

Fertilizer Prices / Breakeven Points

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AG PROFITABILITY CONFERENCE

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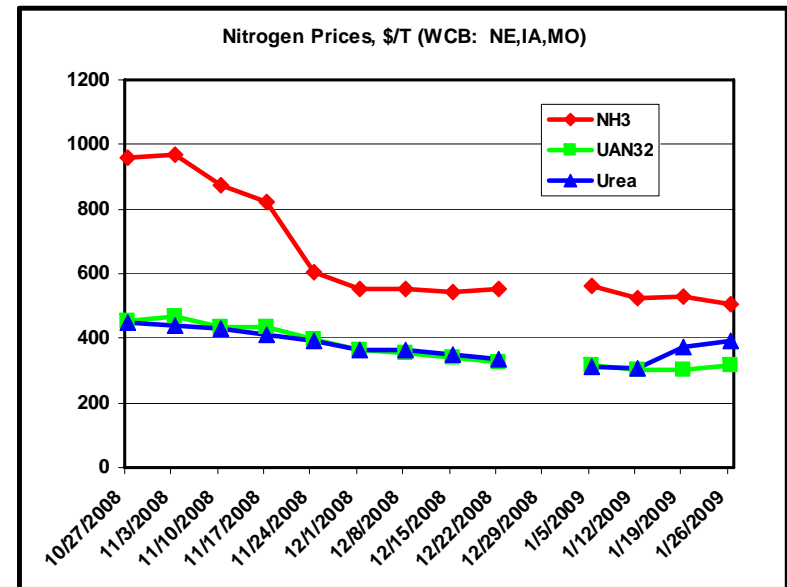
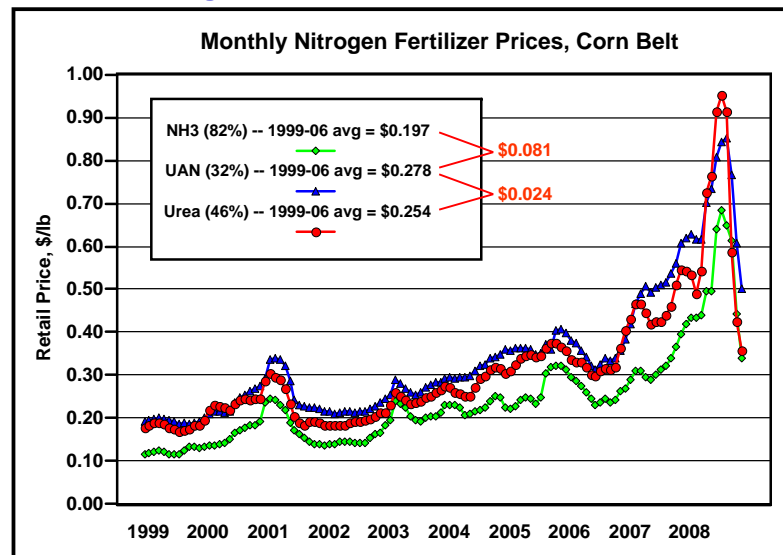
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 Extension Office
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Lyons, Kansas



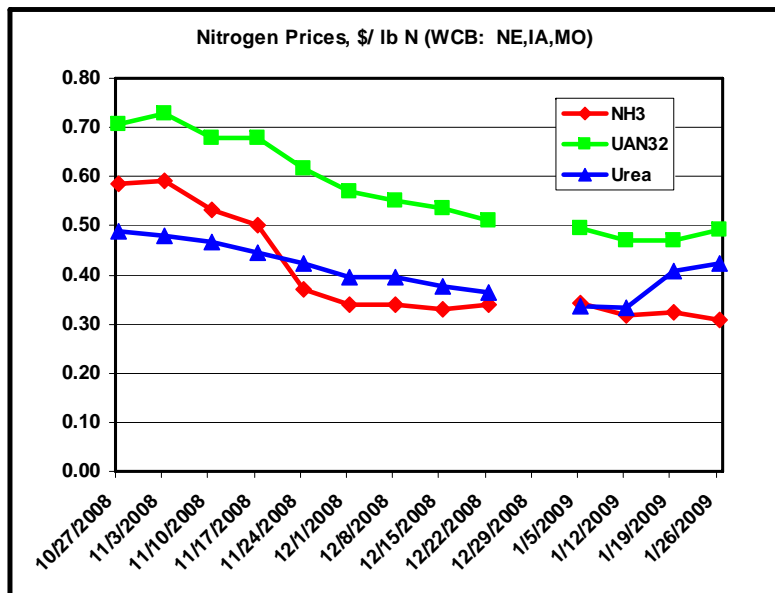
Fertilizer prices
 (should you be cutting back on fertilizer rates?)



N prices have fallen recently, but are still significantly above historical averages...

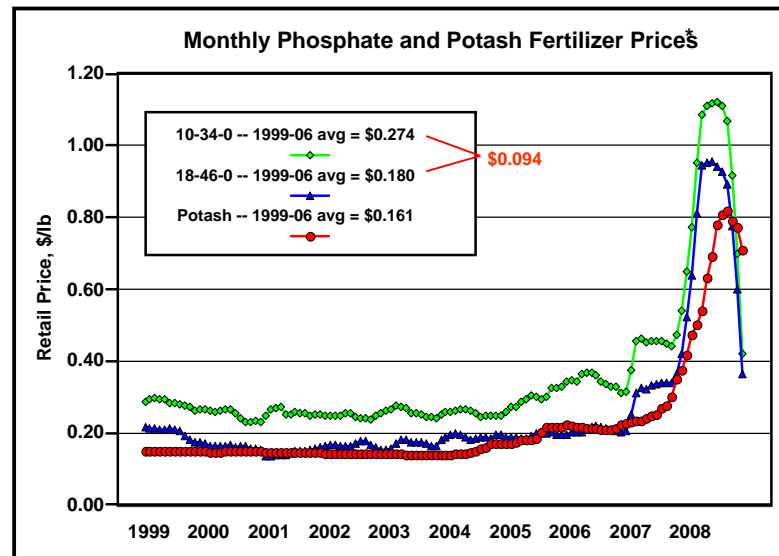


Prices fell off their highs, especially NH3 (big drops in a short time span)

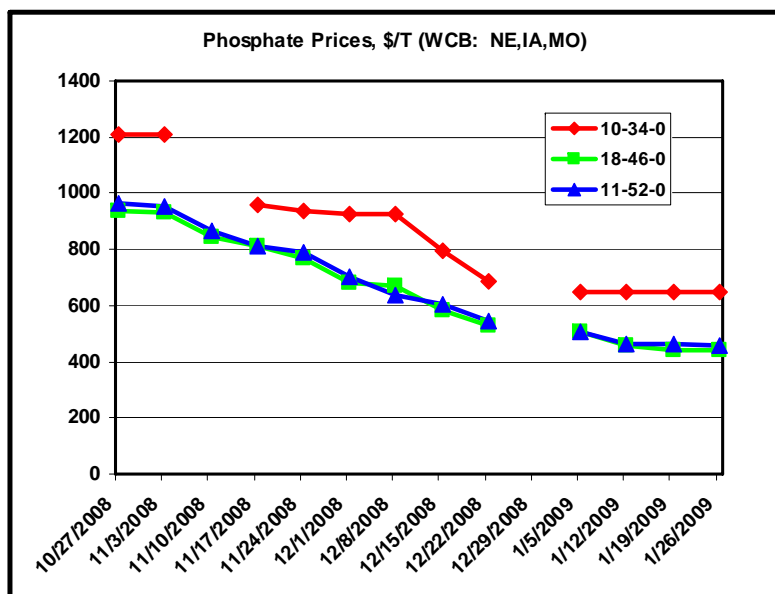


Big differences in prices of N products – urea adjusting to more what we expect?

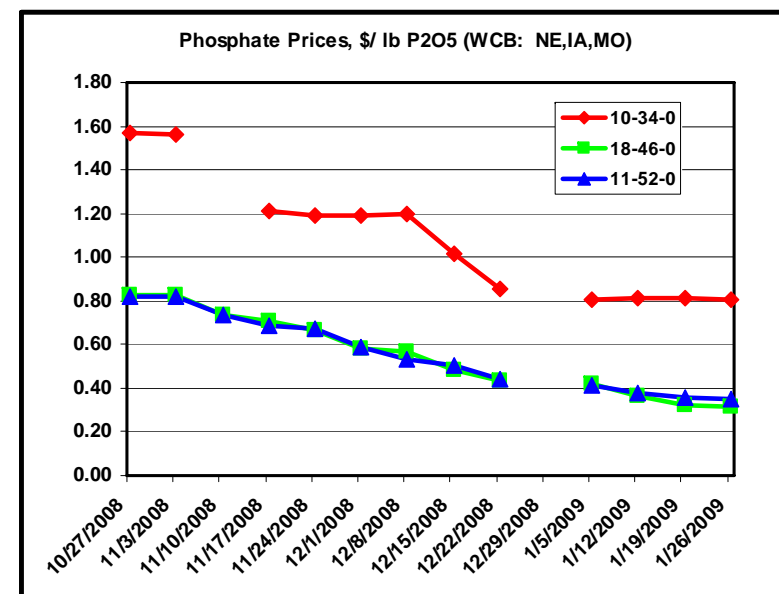
P and K prices have fallen recently, but are still significantly above historical averages...



* Price of phosphate is based on blend price less value of N (average of NH3, UAN 32, and Urea prices)



Big differences in prices of P products – how fast will the adjustment be?



Big differences in prices of P products – how fast will the adjustment be?

Microsoft Excel - KSU-FertCalc.xls

KSU-FertCostCalc.xls --- A spreadsheet program to calculate the per unit cost of fertilizer nutrients given the total cost per ton for various products.
Version -- 1.26.09

INPUTS vs CALCULATED VALUES

In the *Calculator* sheet all blue numbers are inputs and all black numbers are calculated from these inputs. The spreadsheet automatically recalculates every time an additional input is entered. Thus, it is important to wait until all data have been entered and reviewed before interpreting any of the calculated results (i.e., black numbers).

DESCRIPTION OF INPUTS

Several of the input titles have a red diamond in the upper right hand corner of the cell. By moving your mouse cursor over this diamond, a brief description of the input will be displayed on the screen.

Developed by:

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Kansas State University
Department of Agricultural Economics

Calculate the cost per lb of nutrient to compare alternative fertilizer sources/products.

Microsoft Excel - KSU-FertCalc.xls

Fertilizer Cost Calculator

Fertilizer type	Cost of product \$/ton	Nutrient Percent			Cost of nutrient, \$/lb		
		N	P	K	N	P	K
Nitrogen							
1 Anhydrous (NH3)	\$500	82%	---	---	\$0.305	na	na
2 Urea	\$385	45%	---	---	\$0.428	na	na
3 UAN, 20 0 0	\$270	28%	---	---	\$0.482	na	na
4 UAN, 32 0 0	\$300	32%	---	---	\$0.469	na	na
Average cost ==>					\$0.421	na	na
Phosphorus							
1 Super phosphate	\$550	---	45%	---	na	\$0.611	na
2 XXX	\$0	---	0%	---	na	na	na
Average cost ==>					na	\$0.611	na
Potassium							
1 Muriate of potash	\$795	---	---	60%	na	na	\$0.663
2 XXX	\$0	---	---	0%	na	na	na
Average cost ==>					na	na	\$0.663
Blends¹							
1 10-34-0	\$650	10%	34%	0%	\$0.612	\$0.776	n/a
2 18-46-0	\$440	18%	46%	0%	\$0.263	\$0.375	n/a
3 11-52-0	\$455	11%	52%	0%	\$0.267	\$0.381	n/a
4 XXX	\$0	0%	0%	0%	n/a	n/a	n/a
5 XXX	\$0	0%	0%	0%	n/a	n/a	n/a
6 XXX	\$0	0%	0%	0%	n/a	n/a	n/a

¹Cost of individual nutrients are calculated simultaneously considering the value of N, P, and K costs individually at their average costs and then making proportional adjustments.

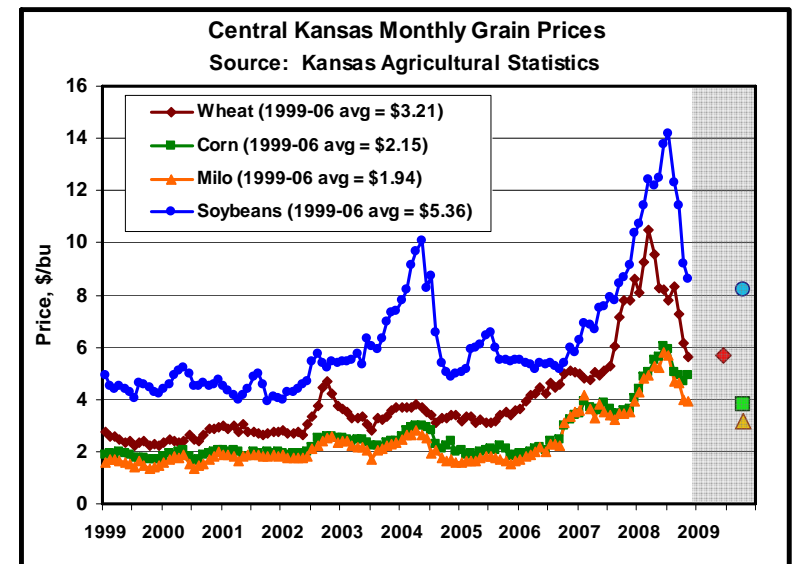
Fertilizer type	N	P	K	\$/ton at avg prices
3 1 1 1	3	1	1	\$512
2 1 1 1	2	1	1	\$716
2 1 1 1	2	1	1	\$730
0 0 0 0	0	0	0	\$0
0 0 0 0	0	0	0	\$0

Price of P varies considerably for liquid versus dry products.

What do these high prices imply for fertilizer rates?

... perhaps not a great deal if expected crop prices also are really high ... sort of what we've been preaching the last year and a half

Like fertilizer prices, crop prices have fallen recently, but they are still significantly above historical averages...



So, should we adjust fertilizer rates when fertilizer or crop prices change?

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KSU nitrogen recommendations ... no prices

Corn and grain sorghum

$N \text{ rec} = (\text{Yield Goal} \times 1.6) - (\% \text{SOM} \times 20) - \text{Profile N} - \text{Manure N} - \text{Other N Adjustments} + \text{Previous Crop Adjustments}$

Wheat

$N \text{ rec} = (\text{Yield Goal} \times 2.4) - (\% \text{SOM} \times 10) - \text{Profile N} - \text{Manure N} - \text{Other N Adjustments} + \text{Previous Crop Adjustments} + \text{Tillage Adjustments} + \text{Grazing Adjustments}$

Sunflowers

$N \text{ rec} = (\text{Yield Goal} \times 0.075) - (\% \text{SOM} \times 20) - \text{Profile N} - \text{Manure N} - \text{Other N Adjustments} + \text{Previous Crop Adjustments}$

Kastens, Dhuyvetter, Schlegel, & Dumler started working on this in late 2005 . . .

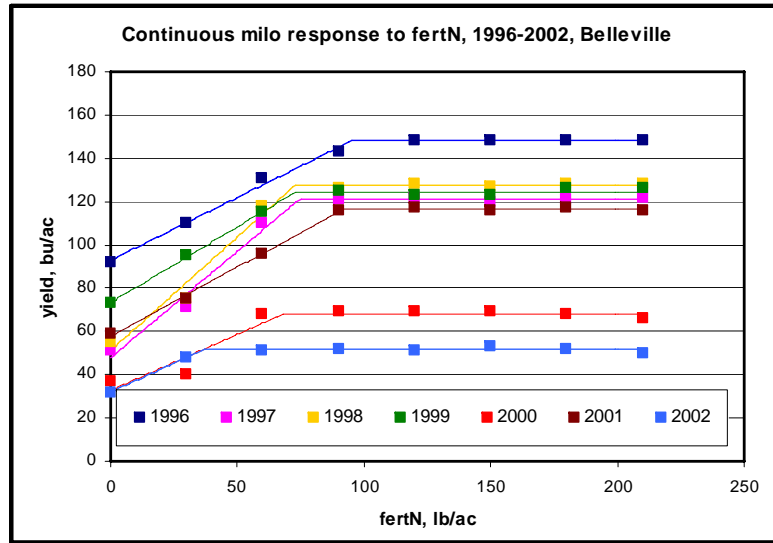
KSU nitrogen recommendations vs. N price

- Recommendations do not explicitly include prices
- Mathematical relationship between expected yield and nitrogen (i.e., production function) is needed in order to adjust recommendations for prices
- Similar issues pertain to P & K recommendations (i.e., no way to adjust them for prices)
- We assume KSU had in mind these prices:
 - Wheat \$3.22/bu
 - Corn \$2.35/bu
 - fertN \$0.21/lb N (fertP, used later, \$0.24/lb P2O5)

Nitrogen production function...

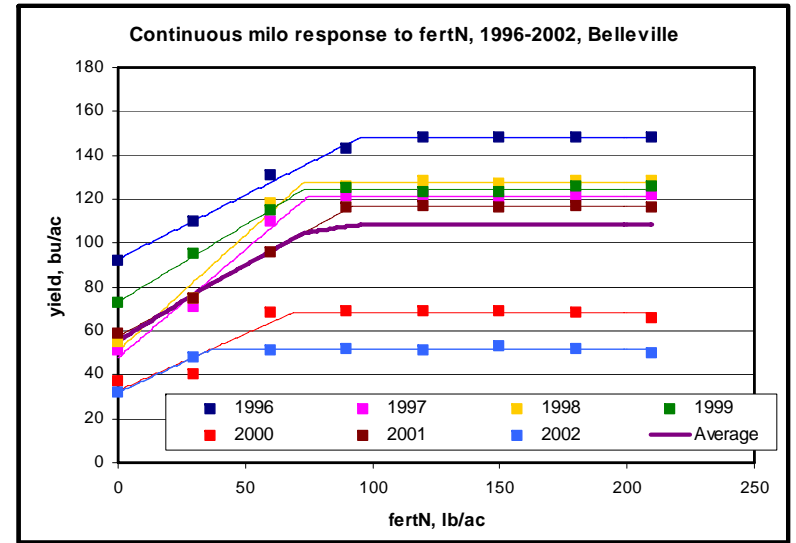
- In a limiting factor framework, it is generally believed that relationship between N and yield is linear for any given year and location (implies linear plateau production function)
- Linear plateau production function implies that optimal N will either be 0 or level where yield plateaus
- Average of multiple linear plateau production functions can be non-linear and this represents expectations of future N:yield relationship

Yield response by year – linear plateau “fits” data quite well...



What would yield be for given fertN next year?

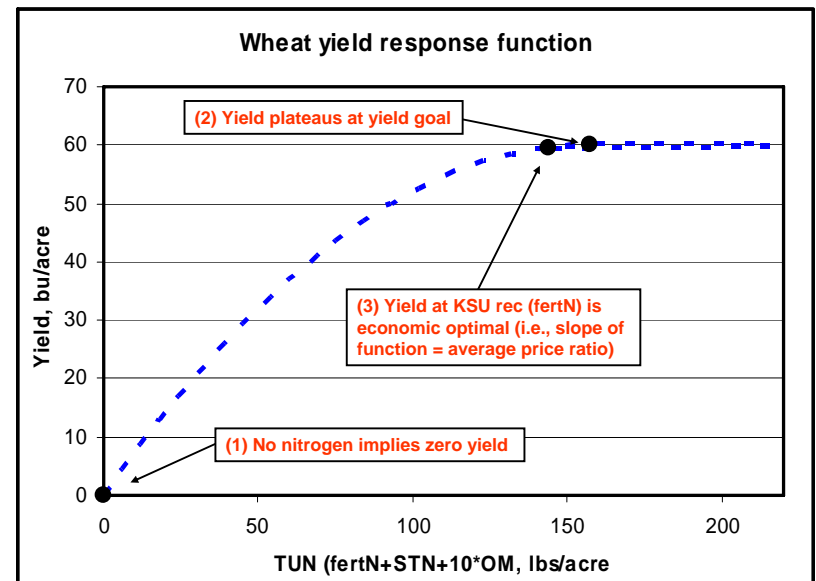
Average of linear plateaus can become non-linear...



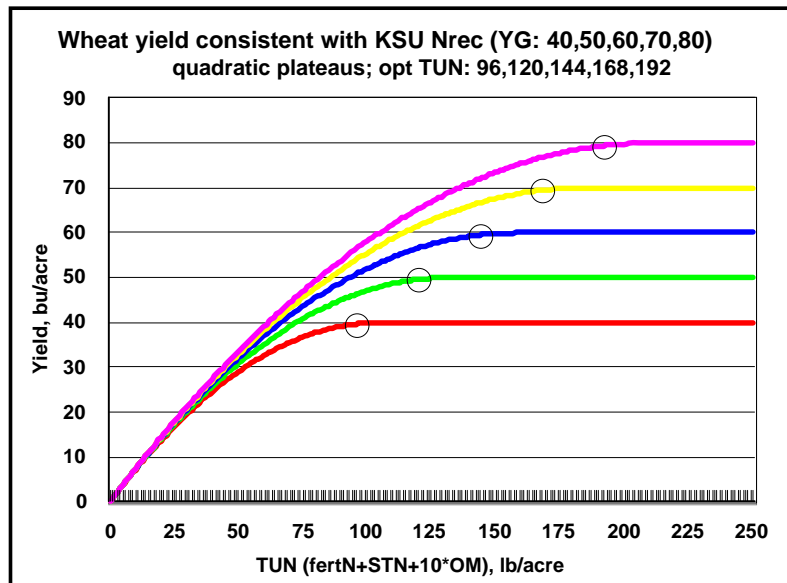
Nitrogen production function...

- Nice property of non-linear production function is that it implies diminishing marginal returns and thus prices matter
- Assumed functional form is quadratic plateau which allows diminishing returns – consistent with linear plateau in any given year
- Estimate model parameters such that
 - KSU Nrec is economic optimum at historical average prices
 - Yield plateau is equal to yield goal
 - Intercept goes through origin (i.e., 0 N equates to 0 yield)

Defined points that allowed quadratic-plateau function to be defined...

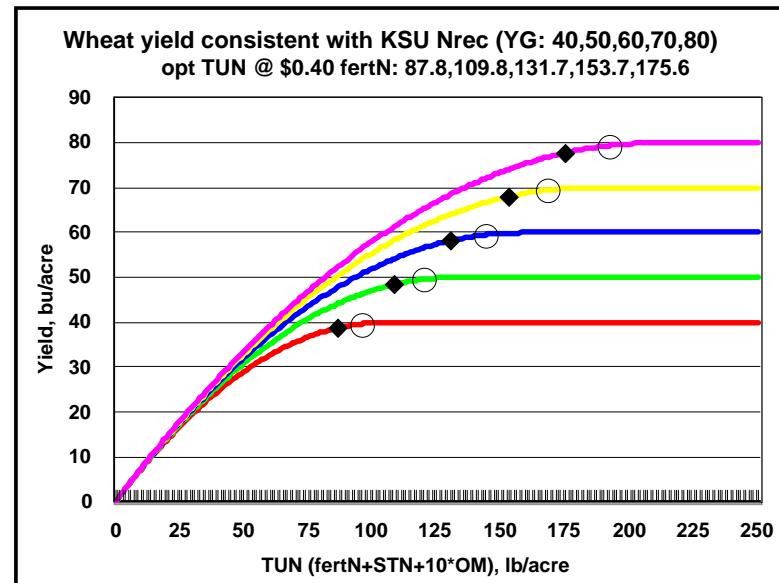


Same optimal N (slope there = 0.21/3.22) but yields about 1% lower than plateau



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Slope at diamonds is 0.40/3.22



With more expensive N, you make more money by applying less

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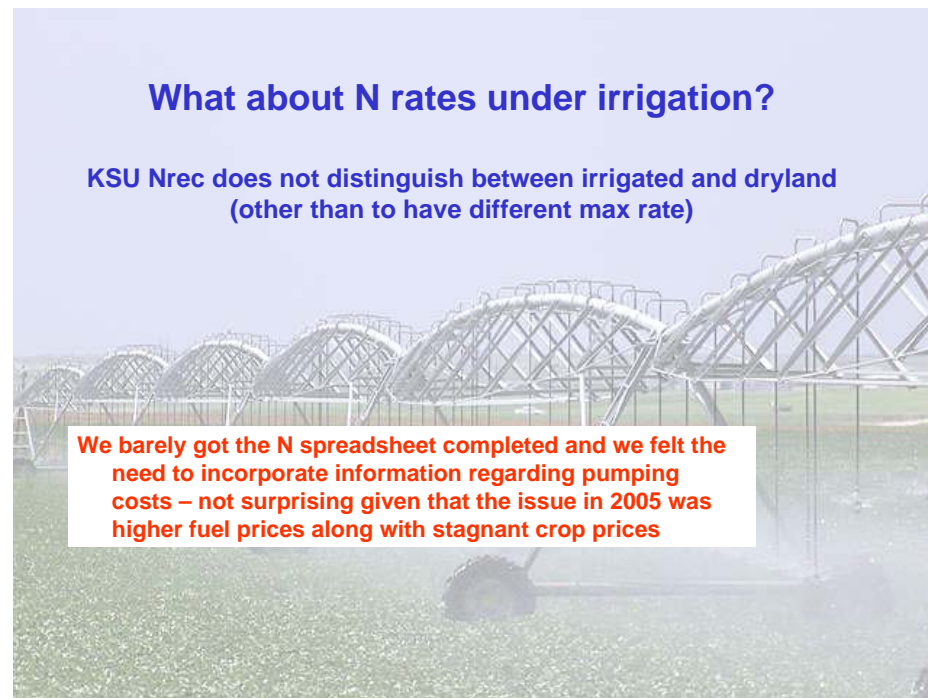
Operationalizing production function...

- Everything was embedded in an Excel spreadsheet so that users could determine optimal fertilizer N rates based on fertilizer N prices and crop prices
- We could use the spreadsheet to recommend some “typical” percentage cutbacks on fertilizer – dealers had been requesting such info throughout 2005

What about N rates under irrigation?

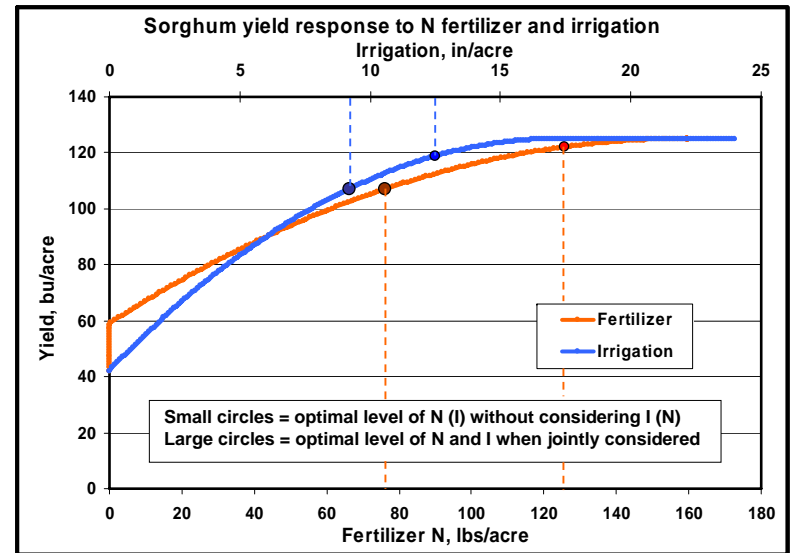
KSU Nrec does not distinguish between irrigated and dryland (other than to have different max rate)

We barely got the N spreadsheet completed and we felt the need to incorporate information regarding pumping costs – not surprising given that the issue in 2005 was higher fuel prices along with stagnant crop prices



- **KSU N recs don't distinguish between irrigators and non-irrigators, which means:**
 - Recommended N rates assume water is not limiting yield (or that producer picks a reduced yield goal based on water cost)
- **With high pumping cost and high N prices and low crop prices, our spreadsheet recommended large cutbacks in both N and irrigation water**

When considering irrigation and N together, optimal values decrease significantly...

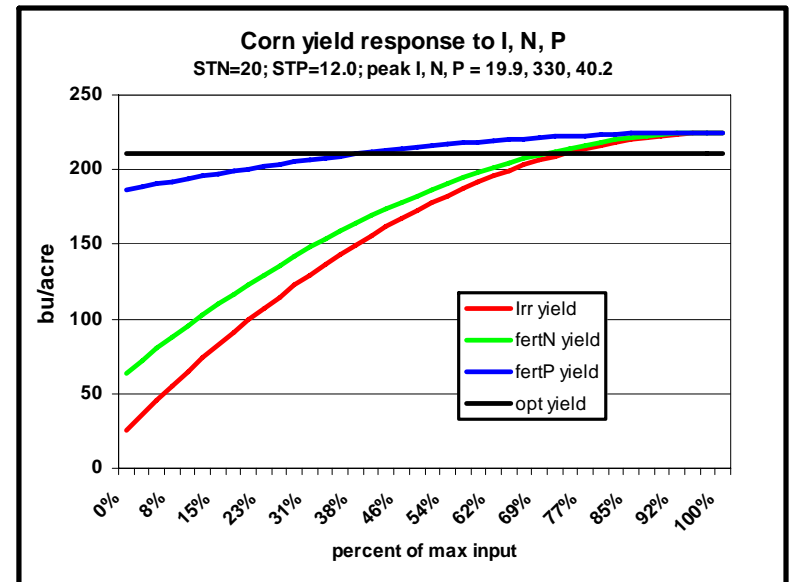


Sorghum price = \$2.10/bu, N price = \$0.40/lb, irrigation cost = \$6.50/inch

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Late summer early Fall 2008 ...

- Very high fertilizer prices and not just N
- Falling crop prices
- Producers asking about price-based adjustments again, especially related to high P prices (\$1.20/lb P205???)
- And so we adjust the decision spreadsheet again...
 - ...this time incorporating P
 - Use MF-2586 sufficiency P recs



Corn \$4.29/bu; N \$0.71/lb, P205 \$1.09/lb, irrigation cost = \$6.00/in (20 in rain; YG=225)
MF-2586 recs: 300 lb N, 38.0 P205; optimal rates: 13.1 in water, 226.9 lb N, 14.5 lb P205

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Microsoft Excel - KSU-NPI_CropBudgets(UsageCo-Jan09).xls

KSU-NPI_CropBudgets.xls -- A spreadsheet budgeting program to compare economic returns of multiple crops and/or crop rotations where nitrogen and phosphate fertilizer and irrigation levels are determined optimally based upon prices.

Version -- 11.30.08

INPUTS vs CALCULATED VALUES
 In the *Budgets*, *Optimal N&P*, *Figures*, and *Irr energy costs* sheets all blue numbers are inputs and all black numbers are calculated from these inputs. The *Irr energy costs* sheet is included as a calculator to assist with determining irrigation pumping costs to enter into the *Budgets* sheet (costs calculated in the *Irr energy costs* sheet need to be manually entered into the *Budgets* sheet).

DESCRIPTION OF INPUTS
 Several of the input cells (i.e., blue number) have a red diamond in the upper right hand corner of the cell. By moving your mouse cursor over this diamond, a brief description of the input will be displayed on the screen.

COMPANION PUBLICATION
 The mathematical approach used to determine the economic optimal N rates is described in "Modifying Yield-Goal-Based Fertilizer Recommendations to Reflect Price" (available on www.agmanager.info).

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Extension Agricultural Economists
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KSU-NPI_CropBudgets.xls -- available at www.agmanager.info
 (click on "Decision Tools" under "Projected Budgets")

Microsoft Excel - KSU-NPI_CropBudgets(RiceCo-Jan09).xls

CROP BUDGETS OF TOTAL COSTS AND RETURNS (Nitrogen & Phosphate Fertilizer and Irrigation Water at Economic Optimum Levels)

Crop/System	Wheat	Corn	Sorghum	Soybean	Sunflower	Alfalfa	DC Bean	Total	Per Acre	Per Acre
Planted acres of each crop	72.0	3.0	18.0	7.0	0.0	0.0	0.0	100.0	100.0	100.0
Tillable acres per planted acre	1.00	1.00	1.00	1.00	0.00	1.00	0.00	100.0	100.0	100.0
INCOME PER ACRE										
A. Yield per acre	44.3	89.6	78.3	27.0	964.9	3.6	20.0			
B. Price per unit	\$5.70	\$3.83	\$3.16	\$8.23	\$0.1360	\$110.00	\$8.23	\$25.205	\$252.04	\$252.04
C. Net government payments	\$15.35	\$15.35	\$15.35	\$15.35	\$10.00	\$15.35	\$0.00	1,535	15.35	15.35
D. Indemnity payments	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	0	0.00	0.00
E. Miscellaneous income	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	0	0.00	0.00
F. Returns/acre (A x B + C + D + E)	\$267.68	\$358.36	\$262.68	\$237.60	\$131.23	\$407.79	\$164.60	\$26.740	\$267.39	\$267.39
COSTS PER ACRE										
1. Seed	\$12.80	\$47.04	\$9.48	\$33.75	\$20.02	\$12.60	\$40.00	\$1,470	\$14.70	\$14.70
2. Herbicide	3.64	26.19	20.03	9.06	19.47	5.21	19.90	765	7.65	7.65
3. Insecticide / fungicide	1.00	1.00	0.00	0.00	6.46	6.06	0.00	75	0.75	0.75
4. Fertilizer and lime	44.18	52.82	40.41	23.25	6.49	38.51	16.20	4,230	42.30	42.30
5. Crop consulting	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00
6. Crop insurance	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00
7. Drying	0.00	0.00	0.00	0.00	3.76	0.00	0.00	0	0.00	0.00
8. Miscellaneous	5.75	5.75	5.75	5.75	5.00	5.75	5.00	575	5.75	5.75
9. Machinery expense	99.60	101.57	95.67	59.52	55.70	134.91	53.57	9,513	95.13	95.13
10. Non-machinery labor	11.18	11.44	10.92	6.76	5.98	15.08	6.11	1,083	10.83	10.83
12. Land charge / rent	46.00	46.00	46.00	46.00	0.00	46.00	0.00	4,600	46.00	46.00
G. SUB TOTAL	\$223.15	\$291.81	\$228.26	\$184.09	\$122.97	\$264.02	\$140.78	\$22,310	\$223.10	\$223.10
I. RETURNS OVER COSTS (F - G)	\$37.44	\$56.72	\$27.13	\$47.99	\$34.9	\$135.05	\$18.19	\$3,690	\$36.90	\$36.90
J. TOTAL COSTS/UNIT (H/A)	\$5.20	\$3.37	\$3.01	\$7.02	\$0.13	\$76.45	\$7.32			
K. BREAK-EVEN PRICE (H C/A)	\$4.85	\$3.20	\$2.81	\$6.45	\$0.13	\$72.15	\$7.32			
M. Break-even price (w/ base crop)	\$5.94	\$3.73	\$3.43	\$8.23	\$0.18	\$85.60	\$9.72			
H. Break-even yield (w/ base crop)	46.2	87.0	85.7	27.0	1,309.9	2.6	23.7			
Base crop for breakeven analysis										
Wheat	0	0	0	1	0	0	0			

Microsoft Excel - KSU-NPI_CropBudgets(RiceCo-Jan09).xls

TABLE 1. Production Inputs Used for Budgets

ITEM	Wheat	Corn	Sorghum	Soybean	Sunflower	Alfalfa	DC Bean	Use (Y=1, N=0)
Price scenarios to consider								
Low price scenario	\$4.50	\$3.00	\$2.50	\$6.75	\$0.1180	\$94.88	\$6.75	0
High price scenario	\$6.50	\$4.50	\$3.75	\$10.00	\$0.1650	\$119.67	\$10.00	0
2009 bids (1/26/09)	\$5.70	\$3.83	\$3.16	\$8.23	\$0.1360	\$110.00	\$8.23	1
Yield goal (YG), bu/ac	46.5	93.0	83.0	27.5	1,065	3.6	20.0	
Enter 0 for dryland or 1 for irrigated	0	0	0	0	0	0	0	
Annual rainfall	28.00	28.00	28.00	28.00	28.00	28.00	na	
Soil test P (STP), ppm	12.00	12.00	12.00	12.00	12.00	12.00	na	
Organic matter (OM), %	2.00	2.00	2.00	2.00	2.00	2.00	na	
Soil test nitrogen (STN), lbs/ac	20.0	20.0	20.0	20.0	20.0	20.0	na	
Other N adjustments, lbs/ac	0.0	0.0	0.0	0.0	0.0	0.0	na	
KSU recommended nitrogen, lbs/ac	71.6	88.8	72.8	0.0	19.9	0.0		
Econ Optimum fertN, lbs/ac	55.3	70.2	51.3	0.0	0.0	0.0		
KSU recommended phosphate, lbs/ac	26.2	27.4	25.3	28.0	21.1	46.5		
Econ Optimum fertP, lbs/ac	14.9	16.6	12.7	22.5	7.5	41.4		
Econ Optimum Irrigation Amount, in	0.0	0.0	0.0	0.0	0.0	0.0		
Yield at optimal N, P, and I, bu/ac	44.3	89.6	78.3	27.0	964.9	3.6	20.0	
Change in STP, ppm	-0.40	-0.72	-1.04	0.05	-0.39	-0.08		
Seeding rate (lbs. seeds, etc)	80	21	3	135	22	3	160	
Seed price, \$/unit	\$0.16	\$2.24	\$3.16	\$0.25	\$0.91	\$4.20	\$0.25	
Fertilizer:								\$/unit
Nitrogen (N)	55.3	70.2	51.3	0.0	0.8	0.0	0	\$0.490 /lb
Phosphate (P)	14.9	16.6	12.7	22.5	7.5	41.4	20.0	\$0.810 /lb
Potash (K)	0	0	0	0	0	0	0	\$0.660 /lb
Other	0	0	0	0	0	0	0	\$1.000 /ac
Lime	500	500	500	500	0	500	0	\$0.010 /lb
Herbicide								
Total herbicide	3.64	26.19	20.03	9.06	19.47	5.208	19.9	\$1.00 /ac
Bleed Lite II Magnum								\$11.28 /qt
Atrocin II + crop oil								\$3.63 /qt

User enters yield goal, crop and fertilizer prices, and soil properties - optimal N and P rates are calculated.

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High price scenario	\$6.50	\$4.50	\$3.75	\$10.00	\$0.1650	\$119.67	\$10.00	0
2009 bids (1/26/09)	\$5.70	\$3.83	\$3.16	\$8.23	\$0.1360	\$110.00	\$8.23	1
Yield goal (YG), bu/ac	46.5	93.0	83.0	27.5	1,065	3.6	20.0	
Enter 0 for dryland or 1 for irrigated	0	0	0	0	0	0	0	
Annual rainfall	28.00	28.00	28.00	28.00	28.00	28.00	na	
Soil test P (STP), ppm	12.00	12.00	12.00	12.00	12.00	12.00	na	
Organic matter (OM), %	2.00	2.00	2.00	2.00	2.00	2.00	na	
Soil test nitrogen (STN), lbs/ac	20.0	20.0	20.0	20.0	20.0	20.0	na	
Other N adjustments, lbs/ac	0.0	0.0	0.0	0.0	0.0	0.0	na	
KSU recommended nitrogen, lbs/ac	71.6	88.8	72.8	0.0	19.9	0.0		
Econ Optimum fertN, lbs/ac	61.6	80.2	62.6	0.0	10.6	0.0		
KSU recommended phosphate, lbs/ac	26.2	27.4	25.3	28.0	21.1	46.5		
Econ Optimum fertP, lbs/ac	20.3	21.0	17.8	28.5	13.8	46.0		
Econ Optimum Irrigation Amount, in	0.0	0.0	0.0	0.0	0.0	0.0		
Yield at optimal N, P, and I, bu/ac	45.6	91.4	80.8	27.4	1024.5	3.6	20.0	
Change in STP, ppm	-0.14	-0.51	-0.81	0.36	-0.09	0.16		
Seeding rate (lbs. seeds, etc)	80	21	3	135	22	3	160	
Seed price, \$/unit	\$0.16	\$2.24	\$3.16	\$0.25	\$0.91	\$4.20	\$0.25	
Fertilizer:								\$/unit
Nitrogen (N)	64.8	80.2	62.6	0.0	10.6	0.0	0	\$0.420 /lb
Phosphate (P)	20.3	21.0	17.8	28.5	13.8	46.0	20.0	\$0.390 /lb
Potash (K)	0	0	0	0	0	0	0	\$0.660 /lb

Lower fertilizer prices increase economic optimal rates, but have no impact on KSU recommended rates.

Note: In this particular example, Econ Optimum fertN rates are very close to KSU recommended nitrogen rate IF Phosphate price = \$0.00/lb. Likewise, for Econ Optimum fertP.

Microsoft Excel - KSU-NPI_CropBudgets(RiceCo-Jan09).xls

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Microsoft Excel - KSU-NPI_CropBudgets(RiceCo-Jan09).xls

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Crop System	Wheat	Corn	Sorghum	Soybean	Sunflower	Alfalfa	DC Bean	Total	Per Acre	Per Acre
Planted acres of each crop	72.0	3.0	18.0	7.0	0.0	0.0	0.0	100.0	Planted	Tillable
Tillable acres per planted acre	1.00	1.00	1.00	1.00	0.00	1.00	0.00	100.0		
INCOME PER ACRE										
A. Yield per acre	45.6	91.4	80.8	27.4	1,024.5	3.6	29.0			
B. Price per unit	\$9.70	\$3.83	\$3.16	\$8.23	\$0.1360	\$110.00	\$8.23	\$25,931	\$299.30	\$299.30
C. Net government payments	\$15.35	\$15.35	\$15.35	\$15.35	\$0.00	\$15.35	\$0.00	1,535	15.35	15.35
D. Indemnity payments	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	0	0.00	0.00
E. Miscellaneous income	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	0	0.00	0.00
F. Returns/acre ((A x B) + C + D + E)	\$275.10	\$365.48	\$270.81	\$241.00	\$139.34	\$410.56	\$164.60	\$27,466	\$274.65	\$274.65
COSTS PER ACRE										
1. Seed	\$12.80	\$47.04	\$9.48	\$33.75	\$20.02	\$12.60	\$40.00	\$1,470	\$14.70	\$14.70
2. Herbicide	3.64	26.19	20.03	9.06	19.47	5.21	19.90	765	7.65	7.65
3. Insecticide / fungicide	1.00	1.00	0.00	0.00	6.46	6.06	0.00	75	0.75	0.75
4. Fertilizer and lime	39.31	46.04	37.55	14.96	9.29	21.11	7.00	3,749	37.49	37.49
5. Crop consulting	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00
6. Crop insurance	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00
7. Drying	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00
8. Miscellaneous	5.75	5.75	5.75	5.75	5.00	5.75	5.00	575	5.75	5.75
9. Machinery expense	99.07	102.22	96.59	59.59	55.96	135.20	53.57	9,596	95.96	95.96
10. Non-machinery labor	11.18	11.44	10.92	6.76	5.98	15.08	6.11	1,083	10.83	10.83
12. Land charge / rent	46.00	46.00	46.00	46.00	0.00	46.00	0.00	4,600	46.00	46.00
G. SUB TOTAL	\$219.75	\$285.68	\$226.32	\$175.86	\$126.10	\$247.09	\$131.58	\$21,912	\$219.12	\$219.12
13. Interest on 1/2 nonland costs	6.91	9.59	7.21	5.19	4.89	8.04	5.26	692	6.92	6.92
H. TOTAL COSTS	\$226.66	\$295.27	\$233.53	\$181.06	\$131.06	\$255.14	\$136.84	\$22,605	\$226.05	\$226.05
I. RETURNS OVER COSTS (F - H)	\$48.43	\$70.22	\$37.28	\$59.94	\$8.27	\$155.42	\$27.76	\$4,861	\$48.61	\$48.61
J. TOTAL COSTS/UNIT (H/A)	\$4.95	\$3.23	\$2.89	\$6.60	\$0.13	\$71.01	\$6.84			
K. BREAK-EVEN PRICE (H/C)/A	\$4.62	\$3.06	\$2.70	\$6.04	\$0.13	\$66.74	\$6.84			
M. Break-even price (w/ base crop)	\$5.93	\$3.72	\$3.44	\$8.23	\$0.19	\$83.42	\$8.23			
N. Break-even yield (w/ base crop)	47.5	88.5	89.0	27.4	1,475.5	7.5	29.0			
Base crop for breakeven analysis	0	0	0	1	0	0	0			

Difference between liquid and dry = \$11.71/ac, all else equal.

Scenarios considered...

- Dry versus liquid N & P fertilizer prices
 - Dry: N = \$0.42 and P = \$0.35
 - Liquid: N = \$0.49 and P = \$0.81
- Three crop price scenarios

Price scenarios to consider	Wheat	Corn	Sorghum	Soybean
Low price scenario	\$4.50	\$3.00	\$2.50	\$6.75
High price scenario	\$6.50	\$4.50	\$3.75	\$10.00
2009 bids (1/26/09)	\$5.70	\$3.83	\$3.16	\$8.23

- Fertilizer rates
 - Economic optimal
 - 75% of economic optimal (under fertilize)
 - 125% of economic optimal (over fertilize)

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Crop yield at expected 2009 crop prices and various fertilizer scenarios...

Model-Estimated Yield vs Fertilizer Price and Rate (% of economic optimal)						
	Wheat	Corn	Milo	Soybean	Total	Average
Acres	72.0	3.0	18.0	7.0	100.0	
Dry N & P Prices (N=\$0.42 and P=\$0.35)						
A. Economic optimal rates						
	45.6	91.4	80.8	27.4	254.2	254.2
B. 75% of economic optimal rates (under fertilize)						
	43.0	87.0	77.0	26.2	233.2	233.2
C. 125% of economic optimal rates (over fertilize)						
	46.3	92.7	82.3	27.8	254.2	254.2
Liquid N & P Prices (N=\$0.49 and P=\$0.81)						
D. Economic optimal rates						
	44.3	89.6	78.3	27.4	239.6	239.6
E. 75% of economic optimal rates (under fertilize)						
	41.4	84.6	74.2	26.2	226.4	226.4
F. 125% of economic optimal rates (over fertilize)						
	45.2	91.3	80.0	27.4	253.9	253.9

1) Economic optimal yields are 1-3% higher at lower priced fertilizer (dry).

2) Under-fertilizing results in yields about 5% lower than optimal rate yields.

3) Over-fertilizing results in yields 1-2% higher than optimal rate yields.

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Return over costs at expected 2009 crop prices and various fertilizer scenarios...

Return Over Costs vs Fertilizer Price and Rate (% of economic optimal)						
	Wheat	Corn	Milo	Soybean	Total	Average
Acres	72.0	3.0	18.0	7.0	100.0	
Dry N & P Prices (N=\$0.42 and P=\$0.35)						
A. Economic optimal rates						
	\$49.43	\$70.22	\$37.28	\$59.94	\$4,861	\$48.61
B. 75% of economic optimal rates (under fertilize)						
	\$44.70	\$65.45	\$35.09	\$58.19	\$4,454	\$44.54
C. 125% of economic optimal rates (over fertilize)						
	\$44.31	\$63.98	\$32.78	\$57.65	\$4,376	\$43.76
Liquid N & P Prices (N=\$0.49 and P=\$0.81)						
D. Economic optimal rates						
	\$37.44	\$56.72	\$27.13	\$47.99	\$3,690	\$36.90
E. 75% of economic optimal rates (under fertilize)						
	\$32.16	\$51.84	\$24.86	\$46.97	\$3,247	\$32.47
F. 125% of economic optimal rates (over fertilize)						
	\$32.37	\$50.38	\$22.67	\$46.47	\$3,215	\$32.15

Fertilizer price (dry vs. liquid) has bigger impact on returns than deviations from the optimal rate (over applying is slightly worse than under applying).

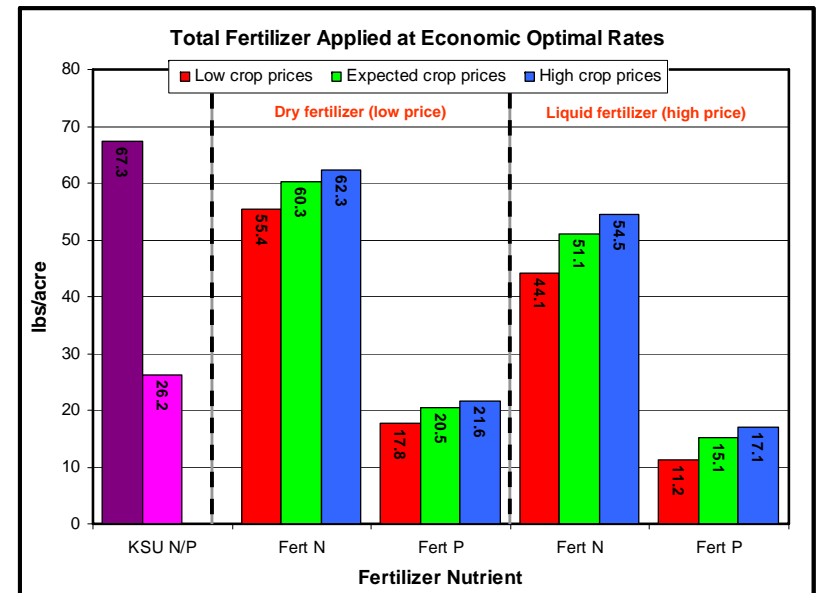
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Return over costs at expected 2009 crop prices and various fertilizer scenarios...

Return Over Costs vs Fertilizer Price and Rate (% of economic optimal)						
	Wheat	Corn	Milo	Soybean	Total	Average
Acres	72.0	3.0	18.0	7.0	100.0	
Dry N & P Prices (N=\$0.42 and P=\$0.35)					KSU rates \$46.55	
A. Economic optimal rates						
	\$49.43	\$70.22	\$37.28	\$59.94	\$4,861	\$48.61
B. 75% of economic optimal rates (under fertilize)						
	\$44.70	\$65.45	\$35.09	\$58.19	\$4,454	\$44.54
C. 125% of economic optimal rates (over fertilize)						
	\$44.31	\$63.98	\$32.78	\$57.65	\$4,376	\$43.76
Liquid N & P Prices (N=\$0.49 and P=\$0.81)					KSU rates \$29.11	
D. Economic optimal rates						
	\$37.44	\$56.72	\$27.13	\$47.99	\$3,690	\$36.90
E. 75% of economic optimal rates (under fertilize)						
	\$32.16	\$51.84	\$24.86	\$46.97	\$3,247	\$32.47
F. 125% of economic optimal rates (over fertilize)						
	\$32.37	\$50.38	\$22.67	\$46.47	\$3,215	\$32.15

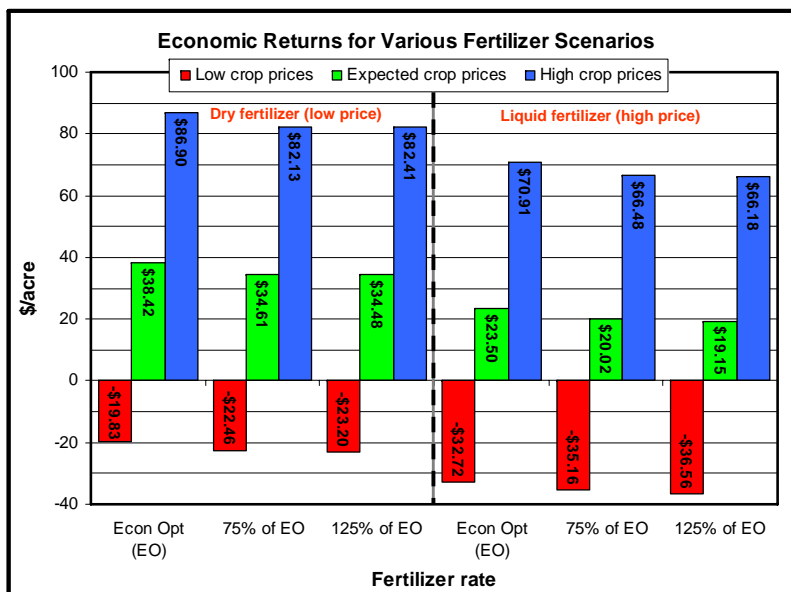
Following KSU recommendations is only slightly less profitable at low fertilizer prices, however, much larger difference at high fertilizer prices.

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KSU recommended rates are higher in all cases...

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Fertilizer prices and rates impact returns, but not near as much as commodity prices...

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Side issues with P

- Following MF-2586 N and Precs, depending upon crop and rotation, will end up over time at 11-14 ppm STP
- At crop prices and high fertilizer prices shown (esp P), would end up at much lower STP, perhaps 5-10 ppm
- Seems weird to end up that low but is it wrong?
 - Haven't seen such prices before

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Critical issues to think about

- Are MF-2586 rates really predicated on “other factors not limiting?”
- Can we fully compensate for low soil fertility with fertilizer?
- Might application methods and timing modify our results?
- What about using fertilizer P to compensate for low soil pH?

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So, what should one do?

- Use the spreadsheet! If your intuition causes you to question the results:
 - Average the results with some other method
 - Use the adjustment factors in the spreadsheet
 - Question your intuition
- Likely, no one would ignore prices forever, i.e., regardless of their levels

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There may be bigger issues to consider

- We're seeing local fertilizer prices vary as much as 2x to 3x from location to location
- Liquid vs. dry – hire custom applicator?
- We expect continued drops in prices but perhaps a spike again next spring since little fertilizer got placed in the fall of 2008
- What about availability?
- Do I trust my provider's finances?

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The screenshot shows the AgManager.info website in a Windows Internet Explorer browser. The address bar displays "www.agmanager.info". The website header includes "AgManager.info" and "Providing Information and Tools For The Competitive Business". A navigation menu on the left lists categories such as "Agribusiness", "Crops", "Energy", "Farm Management", "Human Resources", "Income Tax & Law", "Livestock & Meat", "Policy (including 2008 Farm Bill)", "An Eco News", "Contributors", "Programs", "Sponsors", and "Upcoming Events". A "SIGN-UP for Weekly Email Updates" link is also visible. The main content area features a "Recent Updates" section with several articles, including "KSI-FertCalc - Excel spreadsheet for calculating per unit fertilizer costs" and "Commodity Program Decisions in the 2008 Farm Bill". A "Questions?" box is overlaid on the page, with a callout line pointing to the "An Eco News" menu item. The footer contains information about "Cattle Risk Management Library" and "In the Cattle Markets" and Radio Interview.