Increasing Fertilizer Efficiency

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Nitrogen prices are high-

35-55 cents/lb N.

Gas prices have been hovering around $8/MMBTU all year.

More and more of our N supply (about 50%) is imported.

The infrastructure of pressurized ships, port facilities, pipelines and rail is not great enough to handle the increased need. There is little incentive to domestic manufacturers to make imports easier to obtain.

Urea is also being imported in record quantities, but the distribution network is operated by companies involved with manufacture. There is little incentive to “cut deals”, and the result is charging what the market will bear.

In addition, the ITC has ruled that the tariffs on Russian and eastern bloc urea into the US stay in place for another 5 years, meaning that a large source of cheaper product is not available for reasonable shipment into the US.

Recently, the ruling has come up again, but with Russia/US relations on the chill again, the outcome is doubtful, unless an olive branch is needed.

Corn is the number 1 user of N in the US. Last year's 15% rise in corn acreage caused a major scrambling for product and a substantial price jump.

This year, acreage is expected to remain high.

Relatively high corn yield in the central corn belt and relatively high corn prices will keep N rates high despite the costs and despite University research that suggests backing off rates would be economically prudent.

Management Strategies-

Use of soil testing to identify residual N.

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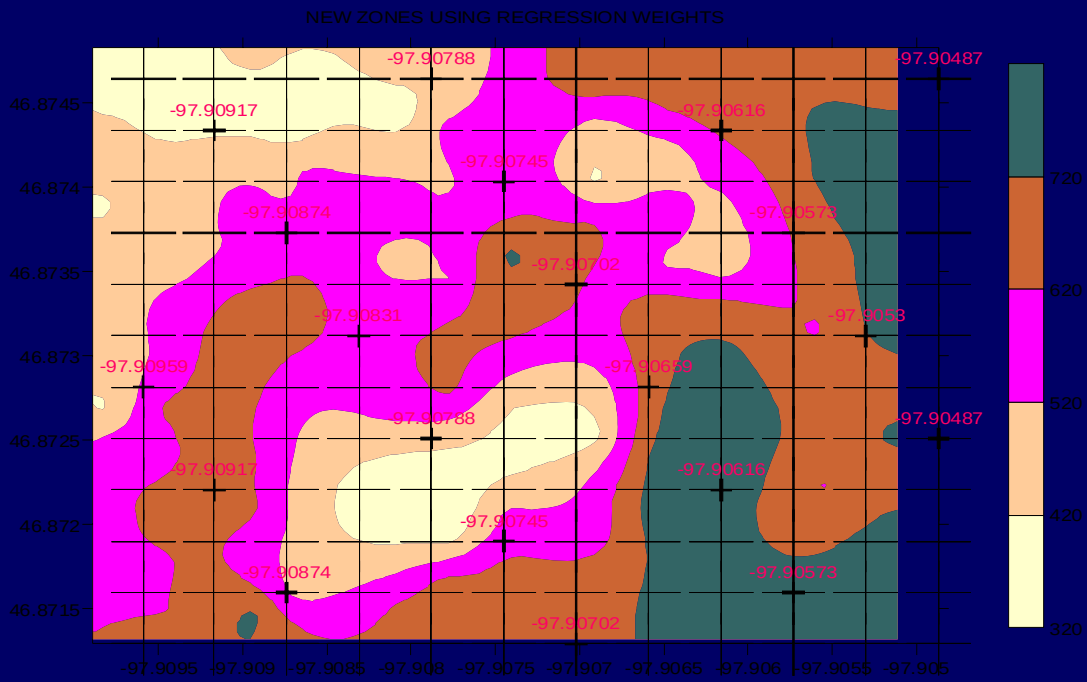
Sampling by zone will result in more confidence in the number.

Tools that we found to be helpful in zone delineation were-
topography, yield frequency maps, soil EC, aerial/satellite imagery

Dividing data sets into classes that make 3-5 zones greatly improves understanding of residual N patterns and provides opportunities for management.



Management Strategies-

Alternative crops

-Crops that require no N

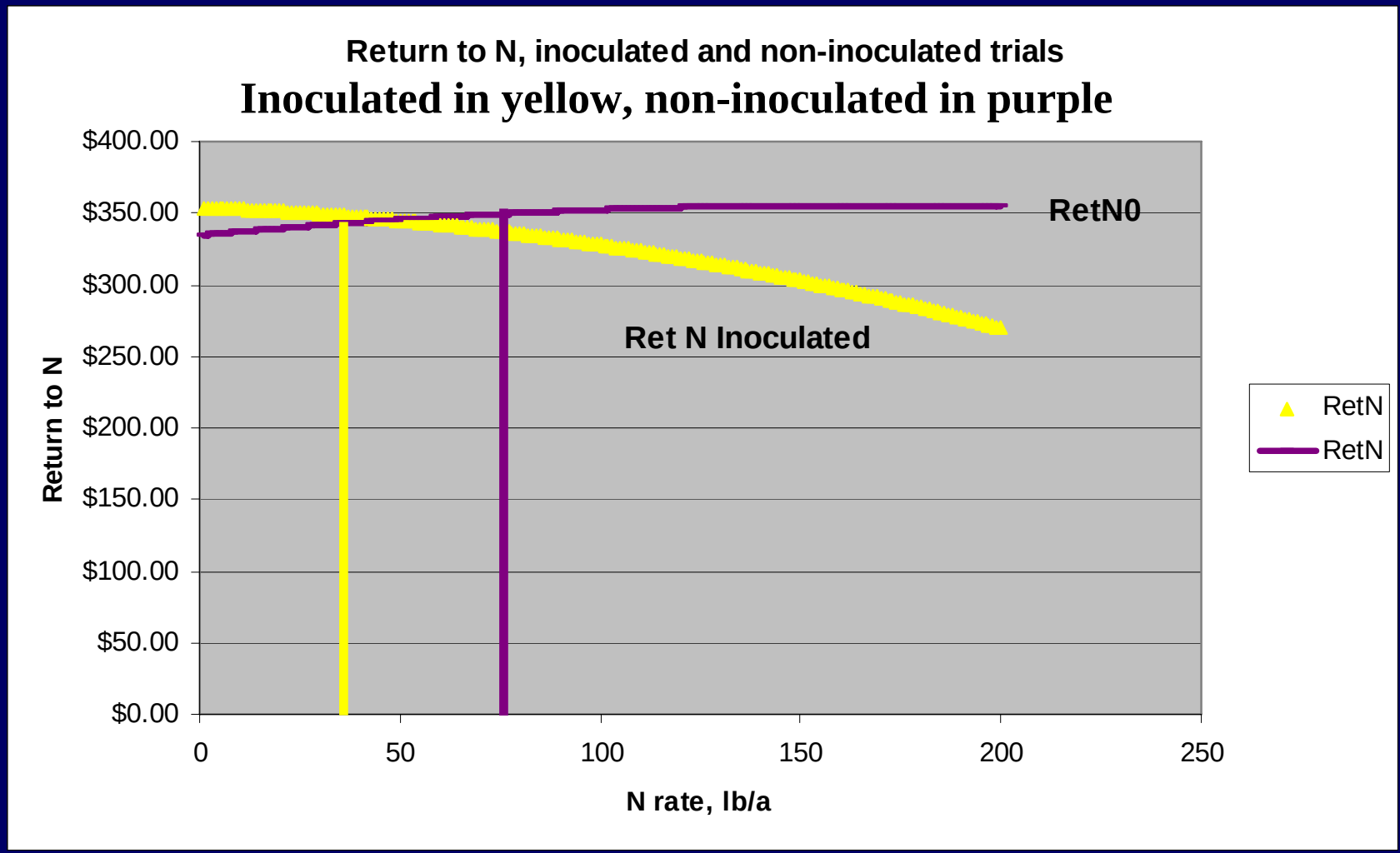
-Crops that require reduced N rates

Crops that require no N

Most legumes-

-Peas
-Lentils
-Alfalfa
-Soybean

From these data, maximum N rate regardless of "yield potential" should be about 50 lb/acre for inoculated dry beans and 75 lb/acre for non-inoculated dry beans.



Crops that require less N than wheat/corn-

Flax- N recs are capped at 80 lb N.

Barley- N rates should be conservative. Rates in the west lower than east.

Canola- New recs cap maximum N at 150 lb. Less in the west.

Sunflowers- Rooting depth can scavenge unaccounted for deep N.

Sugarbeet N rates are well-defined.

Some local heavy clay areas may need a little more N, but not much more.

In most areas, following the recs will result in successful production.

Take advantage of N credits from previous crops and conditions-

Legumes-

-Annual legumes- 40 lb N/acre
-Sugarbeet leaves- 0-80 lb N/acre
-Volunteer grains present when fields were sampled- 20% to 50% of N contained in the growing cover.

N application methods-

Urea application-

Avoid application on the surface in no-till fields. Ammonia volatilization is a problem. Losses can be high.

N application methods-

Urea application-

In conventionally-tilled fields, till into the soil within 48 hours generally unless it is so dry that granules remain intact.

It takes at least ½ inch of rain to incorporate urea.

Addition of Agrotain will add about 10 days to the safety of surface-applied urea.

It really works.

Lots of studies support its use.

ESN studies have shown that the product needs to be handled gently.

In non-irrigated soils, results have been inconsistent.

We have worked with a Georgia-Pacific product for several years.

In dry years, the urea or liquid behaves similar to urea or 28%.

In wet springs after application on sandy soils, it has an advantage over urea or 28%.

This season, 30 lbs acted like 60 urea. 60 lbs acted like 90 urea.

N application methods-

Ammonia-

Application at least 4-inches deep is considered 100% efficient.

I consider 2-3 inch deep application 90% efficient.

N application methods-

Timing-

In some years, there is little difference between fall and spring application.

In some years, there may be as much as 20% difference.

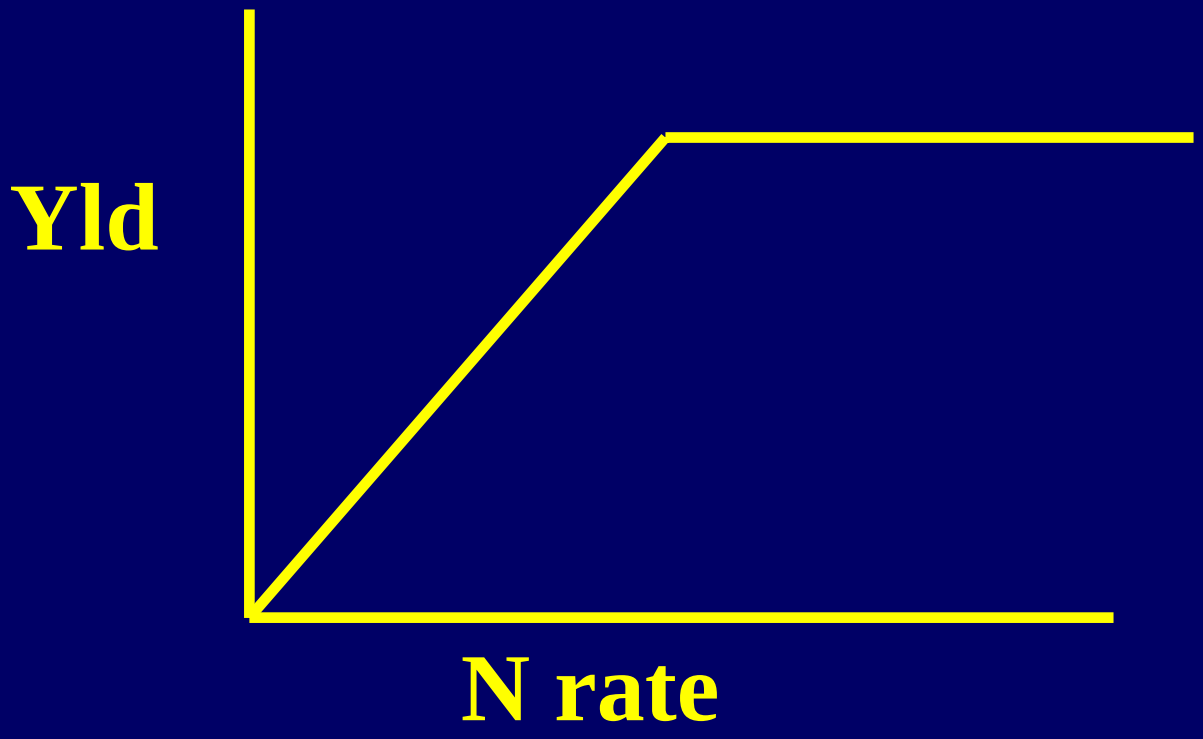
Canadian recommendations consider fall about 90% efficient.

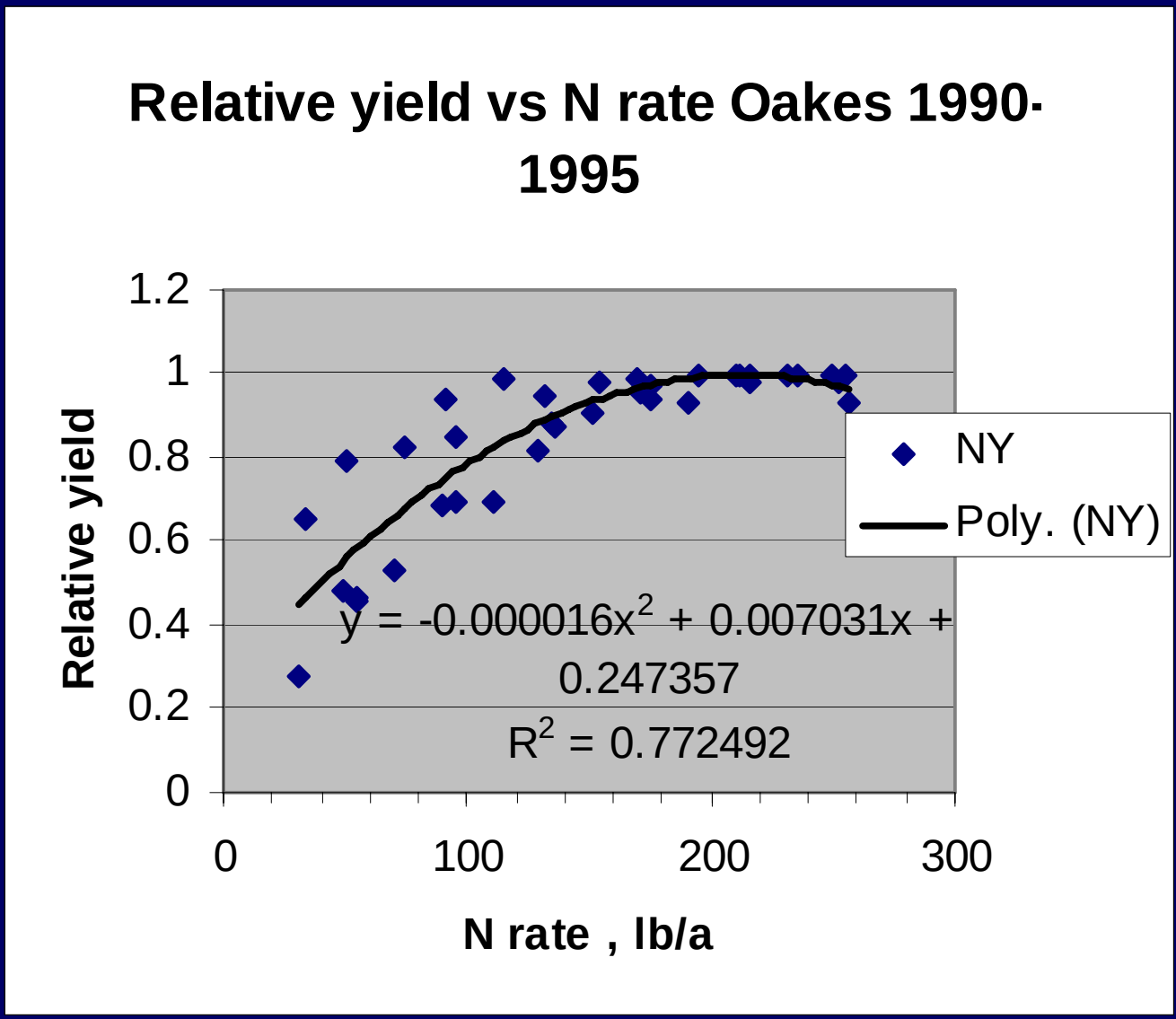
Should N rates be the same regardless of the price of N and the crop?

Probably not.

Current corn recommendations do not consider either crop price or N price.

N rate = YG X 1.2 less credits



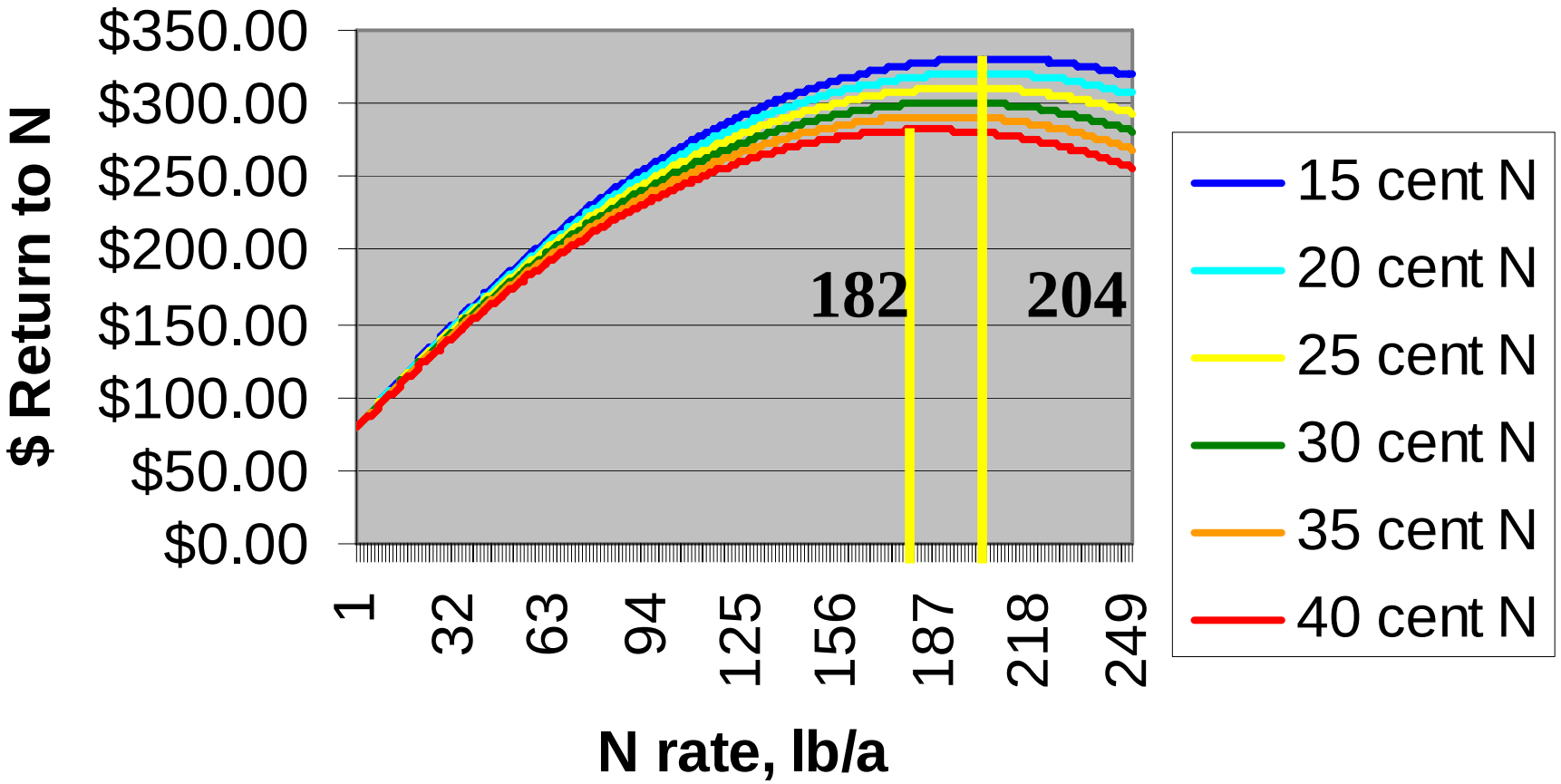

Relative yield vs N rate Oakes 1990-1995
Relative yield
1.2
1
0.8
0.6
0.4
0.2
0
0
100
200
300
N rate , lb/a
NY
Poly. (NY)
y = -0.000016x2 + 0.007031x + 0.247357
R2 = 0.772492

What several state are doing now is calculating the

“Return to N”

based on their data base, cost of N and price of commodity.

Return to N with N rate, corn at $2.50



Given the high price of N and low price for corn, this is what I would consider-

In the east,-

No higher than 180 lb N ± 20 lb.

Take credits against that number.

Out west-

No higher than 120 lb N ± 20 lb.

But no lower than 100 lb N.

In irrigated sands,

50-60 lb N preplant
50-100 lb sidedress

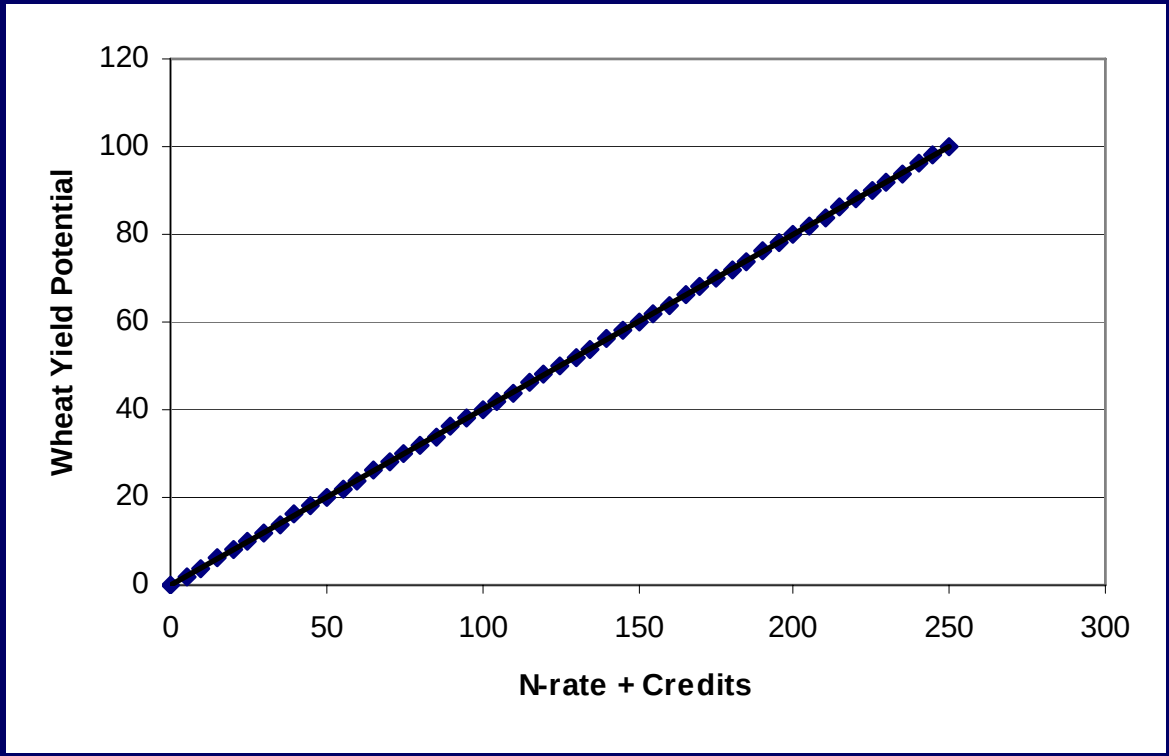
tissue test to determine
in-season N through the pivot.

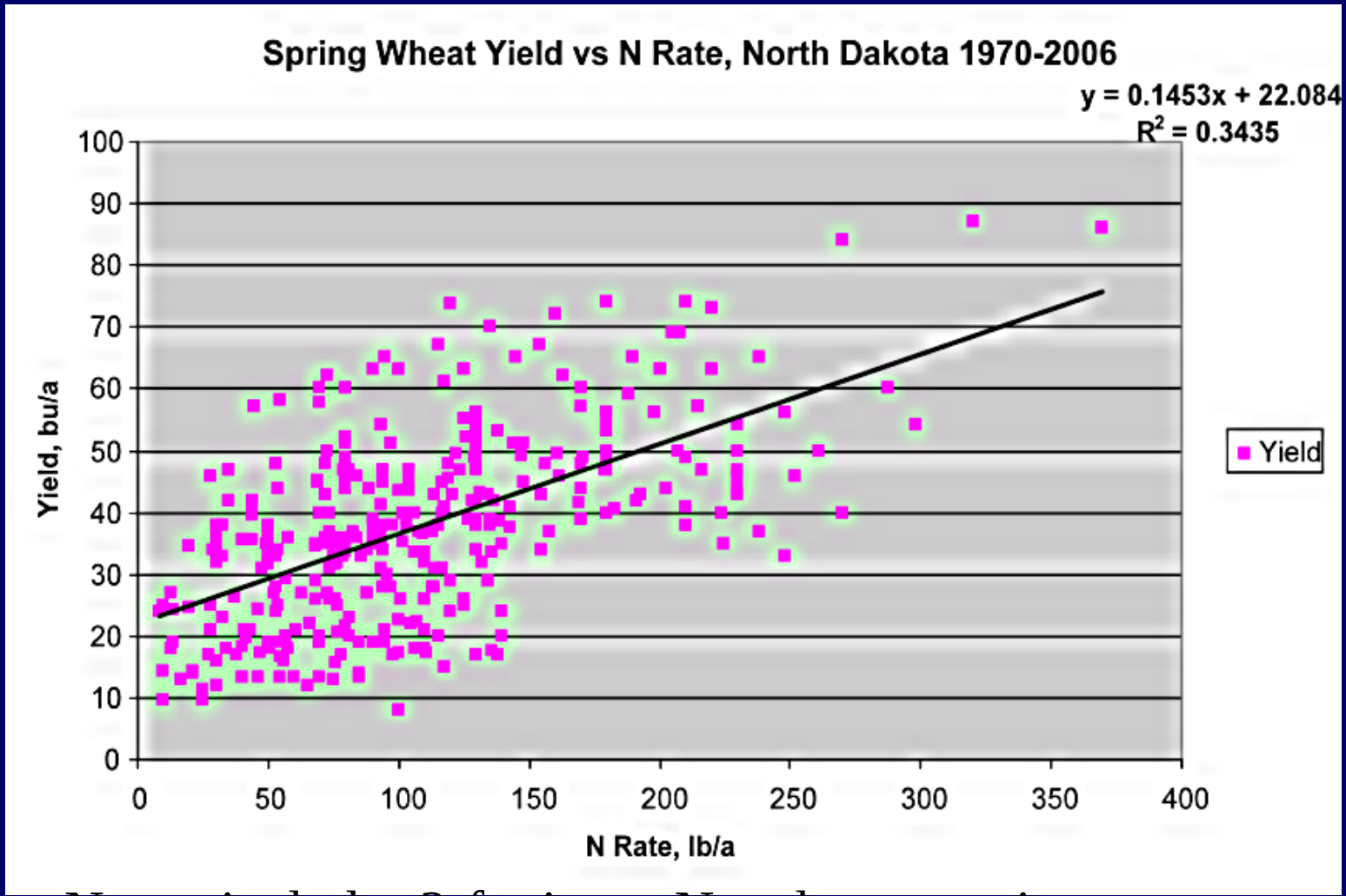
How About Wheat???

The formula does not contain a contemporary economic component.

-no allowance for soil mineralization differences

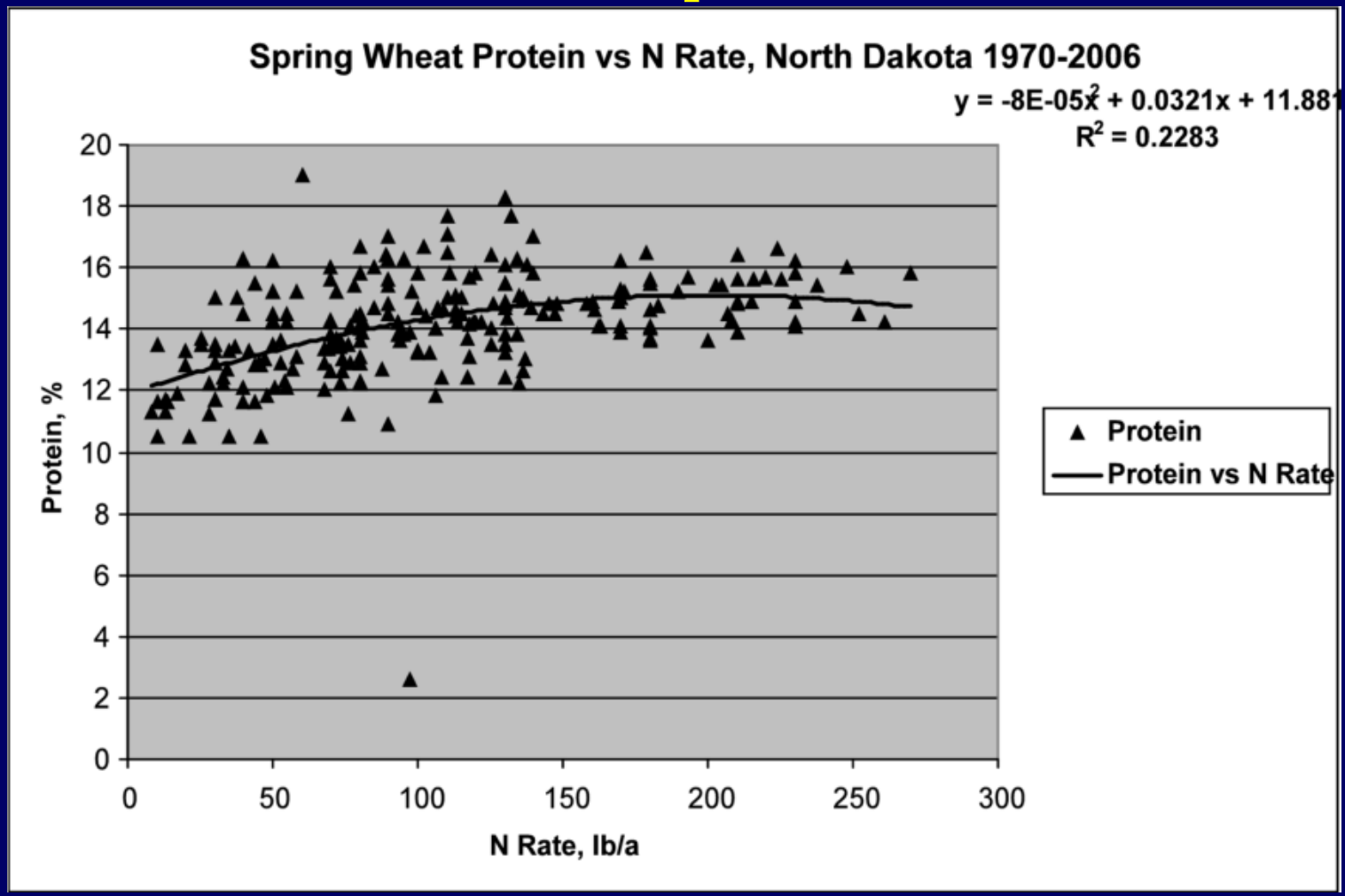
-no allowance for agri-climatology differences

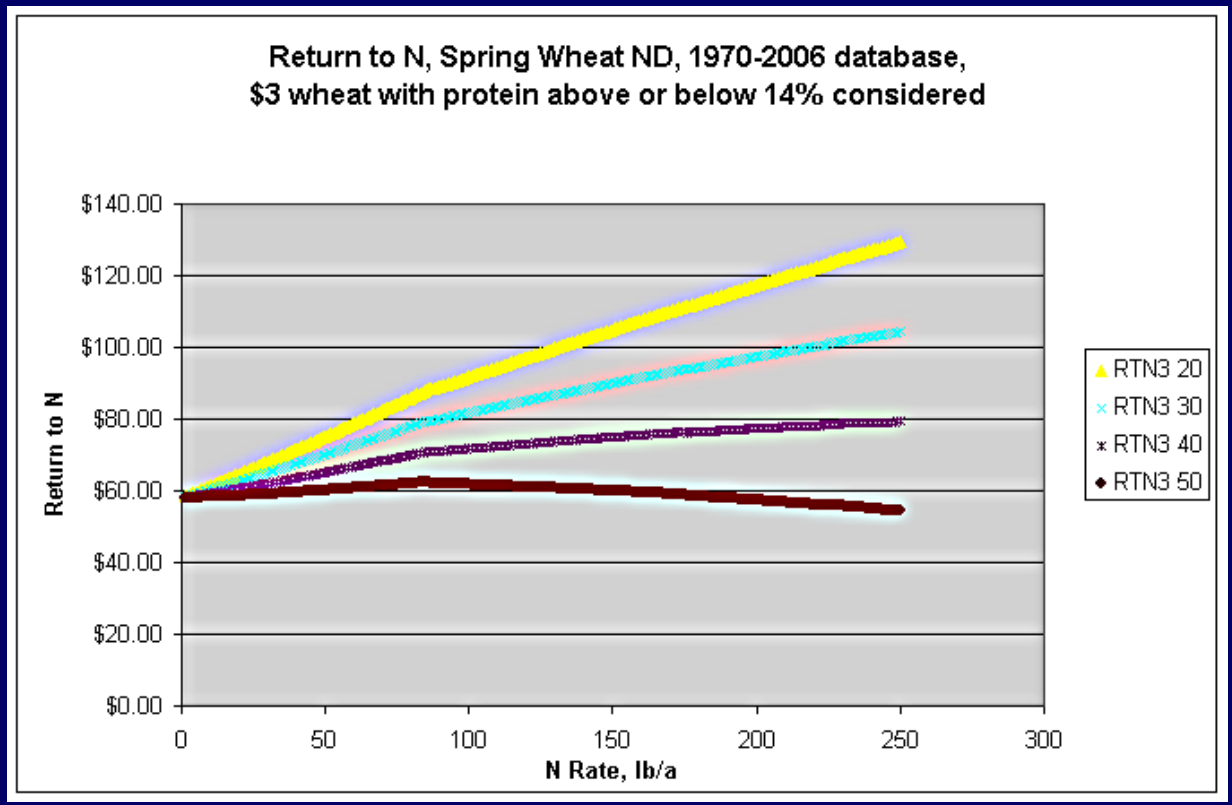


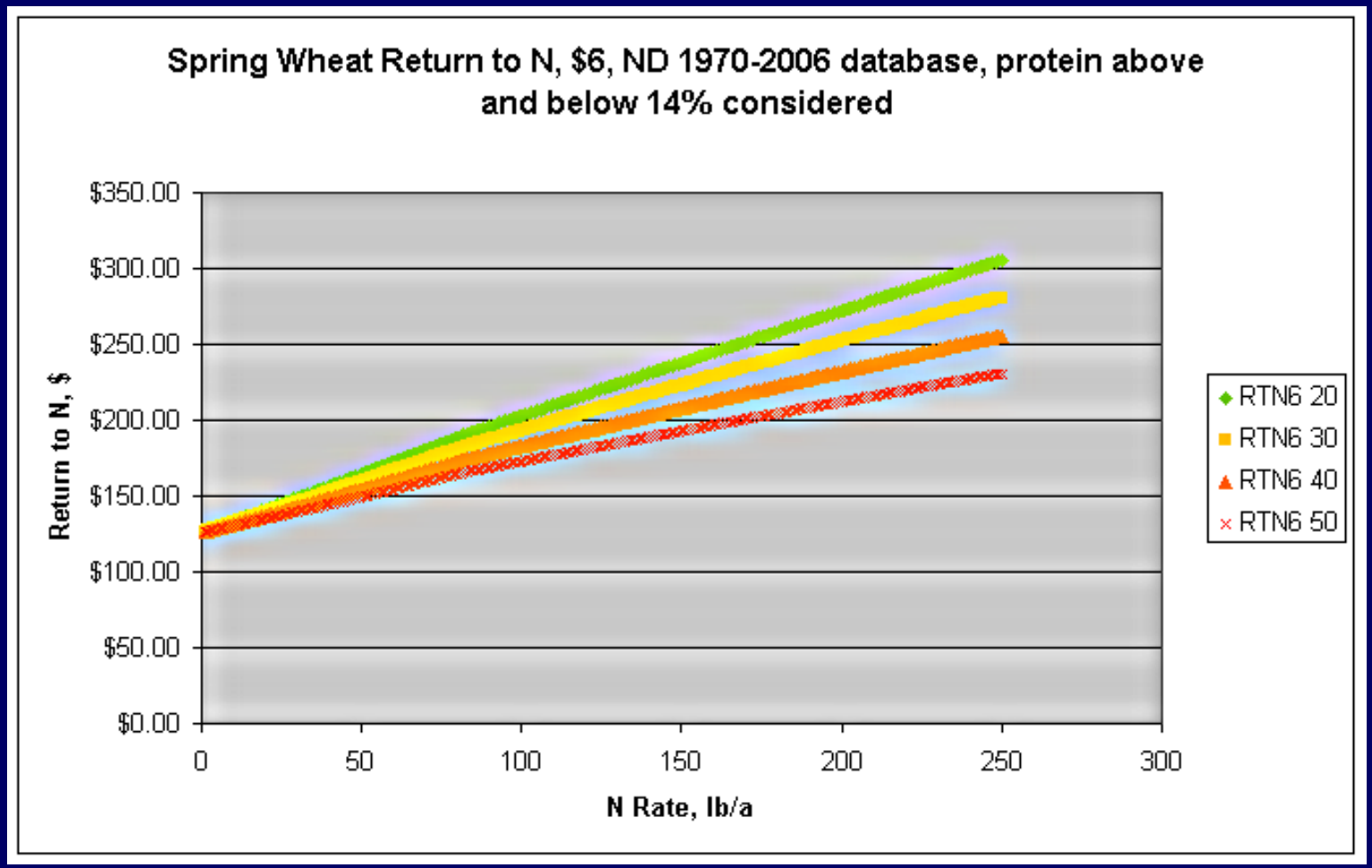


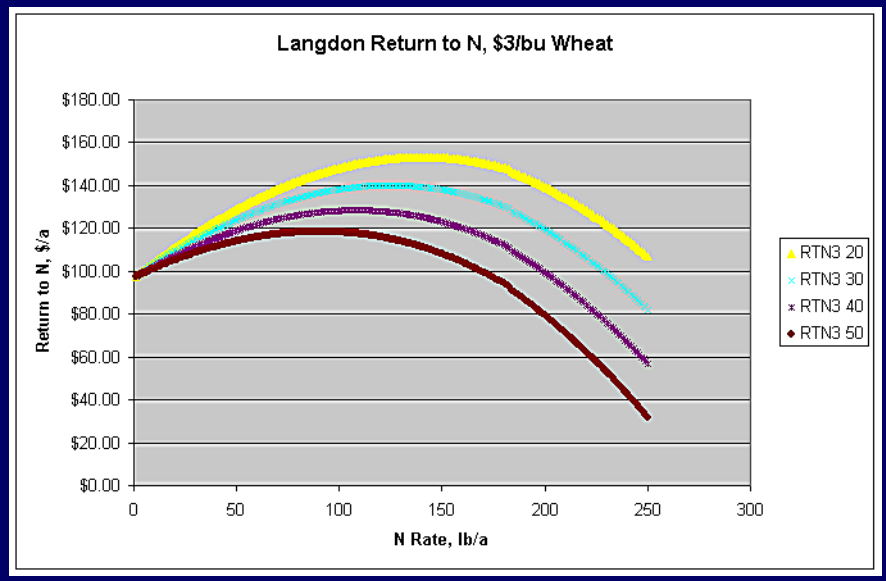
N-rate includes 2-ft nitrate-N and any previous crop credit estimate.

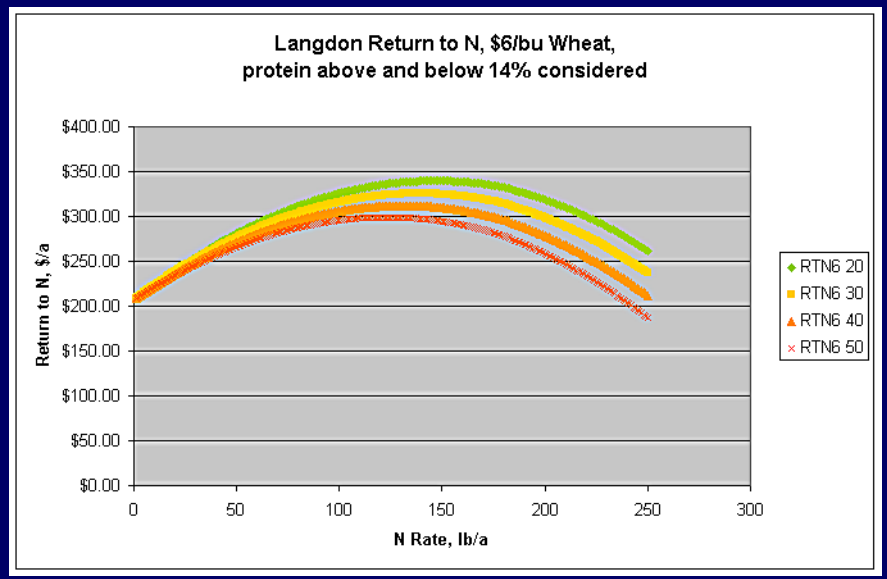
Protein in ND is an economic quality component.
Below 14%, elevators subtract a dock.
From 14 to about 15% elevators provide a $ premium.
Above 15%, no additional premium.

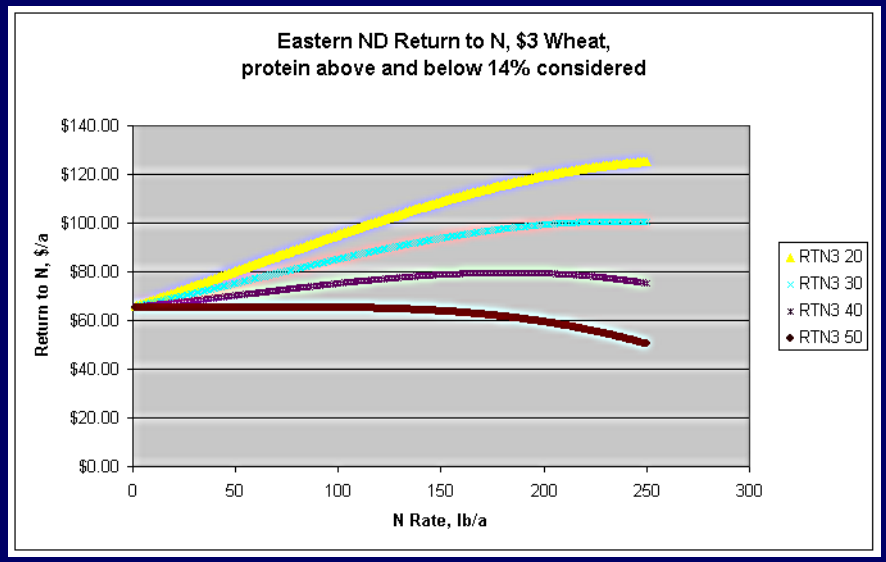


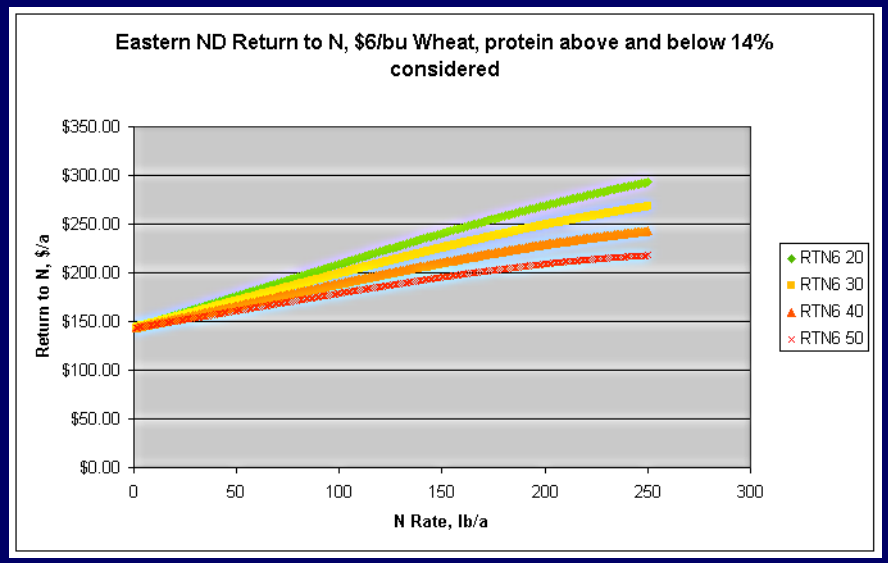

Return to N, Spring Wheat ND, 1970-2006 database,
$3 wheat with protein above or below 14% considered
$140.00
$120.00
$100.00
$80.00
$60.00
$40.00
$20.00
$0.00
Return to N
0
50
100
150
200
250
300
N Rate, lb/a
RTN3 20
RTN3 30
RTN3 40
RTN3 50

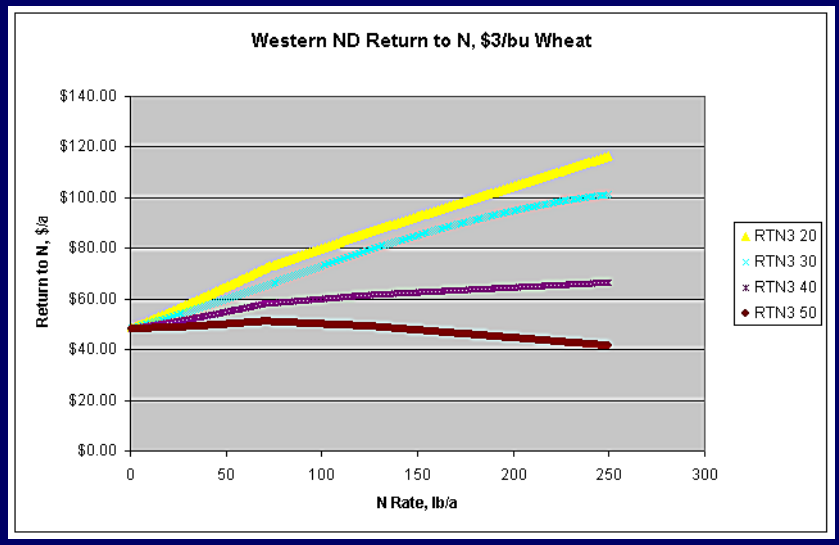

Spring Wheat Return to N, $6, ND 1970-2006 database, protein above and below 14% considered
$350.00
$300.00
$250.00
$200.00
$150.00
$100.00
$50.00
$0.00
Return to N, $
0
50
100
150
200
250
300
N Rate, lb/a
RTN6 20
RTN6 30
RTN6 40
RTN6 50

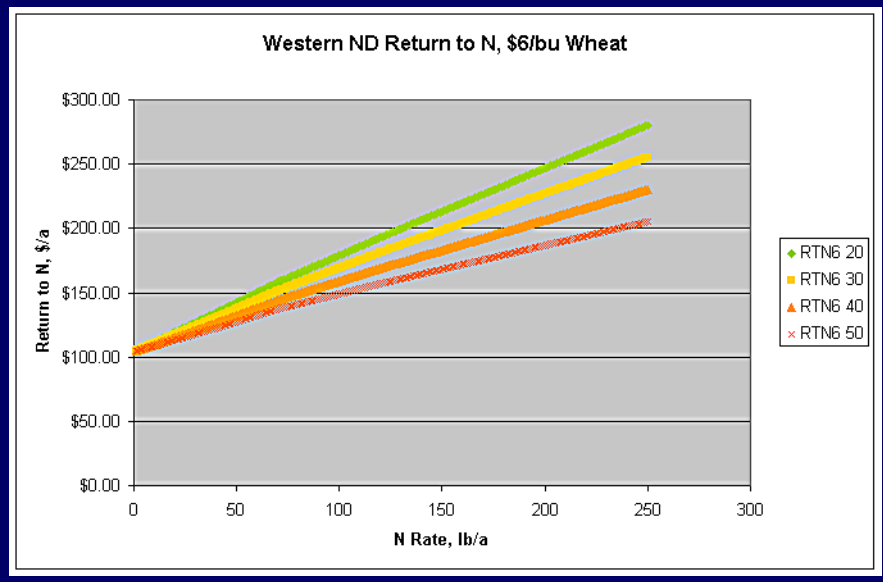

Langdon Return to N, $3/bu Wheat
$180.00
$160.00
$140.00
$120.00
$100.00
$80.00
$60.00
$40.00
$20.00
$0.00
Return to N, $/a
0
50
100
150
200
250
300
N Rate, lb/a
RTN3 20
RTN3 30
RTN3 40
RTN3 50


Langdon Return to N, $6/bu Wheat,
protein above and below 14% considered
$400.00
$350.00
$300.00
$250.00
$200.00
$150.00
$100.00
$50.00
$0.00
Return to N, $/a
0
50
100
150
200
250
300
N Rate, lb/a
RTN6 20
RTN6 30
RTN6 40
RTN6 50


Eastern ND Return to N, $3 Wheat,
protein above and below 14% considered
$140.00
$120.00
$100.00
$80.00
$60.00
$40.00
$20.00
$0.00
Return to N, $/a
0
50
100
150
200
250
300
N Rate, lb/a
RTN3 20
RTN3 30
RTN3 40
RTN3 50


Eastern ND Return to N, $6/bu Wheat, protein above and below 14%
considered
$350.00
$300.00
$250.00
$200.00
$150.00
$100.00
$50.00
$0.00
Return to N, $/a
0
50
100
150
200
250
300
N Rate, lb/a
RTN6 20
RTN6 30
RTN6 40
RTN6 50

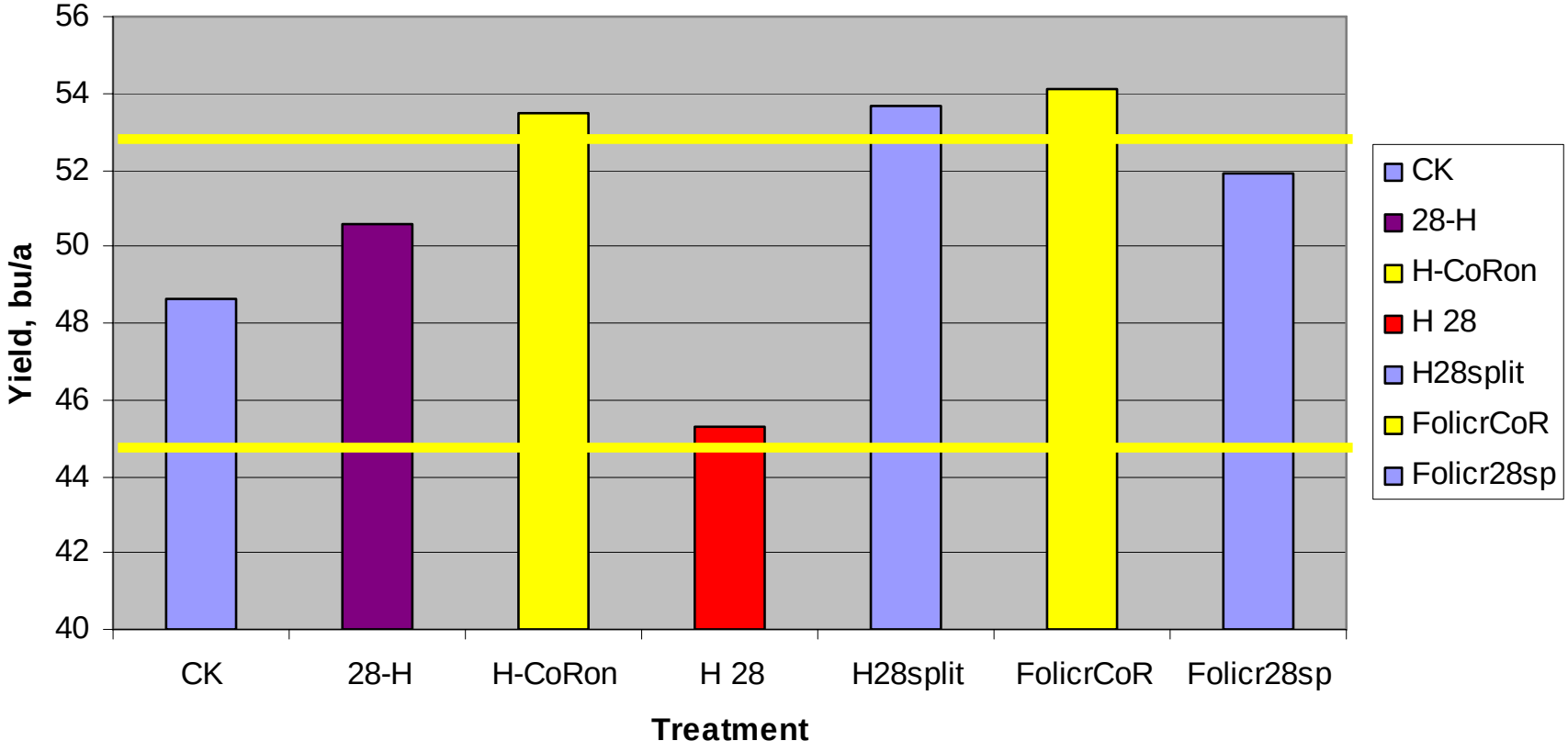

Western ND Return to N, $3/bu Wheat
$140.00
$120.00
$100.00
$80.00
$60.00
$40.00
$20.00
$0.00
Return to N, $/a
0
50
100
150
200
250
300
N Rate, lb/a
RTN3 20
RTN3 30
RTN3 40
RTN3 50


Western ND Return to N, $6/bu Wheat
$300.00
$250.00
$200.00
$150.00
$100.00
$50.00
$0.00
Return to N, $/a
0
50
100
150
200
250
300
N Rate, lb/a
RTN6 20
RTN6 30
RTN6 40
RTN6 50

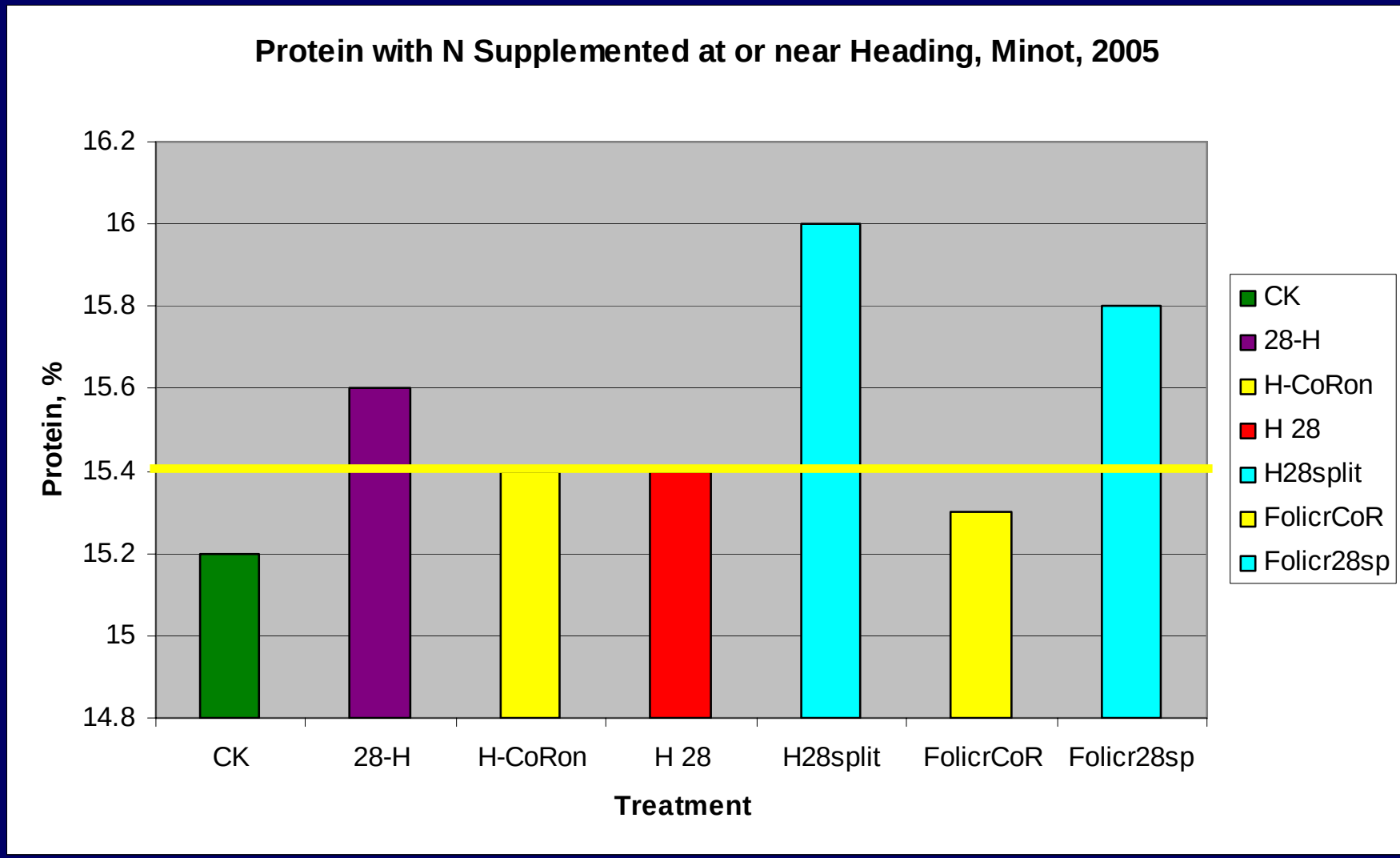
There has been consistent success with post-anthesis application of N for protein enhancement.

Yield, Minot, 1995 Spring Wheat with N Supplemented from 1/2 flower to post anthesis

Yellow horizontal lines indicate LSD 5% above or below check



28-H = 28% with Headline, H-CoRon = Headline with CoRon, H 28 = 28% alone at heading, H28split = Headline and 28% put on separately, FolicrCoR = Folicur and CoRon applied together; Folicr28sp = Folicur and 28% applied separately.



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2007 research on UAP NPact

With 2 gal/a rate at 5-6 leaf stage, no increase in yield or quality or spring wheat.

Flag leaf-N was not increased by 2 gal/a rate.

Phosphate efficiency?

Band application- can decrease recommended P rates (or K) by 1/3.

Deep bands should be followed by small starter applications for corn at planting.

QUESTIONS?