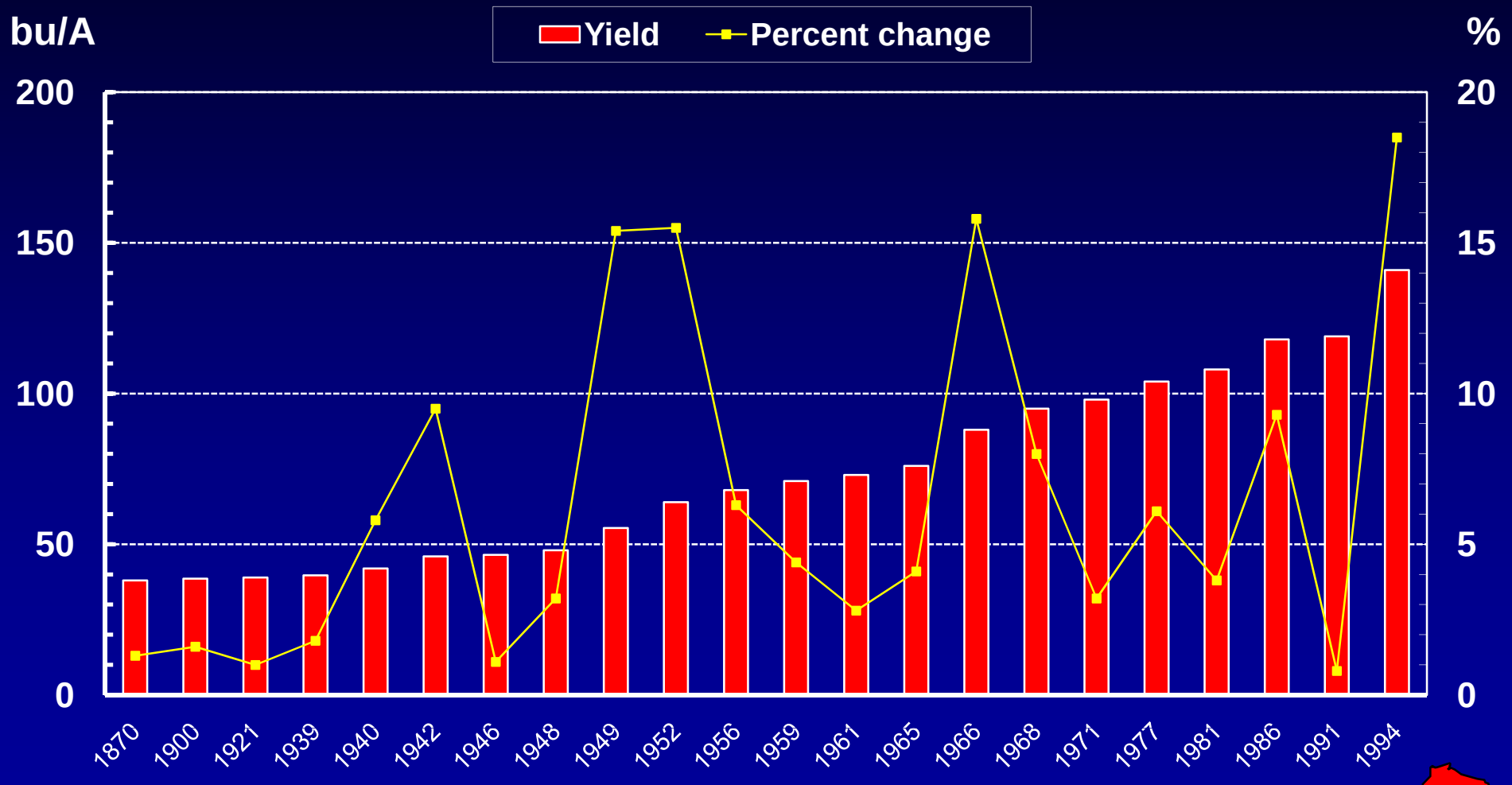
Corn Yield (bu/A) in Wisconsin Since 1866



Lauer

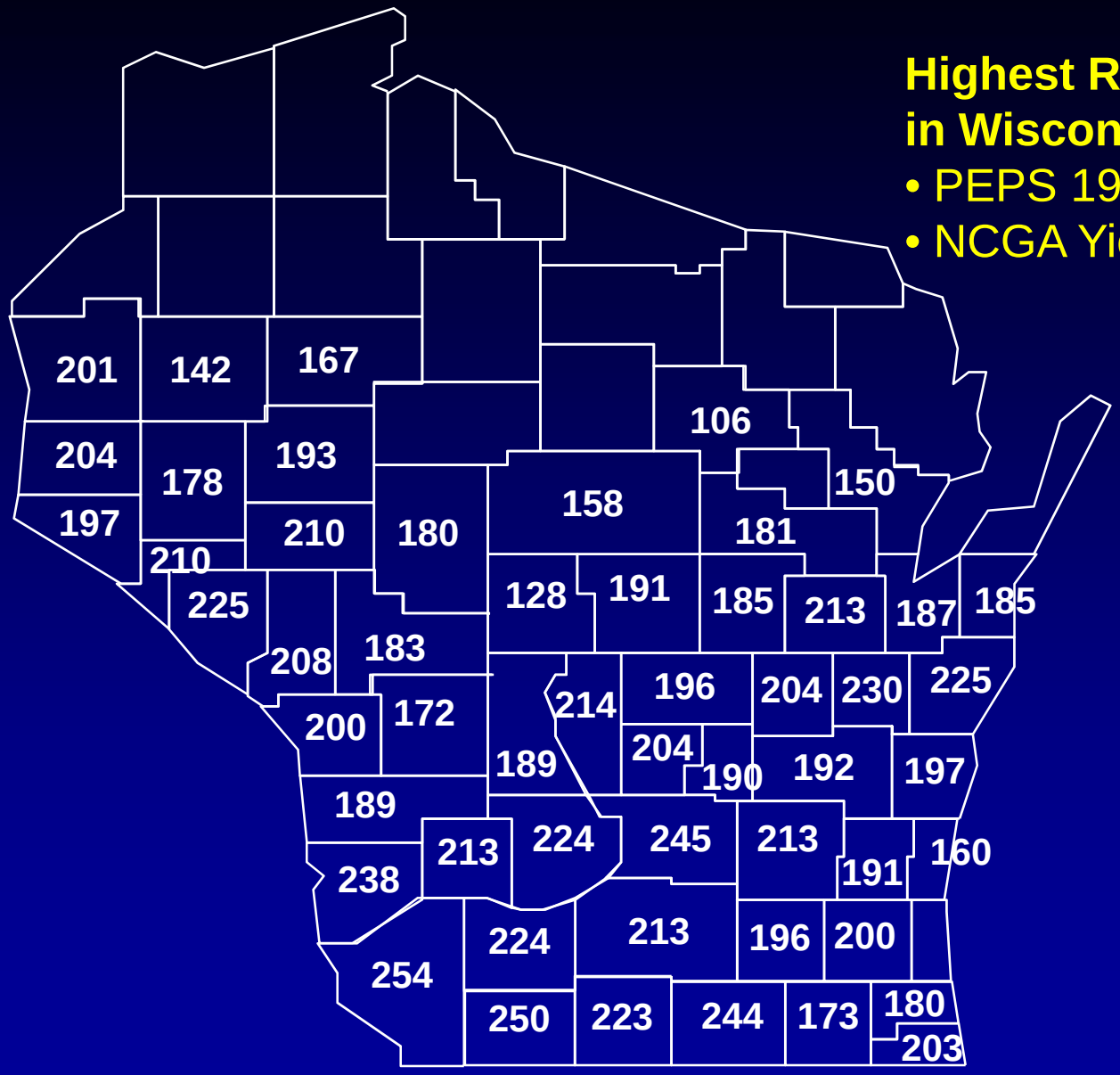
University of Wisconsin - Madison

Years of Record Corn Yield and the Percent Increase Over the Previous Record Year



Lauer

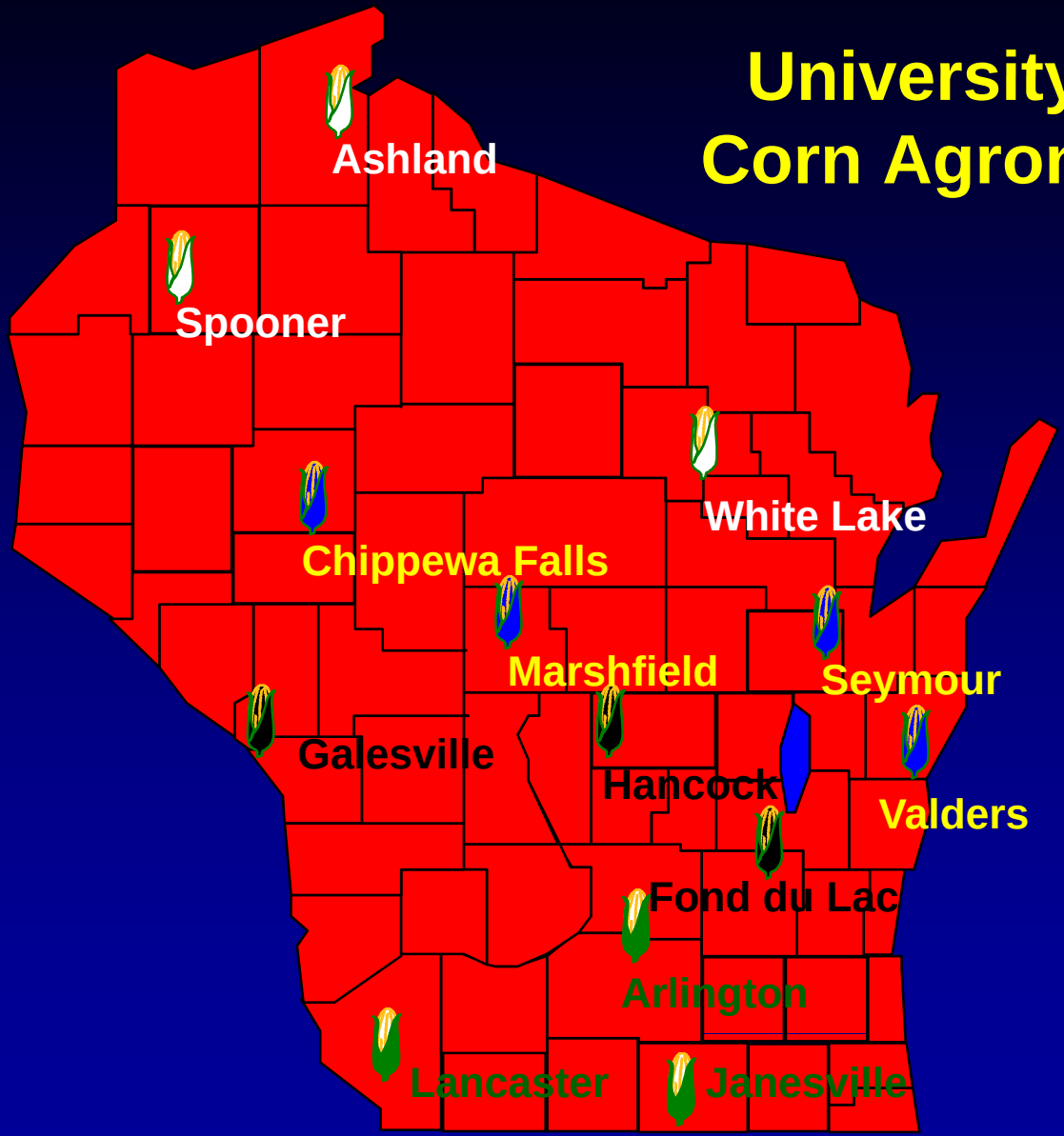
University of Wisconsin - Madison



Highest Recorded Corn Yields in Wisconsin Counties

- PEPS 1987-1998
- NCGA Yield Contest 1983-1998

University of Wisconsin Corn Agronomy Program



1999 Wisconsin Corn Performance Trials
Grain Summary

Location	1989-1998 *N*	1989-1998 Yield	1999 *N*	1999 Yield	Percent Change
Arlington	1727	185	198	222	+ 20
Janesville	1727	177	198	222	+ 25
Lancaster	1727	170	198	192	+ 13
Fond du Lac	1525	159	159	207	+ 30
Galesville	1525	157	159	202	+ 29
Hancock	1524	178	159	202	+ 13
Chippewa Falls	1276	147	168	169	+ 15
Marshfield	990	137	168	179	+ 31
Seymour	922	144	69	171	+ 19
Valders	1400	145	168	199	+ 37
Ashland	129	129	16	157	+ 22
Spooner	1901	123	189	168	+ 37
White Lake	582	85	63	147	+ 73

Note: Seymour average includes New London 1989-1992.

Using Wisconsin Corn Hybrid Performance Trial Results

- **Use multi-environment average data**
  - ***Begin with trials in zone(s) nearest you***
  - ***Compare hybrids with similar maturities***
  - ***Use many years and locations***
- **Evaluate consistency of performance**
  - ***Check performance in other zones and locations***
  - ***Check other reliable unbiased trials***
  - ***Be wary of inconsistent performance.***

You are taking a tremendous gamble if basing your hybrid selection decisions on 1 or 2 local test plots

Profits through Efficient Production Systems "PEPS"

- Can we grow $1.50 corn and $3.50 soybeans in Wisconsin?
- Sponsors:
  - *University of Wisconsin - Extension Grain Crops*
  - *Department of Agronomy*
- Wisconsin Corn Growers Association
- Wisconsin Soybean Association
- USDA Soil Conservation Service
- Numerous Agricultural Companies

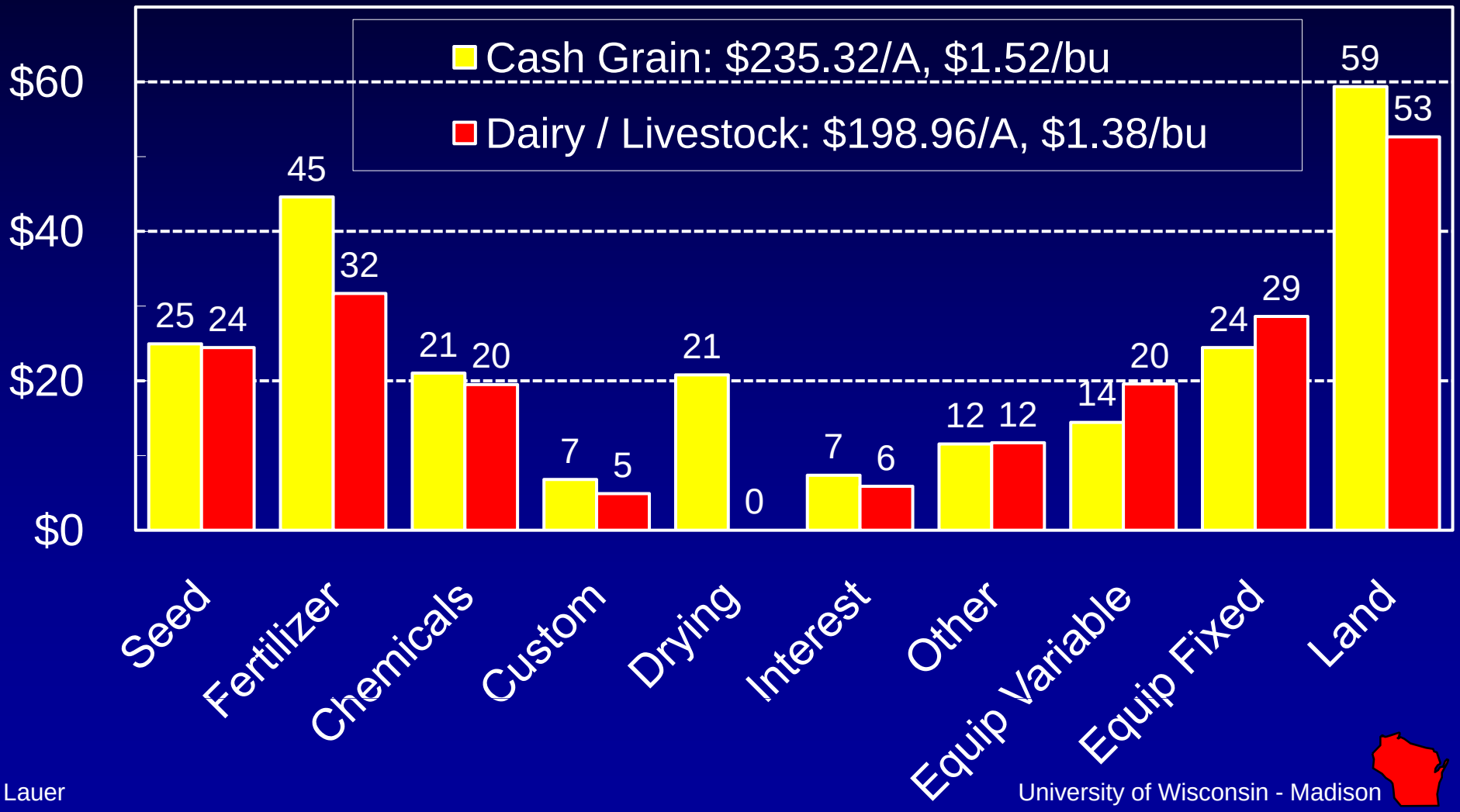
PEPS Objectives

- **Emphasize soil and water conservation, efficiency, profitability, and competitiveness vs. productivity alone**
- **Recognize the way efficient growers integrate practices into a system through:**
  - ***PEPS Contest***
  - ***PEPS Workshops***

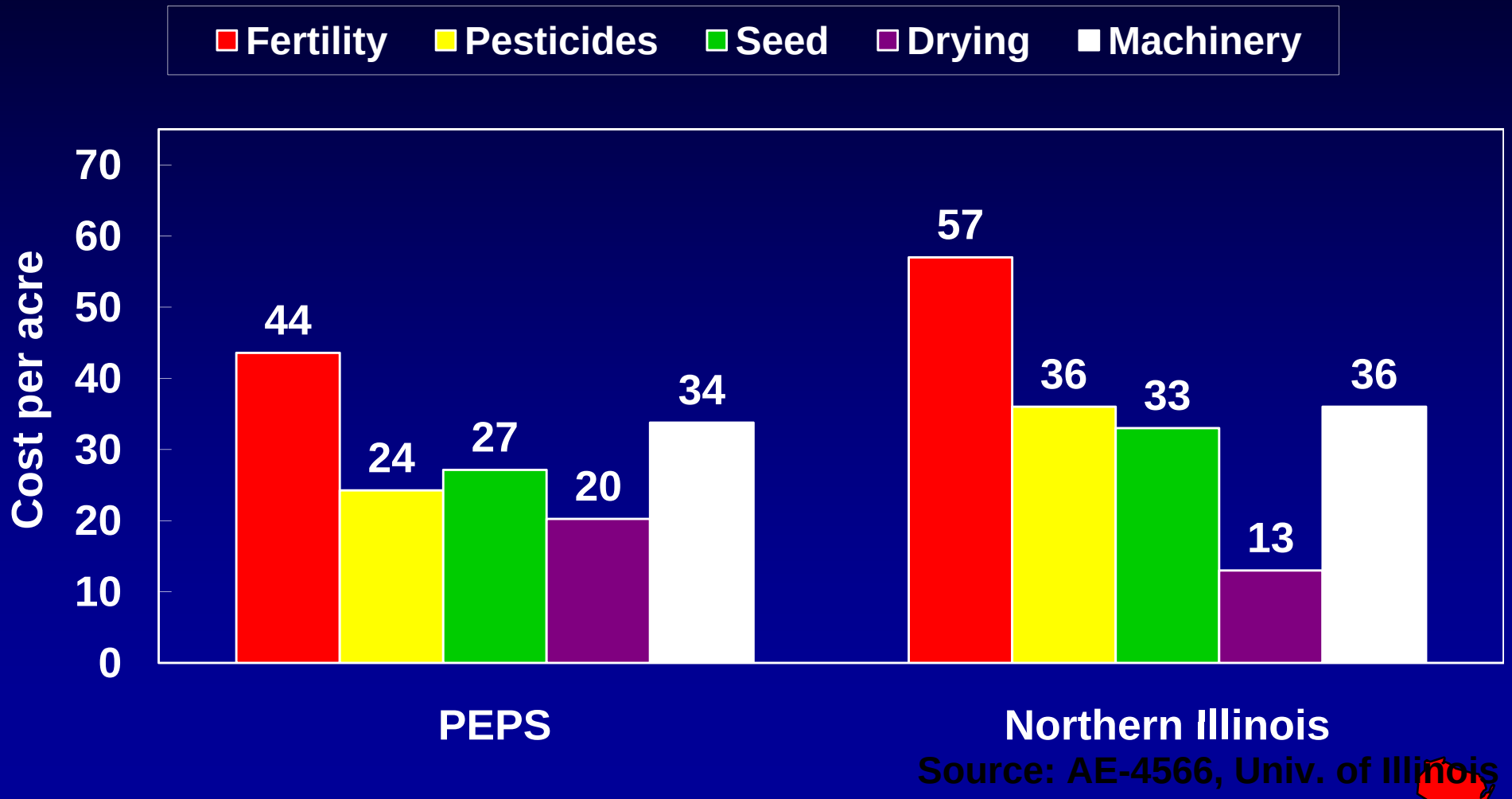
PEPS Contest Description

- Placing based on grower return and lowest cost per bushel (Production costs, verified yields)
- Soil loss within tolerable “T” level
  - *(USLE, WEE; USDA-NRCS)*
- Districts (5)
- Awards: $100 to winner, each district/division
- Entry fee: $25 - no limit on number of entries
- Entry deadline: August 1
- PEPS Divisions: Cash crop corn, Dairy/Livestock corn, Soybeans

Average PEPS Costs of Production in $/A
Cost / A, Cost / bu (1987-1998)



Input costs for Wisconsin and Illinois farms …

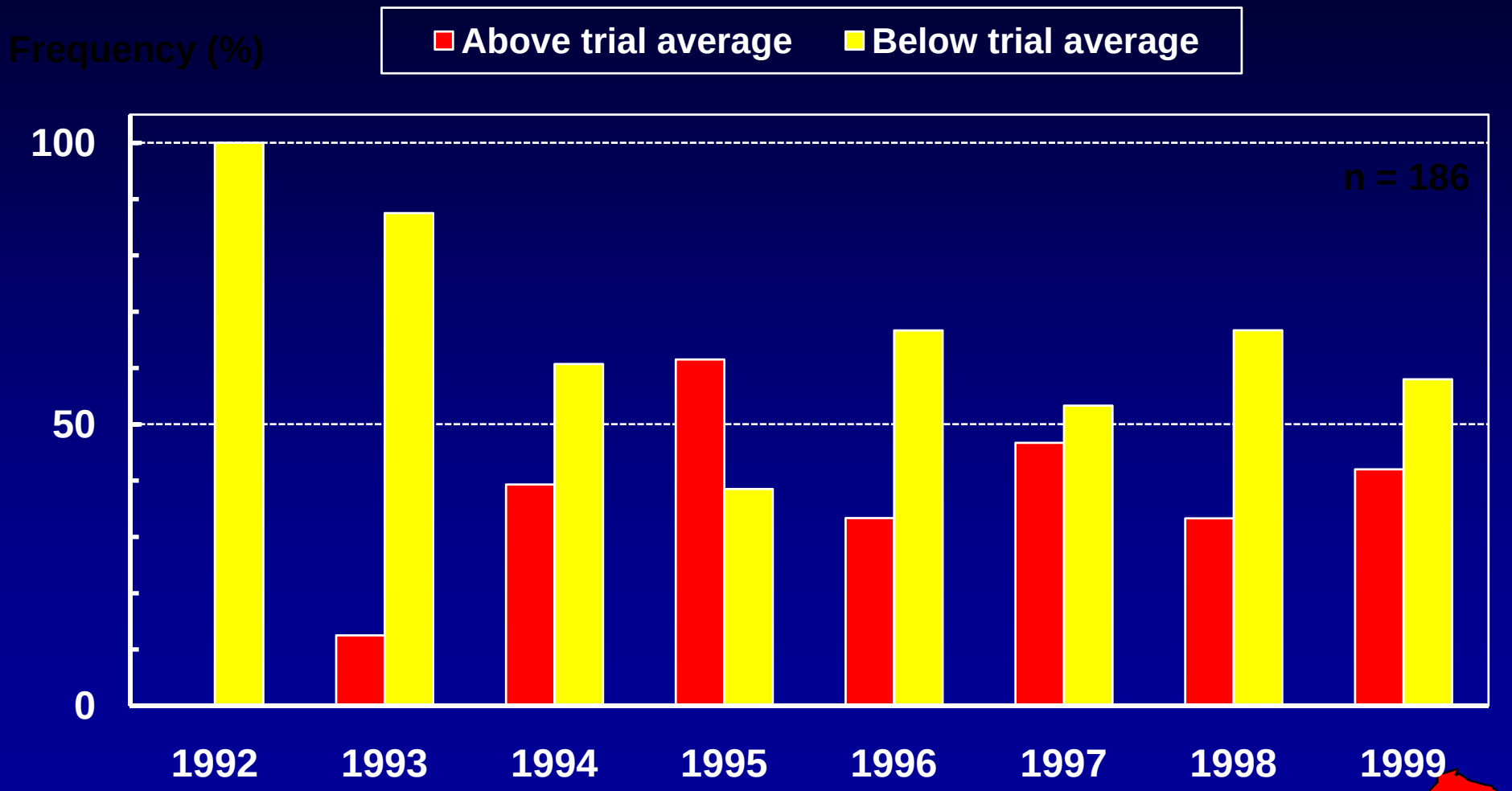


Source: AE-4566, Univ. of Illinois

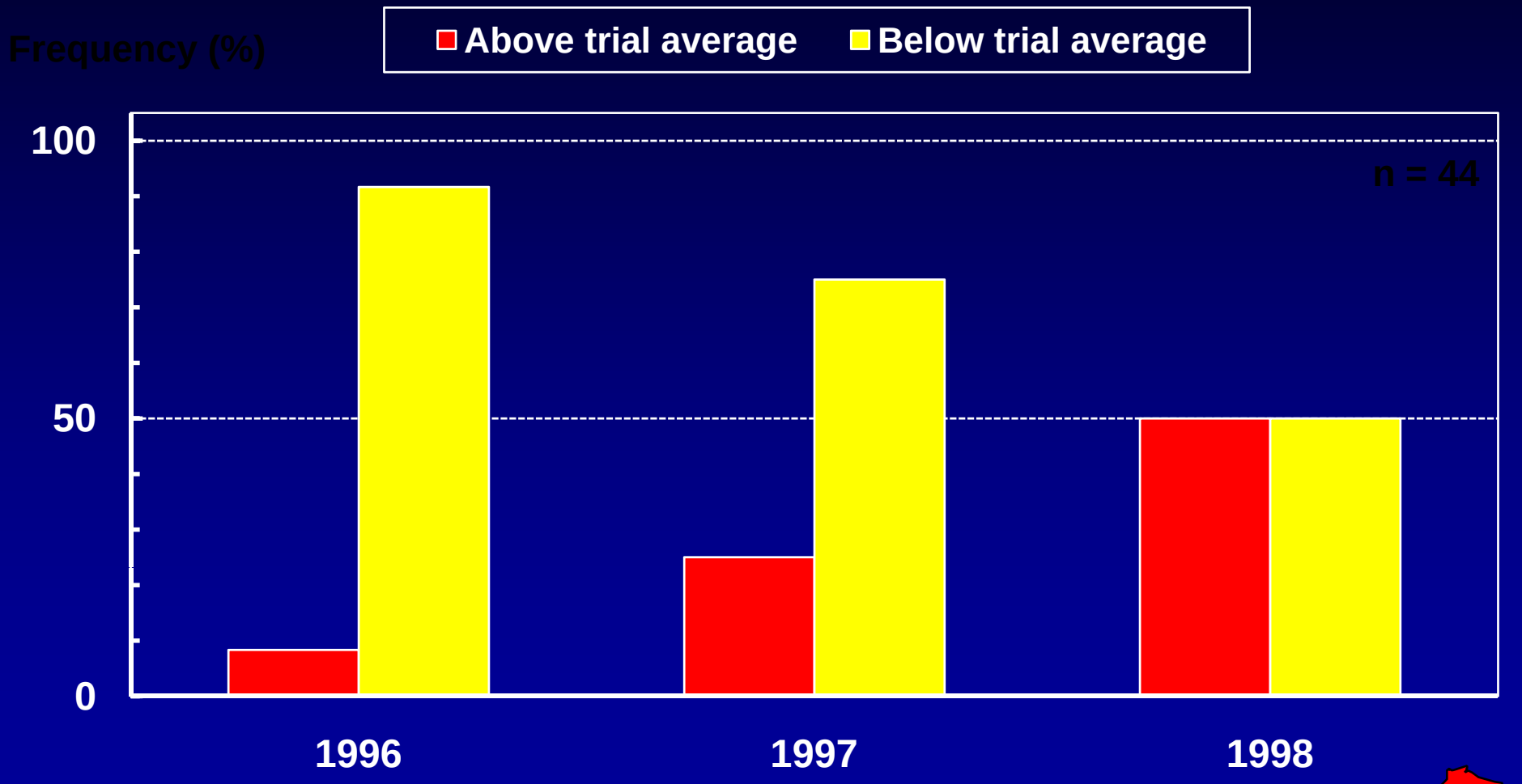
GMO Issues

- **Successes**
- **Agronomic Performance**
  - ***Yield lag and drag***
  - ***Pollen drift***
- **Marketing**
  - ***Premiums***
  - ***Emotional***
- **Pest Resistance Management**
- **Crop Rotation**

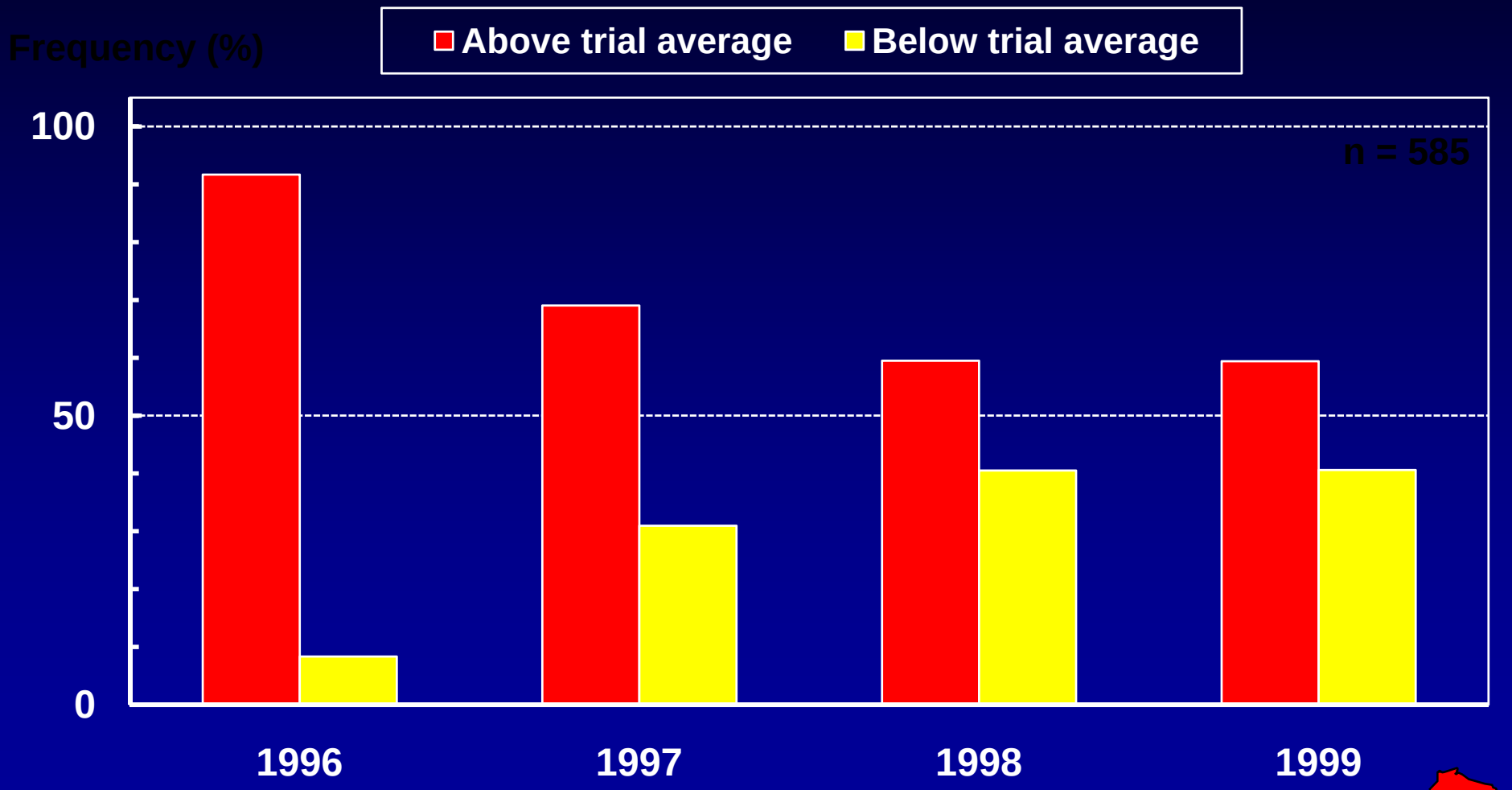
Yield of "IMI" Hybrids in Relation to the Average of All Hybrids in a Wisconsin Trial



Yield of “SR” Hybrids in Relation to the Average of All Hybrids in a Wisconsin Trial



Yield of “BT” Hybrids in Relation to the Average of All Hybrids in a Wisconsin Trial

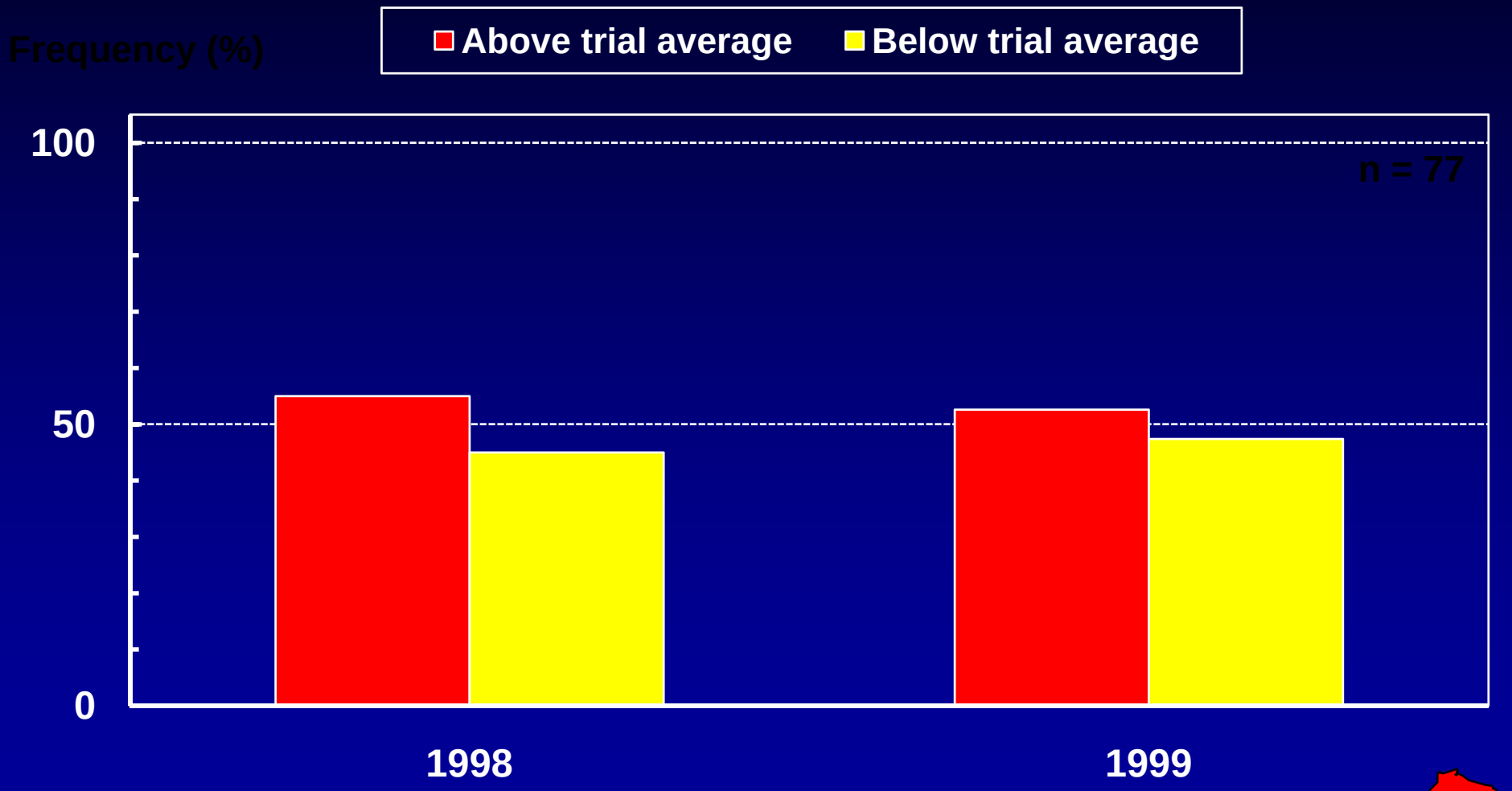


Bt corn registrations as of December, 1999

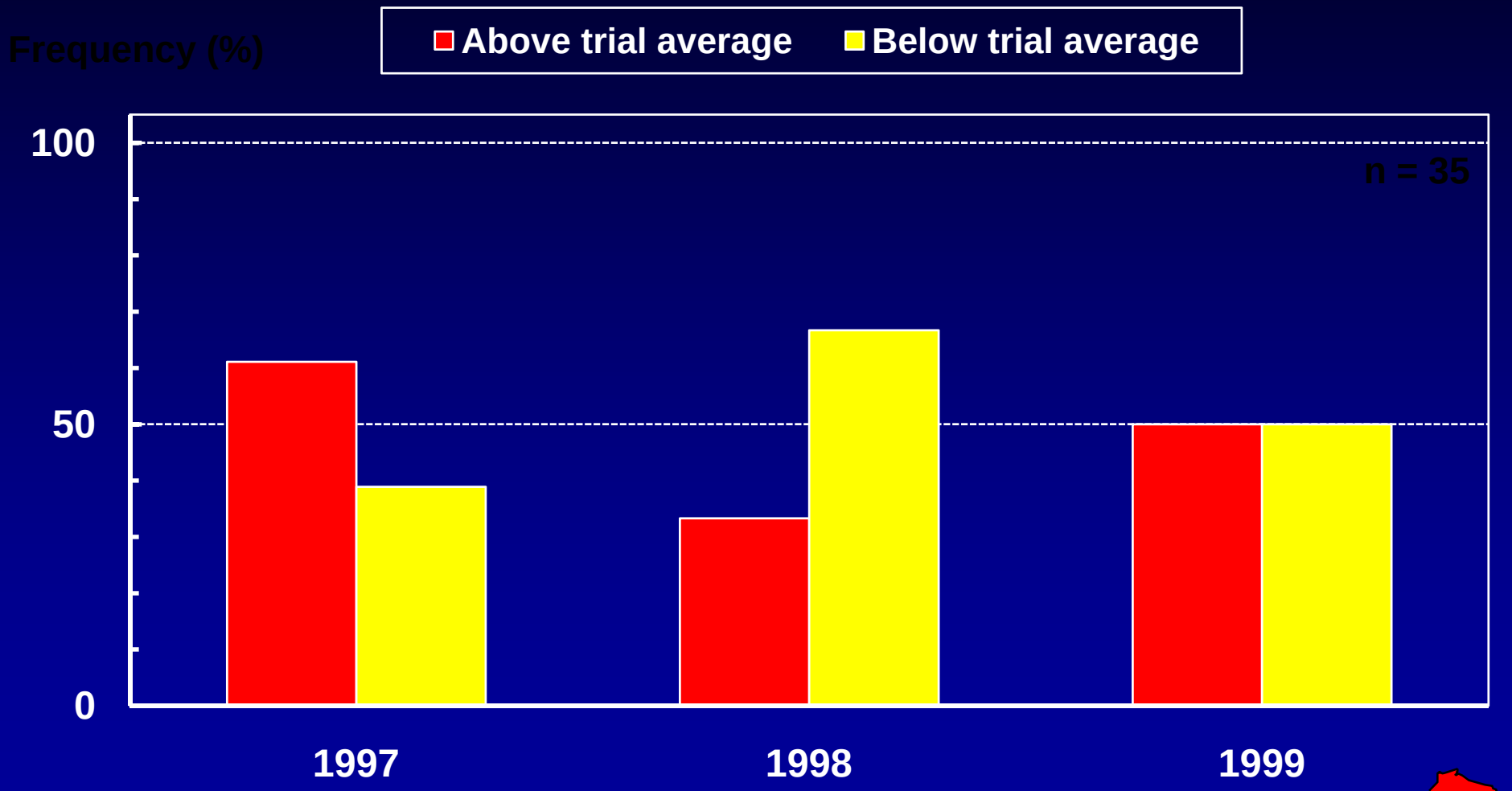
Company	Event	Protein	Brand	1st ECB	2nd ECB	Refugia
Novartis	176	CryIA(b)	Knockout / Maximizer	Yes	No	Suggested
Mycogen	176	CryIA(b)	NatureGard	Yes	No	Suggested
Monsanto	Bt11	CryIA(b)	YieldGard	Yes	Yes	Suggested
Monsanto	MON810	CryIA(b)	YieldGard *	Yes	Yes	Agreement 5% acres
DeKalb	DBT418	CryIA(c)	Bt-Xtra	Yes	Limited	5% acres
PGS/AgrEvo	CBH351	Cry9(c)	StarLink	Yes	Yes	5% acres

* Supplemental distributors: Cargill, DeKalb, Golden Harvest, ICI/Garst, Pioneer

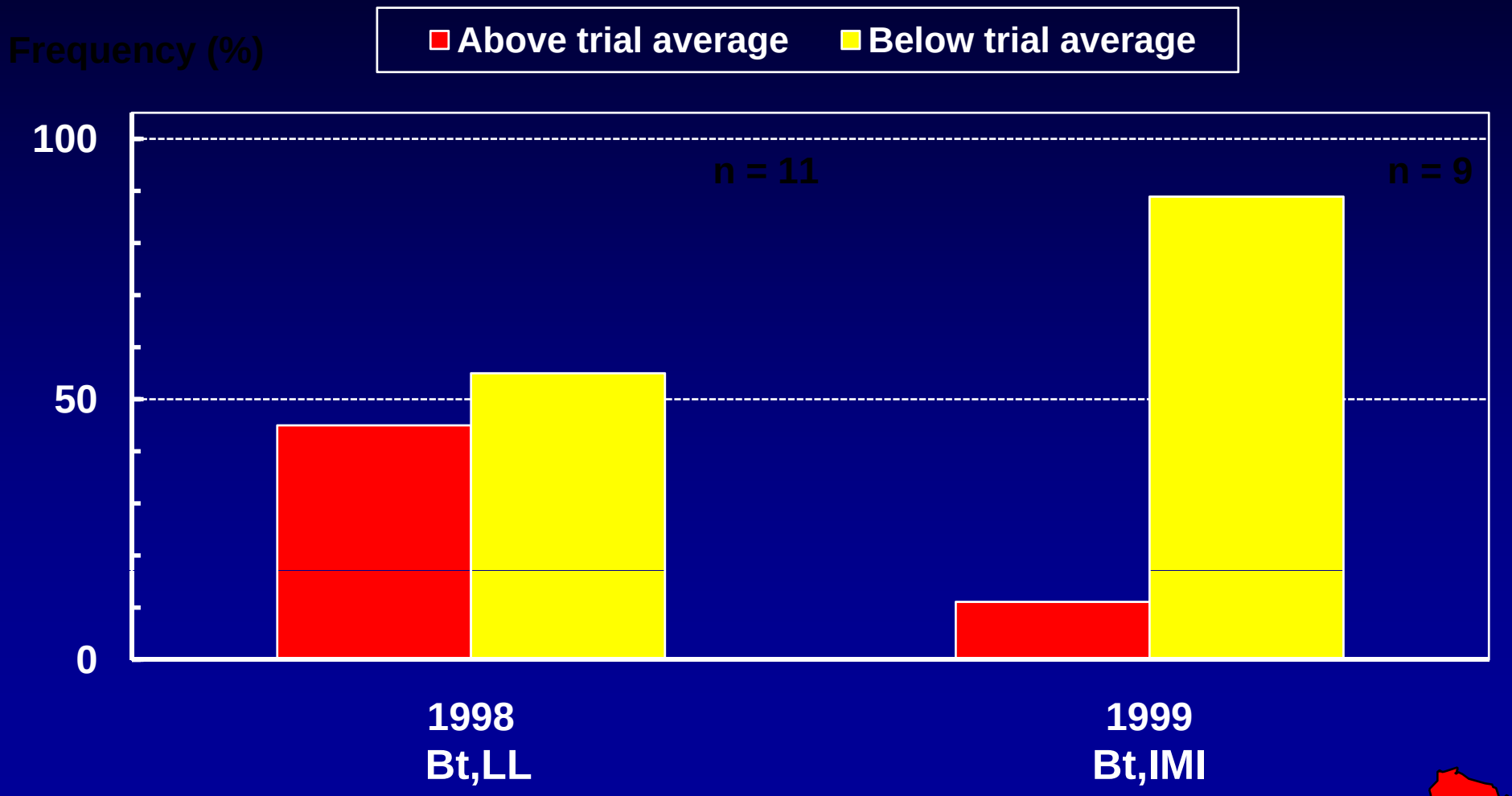
Yield of “Round-up Ready” Hybrids in Relation to the Average of All Hybrids in a Wisconsin Trial



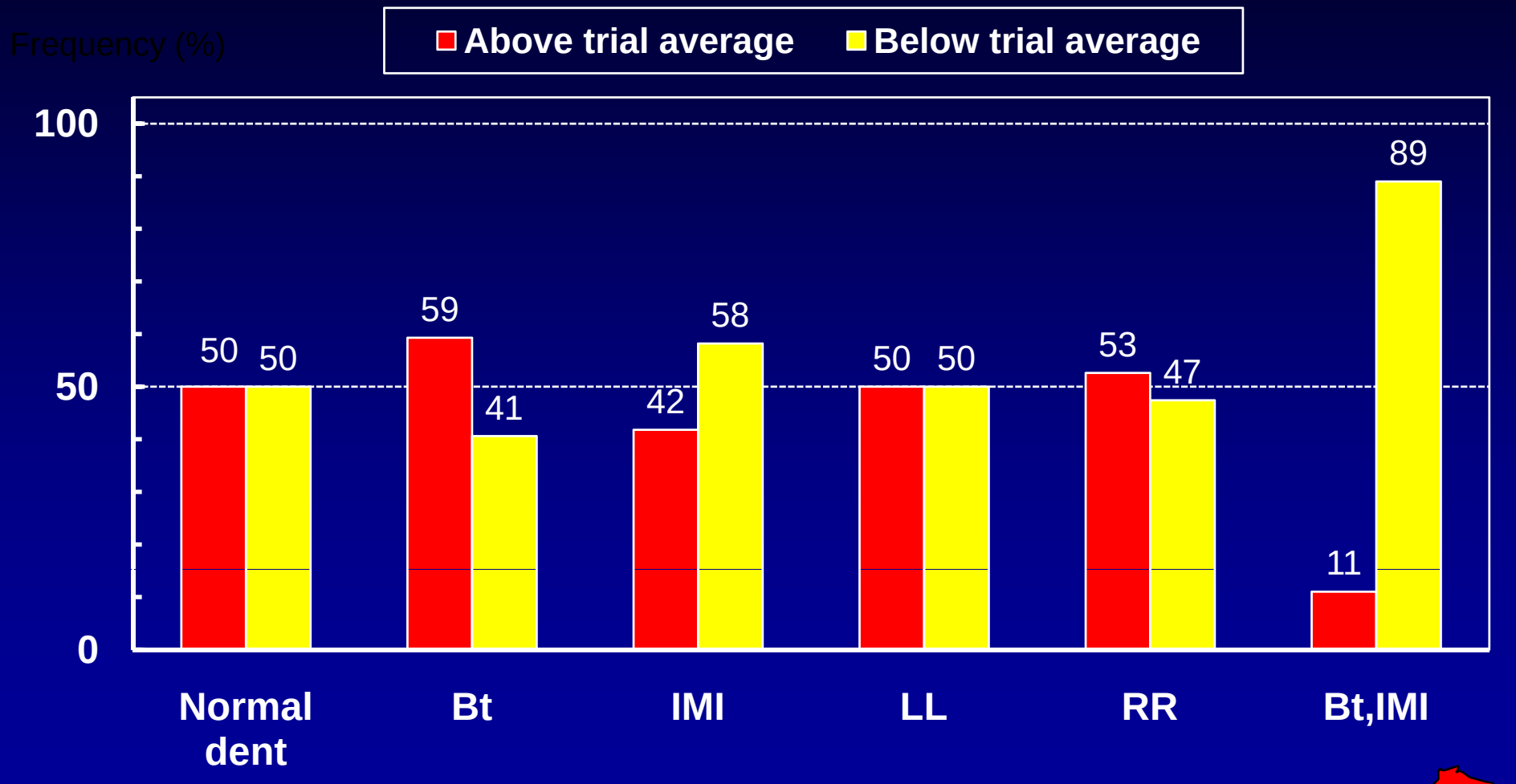
Yield of “Liberty Link” Hybrids in Relation to the Average of All Hybrids in a Wisconsin Trial



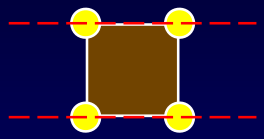
Yield of "Gene Stacked" Hybrids in Relation to the Average of All Hybrids in a Wisconsin Trial



Yield of Specialty Hybrids in Relation to the Average of All Hybrids in the 1999 Wisconsin Hybrid Trials



Plant Arrangement in the Field

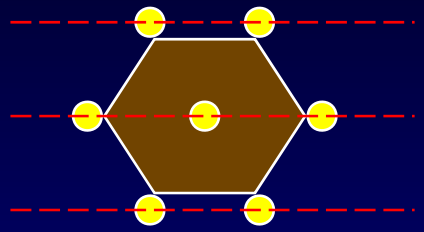


Square

Between plants = 14.5 in

Between rows = 14.5 in

Plants per acre = 30,000



Hexagon

Between plants = 14.5 in

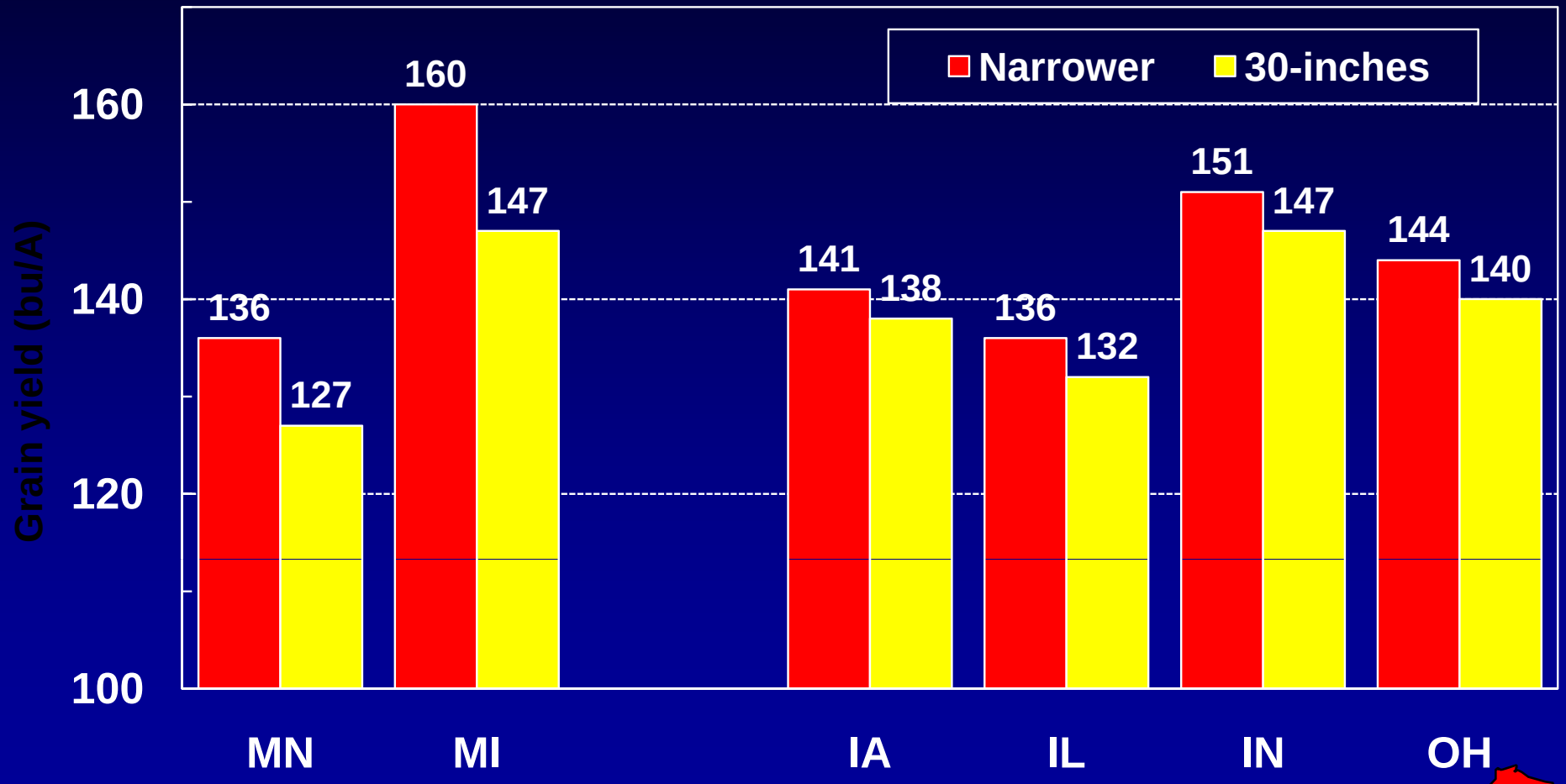
Between rows = 14.5 in

Plants per acre = 30,000

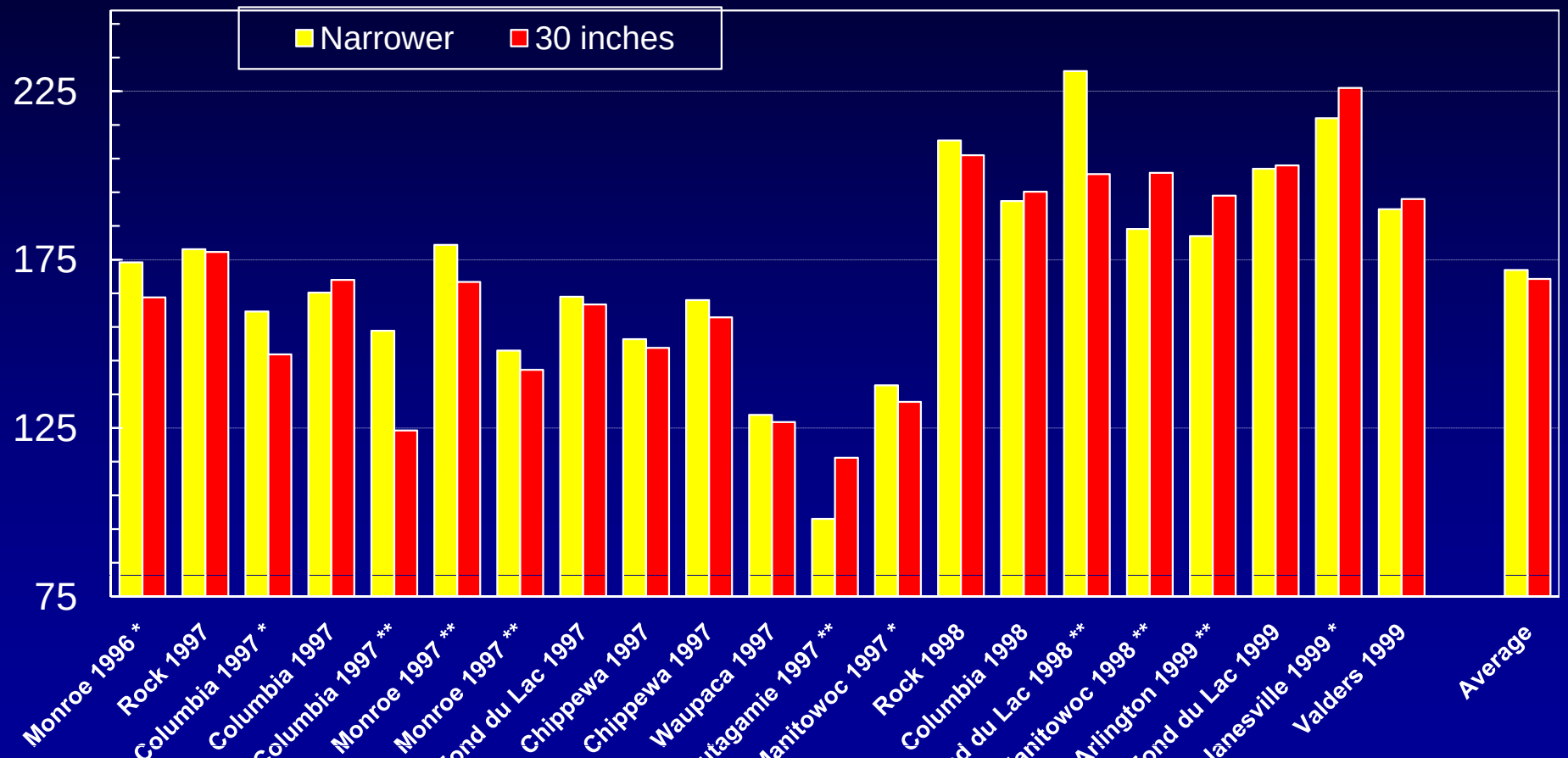
Plant Spacing for Various Plant Densities and Row Spacings

Plant	Row spacing		
density	30-in.	20-in.	Equidistant
plants/A	inches between plants		
25000	8.4	12.5	15.8
30000	7.0	10.5	14.5
35000	6.0	9.0	13.4

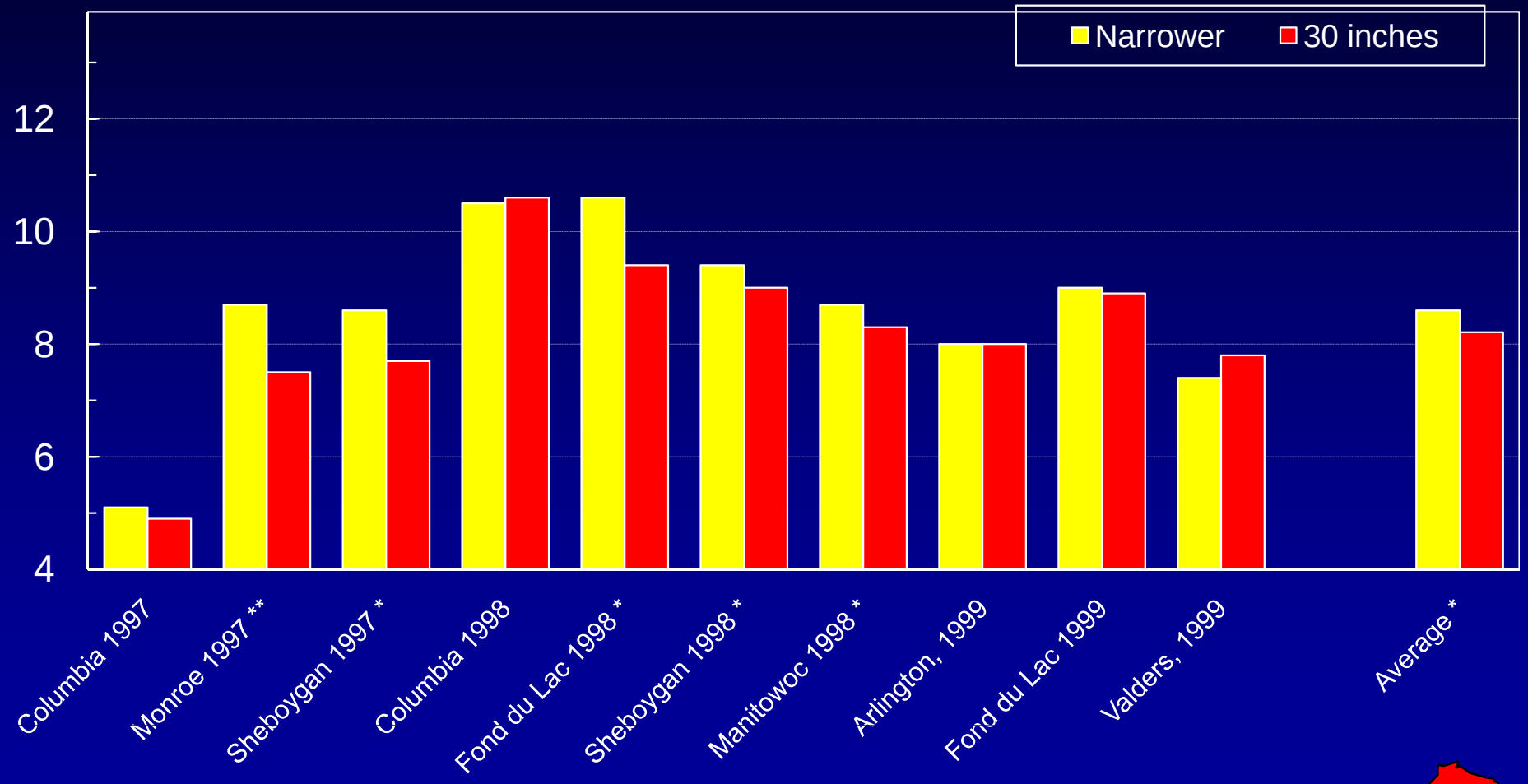
Corn Response to Row Spacing



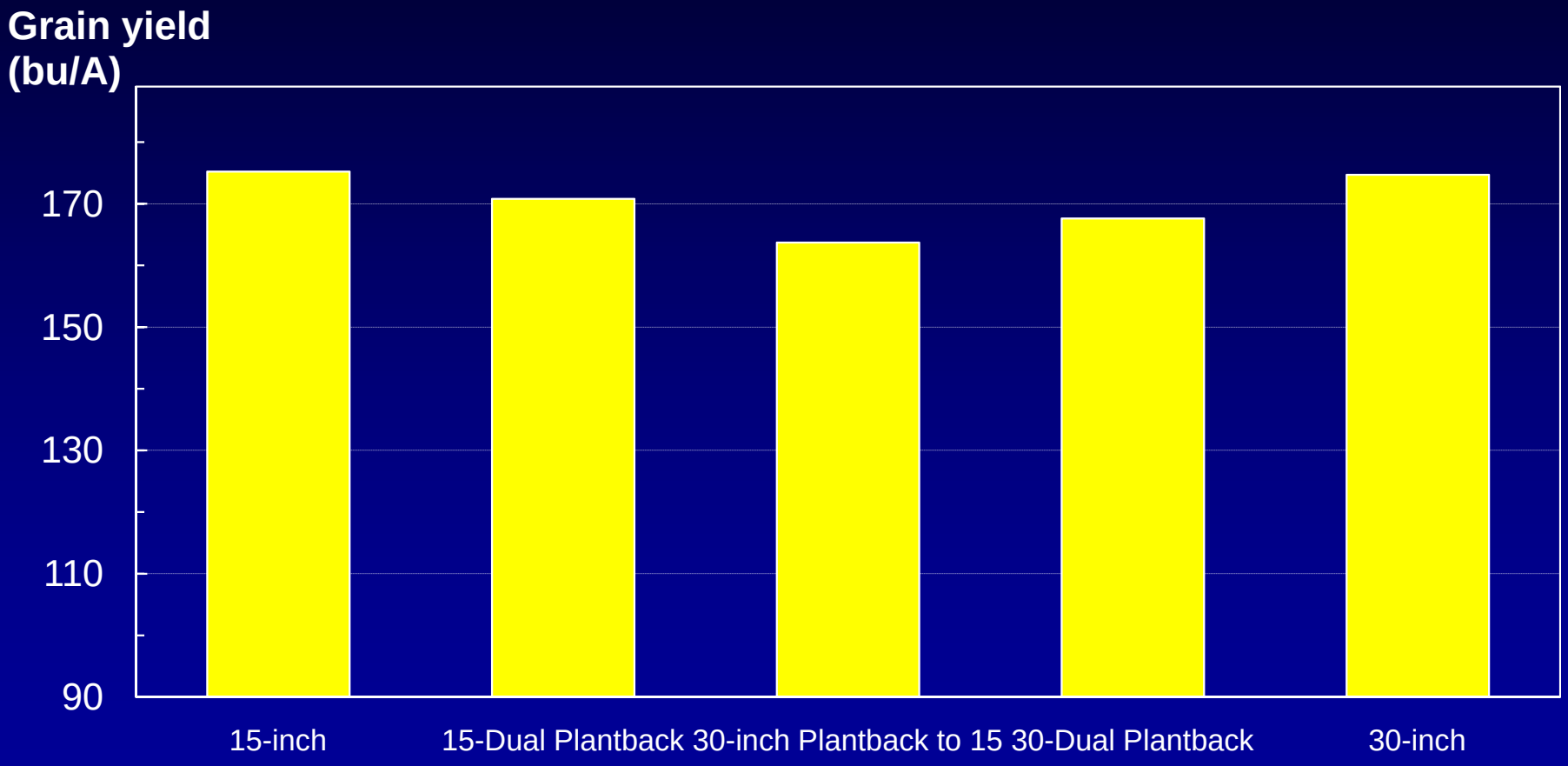
Corn Grain Yield (bu/A) Response to Row Spacing in Wisconsin



Corn Silage Yield (T/A) Response to Row Spacing in Wisconsin



Corn response to row spacing planting patterns and techniques in 1997.



Summary

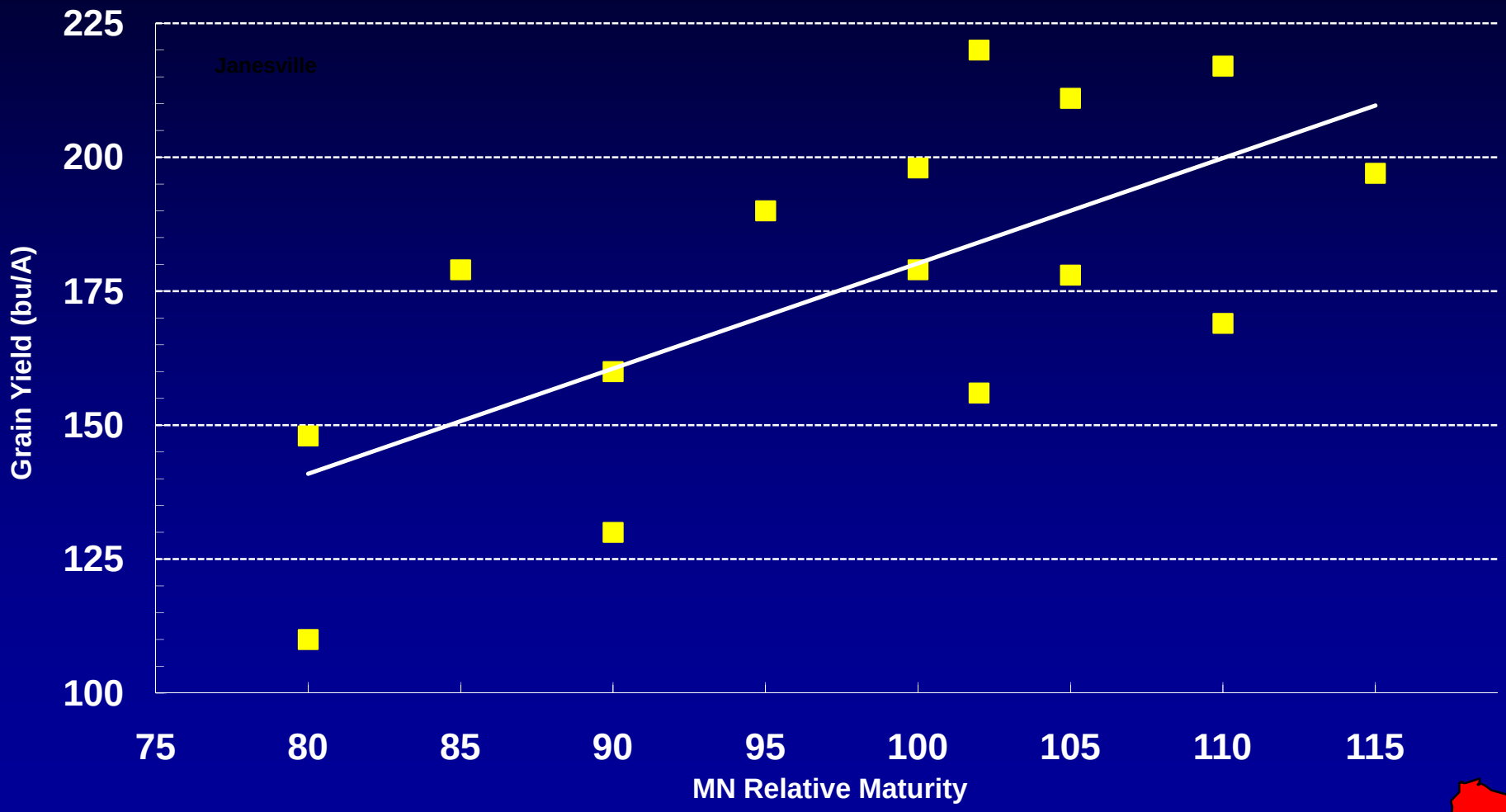
- Corn grain yield response to narrower rows was variable. On average, grain yield increase was 4%. Significant increase in 7 of 21 trials and significant decrease in 4 of 21 trials.

- Corn silage yields consistently increased on average, 9%, with narrow row spacing. Significant increase in 5 of 10 trials.

What is the Best Corn Maturity to Grow at a Location?

- **The Yield v. Grain Moisture Trade-off**
  - ***Greatest yield potential with full-season hybrids***
  - ***Greatest grain moisture with full-season hybrids***
- **How much yield can be sacrificed to obtain a hybrid that is drier at harvest? Hybrid selection decision depends upon:**
  - ***drying costs, yield level, corn price,use***
- **How is corn hybrid maturity determined?**
  - ***Company rating***
  - ***Growing degree day rating***
  - ***Minnesota Relative Maturity Rating (1929)***

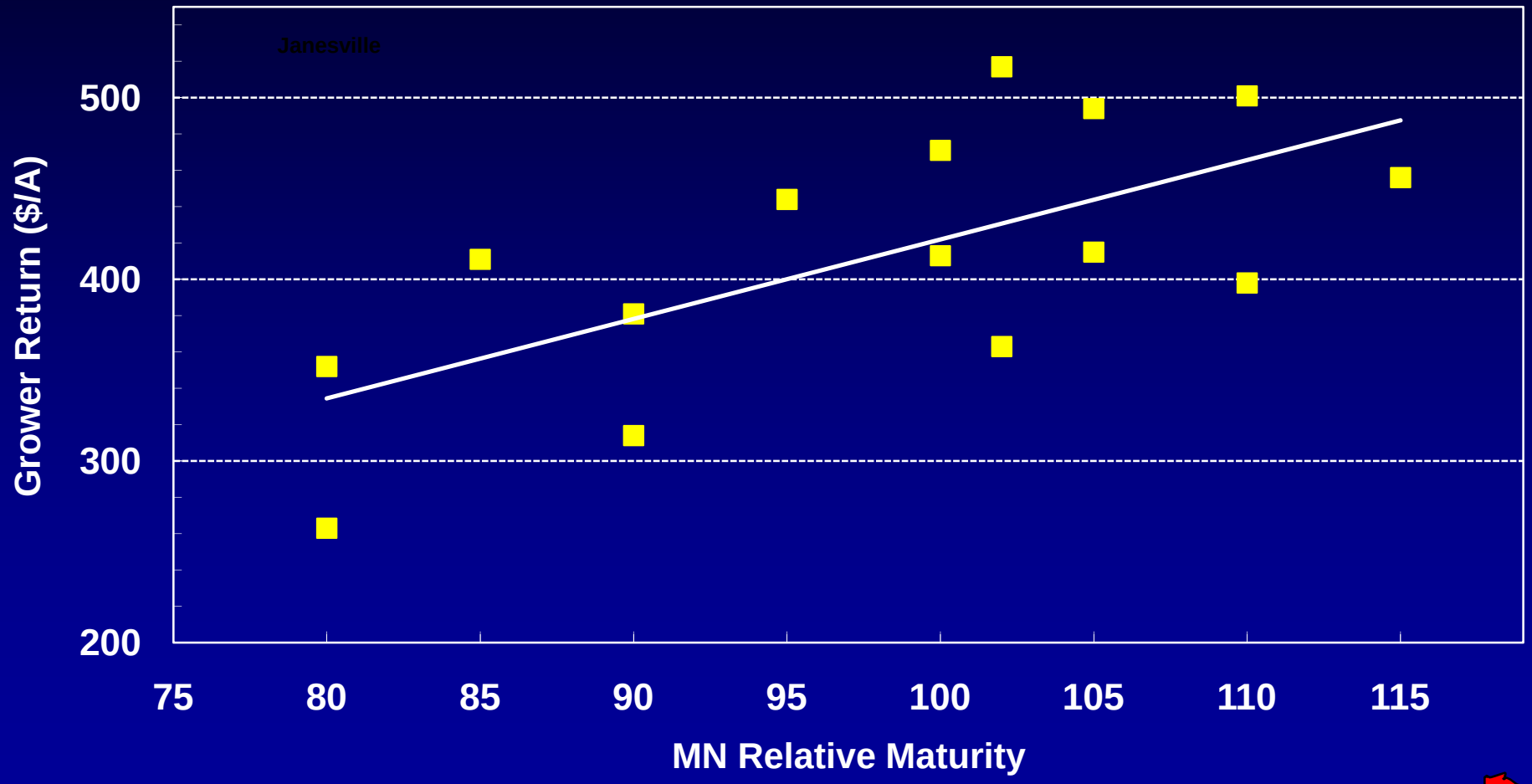
Relationship Between Corn Grain Yield and Minnesota Relative Maturity Rating (1995-1997)



Lauer

University of Wisconsin - Madison

Relationship Between Corn Grower Return and Minnesota Relative Maturity Rating (1995-1997)



Materials and Methods

- **Data set**
  - ***Hybrid trials 1973-1997 (25 years)***
  - ***Used only hybrids with MN Relative Maturity rating***
  - ***Optimum management***
  - ***Corn Price: $2.00, 2.50, and 3.00***
- **Three corn production systems (drying costs)**
  - ***Livestock feeding system (HMC) = $0.00***
  - ***On-Farm drying system = $0.015 per point bushel***
  - ***Commercial elevator drying system = $0.03 per point bushel***
- **Grower return = (Yield * Price) - Drying costs**

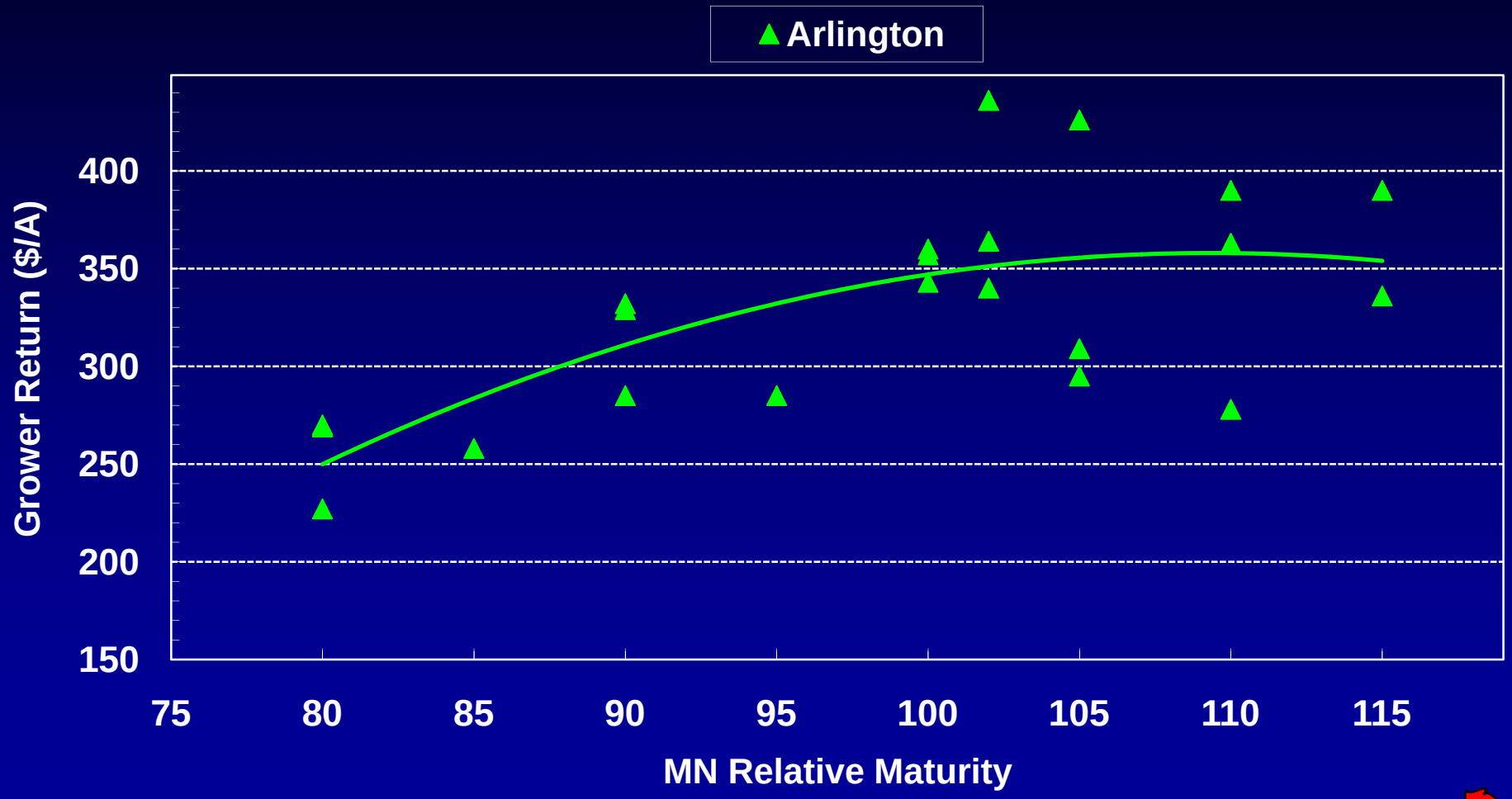
Production Costs Used to Adjust Grower Return for Three Corn Production Systems

Cost factor	Rate	Livestock system	On-Farm drying	Commercial elevator
			dollars	
Drying	Bu / point	0.00	0.015	0.03
Handling	Bu	0.017	0.017	0.017
Hauling	Bu	0.04	0.04	0.04
Storage	Bu / month	0.00	0.02	0.04
Trucking	Bu	0.00	0.112	0.112

Optimum corn hybrid MN Relative Maturity (days) for corn production systems in Wisconsin.

1973-1997	Livestock system			On-Farm drying			Commercial elevator		
Region	2.00	2.50	3.00	2.00	2.50	3.00	2.00	2.50	3.00
Southern	120	120	120	111	114	116	99	103	107
South central	112	112	112	105	106	107	100	102	104
North central	103	103	103	95	96	97	89	91	93
North	89	89	89	87	88	88	85	86	87

Relationship Between Corn Grower Return and Minnesota Relative Maturity Rating (1995-1997)

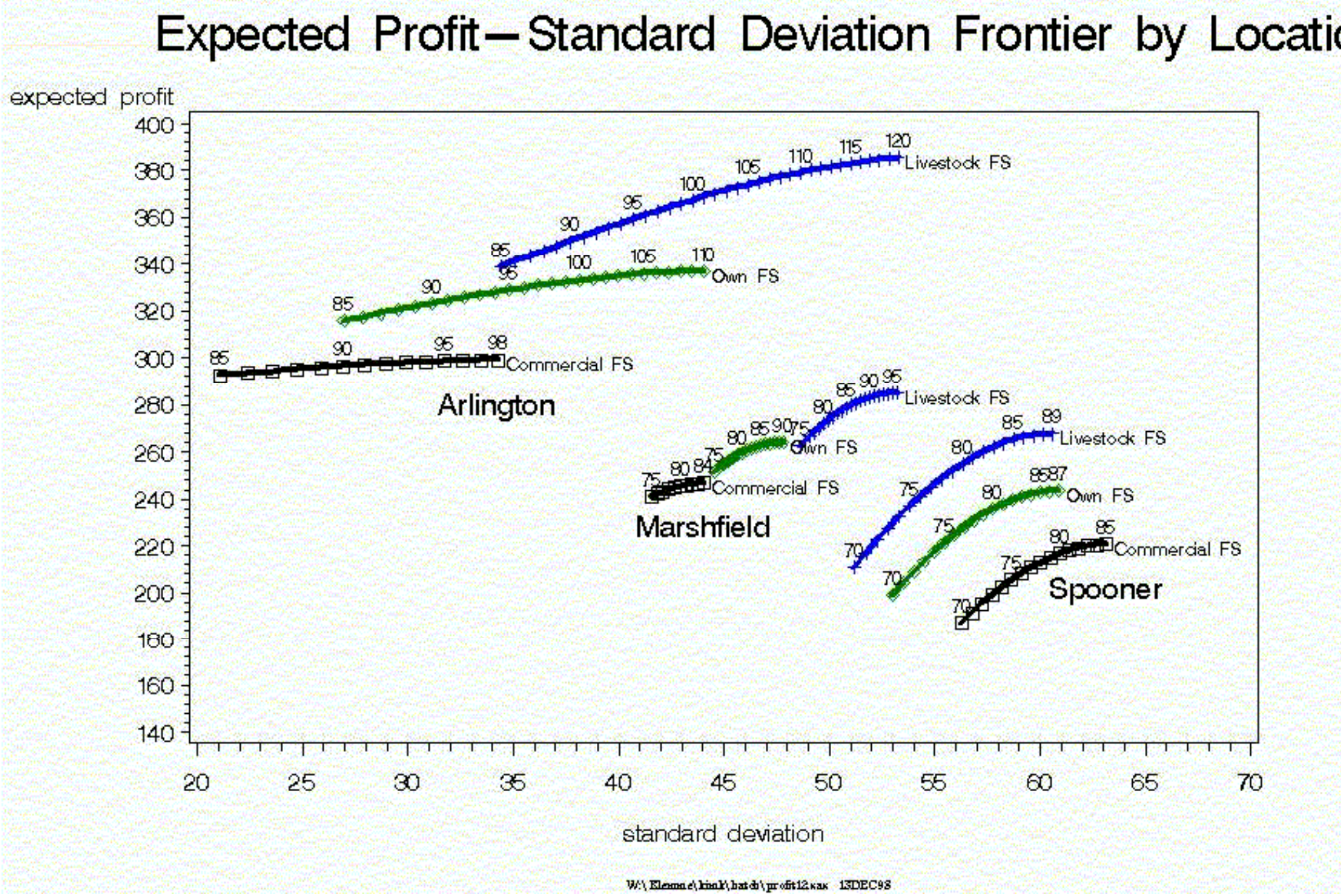


Grower risk (± $/A) of optimum maturity corn hybrids for corn production systems in Wisconsin

1973-1997	Livestock system			On-Farm drying			Commercial elevator		
Region	2.00	2.50	3.00	2.00	2.50	3.00	2.00	2.50	3.00
Southern	56	70	84	45	58	72	35	48	62
South central	64	80	96	60	75	91	58	73	88
North central	57	71	86	55	69	83	54	68	81
North	61	76	91	61	76	91	63	78	92

Grower return ($/A) of optimum maturity corn hybrids for corn production systems in WI

1973-1997	Livestock system			On-Farm drying			Commercial elevator		
Region	2.00	2.50	3.00	2.00	2.50	3.00	2.00	2.50	3.00
Southern	385	482	578	337	432	528	299	392	485
South central	321	401	481	291	370	450	266	344	423
North central	300	375	450	278	352	427	261	334	408
North	268	335	402	244	311	378	221	287	354


Expected Profit—Standard Deviation Frontier by Locati
expected profit
400
380
360
340
320
300
280
260
240
220
200
180
160
140
20
25
30
35
40
45
50
55
60
65
70
standard deviation
Livestock FS
Own FS
Commercial FS
Arlington
Livestock FS
Own FS
Commercial FS
Marshfield
Livestock FS
Own FS
Commercial FS
Spooner
W:\Elanne\kinkl\batch\profit12.sas 13DEC98

Corn relative maturity effect on profitability and risk for corn production systems in southern WI.

1973-1997	Livestock system			On-Farm drying			Commercial elevator		
	2.00	2.50	3.00	2.00	2.50	3.00	2.00	2.50	3.00
Optimum RM (days)	120	120	120	111	114	116	99	103	107
Profit ($/A)	385	482	578	337	432	528	299	392	485
Risk (± $/A)	56	70	84	45	58	72	35	48	62
RM Range (days)	21	21	21	23	24	24	21	21	22

RM Range is the difference between optimum RM and RM at 95% yield.

Corn relative maturity effect on profitability and risk for corn production systems in south central WI.

1973-1997	Livestock system			On-Farm drying			Commercial elevator		
	2.00	2.50	3.00	2.00	2.50	3.00	2.00	2.50	3.00
Optimum RM (days)	112	112	112	105	107	107	100	102	104
Profit ($/A)	321	401	481	291	370	450	266	344	423
Risk (± $/A)	64	80	96	60	75	91	58	73	88
RM Range (days)	15	15	15	13	14	14	12	13	13

RM Range is the difference between optimum RM and RM at 95% yield.

Corn relative maturity effect on profitability and risk for corn production systems in north central WI.

1973-1997	Livestock system			On-Farm drying			Commercial elevator		
	2.00	2.50	3.00	2.00	2.50	3.00	2.00	2.50	3.00
Optimum RM (days)	103	103	103	95	96	97	89	91	93
Profit ($/A)	300	375	450	278	352	427	261	334	408
Risk (± $/A)	57	71	86	55	69	83	54	68	81
RM Range (days)	18	18	18	16	16	15	14	14	15

RM Range is the difference between optimum RM and RM at 95% yield.

Corn relative maturity effect on profitability and risk for corn production systems in northern WI.

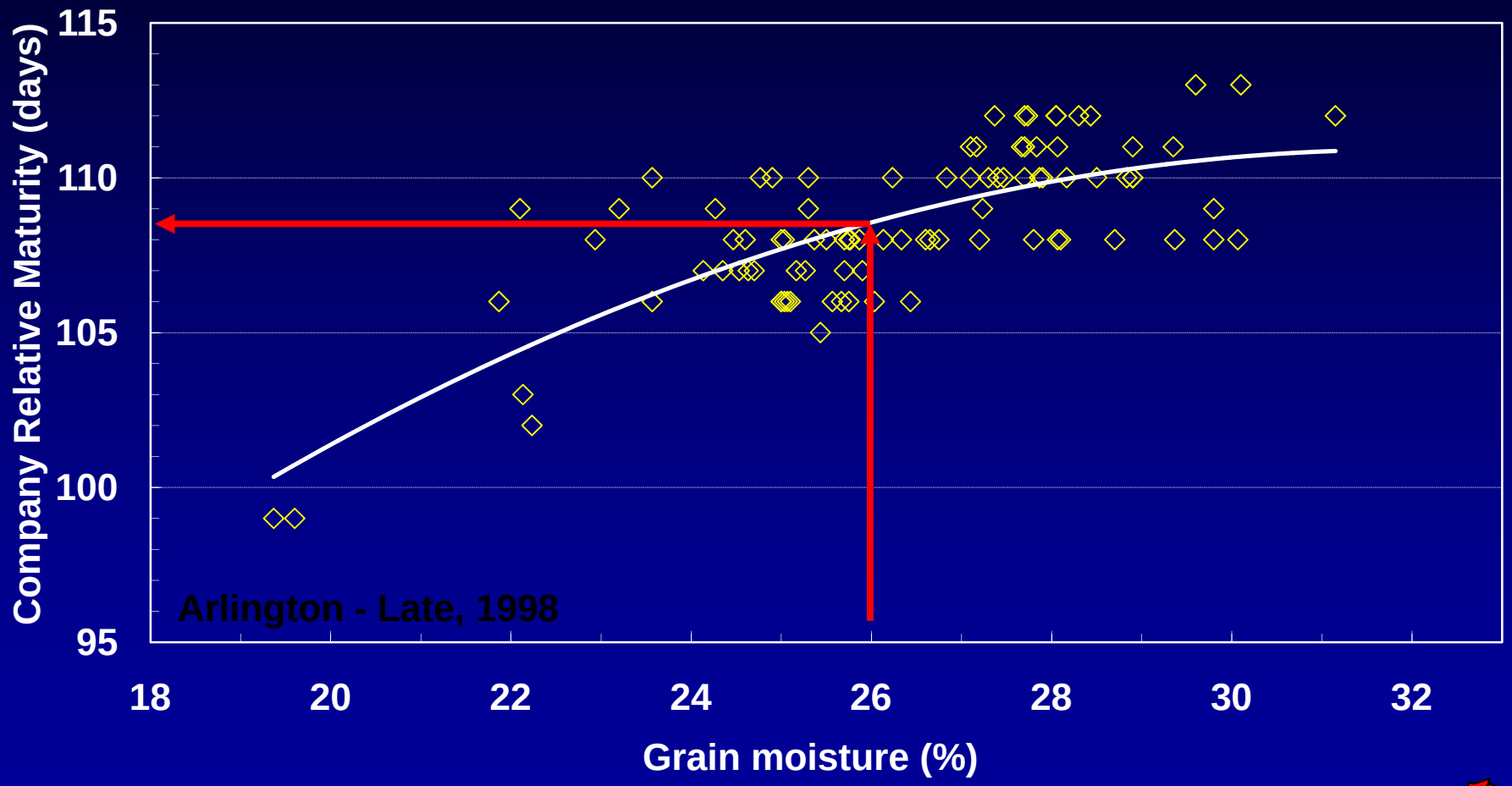
1973-1997	Livestock system			On-Farm drying			Commercial elevator		
	2.00	2.50	3.00	2.00	2.50	3.00	2.00	2.50	3.00
Optimum RM (days)	89	89	89	87	88	88	85	86	87
Profit ($/A)	268	335	402	244	311	378	221	287	354
Risk (± $/A)	61	76	91	61	76	91	63	78	92
RM Range (days)	9	9	9	9	9	9	9	9	9

RM Range is the difference between optimum RM and RM at 95% yield.

Methods for Determining Corn Hybrid Maturity

- Minnesota Relative Maturity System (1929)
- Growing Degree Days (1970)
- Company ratings
- Wisconsin Comparative Relative Maturity rating

Method for determining Wisconsin comparative relative maturity - WI CRM (n=92)

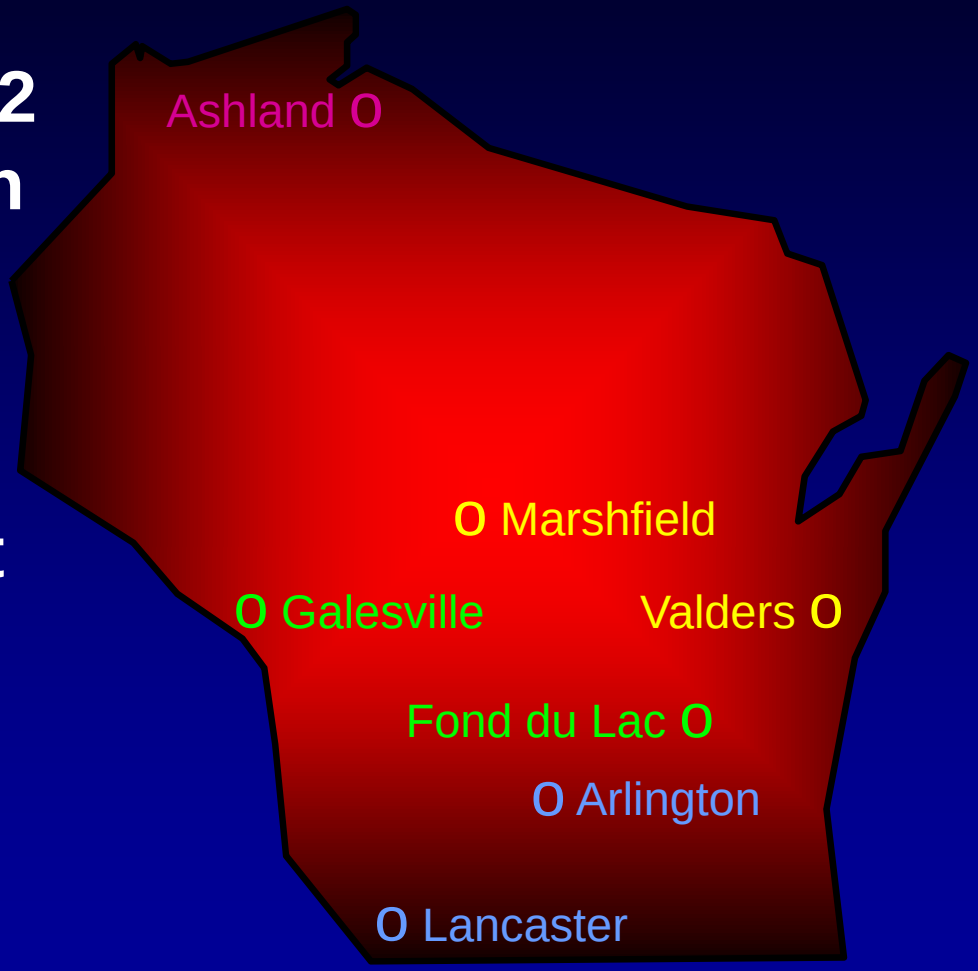


Examples of hybrid CRM ratings (based on MN RM) using WI Corn Hybrid Performance Trial data

Year	Pioneer 3751	Nk Brand N4242	Jung 2496	Golden Harvest H2441	Dekalb DK493
1989	97		98		
1990	97		101		
1991	99	99	100		
1992	100	101	101	104	
1993	99	99	100	105	99
1994		99	99	105	99
1995		101	100	107	100
1996		99		105	101
1997		99		105	101
1998	97				98

Wisconsin Corn Hybrid Silage Performance Trials

- **Each hybrid is tested at 2 locations in a production zone**
- **Seed companies are encouraged to enter silage hybrids in at least one grain trial**



1999 Wisconsin Corn Performance Trials
Silage Summary

	1989-1998		1999		Percent
Location	*N*	Yield	*N*	Yield	change
Arlington	322	9.3	66	10.1	+ 9
Lancaster	245	7.7	66	8.9	+ 16
Fond du Lac	207	8.7	67	9.8	+ 13
Galesville	207	8.0	67	8.1	+ 1
Marshfield	346	6.6	60	7.5	+ 14
Valders	273	7.0	60	8.0	+ 14
Ashland	93	7.0	16	8.0	+ 14

All Time Top 10 Corn Hybrid Silage Yield Performances at a Wisconsin location (1990 to 1999)

Location	Year	Hybrid	Yield Tons DM / A
Arlington	1996	Cargill 5677	13.5
Arlington	1998	Dekalb DK591	13.3
Arlington	1998	Trelay 9700	13.1
Lancaster	1998	Pioneer 33A14	12.8
Arlington	1998	Brunner S-5474	12.8
Arlington	1998	Trelay 9001	12.7
Arlington	1998	Renk RK775	12.6
Fond du Lac	1998	Pioneer 35R57	12.6
Arlington	1998	Dairyland Stealth 1412	12.5
Arlington	1996	Carharts Blue Top CX1080A	12.5

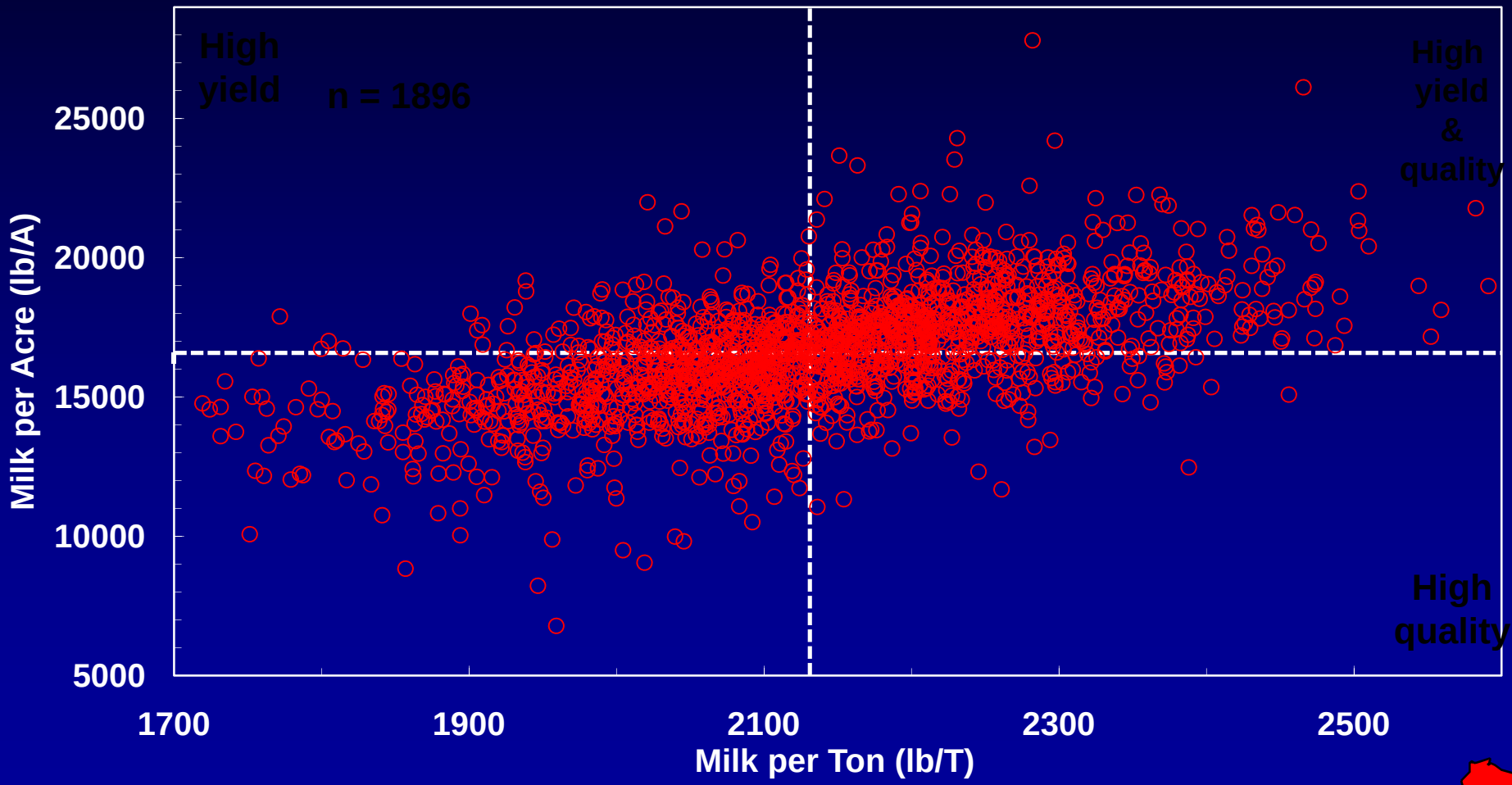
Table 11. Southern Zone - Early Maturity Silage Trial

105 DAY RELATIVE MATURITY OR EARLIER, BASED ON COMPANY RATING

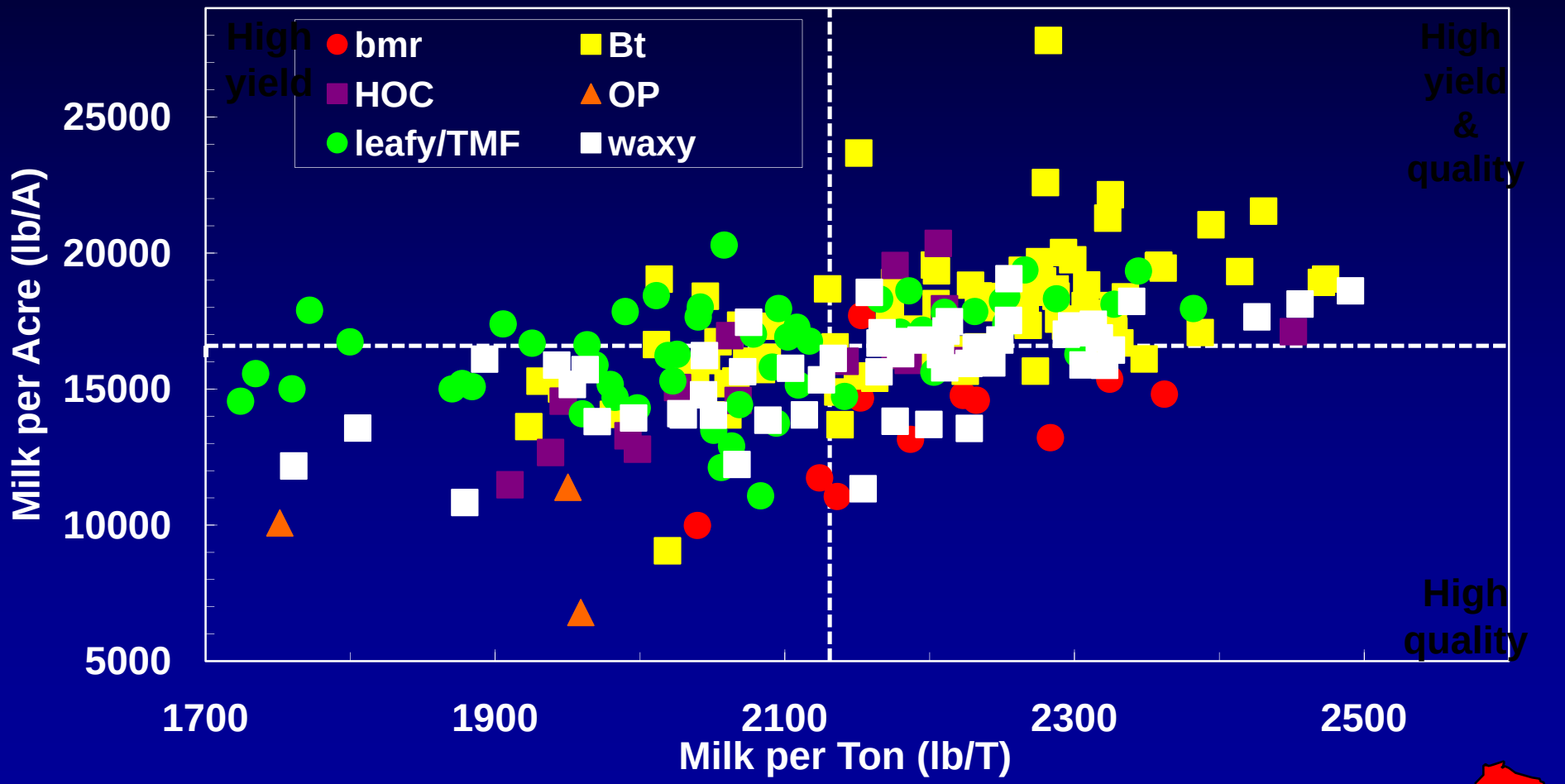
1998

BRAND	HYBRID	AVERAGE Yield T/A	Moist %	Kernel Milk %	CP %	ADF %	NDF %	IVD %	CWD %	MILK PER TON	MILK PER ACRE	ARL Yield T/A	LAN Yield T/A
Dairyland	Stealth 1406	12.0 *	53.7	10	6.6	20	40	79	49	2350 *	27100 *	12.0	12.0 *
Brunner	S-5474	12.0 *	54.7	10	6.7	20	41	79	49	2320	28200 *	13.0 *	11.0 *
Carharts Blue Top	CX105A	10.0	58.8	20	7.0	19	38	80	49	2490 *	25900 *	11.0	9.6 *
Kaltenberg	K5109	10.0	61.3	30	6.8	19	40	80	50	2420 *	24700 *	12.0 *	8.2 *
Cargill	4111	9.9	61.7	20	6.9	21	41	78	48	2230	22300	11.0	8.5 *
Dekalb	DK591	12.0 *	61.8	30	7.3	22	43	79	50	2190	26500 *	13.0 *	11.0 *
105-DAY HYBRID TRIAL AVERAGE		##	61.9										
Garst	8640	10.0	62.4	10	6.8	21	41	79	48	2300	23900	12.0 *	8.5 *
Top Farm	TFsx2103	9.9	64.7	20	7.0	20	41	79	48	2300	23000	11.0	8.5 *
Cargill	F657	8.8	65.2	40	7.1	21	43	81	56	2330	20600	9.3	8.3 *
Trelay	7004	9.2	69.5	30	7.5	21	42	79	50	2280	21100	11.0	7.5
MEAN		10.0	61.4	20	7.0	20	41	79	50	2320	24300	12.0	9.3
LSD(0.10)**		1.6	8.0	10	0.4	2	2	1	2	150	4100	1.7	3.5

Normalized Corn Hybrid Silage Yield and Quality During 1990-1999 in Wisconsin



Corn Specialty Hybrid Silage Yield and Quality During 1990-1999 in Wisconsin



Lauer

University of Wisconsin - Madison

Criteria for Selecting Silage Hybrids

- **Grain yield: allows flexibility (dual purpose)**
- **Whole plant silage yield**
- **Relative maturity: 5-10 days later than grain hybrids**
- **Standability: allows flexibility**
- **Pest resistance**
- **Silage quality**

"Variation for silage yield and quality exists among commercial hybrids in Wisconsin."