

# Costs of Production

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2008 Insurance Workshop

**“Meeting the Risk Management Challenges of a  
New Farm Bill and New Price Relationships”**

November 6, 2008

Courtyard by Marriott  
Salina, Kansas



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# IMPACT OF ENERGY MARKETS ON THE COST OF PRODUCTION

By

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## Impacts on Production Agriculture

### Background

- Unprecedented crude oil price volatility starting in 1997 (Asian financial crisis).
- Oil has been driven by OPEC supply discipline.
- Natural gas market - - rising U.S. demand and stable to declining regional supplies.
- Oil and natural gas prices likely to remain at high for next several years.

## Crude Oil

- Crude Oil currently in \$90-140/barrel range. (volatile Market)  
(8 OCTOBER 2008 - - oil had dropped to \$82/Barrel)
- No new refining capacity built in U.S. over past 25 years.  
Environmental concerns, permitting, and costs are a major issue.
- Appears to be adequate crude oil supplies, but bottleneck is refining capacity. Exporting countries are sending refined product in addition to crude.
- Continued political unrest in southwest Asia (Afghanistan, Iraq, Iran, Syria) --certainly a major variable - - (major oil production region).
- Economic growth in developing countries in Asia such as China and India "fueling" demand for petroleum products.

## Crude Oil Continued

- Hurricanes "Katrina and Rita" and most recently "Ike" shut down nearly 30 percent of refining capacity in the U.S.
- Although this is short term (hurricanes) - - flow of supplies to east coast and other regions have been reduced to a fraction of need (An immediate "spike" in retail gas prices).
- Consequences are increased price volatility, reduced supplies, increasing demand, and higher costs of production in all the vital sectors of the U.S. economy.
- Bottom line is higher retail prices as energy costs are "passed through". The exception, of course, is production agriculture.

## Production Agriculture

- Has been hit particularly hard by increased petroleum prices. Diesel fuel (farm fuel), has increased from \$1.40/gallon in 2004 to \$4.20/gallon in July, 2008 - - nearly a 300 percent increase. Anhydrous Ammonia (NH3) at \$1,400/ton currently (September 2008).
- Current farm energy consumption
  - Direct energy: Includes diesel, gasoline, LP gas, natural gas and electricity
  - Indirect energy: Fertilizers, herbicides, pesticides, and machinery, repair parts, etc.

## Production Agriculture Continued

- In 2002, total energy consumed by U.S. farms (1.7) quadrillion Btu's)
 

Direct Energy:	
Diesel	27%
Electricity	21%
Gasoline	9%
LP gas	5%
Natural gas	<u>4%</u>
	66%
Indirect Energy:	
Fertilizer	28%
Pesticides/herbicides	6%
other related uses	<u>??</u>
	34%

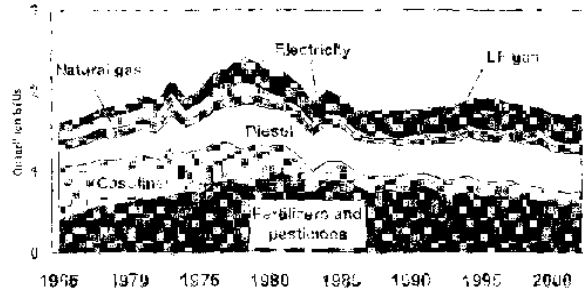
- Increase in energy costs are greatest for feed grain (corn, milo, barley, etc.) and wheat.
  - Wheat – 52% of total operating costs
- Beef cattle operations have small energy expenses relative to crop producers.
  - 3-7% for cow-calf but impact on feed production costs.

## Production Agriculture Continued

- Other related uses (machinery production, repair parts, transportation, etc.) not contained in the total energy consumed equation.
- Figure 1 demonstrates energy consumption from 1965 – 2002.
- Appears consumption has declined from peak levels observed in late 1970's, but the use of the five direct energy sources has remained consistent since early 1990's.

## Production Agriculture Continued

Total Energy Consumed on US Farms, 1965-2002



- Based on John Miranowski's research, Iowa State University, 2004, it appears:
  - Direct energy accounts for 5 -7 percent of total farm expenditures.
  - Indirect energy accounts for 9 – 10 percent of total farm expenditures.

Assuming Miranowski estimate is reasonably accurate, what are the likely short-run impacts on key Colorado agricultural commodities?

### Fertilizer/Herbicide Cost Selected Comparisons (2005-2008) Northern Colorado

	Size	January	
		2008 Price	2005 Price
Dry Fertilizer (Bulk)			
0-0-60	Ton	\$1,000	\$335
11-52-0	Ton	\$1,450	\$400
46-0-0	Ton	\$1,100	\$450
Liquid (truckloads)			
32-0-0		650	280

### Fertilizer/Herbicide Cost Continued

Chemicals	Size	January	
		2008 Price	2005 Price
Atrazine 4-L	2.5 gal.	20.00	11.50
Roundup Weather max	2.5 gal.	81.00	38.50
Rodon 22-K	1 gal.	125.00	110.00
Alliance	2.5 gal.	15.50	10.50
Lorsban 4-E	2.5 gal.	45.00	40.00
Tilt	1 gal.	394.00	385.00 (2006)

## Corn Grain (Surface Irrigated)

	2003	2007	2008
Total Receipts	433.50	680.00	935.00
	(2.55x170bu)	(4.00x170bu)	(5.50x170bu)
Direct Costs:			
Operating -Preharvest			
fertilizer	71.00	140.00	152.00
herbicide	13.50	30.00	30.00
machinery, fuel & lube	27.26	70.42	97.68
other	<u>101.42</u>	<u>212.83</u>	<u>202.37</u>
Total Preharvest	213.18	453.25	482.05
Operating – Harvest			
Machinery, fuel & lube	9.79	25.29	35.08
Other	<u>12.64</u>	<u>15.55</u>	<u>15.96</u>
Total Harvest	22.43	40.84	51.04
Total Operating	235.61	494.09	533.09
Property/Ownership Costs	138.98	138.98	138.98
Total Direct Costs	<u>374.59</u>	<u>633.07</u>	<u>672.07</u>
Net Receipts	58.91	46.93	262.93

## Dryland Winter Wheat–Northern Colorado

	2003	2007
Total Receipts	97.15	190.50
	(3.35x29bu)	(6.35x30bu)
Direct Costs:		
Operating -Preharvest		
fertilizer	24.80	38.40
herbicide	6.75	12.38
machinery, fuel & lube	7.27	18.78
other	<u>7.61</u>	<u>15.08</u>
Total Preharvest	46.43	84.64
Operating – Harvest		
Machinery, fuel & lube	19.20	24.00
Other	<u>.67</u>	<u>1.02</u>
Total Harvest	19.87	25.02
Total Operating	67.30	109.66
Property/Ownership Costs	18.18	18.18
Total Direct Costs	<u>84.48</u>	<u>127.84</u>
Net Receipts	12.67	62.66

## Farm Productivity and Efficiency

- 2% annual productivity growth in production agriculture.
- Use of inputs flat, but productivity output growing.
- Use of major inputs declining except energy after early 1990's.

## Short Term Coping Strategies

- Change tillage practices - - limited till system. May require investing in different tillage implements.
- Changing enterprises to less energy intensive crops. Move away from corn silage to alfalfa or other forages.
- Low-water-use irrigation - - more acres converted to energy reducing low-pressure systems. (35% of irrigated corn use low-pressure).

## **Short Term Coping Strategies** **Continued**

- Nitrogen management - - soil testing (While commercial nitrogen fertilizer is applied to nearly all corn acreage, less than 30% reported using a soil test.)
- Assessing market demand for other commodities with smaller direct and indirect energy requirements - - are there markets for oil based crops particularly related to the emerging bio-diesel/ethanol markets. (Bio-fuels have limited potential). (Currently Bio-fuel is cheaper than regular diesel fuel but there are problems using this fuel).
- Other sources of nutrients - - “green” crops and increased use of manure.

## **Short Term Coping Strategies** **Continued**

- Substitution of biotechnology for fertilizers, pesticides/herbicides emerging market.
- Downsizing acreage - - produce on most productive lands - - CRP opportunities and other governmental environmental programs.
- Substitution of labor for capital where possible rather than what we have observed over time.
- Wind power, solar energy are growing in popularity and cost effectiveness.

## **Conclusions**

- Agriculture is an important consumer of direct and indirect energy in crop and animal production.
- Producers do adjust to changes in real energy costs - - making changes relative to input use and production.
- Very vulnerable to energy supply disruptions particularly during planting or harvesting seasons.

## **Conclusions Continued**

- Agriculture is generally energy efficient relative to other sectors.
- Continued consumer demand for processed food items will also impact production agriculture. (Processing sector consumed 1.4 quadrillion Btu’s in 2002.)
- Era of adjustment - - adjusting to a higher plateau of energy prices. Farmers and ranchers in the U.S. have excelled when the need to adjust is facing them.