

Evaluating Options for Freeze Damaged Wheat (4-25-07)

Introduction:

A severe freeze in early April left many grain producers questioning the value of their winter wheat crops. According to USDA, there were around 420,000 acres of wheat planted in Kentucky during the fall of 2006. There is speculation that more than one-half of this potential crop may have been severely damaged. Producers who have forward-contracted should contact elevators and discuss their contract options. Three main options are available for the rest of Kentucky wheat growers and some forward contractors depending on their specific situation.

Option #1 is to stay the course: Harvest the wheat this summer and double-crop soybeans. Option #2 is to kill the wheat stand and plant corn as soon as conditions permit. Finally, option #3 is to kill the wheat stand and plant full-season soybeans. The best option will depend on the extent of the damage to the wheat crop and the relative productivity potential and price levels among the various crops.

A decision aid was developed by the department of Agricultural Economics to help assess these options. A draft of this decision aid was sent to all ANR agents in mid-April. The spreadsheet-based tool examines which of these three options would likely net the highest return for the producer based on parameter values chosen by the user.

A brief discussion dealing with the parameter values used in this analysis will precede the discussion of results. Those interested are strongly encouraged to experiment with the decision aid and modify the default values based on their production records and expectations. A summary of the results is provided based on these default values and includes a sensitivity analysis for two of the most important variables involved in making this decision.

Parameter Values:

Prices: Prices for corn, soybeans, and wheat are set at \$3.50, \$7.35, and \$4.60 respectively. An important point to remember is that prices are quite volatile, and the user should check the market for price changes. A basis of $-\$0.30$, $-\$0.30$, and $-\$0.60$ was used for corn, soybeans, and wheat in conjunction with the most current CBOT® futures pricing. The wheat basis is much weaker than the long-term average, but is in line with this market in the last 12 months. The user can adjust this basis closer to the $-\$0.30$ used for corn and soybeans if so desired.

Wheat Yield Loss: Potentially, the most important thing that producers can do is objectively assess the extent of the wheat damage in terms of final yield loss. This assessment is the most critical portion of the analysis. Consult with your County Extension ANR Agent for field scouting. Images of wheat scouting and what to assess are available at the Grain Crops Extension website: <http://www.uky.edu/Ag/GrainCrops/>.

Corn after Corn Penalty: Corn planted after corn will typically have reduced yields of 5-15% over corn grown in rotation with soybeans. Most of the wheat ground in Kentucky will have been seeded into corn stubble, thus effectively making it second-year corn if planted to this crop. Although 10% may be the average yield penalty, there are some producers who feel that there will be a more substantial yield penalty this year with no-till planting operations due to the interference of the wheat residue, resulting in poor seed to soil contact. Thus this parameter is varied from 10-20% to see how the results change.

Double-Crop Soybean Penalty: Soybeans double-cropped after wheat harvest will generally experience a yield decline over full-season soybeans due to the shorter growing season. Typically, the yield penalty for soybeans averages around 20% but there is concern that the wheat harvest will be delayed by 1-2 weeks this year, resulting in a shortened growing season for the double-cropped soybeans. Thus this parameter is varied from 20-30% to see how the results change.

Corn Yield Ratios: To help determine realistic relative yields among the multiple crops on a given soil or field, yield ratios are used. Yield ratios are the average yield of a specific crop relative to the average corn yield (in rotation). For example, a corn-soybean ratio of 3.0 means that 3 bushels of corn (grown in rotation) are produced on average for each bushel of full-season soybeans on a particular field. Corn-soybean ratios in Kentucky typically range from 2.9-3.3 with the higher ratios seen on the better ground. For this analysis, a ratio of 3.1 is used on the 150 bushel corn ground and a ratio of 3.3 is used on 175 bushel corn ground. There is not as much data on corn-wheat ratios, but a ratio of 2.5 appears reasonable in most cases and is used as the default value in this analysis. As an example, using a corn-soybean ratio of 3.1 and corn-wheat ratio of 2.5 on 150 bushel corn ground would give yields of 150, 48, and 60 bushels for corn in rotation, full-season soybeans, and wheat respectively.

Net Revenue Wheat Silage: Producers have the option of harvesting the damaged wheat for silage before planting to corn or full-season soybeans. This silage may have a positive net value as feed and/or bedding. Producers should make certain that any inputs used in production of the wheat are labeled for feed use. Testing is also highly recommended to make certain that nitrate levels are safe for feed. Also, the farmer should use a ballpark figure of 1.5 to 2 tons of dry matter per acre, well below the normal values of 3 to 4 tons of dry matter per acre for wheat silage. The default value for this parameter is set at zero in the decision aid and in the following analysis.

Crop Insurance Payments: Finally, producers also need to factor in potential crop insurance payments and input this amount into the decision aid. It is important that the user not include insurance payments that affect all options equally. If payments are received regardless of what the producer does, then they do not need to be considered in the decision process. The following descriptive analysis will not account for the possibility of insurance payments because there are multiple options and possibilities. However, producers should evaluate their expected options and input potential payments into the decision aid.

Results:

The results of this analysis are summarized in Tables 1 and 2 below. These tables show the indifference point for the wheat yield loss in which staying with wheat or replanting (to either corn or full-season soybeans) will have the same net return. Yield losses below this point will favor staying with the wheat crop, while yield losses above this point will favor either planting corn or full-season soybeans. Table 1 shows the results for 150 bushel corn ground while Table 2 shows the results for 175 bushel corn ground.

An example of the cost assumptions is shown in Table 3 at the end of this document which provides a snapshot of the entire decision aid model on 150 bushel corn ground. Input costs include seed, fertilizer, and chemicals. Machinery costs are based on custom machinery rates for Kentucky. Other costs include grain drying, trucking, and operating interest. An important point is that costs incurred before the wheat freeze (sunk costs) are not considered in the analysis.

Table 1 - Wheat Loss Indifference Point (150 bu Corn Ground)			
	Corn Yield Penalty		
	10%	15%	20%
20% Soybean Yield Penalty	59%	62%	62%
25% Soybean Yield Penalty	53%	55%	55%
30% Soybean Yield Penalty	46%	49%	49%
<p><u>Note:</u> This represents the point at which net revenue is identical between wheat and the next highest net revenue crop. Percentages below this point are favorable for keeping wheat. Percentages above this point are favorable for planting corn (shaded) or soybeans (unshaded). <u>Assumptions:</u> Elevator price for wheat, corn, and soybeans of \$4.60, \$3.50, and \$7.35 a bushel. Corn/soybean yield ratio of 3.1, and a corn/wheat yield ratio of 2.5. No wheat silage value and no crop insurance revenue.</p>			

Table 2 - Wheat Loss Indifference Point (175 bu Corn Ground)			
	Corn Yield Penalty		
	10%	15%	20%
20% Soybean Yield Penalty	50%	59%	65%
25% Soybean Yield Penalty	44%	53%	59%
30% Soybean Yield Penalty	38%	47%	53%
<p><u>Note:</u> This represents the point at which net revenue is identical between wheat and the next highest net revenue crop. Percentages below this point are favorable for keeping wheat. Percentages above this point are favorable for planting corn (shaded) or soybeans (unshaded). <u>Assumptions:</u> Elevator price for wheat, corn, and soybeans of \$4.60, \$3.50, and \$7.35 a bushel. Corn/soybean yield ratio of 3.3, and a corn/wheat yield ratio of 2.5. No wheat silage value and no crop insurance revenue.</p>			

For the 150 bushel corn ground, the indifference point for wheat yield loss varies between 46-62% depending on corn-after-corn and double-crop soybeans penalties. On the 175 bushel corn ground, the indifference point varies between 38-65%. The wider range on the more productive ground occurs because the higher yields tend to amplify the changes in the corn and soybean yield penalties.

There was no clear preference between corn or full-season soybeans once above the indifference point. On 150 bushel corn ground, full-season soybeans were more profitable than corn at 15-20% corn-after-corn yield penalties while corn was more profitable than the 10% level. On 175 bushel corn ground, corn was more profitable than full-season soybeans at 10-15% corn yield penalties, while full-season soybeans were more profitable at the 20% level. Thus, the decision between replanting to corn or full-season soybeans needs to be evaluated on a site-specific basis and will change depending on the price structure between these two crops.

Conclusions:

Assuming no crop insurance and no wheat silage value it appears that wheat stand yields would have to be reduced by approximately 40% for it to be profitable to replant to corn or full-season soybeans, even under the most favorable conditions evaluated for corn or full-season soybeans. Using the mid-point values evaluated for the corn-after-corn penalty (15%) and the double-crop soybean yield penalty (25%) would require a wheat stand yield loss of over 50% for replanting to prove profitable.

Results from this publication were based on a number of assumptions for parameter estimates such as yield ratios, yield penalties, and prices. While every effort was made to ensure that these assumptions were as realistic as possible, farmers are strongly encouraged to input values based on their experience, production records, and expectation for harvest pricing.

Wheat Damage Decision Aid			
	Corn	Soybeans	Wheat
Expected Price	\$3.50	\$7.35	\$4.60
Corn Yield Ratio	-	3.1	2.5
Yield Penalty - Corn after Corn	15%		
Yield Penalty - Dbl Crop Soybeans	25%		
Expected Corn Yield (in rotation)	150		
Expected Yield 2007 Crop (replant)	128	48	
Expected Yield Dble Crop (normal)		36	60
Est. Wheat Yield Loss and Final Yield	50%		30
Net Revenue Wheat Silage	\$0		
	Corn	Soybeans	Wheat-Soybeans
Inputs:			
Seed	\$49	\$27	\$27
Nitrogen	\$32	\$0	\$0
P, K, and Lime	\$11	\$0	\$0
Herbicides	\$23	\$25	\$25
Insecticides	\$5	\$0	\$0
Fungicides	\$0	\$0	\$15
Total Inputs	\$119	\$52	\$67
Machinery Work:			
Custom Machinery	\$80	\$71	\$89
Other:			
Drying Grain	\$19	\$0	\$0
Trucking Grain	\$13	\$5	\$7
Operating Interest	\$8	\$5	\$5
Additional User Est. Costs (+/-)	\$0	\$0	\$0
Total Other	\$40	\$10	\$12
Crop Insurance Payments	\$0	\$0	\$0
Total Revenue	\$446	\$356	\$405
Total Costs	\$239	\$132	\$167
Net Revenue	\$207	\$223	\$237
Net Revenue (with wheat silage)	\$207	\$223	\$237

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