

Impact of Energy Price Increases on Irrigated Crop Farms in Kansas

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Introduction

This paper documents increases in seed expense; fertilizer and lime expense; herbicide and insecticide expense; gas, fuel, and oil expense; crop machinery cost; and crop production cost from 2003 to 2008 using data from irrigated crop farms participating in Kansas Farm Management Association (KFMA) program.

Data

Annual KFMA summary data for irrigated crop farms from 2003 to 2008 were used in this study. On average, 83 KFMA farms were classified as irrigated crop farms over the 2003 to 2008 time period. At least two-thirds of the labor for these farms was used to produce irrigated crops. Many of these farms also had a livestock enterprise and/or produced crops on non-irrigated land.

All costs and expenses are reported on an accrual basis. Gas, fuel, and oil expense includes fuel used by machinery and equipment as well as irrigation energy expense. Crop machinery cost includes the crops' share of repairs, gas, fuel, oil, machine hire, economic depreciation, an opportunity charge on machinery and equipment investment, and an adjustment for machine work income. Crop production cost includes hired labor, machinery cost, seed, fertilizer and lime, herbicide and insecticide, storage and marketing, insurance, supplies, utilities, and dues and fees.

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Production cost is impacted by price changes, technology, and crop mix. Adopting technology (e.g., switching to a reduced tillage system) and changes in a farm's crop mix often change the optimal mix of inputs. It was not possible to disentangle the impacts of price changes, technology adoption, and crop mix changes in the analysis summarized below.

Analysis

Tables 1-4 contain summary information on crop related expenses for irrigated farms. On a per acre basis, crop production cost increased \$34.65 from 2003 to 2004, \$3.65 from 2004 to 2005, \$5.65 from 2005 to 2006, \$34.93 from 2006 to 2007, and \$22.62 from 2007 to 2008. These per acre crop production cost increases represented a 19.02% increase from 2003 to 2004, a 1.68% increase from 2004 to 2005, a 2.57% increase from 2005 to 2006, a 15.45% increase from 2006 to 2007, and an 8.67% increase from 2007 to 2008. Table 2 compares the five year average for 2003-2007 to 2008. Crop production cost for irrigated farms increased 28.17% on a per acre basis from 2003-2007 to 2008.

Increases in energy related expenses (fertilizer and lime; gas, fuel, and oil) were a major contributor to the increase in crop production cost. On a per acre basis, approximately 45% of the increase in crop production cost from 2003-2007 to 2008 was attributable to increases in energy related expenses. Table 3 presents the increases in energy related expenses from 2003 to 2008. Energy related expenses increased 10.58% in 2008. In 2008, fertilizer expense increased by 2.68% and gas, fuel, and oil expense increased by 27.36%. The remaining increase in crop production cost per acre was due to increases in seed, herbicide and insecticide, hired labor, repairs, machine hire, storage and marketing, insurance, supplies, utilities, dues and fees, economic depreciation, and opportunity charges on machinery and equipment investment. Table 4 compares the five year average for 2003-2007 to 2008. Fertilizer expense per crop acre increased 52.65% from 2003-2007 to 2008. Over the same time period, gas, fuel, and oil

expense per crop acre increased 32.49%. Total energy related expense increased 41.27% per crop acre from 2003-2007 to 2008.

Summary

Increases in energy related expenses represented approximately 45% of the increase in crop production cost per acre from 2003-2007 to 2008. Increases in energy related expenses increased per acre cost by \$10.19 in 2008 and \$32.19 from 2003-2007 to 2008. Annual percentage changes in energy related expenses since 2003 have ranged from an 8.71% increase from 2004 to 2005 to a 19.50% increase from 2003 to 2004.

Table 1. Major Crop Related Expenses for Irrigated KFMA Crop Farms from 2003-2008.

| <u>Expense Category</u> | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|----------|----------------|----------|----------|----------|----------|
| <u>Expense per Crop Acre</u> | | | | | | |
| Seed | \$20.27 | \$26.44 | \$25.13 | \$25.09 | \$30.27 | \$32.32 |
| Fertilizer and Lime | \$23.06 | \$28.23 | \$32.71 | \$35.28 | \$50.47 | \$51.83 |
| Herbicide and Insecticide | \$17.67 | \$21.01 | \$21.53 | \$22.13 | \$26.24 | \$26.61 |
| Gas, Fuel, and Oil | \$36.76 | \$43.23 | \$45.01 | \$49.36 | \$45.81 | \$58.35 |
| Machinery Cost | \$63.38 | \$72.33 | \$75.08 | \$76.62 | \$81.89 | \$84.46 |
| Crop Production Cost | \$182.14 | \$216.79 | \$220.44 | \$226.09 | \$261.02 | \$283.64 |
| <u>Annual Percentage Change in per Acre Expense</u> | | | | | | |
| Seed | | 30.45% | -4.95% | -0.15% | 20.64% | 6.76% |
| Fertilizer and Lime | | 22.41% | 15.84% | 7.88% | 43.06% | 2.68% |
| Herbicide and Insecticide | | 18.95% | 2.46% | 2.76% | 18.57% | 1.42% |
| Gas, Fuel, and Oil | | 17.59% | 4.13% | 9.67% | -7.19% | 27.36% |
| Crop Machinery Cost | | 14.13% | 3.80% | 2.04% | 6.89% | 3.14% |
| Crop Production Cost | | 19.02% | 1.68% | 2.57% | 15.45% | 8.67% |

Source: Kansas Farm Management Association 2008 Databank.

Table 2. Major Crop Related Expenses for Irrigated KFMA Crop Farms, 5-Year Average and 2008.

| <u>Expense Category</u> | <u>2003-2007</u> | <u>2008</u> | <u>% Change</u> |
|------------------------------|------------------|-------------|-----------------|
| <u>Expense per Crop Acre</u> | | | |
| Seed | \$25.44 | \$32.32 | 27.04% |
| Fertilizer and Lime | \$33.95 | \$51.83 | 52.65% |
| Herbicide and Insecticide | \$21.72 | \$26.61 | 22.53% |
| Gas, Fuel, and Oil | \$44.04 | \$58.35 | 32.51% |
| Machinery Cost | \$73.86 | \$84.46 | 14.36% |
| Crop Production Cost | \$221.30 | \$283.64 | 28.17% |

Source: Kansas Farm Management Association 2008 Databank.

Table 3. Energy Intensive Expenses for Irrigated KFMA Crop Farms from 2003-2008.

| <u>Expense Category</u> | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|--|----------|-----------|-----------|-----------|-----------|-----------|
| <u>Fertilizer and Lime</u> | | | | | | |
| Crop Expense | \$35,336 | \$41,079 | \$54,030 | \$62,167 | \$103,724 | \$102,930 |
| Expense per Crop Acre | \$23.06 | \$28.23 | \$32.71 | \$35.28 | \$50.47 | \$51.83 |
| Annual Percentage Change in per Acre Expense | | 22.41% | 15.84% | 7.88% | 43.06% | 2.68% |
| <u>Gas, Fuel, and Oil</u> | | | | | | |
| Crop Expense | \$56,320 | \$62,942 | \$74,361 | \$86,978 | \$94,149 | \$115,886 |
| Expense per Crop Acre | \$36.76 | \$43.26 | \$45.01 | \$49.36 | \$45.81 | \$58.35 |
| Annual Percentage Change in per Acre Expense | | 17.68% | 4.05% | 9.67% | -7.19% | 27.36% |
| <u>Total Energy Related Expense</u> | | | | | | |
| Crop Expense | \$91,656 | \$104,021 | \$128,391 | \$149,145 | \$197,873 | \$218,816 |
| Expense per Crop Acre | \$59.83 | \$71.49 | \$77.72 | \$84.65 | \$96.29 | \$106.48 |
| Annual Percentage Change in per Acre Expense | | 19.50% | 8.71% | 8.91% | 13.76% | 10.58% |

Source: Kansas Farm Management Association 2008 Databank.

Table 4. Energy Intensive Expenses for Irrigated KFMA Crop Farms, 5-Year Average and 2008.

| <u>Expense Category</u> | <u>2003-2007</u> | <u>2008</u> | <u>% Change</u> |
|-------------------------------------|------------------|-------------|-----------------|
| <u>Fertilizer and Lime</u> | | | |
| Crop Expense | \$59,267 | \$102,930 | 73.67% |
| Expense per Crop Acre | \$33.95 | \$51.83 | 52.65% |
| <u>Gas, Fuel, and Oil</u> | | | |
| Crop Expense | \$74,950 | \$115,886 | 54.62% |
| Expense per Crop Acre | \$44.04 | \$58.35 | 32.49% |
| <u>Total Energy Related Expense</u> | | | |
| Crop Expense | \$134,217 | \$218,816 | 63.03% |
| Expense per Crop Acre | \$77.99 | \$110.18 | 41.27% |

Source: Kansas Farm Management Association 2008 Databank.