

USING PRODUCTION COSTS AND BREAKEVEN LEVELS TO DETERMINE INCOME POSSIBILITIES

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Executive Summary

This session describes production costs on farms and detail methods for calculating production costs:

- We identify seven benefits that potentially accrue to farmers who calculate their own production costs. Arguably, the most important benefit is that calculating production costs will close a “control” loop on farms. Many farmers use projected costs in planning. Over time, planning accuracy will increase if projected costs are compared to actual costs.
- Production costs vary dramatically across farms. For example, the per acre costs of producing corn and soybeans were averaged over four years between 1995 through 1998 for crop farms who are enrolled in Illinois Farm Business Farm Management and have high quality farmland. Farms ranked in the top one-third in terms of profits per acre had total cost of \$353 per acre. Per acre costs for farms in the low one-third was \$430, a difference of \$77 per acre from farms in the top one-third. This range in costs points out the need for a farm to calculate their own costs: relying on averages can result in dramatic differences in costs. It also points out the need for cost control.
- We present a means of calculating production costs on an individual farm. The method makes use of a Microsoft Excel spreadsheet called the cost allocation worksheet. This worksheet is available at no cost on the world wide web (web.aces.uiuc.edu/farm.doc). Users of the spreadsheet enter yearly expenses incurred on the farm. These expenses then are allocated to different enterprises that the user specifies. This spreadsheet simplifies the process of calculating production costs.

Using Production Costs and Breakeven Levels to Determine Income Possibilities

by Gary Schnitkey and Dale Lattz



Topics

- 1. Benefits of knowing your cost of production**
- 2. Averages from FBFM**
- 3. Difficulties in calculating costs of production**
- 4. Basis for calculating costs**
- 5. Variability in costs from FBFM records**
- 6. Demonstration of cost allocation worksheet**
- 7. Procedures for allocating costs**
- 8. Factors separating high from low profit farms**

Benefits of Knowing Costs of Production

Benefits

- 1. Useful in budgeting/planning**
- 2. Close control loop**
- 3. Less reliance on farm averages**
- 4. Better information**
- 5. Identify strengths and weaknesses**
- 6. Marketing targets**
- 7. Site specific farming**

1. Useful in budgeting/planning

- Complete cash flow and budgets

1-2 Crop Costs		Total cost per acre for each land class								
<input type="button" value="Return"/>		<input type="button" value="Help"/>								
Corn		Fertilizer	Herbicide	Insecticide	Seed	Dry & Store	Crop Insurance	Machine Hire	Cash Rent	Other
1. xxxxxxxxxxxx		61.0	33.0	0.0	34.0	14.0	12.0	0.0	0.0	0.0

2. Close control loop

- **Many farmers do projected cash flows and budgets**
- **Need to compare projections to actual results to control business**

3. Less reliance on averages

Costs on farms vary

**Per Acre Costs for Farms with High
Quality Farmland, 1995 to 1998.**

	Low 1/3	Mid 1/3	High 1/3
Total costs	\$430	\$379	\$353

Grouped by average mgt. returns

4. Better information

- **Land purchases**
- **Land rental decisions**
- **Expand/quit livestock enterprises**
- **Machinery purchases**

5. Identify strengths and weaknesses

- **Comparisons to budgets**
- **Comparisons to benchmarks**

Benefits

6. Marketing targets

- direct costs
- total costs
- profit level

7. Site specific farming

- need cost data to use this data

Per Acre Budgeted Values From FBFM

Actual Versus Projected Costs, FBFM, Central Illinois Farms

Total Variable Costs Per Acre

Year	1996	1997	1998	1999	2000	2001
Corn	\$165	\$170	\$169	\$160	\$164	\$179
Soybean	\$100	\$106	\$103	\$99	\$101	\$104

Expense Adjustments

- **Fuel costs**
 - \$4 increase per tillable acre
 - More for corn, less for beans
- **Drying (higher LP price, higher moisture(?))**
 - \$4 per corn acre
- **Nitrogen fertilizer costs**
 - \$7 per corn acre

Anhydrous Ammonia Prices

Year	Per ton	Per Acre
1996	\$303	\$28
1997	\$303	\$28
1998	\$253	\$23
1999	\$211	\$19
2000	\$227	\$21
2001	\$300	\$28

Source: U.S.D.A.

Per acre based on 150 lbs actual N applied

Adjustments

- **Soybeans for corn (?)**
- **N rates**
- **“Higher” priced inputs**
- **Leasing terms**

Corn Returns - Soybean Returns

Year	Difference
1996	\$127
1997	-24
1998	-11
1999	-20
2000	-8
2001	-38



6.7 bu. of soybeans

Why switch to soybeans?

- **Costs and loan rates seem to favor soybeans**
- **Less risk**
 - **Lower chances of very low yields**

Why stay with corn?

- **More likely to be above loan rate**
 - **Yesterday (\$2.54 for Dec 01 corn, \$5.19 for Nov 01 soybeans on C.B.O.T.)**
- **Don't screw up rotation**
- **Greater possibility of high yields and high income**

Difficulties in Calculating Production Costs

- **More than one enterprise**
- **Difficulty in allocating costs to more than one enterprise**
- **Difficulties in allocating overhead costs**
- **Requires detailed accounting records**
- **Uncertainties**

Basis for Calculating Costs

Basis

Important for comparability

Across years -- should be consistent

**Across farms -- should be consistent if
you want correct comparisons**

Need to know when looking at costs in press

Common Basis for Cost Calculation

1. Cash flow (not accepted)

- Analyzes sources of cash flow**
- Useful for looking at cash flow position**
- Should not be used to analyze profitability**
- Includes IT and LT principal payments, unfinanced capital purchases, and family living withdrawals**

Common Basis for Cost Calculation

2. Financial

- **Returns and costs based on accrual accounting method**
- **No charges for unpaid labor or equity capital**
- **Includes depreciation**

Common Basis for Cost Calculation

3. Economic

- **Useful for making comparisons across farms**
- **Useful for analyzing long-run investment decisions**
- **Includes opportunity costs for capital and operator labor**

Example of Three Methods

- **Based on economic costs to grow corn in Northern Illinois during 1999**
- **Show difference between the methods**
 - **For owned land**

Per Acre Variable Costs, Corn

	Cash Flow *	Financial	Economic
Variable costs			
Fertilizer	\$49	\$49	\$49
Pesticides	32	32	32
Seed	35	35	35
Drying, storage	13	13	13
Mach repair	<u>35</u>	<u>35</u>	<u>35</u>
Total	\$164	\$164	\$164

*Cash flow could differ from other basis.

Overhead and Labor

	Cash		
	Flow	Financial	Economic
Variable costs	\$164	\$164	\$164
Overhead	33	33	33
Paid labor	5	5	5
Unpaid labor *			29
Family Living	25		
Running total	\$227	\$202	\$231

* Charge for operator's labor

Interest on Nonland Items

	Cash	Financial	Economic
	Flow		
Running total	\$227	\$202	\$231
Paid interest	10	12	
Interest charge *			<u>33</u>
Running total	\$237	\$214	\$264

*** Based on asset value times an interest rate**

Machinery Related Costs

	Cash	Financial	Economic
	Flow		
Running total	\$227	\$214	\$264
Depreciation		33	33
Inter. principal	10		
Purchases	20		
Running total	\$252	\$247	\$297

*** Based on asset value times an interest rate**

Land Costs for Owned Land

	Cash		
	Flow	Financial	Economic
Running total	\$252	\$247	\$297
Property taxes	28	28	28
Paid interest	30	30	
Principal payment	10		
Adjusted cash rent *			<u>111</u>
Running total	\$320	\$305	\$436

*** Gives opportunity cost for land investment**

Variability in Costs from FBFM Records

Demonstration of Cost Allocation Worksheet

Cost Allocation Sheet

Available at farm.doc

Web.aces.uiuc.edu/farm.doc

(in finance section under FAST tools)

Procedures for Allocating Costs

Procedures

- 1. Starting point**
- 2. Determine enterprises**
- 3. Unit of comparisons**
- 4. Period of analysis**
- 5. Adjustments**
- 6. Allocating costs**

2. Determine enterprises

Tradeoff:

Detail	versus	Accuracy
Usefulness (?)		Effort

Examples:

Corn

Soybeans

Custom work

Corn -- farm 1

Corn -- farm 2

3. Unit of comparison

Examples:

Crops:

**Total, Per tillable acre, Per operator acre,
per bu.**

Livestock:

Total, Per pig sold, Per cwt. sold

Custom work/farming:

Total

3. Unit of comparison

Operator acre.



Waits acres by share of revenue.

Why? Places costs on standard basis across rental arrangements.

Operator acre

1 owned or cash rent acre = 1 operator acre

1 share rent acre (50%) = .5 operator acre

Owned or	Share	Operator
Cash rent	Rent	Acre
1,000		1,000
	1,000	 500

4. Period of analysis

For crops, usually one year

5. Adjustments

- **Cash settlements -- share-rent landlord costs (e.g., farmer pays \$1,000 for seed but share-rent landlord pays his share of \$500, need to reduce seed expense by \$500)**

5. Adjustments

- **Accounts payable -- Costs already incurred but not paid for**
- **Prepaid expense -- Items paid for but related to next year's production (e.g., Apply and pay for 2001 fertilizer in 2000)**

5. Adjustments

Item	Cash Operating Expense	B.O.Y. Ac Pay.	E.O.Y. Ac Pay.	B.O.Y. Prepaid	E.O.Y. Prepaid	Cash Settle- ments	Expense
Interest	15045	1850	3550				16745
Labor	12927		1000				13927
Pesticides	22431			6500	9250		19681
N fertilizer	9062			4500	6500		7062
Other fertilizer	12700			10500	7500		15700
Seed	20712			7500	11750		16462
Machine hire	7855						7855
Drying	4637	1500					3137
Storage	3686						3686
Machine repair	14548						14548
Fuel	8790			1000	1000		8790

6. Allocate costs

Methods:

- 1. Direct -- know the cost for each category (e.g. fertilizer expense to corn)**
- 2. Indirect -- can not directly allocate costs. Need to use some allocation method (e.g., machinery and overhead expenses)**

Suggested indirect allocation methods for crops

- 1. Per tillable acre -- machinery expenses**
- 2. Per operator acre -- perhaps for overhead expenses, crop expenses**
- 3. Budget -- based on estimated percentages from Illinois crop budgets**
- 4. Total revenue**
- 5. Total expenses**

Factors Separating High Profits from Low Profit Farms

Data

- **FBFM farms**
- **640 grain farms:**
 - little revenue from livestock
 - high soil rating
 - data from 1995 through 1998
- **Divide into high, mid, low 1/3 categories based on average management return over the four years**

Per Acre Revenue and Costs, FBFM Farms, Central Illinois, High Soil Rating, 1995-98

	High 1/3	Mid 1/3	Low 1/3
Gross Revenue	\$415	\$396	\$380
Total Expense	<u>353</u>	<u>378</u>	<u>428</u>
Mgt. Returns	62	18	- 48

Characteristics

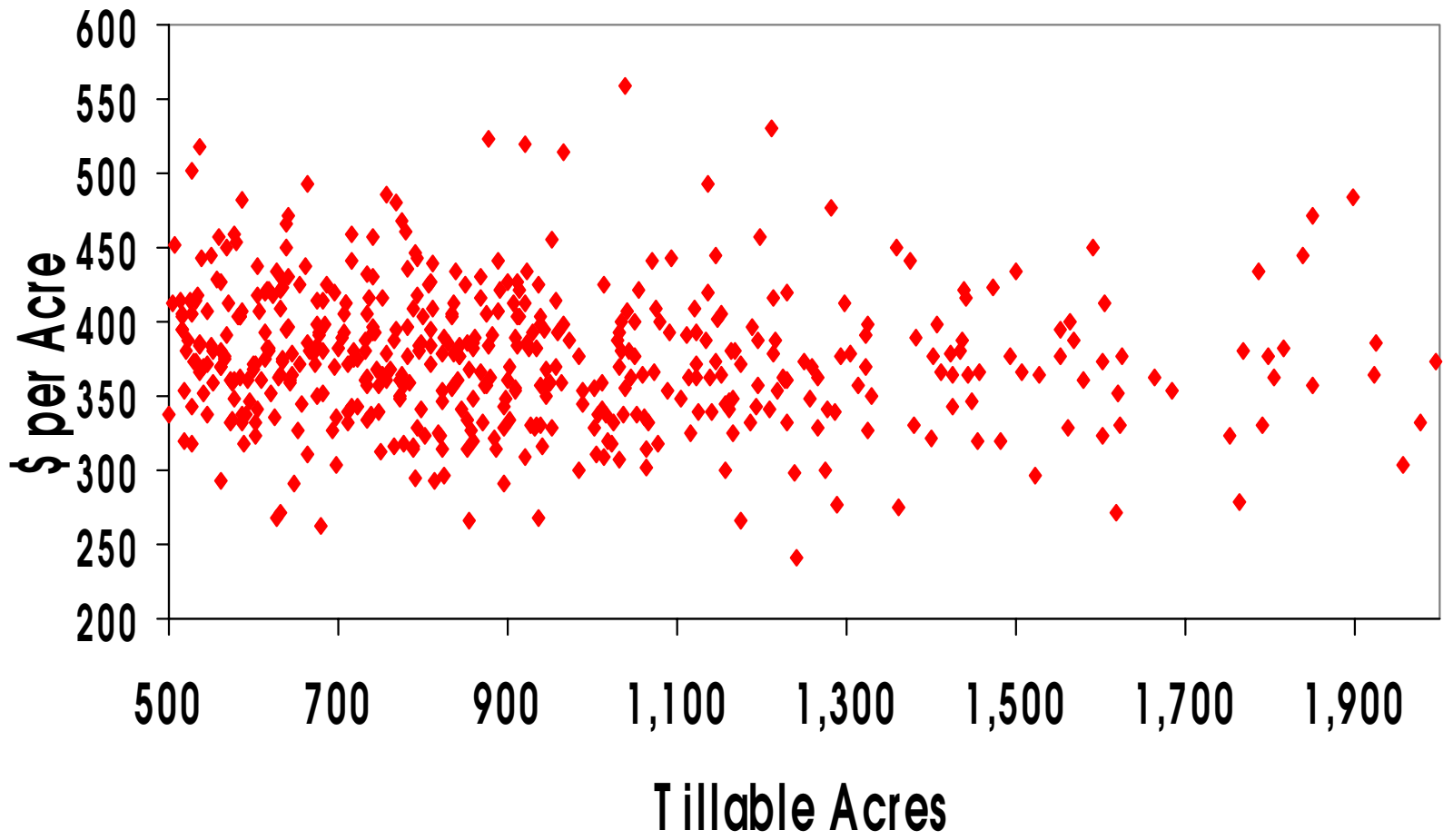
Averages for 1995-98

	High 1/3	Mid 1/3	Statistic
			Diff.
Total acres	988	977	No
Percent rented	87%	83%	No
Soil rating	92	91	No
Corn yield	152	146	Yes
Soybean yield	49	48	Yes
Corn price	\$2.72	\$2.71	No
Soybean price	\$6.75	\$6.69	No

Costs Per Acre

Item	High 1/3	Mid 1/3	Difference
Crop	\$93	\$98	-5
Power	58	63	-5
Building	18	18	0
Labor	32	35	-3
Other	48	50	-2
Land	<u>104</u>	<u>114</u>	<u>-10</u>
Total	352	378	-25

Total Costs and Tillable Acres



Persistence Across Years

