



**AgEcon** SEARCH  
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

*The World's Largest Open Access Agricultural & Applied Economics Digital Library*

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

Give to AgEcon Search

AgEcon Search  
<http://ageconsearch.umn.edu>  
[aesearch@umn.edu](mailto:aesearch@umn.edu)

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

KY

207-10-217

WITHDRAWN

GIANNINI FOUNDATION OF  
AGRICULTURAL ECONOMICS  
LIBRARY

JUN 26 1989

Staff Paper 219

February 1987

**An Analysis of Participation Options  
in the Feed-Grain and Wheat  
Government Programs**

**Jill M. Wade  
Steven K. Riggins**

**Department of Agricultural Economics  
University of Kentucky**

AN ANALYSIS OF PARTICIPATION OPTIONS IN THE FEED-GRAIN AND WHEAT  
GOVERNMENT PROGRAMS

by

Jill M. Wade and Steven K. Riggins

The options available under the 1987 Feed Grain and Wheat Government Programs are similar to last year's with some revisions. Target prices remain fixed at \$3.03 for Corn and \$4.38 for Wheat. Effective loan rates fell only slightly, from \$1.84 for Corn to \$1.82 and from \$2.30 for Wheat to \$2.28, assuming there are no Gramm-Rudman-Hollings cuts in the 1987-1988 rate.

The major differences in this year's program include the following:

1. The mandatory Acreage Conservation Reserve (ACR) for wheat has been increased from 22.5% of base to 27.5% of base. The mandatory ACR for corn has been raised from 17.5% to 20% of base acreage.
2. The Paid Land Diversion (PLD) provisions of both the corn and wheat programs have also been changed. Last year, farmers participating in the wheat program received \$1.10 per program bushel on 2.5% of their base. Corn producers received \$0.73 per program bushel on 2.5% of corn base. There will not be any paid land diversion for wheat producers this year. The opportunity to set aside an additional 10% of the wheat base in order to receive payment at the rate of \$2 per program bushel has NOT been extended into the 1987-88 crop year and the 2.5% minimum PLD has been dropped.

---

The Authors are Extension Associate and Associate Extension Professor, respectively at the University of Kentucky

3. There WILL be an optional 15% set aside for Corn growers this year. Setting aside an additional 15% of corn base will qualify farmers for payment at the rate of \$2 per program bushel on those acres. The entire land diversion payment is subject to the \$50,000 payment limitation.

#### PARTICIPATION IN THE FEED GRAINS PROGRAM

There are five options available for farmers planning to produce corn this year.

1. Do not participate in the government program for feed-grains. This option, of course requires no set-aside and no government restrictions. It also provides no price protection. Given the probability that corn prices will remain well below the target price for the 1987-88 crop year, this will not be an attractive option for most producers.

2. Participate at the 80-20 level. The producer need set aside only 20% of his base acres and will be eligible for loan protection and deficiency payments.

3. Participate at the 80-20 level **and** set aside an additional 15% in the paid land diversion. Again, the producer is eligible for price and income protection but on fewer acres - only 65% of the total base will be planted. The advantage to this option is that the producer will receive \$2 per program bushel on 15% of the base without incurring any production costs and with no price risk on that 15%.

4. Participate at the 50-92 level. Under this option, the producer may elect to set aside up to 50% of the remaining eligible base and will receive deficiency payments on 92% of those acres. In

order to take full advantage of this option, the minimum 50% of remaining acres would be planted.

5. Participate at the 50-92 level and set aside 15% in the paid land diversion. Again, 15% of the base would receive a guaranteed price of \$2 on the program yield and deficiency payments would be received "as if" 92% of the remaining eligible base had been planted. Table 1 illustrates how a corn producer with 100 acres of corn base would be affected by each of the above options.

#### PARTICIPATION IN THE WHEAT PROGRAM

Because there is no longer a paid land diversion in the wheat program, there will be only three options for the wheat producer this year. They are:

1. Do not participate in the government program for wheat. The disadvantage to this option is the same as for nonparticipation in the feed grains program. Prices are not likely to rise above the target price for wheat and most producers will want to be eligible to receive loans and deficiency payments.
2. Participate at the 72.5-27.5 level. By setting aside 27.5% of the wheat base, producers will be eligible to receive price and income protection.
3. Participate at the 50-92 level. As with corn, wheat producers may devote up to 50% of the remaining base to a conservation use and receive deficiency payments "as if" 92% of the remaining eligible base were planted.

Table 2 illustrates the options available to a producer with 100 acres of wheat base.

Table 1 -- 1987-88 Feed-Grain Options on 100 Acres of Corn Base

OPTION	ACR	PAID LAND DIVERSION	ADDITIONAL CUA	PLANTED	ELIGIBLE FOR:
-----acres-----					
NP	0	0	0	100	No gov't payments
80-20	20	0	0	80	Deficiency payments and loan rate on 80 acres
80-20 +15%	20	15	0	65	Deficiency payments and loan rate on 65 acres + \$2 per program bu. x 15 acres
50-92	20	0	40 <sup>1</sup>	40	Deficiency payments on 73.6 acres. Loan rate on 40 acres
50-92	20	15	32.5 <sup>1</sup>	32.5	Deficiency payments on 59.8 acres, loan rate on 32.5 acres + \$2 per program bu. x 15 acres

<sup>1</sup>This table assumes the producer puts the maximum acres in the additional set aside.

Table 2 -- 1987-88 Wheat Program Options on 100 acres of Wheat Base

OPTION	ACR	ADDITIONAL CUA	PLANTED	ELIGIBLE FOR:
NP	0	0	100	No government payments
72.5-27.5	27.5	0	72.5	Deficiency payments and loan rate on 72.5 acres
50-92	27.5	36.25 <sup>1</sup>	36.25	Deficiency payments on 66.7 acres. Loan rate on 36.25 acres.

<sup>1</sup>This table assumes the producer puts the maximum acres in the additional set aside.

## ANALYSIS OF OPTIONS

Given the many options available, it is important for producers to assess the options and the impact of each upon the farm's income earning potential. A fairly simple method of analysis is partial budgeting. Only those factors that will be affected by the decision to participate, or at what level to participate, are included in the partial budget. A producer need only compare total cash receipts from all sources minus total variable cash production expenses for each alternative level of participation. This modified contribution to overhead (CTO) method allows rapid consideration of several "what if" questions. Since only variable cash production expenses are considered, the net cash remaining, referred to as CTO, is actually a return to operator labor and management, and all capital assets. Thus CTO can also be thought of as the cash left over to pay property taxes, insurance, family living expenses and debt service on land, buildings and machinery. Remember, it is the CTO that should be maximized when deciding at what level to participate, NOT the total level of government payments.

## RESULTS OF ANALYSIS

The following analysis looks at a sample farm to determine the general impact of certain factors upon the optimum level of participation. While this is useful in drawing some general conclusions about the wheat and feed grains program, each farm operation is unique and needs to analyze the options independently. Worksheets are provided at the end of this publication to do that.

## CORN

Table 3 looks at the effect of a change in the price of corn upon the sample farm. It assumes an expected yield of 100 bushels, an ASCS program yield of 90 bushels, and a variable cost on planted acres of \$150. Clearly, the CTO per acre of corn base is lowest for the nonparticipation option at price levels likely to exist for the 1987 crop year. It does not outperform the other alternatives until the price reaches \$2.80.

The 80-20 option, with the additional 15% paid land diversion, returns the highest CTO for all price levels below \$2.80. The 80-20 option without the 15% diversion is not considerably below this, however, the risk of that option is higher. There are both production costs and risk on 15% more acres under the 80-20 option without the 15% diversion.

Notice the CTO on both 50-92 options increases as the price falls from \$2.80 to \$1.82 and then decreases from \$1.82 to \$1.50. This is because the value of deficiency payments is a large part of the CTO in these cases. As the price falls to the loan rate, the magnitude of the deficiency payments increases. Once the price reaches the loan rate, deficiency payments do not increase further and the low price on fewer bushels of corn reduce the CTO under these two options.

Table 4 looks at the impact of variable costs of production on the optimum level of participation. here, the price is assumed to be \$1.75. Again, the CTO from nonparticipation is the lowest of all alternatives. For variable costs of production ranging from \$120 to \$170 per acre, the 80-20 option with the 15% optional diversion is the best option. If the variable cost of production is very low (and expected yield remains at 100 bushels/acre), the CTO for the 80-20



Table 3: CTO per acre of Corn Base for alternative levels of participation at varying price levels<sup>1</sup>

Corn Price	--15% Diversion--				
	NP	80-20	50-92	80-20	50-92
2.80	130	122	74	120	61
2.70	120	122	76	119	63
2.60	110	121	78	119	66
2.50	100	120	80	118	69
2.40	90	120	83	117	71
2.30	80	119	85	116	74
2.20	70	118	87	116	77
2.10	60	118	89	115	79
2.00	50	117	91	114	82
1.90	40	116	93	113	84
1.82	32	116	95	112	87
1.80	30	115	94	111	86
1.70	20	108	91	103	82
1.60	10	102	88	95	78
1.50	0	95	85	87	74

<sup>1</sup>Expected yield = 100

Program yield = 90

Variable cost on planted acres = \$150/acre

Mowing cost on mandatory set-aside = \$2/acre

Establishment cost on optional set-aside = \$15/acre

Table 4: CTO at different variable cost of production levels<sup>1</sup>

Variable Cost	NP	--15% Diversion--			
		80-20	50-92	80-20	50-92
110	65	137.39	105.72	138.72	99.75
120	55	130.89	102.47	130.72	95.75
130	45	124.39	99.22	122.72	91.75
140	35	117.89	95.97	114.72	87.75
150	25	111.39	92.72	106.72	83.75
160	15	104.89	89.47	98.72	79.95
170	5	98.39	86.22	90.72	72.25

<sup>1</sup>Expected yield = 100  
 Program yield = 90  
 Price = \$1.75/bu.  
 Mowing cost = \$2/acre  
 Estab. cost = \$15/acre

Table 5: CTO per acre of corn base at varying levels of program yield<sup>1</sup>

Program Yield	NP	--15% Diversion--			
		80-20	50-92	80-20	50-92
120	60	166.73	134.80	163.76	124.47
110	60	155.87	124.57	154.08	115.56
100	60	145.00	114.33	144.40	106.66
90	60	134.14	104.10	134.72	97.75
80	60	123.27	93.86	125.04	88.84
70	60	112.41	83.63	115.36	79.94

<sup>1</sup>Expected yield = 120  
 Price = \$1.75/bu.  
 Variable production cost = \$150/acre  
 Mowing cost = \$2  
 Estab. cost = \$15

option without the 15% diversion becomes slightly higher because actual production on those acres can return more than the \$2 per program bushel payment returns. However, the difference (\$1.33/acre) probably does not justify the assumption of more risk.

Neither of the 50-92 options yields a higher, or even reasonably close, CTO than the 80-20 options.

Table 5 considers the case where program yield differs substantially from actual expected yield. This may be the case for farmers that have not been participating in the program and have not updated their yields with the ASCS. For this table, the expected yield is 120 bushels/acre. The 80-20 options are clearly superior, once again, to either nonparticipation or the 50-92 options. The 80-20 option with the 15% paid land diversion is the best option for program yields ranging from 120 to 100. The 80-20 option without the paid land diversion becomes only slightly higher (\$0.58/acre) when program yield falls to 90 bushels. In this case, therefore, the 80-20 option with the paid land diversion is the best option even when program yields are almost 30 bushels lower than actual yield. For differences much higher than that, it would pay to consider NOT taking part in the paid land diversion.

The final table for corn, TABLE 6 looks at the impact of the number of base acres upon the CTO for alternative levels of participation. When a producer begins to be affected by the \$50,000 payment limitation, levels of participation which do not include the 15% paid land diversion return a higher CTO. At 800 base acres, this producer's payments are limited. Since the entire diversion payment is subject to this limit, options which include that payment reach the limit first. Therefore, producers that are likely to hit the payment

limitation will find that the 80-20 option without the 15% diversion may be their most profitable option.

In general, across a wide range of conditions, the 80-20 option with the 15% paid land diversion will be preferred for those producers NOT subject or just barely subject to the payment limitation. Producers who do expect to hit the payment limitation may well receive the highest CTO by participating at the 80-20 level. The 50-92 options did not return an attractive CTO on this sample farm.

#### WHEAT

Analysis of the results for different levels of program participation yielded results similar to those for corn - without any optional land diversion. The sample wheat producer has 100 acres of wheat base with an expected yield of 40 bushels/acre, a program yield of 35 bushels/acre, double-crop soybean yields of 30 bushels/acre, a soybean price of \$4.60, and a variable cost of production on wheat/bean acres of \$150.

Table 7 shows the effect of varying prices on the CTO for different levels of participation. Neither the 50-92 option nor the nonparticipation option appear to be viable alternatives in this situation. The CTO for these is considerably below that for the 72.5-27.5 option.

Table 8 assumes a fixed price for wheat of \$2.30 and shows the effect of increasing the variable costs of production on wheat/soybean acres. At the lowest cost of \$110 to the high cost listed of \$170, the "basic" participation option - 72.5-27.5 is the best choice.

Finally, Table 9 shows the effect of a difference between actual expected yield and program yield. Even when the producer reasonably

Table 6: CTO per acre of corn base at different levels of total base<sup>1</sup>

Total Base	NP	--15% Diversion--			
		80-20	50-92	80-20	50-92
500	25	111.39	92.72	106.72	83.75
600	25	111.39	92.72	106.72	83.75
700	25	111.39	92.72	106.72	83.75
800	25	103.01	87.86	106.72	83.75
900	25	96.07	80.91	106.72	83.75
1000	25	90.51	75.36	102.72	83.75

<sup>1</sup>Expected yield = 100  
 Program yield = 90  
 Price = \$1.75  
 Variable cost = \$150  
 Mowing = \$2  
 Estab. = \$15

Table 7: CTO per acre of wheat base at varying price levels<sup>1</sup>

\$/bu.	NP	72.5-27.5	50-92
2.10	72	104.94	69.14
2.20	76	107.84	70.59
2.30	80	110.23	71.57
2.40	84	110.59	70.69
2.50	88	110.96	69.80
2.60	92	111.32	68.92
2.70	96	111.68	68.03
2.80	100	112.04	67.15
2.90	104	112.41	66.26
3.00	108	112.77	65.35

<sup>1</sup>Expected yield = 40; program yield = 35; V.C. on wheat/soy acres = \$150 soybean yield = 30; s.price = \$4.60; mowing = \$2; estab. = \$15

Table 8: CTO per acre of wheat base at different levels of variable cost

Variable Cost	NP	72.5-27.5	50-92
110	120	139.23	86.07
120	110	131.98	82.45
130	100	124.73	78.82
140	90	117.48	75.20
150	80	110.23	71.57
160	70	102.98	67.95
170	60	95.73	64.32

Table 9: CTO per acre of wheat base at varying levels of program yield

Program Yield	NP	72.5-27.5	50-92
40	80	117.77	78.51
35	80	110.23	71.57
30	80	102.69	64.63
25	80	95.15	57.70
20	80	87.61	50.76

expects a 40 bushels/acre yield and has a program yield 20 bushels lower - at 20 bushels/acre, the "basic" participation option returns the highest CTO.

For a large range of conditions, wheat producers will maximize their CTO by setting aside the minimum amount of wheat acres-27.5%.

#### SUMMARY

While each producer faces a unique set of conditions and needs to analyze all available options for their own operation, this analysis does yield some general conclusions. The results of this analysis show that most corn producers who do not expect to be affected by the \$50,000 limitation and who have a program yield, no more than 25-35 bushels below their actual expected yield will maximize their returns by participating in the feed grains program at the 80-20 level WITH the optional paid land diversion. Producers who do expect the \$50,000 payment limitation to affect them will probably be better off with the 80-20 option and NO participation in the optional land diversion. However, this will depend heavily on to what degree the producer is impacted by the \$50,000 payment limitation; the larger the farm base, the greater chances are that the 80-20 option without the 15% diversion, will be the superior option. Wheat producers will generally be best off by participating in the "basic" wheat program, setting aside 27.5% of their base acres.

EVALUATING PARTICIPATION IN THE 1987 FEED GRAINS PROGRAM

1. The Corn Program Worksheet allows five options:

No participation in the 1987 Corn Program.

80-20: Set aside the mandatory 20% of Corn base.

80-20 + 15%: Set aside the mandatory 20% of Corn base plus enter an additional 15% into the Paid Land Diversion.

50-92: Set aside the mandatory 20% of Corn base, enter 15% into the paid land diversion, and plant at least 50% of the remaining base to receive 92% of the deficiency payments.

\* Note: The worksheet assumes that corn will not rise above the loan rate of \$2.28. If you think that prices may rise above that level, substitute (\$3.03 - Expected U.S. Corn Price) for \$1.21 on lines E3 and E4.

2. The Wheat Program Worksheet allows three options:

No participation in the 1987 Wheat program.

72.5-27.5: Set aside the mandatory 27.5% of Wheat base.

50-92: Set aside the mandatory 27.5% of wheat base and plant at least 50% of the remaining base to receive 92% of the deficiency payments.

\* Note: The worksheet assumes that Wheat prices will not rise above the loan rate of \$2.85. If you think that prices may rise above that level, substitute (\$4.38 - Expected U.S. Wheat Price) for \$2.10 on lines E2 and E3.



1987 CORN PROGRAM WORKSHEET

	NP	80-20	80-20 + 15%	50-92	50-92 + 15%
<b>A. Planted Acres</b>					
1. Total Corn Base	_____	_____	_____	_____	_____
2. Mandatory Set Aside (.20 x A1)	xxxxxx	_____	_____	_____	_____
3. Optional Set Aside (.15 x A1)	xxxxxx	xxxxxx	_____	xxxxxx	_____
4. Additional CUA Acres (A1 - A2 - A3) x 0.50	xxxxxx	xxxxxx	xxxxxx	_____	_____
5. Planted Acres (A1 - A2 - A3 - A4)	_____	_____	_____	_____	_____
<b>B. Crop Returns</b>					
1. Expected Market Price	_____	_____	_____	_____	_____
2. Expected Corn Yield	_____	_____	_____	_____	_____
3. Total Returns (A5 x B1 x B2)	_____	_____	_____	_____	_____
<b>C. Variable Cash Costs</b>					
1. Variable Cost on Corn Acres (\$___/acre x A5)	_____	_____	_____	_____	_____
2. Variable Cost on Mandatory Set Aside (\$___/acre x A2)	xxxxxx	_____	_____	_____	_____
3. Variable Cost on Optional and/or CUA Acres (\$___/acre x (A3 + A4))	xxxxxx	xxxxxx	_____	_____	_____
4. Total Cash Costs (C1 + C2 + C3)	_____	_____	_____	_____	_____
<b>D. Crop Returns</b>					
1. Returns Above Cash Costs (B3 - C4)	_____	_____	_____	_____	_____
<b>E. Government Payments</b>					
1. ASCS Program Yield	xxxxxx	_____	_____	_____	_____
2. Diversion Payment (A3 x E1 x \$2.00)	xxxxxx	xxxxxx	_____	xxxxxx	_____
3. Deficiency Payment (80-20 option) (A5 x E1 x \$1.21)	xxxxxx	_____	_____	xxxxxx	xxxxxx
4. Deficiency Payment (50-92 option) (A1 - A2 - A3) x 0.92 x E1 x \$1.21)	xxxxxx	xxxxxx	xxxxxx	_____	_____
5. Total Government Payments (E2 + E3 + E4)	xxxxxx	_____	_____	_____	_____
<b>F. Payments Subject to Limit*</b>					
1. Under 80-20 Option [E2 + (A5x E1 x \$0.75)]	xxxxxx	_____	_____	xxxxxx	xxxxxx
2. Under 50-92 Option [E2 + (A1- A2 - A3) x 0.92 x E1 x 0.75]	xxxxxx	xxxxxx	xxxxxx	_____	_____
3. Total Payment Subject to Limit Enter the nonzero value F1 or F2	xxxxxx	_____	_____	_____	_____

**G. Payment Received**

- |  |       |       |       |       |       |
|--|-------|-------|-------|-------|-------|
| 1. If F3 < \$50,000: Enter E5                                    | xxxxx | _____ | _____ | _____ | _____ |
| 2. If F3 > \$50,000:<br>E5 - (F3 - \$50,000)                     | xxxxx | _____ | _____ | _____ | _____ |
| 3. Total Payment Received<br>Enter the nonzero value G1<br>or G2 | xxxxx | _____ | _____ | _____ | _____ |

NET CASH RETURN  
D1 + G3)

\_\_\_\_\_

\*Note: If E5 < \$50,000, it is not necessary to complete this section.  
Simply enter the value from Line E5 on Line G3.

1987 Wheat Program Worksheet

	NP	BASIC 75.5-27.5	50-92
<b>A: Planted Acres</b>			
1. Total Wheat Base	_____	_____	_____
2. Mandatory Set Aside (0.275 x A1)	XXXXXX	_____	_____
3. Additional CUA Acres (A1 - A2) x 0.50	XXXXXX	XXXXXX	_____
4. Planted Acres (A1 - A2 - A3)	_____	_____	_____
<b>B. Crop Returns</b>			
1. Expected Market Price for Wheat	_____	_____	_____
2. Expected Wheat Yield	_____	_____	_____
3. Expected Market Price for Soybeans	_____	_____	_____
4. Expected Double Crop Soybean Yield	_____	_____	_____
5. Total Crop Returns (A4 x B1 x B2) + (A4 x B3 x B4)	_____	_____	_____
<b>C. Variable Cash Costs</b>			
1. Variable Cost on Wheat/Bean Acres (\$_____/acre x A4)	_____	_____	_____
2. Variable Cost on Mandatory Set Aside (\$_____/acre x A2)	XXXXXX	_____	_____
3. Variable Cost on Additional CUA Acres (\$_____/acre x A3)	XXXXXX	XXXXXX	_____
4. Total Cash Cost (C1 + C2 + C3)	_____	_____	_____
<b>D. Crop Returns</b>			
1. Returns Above Cash Costs (B5 - C4)	_____	_____	_____
<b>E: Government Payments</b>			
1. ASCS Program Yield	XXXXXX	_____	_____
2. Deficiency Payment: 72.5-27.5 Option (A4 x E1 x \$2.10)	XXXXXX	_____	XXXXXX
3. Deficiency Payment: 50-92 Option (A1 - A2) x 0.92 x E1 x \$2.10	XXXXXX	XXXXXX	_____
4. Total Government Payments (E1 + E2 or E3)	XXXXXX	_____	_____
<b>F. Payment Subject to Limit*</b>			
1. Under 72.5-27.5 Option: (A4 x E1 x \$1.53)	XXXXXX	_____	XXXXXX
2. Under 50-92 Option: (A1 - A2) x 0.92 x E1 x \$1.53	XXXXXX	XXXXXX	_____
3. Total Payment Subject to Limit (Enter the nonzero value F1 or F2)	XXXXXX	_____	_____

**G. Payment Received**

- |   |        |       |       |
|---|--------|-------|-------|
| 1. If F3 < \$50,000: Enter E4                               | xxxxxx | _____ | _____ |
| 2. If F3 > \$50,000<br>[E4 - (F3 - \$50,000)]               | xxxxxx | _____ | _____ |
| 3. Total Payment Received<br>(Enter nonzero value G1 or G2) | xxxxxx | _____ | _____ |

**NET CASH RETURN**

(D1 + G3) \_\_\_\_\_

\*Note: if E4 < \$50,000, it is not necessary to complete this section.  
Simply enter the value from Line E4 on line G3.