Implementation of Regional Nitrogen Fertilization Guidelines for Corn in Wisconsin

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New Guidelines …

- Use regional philosophy
- Are soil and rotation based

Information needed to use new guidelines

- Soil yield potential
- Previous crop
- N:corn price ratio

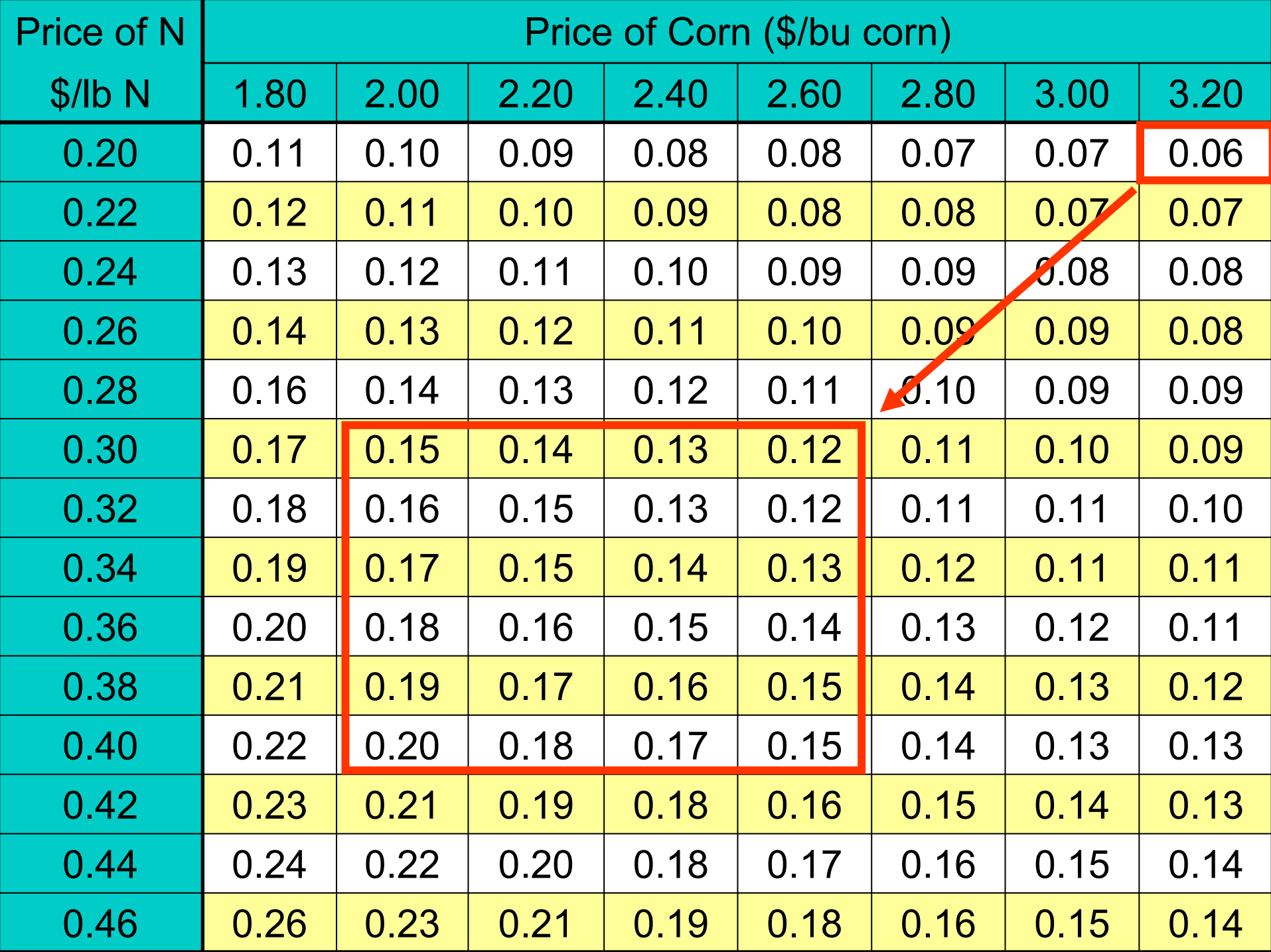
Soil yield potential

- Based on:
  - Rooting depth
  - Water holding capacity
  - Drainage
  - Length of growing season
- Can be found in UWEX A2809

N:Corn price ratio

- Old recommendations price ratio = 0.06
- Today's price ratio ??

Price of N	Price of Corn ($/bu corn)							
$/lb N	1.80	2.00	2.20	2.40	2.60	2.80	3.00	3.20
0.20	0.11	0.10	0.09	0.08	0.08	0.07	0.07	0.06
0.22	0.12	0.11	0.10	0.09	0.08	0.08	0.07	0.07
0.24	0.13	0.12	0.11	0.10	0.09	0.09	0.08	0.08
0.26	0.14	0.13	0.12	0.11	0.10	0.09	0.09	0.08
0.28	0.16	0.14	0.13	0.12	0.11	0.10	0.09	0.09
0.30	0.17	0.15	0.14	0.13	0.12	0.11	0.10	0.09
0.32	0.18	0.16	0.15	0.13	0.12	0.11	0.11	0.10
0.34	0.19	0.17	0.15	0.14	0.13	0.12	0.11	0.11
0.36	0.20	0.18	0.16	0.15	0.14	0.13	0.12	0.11
0.38	0.21	0.19	0.17	0.16	0.15	0.14	0.13	0.12
0.40	0.22	0.20	0.18	0.17	0.15	0.14	0.13	0.13
0.42	0.23	0.21	0.19	0.18	0.16	0.15	0.14	0.13
0.44	0.24	0.22	0.20	0.18	0.17	0.16	0.15	0.14
0.46	0.26	0.23	0.21	0.19	0.18	0.16	0.15	0.14



New Guidelines

Soil and Previous Crop	N:Corn Price Ratio ($/lb N:$/bu)			
	0.05	0.10	0.15	0.20
	lb N/a (Total to Apply)			
High/ V.High Yield Potential Soils				
Corn, Forage legumes, Vegetable legumes, green manures	165 (135-190)	135 (120-155)	120 (100-135)	105 (90-120)
Soybean, Small grains	140 (110-160)	115 (100-130)	100 (85-115)	90 (70-100)
Medium/Low Yield Potential Soils				
Corn, Forage legumes, Vegetable legumes, green manures	110 (90-135)	100 (80-110)	85 (70-100)	75 (60-90)
Soybean, Small grains	90 (75-110)	60 (45-70)	50 (40-60)	45 (35-55)
Irrigated Sands & Loamy Sands				
All crops	215 (200-230)	205 (190-220)	195 (180-210)	190 (175-200)
Non-Irrigated Sands & Loamy Sands				
All crops	110 (90-135)	100 (80-110)	85 (70-100)	75 (60-90)

Notes

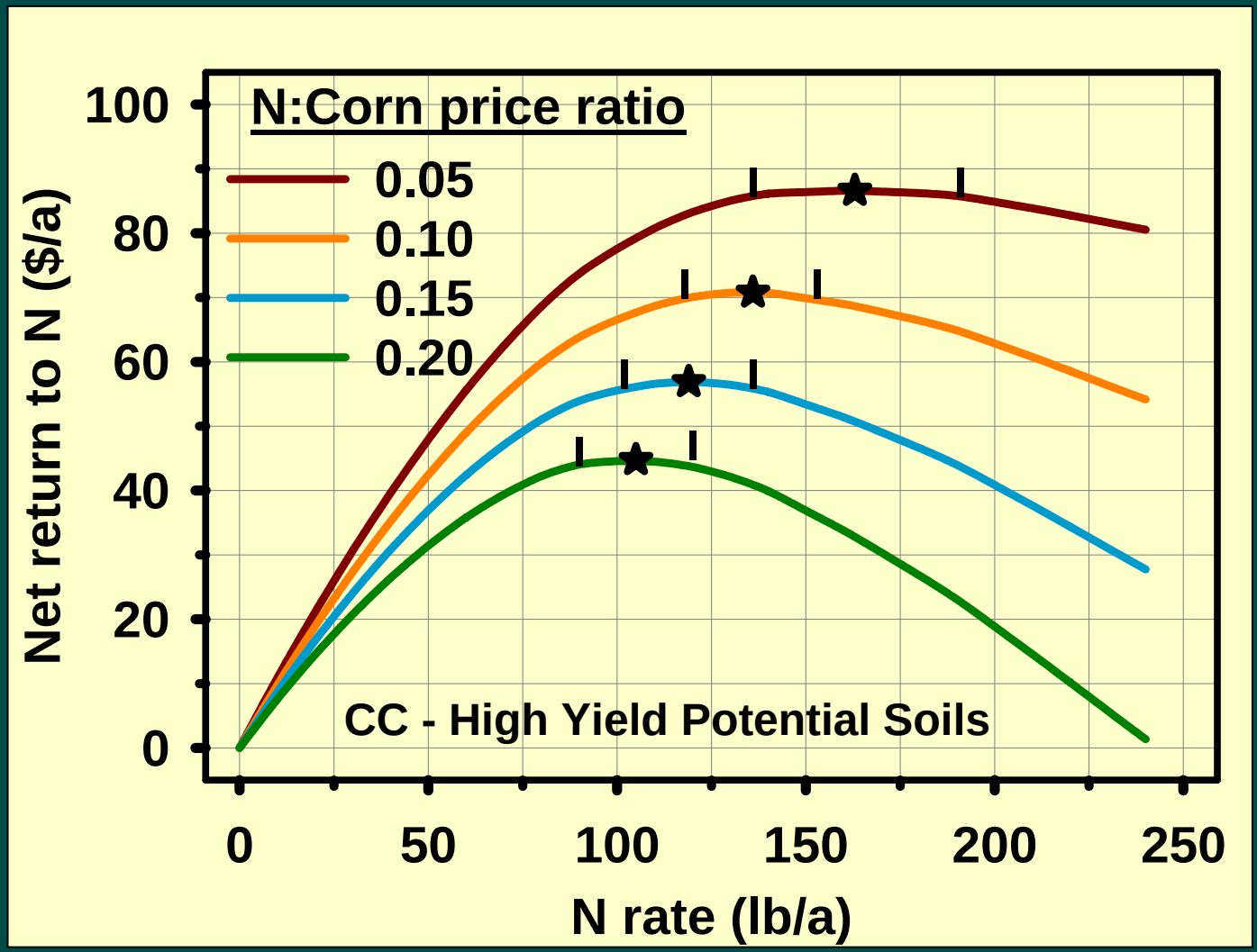
- The rate provides the maximum return to N (MRTN)
- The range provides a range of N rates that have profitability within $1/a of MRTN
- This is the total amount of N to apply
  - Includes starter N
- Subtract manure and legume credits
  - No soybean credit
- These rates assume no N losses
  - Follow N management BMPs to minimize N loss

High/V.High Yield Potential Soils

Soil and Previous Crop	N:Corn Price Ratio ($/lb N:$/bu)			
	0.05	0.10	0.15	0.20
	lb N/a (Total to Apply)			
High/ V.High Yield Potential Soils				
Corn, Forage legumes, Vegetable legumes, green manures	165 (135-190)	135 (120-155)	120 (100-135)	105 (90-120)
Soybean, Small grains	140 (110-160)	115 (100-130)	100 (85-115)	90 (70-100)

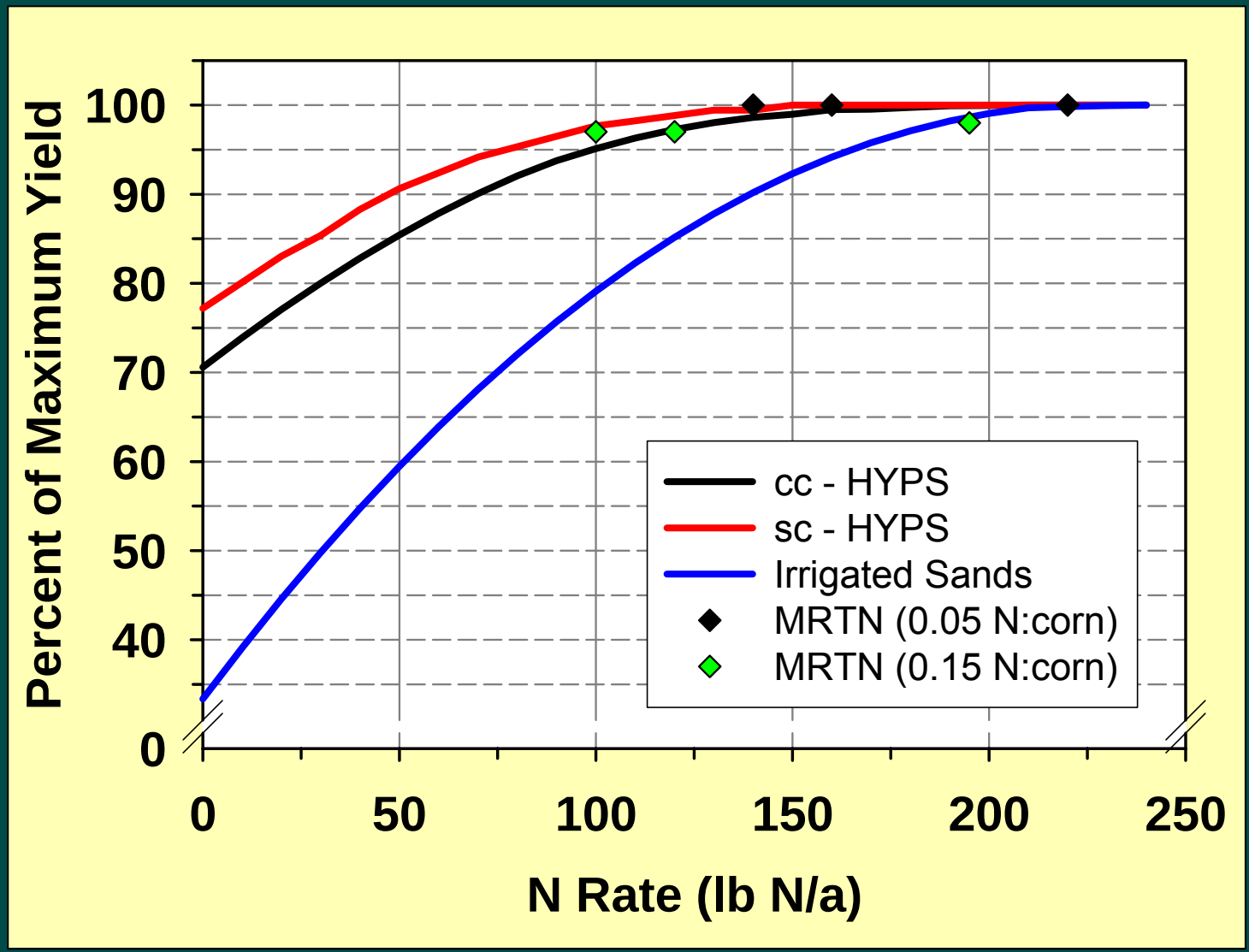
- Old recommendation for corn after corn was 160 lb N/a + up to 20 lb N/a in starter
  - Price ratio = 0.06

Profitable N Rates



- A range of N rates can produce profitable yields
- Economics clearly drives the profitable N rate

How much yield will be lost by reducing N rates?



Some guidelines for using ranges

Situation	Portion of Range to Use		
	low	mid	high
> 50 % residue cover at planting			✓
Previous crop is small grain	✓	✓	
100 % of N is from organic sources			✓ Plus up to 20 lb N/a in starter fertilizer may be applied
If there is a likelihood of residual N (carryover N)	✓		Or use PPNT

Some guidelines for using ranges

Situation	Portion of Range to Use		
	low	mid	high
Medium & fine-textured soils with > 10.0 % organic matter	✓		
Course-textured soils with < 2.0 % organic matter			✓
Course-textured soils with > 2.0 % organic matter	✓	✓	

N credits

- There is no longer a N credit for soybean
  - Use values listed in the tables
- Forage legume, leguminous vegetable, and green manure N credits remain the same
- Manure N credits remain the same

N credits

- PSNT is used as a N credit
  - First determine target N rate, then subtract PSNT credit from the target N rate
  - Previously, PSNT values provided different target sidedress N rates
- PPNT is unchanged
  - Use high end of range and subtract the credit

PSNT ppm	Yield Potential N credit — lb N/a — High	Med.
≥ 21	*	*
18-20	100	80
15-17	60	80
13-14	35	40
11-12	10	40
≤ 10	0	0

* No additional N is needed

Corn after soybean example
Data from actual field experiment

Soil	Silt loam, high yield potential, 2.5 % organic matter
Rotation	Soybean, **CORN**
5 yr average yield	190 bu/a
Manure application	None within the past 4 years
Weather	Slightly cool in early May, then seasonable
N price	$0.35/lb N
Grain price	$2.20/bu
N:Corn price ratio	0.16

Corn after soybean example

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NEW

Old = 120 lb N/a + up to 20 lb N/a in starter

Actual: Max yield = 213 bu/a at 120 lb N/a

Most profitable yield = 211 bu/a at 100 lb N/a

Valuing grain

- If grain is sold, place a realistic value on it
  - Value may differ between farms based on marketing strategies
- If grain is used as feed on farm,
  - Value grain at the price it would cost to purchase grain for feed

Valuing manure N

- Value is dependent upon farm situation

1. If adequate land base to spread manure,
   - Then value could be equal to fertilizer N

2. If land base is limited,
   - Spread manure at a rate not to exceed the amount needed to max yield
     - N:corn price ratio 0.05 (top end of range)

Corn Silage

- Percent max. silage yield at a given N rate is same as grain
- Silage quality not greatly impacted by N rate
- If feeding all silage on farm,
  - Use mid to upper end of 0.05 N:corn price ratio
- If selling silage and producer wants to reduce N rate,
  - Then can do so by choosing an appropriate N:corn grain price ratio

Nutrient Management Standards

- Standards specify recommendations in A2809, 1998 edition
  - Less N can always be applied
- Very rarely will these new guidelines produce a N recs. greater than A2809
- These new guidelines can be used in nutrient management plans

Updating extension materials

- Laboratory reports before the spring soil sampling season
- A2809 update in summer 2006
- Other bulletins as we get to them
- Fast Facts – when $$ permit

N Rate Calculator

- Updated to reflect new UWEX guidelines
  - Mike Rankin, UWEX-Fond du Lac
  - http://www.uwex.edu/ces/crops/NComparison.htm
- Regional Calculator
  - Shows details of all states
  - WI data is high yield potential soils only
  - http://extension.agron.iastate.edu/soilfertility/nrate.aspx

Summary

- Uses regional philosophy
- Confirms old recommendations
- Provides for producer flexibility
- Can be used in nutrient management plans

QUESTIONS?

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Larry Bundy
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