

## **Rising Energy Prices and Iowa Farmers** **By Mike Duffy and Darnel Smith, ISU Extension Economists**

Our current agricultural production system is heavily based on petroleum products. Therefore, price swings in all petroleum-based energy costs will have major impacts. ISU research shows that increases in energy prices affect variable costs of farm production to a much greater degree than total costs.

### **Record highs today?**

Sometimes we hear that even though prices are high now, they aren't record highs in real terms. Based on the readily available information, the record high was in 1981 at \$12.51 per million BTUs of gasoline. The current estimate as of March 2005, based on the American Automobile Association (AAA) numbers, is approximately \$9.50 per million BTUs. Only 1979 thru 1982 prices were higher than what we have now. These estimates are in 1982 to 1984 dollars.

As of late March 2005, according to the AAA web site and in most of the locations around Iowa, we are seeing record high gas and diesel prices, in nominal terms. There is a lot of discussion in the news regarding petroleum production. Obviously supply and demand will have a big impact on the prices.

The impact on variable costs is highly visible. The increases in fuel prices are posted and so they are seen almost daily. Based on AAA information, diesel prices in the Des Moines area have increased 37 percent at the retail level over the past year.

What does that mean for agricultural production in Iowa?

### **Impacts on Cost of Production**

Every year ISU Extension publishes bulletins on the Estimated Costs of Crop Production. One part of the methodology used to determine the estimates is a survey of dealers regarding certain costs. Table 1 shows the energy-related values used for the 2004 and 2005 estimates.

**Table 1: Energy-Related Prices Used in ISU Estimated Costs of Production**

| Item         | 2004   | 2005   | Percent Change |
|--------------|--------|--------|----------------|
| Gasoline/gal | \$1.45 | \$1.75 | 21%            |
| Diesel       | 1.10   | 1.65   | 50             |
| LP Gas       | 1.00   | 1.15   | 15             |
| Nitrogen/lb* | \$.25  | \$.30  | 20%            |
| Phosphate    | .28    | .33    | 18             |
| Potash       | .15    | .18    | 20             |

\* Nitrogen prices reflect a 50/50 mix of anhydrous and other N forms

## Possible price scenarios

With increases in these energy prices, a common question is what impact these increases have on costs of production. To estimate the impact, we used two alternative scenarios. In scenario 1, fuel prices increased 25 percent and fertilizer prices increased 15 percent. In scenario 2, fuel prices increased 50 percent and fertilizer prices increased 25 percent. These increases are above what was used in the original 2005 estimated costs.

Table 2 shows the prices used for the two scenarios. All other costs remained the same in the estimated costs.

**Table 2: Energy and Fertilizer Prices for Alternative Scenarios**

| Item:           | Scenario 1 | Percent Increase | Scenario 2 | Percent Increase |
|-----------------|------------|------------------|------------|------------------|
| Gasoline/gallon | \$2.19     | 25               | \$2.63     | 50               |
| Diesel          | 2.06       | 25               | 2.48       | 50               |
| LP Gas          | 1.44       | 25               | 1.73       | 50               |
| Nitrogen/lb     | \$ .345    | 15               | \$ .375    | 25               |
| Phosphate       | .379       | 15               | .413       | 25               |
| Potash          | .207       | 15               | .225       | 25               |

Tables 3 and 4 show the impact under Scenario 1 for both variable and fixed costs. The impacts are shown by crop and yield level. The percentage changes are the increases over the published numbers.

**Table 3: Percent Change in Variable Costs by Yield and Crop, Scenario 1**

| Crop                | Low | Yield Level |      |
|---------------------|-----|-------------|------|
|                     |     | Medium      | High |
| (Percent Increase)  |     |             |      |
| Continuous Corn     | 9.2 | 10.3        | 11.8 |
| Corn after Soybeans | 9.8 | 10.1        | 10.3 |
| Soybeans            | 5.4 | 5.7         | 5.9  |

**Table 4: Percent Change in Total Costs by Yield and Crop, Scenario 1**

| Crop                | Low | Yield Level                  | High |
|---------------------|-----|------------------------------|------|
|                     |     | Medium<br>(Percent Increase) |      |
| Continuous Corn     | 5.0 | 5.6                          | 6.5  |
| Corn after Soybeans | 5.1 | 5.1                          | 5.2  |
| Soybeans            | 2.2 | 2.2                          | 2.1  |

Notice that in Tables 3 and 4 that the percentage increase associated with the rise in costs increases as the yield level increases. This happens because of the higher fertilizer use associated with the higher yields. Machinery use is assumed to be the same regardless of the yield levels.

Tables 3 and 4, as expected, show that the increases in energy costs have substantially higher impacts on the variable costs compared to total costs.

Tables 5 and 6 present the impacts on variable and total costs under Scenario 2. Again, the energy-related prices used for the tables appear in Table 2.

**Table 5: Percent Change in Variable Costs by Yield and Crop, Scenario 2**

| Crop                | Low  | Yield Level                  | High |
|---------------------|------|------------------------------|------|
|                     |      | Medium<br>(Percent Increase) |      |
| Continuous Corn     | 16.1 | 18.1                         | 20.7 |
| Corn after Soybeans | 17.4 | 17.9                         | 18.2 |
| Soybeans            | 9.2  | 9.7                          | 10.0 |

**Table 6: Percent Change in Total Costs by Yield and Crop, Scenario 2**

| Crop                | Low | Yield Level                  | High |
|---------------------|-----|------------------------------|------|
|                     |     | Medium<br>(Percent Increase) |      |
| Continuous Corn     | 8.8 | 9.9                          | 11.3 |
| Corn after Soybeans | 9.0 | 9.1                          | 9.3  |
| Soybeans            | 3.7 | 3.7                          | 3.6  |

## **Results**

Remember, when you think about the scenarios we presented here, the 25 and 50 fuel price percent increases were based on the 2005 estimates. Those price estimates were already 21 percent higher for gas and 50 percent higher for diesel (Table 1).

- The changes under Scenario 2 follow similar patterns to those found under Scenario 1. The order of magnitude, however, is considerably greater.
- With average yields, under Scenario 1 total costs of production increased approximately 5 percent for corn and 2 percent for soybeans.
- Under Scenario 2 the increases were approximately 10 percent for corn and 4 percent for soybeans. The increases, however, have substantially greater effect on variable costs. As a result, they do impact potential profitability to a greater extent than might be supposed simply by looking at the impact on total costs.

## **What can farmers do?**

Starting now, farmers need to think more cautiously about their energy use. Mark Hanna, ISU agricultural and biosystems engineering professor, has suggested:

- making sure implements are clean,
- evaluating the necessity of each trip across the field, and
- keeping all the power units are tuned up and filters cleaned.

It is also important to evaluate carefully the fertilizer programs you use. Most of these actions are things we have always stressed, but with the higher energy costs producers will want to pay more attention to these details.

We had better get used to volatile energy prices. We believe that they will continue to be volatile on the way up, not down. In our opinion, the days of cheap oil are over, and are not likely to return.