REACTING TO HIGH NITROGEN COSTS AND LIMITED SUPPLIES

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Background

- N fertilizer prices have increased substantially for 2001.
- Supplies of N fertilizers may be limited.
- Producers have questions about optimum N rates and management in this situation.

Strategies for Using Available N Supplies Efficiently

- Identify economic optimum N rate
- Apply some N to all responsive acres
- Credit N from non-fertilizer sources
- Use diagnostic tests where appropriate
- Manage applied N to avoid losses

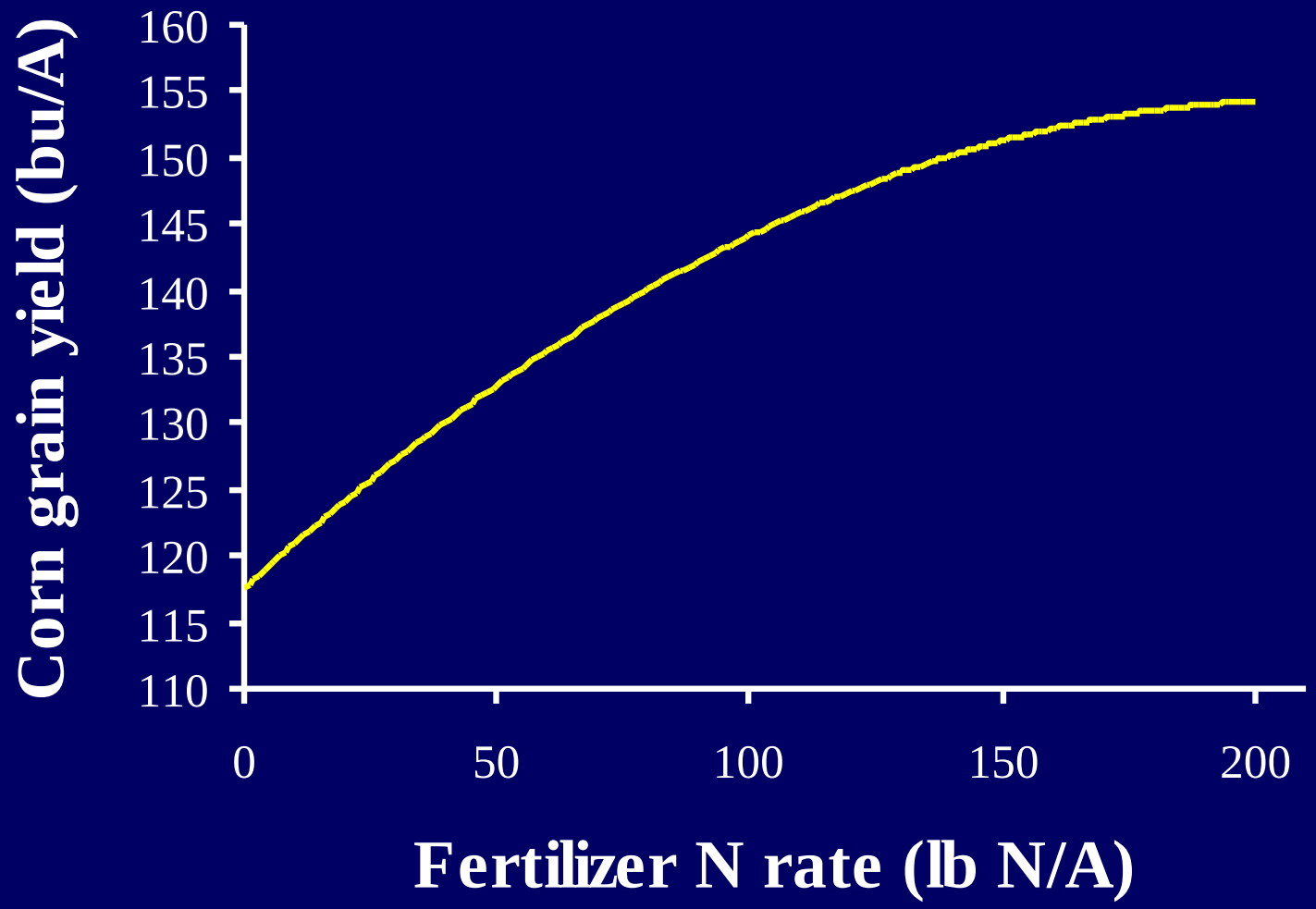
Economic Optimum N Rate

Cost of last increment of N added	=	Value of yield increase produced

Selecting the Economic Optimum N Rate

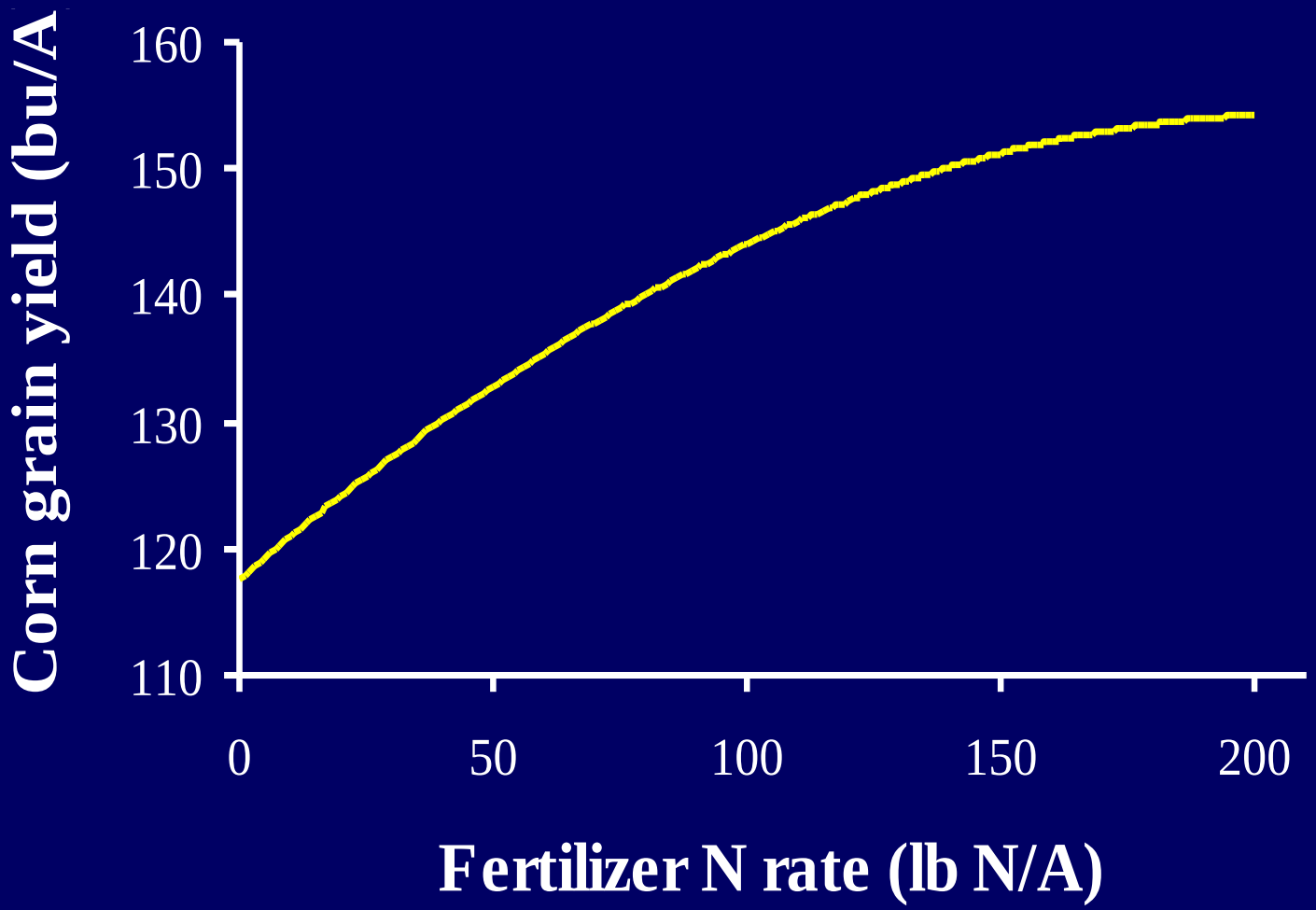
- Depends on corn:N price ratio.
- Largest gains in return occur with the first increments of applied N.
- Economic optimum N rates are not greatly affected by corn or N price changes.

Corn Grain Yield Response to N



Data: Vanotti, M.B. and L.G. Bundy. 1994. J. Prod. Agric. 7:249-256

Figure 1. Corn Grain Yield Response to N



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Selecting the Economic Optimum N Rate

- With adequate capital and N supply, select N rate based on optimizing economic return.
- A 10 to 20 % reduction in N rate will not have major effects on economic return.
- Profitability will be lowered due to higher N costs.

Corn Yield Increase and Returns from N Additions on High Yield Potential Soils in Wisconsin

N rate	Yield increase	Gross return	Return /lb N
lb N/acre	bu/acre	$/40 lb N	$
40	12.6	25.20	0.63
80	10.0	20.00	0.50
120	7.4	14.80	0.37
160	4.7	9.40	0.24
190	1.8	3.60	0.09

Returns based on $2.00/bu corn price

Economics of N use in long-term Lancaster corn data based on several corn:N price ratios

N Rate	Actual Yield	Yield increase	Increased Corn† value	Increased N fertilizer cost		
				0.15 (13.3)	0.25 (8)	0.35 (5.7)
lb/acre	----- bu/acre -----		---------- $/acre ----------			
100	119.5	5.5	11.00	3.00	5.00	7.00
120	124.2	4.7	9.40	3.00	5.00	7.00
140	128.0	3.8	7.60	3.00	5.00	7.00
160	130.3	2.3	4.60	3.00	5.00	7.00
180	132.0	1.7	3.40	3.00	5.00	7.00
200	132.5	0.5	1.00	3.00	5.00	7.00

† Corn value = $2.00/bushel.

Numbers in parentheses are the net corn:N price ratios.

Nitrogen Economic Return Calculator

- Developed by Mike Rankin, Fond du Lac County Crops and Soils Agent.
- Based on N response data for major Wisconsin soil groups
- Accessible at : http://www.uwex.edu/ces/crops/NComparison.htm

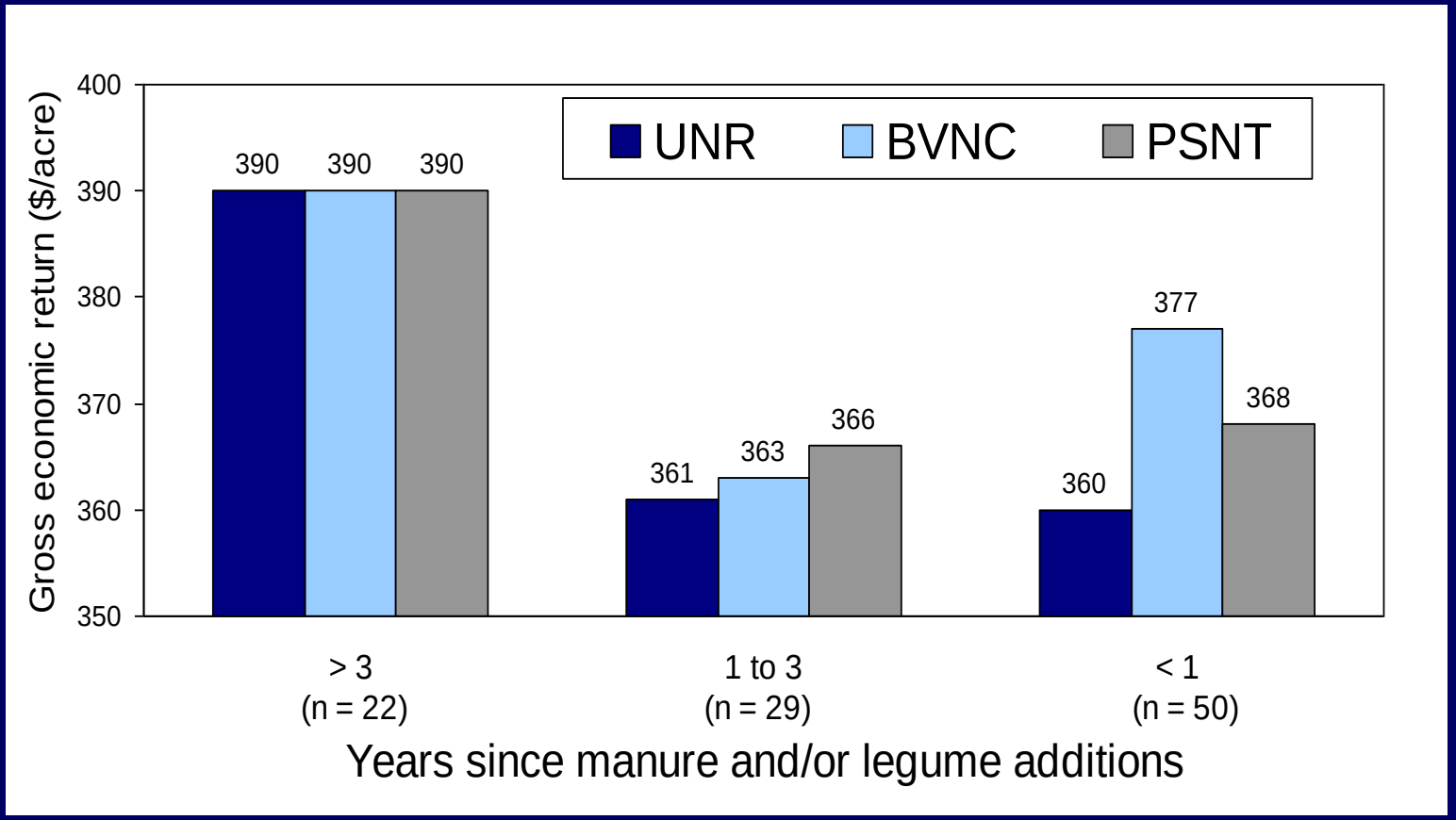
Nitrogen Economic Return Calculator

- Allows comparison of N sources at user-selected prices.
- Provides average yield increase expected at various N rates.
- Calculates net return at N rate and N and corn prices selected.
- Gives information for major Wisconsin soil groups.

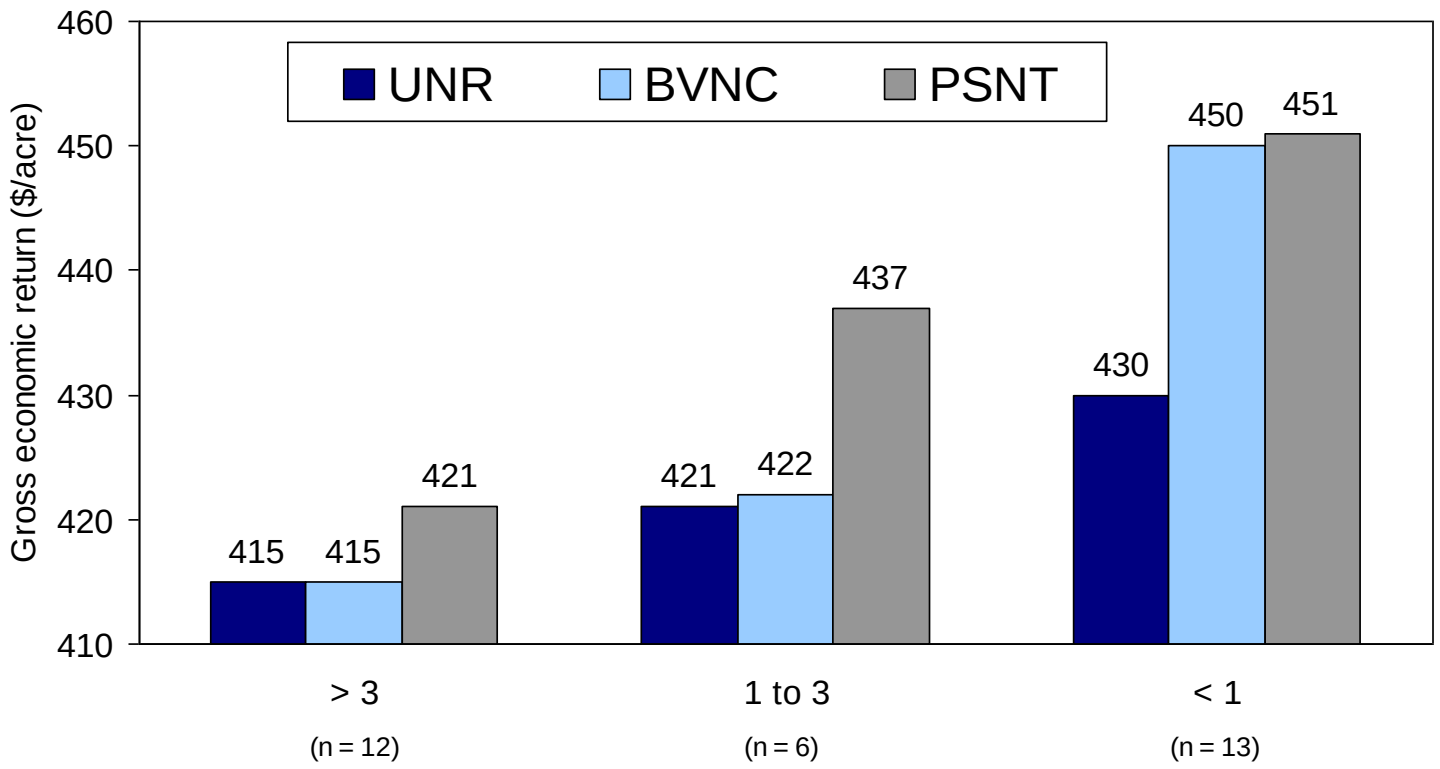
Strategies for Using Available N Supplies Efficiently

- Identify economic optimum N rate
- Apply some N to all responsive acres
- Credit N from non-fertilizer sources
- Use diagnostic tests where appropriate
- Manage applied N to avoid losses

Gross economic return from three N recommendation methods at 101 Wisconsin locations, 1989 to 1999.



Gross economic return at 31 sites with high yield potential soils and average to above average May-June air temperatures, 1989 to 1999.



Economic gain from N recommendations based on N credits or the presidedress nitrate test

Legume/Manure History	Sites	Method	Corn:N price ratio	
			High (16.7)	Low (5.1)
			-Economic gain, $/acre-	
< 1 yr.	50	BVNC	15	37
		PSNT	14	35
1-3 yr.	29	BVNC	3	10
		PSNT	6	20
> 3 yr.	22	BVNC	0	0
		PSNT	0	12

High = ($2.50:$0.15), Low = ($1.80:$0.35)

Effectiveness of N test in predicting optimum corn in rate, inorganic sites

Recom. Method	Accuracy*		
	Correct	Over Applied	Under Applied
	- - - - - - - - - - % - - - - - - - - - -		
STD.	22	67	11
PPNT	89	0	11
PSNT	67	11	22

*High yield potential soils. Correct if ± 30 lb N/a of observed optimum.

Effectiveness of N test in predicting optimum corn N rate, organic sites

Recom. Method	Accuracy*		
	Correct	Over Applied	Under Applied
	- - - - - - - - - - - - - - - % - - - - - - - - - - - - - - -		
STD.-BVNC	8	77	15
PPNT-BVNC	38	38	24
PSNT	62	23	15

*High yield potential soils. Correct if ± 30 lb N/a of observed optimum.

BVNC = Book value N credit

Prioritizing N Applications

- Apply some N to all potentially responsive acreage.
- This will increase return from N use more than applying the full rate to some acres and no N to others.

Prioritizing N Applications

- Credit N from non-fertilizer sources
  - ✓Corn following alfalfa usually does not need N
  - ✓No responses to more than 40 lb N/acre
  - ✓Fully credit manure N
  - ✓Take 40 lb/acre credit for soybean

Prioritizing N Applications

- Use diagnostic tests to identify N needs
  - ✓Economic return from using tests is much greater when corn:N price ratios are unfavorable.
  - ✓PSNT can help identify organic N contributions.
  - ✓Preplant nitrate test can account for residual N from previous management.

Prioritizing N Applications

- Manage N to avoid losses
  - ✓Use sidedress applications where leaching is probable.
  - ✓Manage urea N sources to minimize ammonia losses.
  - ✓Incorporate or inject manure to conserve N.

Nitrogen Recommendations for Corn

	Sands & loamy sand		Other soils	
			Yield Potential	
Organic matter	Irrigated	Non-irrigated	Med/low	Very high/ high
---%---	----------lb N/acre----------			
<2	200	120	150	180
2-9.9	160	110	120	160
10-20	120	100	90	120
>20	80	80	80	80