

Profitable Fertilizer Use

Dr. Dave Franzen

NDSU Extension Soil Specialist

Nitrogen prices are high-

30-40 cents/lb N.



**Ammonia purchased at “bargain” prices in fall 2005 was based on \$8 gas.
Ammonia being manufactured now in North America is based on \$12 gas.**



More than 90% of the cost of making anhydrous ammonia now is the cost of natural gas.

Most US manufacturers are operating at a loss. A shortage of natural gas this winter



will likely result in selling gas contracts on the open market and shutting down more plants.

Ammonia is being imported into the US in record quantities, but the infrastructure of pressurized ships, port facilities, pipelines and rail is not great enough to handle the increased need.



Urea is also being imported in record quantities, but the hurricanes have greatly disrupted barge traffic at the Gulf ports.



Jan. 19 report says that although terminals directly on the river are 100% operational, terminals on associated tributaries and canals are not.

Overall, the industry hopes to be up to 60% capacity by March.

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.

Corn is the number 1 user of N in the US. Despite relatively low corn prices compared with N costs, corn acreage is expected to remain relatively constant.



What does this mean?

**High N prices for as far
as I can see in the future.**

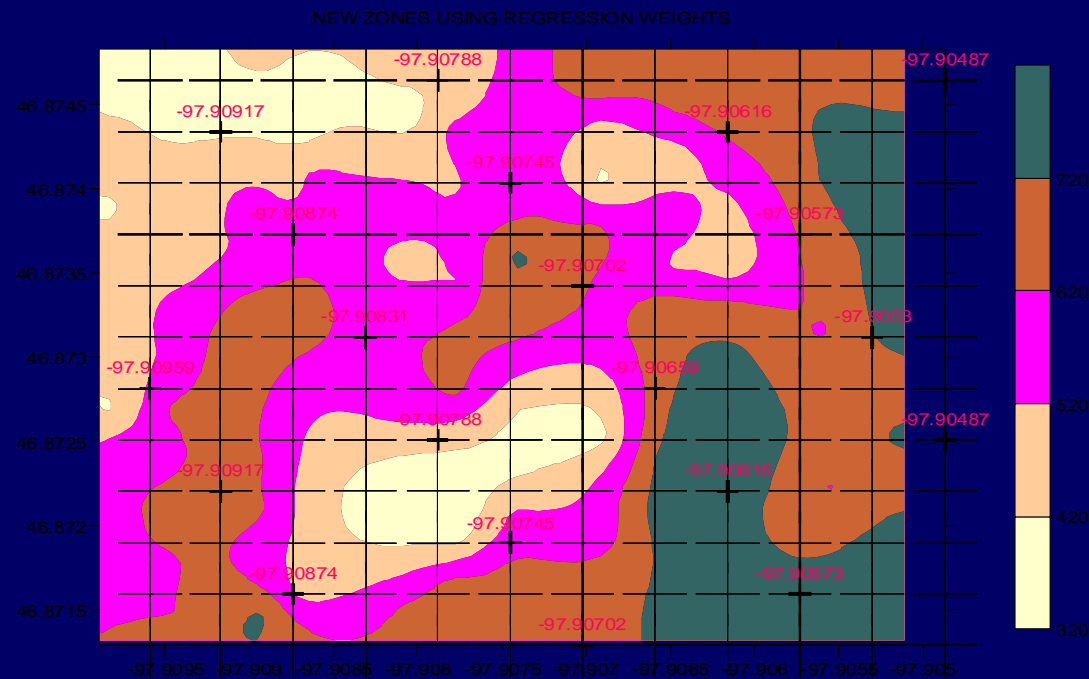
**The chance of shortages of products
as spring approaches, especially if
the winter is cold in the central and
eastern US.**

Management Strategies-

Use of soil testing to identify residual N.

NDSU Extension has been talking about soil testing for 35 years, but still only a small percentage of growers use it.

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



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- 1/3-1/2 of N contained in the growing cover.**

N application methods-

Urea application-

**Avoid application on the surface
in no-till fields.**

**Successful no-till growers have figured
out a way to place N below the soil
surface.**

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 1/2 inch of rain to incorporate 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.

**What several state are doing now
is calculating the**

“Return to N”

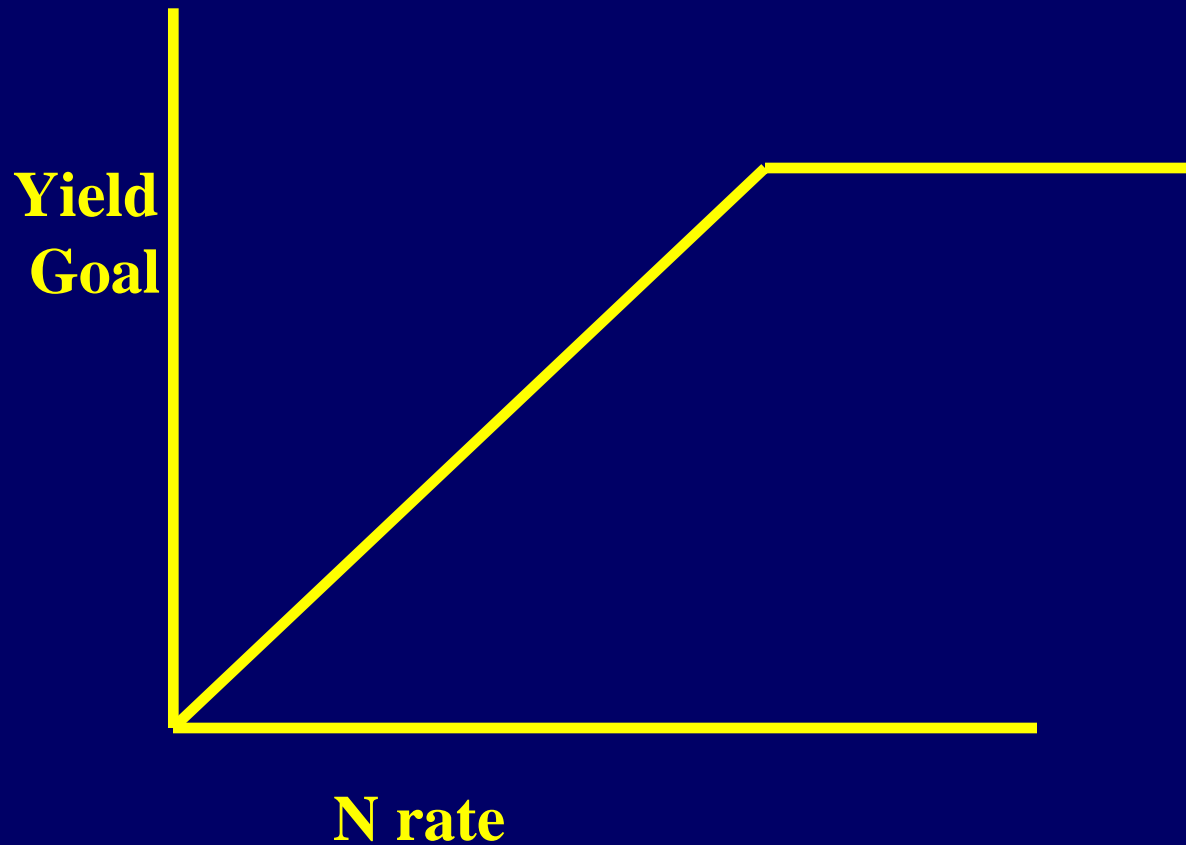
**based on their data base, cost of N
and price of commodity.**

**Generally, given the yield goals
that are REASONABLE
based on past experiences,**

**use the NDSU charts to find the rate,
then decrease the rate by about 10%
for 30 cent N, and 15 % for 40 cent N.**

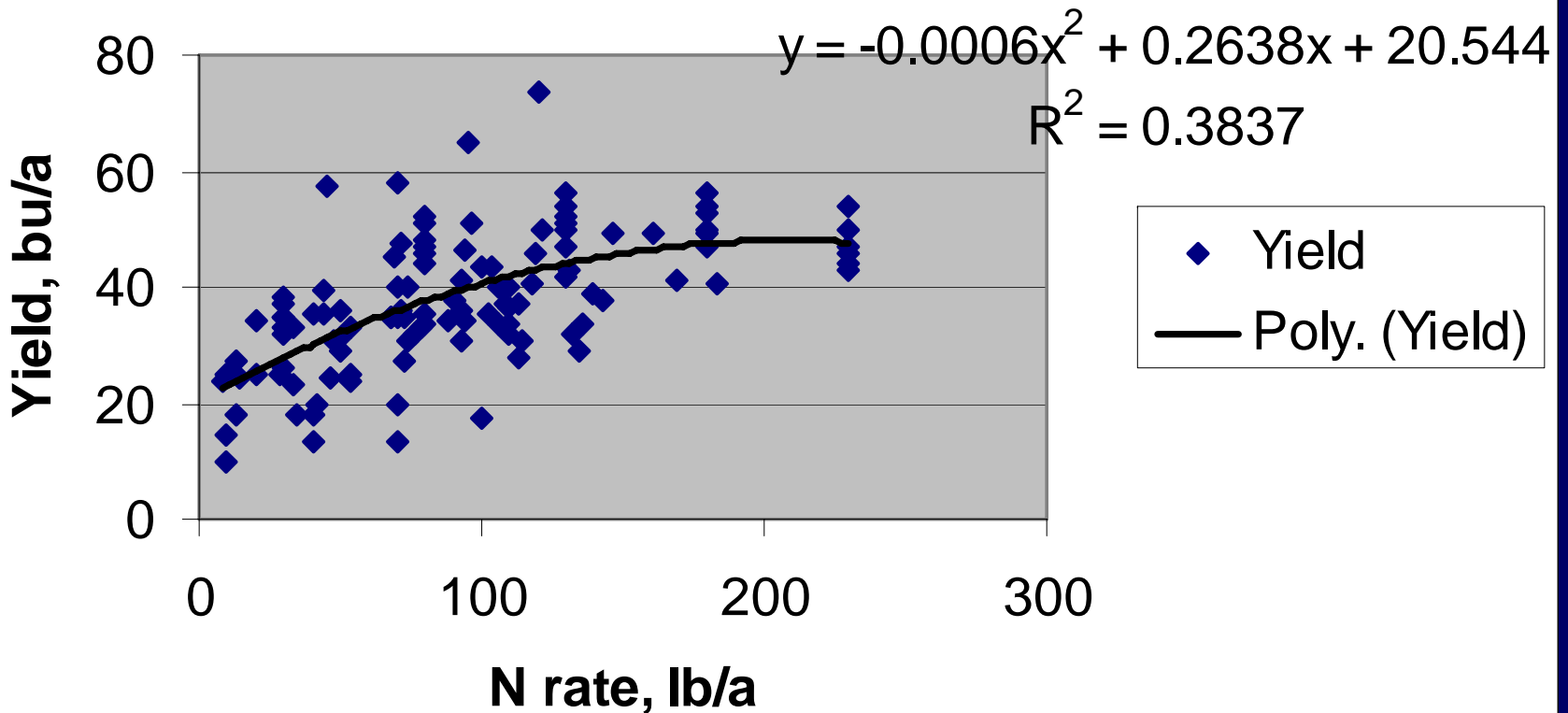
Wheat recs are also linear plateau.

N rate = YG X 2.5 less credits



The actual data show a curve relationship. “Law of Diminishing Returns”

Wheat yield with N rate, 1979-1993



**There is a disconnect generally
between yield goal and economic N rate.**

Yield goal is a wish.

**The yield response to N curves are
similar regardless of yield potential.**

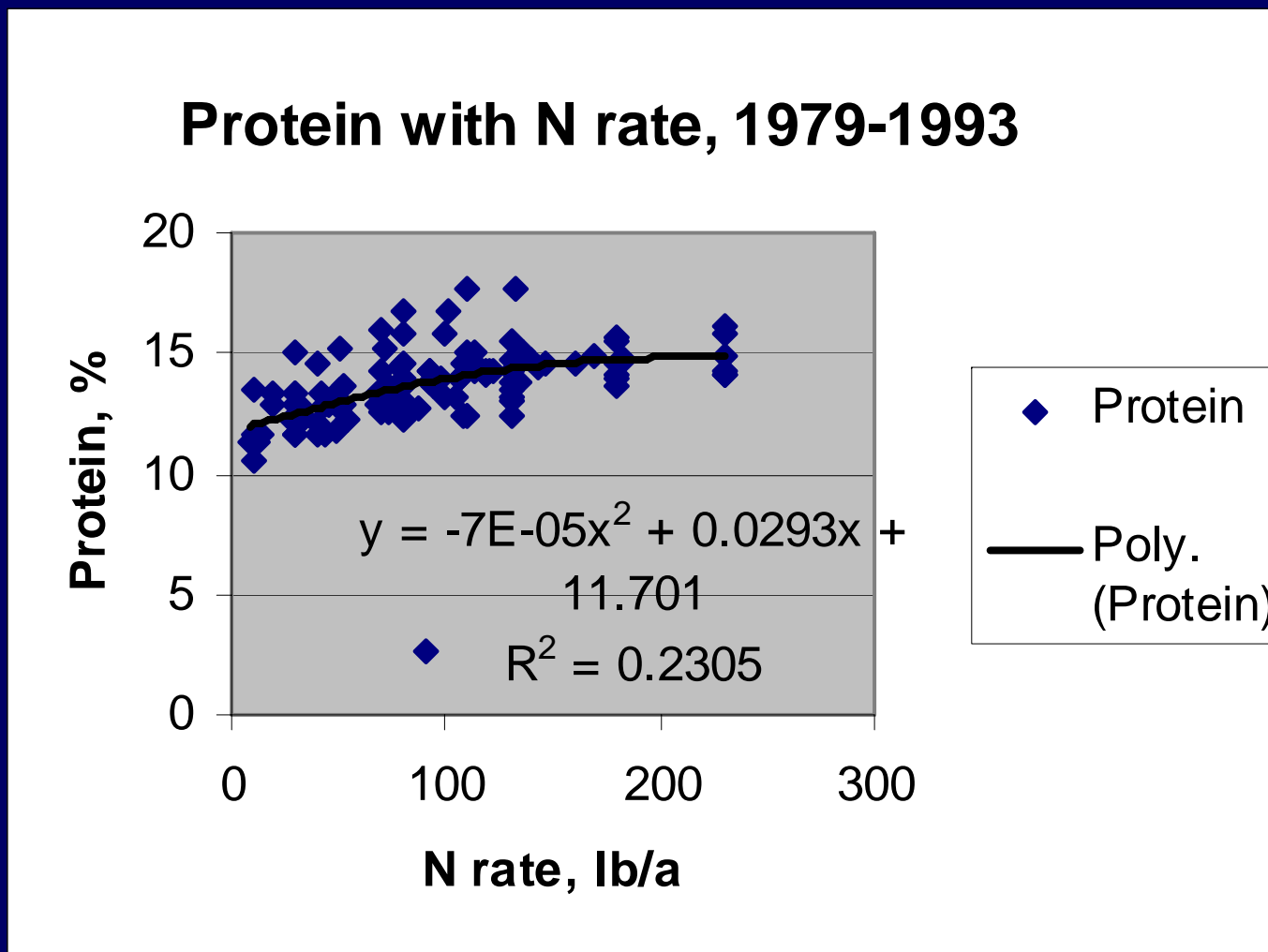
Maybe we need to define a better term instead of “Yield Goal”, considering the psychic intent of that term.

**“Historic Yield Tendency”
or “HYT”**

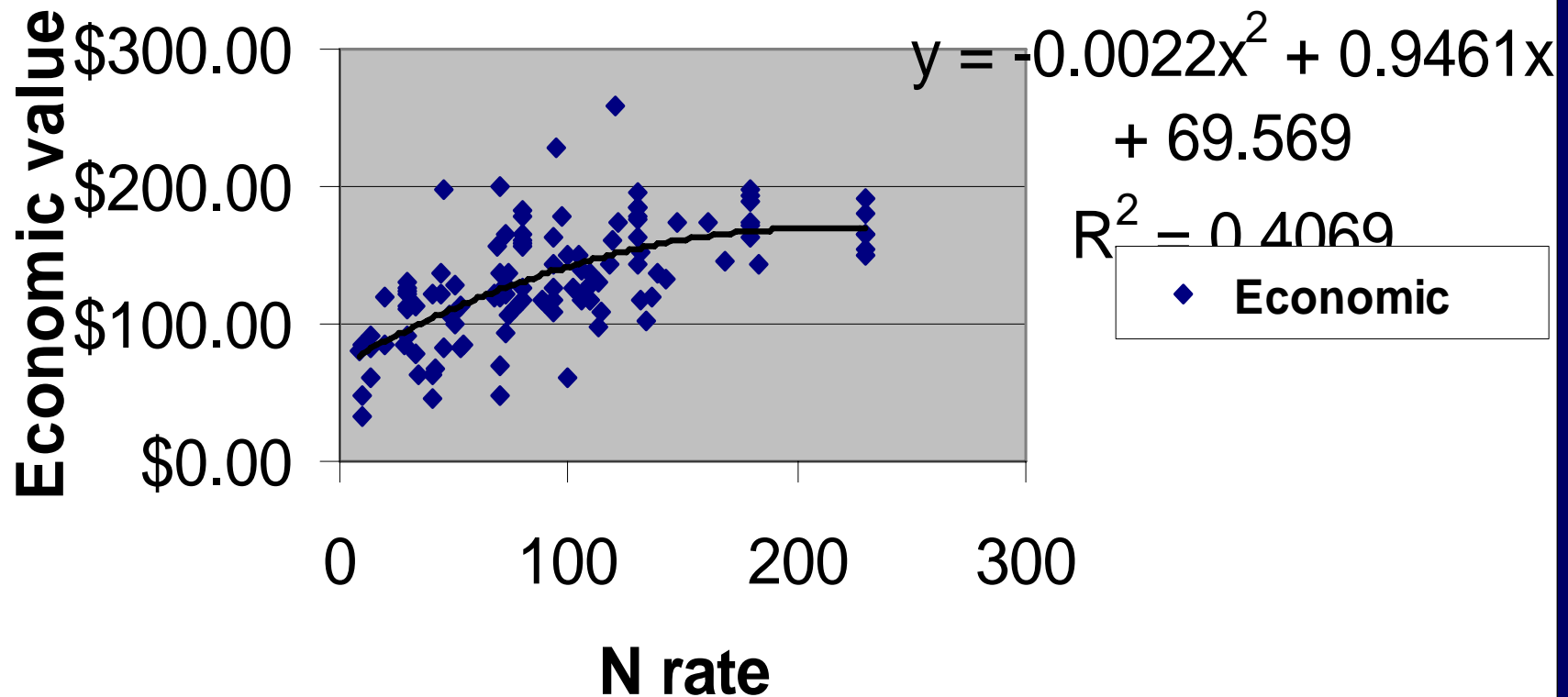
Growers should take a look at historical yields on the farm and consider that for at least wheat, the possibility of growing greater than 10 % of the average yield happens less than 20% of the time.

Using this historical average as a basis for N rate decisions is not a bad decision.

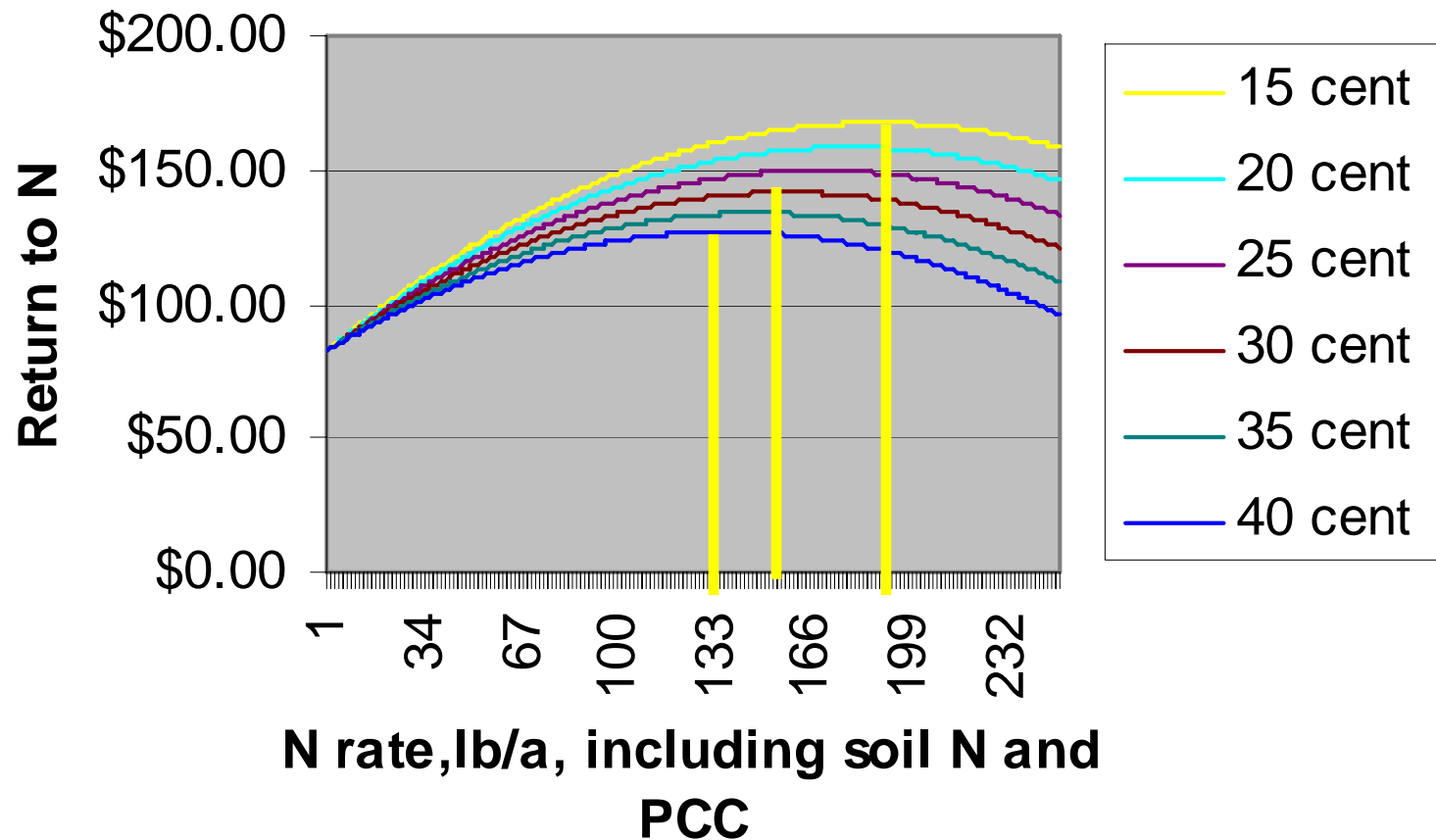
Protein is related to N rate, but it isn't linear either. There is a limit to protein.



**Economic value, Wheat yield and protein \$0.04
per 1/10 point below or above 14%,
wheat price \$3.50**



Return to N with \$4 wheat for N costs ranging from 15 to 40 cents/lb N



Generally, as wheat prices are reduced by 50 cents, optimum economic N rates decline by about 10 lb N/acre.

As N prices increase by 5 cents/lb N, optimum economic N rates decline by about 10 lb N/acre.

**Use the HYT for
a field and our current recommendation
chart to come up with a base N rate.
Then increase or decrease rate based on
current wheat price and N prices,
compared with about a \$4 historical
wheat price and 20 cent N rate of about
15 years ago.**

As a general rule, with N costs at 30 cents, reducing chart HYT rates by 10% would be appropriate.

With N costs at 40 cents, reducing by 15% would be justified.

**If the decision is made to reduce rates,
choose a higher protein variety that has
a tendency to make grade no matter the
conditions.**

Other traits to consider are-

-disease package

-lodging

-yield consistency

We are entering a new era in N management.

More data is needed to better resolve the issue of N rate and yield for most of our crops.

Recommendations in the past were developed in a time when N was cheap and crop prices were higher from an inflationary perspective.

Today is different.

Generally, as crop prices decline and N costs increase, N rates should decrease.