

Ethanol Impact on Corn Production and Agribusiness

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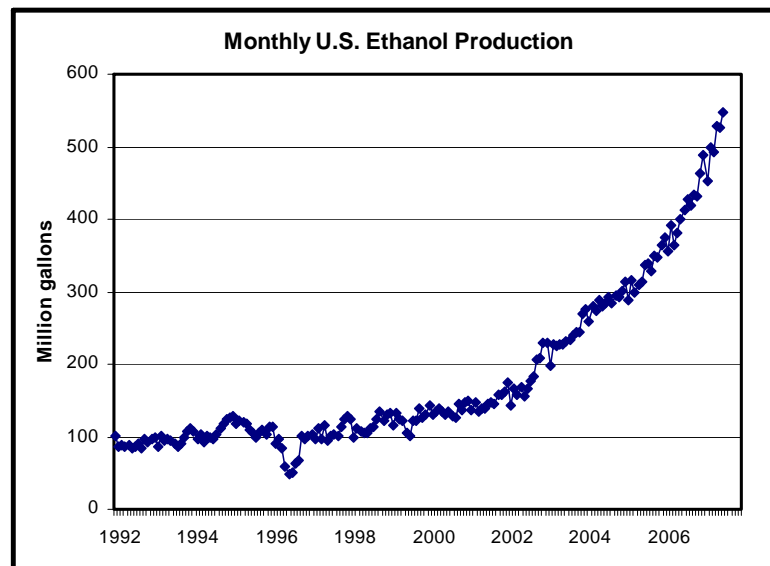
Presentation at 2007 KSU/Agrilience Crop Management Update
Salina, KS, December 4-5, 2007

Drivers of the Biofuels Industry

- Ethanol
 - States ban or restrict MTBE
 - Phaseout began in 2000; production stopped in 2006
 - Subsidies
 - 4 cents/gal blending credit 1978; 51 cents started 2004
 - Federal & state mandates for ethanol inclusion
 - Fed: 4 bgy in 2006 and 7.5 bgy in 2012
 - President calls for reducing gasoline use 20% by 2017
 - High energy prices
- Bio-diesel
 - Low sulfur requirements for diesel
 - Subsidies
 - High energy prices

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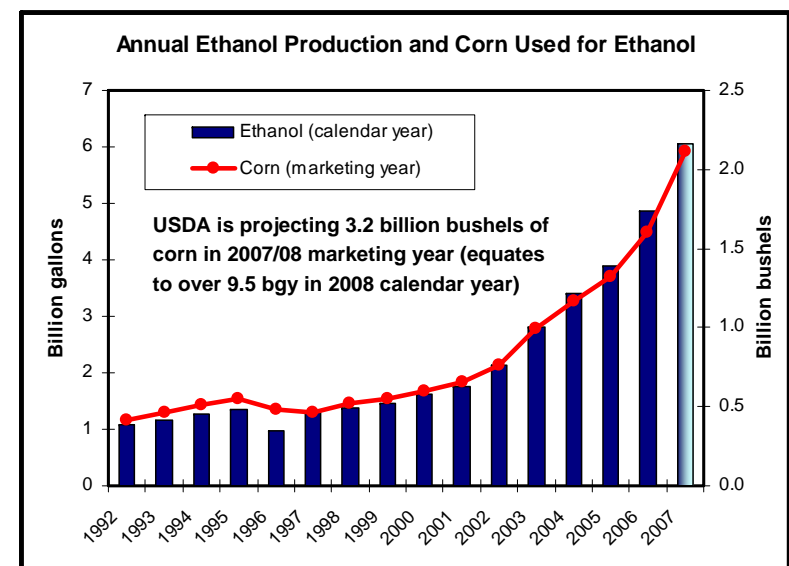
Rapid rates of expansion last several years...



Source: Energy Information Administration (EIA)

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Increases the demand for corn...

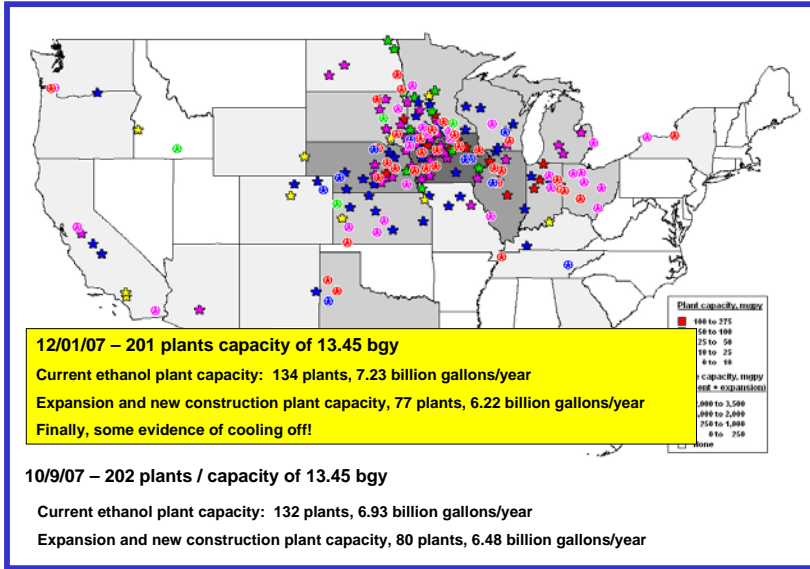


Source: Energy Information Administration (EIA), USDA NASS, and KSU

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Existing and new ethanol plants

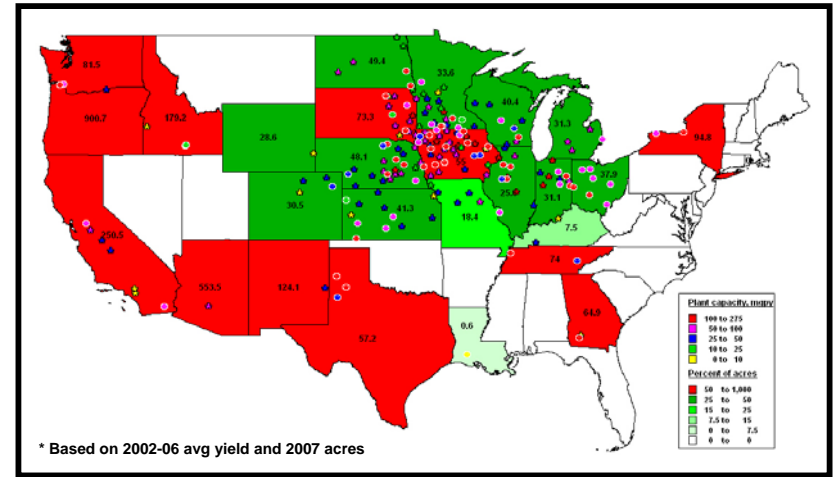
Source: Renewable Fuels Association (RFA)



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% of Acres Needed for Current + Expansion Production*

Source: USDA NASS and KSU

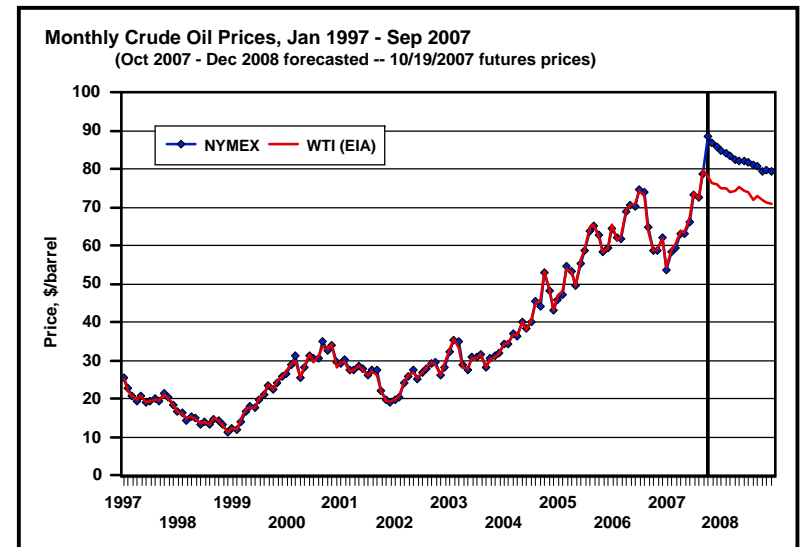


Ethanol expansion is going to create some interesting dynamics...

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Prices, profitability, etc.

Crude oil prices are at historically high levels...

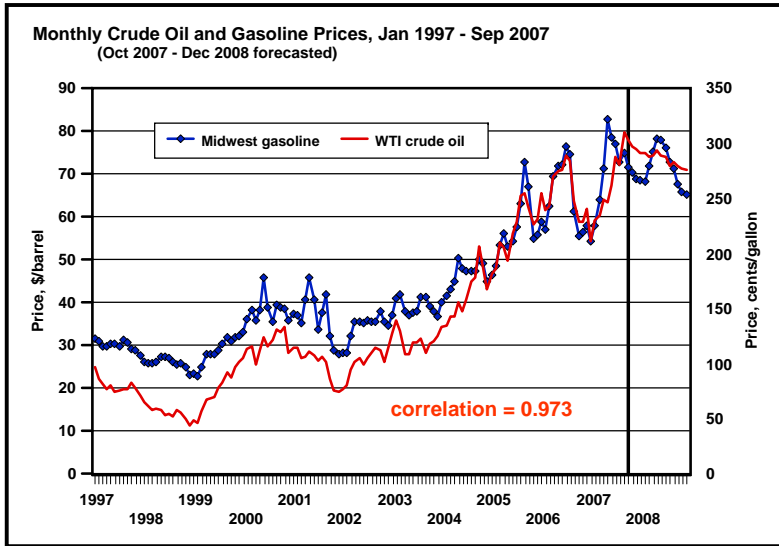


Source: Energy Information Administration (EIA) and KSU

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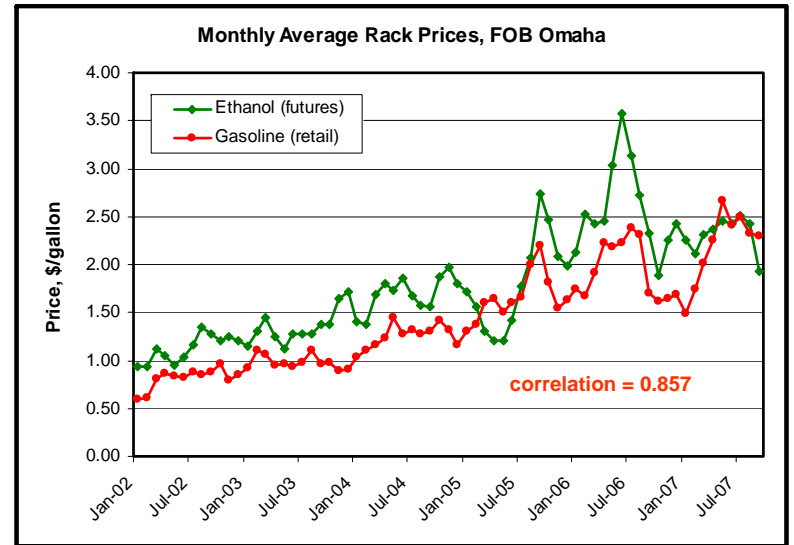
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High oil prices translate into high gas prices...



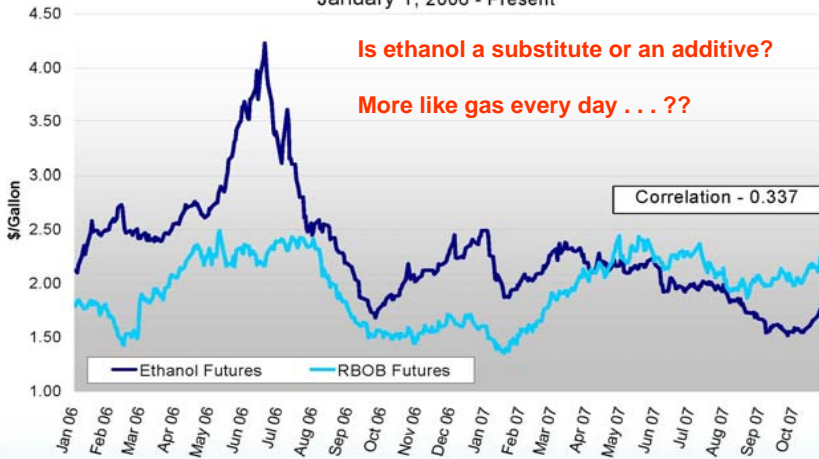
Source: Energy Information Administration (EIA)

Positive correlation → higher gas prices leads to higher ethanol prices...



Source: Nebraska Ethanol Board and Nebraska Energy Office, <http://www.neo.ne.gov/statshtml/66.html>

CBOT Ethanol Futures versus NYMEX RBOB Futures
January 1, 2006 - Present



RBOB (reformulated blendstock for oxygenate blending)

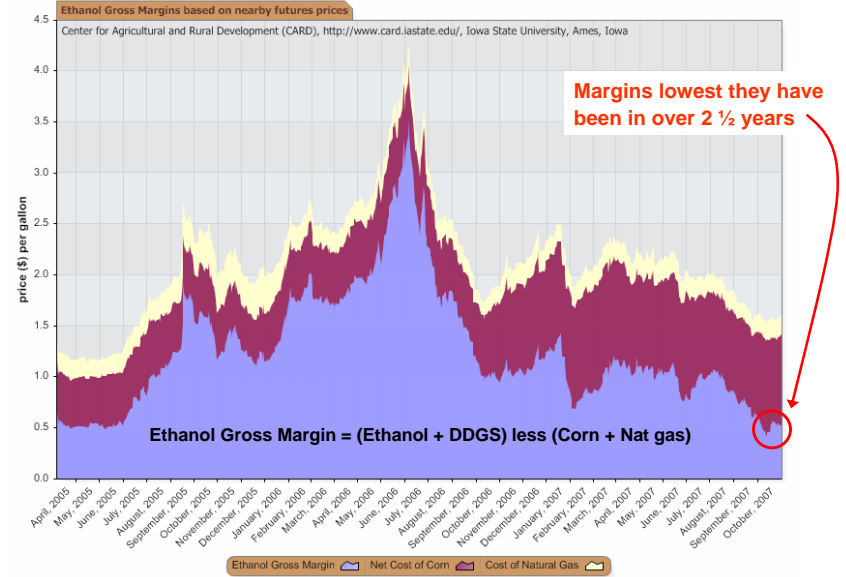
Basis: Chicago Cash Ethanol - NYMEX RBOB Futures
January 1, 2006 to Present



Evolution of industry: left with energy difference plus subsidy (at \$3 gas unsubsidized ethanol should be \$2)? But, could get worse due to infrastructure issues.



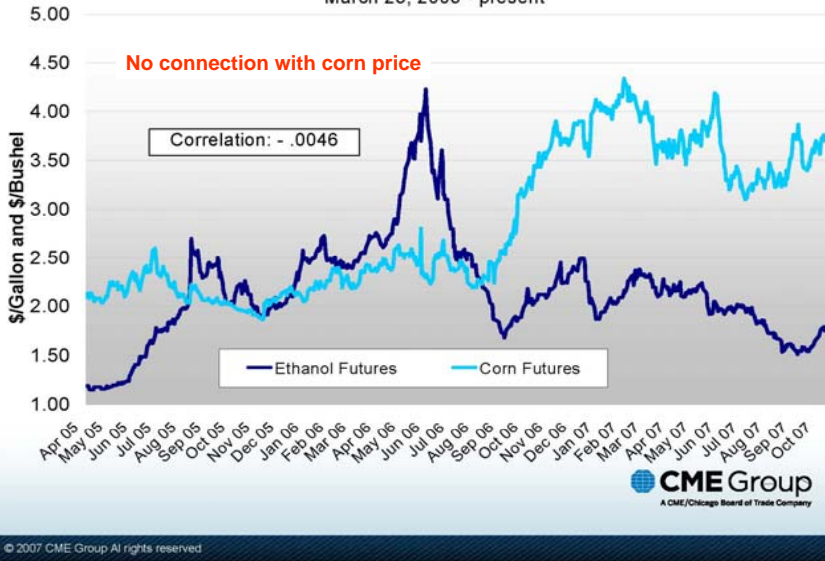
Historical ethanol margins



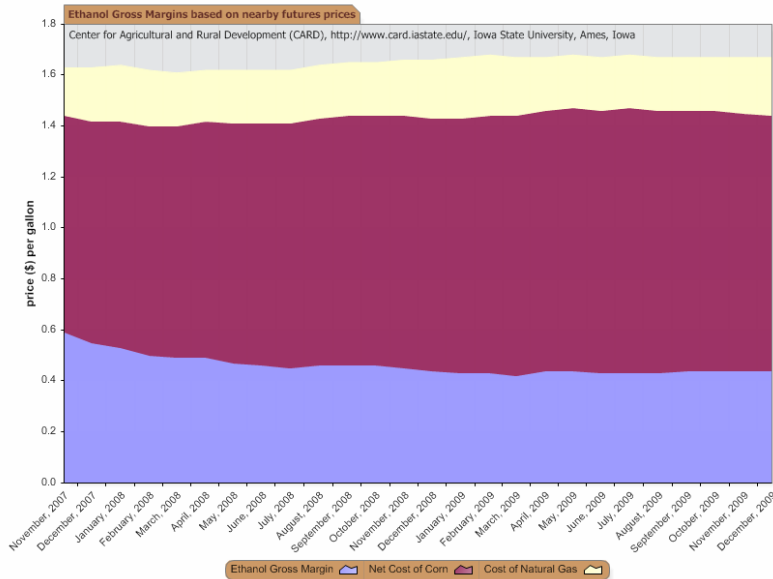
http://www.card.iastate.edu/research/bio/tools/proj_eth_gm.aspx

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CBOT Ethanol Futures versus CBOT Corn Futures March 23, 2005 - present



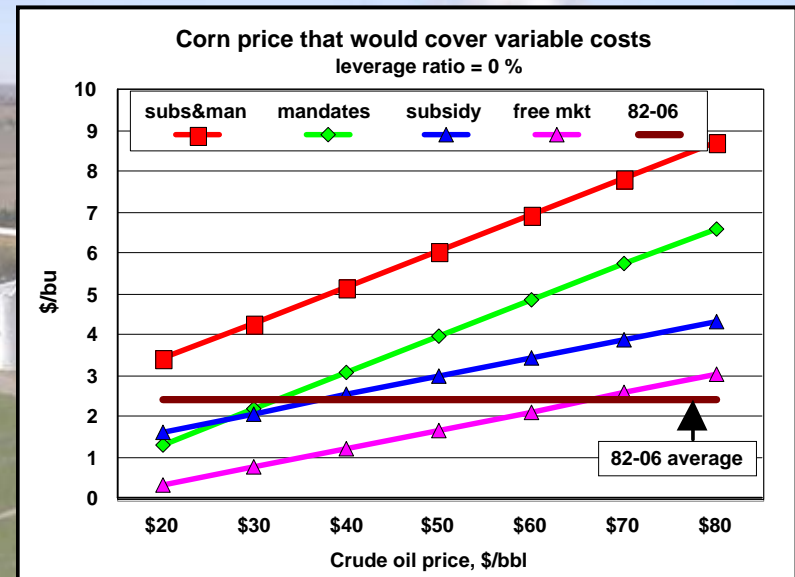
Ethanol margin forecasts → Expansion?



http://www.card.iastate.edu/research/bio/tools/proj_eth_gm.aspx Updated 10/17/07

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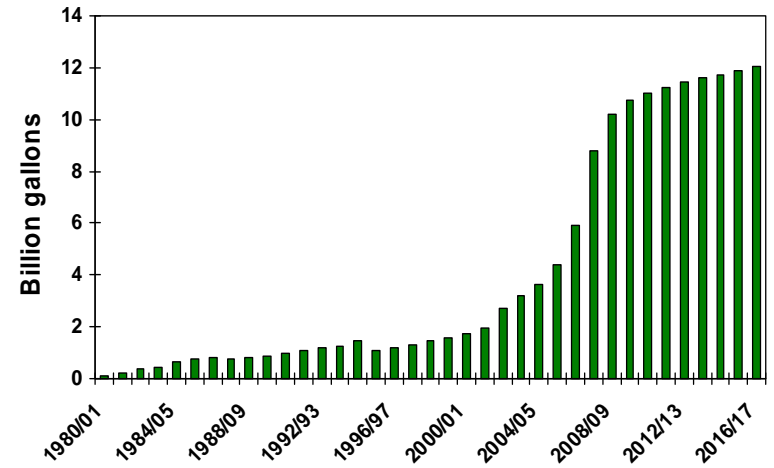
Ethanol Profitability...



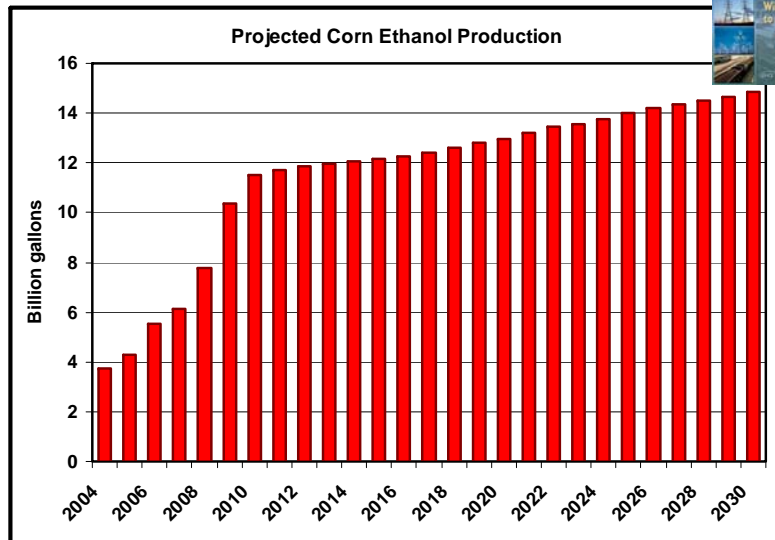
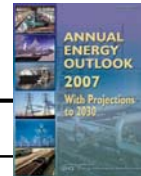
If mothballing costs are high, effective breakeven prices are higher

How much ethanol will be produced going forward?

Projected Corn Ethanol Production
 expect 12 bil. gal. in 2016/17– 30% of corn crop



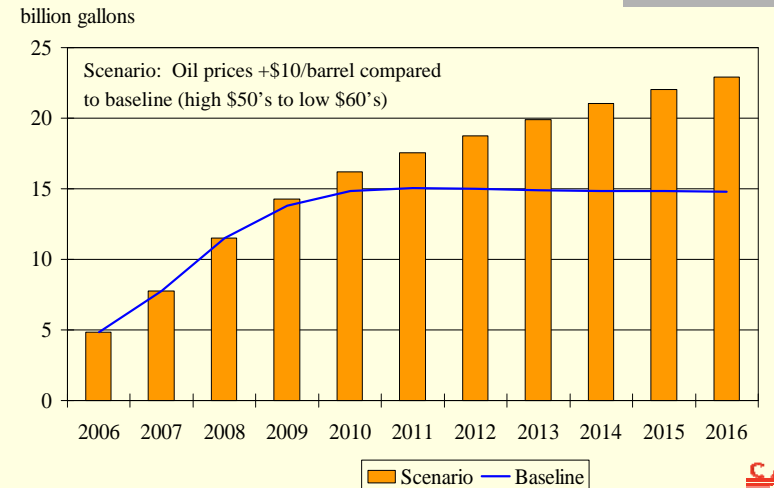
Source: Collins, K. "The New World of Biofuels: Implications for Agriculture and Energy." EIA Energy Outlook, Modeling, and Data Conference, March 28, 2007

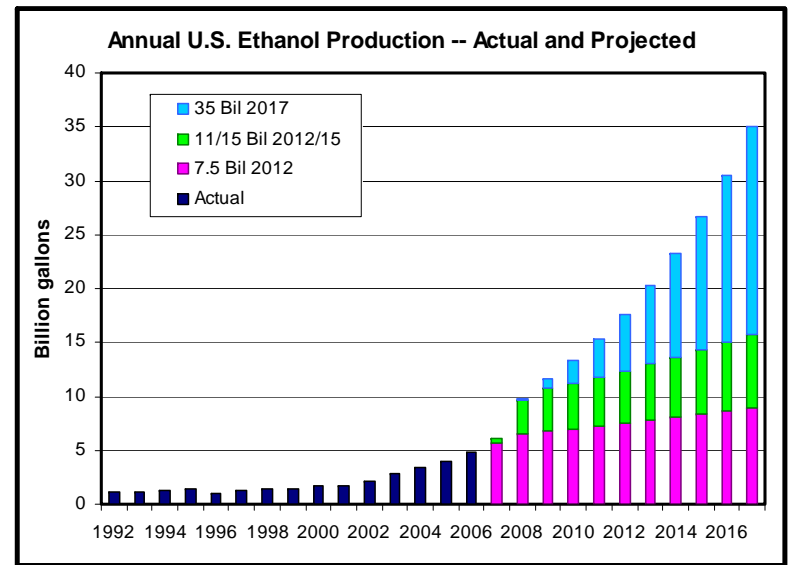
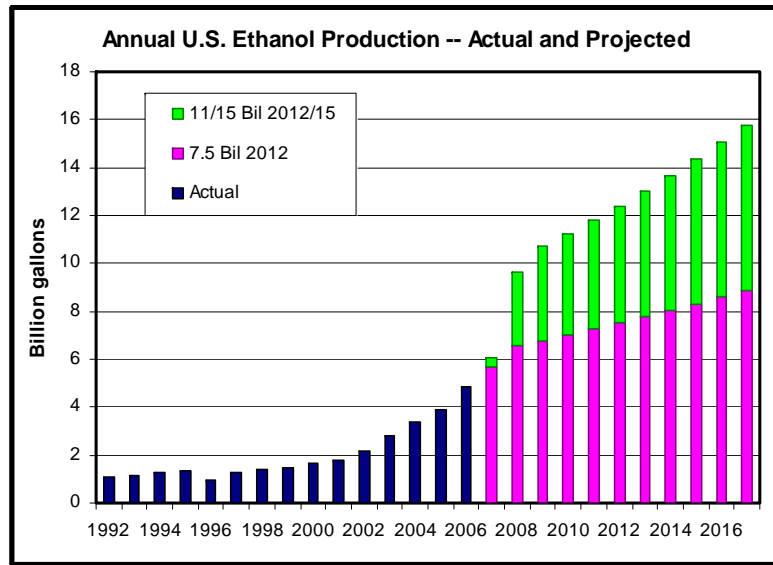


Source: Energy Information Administration, Report #DOE/EIA-0383(2007), February 2007

Projected U.S. Ethanol Production

Source: Chad Hart, CARD, Iowa State University – Spring 2007





Biofuels are catching the eye of oil companies

- “Every option, from developing unconventional fossil fuel resources to pursuing renewable and other alternatives, will need to be pursued if the world expects to meet its growing energy demand through 2030, the **National Petroleum Council** concluded in a recent study.”

... Oil & Gas Journal, Aug. 6, 2007

... much of this journal issue was devoted to agrifuels

... a far cry from the “mood” of the oil industry regarding renewable energy even just 6 months ago

- Biofuels are NOT going away

Some negatives are creeping in . . .

- **Corn for ethanol increases food prices**
 - Probably okay on this one (at least in U.S.)
 - CARD: 30% higher corn price: 1.1% higher food prices
- **Ethanol production is dirty environmentally**
 - Probably okay on this one (i.e., fairly clean)
- **Livestock producers getting louder**
- **Infrastructure & technical issues**
 - Ethanol/gasoline separation, small refineries
 - Cars can use 10% (14 bgy); 5% (7bgy) easily
 - <3% cars FFV; Big3 says half in 2012 – but still only 25% of new cars will be FFV since foreign car makers aren’t making that pledge (they sell half the cars)

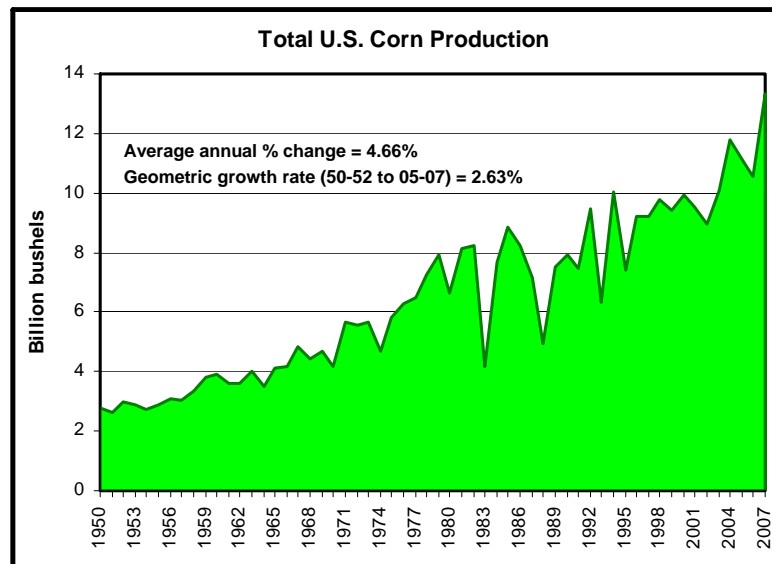
Future ethanol production?

- Not sure who's crystal ball to believe
 - Today's 7 bgy easy to sustain; Next 7 bgy reasonable over time; beyond ???
 - Hard to predict politics
- Impact of cellulosic ethanol?
 - Maintaining SOM will allow only 6.5 bgy from corn stover; alternatives will be slowwww
- Most predictions in the 11-15 bgy range over the next 3-5 years
 - Reflects current actual + planned capacity
 - Approximates E-10 nationwide
 - What does this mean for corn acres?

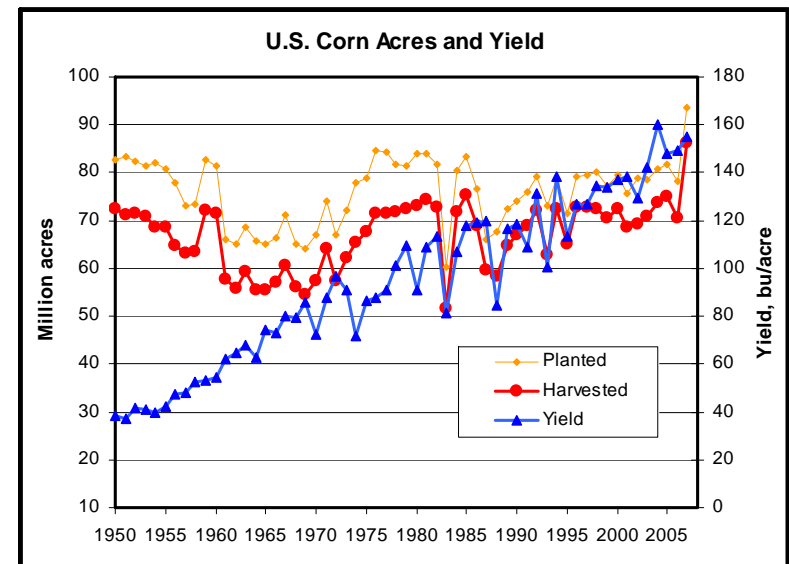
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Corn acres, yields, etc.

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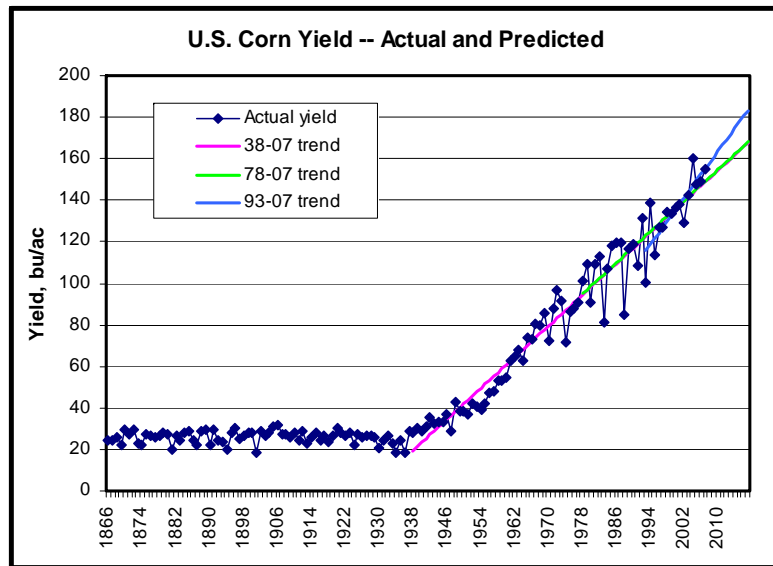


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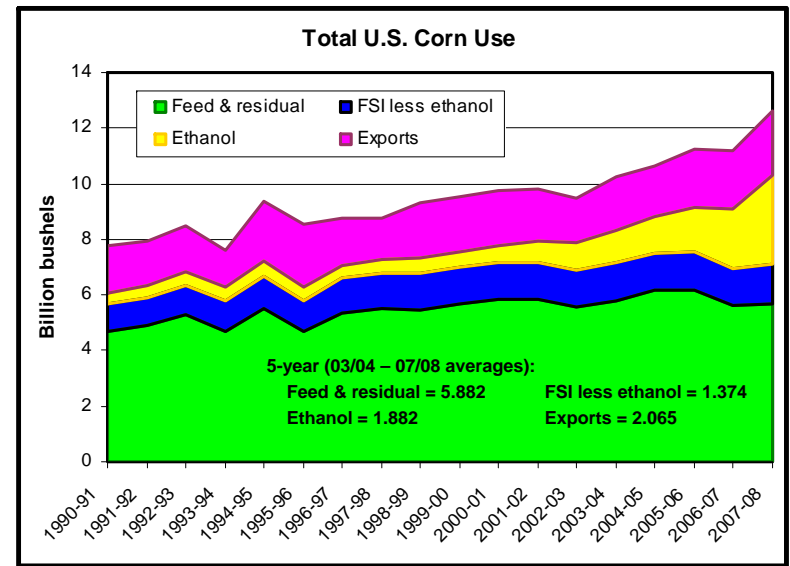


Average annual % change = 0.49% (planted); 0.64% (harvested); 3.37% (yield)
Geometric growth rate (50-52 to 05-07) = 0.04% (planted); 0.14% (harvested); 2.49% (yield)

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Source: USDA WASDE and KSU, 2006-07 is an estimate and 2007-08 is projection

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Corn acres needed...

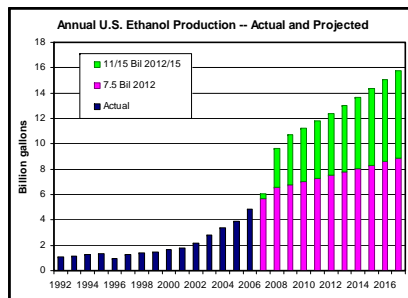
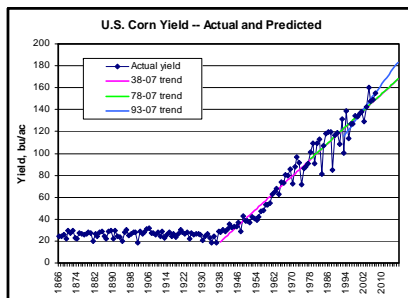
Assumptions:

- Trend yield equal to average of 3 different trend lines (157.5 in 2010 173.0 in 2017)
- Ethanol production consistent with green bars (below)
- Exports, FSI less ethanol, and Feed & Residual held constant at 5-year average
- Maximum of 35% of corn bushels displaced with DDGS

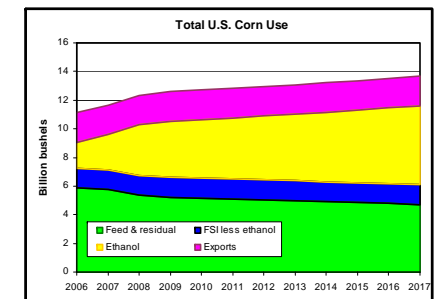
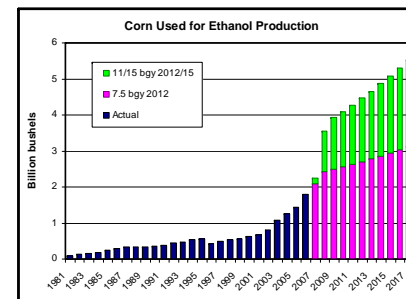
Corn acres needed...

Intermediate results:

- Corn used for ethanol based on total ethanol production and conversion rate of 2.7-2.9 gallons per bushel
- Corn used for Feed & Residual falls as more DDGS are fed to livestock
- Total corn use grows from 12.3 billion bushels in 2008 to 13.7 billion bushels in 2017

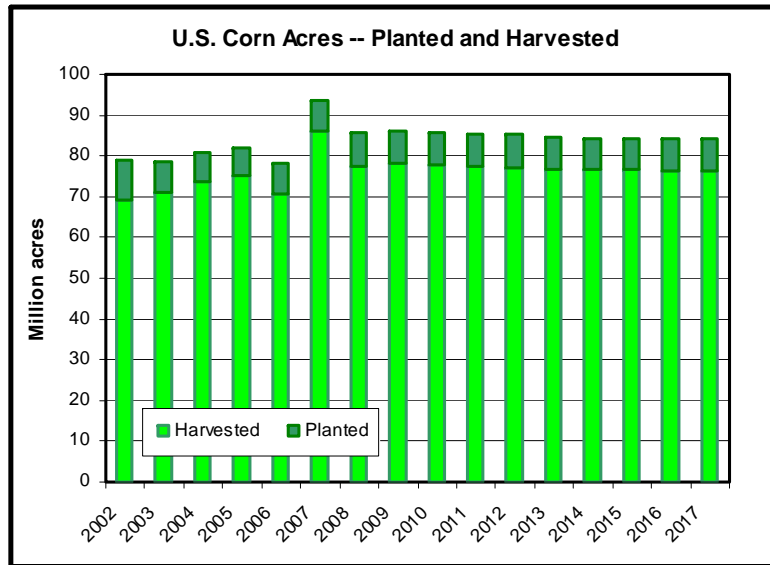


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Yield growth covers increased ethanol needs...



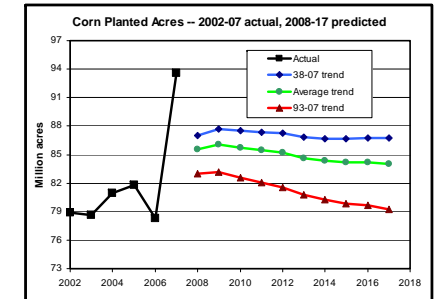
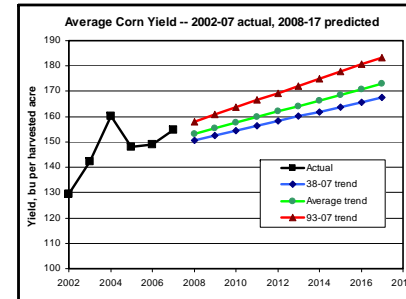
Source: 2002-07 USDA, 2008-2017 KSU projections

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Corn acres needed...

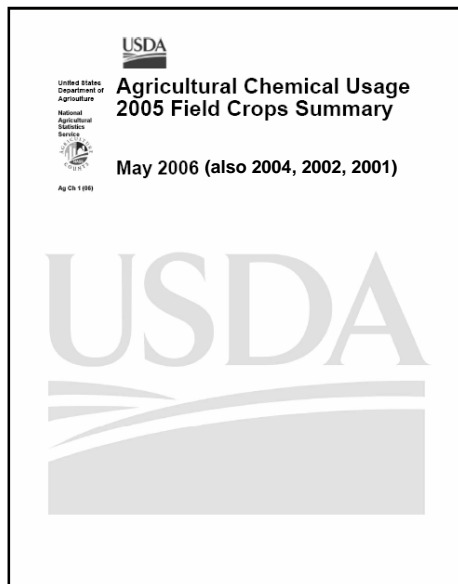
Results are sensitive to yield trend assumptions

- Recent trend suggests planted acres can drop back to more "normal" levels (i.e., 79-82 million acres)
- Longer-term trend suggests the need to consistently plant 86-87 million acres
- Average trend suggests the need for 84-86 million acres - above historical levels, but below 2007



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Corn acres and fertilizer demand...



USDA NASS surveyed 19 states (18 two of the years) regarding chemical usages on corn acres

Report the following:

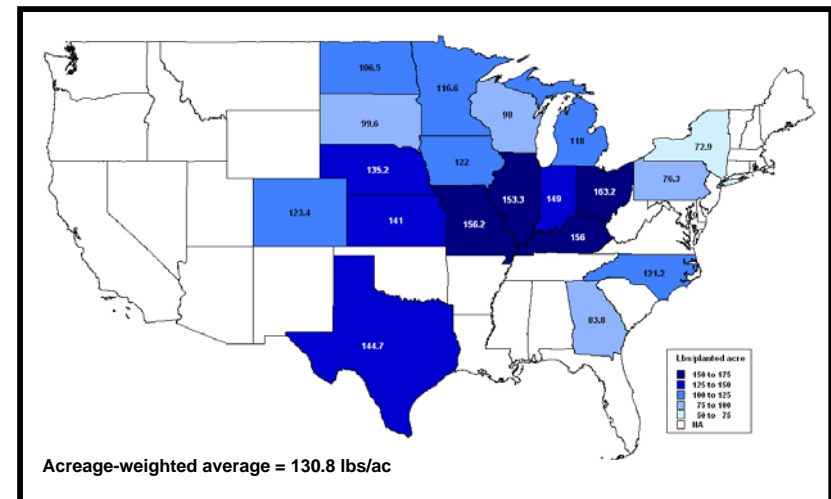
- Acres planted to corn
- Million pounds of N,P,K applied to corn

Calculated the following:

- Acre-weighted pounds applied per planted acre
- Bushel-weighted pounds applied per bushel

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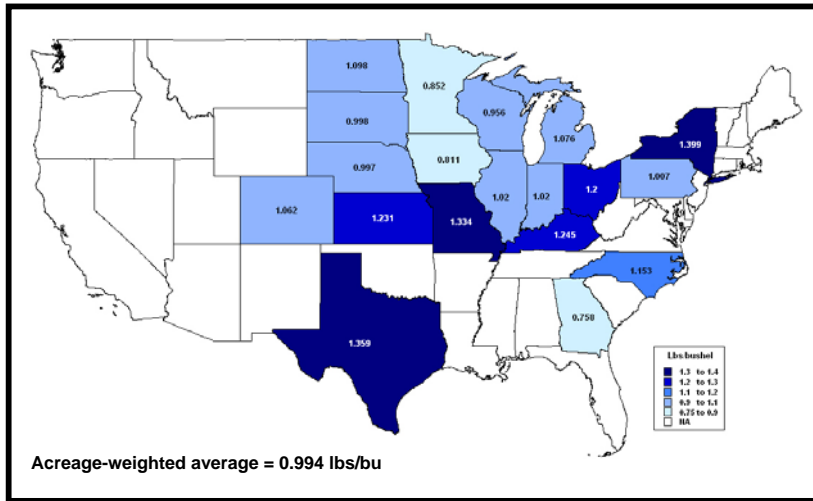
Nitrogen use per planted acre of corn...



Source: USDA Agricultural Chemical Usage - Field Crops Summary (2006, 2004, 2002, 2001)

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Nitrogen use per bushel of corn...



Source: USDA Agricultural Chemical Usage – Field Crops Summary (2006, 2004, 2002, 2001)

51

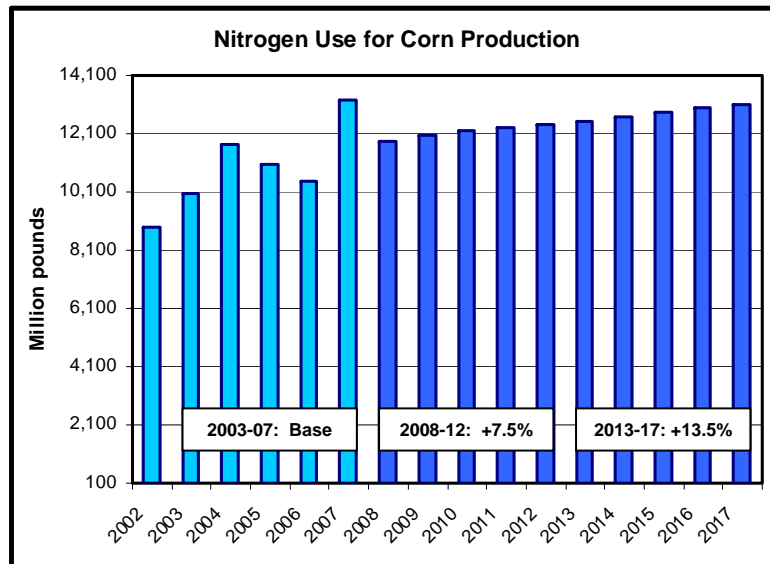
Estimated nutrient use/demand for corn...

Year of survey	2005	2003	2001	2000	Average
States in survey	19	18	19	18	
Weighted Averages					
Nitrogen					
Lbs/ac	132.3	131.9	127.3	131.6	130.8
Lbs/bu	0.953	1.004	0.992	1.027	0.994
Phosphate					
Lbs/ac	47.0	46.6	44.0	47.0	46.2
Lbs/bu	0.338	0.351	0.341	0.364	0.349
Potash					
Lbs/ac	54.1	53.8	53.6	51.5	53.3
Lbs/bu	0.390	0.401	0.412	0.392	0.399

Source: USDA Agricultural Chemical Usage – Field Crops Summary (various years) and KSU

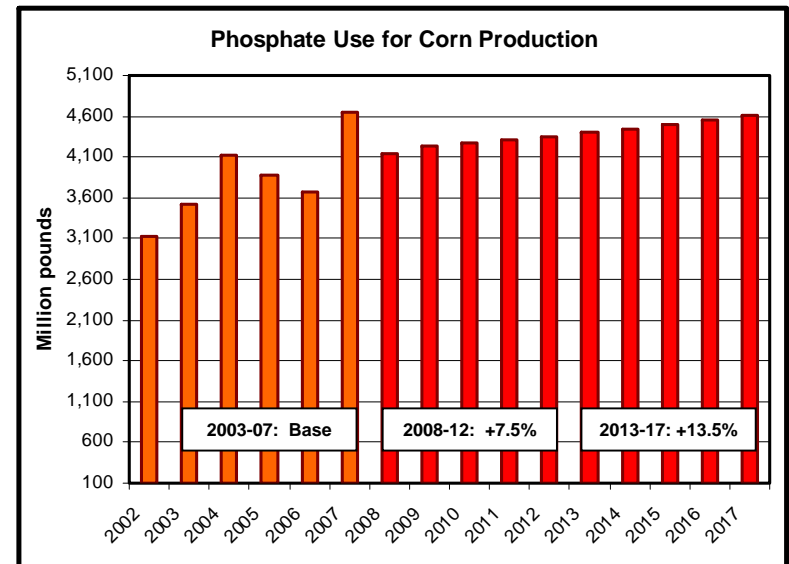
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Nitrogen demand for corn...



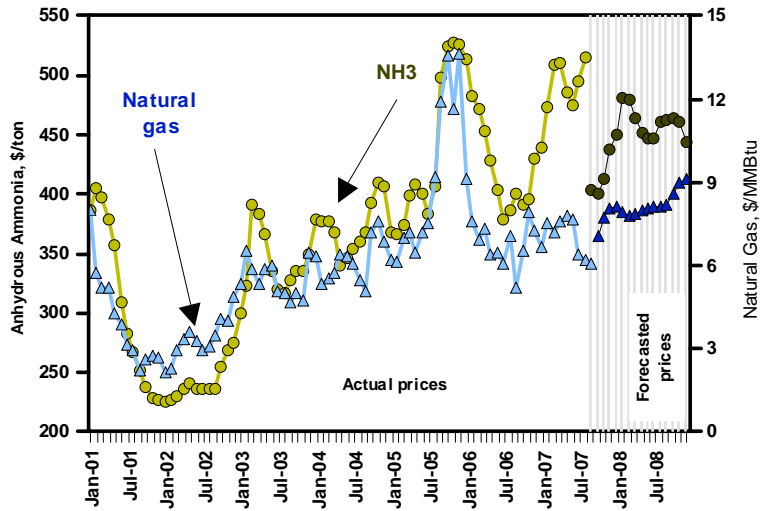
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Phosphate demand for corn...



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Monthly anhydrous ammonia prices, Corn Belt basis.

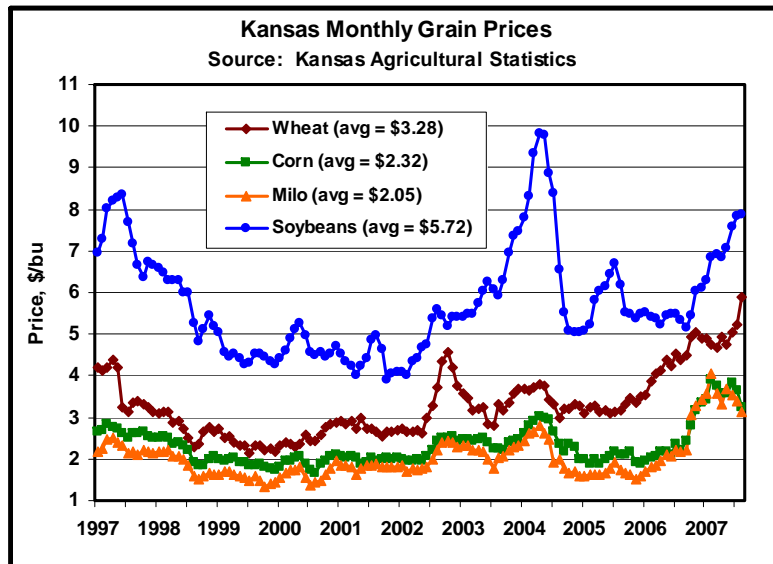


Currently, prices of NH3 are not tied very close to cost of production (i.e., natural gas prices)...

Can the ethanol industry continue to pay high commodity prices?

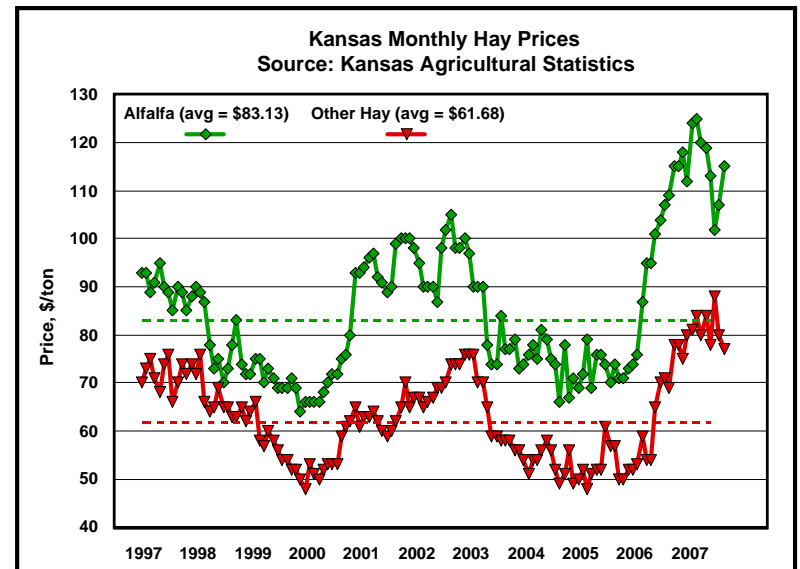
Put another way, how long will high prices last?

Crop prices are strong by historical standards...



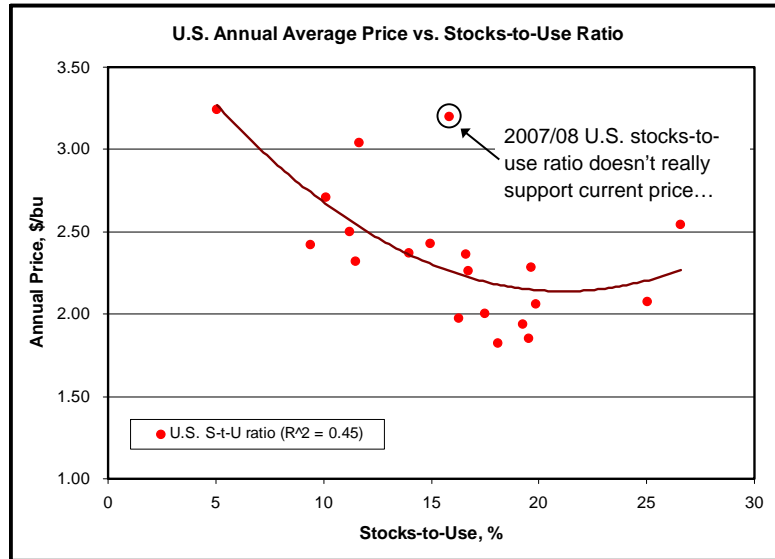
It's not just corn!

Strength in crop markets impacts hay prices...



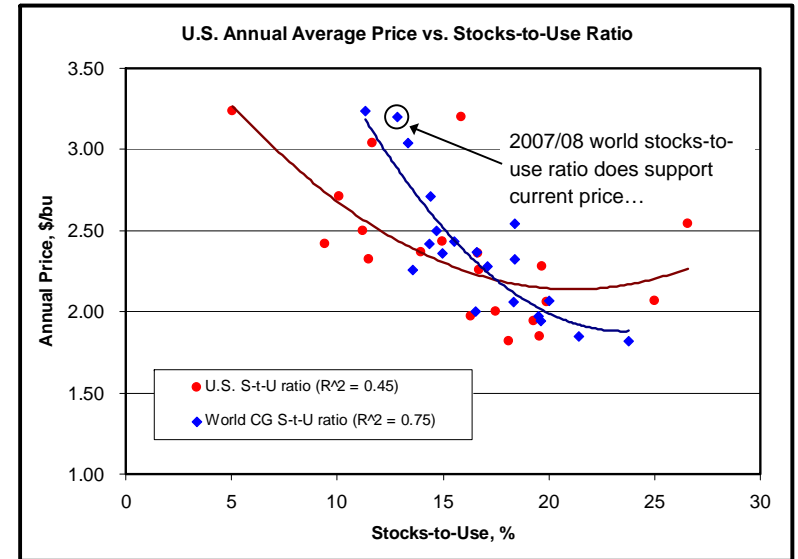
It's not just grains!

Relationship between stocks-to-use ratio and prices...



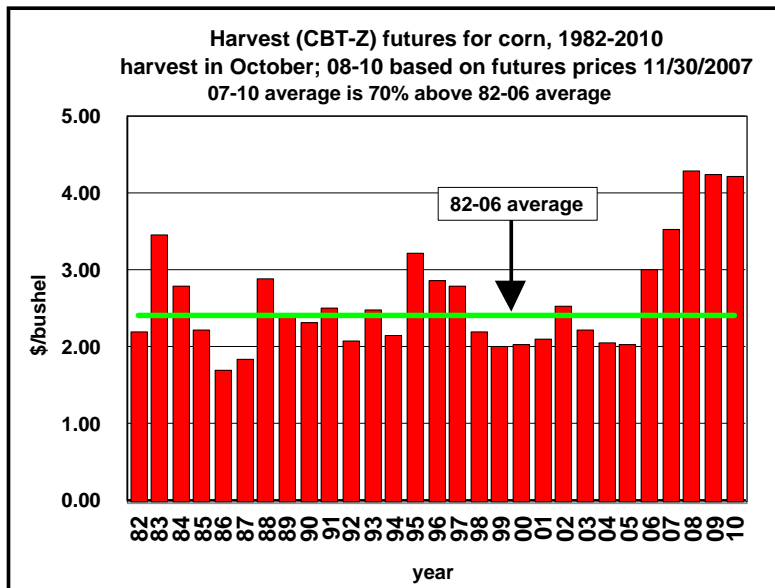
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Relationship between stocks-to-use ratio and prices...



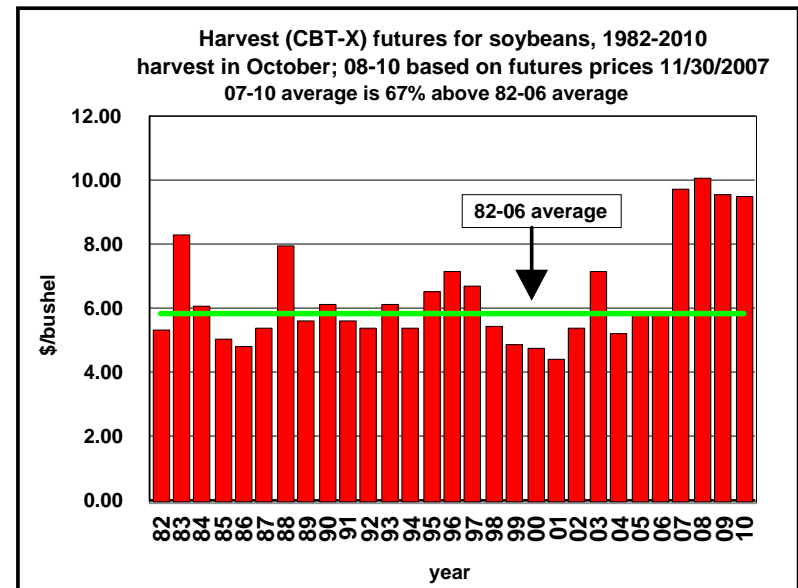
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How long will strong prices stick around?



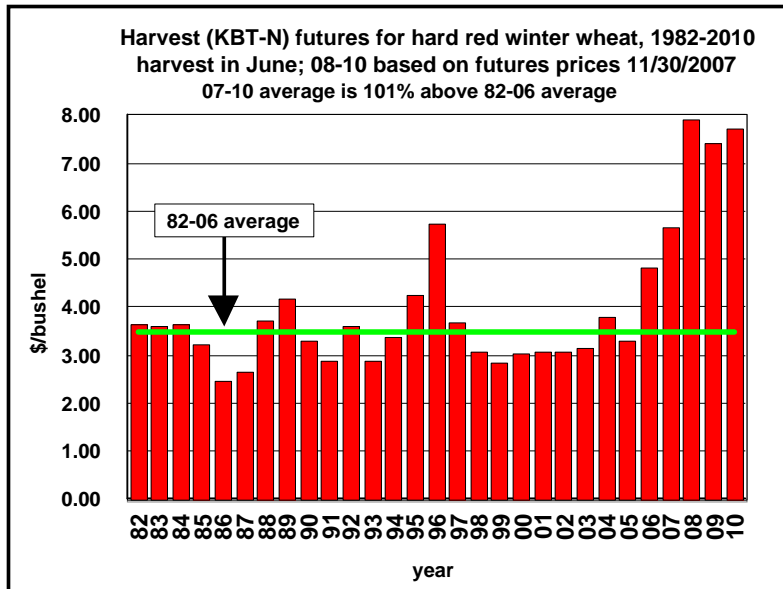
66

How long will strong prices stick around?



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How long will strong prices stick around?



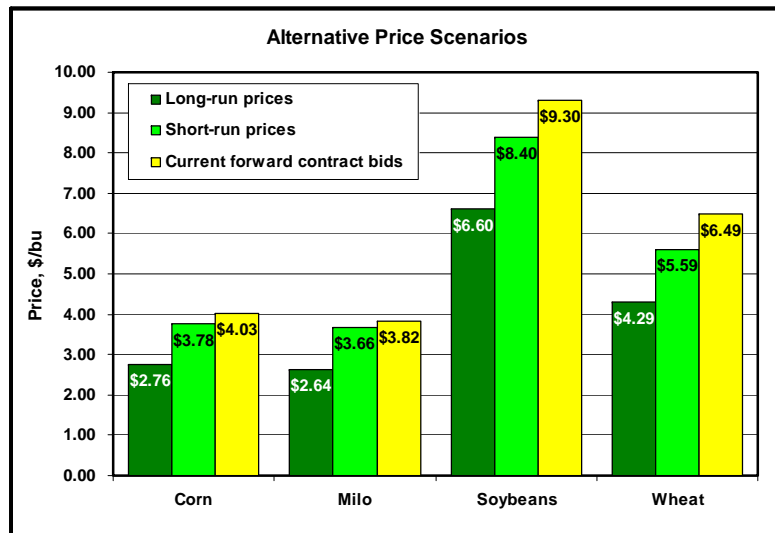
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KSU study of impact of high commodity prices on rental rates

Two approaches:
 Crop budgets
 Historical relationship

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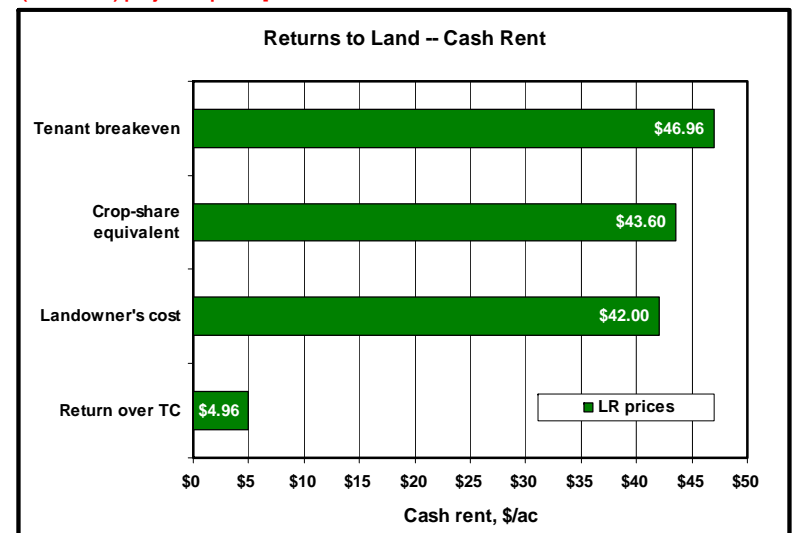
Alternative Prices to Consider for Central Kansas



Long-run (08-12) and short-run (08) from MF-1013, current bids for Newton, KS (11/16/07)

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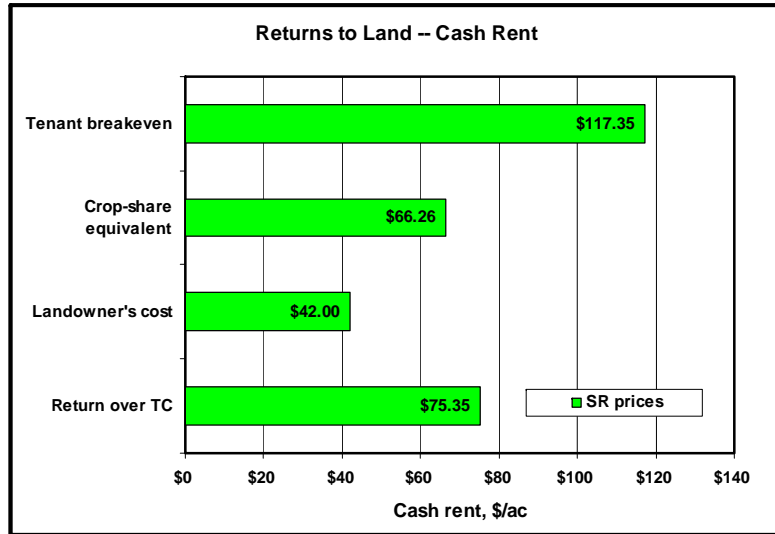
Estimated cash rents for Central Kansas [long run (2008-2012) projected prices]



Based on KSU Farm Management Guides (November 2007) and KSU-Lease.xls (available at www.agmanager.info)

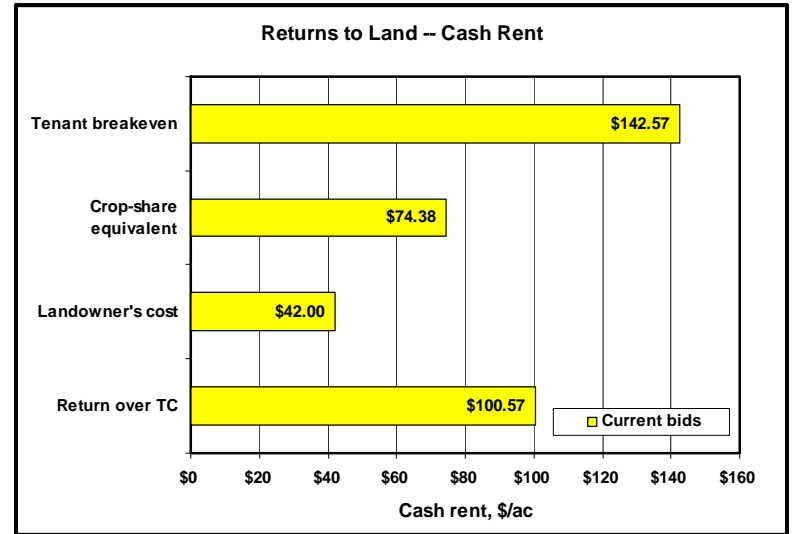
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Estimated cash rents for Central Kansas [short-run (2008) projected prices]



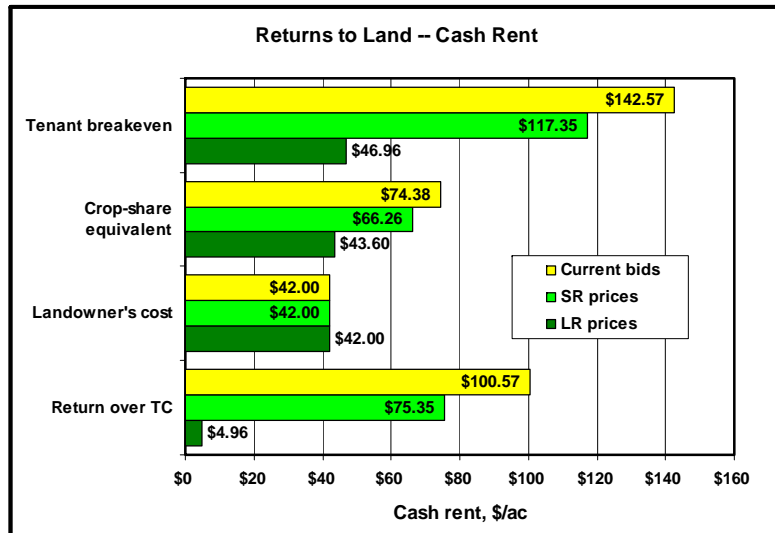
Based on KSU Farm Management Guides (November 2007) and KSU-Lease.xls (available at www.agmanager.info)

Estimated cash rents for Central Kansas [forward contract bids (11/16/07) for 2008 harvest delivery]



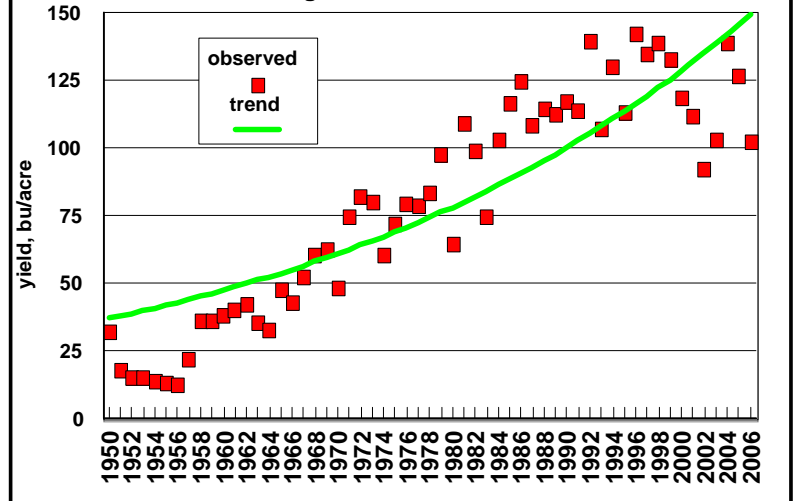
Based on KSU Farm Management Guides (November 2007) and KSU-Lease.xls (available at www.agmanager.info)

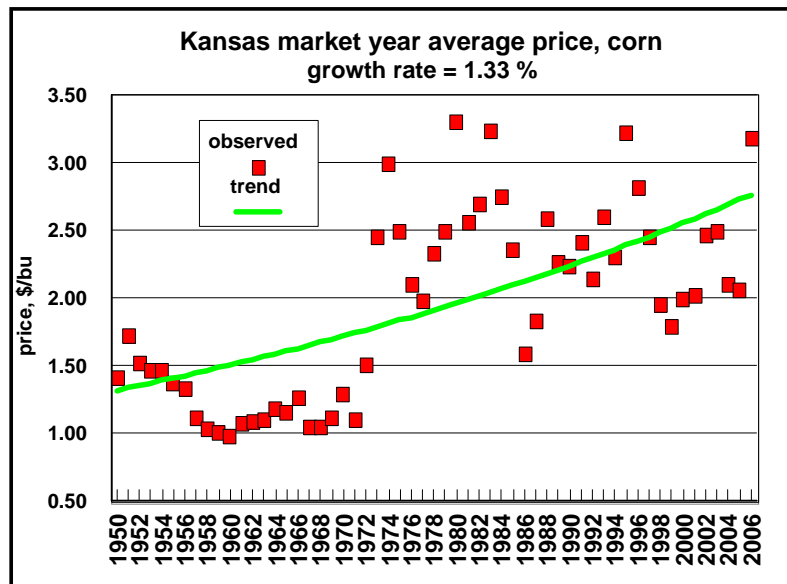
Estimated cash rents for South Central Kansas (alternative price scenarios)



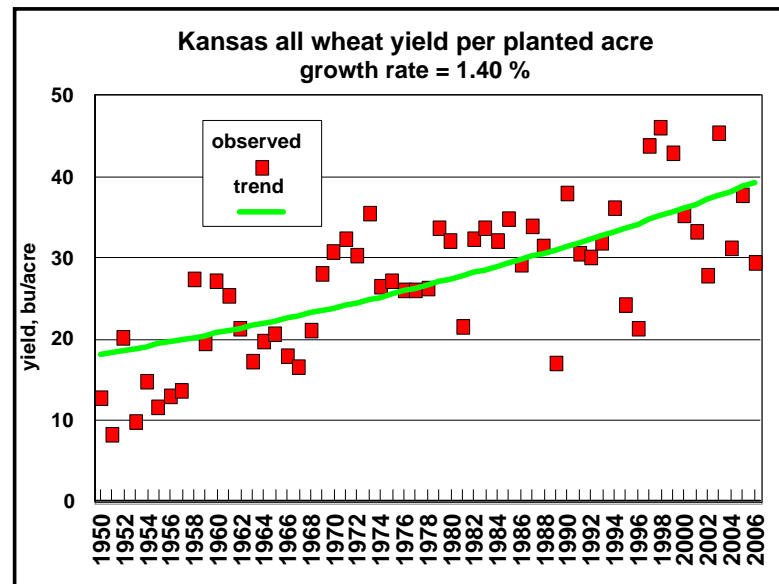
Based on KSU Farm Management Guides (October 2007) and KSU-Lease.xls (available at www.agmanager.info)

Kansas all corn yield per planted acre growth rate = 2.51 %

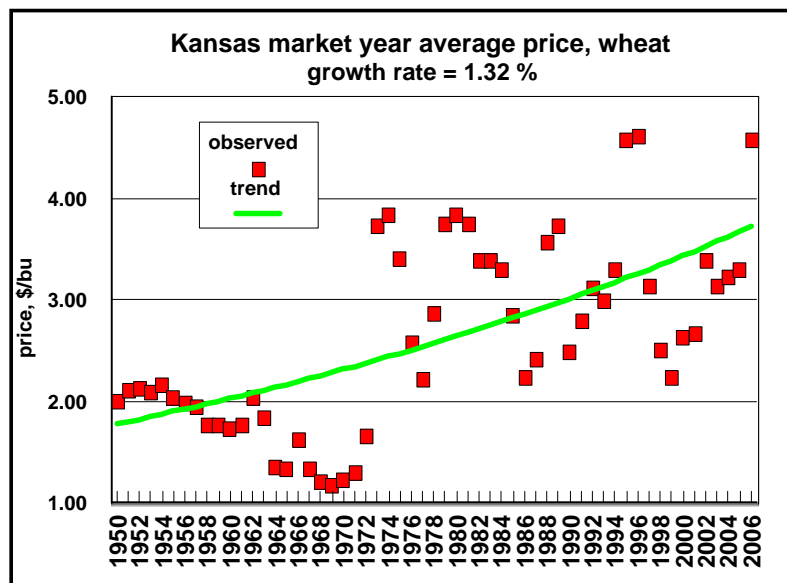




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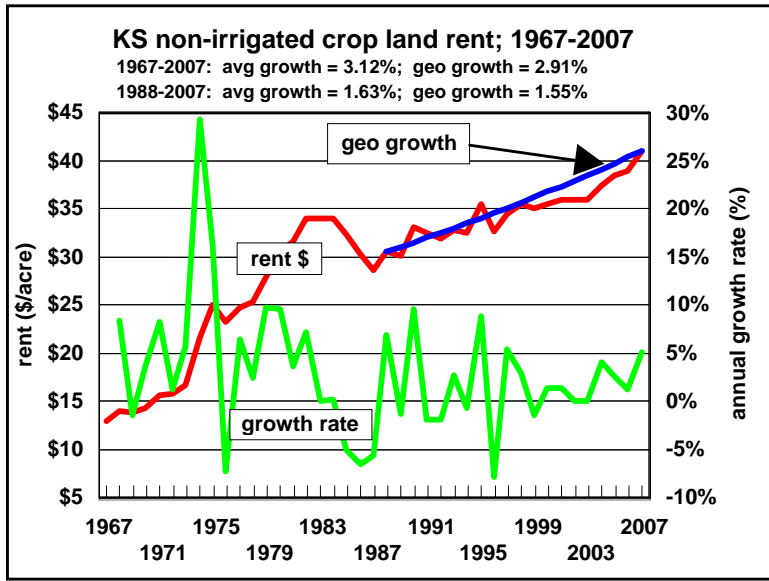


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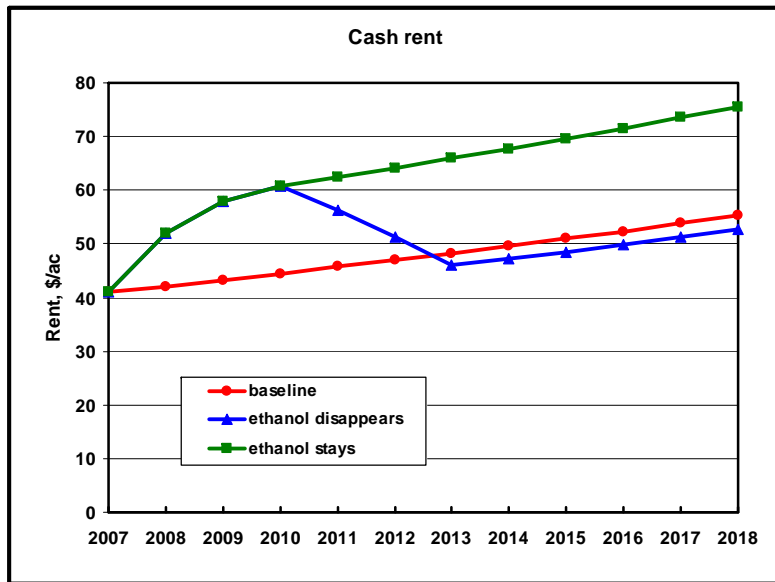
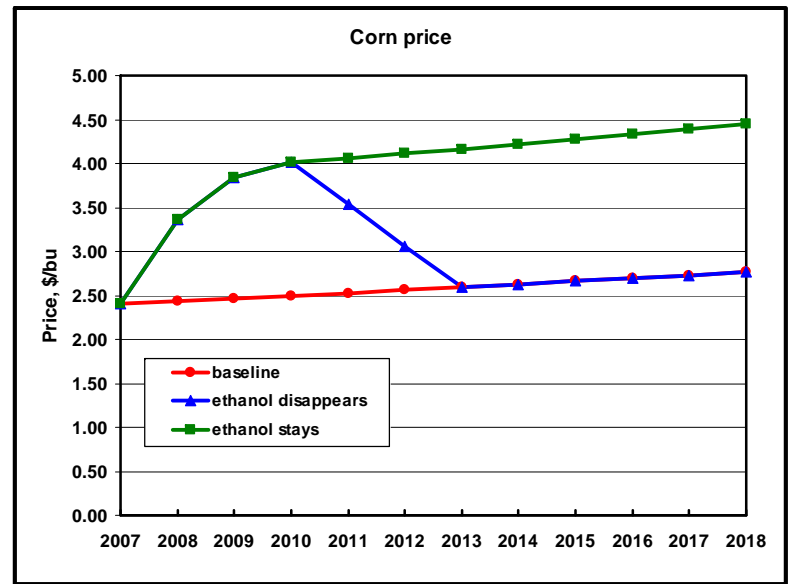
Relationship between yields and crop prices and rents and land values (1950-2006)

	Rent (% change)	Value (% change)
Yield (1% change)	0.70	0.77
Price (1% change)	0.71	0.99

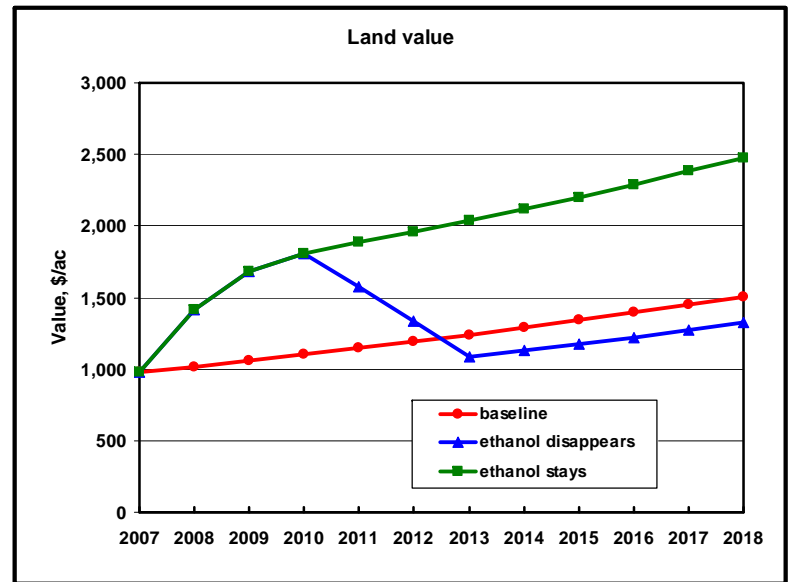
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Suggested expected ag growth rate = 2.37% (but if ethanol continues . . . ?)



Cash rent driven by corn price and yield changes



Land value driven by corn price and yield changes

Summary...

- Ethanol production likely to stabilize around 12-15 bgy over next several years (limited “new” expansion)
- Corn acres to support ethanol production
 - Increase from historical levels
 - With trend yields can be less than 2007
- Fertilizer
 - Use on corn will increase 7.5% in 2008-12 and 13.5% in 2013-17 compared to 2003-07
 - Strong demand will support high fertilizer prices
- Futures prices suggest commodity prices will remain at historically high levels for next several years (more of a world S&D issue than domestic one)
 - Rents and land values are going up!

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Questions?

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tkastens@ksu.edu

Site Updates

- [Livestock Outlook Radio Program](#)
October 22, 2007 by Jim Mintert,LMC
- [Livestock and Hay Charts](#)
October 19, 2007 by Jim Mintert
- [Grain Outlook Radio Program](#)
October 19, 2007 by Mike Woolverton
- [Kansas Grain Price Differentials](#)
October 18, 2007 by Daniel O'Brien
- [Crop Basis Maps](#)
October 18, 2007 by Kevin Dhuyvetter
- [Updated Crop Basis Tool](#)
October 16, 2007 by Kevin Dhuyvetter
- [In The Cattle Markets](#)
October 17, 2007 by Jim Mintert,LMC
- [Current Grain Outlook Newsletter](#)
October 15, 2007 by Mike Woolverton
- [KSU-Vegetative Buffer Excel Tool](#)
October 15, 2007 by Craig Smith and Jeff Williams
- [KSU-Streambank Stabilization Excel Tool](#)
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- [World Grain Supply and Demand Estimates](#)
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- [Water Quality Indices and Net Returns for Crop](#)