

Base Acreage and Yield Update Decision Model: Reference Guide

Todd D. Davis and Charles E. Curtis, Jr.
September 2002

The 2002 Farm Bill provides two types of decoupled payments, direct and counter-cyclical payments, as a safety net to support farm income. Direct and counter-cyclical payments are based on historical production, with the historical base acreage and program yields reflecting production from 1981-1985. The 2002 Farm Bill allows landowners to update the program acres used in calculating the direct and counter-cyclical payments.

This base acreage and yield updating decision is a multi-year decision, as the potential payments depend upon market prices each year of the Farm Bill. This spreadsheet estimates the direct and counter-cyclical payments producers would receive under their old base as well as the new base acres and alternative program yields. The landowner must decide whether to update base acreage to the 1998-2001 average or to maintain the base acreage from the 1996 Farm Bill plus adding oilseed acreage. If the base acreage is updated, the landowner has the option of updating the program yield. This decision can only be made in a limited time frame; therefore it is important that all alternatives are considered to obtain the largest direct and counter-cyclical payments.

Direct Payments

Direct payments are similar to the production flexibility contract payments received under the 1996 Farm Bill. However, the payment rates do not change from year-to-year. The direct payment is calculated as:

$$\text{Direct Payment} = \text{Base Acres} \times \text{Program Yield} \times 85\% \times \text{Direct Payment Rate}$$

Example 1: A farm has 100 acres of cotton base with a program yield of 650 lbs/acre. The direct payment rate for cotton is \$0.0667 per lb (Table 1). The direct payment for cotton is calculated as:

$$\text{Direct Payment} = 100 \times 650 \times 85\% \times \$0.0667 = \$3,685.18$$

Table 1. Direct Payment Rates by Covered Commodity.

	Direct Payment Rates
Corn (\$/bu.)	\$0.28
Soybeans (\$/bu.)	\$0.44
Wheat (\$/bu.)	\$0.52
Cotton (\$/lb.)	\$0.0667
Peanuts (\$/lb.)	\$0.018
Oats (\$/bu.)	\$0.024
Barley (\$/bu.)	\$0.24
Grain Sorghum (\$/bu.)	\$0.35
Canola (\$/cwt.)	\$0.80

Counter-Cyclical Payments

The counter-cyclical payment depends upon the relationship of the U.S. Marketing Year Average price, for a given commodity, relative to the Target Price for that commodity. When the effective U.S price is below the target price, a counter-cyclical payment is made. The effective price is the larger of the U.S. Marketing Year Average price or the U.S. loan rate plus the direct payment rate. The counter-cyclical payment is calculated as:

$$\text{Counter-Cyclical Payment} = \text{Base Acres} \times \text{Program Yield} \times 85\% \times \text{CCP Rate}$$

$$\text{CCP Rate} = \text{Max} (0, \text{Target Price} - \text{Effective Price})$$

$$\text{Effective Price} = \text{Max} (\text{U.S. MYA Price}, \text{Loan Rate}) + \text{Direct Payment Rate}$$

The target prices and loan rates are listed in Table 2. The target prices tend to increase in years 2004-2007 while the loan rates tend to decrease in years 2004-2007. The combinations of changing target prices, loan rates, and price volatility creates uncertainty on the amount of counter-cyclical payments received in any given year.

Table 2. Target Prices and Loan Rates by Commodity for 2002-2007.

	Target Prices		Loan Rates	
	2002-2003	2004-2007	2002-2003	2004-2007
Corn (\$/bu.)	\$2.60	\$2.63	\$1.98	\$1.95
Soybeans (\$/bu.)	5.80	5.80	5.00	5.00
Wheat (\$/bu.)	3.86	3.92	2.80	2.75
Cotton (\$/lb.)	0.724	0.724	0.52	0.52
Peanuts (\$/lb.)	0.2475	0.2475	0.1775	0.1775
Oats (\$/bu.)	1.40	1.44	1.35	1.33
Barley (\$/bu.)	2.21	2.24	1.88	1.85
Grain Sorghum (\$/bu.)	2.54	2.57	1.98	1.95
Canola (\$/cwt.)	9.80	10.10	9.60	9.30

When the marketing year average price is near the target price, the counter-cyclical payment will be small or nonexistent. Conversely, when the marketing year average price is below the loan rate, the maximum counter-cyclical payment is made. Consider a couple of examples.

Example 2: A farm has 100 acres of corn base with an 80 bushel per acre program yield. The U.S. MYA price is \$2.40 per bushel.

$$\text{Effective Price} = \text{Max} (\$2.40, \$1.98) + \$0.28 = \$2.40 + \$0.28 = \$2.68$$

$$\text{CCP Rate} = \text{Max} (0, \$2.60 - \$2.68) = \$0.00$$

$$\text{Counter-Cyclical Payment} = \$0.00$$

As illustrated by Example 2, there is a chance that no counter-cyclical payment will be made. Conversely, when the marketing year average price is below the loan rate, the maximum counter-cyclical payment will be made (illustrated in Example 3).

Example 3: Using the same program acres and yields as in Example 2, assume that the U.S. MYA price is \$1.89 per bushel.

$$\text{Effective Price} = \text{Max} (\$1.89, \$1.98) + \$0.28 = \$1.98 + \$0.28 = \$2.26$$

$$\text{CCP Rate} = \$2.60 - \$2.26 = \$0.34$$

$$\text{Counter-Cyclical Payment} = 100 \times 80 \times 85\% \times \$0.34 = \$2,312$$

Base Acreage and Program Yield Decision Spreadsheet

The base acreage and yield update decision spreadsheet is composed of four separate worksheets. The title worksheet is for reference and indicates whom you should contact for help in answering any questions associated with operating this decision aid.

Input Form

The input page has four sections. The top section identifies the name of the landowner (cell B4) and a description of the farm being analyzed (cell B5). The number of entities is entered in cell B6 and is used in determining the direct and counter-cyclical payment limits. The payment limitations are increased by 150% if a spouse is involved while the limits are doubled if the three-entity rule is used. The number of tillable acres, excluding land in CRP or WRP, is entered in cell B7.

	A	B	C	D	E	F	G	H	I
4	Name								
5	Farm Name								
6	# of Entities	1=1 Entity, 2= Producer and Spouse, 3= Three-Entities							
7	# of Tillable Acres								

Base acreage information is entered into cells B11-B19 for the old base (1996 Farm Bill) and in cells C11-C119 for the new base (1998-2001 average). The total base acreage for the old base and new base are listed in cells B20 and C20, respectively. **Note: You can only exceed the number of tillable acres by the amount of double-cropping.** A message will appear if the total base acreage is greater than the number of tillable acres. Data for this section of the input form are obtained from the County FSA office. Use the 1998-2001 average peanut acreage for the old base.

	A	B	C
10		Old Base	1998-2001
11	Corn		
12	Soybeans		
13	Wheat		
14	Cotton		
15	Peanuts		
16	Oats		
17	Barley		
18	Grain Sorghum		
19	Canola		

The program yields are entered into cells B25-B33 for the old program and into cells C25-C33 for the new program yield (1998-2001 average yields). The spreadsheet automatically calculates the program yield for the 70% of the yield increase option and for the 93.5% of the new yield option. The data for this section are obtained from the County FSA Office. **Note: An old program yield must be entered to calculate direct payments for a crop enterprise.** Use the 1998-2001 average peanut yield for both the old program yield.

A	B	C
	Old Yield	1998-2001
Corn (bu)		
Soybeans (bu)		
Wheat (bu)		
Cotton (lbs)		
Peanuts (lbs)		
Oats (bu)		
Barley (bu)		
Grain Sorghum (bu)		
Canola (cwt)		

The next section of the input spreadsheet (Cells B40-J49) lists the U.S. Marketing Year Average (MYA) prices, by commodity, from 1991-2000. Prices from this time period are especially relevant in forming price expectations for the next six years, as these prices reflect the use of marketing loans that were not available in earlier years. At the bottom of the table are three price expectations – pessimistic, expected, and optimistic. The expected price is the average price over the 10-year period. The pessimistic price is the expected price minus one standard deviation while the optimistic price is the expected price plus one standard deviation. By varying price expectations, the effect of different price levels on counter-cyclical payments can be determined. For instance, pessimistic prices will generate larger counter-cyclical payments than expected or optimistic prices. The prices used in the analysis are entered into cells B59-J59. Decision makers can also enter their own price expectations in cells B59-J59.

	A	B	C	D	E	F	G	H	I	J
57		Corn	Soybeans	Wheat	Cotton	Peanuts	Oats	Barley	Grain Sorghum	Canola
58		\$/bu	\$/bu	\$/bu	\$/lb	\$/lb	\$/bu	\$/bu	\$/bu	\$/cwt
59	U.S. MYA Price									

Summary Page

The farmer's name and farm description is listed at the top of the summary page (cells B1 and B2, respectively).

	A	B
1	Name	
2	Farm Description	

The total direct payments for the old base and new base are reported in cells B6 and B7, respectively. If the total direct payment exceeds the payment limit, a message will indicate that the direct payment limit has been reached.

	A	B	C
4	Direct Payments under Old and New Base		
5		Total Direct Payments	
6	Old Base		
7	New Base		

The spreadsheet calculates the total direct and counter-cyclical payments for 100 different marketing year average prices for each year of the Farm Bill. There are four possible base acreage and program yield combinations. **Old Base – Old Yield** is the option where the base acreage and program yields are not updated (but soybeans is added as a covered crop). **New Base – Old Yield** is the option where the new base acreage is chosen with the old program yields. **New Base – 70% Yield increase** is the option where the new base acreage is chosen and the program yield is calculated as the old yield plus 70% of the increase in program yields. **New Base – 93.5% Avg. Yield** is the option where the new program yield is calculated as 93.5% of the 1998-2001 average.

The average projected counter-cyclical payment for each year is listed in cells B11-G14. The average over the life of the Farm Bill and the maximum counter-cyclical payments are listed in cells I11-I14 and J11-J14, respectively. The counter-cyclical payment limits are included in the calculation.

	A	B	C	D	E	F	G	H	I	J	
9	Average Projected Total Counter-Cyclical Payments									Six-Year	
10		2002	2003	2004	2005	2006	2007		Avg.	Max.	
11	Old Base - Old Yield										
12	New Base - Old Yield										
13	New Base - 70% Yield Increase										
14	New Base - 93.5% Avg. Yield										

Similarly, the average total direct and counter-cyclical payments for each year are listed in cells B19-G22. Again, the average and maximum total payments over the life of the farm bill are listed in cells I19-I22 and J19-J22, respectively.

	A	B	C	D	E	F	G	H	I	J	
17	Average Projected Total Direct and Counter-Cyclical Payments									Six-Year	
18		2002	2003	2004	2005	2006	2007		Avg.	Max.	
19	Old Base - Old Yield										
20	New Base - Old Yield										
21	New Base - 70% Yield Increase										
22	New Base - 93.5% Avg. Yield										

The next section of the summary spreadsheet lists the direct and counter-cyclical payments on a per acre basis for each crop enterprise. This section lists the minimum, average, and maximum per acre total direct and counter-cyclical payments. The total base acreage for the farm cannot exceed the amount of tillable acres except for double-cropped acreage. Therefore, the owner may have to reduce the base of a less profitable crop in order to maximize the total direct and counter-cyclical payments. This section of the spreadsheet can be used to determine which acreage of base to reduce. Enter the number, in cell B26, representing the base acreage/program yield that is being analyzed. For example, 1 represents the old base-old yield while 2 represents the new base-old program yield alternative.

	A	B	C	D	E	F	G	H	I	J
25	Direct and Counter-Cyclical Payments (CCP) by Crop (\$/Acre)									
26	CCP Yield		1=Old Base -Old Yield, 2=New Base-Old Yield,							
27			3=New Base - 70% Yield Increase, 4=New Base - 93.5% of Avg. Yield							
28		Corn	Soybeans	Wheat	Cotton	Peanuts	Oats	Barley	Sorghum	Canola
29	Direct Payments									
30	Minimum CCP									
31	Average CCP									
32	Maximum CCP									
33										
34	Direct + Minimum CCP									
35	Direct + Average CCP									
36	Direct + Maximum CCP									

The next section reports the probability of obtaining the largest total direct and counter-cyclical payment for each year for each base acreage/yield option. The purpose of this section is to help decision-makers gauge the confidence that their decision captures the largest direct and counter-cyclical payments in each year.

	A	B	C	D	E	F	G
41	Probability of Obtaining the Largest Direct and Counter-Cyclical Payments						
42		2002	2003	2004	2005	2006	2007
43	Old Base - Old Yield						
44	New Base - Old Yield						
45	New Base - 70% Yield Increase						
46	New Base - 93.5% Avg. Yield						

The last section of the summary spreadsheet reports the probability of exceeding the counter-cyclical payment limits for covered crops excluding peanuts and for peanuts. Enter the number, in cell B52, indicating the base acreage/program yield to be analyzed.

	A	B	C	D	E	F	G	H	I	J
49	Probability of Exceeding Counter-Cyclical Payment Limits									
50	Option		1=Old Base -Old Yield, 2=New Base-Old Yield,							
51			3=New Base - 70% Yield Increase, 4=New Base - 93.5% of Avg. Yield							
52										
53		2002	2003	2004	2005	2006	2007			
54	Covered Crops excluding Peanuts									
55	Peanuts									

Graph

The figure included on the graph spreadsheet reports the average total direct and counter-cyclical payments for three different price expectations. The minimum CCP option assumes that prices are above the target price level for the life of the Farm Bill and no counter-cyclical payments are made. Thus, only direct payments are received under this price assumption. Alternatively, the maximum CCP option assumes that the marketing year average price is below the loan rate and the maximum CCP is paid over the life of the Farm Bill. The six-year average reports the average direct and counter-cyclical payments using the prices entered on the input page. If pessimistic prices were used, then the six-year average would be similar to the maximum CCP option. If optimistic prices were used, then the six-year average would be similar to the minimum CCP option. Expected prices would be somewhere in between the minimum and maximum CCP options.