# A CROP BUDGET CALCULATOR FOR ELECTRONIC SPREADSHEETS

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# A Crop Budget Calculator for

#### Electronic Spreadsheets

Budgets of crop enterprise costs and returns are useful sources of information to a crop producer and those working with him for such purposes as selecting crops, calculating input needs and projecting costs and returns. Ideally, budgets should be tailor-made for each specific situation and for each change being considered, such as a change in crop acres, fertilizer rates or machines. Budgeting with a pencil and paper or a hand calculator can be time-consuming and tedious. Decisions are therefore often made without any budgeting or with budgets for only one or two of the most promising choices. Microcomputers can reduce greatly the time required for calculating budgets.

#### PURPOSE

This paper presents a method for calculating crop enterprise budgets using an electronic spreadsheet program on a microcomputer. The Visicalc brand of spreadsheet on an Apple II Plus microcomputer are used as examples. The paper is organized as follows: First, the concepts of an electronic spreadsheet and a template or overlay are introduced. Hardware and software requirements are then listed. The method of organizing budget information on the spreadsheet is next, followed by a discussion of the methods used to calculate various budget items, with printouts of the template and its formulas and formats.

#### DEFINITIONS

Electronic Spreadsheet - a popular type of microcomputer software for business and agricultural applications. The name comes from similarity to a paper spreadsheet on which calculating tasks are set up as tables of columns and rows of figures. These rows and columns are titled, cross referenced and manipulated mathematically. An

¹This paper is not intended to introduce a potential user to the concept of an electronic spreadsheet or to teach its use. Readers are referred to H. Willson, Personal and Desktop Computing: A Short Course in Computer Literacy, "Lesson II, Spread Sheet Programs and Lesson III, Program Operation," Cooperative Extension, College of Agriculture and Life Sciences, Cornell University, 1982, or to the tutorial section of the spreadsheet user manual for that purpose. This paper discusses one of many applications of an electronic spreadsheet.

<sup>&</sup>lt;sup>2</sup>Brand names used herein are for convenience only. No endorsement is intended nor is criticism of unnamed products implied.

selectronic spreadsheet arranges the computer's memory as an "electronic sheet". The computer's screen becomes a "window" which looks at a part of the spreadsheet.

# WHAT YOU NEED TO USE THE CALCULATOR

To use this template you will need:

- 1. A microcomputer with at least 48K RAM memory, video screen, key-board and at least one disk drive;
- 2. A printer for producing paper copies (optional);
- 3. An electronic spreadsheet source program diskette and user manual matching the brand of microcomputer being used; and
- 4. At least two blank diskettes for storing completed budgets (one for the original and one as a backup).

#### BACKGROUND

The template was developed on a Visical electronic spreadsheet, 1980 16-sector version, on an Apple II Plus microcomputer with 48K of memory. The formulas can be typed into other versions of Visical for Apple and Radio Shack computers. In the fall of 1982, there were reportedly about 20 different brands of electronic spreadsheets on the market. Minor modifications in the formulas may be needed for brands other than Visical.

# TYPING IN OR OBTAINING A DISKETTE COPY OF THE TEMPLATE

For the Apple II Plus microcomputer and Visicalc, prepare the template for use by typing in the labels, numbers and formulas using the rows and columns of Table Al in the Appendix as a guide. Table Al is a key to the formulas and formats used in Table Al. The formulas are explained below in the section "Formulas Used in the Crop Budget Template." Minor modifications in the formulas may be needed for spreadsheet brands other than Visicalc.

A 5 1/4" diskette copy of the template can also be obtained but only for the 1980 16-sector Visicalc for use on the Apple II Plus. Contact your county Extension agent or William F. Lazarus, Department of Agricultural Economics, Cornell University, Ithaca, N.Y., 14853, for details on obtaining a diskette copy.

# USING THE CROP BUDGET CALCULATOR

To use the template with Visicalc and the Apple II Plus, first insert the Visicalc program diskette. Turn on the machine and wait until the Visicalc display appears on the screen. Then remove the

Visicalc diskette, insert the diskette containing the template and load it by typing the following keys: / S L, and the filename CROP TEMPLATE and the return key. The upper 20 lines (or rows) of the budget in Table A. 1 in the Appendix will appear.

The first row is the title of the budget. Change this to whatever you like by typing over it. The cursor will be located in the upper left corner (element Al). Type in the first nine letters of

your title, then move the cursor to the right using the continue until you have typed in all of your title.

The rest of the budget is made up of seven columns and 67 rows. The columns are described in Table 1.

Table 1. Crop Budget Column Descriptions

column	description	label
A,B C D E	item description units quantity per acre price per unit total cost or value per acre	blank UNITS QUANTITY PRICE COST/ACRE

The organization of the row items is the same as that used in A.E. Research 80-6, Economic Analysis of New York Field Crop Enterprises. For items where a quantity and a price appear, cost or value per acre is calculated by multiplying price times quantity. For other items, such as fuel and repairs, the cost per acre is a more complicated calculation. Cost per acre for these items is calculated using a different template and then typed directly into the cost column. 3

The rows include some containing only headings, followed by rows with specific items. SEED in row 7 is a heading, followed by items. CORN and a blank in case a second seed type is needed, as for hay mixtures. Visicalc has no way to indent a label. To get roughly the

same effect as indenting, start the label with quotes " and a period . The quotes are necessary to identify the period as a

label. Otherwise, an entry starting with a period will be interpreted as a number and result in an error message.

<sup>&</sup>lt;sup>3</sup>The reader may be interested in A.E. Ext. 82-39, <u>A Machinery</u> Cost Calculator for Electronic Spreadsheets, by the author. This calculates power and equipment, variable and fixed costs and machine operating labor requirements for a given set of machinery.

The template has room for two types of seed, three types of fertilizer and four chemicals. More rows can be added in the middle of a list of items by moving the cursor to the location where the new

The budget is divided into variable expenses, fixed expenses and crop returns. Variable expenses are those incurred only if the crop is grown in a given year, such as for fertilizer and lime. Fixed expenses are those items such as power and equipment ownership costs for interest and depreciation that are incurrred as long as the machine is owned whether the crop is grown this year or not. Variable expenses are broken down further into expenses for growing the crop up to harvest, harvesting and selling expenses, interest on operating expenses and labor costs.

Crop value is calculated, followed by net returns over variable expenses and over all expenses. The last two items in the budget are the breakeven crop prices to cover variable expenses followed by that to cover all expenses.

Move the cursor around to look at all of the items in the budget using the arrow keys 

and 

the arrow keys 

and 

the arrow will either move up and down, or left and right. To change cursor direction from horizontal to vertical, or vice versa, hit the space bar. The repeat key,

REPT, is useful for moving the cursor some distance. An alternate method for moving the cursor is to type 

shift 

Al moves the cursor to the upper left corner.

The rows are described in Table 2.

To construct a budget using the template, move the cursor to each price and quantity or cost entry and type in your value. The totals are recalculated by the program as each new entry is made. Note that the units must be the same for quantity and price. If corn seed quantity is entered as kernels per acre, price must be price per kernel. The conversion can be done by the spreadsheet, however. If the price is \$50 for an 80,000 kernel bag, enter 50/80,000. The result, \$0.000624, is the price per kernel and will appear in the price column.

Table 2. Crop Budget Row Descriptions

variable expenses heading growing expenses heading seed expense per acre, heading expense for specific seed type, such as corn space for second seed type, for mixed hay seedings fertilizer heading	VARIABLE EXPENSES .GROWING SEED
seed expense per acre, heading expense for specific seed type, such as corn space for second seed type, for mixed hay seedings	
8 expense for specific seed type, such as corn 9 space for second seed type, for mixed hay seedings	SEED
9 space for second seed type, for mixed hay seedings	
·	.CORN
0 fertilizer heading	blank
	FERTILIZER
specific types of fertilizer, such as N, P and K, 10-30-10 or urea  2	. N . P . K
4 lime expense	LIME
5 chemicals heading	CHEMICALS
6 specific herbicides and insecticides-type in names	.LASSO, etc.
o power and equipment expenses for growing the crop, heading	POWER, EQUIP
fuel, oil and grease (enter cost directly)	.FUEL,OIL
repairs and maintenance (enter cost directly)	-R & M
other expenses (soil tests, hand tools, etc.) for growing the crop	OTHER
total growing expenses (sum of rows 7-23)	TOTAL CROWING
7 harvesting and selling expenses, heading	-HARVESTING
power and equipment expenses, for harvesting the crop, heading	POWER, EQUIP
of fuel, oil and grease	.PUEL,OIL
31 repairs and maintenance	-R & M
32 drying variable expenses	DRYING
33 twine	TWINE
34 other harvesting and selling expenses	OTHER
36 total harvesting and selling expenses	TOTAL HARVESTING
interest on operating expenses	INTEREST, OPER
40 labor expenses	LABOR
42 total variable expenses (sum of growing, harvesting and selling, interest and labor	TOTAL VARIABLE
44 fixed expenses, heading	FIXED EXPENSES
46 power and equipment ownership expenses	POWER, EQUIP
47 machinery storage	MACH STORAGE
48 land use expenses (rental or interest on value of owned land)	LAND
49 property taxes	TAX
51 total fixed expenses	TOTAL FIXED
53 total expenses (variable plus fixed)	TOTAL EXPENSES
55 crop gross value per acre, heading	CROP VALUE
56 value of main crop product, such as silage for corn silage	.SILAGE
value of second crop product, such as bedding for small grain total crop value per acre	.BEDDING TOTAL VALUE
61 ner return per acre over variable expenses	NET-VAR EXP
63 net return per acre over all expenses	NET-ALL EXP
65 breakeven price for the main crop product to cover variable expenses	BRKEV-VAR
67 breakeven price for the main crop product to cover all expenses	BRKEV-ALL

It is suggested that you organize the required data in the proper order before starting to type it into the microcomputer. A set of five blank worksheets has been provided in the Appendix for organizing and reviewing the data. A completed sample worksheet for the template corn silage budget is provided. When the budget is completed, it can be saved and used as a template for future budgets

by typing / S S and a filename. The filename must begin

with a letter and can be from one to 30 characters. Letters, numbers, the space character and all punctuation except the comma can be included in the filename.

To print a paper copy, first move the cursor to the upper left corner. Then type /Pl (assuming the printer is connected to slot 1)

and hit return twice. Then type - F 6 7 to complete the print command.

# FORMULAS USED IN THE CROP BUDGET TEMPLATE

For machines other than the Apple II and II Plus or for spreadsheets other than the 1980 version of Visicalc, the template can be typed in from the keyboard using Table A.1 as a guide. The formulas are quite simple in most cases. For example, seed cost per acre (F8) is calculated as seed quantity times price, so enter the formula +D8\*E8 for F8. The column totals use a special summing function. Enter @ sum (F7...F23) to calculate total growing cost, F25. A cautionary note: rows can be added or deleted between F7 and F23 or anywhere the @ sum function is used, but do not delete either the first element, F7, or the last, F23. An error message will result. The printout of formulas in Table A.2 is provided to assist in entering any formula which might not be obvious from the output in Table A.1.

The formula is printed out for every element in the worksheet, starting from the bottom right corner and moving right to left. The element coordinates follow the "greater than" > sign. Following the colon, a number, label or formula may be shown. A number is printed directly. A label is indicated by a beginning quote ".

>F67: + F53/D56

element formula
coordinates

Visicalc offers a choice between two modes for recalculating the spreadsheet once an element has been changed: column-by-column left to right, or row-by-row top to bottom. The default mode is column-by-column. This can cause errors in calculating operating expenses, D38. This is the sum of growing expenses, F25, and harvesting expenses, F36, which are above but to the right of D38. It is possible to change a value in column F, recalculate the spreadsheet once, and

not have the change appear in column D because D is calculated before F. To avoid errors in D38, change the order of recalculation to row-

by-row by typing / G O R . Growing and harvesting ex-

penses are then recalculated before D38, which will then always have the correct value.

Once the template has been typed in and all values match those in Table A.1, proceed to enter your own values from the Appendix worksheets to calculate an individualized crop enterprise budget.

APPENDIX

Table A.1 Crop Budget Template Output

	тения Дван — шефц Вера	=======================================		esa <b>Kass</b> se	****
1	CROP BUDGET TEMPL	ATE (CORN	SILAGE BUDG	ET)	
2 3 4 5	VARIABLE EXPENSES .GROWING	UNITS	QUANTITY PR	lice co	ST/ACRE
4 7 8 9	SEED .CORN	KERNELS	25000.00	.000624	15.60 0.00
10 11 12 13	FERTILIZER .N .P .K LIME	LES LBS LBS TONS	1 0 0 . 0 0 5 0 . 0 0 5 0 . 0 0 0 . 5 0	0.32 0.28 0.16 22.50	32.00 14.00 8.00 11.25
15 16 17 18	CHEMICALS LASSO ATRAZINE FURADAN	GTS GTS LBS	2.50 1.00 10.00	4.82 3.08 1.05	12.05 3.08 10.50 0.00
20 21 22 23	POWER, EQUIP FUEL, OIL Ram OTHER				7.80 4.90 2.00
24 25 26	TOTAL GROWING			-	121.18
27 28	HARVESTING				
29 30 31 32 34	FOWER, EQUIP FUEL, OIL REN DRYING TWINE OTHER				10.25 4.75 0.00 0.00 7.00
35 36	TOTAL HARVESTING				22.00
37 38	INTEREST OPER	DOLLARS	143.18	. 065	9.31
3 9 4 0	LABOR	HOURS	8 . 40	4.00	33.60
41 42	TOTAL VARIABLE				186 07
43 44	FIXED EXPENSES				
45 46 47 48 49	POWER, EQUIP MACH STORAGE LAND TAX	ACRE			57.65 5.45 24.00 0.00
50 51	TOTAL FIXED				87.10
53	TOTAL EXPENSES				273.19
5 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	CROP VALUE SILAGE BEDDING	TOMS TOMS	18.00	20.00	00.03s
១៦ ៦ទ ៩ពី	TOTAL VALUE				360.00
A 1	NET-VAR EXF	AURE			173.91
120 a a a	NET-ALL EXF	ACRE			88.81
0 4 5 5 2 2	BRKEV-VAR	TON			10.34
6 t 8 7	DRKEV-ALL	TON			i5.18

### Table A.2 Formulas Used in the Crop Budget Template

```
>F32:/F6+D32*E32
>A32:"DRYING
) F67:+(F53-F57-F58)/D56
)C67:"TON
>067:7FR
>A67:"BRKEV-ALL
                                                     >F31:/F$4.75
                                                     A31 " R&M
 >F65:+(F42-F57-F58)/D56
                                                     >F30:/F$10.25
⇒C65:"TON
                                                     ) E30:/F$
 >B65./FR
>A65:"BRKEV-VAR
                                                     →D30:/F%
                                                     )A30:".FUEL.OIL
)B29:"IF
 ○ Γ63:4F59-F53
 >C63:"ACRE
>B63:"XF
>A63:"NET-ALL E
                                                     AZ9 "FOWER EQU
                                                     > B27: "NG
> A27: ".HARVESTI
> F25: /F4@SUM(F7...F23)
 )F61 . +F59--F42
>C61 "ACRE
                                                    ) B25: "WING
) A25: "TOTAL GRO
) F23: /F$2
 )B61:"XP
)A61:"NET-VAR E
 ) F 5 9 : @SUM ( F 5 6 . . . F 5 8
                                                     A23: "OTHER
                                                     )F22:/F34.9
)A22:".R&M
 > B5 9 : "UE
> A5 9 : "TOTAL VAL
 >F57 +D57*E57
>C57:"TONS
>A57:".BEDDING
>F56:+D56*E56
                                                     )F21./F$7.8
                                                     >E21:/Γ$
>A21:".FUEL.OIL
                                                     >F20:/F9
 ) E56:20
                                                     >B20:"IF
                                                     >A20:"FOWER.EQU
>F19:+D19*E19
 ) D56:18
) C56: "TOMS
 )A56:".SILAGE
                                                     >F18.+D18*E18
                                                     >E18:1 05
 )ASS: "CROP VALU
                                                      >D18:10
 >F53:/F5+F51+F42
                                                     CIB "LBS
                                                     DAIS: " FURADAN
 DESS: "ENSES
                                                     )F17:+D17*E17
>E17:3.08
 ) A53 - "TOTAL EXP
) F51 : @SUM (F46 . . F50)
 >B51 PED
>A51 TOTAL FIX
                                                     D17
                                                     >Cl7: OTS
>A17 " ATRAZINE
. > F 49 : / F $ 0
                                                     >F16 +D16*E16
 DA49: "TAK
 ) F 48 . / F $ 24
) C 48 . "ACRE
                                                     ⇒£15:4.82
                                                     )D16:2.5
)C16:"GTS
)A16:" LASSO
)A15:"CHEMICALS
)F14:/F5+D14*E14
 ) A 48: "LAND
 >F47:/F45 45
 )B47: "AGE
)A47: "MACH STOR
 )F46:/F457 65
)B46:"TP
)A46:"FOWER,EQU
                                                      )E14.22 5
                                                     >D14::5
>C14:"TONS
 >B44: "EMSES
>A44 "FIXED EXP
                                                      A14 "LIME
 )F42 · /F t + F25 + (@SUM(F36 . F41))
 B42 TABLE
 A42: "TOTAL VAR
 043*04540 044¢
 NE40:4
 >D40:9.4
 C40: "HOURS
 )A40:"LABOR
 > F38: / F$ + D28 * E38
 >E38 /FG.065
 )D38-7F$4F364F25
 ) C38: "DOLLARS
 YESS ", OFER
 YERRETMI : 88 AC
  >F36 / F4@SUM(F30 ... F34)
 >B36: /F5
 AS6: "TOTAL HAR
 ) F 34:7
 AS4 "OTHER
```

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Table A.2 Formulas Used in the Crop Budget Template (cont.)

```
>F15:/F5+D13*E13
>E13:.16
>D13:50
  )C13:"LBS
  >F12:/F3+D12*E12
 >E12:.28
>D12:50
>C12:"EBS
>A12:" F
  >F11:/F$+D1:*E11
  >E11: 32
 )C11:"LBS
)A11:".N
)E10:/F$
  >BIO: "R
>AIO: "FERTILIZE
) F9 : +D9*E9
) F8 : /F4+D8*E8
  >E8:/FG15.6/25000
>D8:25000
>C8:"KERNELS
>A8:" CORN
  ) F7 - / FR
  )E7:/FR
)D7:/FR
  OCT:/FR
DAT: "SEED
  )F5:/FR
  >E5:/FR
>D5:/FR
>C5:/FR
>A5:".GROWING
 AS GROWING
) E4: / FR
) B4: "EXPENSES
) A4: "VARIABLE
) F3: "COST/ACRE
) E3: "PRICE
  D3: "QUANTITY
C3: "UNITS
  >C::"DGET)
>D::"BILAGE BU
>C:: /FL"TE (CORN
>B::"ET TEMPLA
>AI:/FR"CROP BUDG
   1W1
   /GOR
   /GRA
  /GFS
   / G C 9
  /X>A1:>A::/TV
>A3:/TH
/X-/X>A1:>A1
```

crop Corn Silage				
Crop	Units	Quantity	Price	Cost/Acre
VARIABLE EXPENSES Growing			,	
Seeds	K	25,000	50/80	000
Fertilizer		·		
N	<u>lbs</u>	100	32_	
P	<u>lbs</u>	50	,28	
К	<u>lbs</u>	50	. 16	
Lime	tons	5_	22.50	
Chemicals				
Lasso	ats_	2.5	4.82	•
Atrazine	ats_		3.08	
Euradan	ats	10	1.05	
Power & Equipment				
Fuel, Oil & Grease				7.80
Repairs & Maintenance				4.90
Other				2,00
Harvesting and Selling Power & Equipment				
Fuel, 0il & Grease				10.25
Repairs & Maintenance				4.75
Drying				
Other				7.00
Twine				
Interest on Operating Exp.			.13/2	-
Labor, Hours	hours	8.4	4.00	<u>r</u>
FIXED EXPENSES Power & Equipment				57.65
Machinery Storage				_5.45
Land Charge				24.00
Property Tax				
CROP VALUE				
silage	tons	18	20.00	2
				-

Crop	<b></b>			
Crop	Units	Quantity	Price	Cost/Acre
VARIABLE EXPENSES				
Growing		•		
Seeds		•	<del></del>	
Fertilizer				
N	<u>. , , , ,</u>			
P				
K .	<u> </u>			
Lime				
Chemicals				
	<del>,</del>			
Power & Equipment				
Fuel, Oil & Grease		•		
Repairs & Maintenance				
0ther				
Harvesting and Selling Power & Equipment				
Fuel, Oil & Grease				
Repairs & Maintenance				
Drying				
Other			, <u>.</u>	
Twine				
Interest on Operating Exp.				
Labor, Hours	<del>,</del>			_
FIXED EXPENSES Power & Equipment				
Machinery Storage	·			
Land Charge		177.24.11		
Property Tax				
CROP VALUE				
				-
-				

Crop				
Crop	<u>Units</u>	Quantity	Price	Cost/Acre
VARIABLE EXPENSES  Growing				
Seeds		<b>.</b>		
Fertilizer				
N				
P				
K				
Lime				
Chemicals	***************************************			
- 1				
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Power & Equipment				
Fuel, Oil & Grease				
Repairs & Maintenance	<u>a</u>			
Other	· · · · · · · · · · · · · · · · · · ·			
Harvesting and Selling Power & Equipment				
Fuel, Oil & Grease				
Repairs & Maintenance	2			
Drying				
Other				
Twine				
Interest on Operating Exp	D.			
Labor, Hours				
FIXED EXPENSES				•
Power & Equipment				
Machinery Storage				
Land Charge				
Property Tax		<u></u>		"
CROP VALUE		•		
			· · · · · · · · · · · · · · · · · · ·	•

Crop	_			
Crop	Units	Quantity	Price	Cost/Acre
VARIABLE EXPENSES  Growing				
Seeds				
Fertilizer				
N				
P				
K		<u>,</u>		
Lime				
Chemicals				
	<u></u>			
<del></del>	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			
Power & Equipment				
Fuel, Oil & Grease		•		
Repairs & Maintenance			,	
Other				
Harvesting and Selling Power & Equipment	9 <u>————————————————————————————————————</u>			
Fuel, Oil & Grease				
Repairs & Maintenance				
Drying				
Other				
Twine		***************************************		·
Interest on Operating Exp.		<del></del>		
Labor, Hours	·		<u>,</u>	
FIXED EXPENSES				•
Power & Equipment				
Machinery Storage				
Land Charge				
Property Tax				
CROP VALUE				
		,		

Crop		-			
Crop		Units	Quantity	Price	Cost/Acre
VARIABLE EXPENSES Growing					
Seeds		<u> </u>			
Fertilizer		•			
N					
P					
K			· · · · · · · · · · · · · · · · · · ·		
Lime				WINDS TO 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
Chemicals					
<del> </del>					
Power & Equip	ment				
Fuel, Oil &	Grease				
Repairs & M	aintenance				
Other					
Harvesting and Power & Equip					-
Fuel, 0il &	Grease				
Repairs & M					
Drying					
Other					
Twine					
Interest on Ope	rating Exp.				
Labor, Hours					
FIXED EXPENSES Power & Equip	ment				
Machinery Sto	rage				
Land Charge	_				
Property Tax					
CROP VALUE					

Crop				
Crop	Units	Quantity	Price	Cost/Acre
VARIABLE EXPENSES  Growing				
Seeds				
Fertilizer				
N				
P				
K				
Lime			******	
Chemicals				
1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -				
Power & Equipment				
Fuel, Oil & Grease				
Repairs & Maintenance				
Other				
Harvesting and Selling Power & Equipment				
Fuel, Oil & Grease		•		
Repairs & Maintenance				
Drying				1.
Other		***************************************		
Twine		<del></del>		
Interest on Operating Exp.	(A		<del></del>	
Labor, Hours		···		
FIXED EXPENSES Power & Equipment			<u> </u>	
Machinery Storage				
Land Charge				
Property Tax				
CROP VALUE				
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