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OSU Current Report

Cooperative Extension Service • Division of Agriculture • Oklahoma State University

VISICALC Microcomputer Template: Analysis of the 1985 Government Wheat Program

Kim B. Anderson

Required Equipment

VISICALC templates are available for Apple IIe and TRS-80 Models II, 12, and 16 with Enhanced VISICALC. A copy of the template can be obtained by contacting the author.

Advantage of Risk-Rated Approach

The decision to participate or not participate in the government acreage reduction program is critical. With the expected wheat carryover of 1.4 billion bushels and a strong potential for low participation in the program, the harvest price of wheat in 1984 could dip below the $3.30 loan rate. If wheat yields are reduced by a drought and exports increase, the price of wheat could top $4 per bushel. No one knows what prices and yields will be. A risk-oriented approach facilitates evaluation of risky decisions. This approach shows both the risk of bad outcomes and the potential profit from good outcomes, thus enhancing the decision process.

1985 Government Program Summary

Provisions of the 1985 government wheat program include:

- --A $4.38-per-bushel target price.
- --A $3.30-per-bushel national average loan rate.
- --A maximum deficiency payment of $1.08. The deficiency payment will be based on the higher of the June through October 1985 national average wheat price or $3.30, and the $4.38 target price. One-half or $0.54 per bushel of the deficiency can be requested at sign-up. The remainder is normally received in December.
- --To be eligible for loans, purchases, and payments for the 1985 crops of wheat, producers must reduce their wheat harvested acreage by 30 percent of the base acres. This includes 20 percent acreage reduction and 10 percent for paid land diversion.
- --1985 acreage bases will be an average of 1983 and 1984 planted and considered planted to wheat.
- --The diversion payment rate is $2.70 per bushel on 10 percent of the base acreage and the base yield. Fifty percent of the diversion payment can be received at sign-up.
- --Haying will not be permitted on the conservation use acreage.
- --Grazing will be permitted during the seven principal growing months. The principal growing months will be designated by the ASCS State Committee.
- --In the event of a natural disaster, emergency haying and unlimited grazing privileges may be authorized as needed on a county-by-county basis.
- --Offsetting and cross compliance will not apply to the 1985 program.
- --Payment-in-kind is not authorized for the 1985 wheat crop.
- --USDA will review the size of the farmer-owned reserve before the regular price support loans for the 1985 crops reach maturity. At that time it will be determined whether entry into the reserve will be permitted.
- --Contracts signed by participants will be considered binding and penalties will be assessed for noncompliance.
- --If the producer doesn't sign up or comply, no benefits are received.
- --Sign-up is between October 15, 1984, and March 1, 1985.
- --To maintain a base acreage and yield, producers not participating should declare their planted wheat acres and yield to the county ASCS office.

Additional information should be obtained from your county ASCS office. The provisions are subject to change.

Risk-Rated Decisions

To compare net returns from participation to non-participation, producers need to estimate

yields, prices, and costs. To account for uncertainty about yields and prices, the estimates should include optimistic, expected, and pessimistic values. In turn, the net returns will be calculated as optimisitic, expected, and pessimistic. For a detailed description of risk ratings, read Fact Sheet 159, "Risk Rated Management Decisions for Farmers and Ranchers."

The optimistic rating should be assigned a favorable outcome at the one-sixth chance level. Thus, there is one chance in six of an outcome as good or better than an optimistic rated outcome. The expected rating may be assigned the most likly outcome. There is a 50-50 chance that the outcome will be greater than or less than the expected value. The pessimistic rating should be assigned an unfavorable outcome at the one-sixth chance level. Thus, there would be one chance in six of an outcome as bad or worse than the pessimistic rating.

For the analysis below, the expected price per bushel is $3.35. Thus, there is an estimated 50 percent chance that the 1985 harvest wheat price will be below $3.35 and a 50 percent chance that the price will be above $3.35.

The optimistic harvest price is $3.89. Thus, there is an estimated one-in-six chance that the harvest price of wheat will be equal to or greater than $3.89 per bushel. The pessimistic harvest price is $3. Thus, there is an estimated one-in-six chance that the harvest wheat price will equal to or below $3 per bushel. Note that the optimistic and pessimistic prices are not extreme prices but may be thought of as average highs or lows.

Wheat price forecast by competent forecasters or forecasts based on the futures market price have typically had errors of about 18 percent for a one-year forecast, about 16 percent for a nine-month forecast, about 12 percent for a six-month forecast, and about 11 percent for a three-month forecast. Thus, as a thumb rule, the optimistic price equals the expected price multiplied by 1.16 for a one-year forcast, 1.14 for a nine-month forcast, 1.12 for a six-month forcast, and 1.11 for a three-month forcast. To obtain the pessimistic price, multiply the expected price by one minus the error term (1 - .16 = .84; $3.35 x .84 = $2.81). Decision makers may want to alter the optimistic and pessimistic values to fit their own risk assessment. In the example used in this Current Report, $2.81 was changed to $3 per bushel.

Producers should calculate yield error terms for their farm. For expected yields between 30 to 35 bushels, a rule of thumb is that the optimistic and pessimistic yields are about plus or minus 6 bushels. Based on past experience or field records, producers may want to use a different thumb rule. The important point is that the optimistic and pessimistic values be assigned in the same manner as prices.

Using the VISICALC Template

The template is set on row and manual calculation. Thus, an exclamation point (!) must be entered for calculations to be made. The template input format is shown in Table 1. To change values, place the cursor on the number to be changed and type in the new number. The number is entered by pressing the RETURN key or an ARROW key.

Line 47, ACREAGE Harvested if NON-PART., is the number of acres that will be harvested if the producer does not sign up for the government program.

Line 48, ASCS Base, is the average of the 1983 and 1984 ASCS wheat base acres. This value can be obtained from the county ASCS office and may be different than the value entered in line 47.

The prices entered in lines 51, 52, and 53 are the optimistic, expected, and pessimistic prices explained in the "Risk-Rated Decisions" section.

Table 1. Input Table for Wheat Government Program

41	Analysis for Farm:	
42		
43		INPUT
44	DESCRIPTION	VALUE
45		
46	ACREAGE (AC.)	
47	Harvested if NON-PART.	100
48	ASCS Base	100
49		
50	CASH PRICE ($/BU.)	
51	Optimistic	3.89
52	Expected	3.35
53	Pessimistic	3.00
54		
55	LOAN RATE ($/BU.)	3.30
56	STORAGE COST ($/MONTH)	.028
57		
58	PRODUCTION COST ($/AC.)	
59	For Acreage Harvested	85
60	For Acreage Not Harvested	25
61		
62	YIELD (BU./AC.)	
63	Optimistic	38
64	Expected	32
65	Pessimistic	26
66	ASCS Program Yield	32
67		
68	STOCKERS: ON ACREAGE TO BE	
69	HARVESTED (MARCH 1 SALE)	
70	Stocking Rate (HD./AC.)	0
71	NET RETURNS ($/HD.)	
72	Optimistic	0
73	Expected	0
74	Pessimistic	0
75		
76	STOCKERS: ON GOVERNMENT	
77	ACRES (MAY 1 SALE)	
78	Stocking Rate (HD./AC.)	0
79	NET RETURNS ($/HD.)	
80	Optimistic	0
81	Expected	0
82	Pessimistic	0
83		
84	PRICE-COST CORRELATION	-0.10
85		

The loan rate entered in line 55 should be the county loan rate. The $3.30 value on the template is the national loan average. The county loan rate can be obtained from the county ASCS office.

Storage cost estimates can be obtained from a local elevator or by calculating on-farm storage costs from local farm records. Storage cost should be entered on line 56 as cost per bushel per month.

Production costs per acre are entered in lines 59 and 60. The cost value for line 59, Acreage Harvested, can include out-of-pocket costs, total cash costs, or total costs. Because fixed costs should be allocated to both harvest and non-harvested acres, only out-of-pocket costs are used in this example. The out-of-pocket costs per harvested acre was $85 (line 59), and the out-of-pocket costs per non-harvested acre was $25 (line 60). If a producer desires to include fixed costs, the per acre cost should be added to the values in lines 59 and 60.

Optimistic, expected, and pessimistic yield estimates are entered in lines 63, 64, and 65. Optimistic and pessimistic yield values should be determined in the same manner as optimistic and pessimistic prices. The only difference is that the variability will be different for each farm.

Line 66, ASCS Program Yield for the farm being analyzed, should be obtained from the county ASCS office. The value may differ from the expected yield used in line 64.

Values for the STOCKERS section may be obtained by running the VISICALC program "LVSTRISK" (LVSTRISK should be included on the VISCALC disc). Two runs are required to analyze the optimistic, expected, and pessimistic net returns for selling the stockers around March 1 and for selling the stockers around May 1. The per-head net returns should be entered in the appropriate line between lines 70 and 82. The stocking rate for winter pasture should be entered in line 70, and the graze-out stocking rate should be entered in line 78. Note that total net return should be entered in lines 72, 73, and 74 as well as in lines 80, 81, and 82.

To enter rental return, enter the stocking rate (lines 70 and 77) as one (1) head per acre. Then enter the rental rates in lines 73 and 81.

Line 84, PRICE-COST CORRELATION, is used to adjust the optimistic and pessimistic net return values for the relationship between selling price and production cost per bushel (yield). If low yields are associated with high selling prices, then the correlation would probably be about -.3. If low yields are associated with low selling prices, the correlation would be about .3. If yields have no relationship to price, the value in line 32 would be 0.

The output from the above input is shown in Table 2. CALCULATED: Harvested Yield (Bu./Ac.) is adjusted as poorer cropland is removed from production due to the government program. Yield is unchanged for non-participation. Yield is increased 5 percent for 30 percent acreage reduction. The increases can be altered by changing the equation in cells F96.

Table 2. Output Table for Wheat Program Analysis

ITEM	NON-PART	30% ARP
CALCULATED:		
Harvested Yield (BU./AC.)	32	33.6
Deficiency Payment ($)		2307
Diversion Payment ($)		864
PRODUCTION COST ($/BU.)		
Optimistic	2.24	1.69
Expected	2.66	1.99
Pessimistic	3.27	2.43
NET RETURN PER ACRE ($/AC.)		
Optimistic	47.37	61.13
Expected	22.20	43.50
Pessimistic	-0.71	27.95
NET RETURN TOTAL ($)		
Optimistic	4737	6113
Expected	2220	4350
Pessimistic	-71	2795
PROBABILITY OF:		
Positive Net Returns	0.83	0.99
Negative Net Returns	0.17	0.01

To determine the deficiency payment, the larger of the $3.30 loan or the expected cash price is subtracted from the $4.38 target price. In this example, $3.35 was subtracted from $4.38 to determine a $1.03-per-bushel deficiency payment. The deficiency payment is based on the per-bushel payment, the harvested acres, and the ASCS Program Yield.

PRODUCTION COST ($/Bu.) is calculated by dividing the total production cost by the total bushels produced. Note that the adjusted yields are used. For example, with 30 percent APR, the expected cost per bushel is $1.99 ($85 x .7 + $25 x .3 = $67; $67 : 33.6 bushels per acre = $1.99). Optimistic cost per bushel is $1.69. Pessimistic cost per bushel is $2.43.

Costs per bushel can be used to compare non-participation with participation and/or to calculate target prices. If the calculated costs are to be used to establish target prices, the producer may want to include all cash costs (and/or non-cash costs and family living) in cells 58 and 59. The costs in cells 58 and 59 should be increased the same amount. For example, if fixed costs and family living add another $50 per acre, cell E58 would be changed to $135 and cell E59 would be changed to $75. Both costs were changed by $50.

Net return is presented on a per-acre basis and for total acres. Net return is expected to be greater than the optimistic return one time out of six, less than the pessimistic return one time out of six, and either greater or less than the expected return 50 percent of the time. For

example, with non-participation, net return will be greater than $22 per acre 50 percent of the time and less than $22 per acre 50 percent of the time. Losses will be greater than $1 one time out of six. And, net return will be greater than $47 per acre one time out of six.

With participation in the 30 percent government program, the optimistic return is $61, the expected net return is $43, and the pessimistic return is $28 per acre. This analysis indicates that more than five times out of six the pessimistic return from participation will be greater than the expected return from non-participation.

When net returns for participation are calculated, if the expected wheat price is greater than the loan rate minus nine months storage, then the wheat produced in the government program is assumed to be sold on the cash market. Thus, as the cash price increases, the deficiency payment decreases and the price received increases.

The probability that net return will be greater than zero is given as the "PROBABILITY OF: Positive Net Returns." And, the "PROBABILITY OF: a Negative Net Return" is the chance that net return will be less than zero.

Appendix A.

Following are the equations for the government wheat program template. The titles can be obtained from Tables 1 and 2. Rows 1 through 42 contained instructions.

```
>F118 1-F117

>E118 1-E117

>F117 @IF(O115,(S115),1-S115)

>E117 @IF(J115,(N115),1-N115)

>S115 +R115*((.31938153*Q115)-(.356563782*(Q115^2))+(1.781477937*
(Q115^3))-(1.821255978*(Q115^4))+(1.330274429*(Q115^5)))

>R115 .398942281*((2.71828)^((-(P115^2)/2)))

>Q115 1/(1+(.2316419*P115))

>P115 @MIN(2.5,(@ABS((F108-0)/@IF(O115,N106,N107)))

>O115 (F108<0)

>N115 +M115*((.31938153*L115)-(.356563782*(L115^2))+(1.781477937*
(L115^3))-(1.821255978*(L115^4))+(1.330274429*(L115^5)))

>M115 .398942281*((2.71828)^((-(K115^2)/2)))

>L115 1/(1+(.2316419*K115))

>K115 @MIN(2.5,@ABS((E108-0)/@IF(J115,M106,M107)))

>J115 (E108<0)

>F114 (F109*E48)

>E114 (E109*E47)

>F113 (F108)*E48

>E113 (E108)*E47
```

```
>F112 (F107*E48)

>E112 (E107*E47)

>F109 (F108-N107)

>E109 (E108-M107)

>F108 (F107-N106)

>E108 (E107-M106)

>N107 @SQRT(((N105*.7)^2)+(N96^2))

>M107 @SQRT((N104^2)+(N94^2))

>F107 ((K56*F96)-E59)*.7+(F98/E48)+((F99/E48))-(E60*K51)+(E81*E78*.3)+
N106

>E107 (E52-E103)*E96+(E73*E70)+M106

>N106 @SQRT(((M105*.7)^2)+(M96^2))

>M106 @SQRT((M104^2)+(M94^2))

>N105 @SQRT(((K56^2*I65)+(E64^2*K61)+(2*K56*E64*@SQRT(I65)*@SQRT(K61)*
E84))

>M105 @SQRT(((K56^2*I64)+(E64^2*K60)+(2*K56*E64*@SQRT(I64)*@SQRT(K60)*
E84))

>F104 ((E59*.7)+(E60*K51)/(E65-E96+F96))

>E104 (E59/E65)

>F103 ((E59*.7)+(E60*K51)/F96)

>E103 (E59/E64)

>F102 ((E59*.7)+(E60*K51)/(E63+F96-E96))

>E102 (E59/E63)

>F99 +E48*E66*.1*2.7

>F98 (E48*E66*.7*(4.38-(@MAX(E52,E55)))

>N96 (E81-E82)*E78*.3

>M96 (E80-E81)*E78*.3

>F96 (E64)*1.05

>N94 (E73-E74)*E70

>M94 (E72-E73)*E70
```

```
>I65 (E64-E65)^2

>I64 (E63-E64)^2

>K61 (K56-J56)^2

>K60 (E51-K56)^2

>K56 @MAX(E52,J56)

>J56 (E55-(E56*9))

>I53 (E52-E53)^2

>I52 (E51-E52)^2

>K51 (+E47-(E48*.7))/E47
```

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