The Economics of Fertilizing Sub-Irrigated Meadows

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I am not sure fertilizer would be this effective

Elephant Grass

What might be a reason to use fertilizer?

- Increases Quantity of Forage
- Makes/Saves You Money
- The Neighbor does it
- We have always done it
- I have extra cash laying around so I thought I would use it
- I have limited forage resources

Things to consider when choosing to fertilize meadows

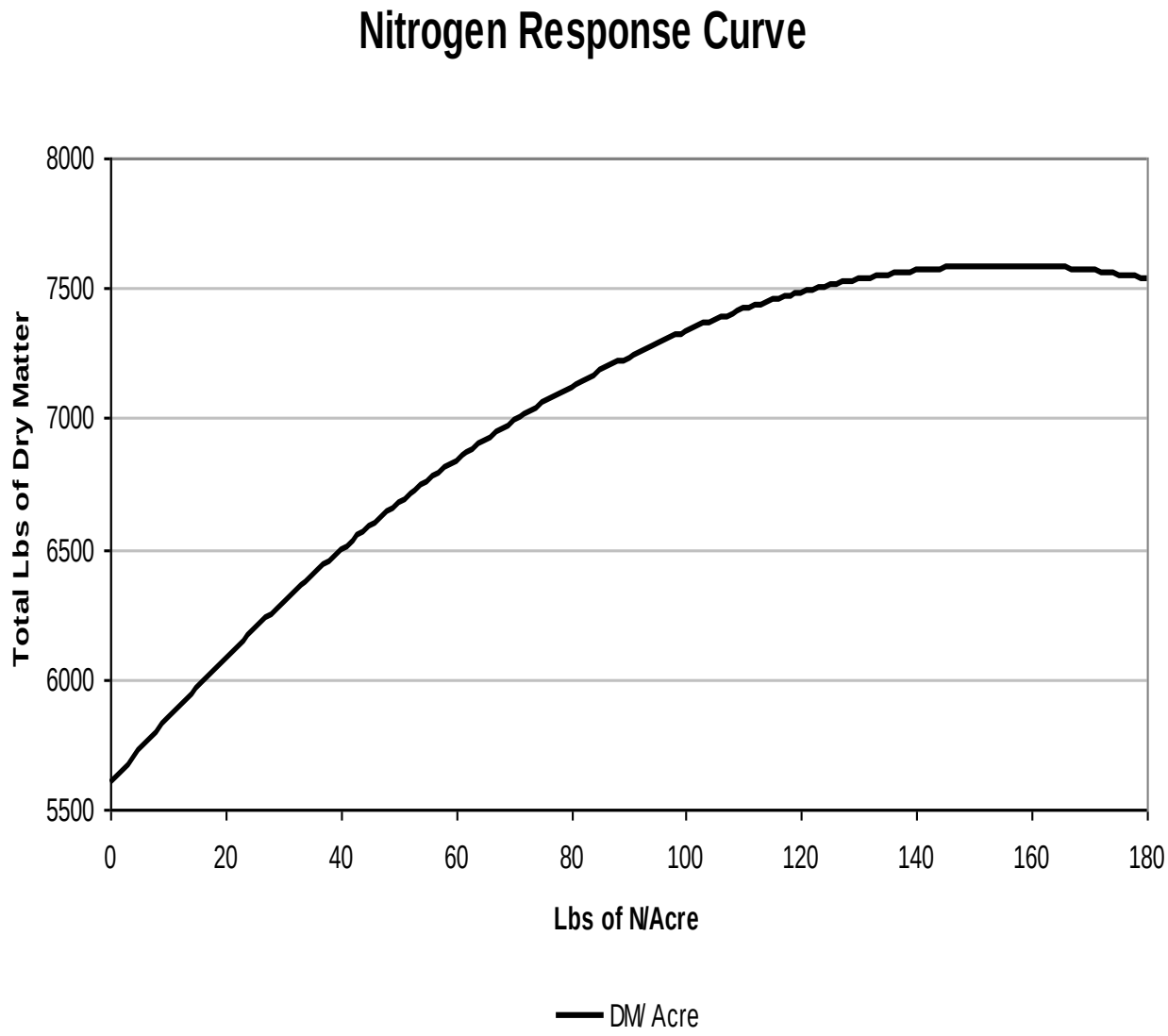
Consider the . . .

- Expected Cost of Forage
- Expected Value of the Forage
- Fertilizer Cost
- Risk

The Physical Nature of Fertilizing

- Typically the first units applied provide greater results then the following units, until eventually added units may actually began to reduce production. (Diminishing Marginal Returns)
- Do we have evidence of this for Sandhill Meadows (Clark, Nichols and Eskridge)

The “Production Function”



This Relationship Provides a Basis For Our Analysis

- Economist generally say fertilizer is applied to the point where the cost of the fertilizer equals the benefit from using that fertilizer. But where is that?
- Example: If fertilizer cost $10 and returns $12 then it makes sense to apply it, but if it cost $10 and returns only $8 it doesn't make sense to apply it, unless????

THIS IS PRETTY SIMPLE EXCEPT WE HAVE NOT CONSIDERED THAT RETURNS VARY DEPENDING ON YIELD AND PRICE VARIATIONS FROM THOSE EXPECTED

This variation is a source of risk

Risk

- So, how much risk are you willing to take?

- Not everyone is willing to accept the same amount of risk for the same payoff?

Prices Variations

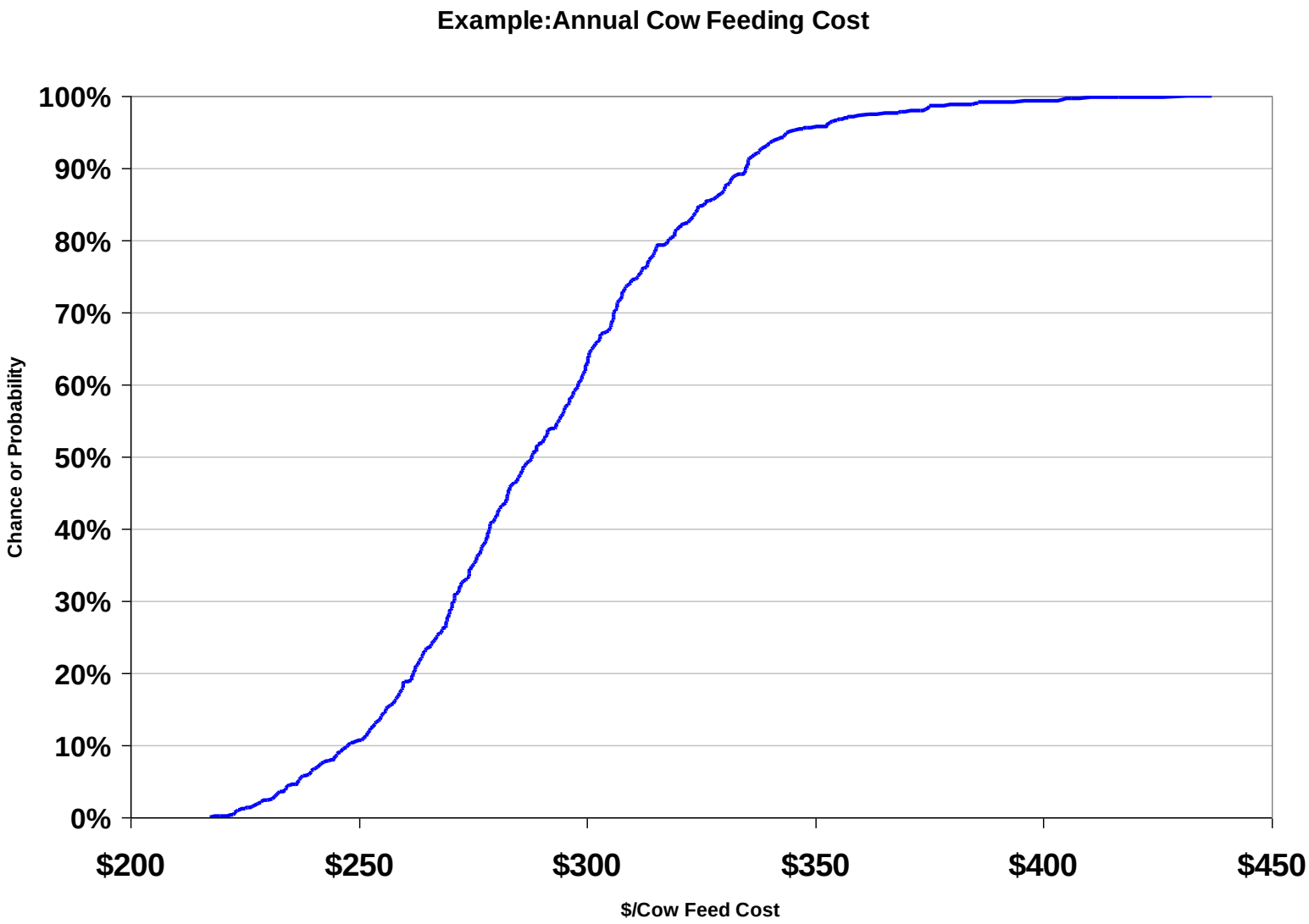
- Consider 5 possible prices for hay (a measurable forage source)
- $40/ton
- $60/ton
- $80/ton
- $100/ton
- $120/ton
- Prices were translated into $/ Lb. TDN

Yields

- Yields for different levels of Nitrogen fertilizer were extrapolated from the production function by Clark, Nichols and Eskridge
- Phosphorus and Sulfur levels were held constant.
- Dry Matter was adjusted in accordance with extrapolated yields

Understanding Results

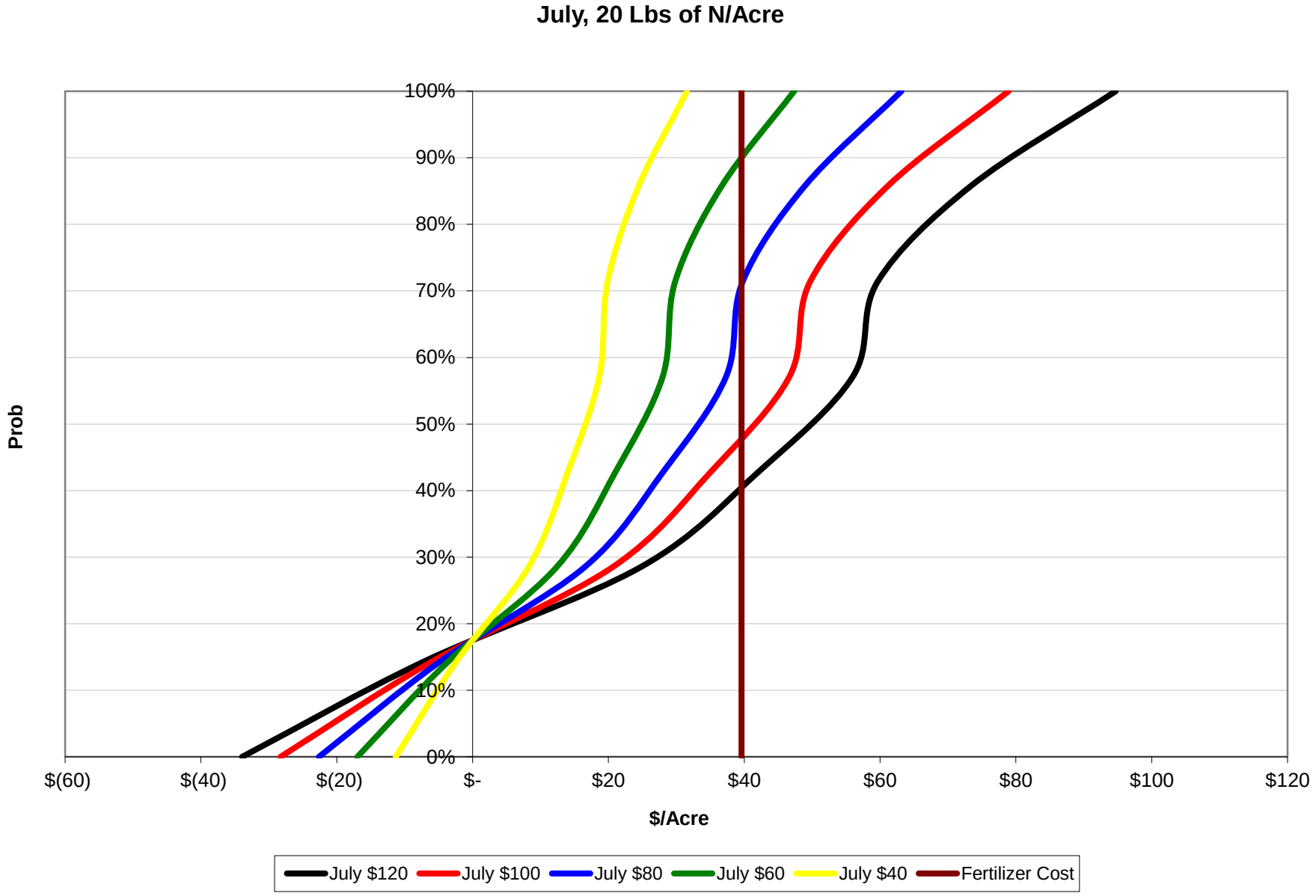
- Each time one of the “stochastic variables changes” (Price or Yield) a new outcome can be observed. If we take that observation and record it along with many other observed outcomes we can build a drawing representing the range of outcomes, as we track these outcomes we can associate the chance or probability of each happening. We call this mapping of the outcomes and probabilities a possibility curve, since it includes many of the possible outcomes.

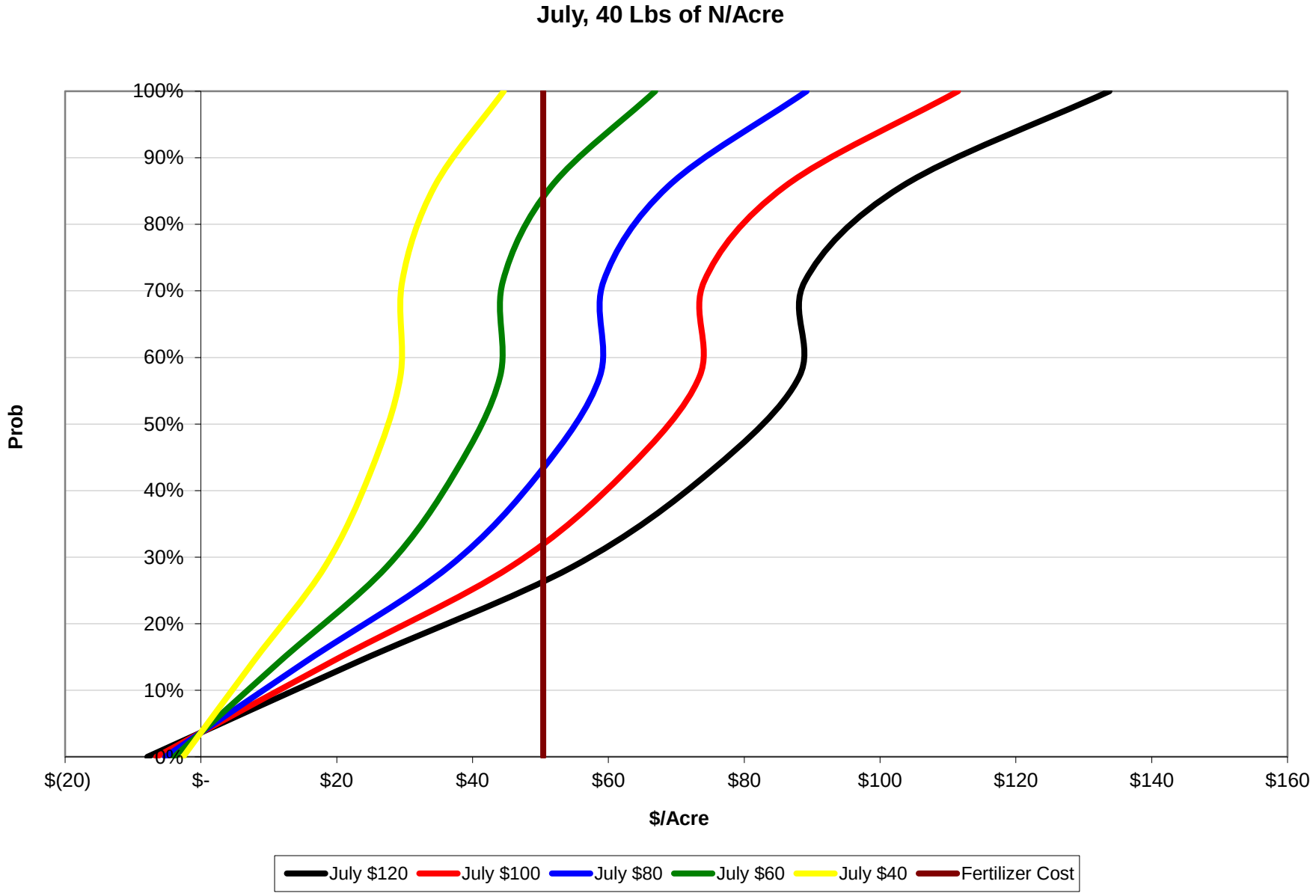

Example:Annual Cow Feeding Cost
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Chance or Probability
$200
$250
$300
$350
$400
$450
$/Cow Feed Cost

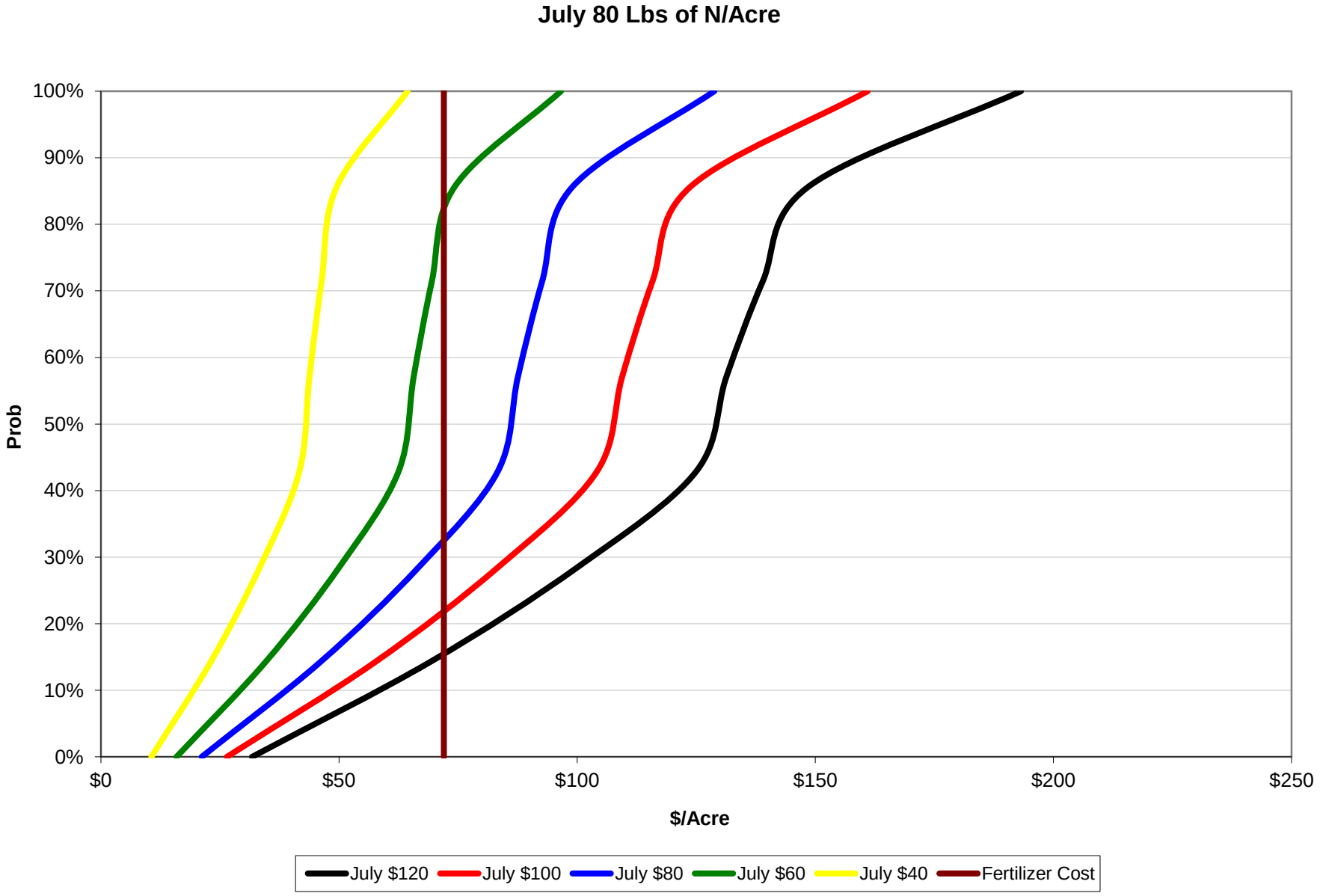
What We Measured

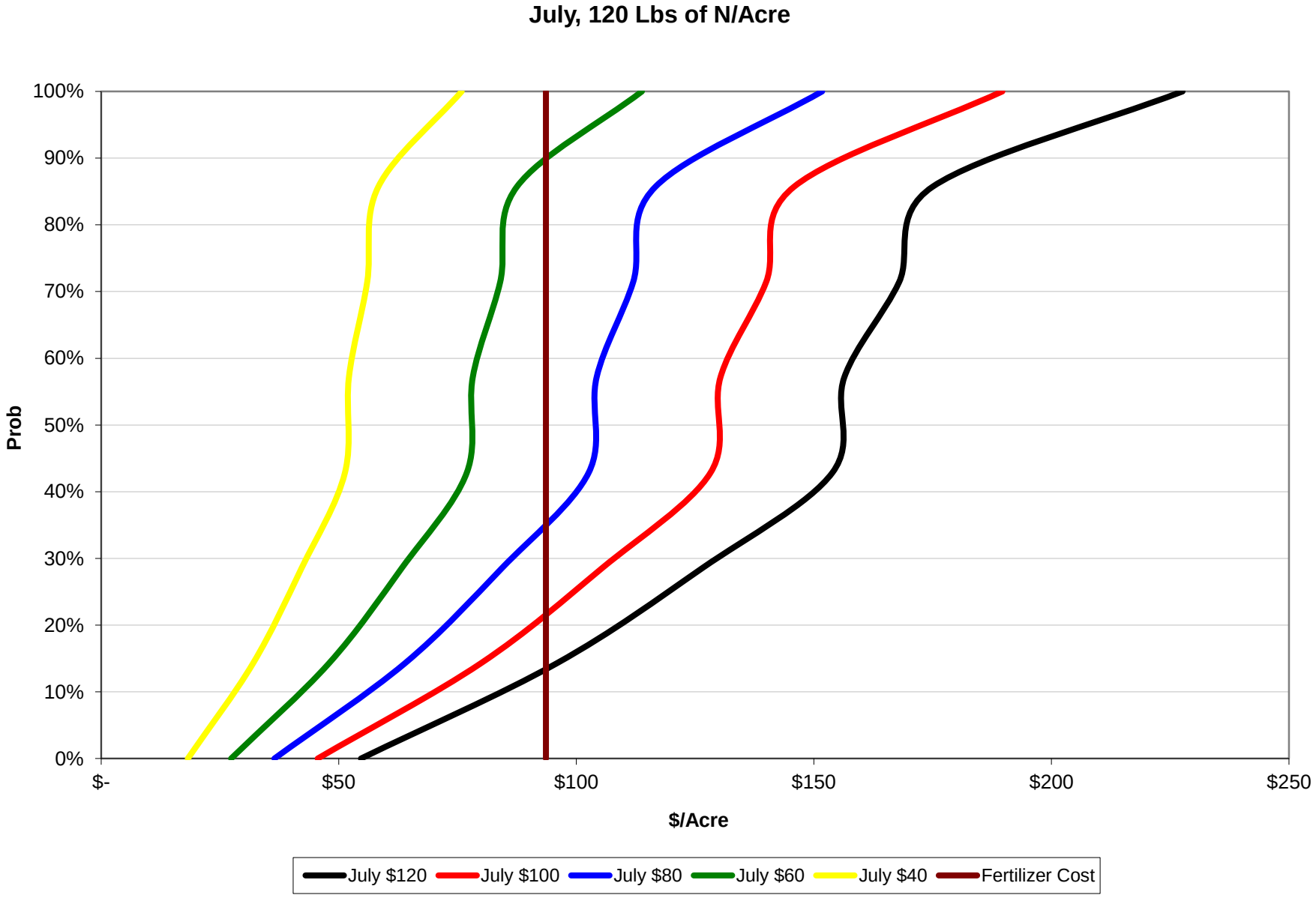
- Using This data we made an example for the difference between the value of the TDN produced with 20 lbs of N per acre, the application of fertilizer verses the value of the TDN produced with no added fertilizer.
- $480 worth of TDN with fertilizer
- $440 worth of TDN without fertilizer
- $40 gain from fertilizer use


The
Bottomline


July, 20 Lbs of N/Acre
Prob
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
$(60)
$(40)
$(20)
$-
$20
$40
$60
$80
$100
$120
$/Acre
July $120
July $100
July $80
July $60
July $40
Fertilizer Cost


July, 40 Lbs of N/Acre
Prob
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
$(20)
$-
$20
$40
$60
$80
$100
$120
$140
$160
$/Acre
July $120
July $100
July $80
July $60
July $40
Fertilizer Cost


July 80 Lbs of N/Acre
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Prob
$0
$50
$100
$150
$200
$250
$/Acre
July $120
July $100
July $80
July $60
July $40
Fertilizer Cost


July, 120 Lbs of N/Acre
100%
90%
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70%
60%
50%
40%
30%
20%
10%
0%
Prob
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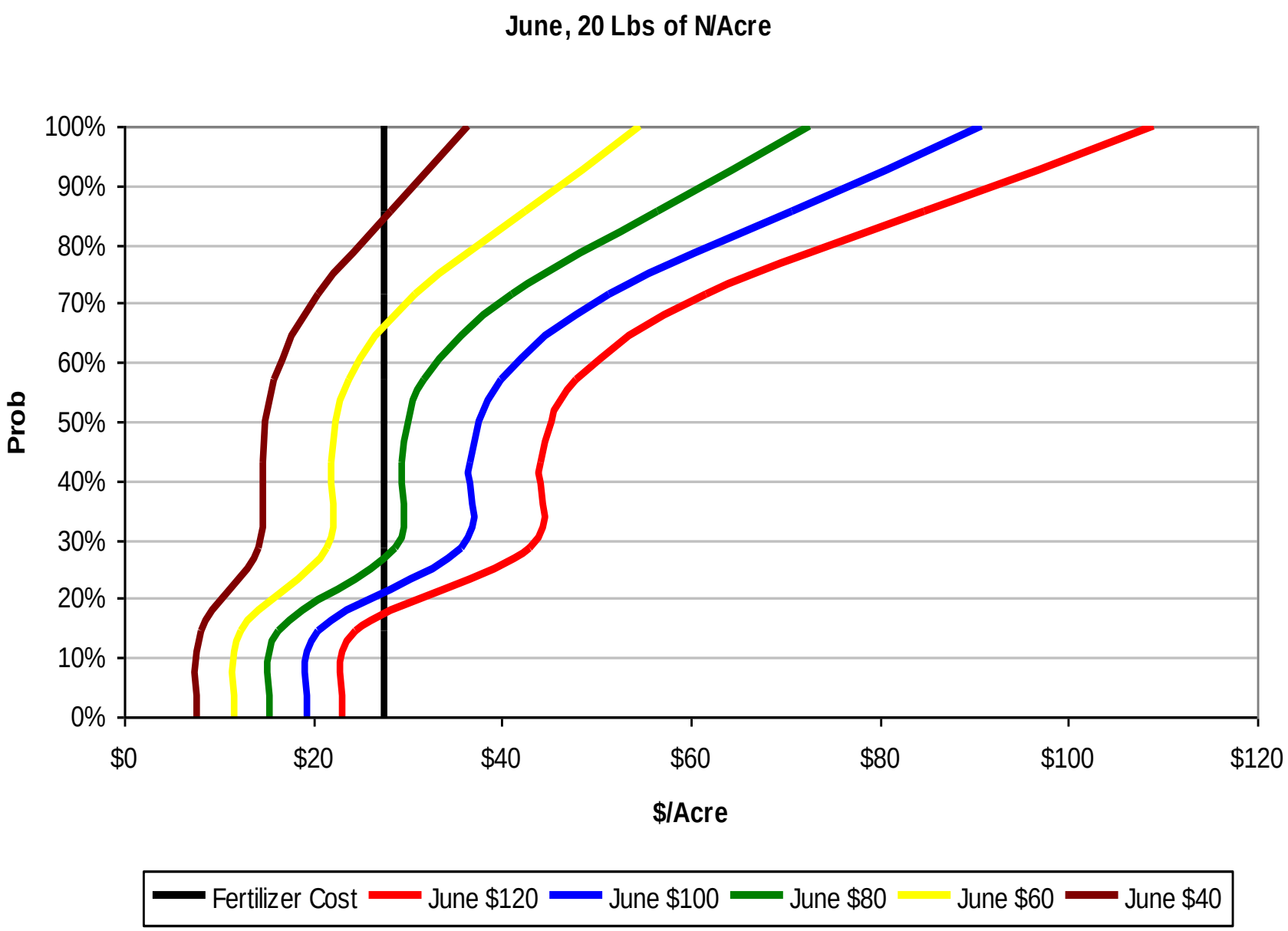
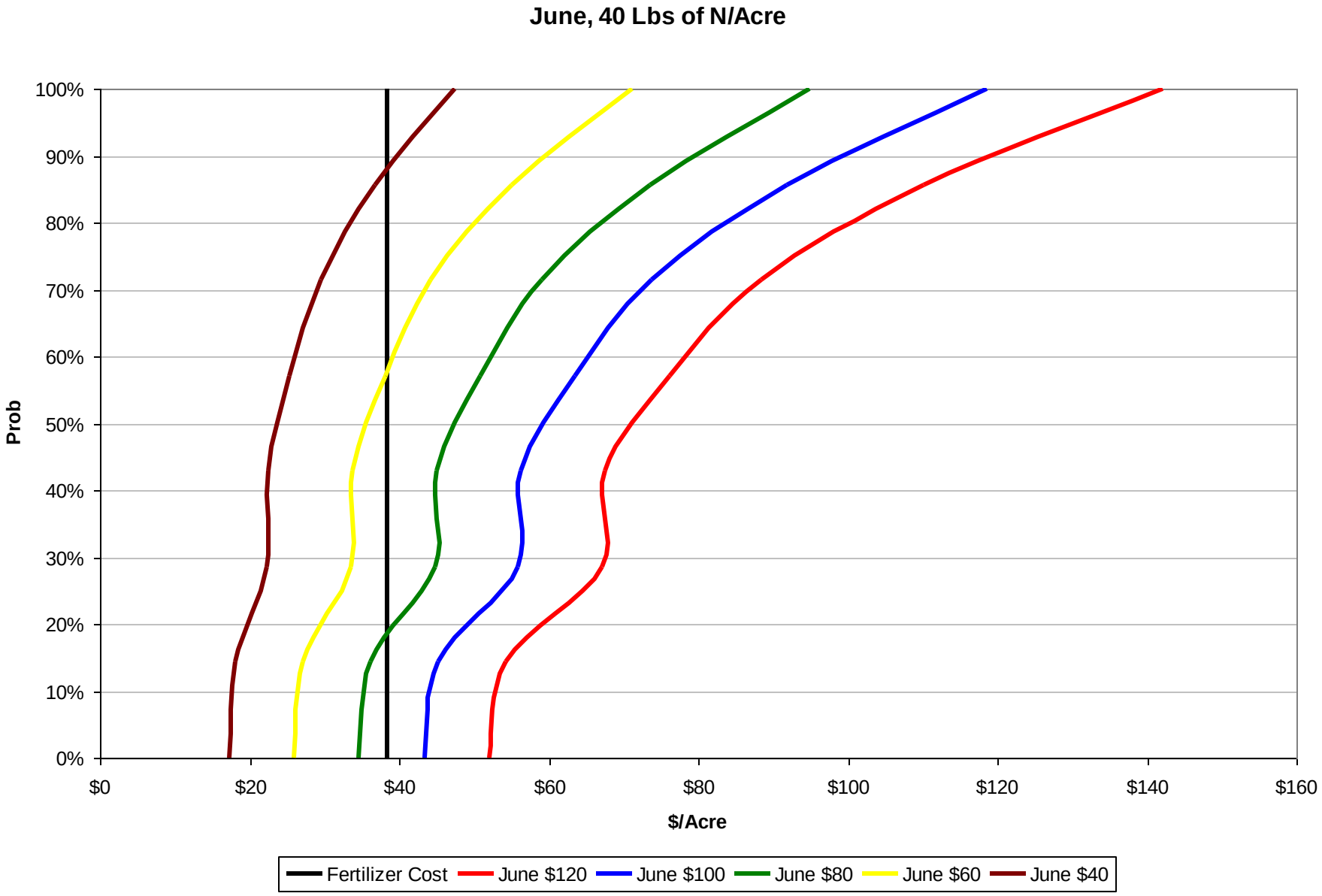
$50
$100
$150
$200
$250
$/Acre
July $120
July $100
July $80
July $60
July $40
Fertilizer Cost

Some General Conclusions

- Low hay prices result in low levels of economic success of using fertilizers at all rates
- Higher fertilizer cost result in lower levels of breaking even.
- Higher rates of fertilizer increase the chance of economic success.


June, 20 Lbs of N/Acre
Prob
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
$0
$20
$40
$60
$80
$100
$120
$/Acre
Fertilizer Cost
June $120
June $100
June $80
June $60
June $40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20%
10%
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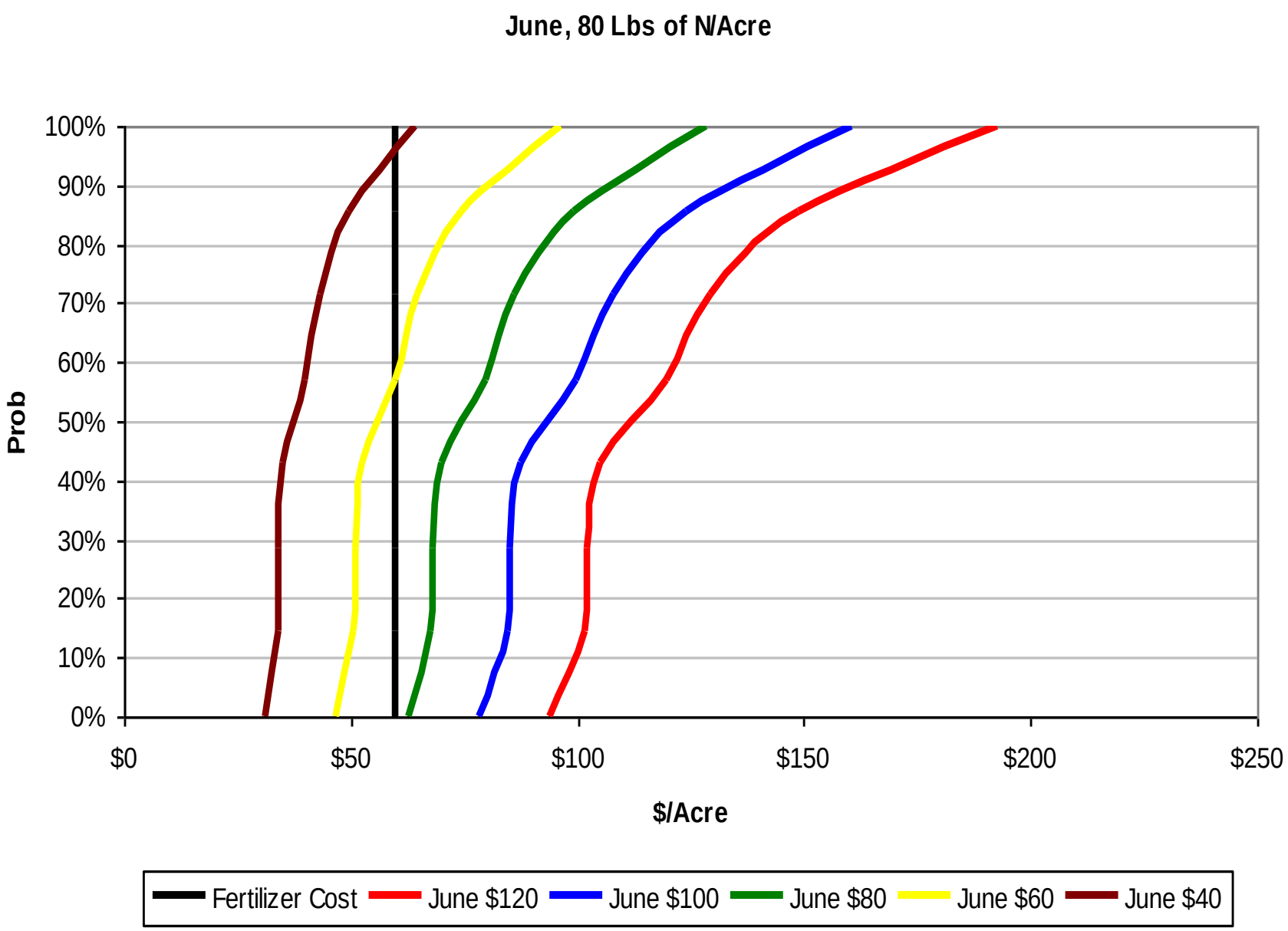
$80
$100
$120
$140
$160
$/Acre
Fertilizer Cost
June $120
June $100
June $80
June $60
June $40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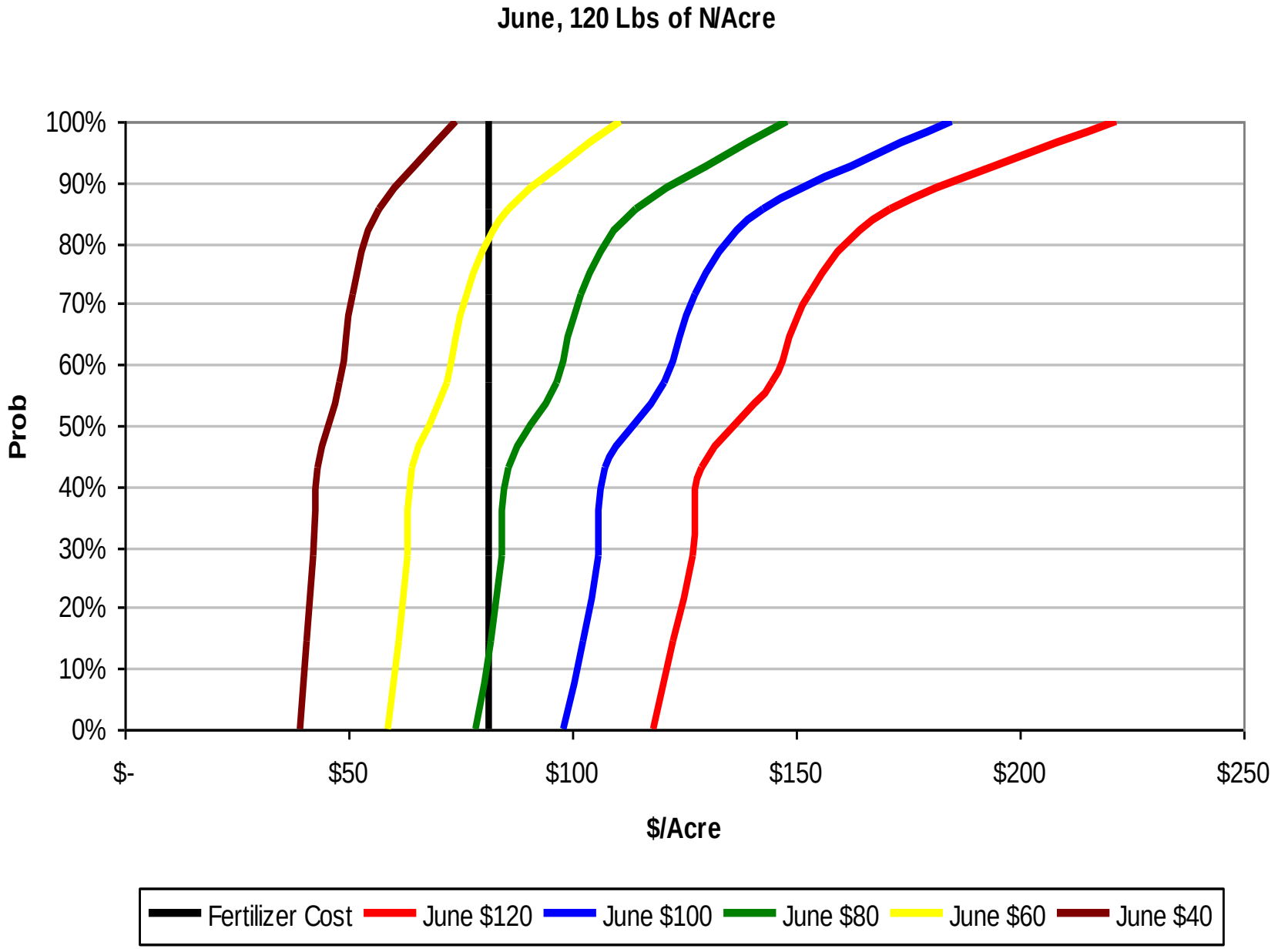
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$/Acre
Fertilizer Cost
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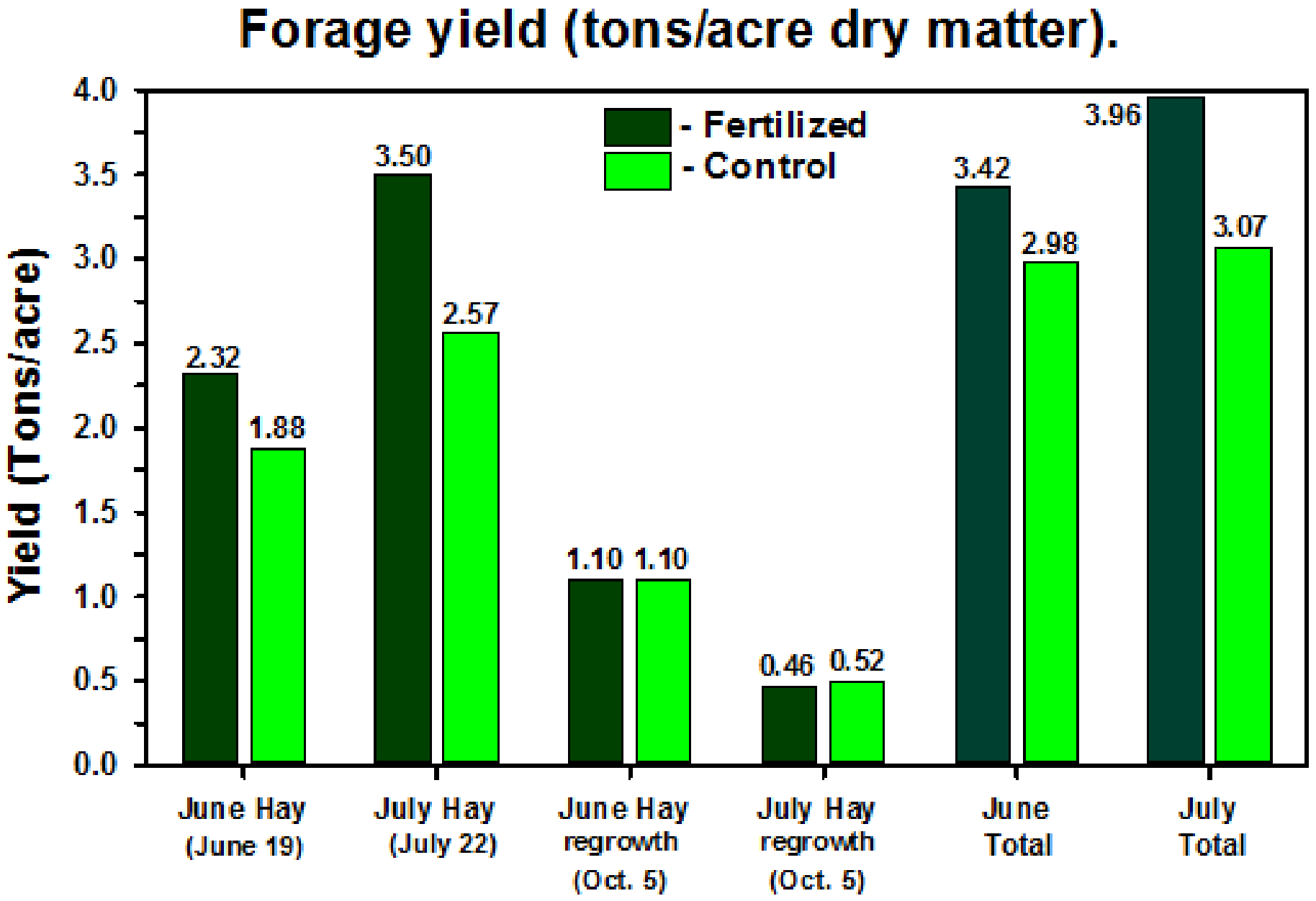
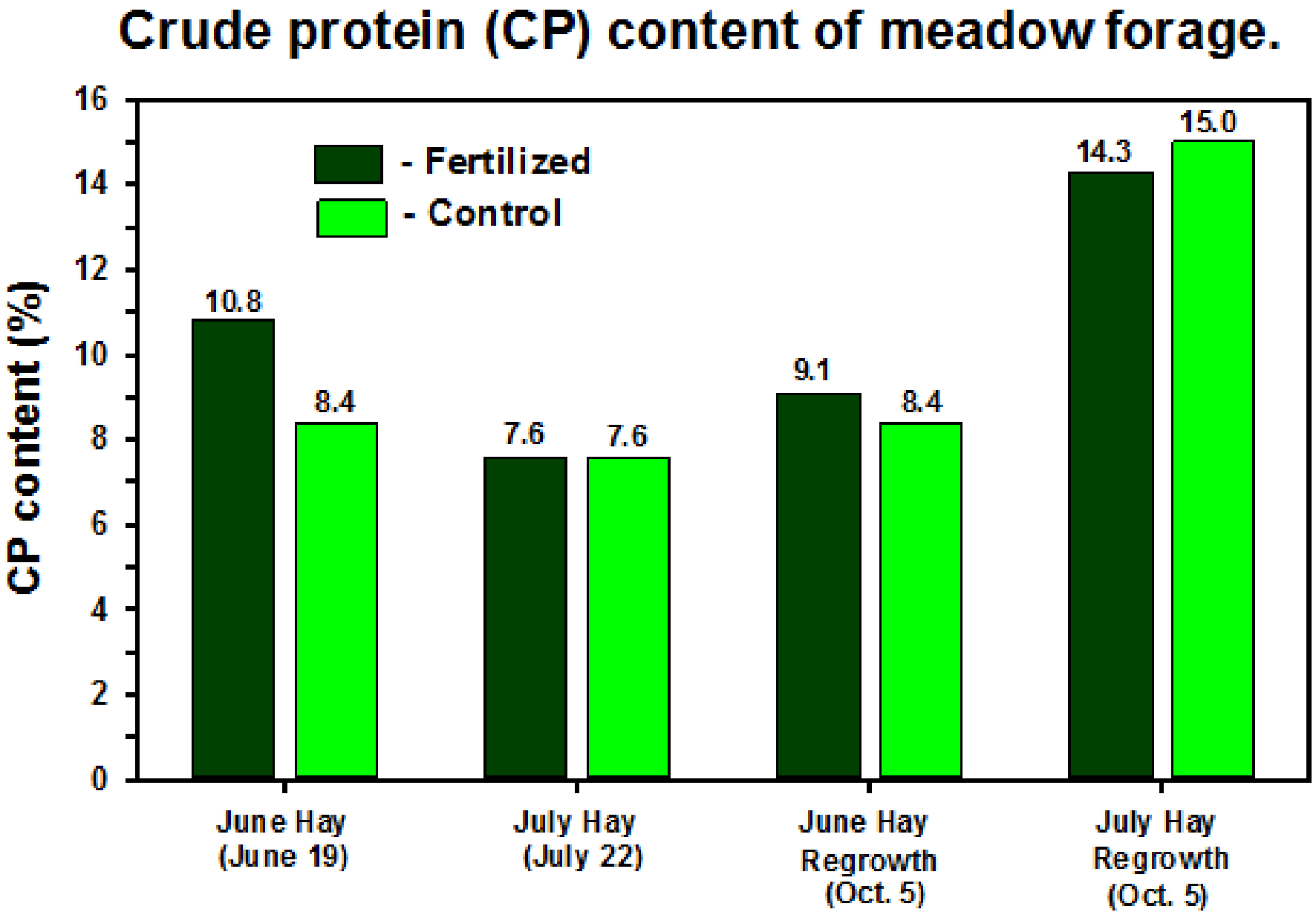
June $100
June $80
June $60
June $40

- June and July Harvest have vary different results
- Higher Expected Hay Prices Mean Higher Fertilizer usage
- Low levels may be more costly
- Your risk preference will change the amount of fertilizer you will apply

Wet Meadow Demonstration Site: Yield Data



Wet Meadow Diet and Hay Quality Data (dry matter basis)



Questions