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Corn versus Soybeans Decisions in 2008

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Economics Commentator 492 discussed in general terms some of the considerations South Dakota producers are looking forward to the 2008 crop year. As stated in that publication, higher commodity prices, the debate surrounding the passage of a new Farm bill and weather during the planting season, will still influence the final acreage planted. This newsletter examines the choice between planting acreage to corn or soybeans for the 2008 crop year.

Costs to produce different crops will vary by region of the state and producers will have to make adjustments to their production budgets to reflect the region of the state where they produce. Cost of production estimate information is available to assist South Dakota producers with their spring planting budgets and can be found on the SDSU Extension Economics web site at

<http://econ.sdstate.edu/Extension/Tools/2008%20Spring%20Crops.xls>

Templates of cost of production budgets for major spring crops are available with space provided for producers to complete the budget using their own figures based on their actual production history.

The question some producers face is whether to plant more acres to soybeans because corn acres will incur higher production costs due to high fertilizer prices. A partial budget approach can be used to answer this question. Table 1 uses a partial budget format utilizing SDSU budget information.

Table 1. Plant Soybeans Instead of Corn

Additional costs for planting 1 acre soybeans

| | |
|-----------------------------|----------|
| Direct costs per acre | |
| Seed | \$ 34.50 |
| Fertilizer | \$ 24.34 |
| Herbicide | \$ 14.23 |
| Insecticide | \$ 0.00 |
| Fungicide | \$ 0.00 |
| Crop Insurance | \$ 11.00 |
| Machinery Costs (Operating) | \$ 32.34 |
| Custom hire | \$ 0.00 |
| Drying | \$ 0.00 |
| Operating Interest | \$ 6.98 |
| Other variable costs | \$ 0.00 |
| Total direct costs | \$123.40 |

Reduced returns from 1 acre corn

| | |
|-------------------------|----------|
| Estimated Yield | 140 |
| Estimated Selling price | \$ 4.24 |
| Gross Return per acre | \$593.60 |

Total additional costs and reduced returns \$717.00

Additional returns for planting 1 acre soybeans

| | |
|-------------------------|----------|
| Estimated Yield | 40 |
| Estimated Selling price | \$ 10.45 |
| Gross Return per acre | \$418.00 |

Reduced costs from 1 acre corn

| | |
|-----------------------------|----------|
| Direct costs per acre | |
| Seed | \$ 60.00 |
| Fertilizer | \$ 96.28 |
| Herbicide | \$ 17.47 |
| Insecticide | \$ 0.00 |
| Fungicide | \$ 0.00 |
| Crop Insurance | \$ 24.00 |
| Machinery Costs (Operating) | \$ 40.23 |
| Custom hire | \$ 0.00 |
| Drying | \$ 11.00 |
| Operating Interest | \$ 14.94 |
| Other variable costs | \$ 0.00 |
| Total direct costs | \$263.92 |

Total additional returns and reduced costs \$681.92

The difference of \$ 35.08 between the *Total additional costs and reduced returns* of \$717.00 and the *Total additional returns and reduced costs* of \$681.92 would indicate that an acre of soybeans should not be substituted for an acre of corn. (For this example it is assumed that both corn and soybeans would have the same machinery ownership and land charge costs.)

However, the decision on which crops to plant will be based on many more factors than just which crop will generate the greatest dollar value of return. Several of these additional considerations were addressed in Extension Extra 5073 published in February 2007. (<http://agbiopubs.sdstate.edu/articles/ExEx5073.pdf>).

Producers are encouraged to complete their budget projections using a range of estimates (low, medium and high) for costs, prices and yields. Using a combination of scenarios will be useful to evaluate the sensitivity of projected changes to price, cost, and yield estimates. Table 2 has been developed using SDSU Extension Economics for 2008 Corn budgets looking at budget sensitivity to yield – all production costs remained the same for the different scenarios.

As illustrated in Table 2, a 15% reduction in yield would reduce gross revenue from 1 acre of corn by the budgets being considered is the reduction in

\$89.04 (\$593.60 - \$504.56). If the only change to corn yield, an acre of soybeans should then be substituted for an acre of corn since the difference between the *Total additional costs and reduced returns* and the *Total additional returns and reduced costs* obtained from planting an acre of soybeans instead of an acre of corn would favor soybeans by \$53.96.

A table can be developed to test the sensitivity of the advantage of switching an acre of corn to an acre of soybeans.

The numbers inside of parentheses in Table 3 indicate a negative value which means it would be advantageous to plant soybeans instead of corn. In this example (Table 3), soybeans are also more profitable than corn when soybean yields are 15% above average and corn yields are average to below average. Readers are again cautioned that there are many more considerations to the decision making process than just the financial considerations of soybeans versus corn. Readers are encouraged to develop similar sensitivity tables examining different price, yield, and production cost assumptions.

Table 2. SDSU 2008 Corn Budget

| SDSU 2008 CORN Budget | Average Yield | 15 % Less Yield | 15% More Yield |
|---|----------------------|------------------------|-----------------------|
| Gross return | | | |
| Estimated Yield | 140 | 119 | 161 |
| Estimated Selling price | \$4.24 | \$4.24 | \$4.24 |
| Gross Return per acre | \$593.60 | \$504.56 | \$682.64 |
| Return over direct cost per acre | \$329.68 | \$240.64 | \$418.72 |
| Total direct costs per bushel | \$1.89 | \$2.22 | \$1.64 |
| Total cost per bushel | \$2.74 | \$3.22 | \$2.38 |
| Return to management and labor per acre | \$209.83 | \$120.79 | \$298.87 |

Table 3. Advantage of Planting Corn versus Planting Soybeans (based on one acre calculations)

| | Corn Average Yield | Corn -15% Yield | Corn +15% Yield |
|-----------------------|---------------------------|------------------------|------------------------|
| Soybean Average Yield | \$ 35.08 | (\$ 53.96) | \$124.12 |
| Soybean -15% Yield | \$ 97.78 | \$ 8.74 | \$ 186.82 |
| Soybean +15% Yield | (\$ 27.62) | (\$116.66) | \$ 61.42 |

Positive Number = Advantage Corn

(Negative Number) = Advantage Soybeans

Using A Partial Budget Approach for 2008 Cropping Decisions

For many producers, the decision to plant additional acreage to corn for 2008 will not require much reorganization of time and resources. When producers are limited by a fixed set of resources, it may be possible to make use of these resources in more than one way in response to anticipated profit levels. In these situations, producers will want to use a partial budget to evaluate the economic effect of minor adjustments in some portion of the business.

Partial Budget methodology is illustrated in Figure 1 showing that any change in the operation of the farm business should achieve one or more of the following: a) Eliminate or reduce some costs, b) Eliminate or reduce some returns, c) Cause additional costs to be incurred, or d) Cause additional returns to be received.

The following example is based on substituting one acre of soybeans for one acre of corn – a reverse of the situation in Table 1, but using the same values. Values used in the analysis are from SDSU estimates for spring 2008 crop enterprise budgets

The change in net income of \$35.08 from the example above means that, given the assumption of prices and

costs used in the example, by planting one more acre of corn and one less acre of soybeans, the farmer would realize \$35.08 more income. The net effect will be the sum of positive economic effects minus the sum of negative economic effects. The example in Table 1 and Figure 1 both answer the same question and both examples are included to illustrate how a partial budget should be constructed and the results interpreted.

Decision Aid To Assist Producers

A decision aid to assist producers with partial budget comparative analysis between two crops can be found at http://econ.sdstate.edu/Extension/Tools/Partial_%20Budget_Two_Crops_Advantage.xls.

This decision aid is presented in spreadsheet format; one worksheet is provided giving the description and instructions for use and a second worksheet is provided for user's input values which also presents partial budget comparative analysis results between the two crops being analyzed. Using this spreadsheet, producers can determine under which conditions one crop may "dominate" another crop in terms of change of net income. A positive change in net income would indicate that crop 1 should be planted and that, under the specified assumptions, crop 1 would be the dominant crop.

Figure 1. Plant Corn Instead of Soybeans

Date: Spring 2008

Description of Analysis: *Plant More Crop Ground Acres to Corn*

Increases in Net Income

Increase in Income

Sell more corn

140 bu. X \$4.24 = \$593.60

Total Increase \$593.60

Decreases in Net Income

Decrease in Income

Sell less soybeans

40 bu. X \$10.45 = \$418.00

Total Decrease = \$418.00

Decrease in Cost

Plant less soybeans = \$123.40

Total Decrease = \$123.40

Increase in Cost

Plant more corn = \$263.92

Total Increase = \$263.92

Increase in Net Income = \$717.00

Decrease in Net Income = \$ 681.92

(Increase in Income plus Decrease in Cost) (Decrease in Income plus Increase in Cost)

Change in Net Income \$35.08 per acre

(Increase in Net Income minus Decrease in Net Income)

The decision aid allows users to examine a variety of expected conditions for the 2008 growing year. Users are able to conduct the partial budget analysis over a range of crop yields and prices. Users may specify the fluctuation in yield and prices for each crop being considered and be able to see the results for 81 different scenarios. The results are presented considering a triangulation of expected crop yield and prices.

For the example illustrated earlier, an estimated yield of 140 bushels per acre for corn with a "range" value of 20% results in analysis of average corn yields at 140 bushels per acre, lower corn yields of 112 bushels per acre and higher corn yields of 168 bushels per acre. An estimated price of \$4.24 per bushel for corn with a "range" value of 25% results in analysis of average corn prices at \$4.24 per bushel gives lower corn prices of \$3.18 per bushel and higher corn prices of \$5.30 per bushel. In the spread sheet the different scenarios are: (1) Average Yield, Average Price; (2) Average Yield, Lower Price; (3) Average Yield, Higher Price; (4) Lower Yield, Average Price;

(5) Lower Yield, Lower Price, (6) Lower Yield, Higher Price;(7) Higher Yield, Average Price; (8) Higher Yield, Lower Price; and (9) Higher Yield, Higher Price for each crop resulting in 81 scenarios examined.

As stated earlier, using a range of estimates for crop prices and yields will provide a combination of scenarios to evaluate the sensitivity of projected changes to price, cost, and yield estimates.

Readers are encouraged to use the decision aids highlighted in this newsletter to prepare an estimate of the financial impacts of making changes to the enterprise mix of the operation. Using these two decisions will help producers reach an informed decision on the 2008 crop enterprises to be planted.

ECONOMICS COMMENTATOR

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