

Impact of Rising Diesel Prices on Machinery and Whole-Farm Costs

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Agricultural producers and custom operators are currently facing the highest nominal price of diesel they have ever seen. Figure 1 shows actual monthly average diesel prices for southwest Kansas (SW KS) and the U.S. from January 1994 through April 2005 and forecasted prices from May 2005 through December 2006.¹ It can be seen that while the diesel prices in SW KS vary somewhat from US prices, they tend to follow a very similar pattern. Statistical evidence that the two price series follow a similar pattern is that the correlation between these two prices is 0.989. Prices from May 2005 forward follow a slightly different pattern because of the different models used to generate the price forecasts, however, both series suggest prices will drop slightly from current levels but still remain at historically high levels throughout the remainder of 2005 and in 2006.

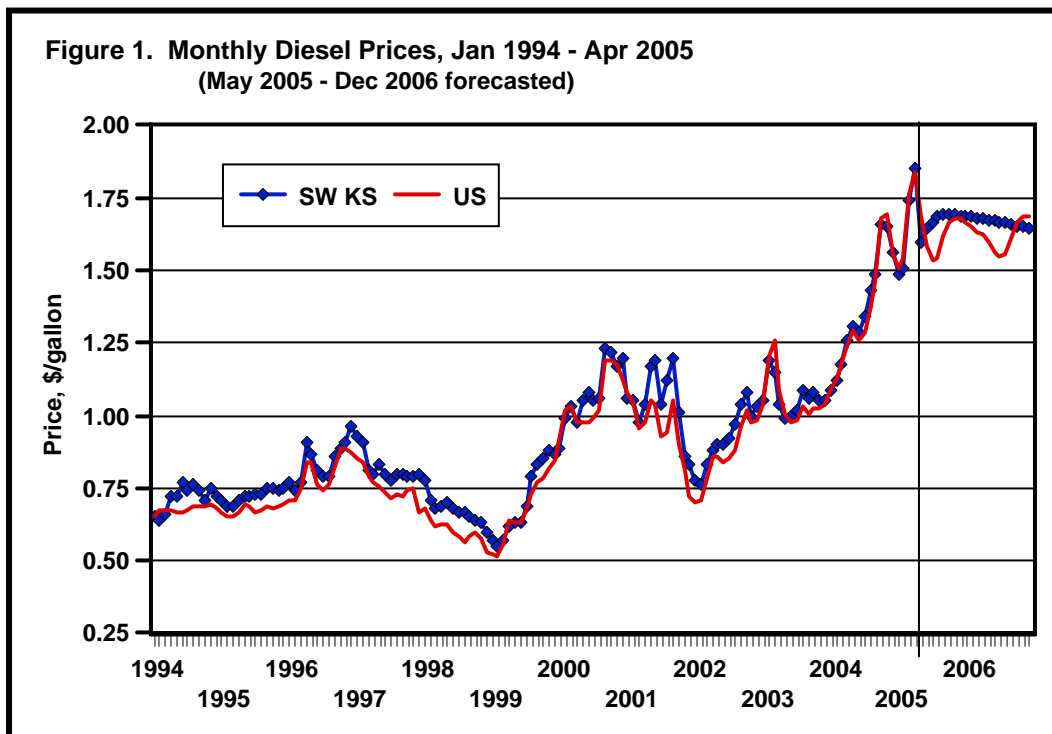


Table one shows the average diesel price from March through October (principal months producers are doing their farming operations) as well as the year-to-year percentage changes. The SW KS average price for 2005 is \$1.70 per gallon which is an increase of \$0.33 per gallon (+23.8%) from 2004, which was up \$0.32 per gallon from 2003. The US price increases based on the Energy Information Administration (EIA) series is very similar – i.e., \$0.31 per gallon or +22.9%. If the 2005 price forecasts are compared to the average prices from 2000-2003, prices are up \$0.65 per gallon (+64.8%).

¹ The southwest Kansas prices were provided by a local supplier and the forecasts are from a KSU-developed model based on the NYBT crude oil futures market closing prices on April 29, 2005. The U.S. historical prices and forecasts are from the Energy Information Administration (EIA) (<http://eia.doe.gov/>).

Table 1. Average Diesel Prices during Principal Farming Months (March to October)

Year	Mar-Oct average price			Year-to-year percent change		
	SW KS	US (EIA)	Average	SW KS	US (EIA)	Average
2000	\$1.09	\$1.04	\$1.07	-----	-----	-----
2001	\$1.09	\$0.98	\$1.04	+0.6%	-6.1%	-2.7%
2002	\$0.94	\$0.88	\$0.91	-14.1%	-10.0%	-12.1%
2003	\$1.05	\$1.05	\$1.05	+12.1%	+18.6%	+15.3%
2004	\$1.37	\$1.34	\$1.36	+30.0%	+28.4%	+29.2%
2005	\$1.70	\$1.65	\$1.67	+23.8%	+22.9%	+23.4%

Given the high diesel prices in 2005, a question many people are asking is, How will this high diesel price impact machinery and whole-farm costs? In the long run, higher production costs will lead to either higher prices for commodities or a lowering of land costs. That is, market forces will make adjustments to account for these higher costs. However, these higher costs will likely reflect a direct reduction in net income in the short run because producers are limited as to the changes they can economically make. Figure 2 shows the average fuel costs for producers that are members of the Kansas Farm Management Association (KFMA) for the years 2000 to 2004 along with the SW KS diesel price as well as 2005 forecasted values for both fuel costs and diesel prices.² The correlation between whole-farm costs and Mar-Oct diesel prices is 0.990 indicating that producers whole-farm fuel costs are almost entirely influenced by fuel prices (i.e., they don't drastically alter their fuel consumption from year to year based on the price of diesel).³ Given the strong relationship between whole-farm costs and diesel prices, the impact on farm costs can be forecasted for 2005 simply by looking at the percent change in fuel prices from 2004 to 2005. Thus, the 2005 forecasted whole-farm fuel costs of \$15,791 was calculated as \$12,758 (2004 value) x 123.8% (2005 price as percent of 2004 price).

Based on the data presented in figure 2, average producers in the KFMA can expect their fuel costs in 2005 to increase by over \$3,000 compared to what they paid in 2004. While the impact of higher fuel prices is similar for all producers in the sense that they all likely face a price increase of similar magnitude, the impact is not the same in all regions of the state on a whole-farm basis. This is because some regions of the state tend to have larger farms and/or rely upon more farming operations and thus increasing diesel prices has a larger impact on them. Table 2 shows the same information as is presented in figure 2 only the data are broken down by Farm Management region. Northwest and South Central Kansas producers show the largest increases in fuel costs relative to 2004 while the Northeast and Southeast regions show the smallest increases.

² Average fuel costs were taken from the "Annual ProfitLink Summary – Analysis and Management Information" publication from the years 2000 through 2004.

³ As a word of caution, it should be noted that this correlation is based on only five observations (2000–2004) and thus this strong relationship may not hold in the future.

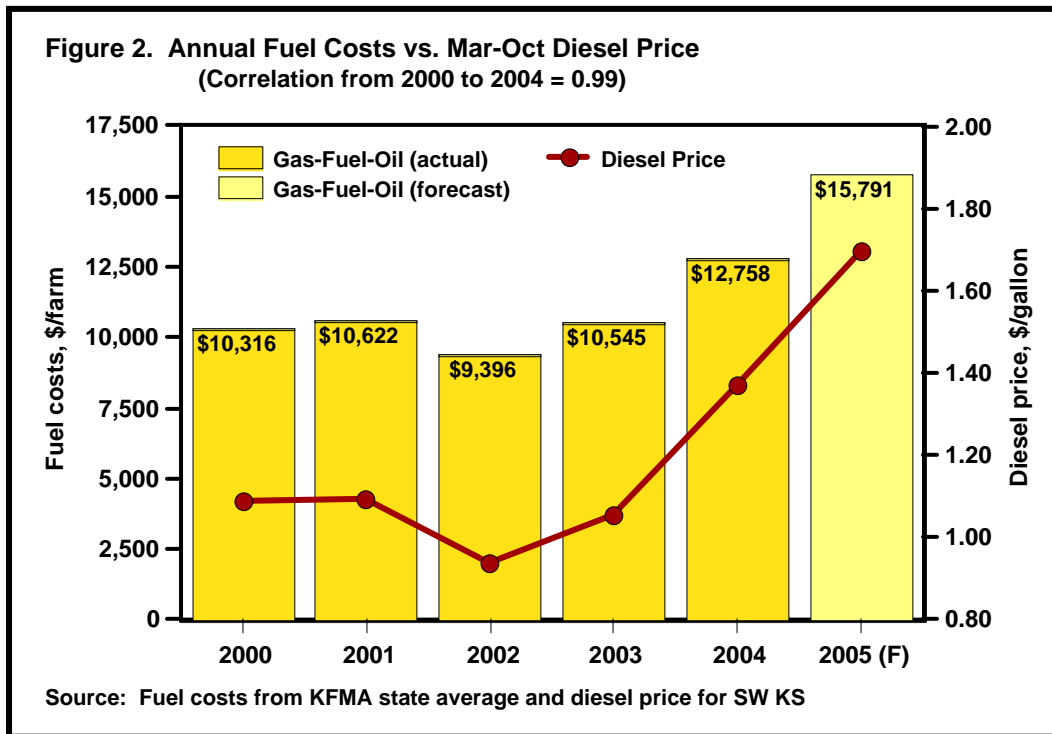


Table 2. Whole-farm Fuel Expenses from KFMA Annual *ProfitLink* Summary

Year	Farm Management Region					
	NW	SW	NC	SC	NE	SE
2000	\$13,114	\$12,791	\$9,522	\$11,373	\$8,311	\$9,246
2001	\$12,621	\$12,311	\$8,994	\$12,676	\$9,383	\$9,633
2002	\$10,664	\$10,645	\$7,817	\$11,170	\$8,082	\$8,985
2003	\$11,711	\$11,786	\$9,427	\$12,379	\$8,980	\$9,911
2004	\$15,053	\$12,812	\$11,723	\$14,660	\$11,369	\$12,117
2005 (forecast)	\$18,631	\$15,858	\$14,510	\$18,145	\$14,072	\$14,998
Increase from 2004	\$3,578	\$3,046	\$2,787	\$3,485	\$2,703	\$2,881

As previously mentioned, there is little producers that are running farm machinery can do about higher fuel prices in the short run. However, what about producers that hire somebody else to do some or all of their farming operations (e.g., custom harvesters), as opposed to doing the operations themselves? While these producers may not see their “fuel costs” increase as much, they are not immune to these higher fuel prices because custom operators likely will increase the rates they charge so as to pass this higher cost on. Thus, another question that many people are asking is, How much should custom rates increase due to the higher fuel costs? There are basically two ways this question can be answered. The first and most direct method would be to simply look at the fuel required per acre for a particular operation (i.e., the number of gallons of fuel that are consumed) and multiply that value by the increase in the price of fuel (e.g., the \$0.33 per gallon). For example, table 3 shows the fuel consumption for various field operations as reported by Lazarus and Selley

(similar fuel consumption information is also reported by Hanna) and the calculated impact increasing fuel prices has on the costs per operation (\$/acre).

Table 3. Fuel Consumption and Diesel Price Impact for Various Field Operations

Operation	Fuel use gal/acre	Fuel price increase, \$/gallon			
		\$0.30	\$0.33	\$0.35	\$0.40
		Increase in cost, \$/acre			
Chisel plow	0.64	\$0.19	\$0.21	\$0.22	\$0.26
Field cultivator	0.34	\$0.10	\$0.11	\$0.12	\$0.14
Tandem disk	0.49	\$0.15	\$0.16	\$0.17	\$0.20
Min-till planter	0.53	\$0.16	\$0.17	\$0.19	\$0.21
No-till drill	0.81	\$0.24	\$0.27	\$0.28	\$0.32
Sprayer	0.11	\$0.03	\$0.04	\$0.04	\$0.04
Swather-conditioner	0.42	\$0.13	\$0.14	\$0.15	\$0.17
Round baler	0.77	\$0.23	\$0.25	\$0.27	\$0.31
Combine--wheat	1.31	\$0.39	\$0.43	\$0.46	\$0.52
Combine--soybeans	2.02	\$0.61	\$0.67	\$0.71	\$0.81
Combine--corn	1.93	\$0.58	\$0.64	\$0.68	\$0.77

Source: Lazarus and Selley (abbreviated version)

Given the information in table 3, the increase a producer might expect to pay for custom rates is quite straight forward. For example, the \$0.33 per gallon forecasted increase in fuel prices will lead to higher costs of 17¢ acre for minimum tillage planting operations. Likewise the increased cost of harvesting wheat (combine only – i.e., does not include trucking) would be about 43¢ per acre.

The second approach to estimating how custom rates might increase due to higher fuel costs would be to multiply a historical custom rate value (i.e., what was charged last year) by the percent increase in fuel prices and by the percent fuel costs are of total costs. That is, custom rates reflect depreciation, interest, repairs, and labor in addition to fuel costs and that needs to be accounted for. Based on KFMA data from 2001, Beaton estimated fuel costs to be 11.4% of total machinery costs which becomes 13.9% when adjusted to 2004 diesel prices and holding non-fuel machinery costs the same as in 2001. Using this relationship we would expect custom rates to increase by about 3.3% (23.8% x 13.9%). Table 4 shows the custom rate charged for various operations in Kansas in 2004 and the amount we might expect them to increase in 2005 due to higher fuel prices (they could also increase for other reasons such as interest rates, labor costs, etc.). At a fuel price increase of \$0.33 per gallon, the custom rates are all increased by 3.3%. If fuel prices continue to increase then the rate increase will be something greater. A key point for producers to recognize is that even though fuel prices might be almost 25% higher than last year, the increase in the cost of machinery operations will be much lower because fuel only makes up a small percent of total machinery costs.

Table 4. Fuel Consumption and Diesel Price Impact for Various Field Operations

Operation	Custom rate	Fuel price increase, \$/gallon			
		\$0.30	\$0.33	\$0.35	\$0.40
		Increase in custom rate, \$/acre			
Chiseling	\$7.96	\$0.24	\$0.27	\$0.28	\$0.32
Field cultivation	\$6.27	\$0.19	\$0.21	\$0.22	\$0.25
Disking	\$6.84	\$0.21	\$0.23	\$0.24	\$0.28
Min-till planter	\$10.29	\$0.31	\$0.34	\$0.36	\$0.42
No-till drill	\$10.72	\$0.33	\$0.36	\$0.38	\$0.43
Sprayer	\$4.03	\$0.12	\$0.13	\$0.14	\$0.16
Swather-conditioner	\$8.90	\$0.27	\$0.30	\$0.32	\$0.36
Round baler	\$8.03	\$0.24	\$0.27	\$0.28	\$0.33
Combine--wheat	\$14.48	\$0.44	\$0.48	\$0.51	\$0.59
Combine--soybeans	\$20.06	\$0.61	\$0.67	\$0.71	\$0.81
Combine--corn	\$20.09	\$0.61	\$0.67	\$0.71	\$0.81

* 2004 state average

Source: Kansas Agricultural Statistics

Higher fuel prices will lead to higher machinery costs that agricultural producers will have to absorb in the short run whether they are doing the operations themselves or hiring somebody else. On average, the current price forecasts suggest that average producers in Kansas will have fuel costs about \$3,000 higher than last year (which were over \$2,000 higher than 2003). In the longer run, if producers anticipate fuel prices will remain high in the future, they will start making more management decisions to lower this cost (e.g., reduce tillage, purchase machinery that is more fuel efficient per unit of use, change crop rotation, etc.).

References

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