

Wheat Production Economics



Pre-Plant Wheat School
 Tuesday, August 11 -- 8:30 am to 12:00 pm
 Farmers Coop in Nickerson

Topics:

- 9:00 - 9:30 am - The Dickey - 2008 - 2009 Wheat Variety Performance Fall Fertility
- 9:30 - 10:00 am - Dink Drevett - Management of Wheat Diseases
- 10:00 - 10:30 am - Kevin Dhuyvetter - Production Economics in Wheat
- 10:30 - 11:00 am - Dallas Peterson - Weed Control in Wheat

K-State Wheat Publications
 The fee is only \$5.00 (payable at the door) and includes breakfast and handouts of the program. Please contact Kevin at kdhuyvet@ksu.edu or 402-762-2379 if you plan to attend.

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 Kansas State Research & Extension
www.agmanager.info

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 Kansas State University



Outline of presentation...

- Overview of historical costs and returns for wheat and alternative crops
- Analysis of costs and returns by tillage system
- Impact of crop and fertilizer prices on economic optimal fertilizer rates



Crop economic considerations...

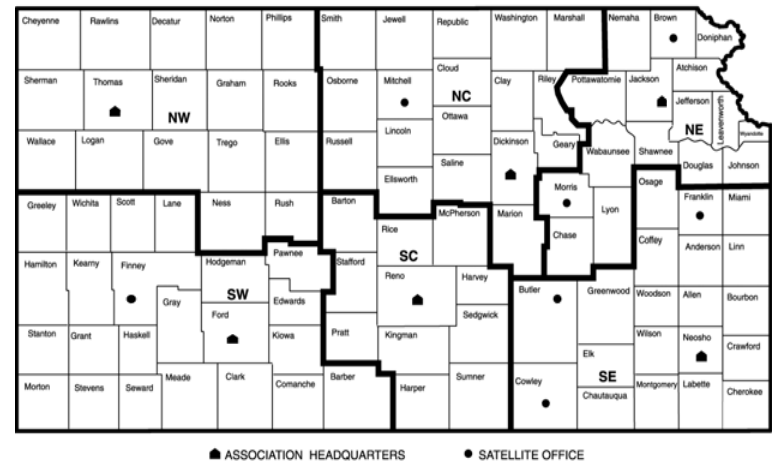
Historical profitability (wheat vs alternative crops)

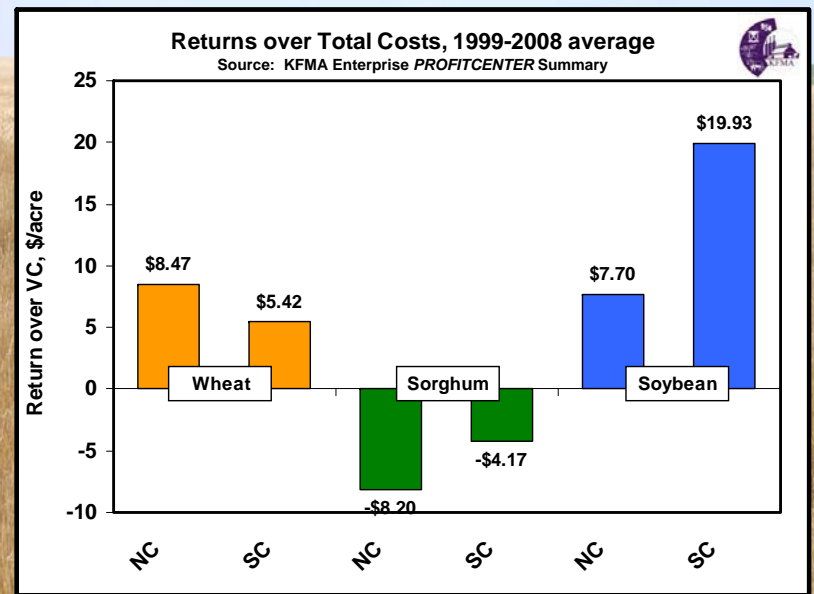
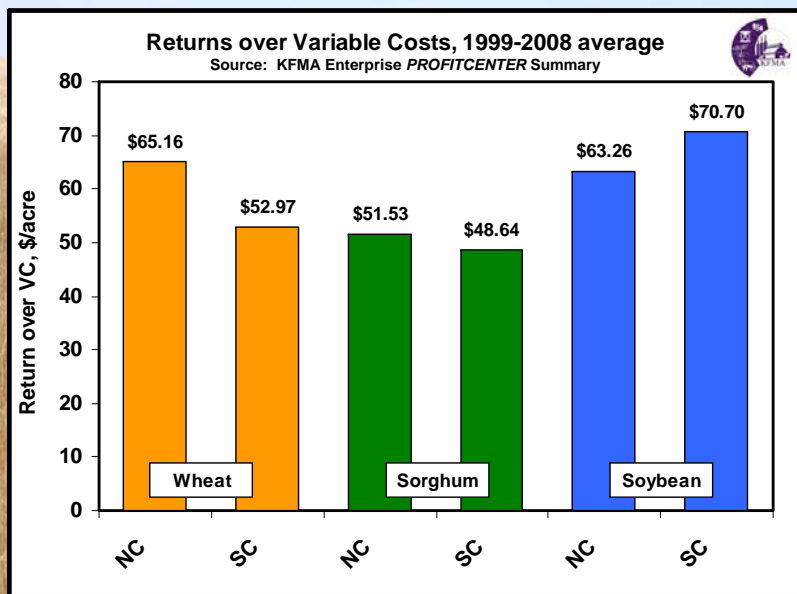
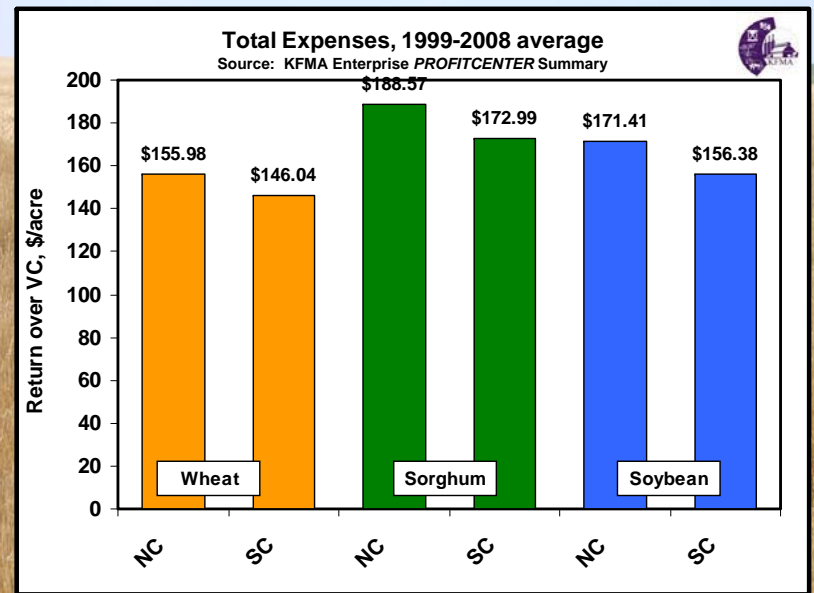
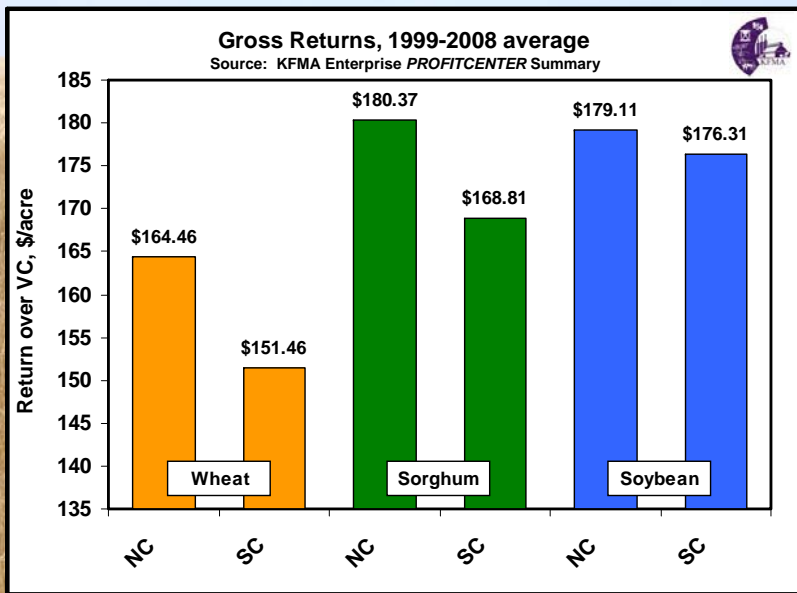
- Short run – return over variable costs
- Long run – return over total costs
- Variability of returns over time (i.e., risk)

Difference in average costs and returns across producers (factors affecting profitability)

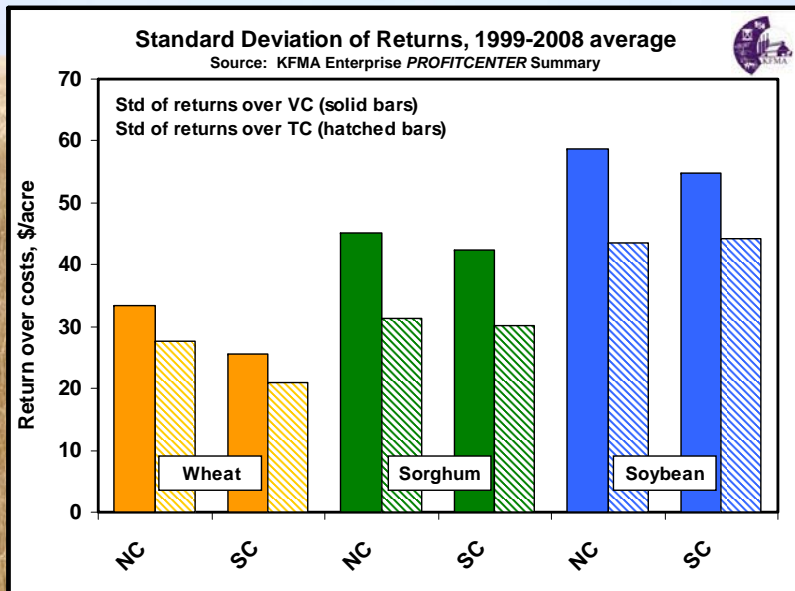


Kansas Farm Management Associations





Wheat Enterprise Efficiency and Profitability



- Objective
 - Discuss differences in wheat enterprise efficiency and net returns
- Data and Methods
 - Wheat enterprise data for 185 KFMA farms with continuous data from 2004 to 2008
 - Computed enterprise efficiency (cost of production) and profitability for each farm
 - Sorted farms into three groups based on profit

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Wheat Enterprise Efficiency and Profitability...

- The high profit group was more efficient, had more wheat acres, more crop acres, a higher yield, a higher price per bushel, and significantly lower costs.
- Total cost per acre for the high profit group was 28 percent lower than low profit group (15% lower than mid profit group).
- Fertilizer, machinery, and labor costs per acre were from 23 to 33 percent lower for the high profit group.

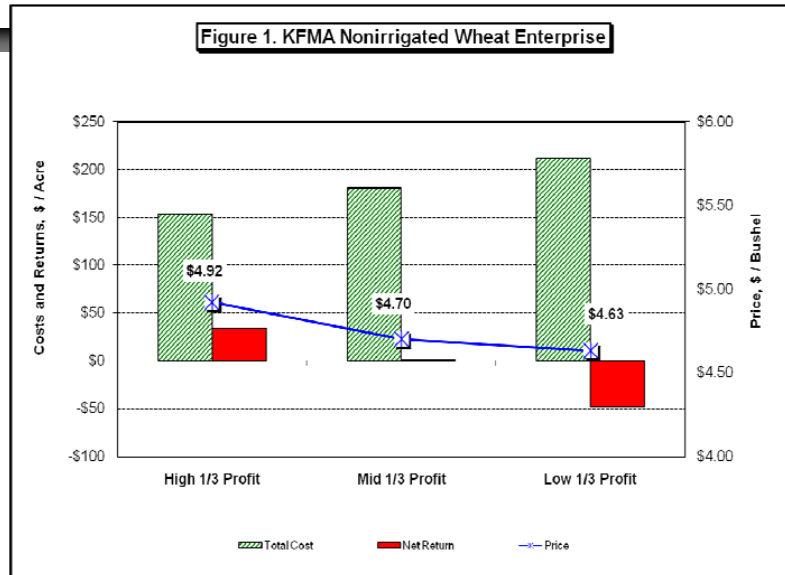
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Kansas Farm Management Association: State Average
2004-2008 Nonirrigated Wheat Enterprise Sorted by Net Return to Management per Acre

	Profit Category			Difference between High 1/3 and Low 1/3	
	High 1/3 Per Acre	Mid 1/3 Per Acre	Low 1/3 Per Acre	Acres / \$	%
Number of Farms	61	62	62		
Enterprise Acres	939	636	422	517	123%
Crop Acres	1,997	1,507	1,059	938	89%
Bushels Produced	28,772	19,185	11,624	17,148	148%
Yield per Acre	39.2	38.4	35.3	3.9	11%
Price per Bushel	\$4.92	\$4.70	\$4.63	\$0.29	6%
Technical Efficiency	0.915	0.797	0.699	0.216	31%
Cost Efficiency	0.683	0.573	0.452	0.231	51%
INCOME:					
Crop Income	\$149.60	\$142.18	\$127.01	\$22.58	18%
Government Payments	\$17.86	\$17.89	\$18.07	(\$0.21)	-1%
Other Income	\$20.66	\$21.87	\$19.35	\$1.31	7%
Gross Income	\$188.12	\$181.93	\$164.43	\$23.69	14%
COSTS:					
Seed	\$7.43	\$9.45	\$8.88	(\$1.45)	-16%
Fertilizer	\$27.06	\$33.07	\$35.35	(\$8.29)	-23%
Herbicide-Insecticide	\$6.68	\$8.04	\$7.90	(\$1.22)	-15%
Crop Insurance	\$5.48	\$6.31	\$6.26	(\$0.78)	-12%
Machinery	\$42.79	\$47.72	\$59.53	(\$16.74)	-28%
Labor	\$24.57	\$27.65	\$36.86	(\$12.29)	-33%
Other	\$6.94	\$9.02	\$11.99	(\$5.05)	-42%
Land	\$20.92	\$25.19	\$27.54	(\$6.62)	-24%
Interest	\$11.88	\$14.10	\$17.80	(\$5.92)	-33%
Total Cost	\$153.75	\$180.55	\$212.11	(\$58.36)	-28%
Net Return to Management	\$34.37	\$1.38	(\$47.68)	\$82.05	

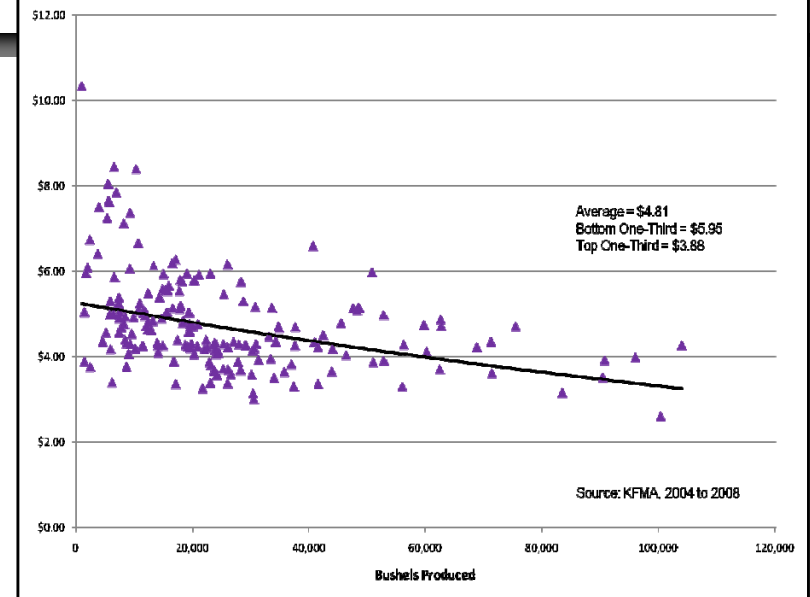
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Differences between profitability groups...



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Figure 2. Cost per Bushel of Wheat in Kansas



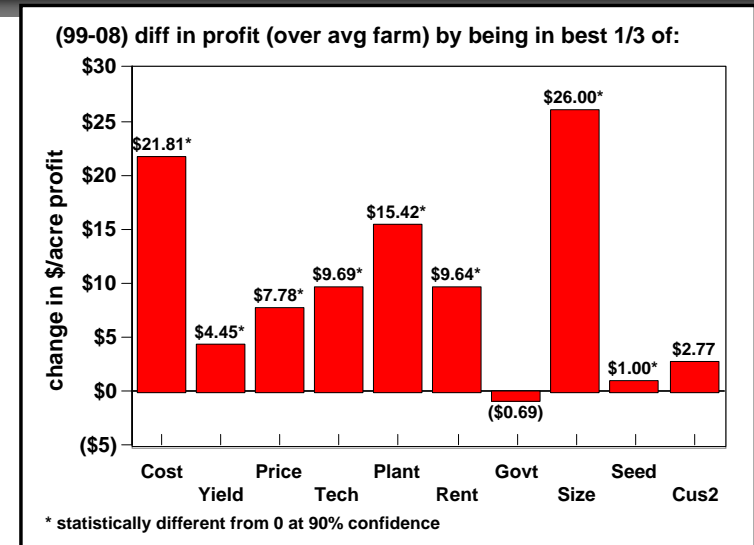
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Machinery costs are important in explaining profitability differences across farms ...

Kansas Farm Management Association Enterprise Analysis Nonirrigated Crops -- State Averages, 2002-2006						
	Corn	Irr Corn	Sorghum	Wheat	Soybean	Alfalfa
Number of Farms	45	15	85	178	74	34
Machinery Costs, \$/acre						
High profit farms	\$59.28	\$73.77	\$51.08	\$51.54	\$54.10	\$74.13
Mid profit farms	\$62.57	\$82.49	\$60.09	\$55.48	\$62.84	\$79.48
Low profit farms	\$90.82	\$104.98	\$73.22	\$75.72	\$75.98	\$109.15
High less low, \$	-\$31.53	-\$31.21	-\$22.14	-\$24.18	-\$21.88	-\$35.02
High less low, %	-34.7%	-29.7%	-30.2%	-31.9%	-28.8%	-32.1%
Differences between high profit farms and low profit farms in ...						
Net returns	\$91.30	\$138.74	\$81.43	\$65.74	\$73.87	\$133.79
Total costs	-\$93.54	-\$125.79	-\$50.96	-\$53.84	-\$53.15	-\$65.86
Cost/net returns	102.5%	90.7%	62.6%	81.9%	72.0%	49.2%
Mach/total costs	33.7%	24.8%	43.4%	44.9%	41.2%	53.2%
Mach/net returns	34.5%	22.5%	27.2%	36.8%	29.6%	26.2%

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Factors affecting profit differences...



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Relative Efficiency of No-Till Production

- Central KFMA Farms, 2008
 - Detailed Cost Analysis
 - Crop cost comparisons on per harvested acre basis
 - Whole-Farm Data
 - Farm size and type
 - Financial ratios and efficiency measures
 - Income shares (feed grains, hay and forage, oilseeds, small grains, beef, dairy)
 - Cost shares (labor, livestock, seed, fertilizer, chemicals, and capital)

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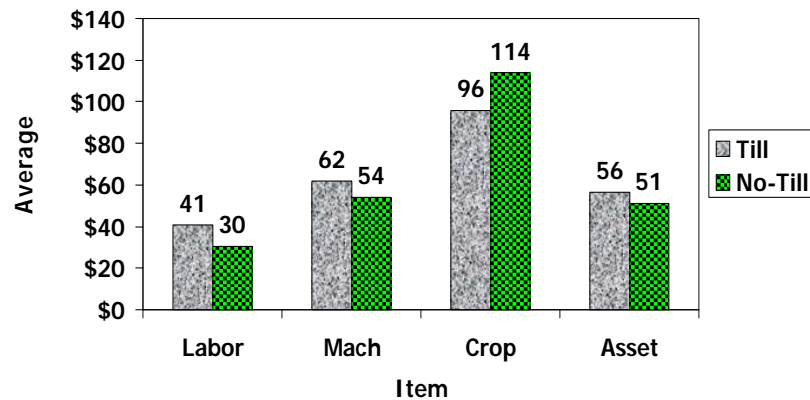
Detailed Cost Comparisons

- Crop Cost Comparisons per Harvested Acre
 - Labor
 - Hired labor and opportunity charges on operator and family labor
 - Machinery
 - Repairs on machinery and equipment, machine hire, gas, fuel, oil, and depreciation on machinery and equipment
 - Crop
 - Seed, crop insurance, fertilizer, herbicide, and miscellaneous costs such as irrigation energy, crop storage and marketing, and crop supplies
 - Improvements, Asset Charges, and Other Expenses

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Detailed Cost Analysis

Cost Categories: NC KFMA, 2008

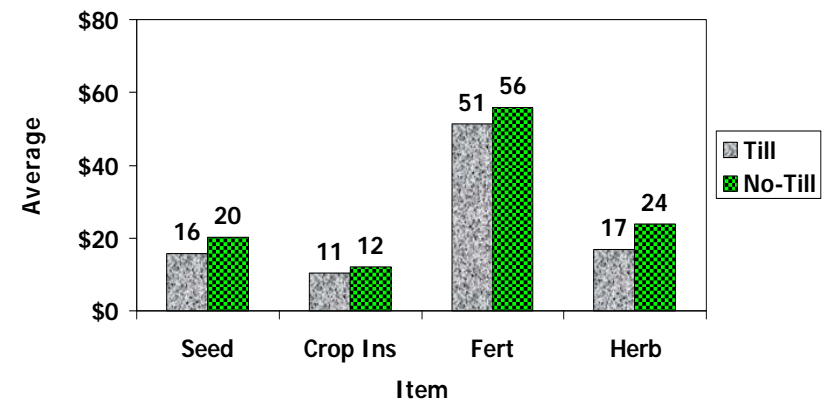


Total: Till = \$255 and No-Till = \$249

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Detailed Cost Analysis

Crop Expense: NC KFMA, 2008

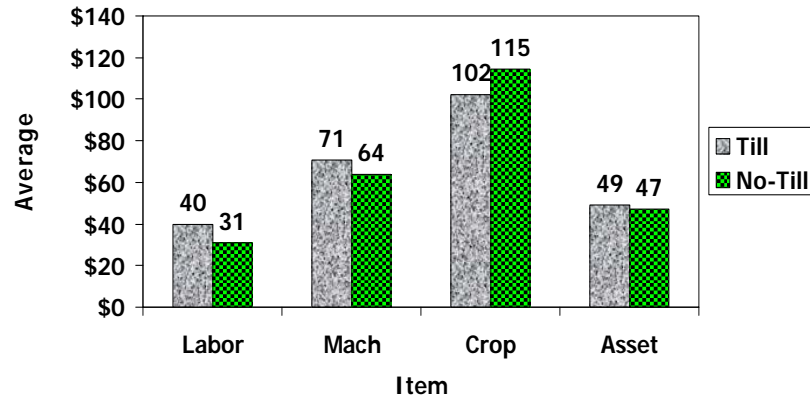


Total: Till = \$96 and No-Till = \$114 (totals do not add due to rounding)

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Detailed Cost Analysis

Cost Categories: SC KFMA, 2008

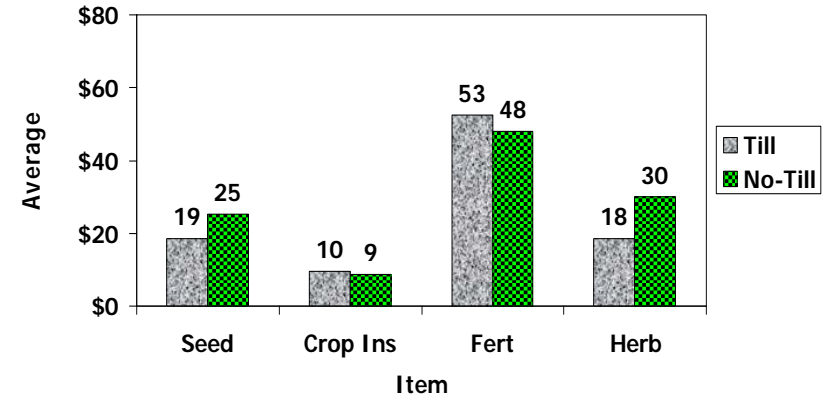


Total: Till = \$262 and No-Till = \$257

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Detailed Cost Analysis

Crop Expense: SC KFMA, 2008



Total: Till = \$102 and No-Till = \$115 (totals do not add due to rounding)

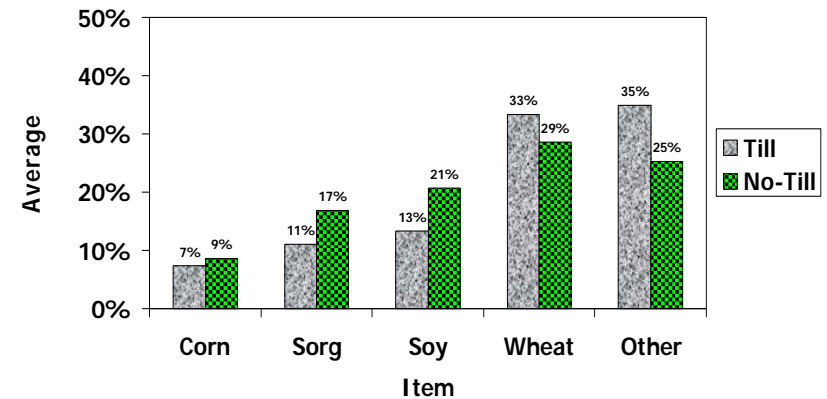
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Value of Farm Production

- **KFMA Data, Central Kansas, 2008**
 - **Value of Farm Production (VFP)**
 - Sum of livestock, crop, and other income computed on an accrual basis minus accrual feed purchased.
 - **Average VFP: NC KFMA**
 - Tillage Farms: \$339,726
 - No-Till Farms: \$586,848 **+72.7%**
 - **Average VFP: SC KFMA**
 - Tillage Farms: \$430,845
 - No-Till Farms: \$835,258 **+93.9%**

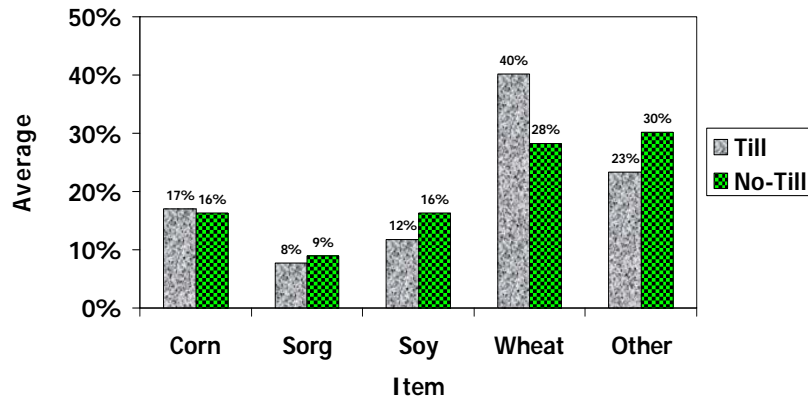
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VFP Sources: NC KFMA, 2008



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VFP Sources: SC KFMA, 2008



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Whole-Farm Data: 5-Year Averages

- KFMA farms in central Kansas with continuous data from 2004 to 2008.
- To be classified as a “no-till” farm, a farm had to utilize a no-till production system for all of their crops (in 2008).
- Number of Farms
 - 77 no-till farms
 - 234 mixed tillage farms

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Whole-Farm Data: Definitions

- Value of Farm Production
 - Sum of livestock, crop, and other income computed on an accrual basis minus accrual feed purchased.
- Net Farm Income
 - Return to operator’s labor, management, and equity (net worth) computed on an accrual basis.
- Less Tillage Index
 - Computed by dividing herbicide and insecticide cost by total crop machinery cost which includes repairs, fuel, auto expense, machinery and equipment depreciation, crop machine hire, and an opportunity interest charge on crop machinery and equipment investment.

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Comparison of Farm Types, Central Kansas

Farm Characteristics	No-Till	Mixed Tillage
Value of Farm Production	\$468,629 <i>+72.7%</i>	\$324,832
Net Farm Income	\$108,467	\$71,510
Total Acres	2,173 <i>+22.1%</i>	1,780
Less Tillage Index	0.173	0.115

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Whole-Farm Data: Definitions

- **Profit Margin**
 - Computed by dividing net farm income plus cash interest paid minus opportunity charges on operator and family labor by value of farm production.
- **Asset Turnover Ratio**
 - Computed by dividing value of farm production by total farm assets.
- **Technical Efficiency Index (ranges from 0 to 1)**
 - Farms with an index of 1 are using the best available technologies and producing on the production frontier.
- **Cost Efficiency Index (ranges from 0 to 1)**
 - Farms with an index of 1 are producing at the lowest cost per unit of aggregate output.

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Comparison of Farm Types, Central Kansas

Financial Ratios and Efficiency	No-Till	Mixed Tillage
Profit Margin	0.1676	0.1233
Asset Turnover Ratio	0.4070	0.3199
Cost Efficiency	0.662	0.605

Technical Efficiency was not significantly different between the two groups of farms.

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Comparison of Farm Types, Central Kansas

Income Shares	No-Till	Mixed Tillage
Feed Grains	0.2303	0.1805
Oilseeds	0.1687	0.1059
Small Grains	0.2271	0.3071

There was not a significant difference between hay and forage, beef, or dairy income shares.

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Comparison of Farm Types, Central Kansas

Cost Shares (as percent of VFP)	No-Till	Mixed Tillage
Labor	0.1702	0.2299
Seed	0.0663	0.0534
Chemicals	0.0797	0.0552
Capital	0.5626	0.6695

There was not a significant difference between livestock and fertilizer cost shares.

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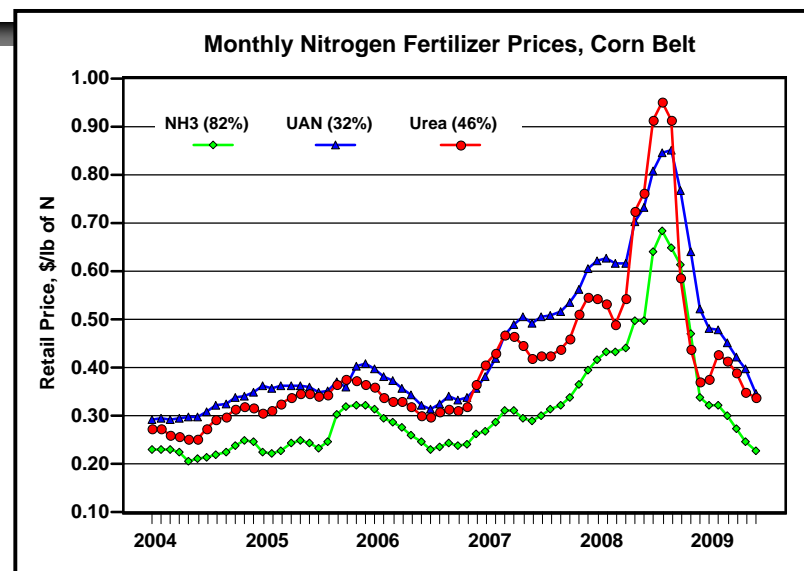
Fertilizer Economics – How do prices impact recommended rates?

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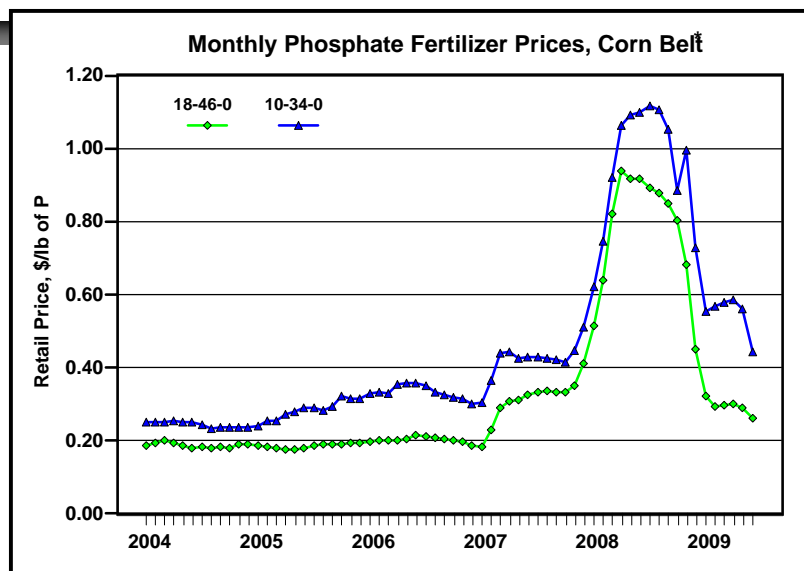


Extreme volatility in nitrogen prices recently...



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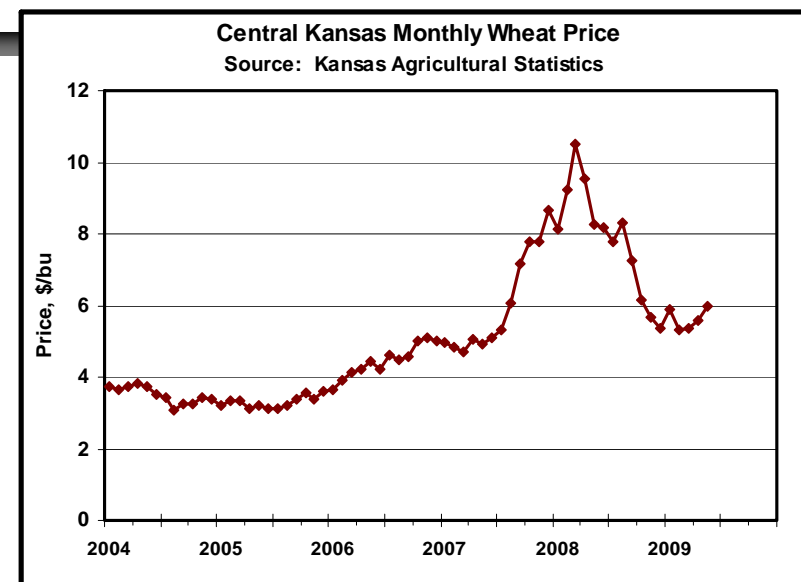
Not just nitrogen prices that have been volatile...



* Value of P calculated after deducting value of N at price of Urea (18-34-0) and UAN (10-34-0)

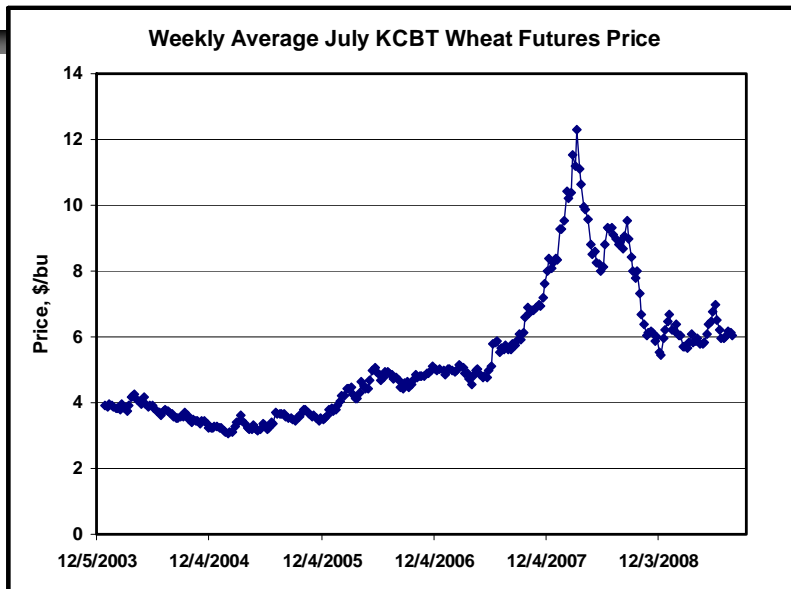
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Cash wheat prices have also been highly variable...



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Wheat futures prices have been very volatile...



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KSU nitrogen recommendations...

Corn and grain sorghum

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

Wheat

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

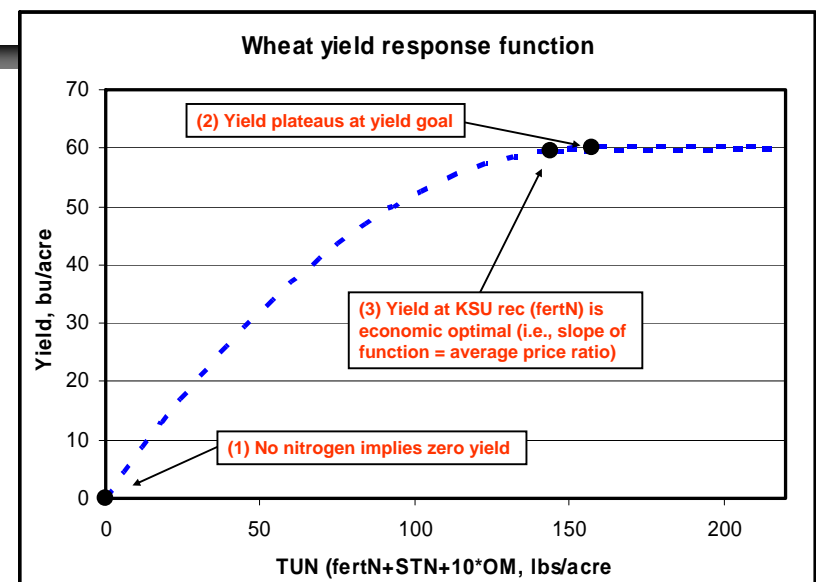
Sunflowers

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

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)
- Production functions were estimated that are consistent with KSU N recommendations at the following prices:
 - Wheat \$3.20/bu
 - Corn \$2.35/bu
 - fertN \$0.21/lb N

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



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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

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 P2O5??)
- And so we adjust the decision spreadsheet again...
 - ...this time incorporating P
 - Use MF-2586 sufficiency P recs

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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 -- 02.05.09

INPUTS vs CALCULATED VALUES

In the *Budgets*, *Optimal NSI*, *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). Likewise, the *FertCostCalc* sheet is a calculator to assist with determining nutrient costs per pound to enter into the *Budgets* sheet (costs 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).

Developed by: Kevin C. Dhuyvetter --- 785-532-3527 --- kcd@ksu.edu
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 Troy J. Dumler --- 620-275-9164 --- tdumler@ksu.edu

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AG MANAGER.INFO
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 Department of Agricultural Economics

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

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	67.0	6.0	12.0	15.0	0.0	0.0	0.0	100.0	100.0	15.00
Tillable acres per planted acre	1.00	1.00	1.00	1.00	0.00	1.00	0.00	100.0	Planted	Tillable
INCOME PER ACRE										
A. Yield per acre	45.0	90.5	79.6	27.3	999.0	3.6	20.0		---	---
B. Price per unit	\$5.15	\$3.24	\$2.91	\$9.94	\$0.1250	\$85.00	\$8.94	\$23,668	\$236.67	\$236.67
C. Net government payments	\$15.00	\$15.00	\$15.00	\$15.00	\$0.00	\$15.00	\$0.00	1,500	15.00	15.00
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	\$246.57	\$317.01	\$238.47	\$258.88	\$124.87	\$318.55	\$178.80	\$25,168	\$251.67	\$251.67
COSTS PER ACRE										
1. Seed	\$12.80	\$47.04	\$9.48	\$33.75	\$20.02	\$12.60	\$40.00	\$1,760	\$17.60	\$17.60
2. Herbicide	3.64	26.19	20.03	9.06	19.47	5.21	19.90	777	7.77	7.77
3. Insecticide / fungicide	1.00	1.00	0.00	0.00	6.46	6.06	0.00	73	0.73	0.73
4. Fertilizer and lime	37.91	44.17	35.26	20.00	8.47	29.29	11.60	3,528	35.28	35.28
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	3.90	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	98.85	101.89	96.14	59.56	55.89	134.88	53.57	9,282	92.82	92.82
10. Non-machinery labor	11.18	11.44	10.92	6.76	5.98	15.08	6.11	1,050	10.50	10.50
12. Land charge / rent	50.00	50.00	50.00	50.00	0.00	50.00	0.00	5,000	50.00	50.00
G. SUB TOTAL	\$221.13	\$287.48	\$227.59	\$184.89	\$125.19	\$258.86	\$136.18	\$22,046	\$220.45	\$220.45
13. Interest on 1/2 nonland costs	6.85	9.50	7.10	5.40	4.85	8.35	5.45	682	6.82	6.82
H. TOTAL COSTS	\$227.98	\$296.98	\$234.69	\$190.29	\$130.04	\$267.21	\$141.63	\$22,727	\$227.27	\$227.27
I. RETURNS OVER COSTS (F - H)	\$18.59	\$20.02	\$3.78	\$68.60	(\$5.17)	\$51.34	\$37.17	\$2,440	\$24.40	\$24.40
J. TOTAL COSTS/UNIT (H/A)	\$5.07	\$3.28	\$2.95	\$6.98	\$0.13	\$74.82	\$7.08			
K. BREAK-EVEN PRICE (H/C)/A	\$4.74	\$3.12	\$2.76	\$6.43	\$0.13	\$70.62	\$7.08			
M. Break-even price (w/ base crop)	\$5.15	\$3.32	\$2.99	\$7.11	\$0.15	\$75.83	\$8.01			
N. Break-even yield (w/ base crop)	45.0	90.0	85.7	21.6	1,200.4	3.1	17.9			
Base crop for breakeven analysis	1	0	0	0	0	0	0			

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

TABLE 1. Production Inputs Used for Budgets

	Wheat	Corn	Sorghum	Soybean	Sunflower	Alfalfa	DC Bean	
Price scenarios to consider								Use (Y=1, N=0)
Long run average	\$3.21	\$2.35	\$2.05	\$7.00	\$0.1000	\$75.00	\$7.00	1
High price scenario	\$6.50	\$4.50	\$3.79	\$10.50	\$0.1400	\$100.00	\$10.50	0
Expected price	\$5.15	\$3.34	\$2.81	\$8.94	\$0.1250	\$85.00	\$8.94	0
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	0.0	
Econ Optimum fertN, lbs/ac	71.8	88.8	73.1	0.0	20.3	0.0	0.0	
KSU recommended phosphate, lbs/ac	26.2	27.4	25.3	28.0	21.1	46.5	0.0	
Econ Optimum fertP, lbs/ac	24.3	24.8	22.6	32.5	20.1	50.2	0.0	
Econ Optimum Irrigation Amount, in	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Yield at optimal N, P, and I, bu/ac	46.2	92.4	82.3	27.5	1057.5	3.6	20.0	
Change in STP, ppm	0.07	-0.32	-0.57	0.59	0.24	0.39	0.00	
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)	71.8	88.8	73.1	0.0	20.3	0.0	0	\$0.210 /lb
Phosphate (P)	24.3	24.8	22.6	32.5	20.1	50.2	20.0	\$0.900 /lb
Potash (K)	0	0	0	0	0	0	0	\$0.660 /lb
Other (O)	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
xxxx								
Bicep Lite II Magnum								\$11.28 /qt

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

2010 forward contract price and current liquid fertilizer prices

TABLE 1. Production Inputs Used for Budgets

	Wheat	Corn	Sorghum	Soybean	Sunflower	Alfalfa	DC Bean	
Price scenarios to consider								Use (Y=1, N=0)
Long run average	\$3.21	\$2.35	\$2.05	\$7.00	\$0.1000	\$75.00	\$7.00	1
High price scenario	\$6.50	\$4.50	\$3.79	\$10.50	\$0.1400	\$100.00	\$10.50	0
Expected price	\$5.15	\$3.34	\$2.81	\$8.94	\$0.1250	\$85.00	\$8.94	0
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	0.0	
Econ Optimum fertN, lbs/ac	59.8	74.8	56.6	0.0	5.8	0.0	0.0	
KSU recommended phosphate, lbs/ac	26.2	27.4	25.3	28.0	21.1	46.5	0.0	
Econ Optimum fertP, lbs/ac	17.5	18.6	15.1	25.9	10.8	41.9	0.0	
Econ Optimum Irrigation Amount, in	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Yield at optimal N, P, and I, bu/ac	45.0	90.5	79.6	27.3	999.0	3.6	20.0	
Change in STP, ppm	-0.28	-0.63	-0.93	0.22	-0.23	-0.05	0.00	
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)	59.8	74.8	56.6	0.0	5.8	0.0	0	\$0.380 /lb
Phosphate (P)	17.5	18.6	15.1	25.9	10.8	41.9	20.0	\$0.500 /lb
Potash (K)	0	0	0	0	0	0	0	\$0.660 /lb
Other (O)	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
xxxx								
Bicep Lite II Magnum								\$11.28 /qt

2010 forward contract price and current dry fertilizer prices

TABLE 1. Production Inputs Used for Budgets

	Wheat	Corn	Sorghum	Soybean	Sunflower	Alfalfa	DC Bean	
Price scenarios to consider								Use (Y=1, N=0)
Long run average	\$3.21	\$2.35	\$2.05	\$7.00	\$0.1000	\$75.00	\$7.00	1
High price scenario	\$6.50	\$4.50	\$3.79	\$10.50	\$0.1400	\$100.00	\$10.50	0
Expected price	\$5.15	\$3.34	\$2.81	\$8.94	\$0.1250	\$85.00	\$8.94	0
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	0.0	
Econ Optimum fertN, lbs/ac	64.8	79.6	62.6	0.0	11.0	0.0	0.0	
KSU recommended phosphate, lbs/ac	26.2	27.4	25.3	28.0	21.1	46.5	0.0	
Econ Optimum fertP, lbs/ac	20.3	20.7	17.8	29.2	14.1	46.0	0.0	
Econ Optimum Irrigation Amount, in	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Yield at optimal N, P, and I, bu/ac	45.6	91.3	80.8	27.4	1026.7	3.6	20.0	
Change in STP, ppm	-0.14	-0.52	-0.81	0.40	-0.07	0.16	0.00	
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	79.6	62.6	0.0	11.0	0.0	0	\$0.380 /lb
Phosphate (P)	20.3	20.7	17.8	29.2	14.1	46.0	20.0	\$0.300 /lb
Potash (K)	0	0	0	0	0	0	0	\$0.660 /lb
Other (O)	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
xxxx								
Bicep Lite II Magnum								\$11.28 /qt

Scenarios considered (winter 2008/09 meetings)...

- Dry versus liquid N & P fertilizer prices
 - Dry: N = \$0.365 and P = \$0.495
 - Liquid: N = \$0.535 and P = \$0.896
- Fertilizer rates
 - Economic optimal
 - 75% of economic optimal (under fertilize)
 - 125% of economic optimal (over fertilize)
- Expected crop prices
 - Wheat = \$5.58; Corn = \$3.85; Milo = \$3.30; Soybean = \$8.47
 - Varying crop prices impacts optimal rates and overall returns, but does not change overall conclusions

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	DC Beans	Total	Average
Acres	25.5	20.5	8.5	25.5	20.0	100.0	
Dry N & P Prices (N=\$0.365 and P=\$0.495)							
A. Economic optimal rates							
	45.4	110.2	84.9	34.9			
B. 75% of economic optimal rates (under fertilize)							
	42.8	104.0	80.7	34.2			
C. 125% of economic optimal rates (over fertilize)							
	46.2	111.7	86.3	35.0			
Liquid N & P Prices (N=\$0.535 and P=\$0.896)							
D. Economic optimal rates							
	43.7	107.6	81.7	34.5			
E. 75% of economic optimal rates (under fertilize)							
	40.7	100.5	77.1	33.7			
F. 125% of economic optimal rates (over fertilize)							
	44.6	109.8	83.5	34.9		xxx	xxx

1) Economic optimal yields are 1-4% higher at lower priced fertilizer (dry).

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

3) Under-fertilizing results in yields about 5% lower 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	DC Beans	Total	Average
Acres	25.5	20.5	8.5	25.5	20.0	100.0	
Dry N & P Prices (N=\$0.365 and P=\$0.495)							
A. Economic optimal rates							
	\$17.62	\$79.46	\$11.99	\$54.08		\$3,842	\$38.42
B. 75% of economic optimal rates (under fertilize)							
	\$12.53	\$71.03	\$8.73	\$52.07		\$3,461	\$34.61
C. 125% of economic optimal rates (over fertilize)							
	\$13.04	\$71.36	\$7.23	\$51.32		\$3,448	\$34.48
Liquid N & P Prices (N=\$0.535 and P=\$0.896)							
D. Economic optimal rates							
	\$1.66	\$54.53	-\$3.76	\$43.34		\$2,350	\$23.50
E. 75% of economic optimal rates (under fertilize)							
	-\$3.53	\$46.85	-\$6.65	\$42.03		\$2,002	\$20.02
F. 125% of economic optimal rates (over fertilize)							
	-\$3.53	\$44.68	-\$9.13	\$41.21		\$1,915	\$19.15

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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	DC Beans	Total	Average
Acres	25.5	20.5	8.5	25.5	20.0	100.0	
Dry N & P Prices (N=\$0.365 and P=\$0.495)							
A. Economic optimal rates							
	\$17.62	\$79.46	\$11.99	\$54.08		\$3,842	\$38.42
B. 75% of economic optimal rates (under fertilize)							
	\$12.53	\$71.03	\$8.73	\$52.07		\$3,461	\$34.61
C. 125% of economic optimal rates (over fertilize)							
	\$13.04	\$71.36	\$7.23	\$51.32		\$3,448	\$34.48
Liquid N & P Prices (N=\$0.535 and P=\$0.896)							
D. Economic optimal rates							
	\$1.66	\$54.53	-\$3.76	\$43.34		\$2,350	\$23.50
E. 75% of economic optimal rates (under fertilize)							
	-\$3.53	\$46.85	-\$6.65	\$42.03		\$2,002	\$20.02
F. 125% of economic optimal rates (over fertilize)							
	-\$3.53	\$44.68	-\$9.13	\$41.21		\$1,915	\$19.15

1) Economic impact of over- or under-fertilizing is about the same at lower priced fertilizer (dry).

2) At higher fertilizer prices (liquid), over-fertilizing starts becoming worse than under-fertilizing.

3) Fertilizer price (dry vs. liquid) has bigger impact on returns than deviations from the optimal rate.

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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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Summary...

- Wheat historically has compared quite well economically in central Kansas (equal or better returns with less risk than other crops)
- No-till farms tend to be larger, have slightly better profit margins (i.e., more efficient), and have less wheat in crop mix than mixed tillage farms
- High grain prices have offset much of the impact of high fertilizer prices such that optimal rates have not changed significantly
- Large difference in price of liquid versus dry P can affect what is optimal

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The screenshot shows the AgManager.info website interface. The main content area features several articles and announcements, including:

- MAST Management, Analysis & Strategic Thinking 2009-2010 Class Enrolling Now** - Distance Education for Progressive Producers.
- 2009 RISK AND PROFIT CONFERENCE** - August 4, 2009 at K-State Alumni Center, Manhattan, KS.
- 2009 Kansas Income Tax Institute** - August 20-21, 2009.
- 2009 Ag Lenders Conferences** - October 6, 2009 in Garden City and Manhattan.

The right sidebar, titled "Recent Updates", lists various news items such as "Grain Outlook Radio Program", "Kansas Grain Price Spread-Transportation Returns", and "RSU-ACRE vs. Spreadsheet to Analyze ACRE vs. DCP - UPDATED".

Overlaid on the bottom center of the screenshot is a white box with the text **Questions?**. In the bottom right corner, there is a contact information box for Kevin Dhuyvetter: 785-532-3527, kcd@ksu.edu.