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microcomputer worksheets for agriculture

iowa state university

economics
figuring crop production costs version 1

I. Objective

Knowing your crop production costs can help you make better management and marketing decisions. It can help answer questions like:

- What selling price do I need to cover out-of-pocket expenses?
- What selling price do I need to lock in a profit? To increase net worth?
- How much price risk can I take in marketing my crop?

This worksheet estimates current crop production and storage costs using information from your farm record book or tax records. You can also project costs for next year.

II. Program Overview

Two types of costs can be computed with this worksheet.

Economic costs: The value of all resources used in crop production, including a return on the investment in land and capital, and a return to labor contributed by the operator. Income in excess of all economic costs represents a return to management and profit.

Cash flow: Cash expenditures only. Their total represents the minimum sale price needed to cover out-of-pocket expenses plus debt retirement and family living needs.

III. Worksheet Specifications

Column width:	9
Number of rows:	180
Number of columns:	8
Recalculation order by:	columns
Recalculation control:	manual
Approximate memory requirement for worksheet only:	13K

IV. User Instructions

A. Entering Inputs

The worksheet calculates costs of production for one "crop" at a time. However, one "crop" could include several similar crops, a single crop harvested by several different methods, or an individual field or farm with a particular crop. Results will be an average of all costs for the "crop" as you define it.

Enter numbers only in cells with a dashed line (————————) under them. The program automatically calculates all other values. Some cells will not apply and may be left blank. Cells for which values are calculated contain either a zero or ERROR when the worksheet is first loaded, until new values are calculated by pressing the ! key.

Some items, such as machinery costs, are difficult to estimate for individual crops. In these cases the worksheet asks for the cost for all crops. The program then calculates a particular crop's share of this total cost based on number of acres and type of crop. For crop share-rented land include only your share of the expenses and yield.

At the top of the worksheet enter the name of the crop and the year (past, present, or future). These are for your reference only. Also enter the expected or actual yield. Enter the number of acres for each crop grown on the whole farm under the "Whole Farm" column. Under the "This Crop" column enter the number of acres in the crop being analyzed.

Continue down the worksheet entering the appropriate cost figures. If a particular type of cost does not apply enter a zero or leave the cell blank. When all inputs have been entered press ! to calculate the outputs. Each time you change, add, or delete an input press ! again to recalculate the outputs.

Prepared by William Edwards, extension economist, Iowa State University.

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MCS-2 | August 1983

Section A—Operating Costs

1. Seed, total cost. Multiply cost per bushel by seeding rate and number of acres of this crop. Include innoculation cost. Value home-raised seed at market price or higher.

2. Fertilizer, total cost. Multiply cost per unit applied by application rate and number of acres. Prorate cost of lime over its useful life. Fertilizer cost may be prorated between corn and soybeans if fertilizer applied one year is carried over to the next.

3. Herbicides and insecticides, total cost. Multiply cost per unit by application rate and number of acres. Cost of applicator rental or custom application may be included here or below in A4.

4. Custom hire. Enter cost of custom operations or machine rental not included above. Also include hired hauling and drying costs.

5. Crop insurance. Enter cost of premium.

6. Fuel and lubrication. From the total farm fuel bill (excluding crop drying fuel) subtract an appropriate portion for livestock enterprises. Also record cost of fuel for drying, if any, or the cost of commercial drying.

7. Machinery repairs. Use total farm bill for machinery and equipment repairs for all crops.

8. Commercial storage cost. Enter actual amount charged per bushel.

9. Miscellaneous. Enter total of other farm costs such as utilities, professional help, supplies, dues, etc.

10. Subtotal of lines 1 through 9. This will be the same for both columns.

11. Return to operating capital. Enter the rate of return that could be earned elsewhere on operating capital and the number of months from planting to sale.

12. Interest. Interest cost of borrowed operating capital. Multiply by the proportion you wish to charge to this crop.

Section B—Machinery Ownership (total for all crop machinery)

1. Depreciation. Use information from your tax records for all crop machinery and equipment. Do not include machinery and equipment used for livestock production.

2. Return on investment. Find the total undepreciated value for crop machinery and equipment from your tax records, or use a current market value. Enter the rate of return that could be earned elsewhere on intermediate capital.

3. Insurance on machinery. Use actual costs or estimate at one-half percent of undepreciated machiney value.

4. Principal and interest payments. Use the actual amount due for the year for crop machinery debt.

Section C—Labor

1. Hired labor. Include wages, social security, workman's compensation insurance cost, etc. for labor hired for this crop.

2. Unpaid labor. Include months of operator and unpaid family labor used on the farm and their monthly value, plus the percentage of labor devoted to this crop.

3. Family living. Estimate the total cash expenditures needed for family living, social security and income tax payments. The computer multiplies this total by the percentage of total family labor devoted to this crop.

Section D—Land and Crop Improvements (total for all crops)

1. Return on investment. Current market value of all owned cropland and cropland improvements, per acre, and expected rate of return to owner from crop production. Net cash returns (net rent) have averaged in the neighborhood of 3 to 4 percent in recent years.

2. Property taxes and insurance. Multiply the local millage rate by the assessed valuation of the land you own. Also include insurance on improvements used in crop production, generally about ½ to 1 percent of value.

3. Principal and interest. Use the actual amount due for the year on debt against owned cropland and improvements used in crop production.

4. Cash rent. Use cash rent actually paid. Do not include cash rent if land is crop-share rented or owned.

5. Depreciation on improvements. Use tax records. Include grain storage, machinery storage, tile, etc. Exclude improvements for livestock production.

B. Interpreting Output

Section E computes a total cost, cost per acre, and cost per bushel for both economic costs and cash flow requirements. If crop income is not sufficient to pay all economic costs in the long run, then profits could be increased by putting resources to some other use. Income in excess of all economic costs represents profit or return to management.

Selling grain at a price at least as high as the cash flow requirement per bushel (plus cash storage costs) must be achieved to pay current cash expenditures. Cash flow shortages may be made up from income from other crops, livestock income, or nonfarm sources. In some cases, cash flow requirements may be reduced by postponing debt repayment or reducing living expenses. Farmers with a high cash flow requirement per bushel should look for ways to reduce risk, such as buying crop insurance or locking in a sale price prior to harvest.

The net worth break-even (section F) is the minimum sale price needed to maintain business equity as well as pay family living expenses and social security and income taxes. This assumes constant land values and no change in machinery values other than normal depreciation. A sale price above this figure makes an increase in net worth possible.

C. Adjusted Acres Calculation

A calculation for the "adjusted acres" for the whole farm and for the crop is shown at the bottom of the worksheet. This is used to allocate whole farm machinery costs among crops. The number of adjusted crop acres equals the sum of the number of acres in each crop multiplied by the appropriate crop factor. The crop factors are:

corn	1.0
soybeans	.7
corn silage	1.2
oats, wheat	.6
hay	.9

Adjusted acres = _____ a. corn + (.7 × _____ a. soybeans) + (1.2 × _____ a. corn silage) + (.6 × _____ a. oats and wheat) + (.9 × _____ a. hay) = _____ acres

The crop factor represents the approximate value of machinery costs per acre for each crop as a fraction of the machinery costs per acre for corn. If you wish to change these factors simply change the constant values in the equations in cells E174 and E176.

V. Set-up Procedure

A. Location of worksheet columns A through H, rows 1 through 180.

B. Steps for Entering.

Step	Procedure
1	Boot electronic worksheet.
2	Set recalculation to manual.
3	Set recalculation order to columns.
4	Enter all column headings and other labels, black printing on worksheet pages 1 to 3.
5	Enter equations and formatting instructions in appropriate locations, see section VII.A. Note: Properly entered equations usually result in error conditions until all equations and example data have been entered and worksheet recalculated, step 7. Red printing on worksheet pages 1 to 3 shows output resulting from properly entered equations.
6	Enter example values in cells with _____ underneath, green printing on worksheet.
7	Recalculate worksheet.
8	Check all values against example worksheet. Correct formulas or values if mistakes are found.
9	Blank out sample inputs shown in green on worksheet pages.
10	Save copy on your diskette. Label with file name.

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VI. Pages of Worksheet

Worksheet page 1

columns

rows	A	B	C	D	E	F	G	H
1								
2		WORK SHEE	T FOR FIG	URING YOU	R CROP PR	ODUCTION	COSTS	
3			IOWA	STATE UNI	VERSITY			
4			COOPERATI	VE EXTENS	ION SERVI	CE		
5	---	---	---	---	---	---	---	---
6	Crop:	CORN		Year	1983		Yield:	142
7		---			---			---
8				Crop acre	s:	Whole	Farm	This Crop
9						======	====	=========
10				Corn		330		330
11						---		---
12				Soybeans		210		
13						---		---
14				Corn Sila	ge	45		
15						---		---
16				Oats, whe	at	60		
17						---		---
18				Hay		50		
19						---		---
20				Total acr	es	695		
21								
22								
23								
24	=========	=========	=========	=========	=========	=========	=========	=========
25								
26		Item			Eco	nomic Cos	ts	Cash Flow
27								
28	=========	=========	=========	=========	=========	=========	=========	=========
29								
30	A. OPERAT	ING COSTS	(for thi	s crop)				
31								
32	1. See	d				$ 5000	$	5000
33						---		
34	2. Fer	tilizer				$ 15000	$	15000
35						---		
36	3. a.	Herbicide				$ 4000	$	4000
37						---		
38	b.	Insectici	de			$ 2000	$	2000
39						---		
40	4. Cus	tom hire				$ 1000	$	1000
41						---		
42	5. Cro	p Insuran	ce			$ 1420	$	1420
43						---		
44	6. a.	Fuel and	lubricati	on:				
45		total, AL	L CROPS $	6100.00		$ 3314	$	3314
46				---				
47	b.	Fuel for	drying or	commerci	al	$ 5000	$	5000
48		drying ch	arge			---		
49								
50	7. Mac	hinery re	pairs:					
51	tot	al for AL	L CROPS $	7500		$ 4074	$	4074
52				---				
53	8. Com	mercial s	torage ch	arges in				
54	$ p	er bushel	$	0.17		$ 7966	$	7966
55				---				
56								

9. Miscellaneous costs								
total for ALL CROPS	$	4000		$	1899		$	1899
10. Subtotal				$	50673		$	50673
11. Return to operating capital								
a.opportunity cost(%)		13.00	%	$	4941			xx
b.months from planting								
to sale		9	mo.					
12. Interest payment on operating								
loan for this crop					xx		$	2500
13. Total				$	55614		$	53173
B. MACHINERY OWNERSHIP (total for ALL crop machinery)								
1. Depreciation				$	14000			xx
2. Return on investment								
a.machinery value	$	100000		$	11000			xx
b.opportunity cost(%)		11.00	%					
3. Machinery insurance				$	500		$	500
4. a. Principal payments					xx		$	16000
b. Interest payments					xx		$	7000
5. Subtotal (for all crop acres)				$	14500		$	23500
6. Total for this crop				$	7877		$	12765
C. LABOR								
1. Hired labor				$	375		$	375
a.total for ALL CROPS		500						
b.% used on this crop		75.00	%					
2. Unpaid operator and family labor				$	5200			xx
a.total months		13.00	mo.					
b.value per month	$	1000	/mo.					
c.% used on this crop		40.00	%					
3. Family living								
a.total for the year		16000			xx		$	6400
4. Total				$	5575		$	6775
D. LAND AND CROP IMPROVEMENTS (total for all crops)								

1. Return on investment								
a. Land value	per acre	2500	/acre	$	69500			xx
b. Opportunity cost (%)		4.00	%					
2. Property taxes and insurance (total, if owned)				$	10000	$	10000	
3. a. Principal payments (if owned)					xx	$	46000	
b. Interest payments (if owned)					xx	$	100000	
4. Cash rent (if land is cash rented)				$	16800	$	16800	
a. Cash rent	per acre	140	/acre					
b. Cash rented acres		120	acres					
5. Depreciation on improvements				$	1550			xx
6. Subtotal (for all crop acres)				$	97850	$	172800	
7. Total for this crop				$	46461	$	82049	
E. TOTAL COSTS (for this crop)								
1. Totals from A,B,C,D				$	115526	$	154762	
2. Total cost per acre				$	350.08	$	468.98	
3. Total cost per bushel or ton				$	2.47	$	3.30	
F. NET WORTH BREAK EVEN								
1. Principal payments						$	30533	
2. Depreciation						$	8341	
3. Income needed to maintain net worth						$	132570	
4. Income per acre needed to maintain net worth						$	401.73	
5. Price needed to maintain net worth						$	2.83	

Worksheet prepared by:
William Edwards, extension economist
Nancy Barickman And Rod Focht, student assistants
June 1983

Reference: ISU Extension publication FM-1777, Figuring Your Crop Production Costs

Adjusted acres for whole farm:	608	
Adjusted acres for this crop:	330	
Total acres for this crop:	330	

VII. Worksheet Equations

A. Original Equations (resulting output in red print on Worksheet pages)

H32: + F32
Duplicates economic cost of seed.

H34: + F34
Duplicates economic cost of fertilizer.

H36: + F36
Duplicates economic cost of herbicide.

H38: + F38
Duplicates economic cost of insecticide.

H40: + F40
Duplicates economic cost of custom hire.

H42: + F42
Duplicates economic cost of crop insurance.

F45: + D45/E174*E176
Divides fuel cost by total adjusted acres, multiplies by crop adjusted acres.

H45: + F45
Duplicates economic cost of fuel and lubrication.

H47: + F47
Duplicates economic cost of drying.

F51: + D51/E174*E176
Divides machinery repair cost by total adjusted acres, multiplies by crop adjusted acres.

H51: + F51
Duplicates economic cost of machinery repairs.

F54: + D54*H6*E178
Multiplies storage cost per bushel by yield and this crop acres.

H54: + F54
Duplicates economic cost of storage.

H58: + F58
Duplicates economic cost of miscellaneous.

F60: + H32 + H34 + H36 + H38 + H40 + H42 + H46 + H47 + H52 + H55 + H57
Subtotal of cash flow operating costs.

F63: + F60*D63*D66/1200
Calculates interest opportunity cost on operating costs.

F71: + F60 + F63
Total of economic operating costs.

H71: + H60 + H69
Total of cash flow operating costs.

F78: + D78*D80/100
Calculates opportunity cost of machinery investment.

H83: + F83
Duplicates machinery insurance cost.

F89: + F75 + F81 + F83
Subtotal of economic machinery costs for all crop acres.

H89: @SUM(H83 ... H87)
Subtotal of cash flow machinery costs for all crop acres.

F91: + F89/E174*E176
Divides economic machinery costs by total adjusted acres, multiplies by crop adjusted acres.

H91: + H89/E174*E176
Divides cash flow machinery costs by total adjusted acres, multiplies by crop adjusted acres.

F96: + D97*D99/100
Calculates hired labor cost for this crop.

H96: + F96
Duplicates economic hired labor cost.

F101: + D102*D104*D106/100
Calculates value of operator and family labor for this crop.

H109: + D109*D106/100
Calculates value of family living expense for this crop.

F112: + F96 + F101
Subtotal of economic labor costs.

H112: + H96 + H109
Subtotal of cash flow labor costs.

F118: + D118*D120/100*F20
Calculates opportunity cost of land investment.

H123: + F123
Duplicates economic costs of property tax and insurance.

F130: + D131*D133
Calculates total cash rent cost.

H130: + D131*D133
Calculates total cash rent cost.

F138:@SUM(F118 ... F136)
Subtotal of economic land costs.

H138:@SUM(H121 ... H136)
Subtotal of cash flow land costs.

F140: + F138*E178/F20
Multiplies by proportion of total crop acres in this crop.

H140: + H138*E178/F20
Multiplies by proportion of total crop acres in this crop.

F145: + F71 + F91 + F112 + F140
Total of economic costs.

H145: + H71 + H91 + H112 + H140
Total of cash flow costs.

F147: + F145/E178
Economic cost per acre.

H147: + H145/E178
Cash flow cost per acre.

F149: + F147/H6
Economic cost per bushel or ton.

H149: + H147/H6
Cash flow cost per bushel or ton.

G154:(H85*H91/H89) + (H126*H140/H138)
Machinery and land principal payments for this crop.

G156:(F75*F91/F89) + (F136*F140/F138)
Depreciation cost for this crop.

G158:(H145 − G154 + G156)
Total cash flow cost minus principal payments plus depreciation.

G160: + G158/E178
Net worth breakeven per acre.

G162: + H160/H6
Net worth breakeven per bushel or ton.

E174: + F10 + (.7*F12) + (1.2*F14) + (.6*F16) + (.9*F18)
Adjusted crop acres for whole farm.

E176: + H10 + (.7*H12) + (1.2*H14) + (.6*H16) + (.9*H18)
Adjusted acres for this crop.

E178: + H10 + H12 + H14 + H16 + H18
Total acres for this crop.

VIII. Formats

Set the global format to "integer" by typing /GFI.

Set individual formats in the following cells by typing /F$ while the cursor is in the indicated cell:

D54	F147	G160	H147
D63	F149	G162	H149
D80			
D102			
D120			

IX. Reference

I.S.U. Extension publication FM-1777, *Figuring Your Crop Production Costs.*

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