



# On-Farm Evaluation of Nitrogen and Phosphorous Nutrient Management



# Program History

- Program first introduced as pilot in 2006
- Conservation Security Program (CSP)
  - Blue Earth River Watershed
- U of M Rate Guidance Changes
  - Multi state regional approach for N guidance
  - Economic considerations for determining rates
  - Huge rate changes on irrigated sands
- Iowa On-Farm Network successes
- Develop a tool to work with farmers in vulnerable groundwater recharge areas

# Nutrient Management Initiative

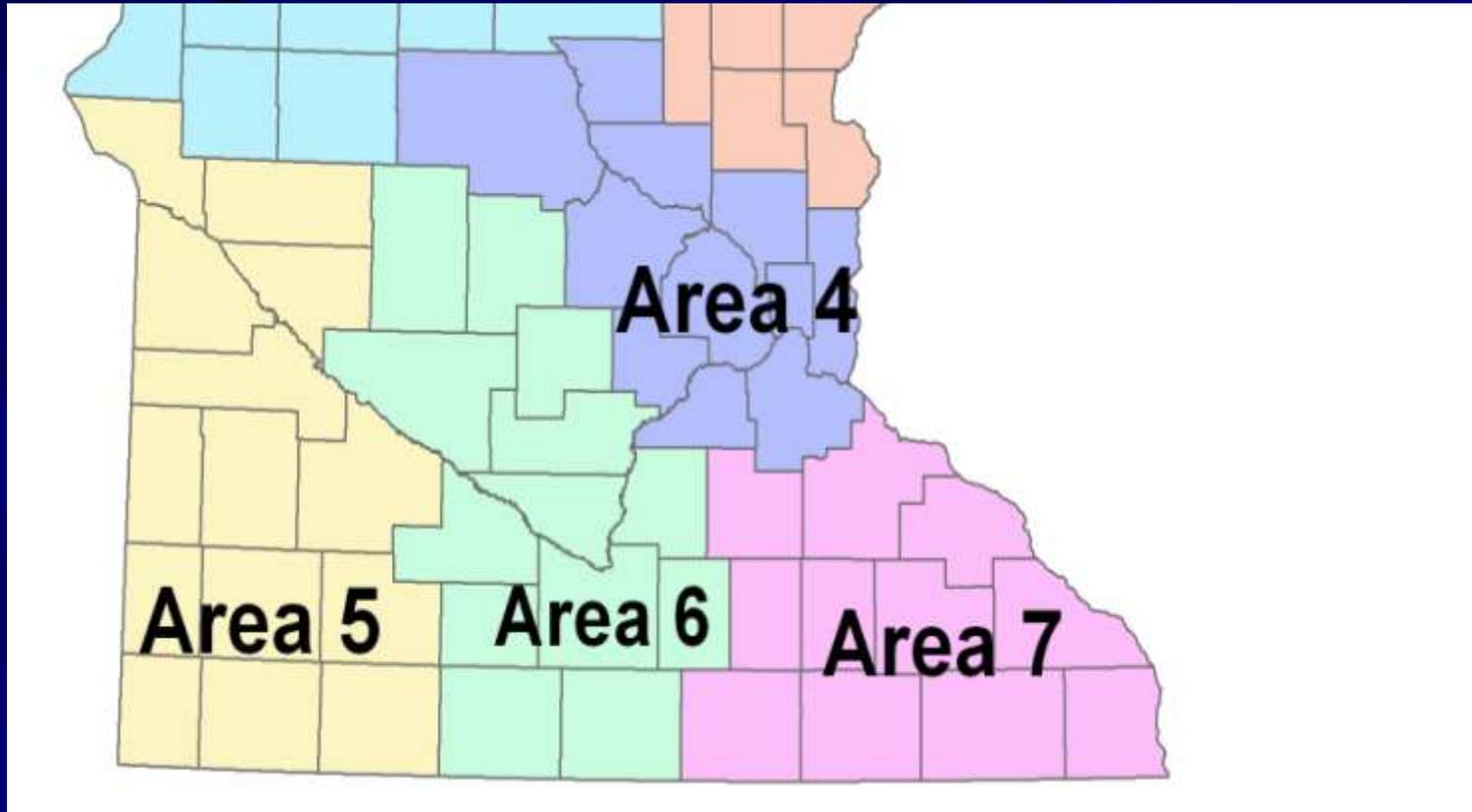
## *On Farm Evaluation*

- Sponsored by USDA-NRCS in collaboration with Minnesota Department of Agriculture.
- Purpose
  - Education—
  - Evaluate economics of nutrient management decisions
  - Assists NRCS with evaluating nutrient management guidance
  - MDA's—**State Nitrogen Fertilizer Management Plan—BMP evaluation**

# Nutrient Management Conference Rochester February 15<sup>th</sup>

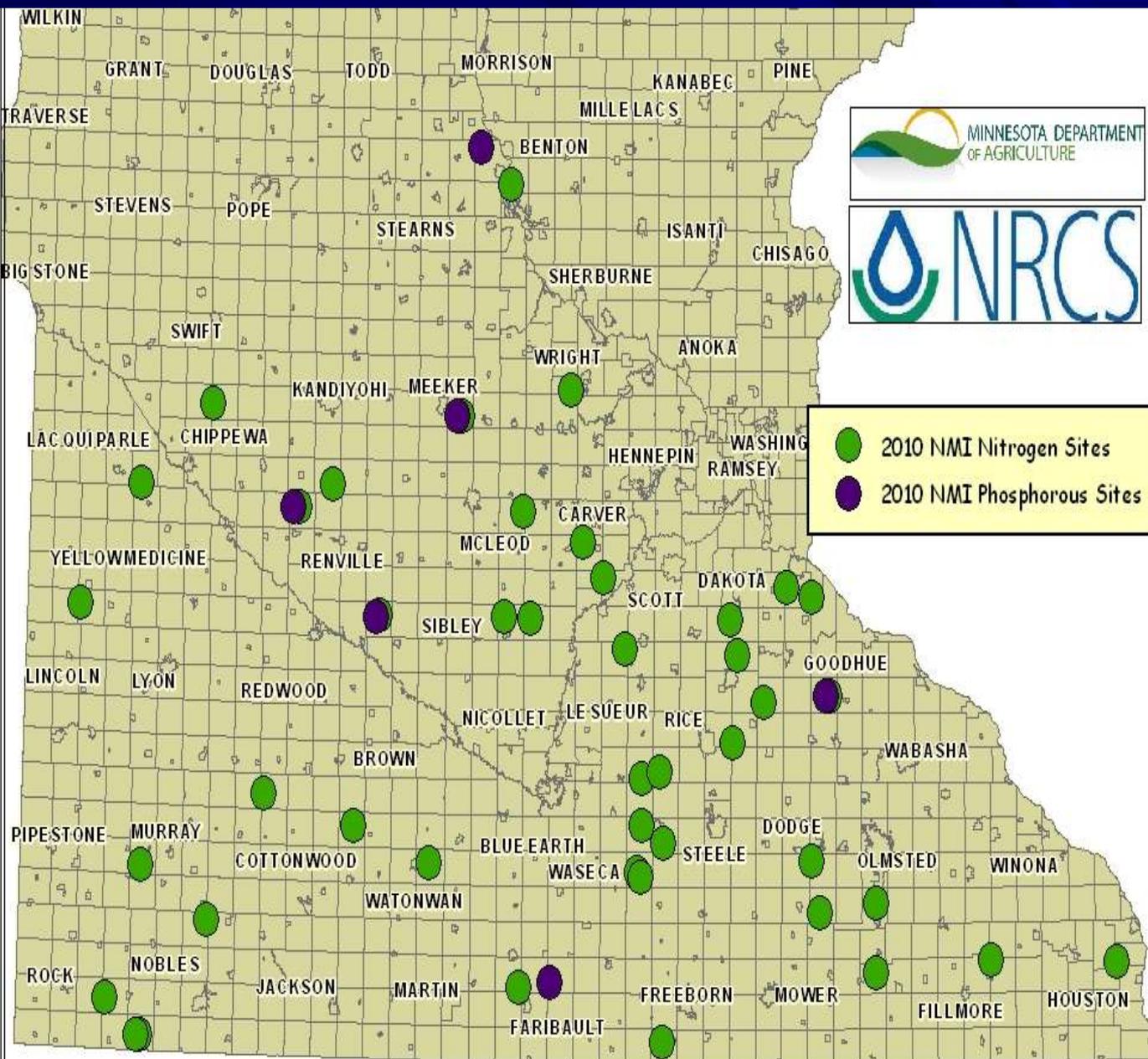


# Eligible Areas of the State



**\*Outside of Areas 4, 5, 6, & 7—Any Vulnerable Wellhead Protection Area**

# 2010 Nutrient Management Initiative Locations



**43 Nitrogen**  
**6 Phosphorous**  
**22 Counties**

# Nutrient Management Initiative—Design

- Either nitrogen or phosphorous site
- 2 Rates replicated 3X
- Minimize variables other than N or P
  - No manure or alfalfa history for past 5 years
- Current soil test required
  - High and very high testing phosphorous fields

# Nutrient Management Initiative—Design

- Nitrogen Guidance—Treatment A (low rate)
  - **100-140#** per Acre corn following soybeans
  - **140-180#** per Acre corn following corn
- Treatment B (high rate)
  - **Maintain at least 30# rate separation**
- Strip size—minimum of 40' wide by minimum of 600' long—can be larger
  - Low N rate check=150-200' length
- Harvest—1 combine swath per strip
- Weigh wagon or yield monitor

Treatment A &  
Treatment B  
must maintain a  
minimum 30#  
rate difference

**Treatment B**

**Treatment A**

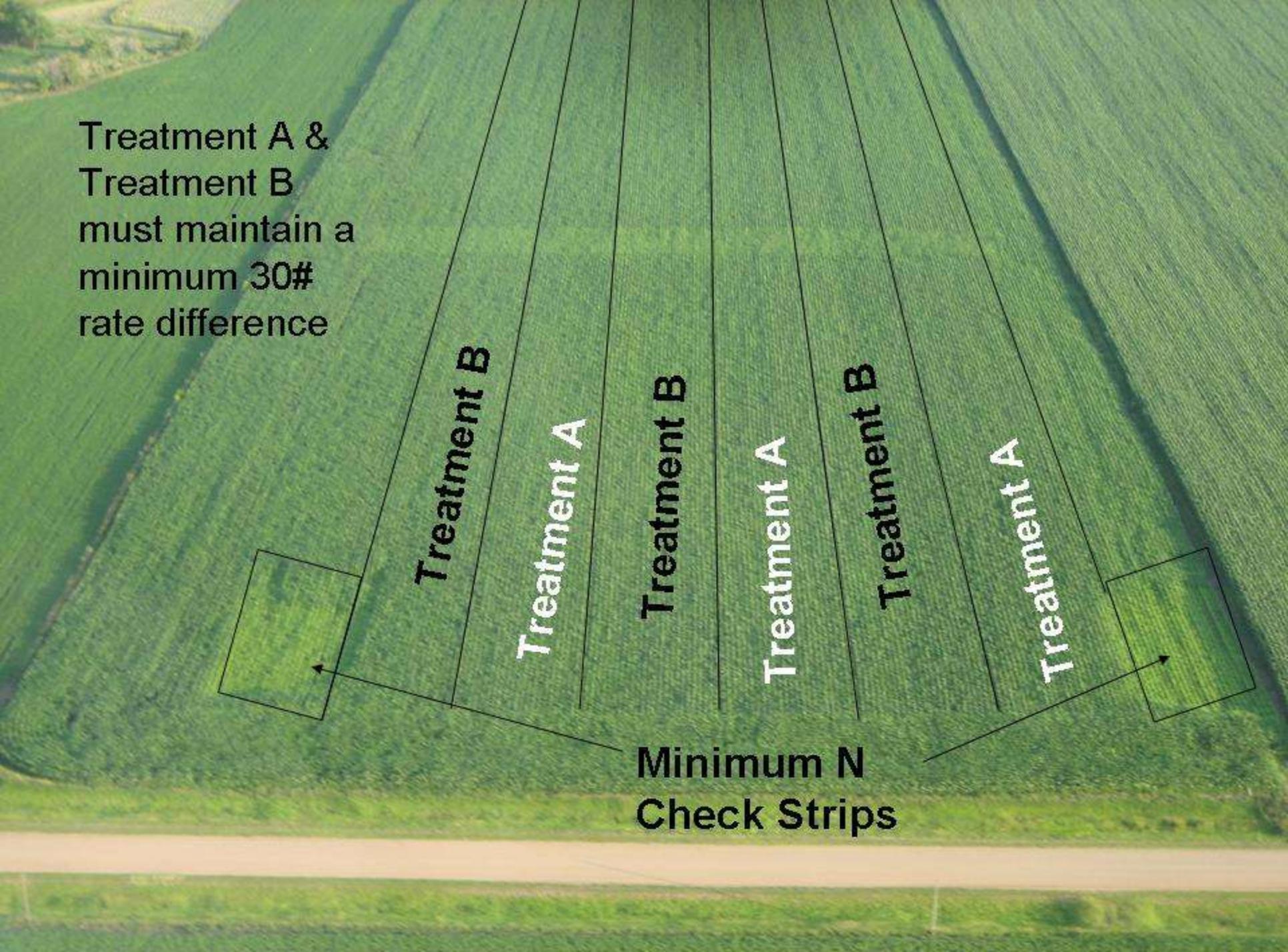
**Treatment B**

**Treatment A**

**Treatment B**

**Treatment A**

**Minimum N  
Check Strips**





**Precision Agriculture  
Enhances the Program**

# Payment and Data Submittal

- Farmer receives \$1200 payment through NRCS EQIP program for participation
- Farmer required to work with Certified Crop Adviser—payment from farmer
- Certified Crop Adviser validates
- Cropping information submitted by **July 1<sup>st</sup>**
- Harvest information submitted by **December 1<sup>st</sup>**
- MDA collects and organizes data



# 2010 Nutrient Management Initiative Results Nitrogen Rate Comparison



County	Sibley	Previous Crop	Soybeans	Soil Test Information	
Township	Arlington	History	New Site	Texture	clay loam
Tillage System	Fall Chisel & Spring Tillage			O.M. %	3.5
Irrigated	Planting Date	Row width	Population	Hybrid/Variety	ph
No	4/21/2010	30	36,000	DKC 48-37	7
Pesticide:	Surpass	Round-up	Callisto	PhosBray ppm	21
Rate	1.5 pts.	24 oz	2 oz	Phos Olsen ppm	
Harvest Date	10/23/2010	Comments		Potassium ppm	162

Treatment A--(low rate)* (1)						Total Plant Food Per Acre						
Nutrient Source	Cost per ton	Rate lbs./Acre	Application Date	Timing/ Placement	Applied on N Check	N total lbs./A	P2O5 total lbs./A	K2O total lbs./A	Sulfur	Zinc		
82-0-0	\$436.00	146	11/15/09	Fall Band	No	120	0	0	0	0		
0-0-60	\$556.00	120	11/05/09	Fall Brdcast	Yes	0	0	72	0	0		
10-34-0	\$380.00	55	04/21/10	Starter	Yes	5.5	19	0	0	0		
Nitrogen Stabilizer Used?						Yes	TPF/Acre	125.5	19	72	0	0

Treatment B--(high rate)* (2)						Total Plant Food Per Acre						
Nutrient Source	Cost per ton	Rate lbs./Acre	Application Date	Timing/ Placement	Applied on N Check	N total lbs./A	P2O5 total lbs./A	K2O total lbs./A	Sulfur	Zinc		
82-0-0	\$436.00	183	11/15/2009	Fall Band	No	150	0	0	0	0		
0-0-60	\$556.00	120	11/5/2009	Fall Brdcast	Yes	0	0	72	0	0		
10-34-0	\$380.00	55	4/21/2010	Starter	Yes	5.5	19	0	0	0		
Nitrogen Stabilizer Used?						Yes	TPF/Acre	155.5	19	72	0	0

Yield Results						Weighing Method		Weigh Wagon		
Strip Number	Total N	Harvested Length in Feet	Row Width Inches	# of Rows Harvested	% Moisture	Test Weight	Harvest Weight	Adjusted Yield @ 15.5%	Lodging Score 1-5 (5 worst)	Yield Averages
Check	5.5	196	30	8	14.5	57.0	890	178.70		Check Ave.
1	125.5	656	30	8	14.6	57.5	3200	191.74		175.70
2	155.5	665	30	8	14.5	57.5	3330	197.06		Treatment A (low)
3	125.5	665	30	8	15.0	58.0	3430	201.79		198.16
4	155.5	672	30	8	14.8	57.5	3350	195.49		Treatment B (high)
5	125.5	676	30	8	14.7	58.0	3460	200.95		192.38
6	150.5	678	30	8	14.9	58.0	3330	192.38		194.98
Check	5.5	226	30	8	15.2	57.5	1000	172.70		

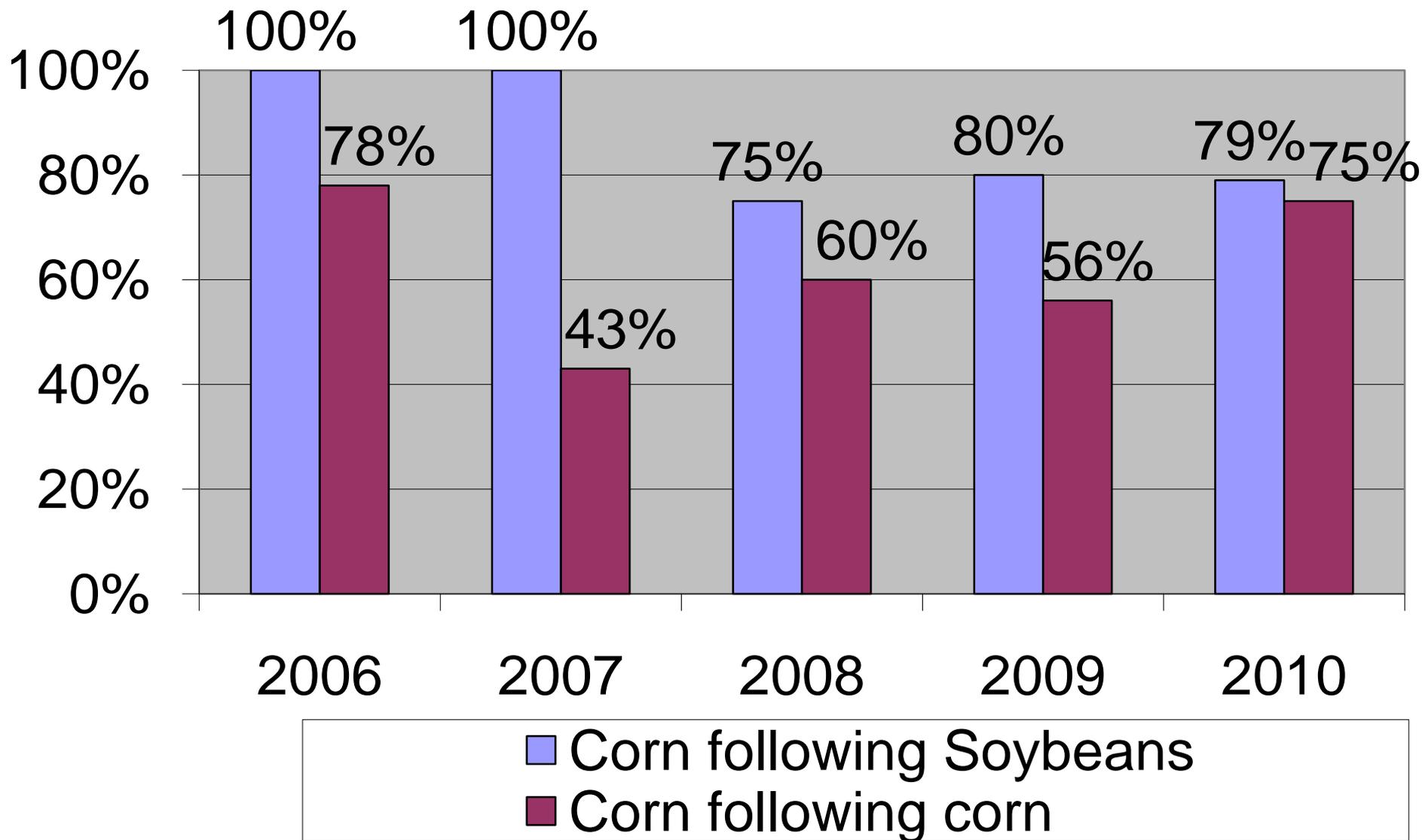
Nitrogen Cost per lb. of actual N	0.27	*Based on farmers actual costs & predominant nitrogen source	
Nitrogen to Corn Price* Ratio	0.07	University of Mn. Rate Guidelines	104-131
Corn price based on \$3.65 per bushel--results from Minnesota Farm Business Management-Marshall & Red Wing			
Additional Cost for	30 lbs. of N per acre		\$8.10
Yield Difference from Additional N	-3.18 bushels/acre or		-\$11.62
Net Return from Additional N per acre @ \$3.65/bu			(\$19.72)

\*(1) Treatment A (lower rate)-- com following soybeans-80-140#/A com following com-120-180#/A  
 \*(2) Treatment B (higher rate--Must maintain a 30# rate difference

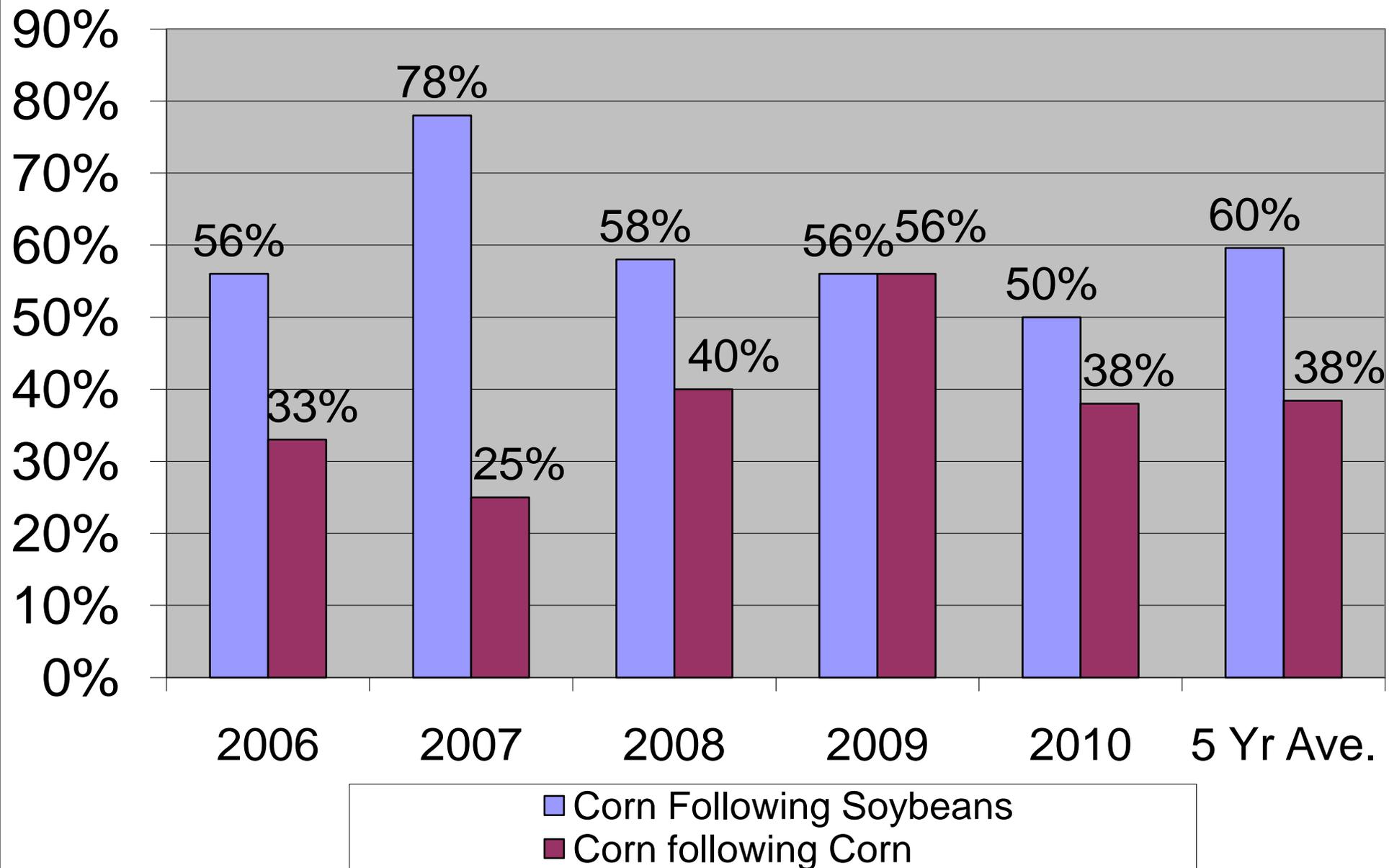
# Economic Evaluation Report

Sent to Participating Farmer and Crop Consultant

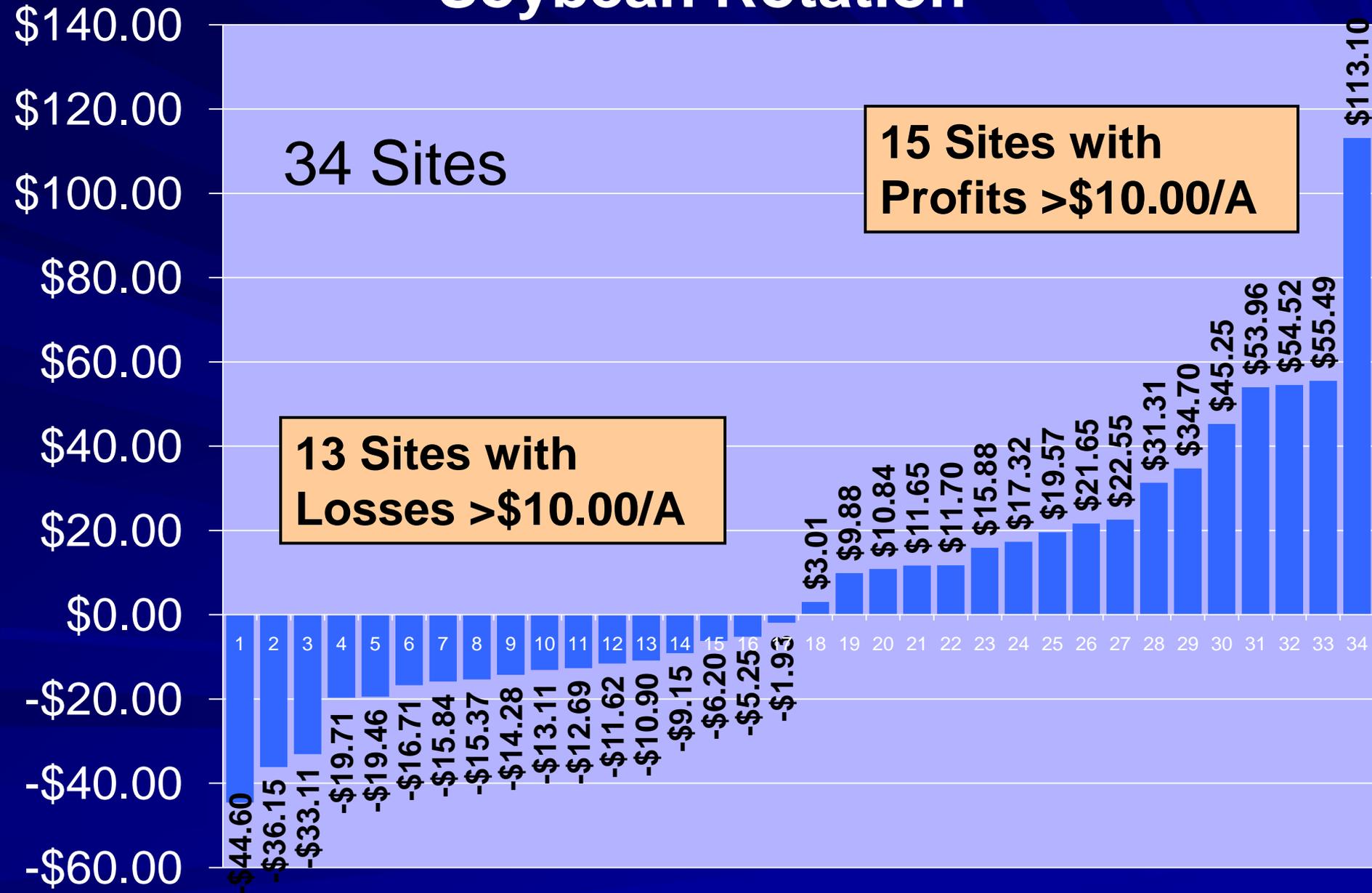
# Yield Advantage from Additional N



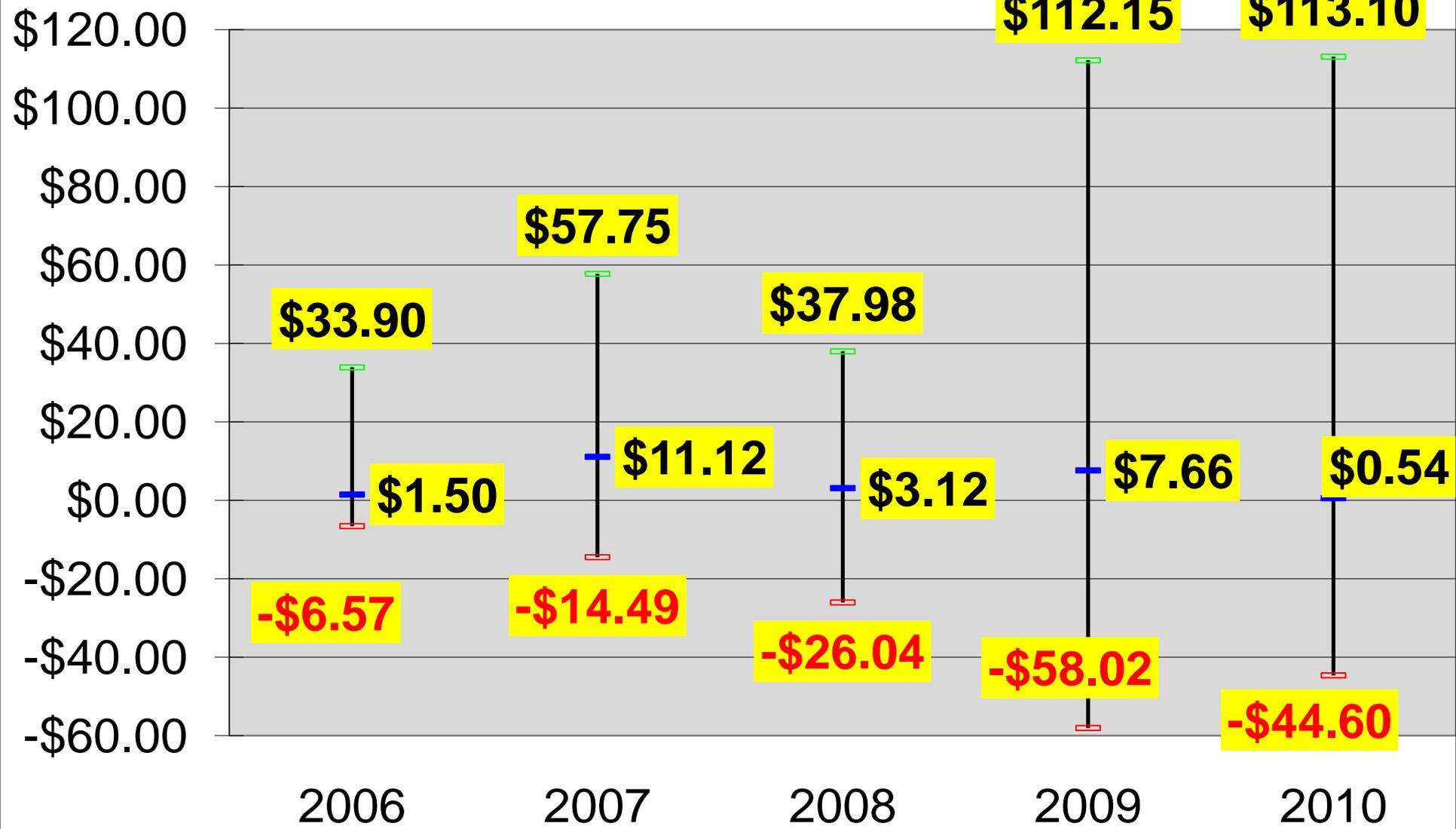
# Economic Advantage from Additional N



# 2010 Net Return from Additional N Soybean Rotation

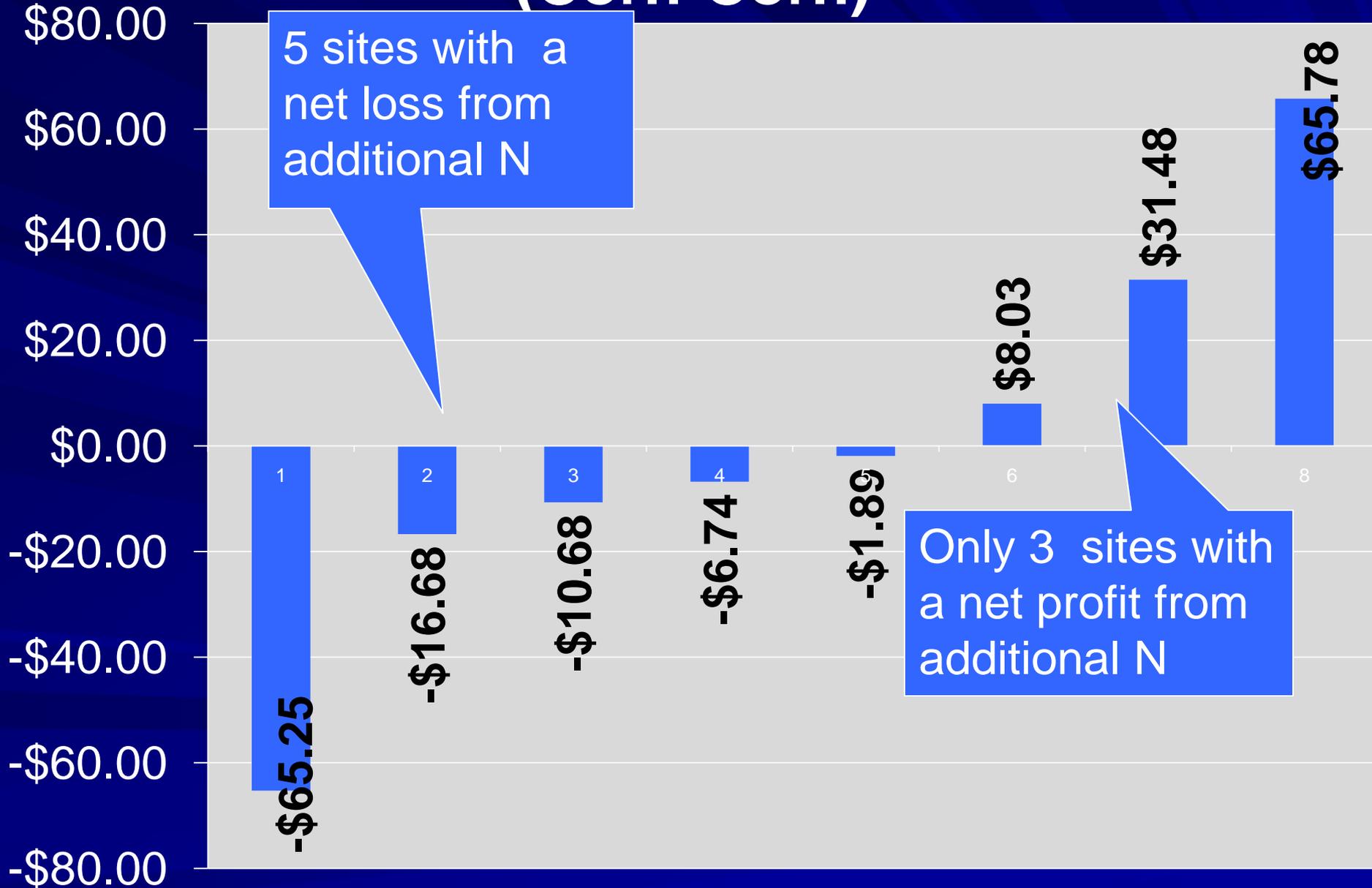


# Corn Following Soybeans (Value of Additional Corn minus N Cost)

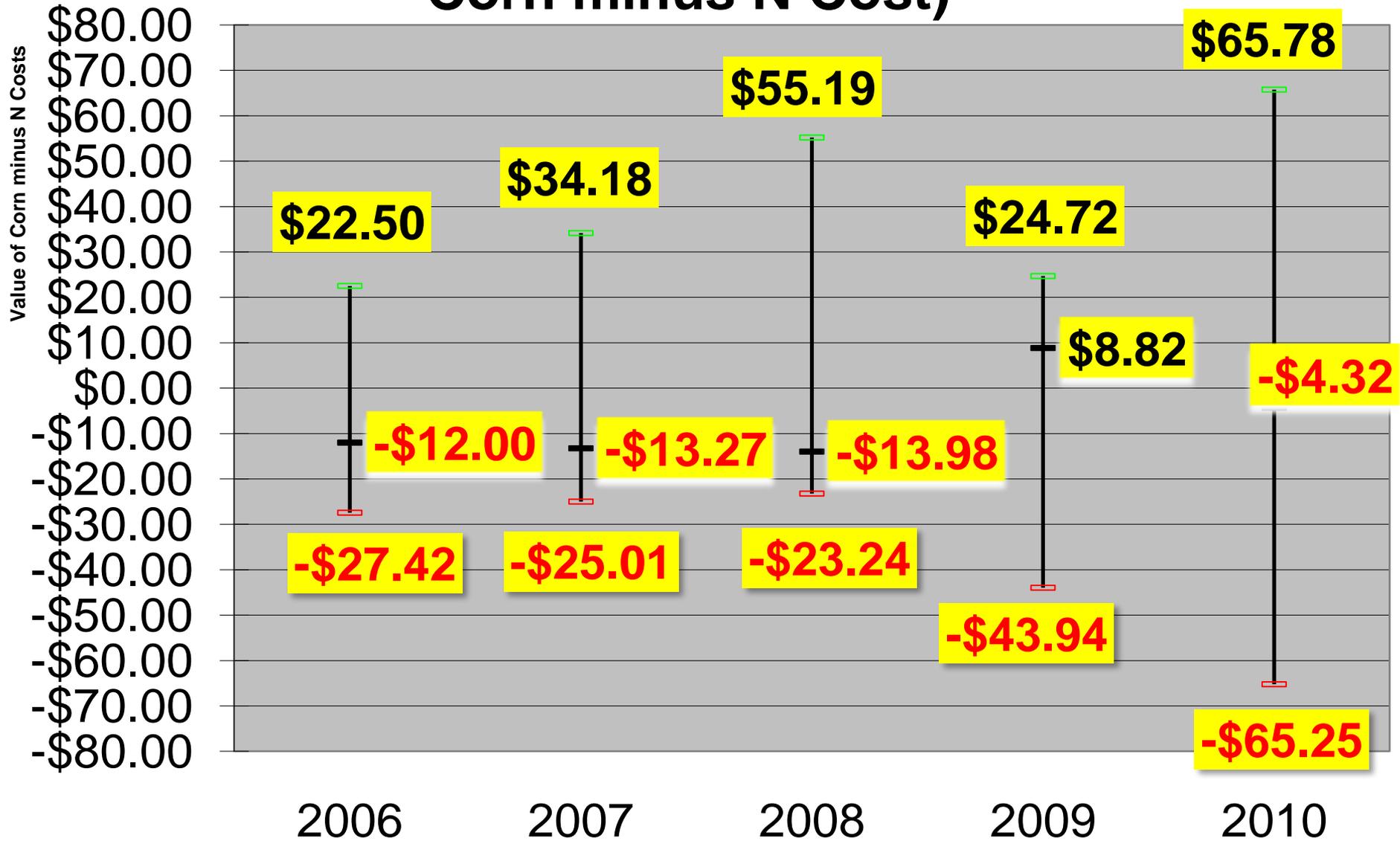


— Highest Return    — Lowest Return    — Median Value

# 2010 Net Return from Additional N (Corn-Corn)



# Corn Following Corn(Value of Additional Corn minus N Cost)

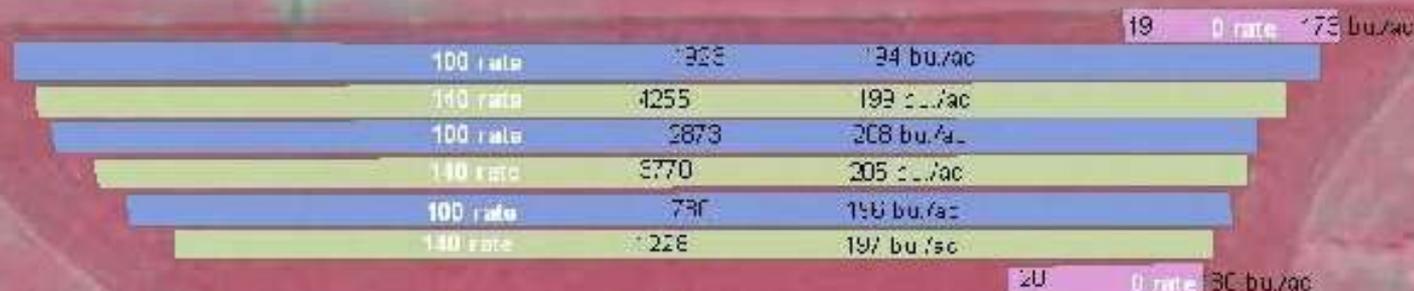


— Highest Return — Lowest Return — Median Value

# Basal Stalk Testing

## BSNT Interpretation

<700 ppm = Deficient  
700-2000 ppm = Optimal  
>2000 ppm = Excessive



## Average BSNT result (ppm)

0 rate = 19  
100 lb.N/a = 1858  
140 lb.N/a = 3084

## Average Yield (bu./ac)

0 rate = 177  
100 lb.N/a = 199  
140 lb.N/a = 200

# Program Evaluation

- 2008 NMI participant survey
  - 95% agreed program should continue
  - 82% very satisfied with the program
- 2009 Certified Crop Consultants survey
  - 50% of farmers made rate changes & 8% made timing changes
  - 100% agreed NMI assisted in evaluation
- 2010 Evaluated first 4 years of results
  - Evaluated rates, timing, sources, and starter fertilizer influence

# Conclusions

- **Economic advantage—High N rate comparison**
  - 60% of time corn following soybeans
  - 38% of the time corn following corn
- **Advantage—split applications of N using higher N rate**
  - SB/C rotation yield advantage 92% of the time
  - Corn/corn yield advantage 50% of time
- **Check strips—70% of overall yield 70% of the time**
- **Corn Production Efficiency**
  - S-C .61-.75# of N per bushel of corn
  - C-C .98-1.14# of N per bushel of corn



**“Build confidence and validate nutrient management decisions”**



**“One on One”  
Involvement with  
Nutrient Management  
Education**



**“Interest with overall regional results”**



**“Implementation Strategy” where groundwater quality is at risk**



**NUTRIENT  
MANAGEMENT  
INITIATIVE FUTURE**

**FUNDING?  
OTHER PARTNERS?**



[www.mda.state.mn.us/nmi](http://www.mda.state.mn.us/nmi)

**Brian Williams**

**Minnesota Department of Ag**

**507-665-6806**

[brian.c.williams@state.mn.us](mailto:brian.c.williams@state.mn.us)

