Machinery Size, Costs and Ownership Alternatives – What's Right for You?

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Executive Summary

During this session, information useful in evaluating machinery decisions on farms is presented:

- The average Fair Market Value (FMV) of machinery on Illinois grain farms enrolled in the Illinois Farm Business Farm Management (FBFM) Association is $239 per acre for farms between 1,000 and 1,500 acres. Average FMVs decline as farm size increases. There is a large range in FMVs: 25 percent of the farms between 1,000 and 1,500 acres have FMVs below $172 per acre and 25 percent of the farm have FMVs above $259 per acre.

- Machinery costs on grain farms enrolled in Illinois FBFM averages $65.85 per acre. This is composed of utilities ($4.12 per acre), machinery repairs ($13.89), machinery hire and leasing ($4.94), fuel ($8.99), light vehicle ($1.54), and depreciation ($27.03).

- Worksheets and methods are shown to estimate machinery costs. A skip row planter example is presented.

- *FAST* tools are Microsoft Excel spreadsheets used to examine farm management problems. The *Machinery Economics* tool allows farmers to estimate the cost of field operations and to estimate the probability of completing field operations. This spreadsheet will be demonstrated during the session. A case example with different size planters on a 1,000 acre farm is presented.

- Software to evaluate leasing and rollovers is presented.

- Custom work costs are compared to revenue. Estimates place custom work costs for complete tillage, planting, and harvesting costs in the $70 per acre range. Revenue is in the $70 per acre range.

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http://www.farmdoc.uiuc.edu/

Outline

- Machinery values and costs from FBFM records
- Machinery cost calculations
- Machinery size questions
- Machinery ownership questions
- Custom work – Does it pay?

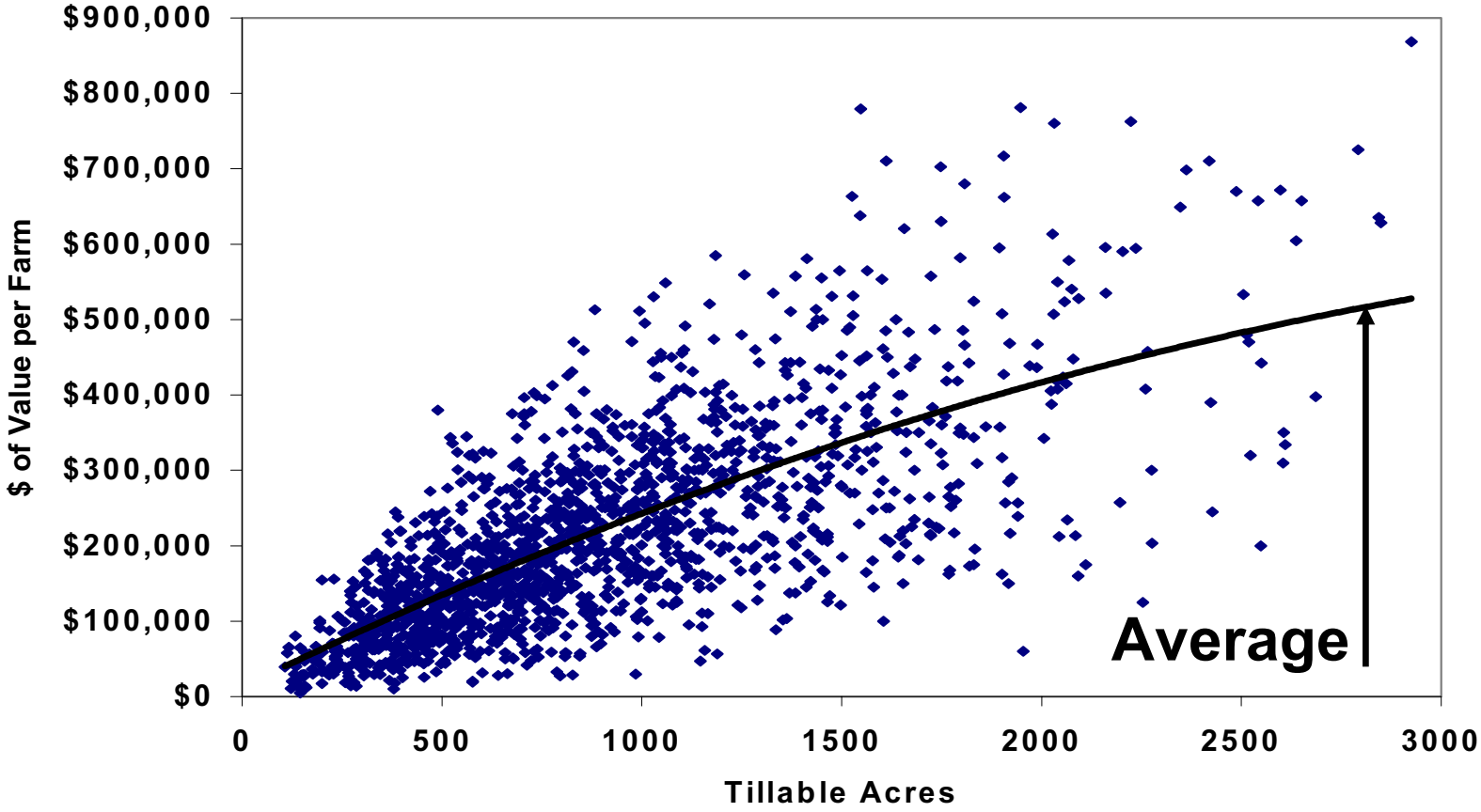
Machinery Values and Costs from FBFM Records

Provide benchmarks for evaluating costs on your farm

Machinery Fair Market Values (FMVs)

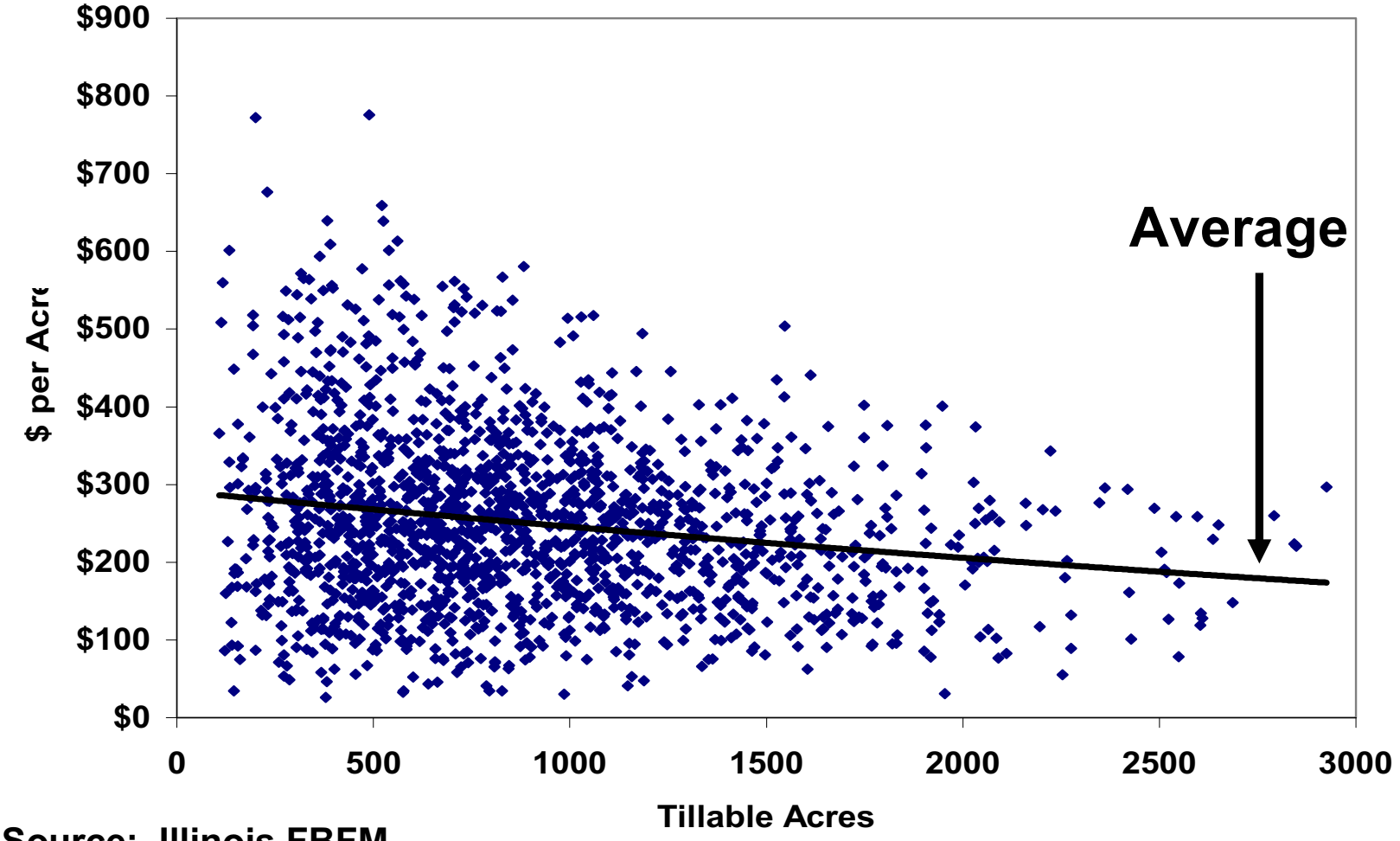
- **Next slide shows per farm FMVs for:**
  - **Farms enrolled in Illinois FBFM**
  - **Grain farms**
  - **Receive less than $20 of custom work per operator acre**

Machinery Fair Market Value (FMV), Illinois Grain Farms, 2000



Source: Illinois FBFM.

Machinery FMV Per Acre, Illinois Grain Farms, 2000



Source: Illinois FBFM.

Machinery FMV By Tillable Acres, Illinois Grain Farms, 2000

	- Breakpoints for FMV --		
Tillable	Low		High
Acres	25 %	Avg	25 %
Less than 500	$180	$273	$344
501 to 750	183	262	321
751 to 1,000	184	252	312
1,001 to 1,500	172	239	294
1,501 to 2,000	143	212	259
Over 2,000	134	203	260

Source: Illinois FBFM.

Using FMV Chart, Example

- **Have a 900 acre farm with a FMV on balance sheet of $297,000**
- **Farm has $330 of FMV per acre ($297,000 / 900)**
- **$312 is the breakpoint for upper 25 percent (see previous slide)**
- **The farm's FMV is in the upper 25 percent of farms between 751 to 1,000 acres**
- **Farm has high FMV**

Machinery Cost Basis By Tillable Acres, Illinois Grain Farms, 2000

	------- Breakpoints -------		
Tillable	Low		High
Acres	25 %	Avg	25 %
Less than 500	$11	$31	$64
501 to 750	21	41	72
751 to 1,000	24	45	70
1,001 to 1,500	34	60	86
1,501 to 2,000	36	62	86
Over 2,000	36	69	94

Source: Illinois FBFM.

Income Statement

FARM REVENUE				
Crops and feed:				
Cash receipts	$	115,959		
Inventory adjustments		22,851	138,810	
Livestock and product sales:				
Cash receipts		114,481		
Inventory adjustments		6,500	120,981	
Gov't payments & other farm receipts			23,000	
Change in farm accounts receivable			-	
GROSS REVENUE				$ 282,791
Less:				
Purchases of livestock		-	3,960	
Cost of purchased feed/grain		-	77,184	
VALUE OF FARM PRODUCTION				$ 201,647
FARM EXPENSES				
Cash operating expenses		$	130,729	
Noncash adjustments to expenses:				
Change in prepaid expenses & unused assets		-	-	
Change accounts payable & unpaid items		+	-	
Depreciation		+	35,500	
Total operating expenses		$	166,229	
Interest Expense				
Amount of interest paid in cash			31,668	
Change in accrued interest payable			(1,123)	
Total interest expense		$	30,545	
TOTAL FARM EXPENSES				$ 196,774
NET FARM INCOME FROM OPERATIONS				$ 4,873

Repairs, Leasing, Fuel, Light Vehicle, Labor

Depreciation

Interest

Machinery Costs Per Tillable Acre, Illinois Grain Farms, 2000

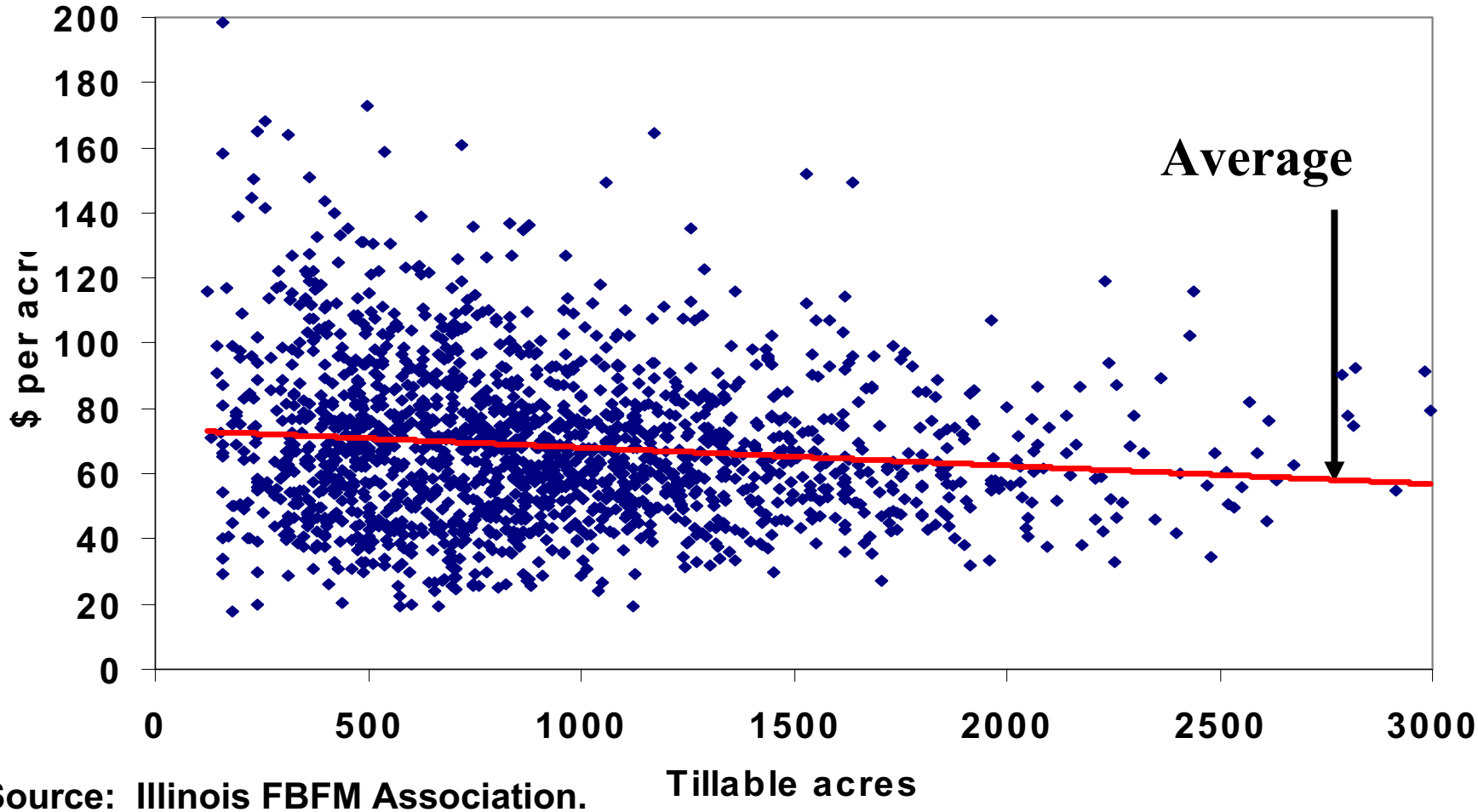
	---------- Breakpoints ----------		
Tillable	Low		High
Acres	25 %	Avg	25 %
Utilities	$2.59	$4.12	$6.62
Mach. repairs	9.57	13.89	19.66
Hire and leasing	1.19	4.94	11.72
Fuel	6.60	8.99	11.44
Light Vehicle	.19	1.54	3.48
Depreciation	15.18	27.03	37.67
Total	51.85	65.85	80.84

Source: Illinois FBFM.

Machinery Costs Per Tillable Acre by Size of Farm, Central Illinois Grain Farms, 2000

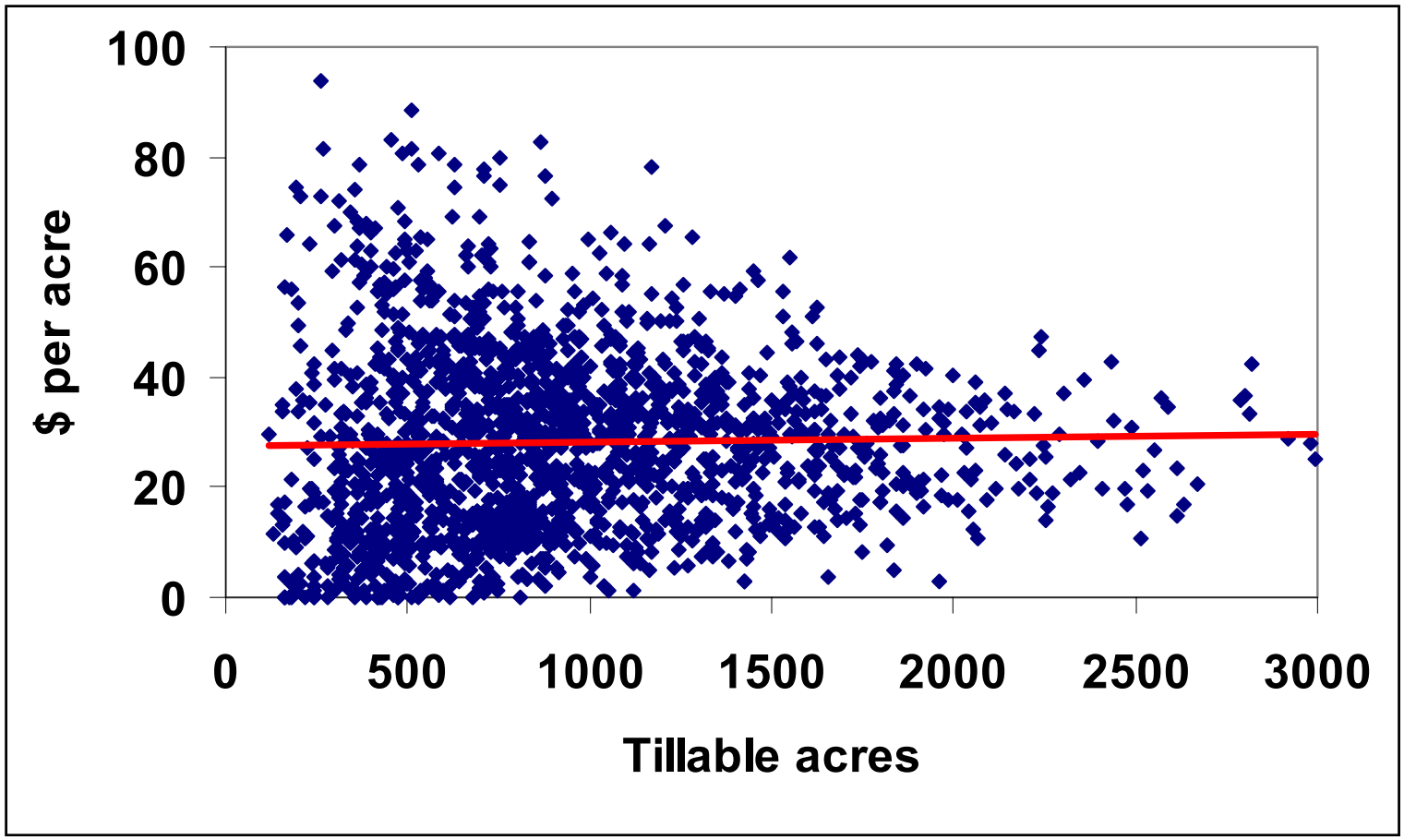
	Tillable acre range			
	180-499	500-799	800-1199	1200-1999
Utilities	$5.84	$4.85	$4.11	$3.54
Mach. repairs	14.76	14.68	13.57	13.18
Hire and leasing	8.06	6.23	5.94	6.52
Fuel	8.81	9.06	8.77	8.97
Light vehicle	3.13	2.55	1.71	1.35
Depreciation	30.71	29.65	29.34	27.84
Total	$71.30	$67.03	$63.43	$61.40

Power Costs Per Tillable Acre, Illinois Grain Farms, 2000



Source: Illinois FBFM Association.

Machinery Depreciation Costs Per Tillable Acre, Illinois Grain Farms, 2000



Source: Illinois FBFM Association.

Machinery Cost Calculations

- **See:**
  - **Tractor Cost Estimation Worksheet**
  - **Implement Cost Estimation Worksheet**

Machinery Cost Estimation Case Problem

- A farmer with 1,200 acre farm is considering buying a 12 row skip-row planter.
- Adding skip rows will increase the list price of the planter $30,000 and the purchase price of the planter by $26,000

Machinery Cost Estimation Case Problem,cont.

- The planter will be used for 10 years.
- At the end of the life, having skip rows will add $4,000 of value.
- Skip rows will be used on 600 acres of soybeans. It will take 40 hours per year to plant 600 acres.

Machinery Cost Estimation Case Problem,cont.

- The interest rate is 7 percent, the insurance, housing rate is 1 percent.

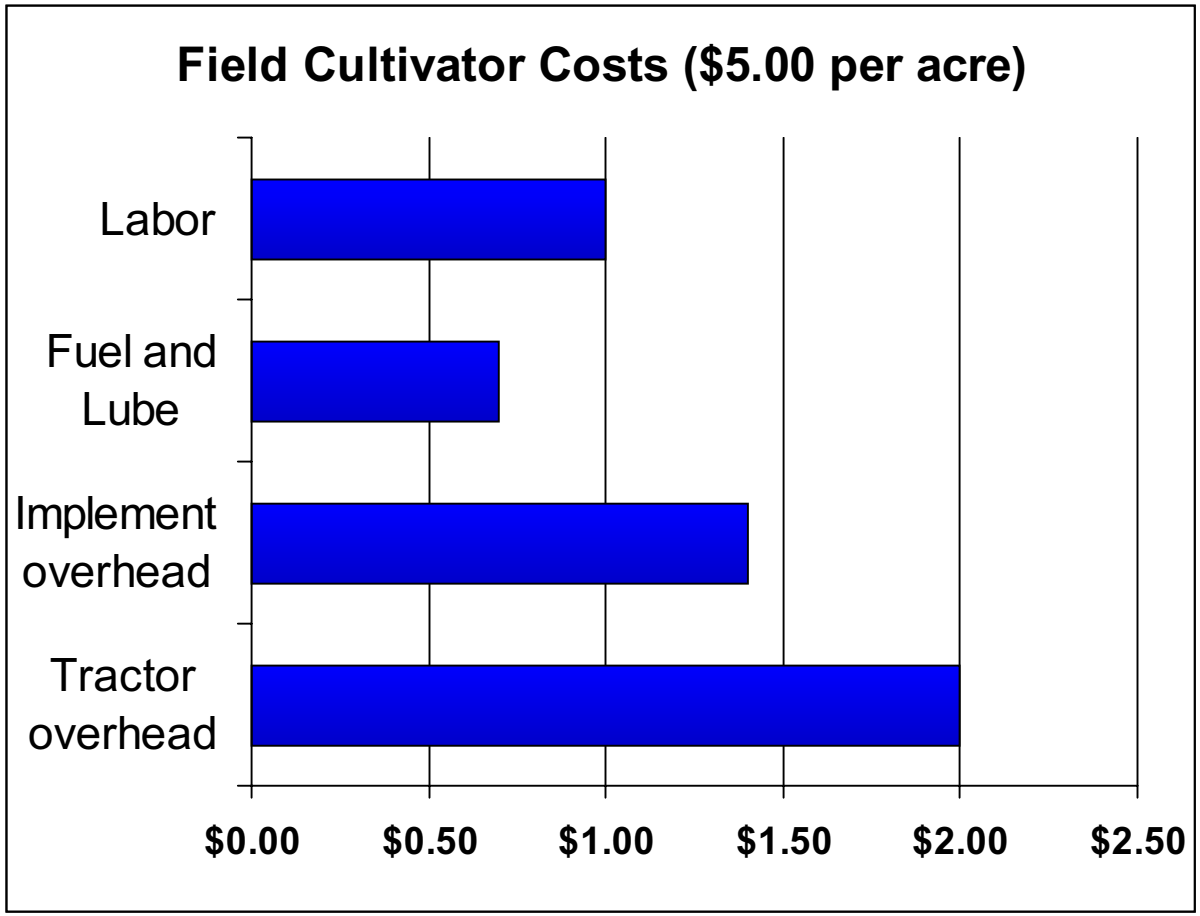
- How much additional revenue per acre must be received to justify the skip row planter

Cost Estimation in Custom Rates

- Procedures used in these worksheets are used to prepare U of I Machinery Cost Estimates
- Often use these publications in setting custom rates
- No profit built into the estimates

Cost Estimation and Custom Rates

- **Most of the costs are in overhead**
- **Need to consider when charging custom rates**



Machinery Cost Estimation

- Demonstrate cost sections of machinery economics worksheets
- Review “Machinery Cost Estimate” fact sheets on Tools CD

Table 3. Per Acre Costs for Combines of Different Sizes and Acres Harvested.

Total Acres[1]	190 hp combine 6-row corn head 20' grain head		220 hp combine 8-row corn head 25' grain head		260 hp combine 12-row corn head 30' grain head	
	Corn	Soybeans	Corn	Soybeans	Corn	Soybeans
	---- $ per acre ----		---- $ per acre ----		---- $ per acre ----	
600	37.80	32.30	41.10	34.90	47.90	38.00
800	31.30	26.30	33.10	27.80	37.40	29.90
1,000	27.70	22.90	28.40	23.70	31.20	25.20
1,200	25.60	20.80	25.60	21.10	27.20	22.10
1,400	24.30	19.50	23.50	19.30	24.40	19.90
1,600			22.30	18.10	22.40	18.40
1,800			21.30	17.20	20.90	17.30
2,000					19.70	16.40
2,200					18.80	15.70
2,400					18.20	15.20

[1] Assumes half the acres are corn and half are soybeans.

Source: Machinery Cost Estimates: Combines, U of I, Dept of ACE

Comparing Costs Across Studies

- Costs can vary across studies because of method

- Depreciation (tax or other)
- Interest (included or not included)

Comparing Costs Across Studies, Example

- Presented benchmarks from FBFM records
- Also used U of I cost estimates

- Next slide compares the alternatives

Comparison of Cost Categories

	FBFM Power Costs	U of I Cost Estimates
Depreciation	Tax	Straight line
Interest	Not included	Estimated
Insurance	Not in power costs	Elsewhere
Fuel and oil	Actual	Estimated
Repairs	Actual	Estimated
Utilities	Actual	Not included

What's the Right Size of Machinery?

Factors to Consider:

- **Timeliness**
- **Labor availability**
- **Land ownership and tenure (lease) position**
- **Future expansion possibilities and plans**
- **Equity and income tax situations**
- **Business cycle stage**
- **Other?**

What's the Right Size of Machinery - example

- 1,000 acre farm, corn-soybean rotation
- 8, 12 or 16 row planter
- Timeliness issues
- Costs (savings) of operations
- Use machinery economic tools to demonstrate

What's the Right Size of Machinery - example

Central Illinois 1,000 acre farm, corn soybean rotation
Complete planting between April 15 and May 15

	Chance of completing	Cost per acre	Additional cost/year	Additonal cost/10 yr.
8 - row	67%	$7.21	----	----
12 - row	95%	$8.13	$920	$9,200
16 - row	98%	$9.54	$1,410	$14,100

Joint Ownership of Machinery

Factors to Consider:

- **Ownership agreement and method**
- **Overcoming scheduling problems – who does what when?**
- **Responsibility of operator labor, repairs and maintenance**
- **Differences in acreage farmed**
- **Accounting and bookkeeping issues**
- **Compatibility of individuals, most important!!**

Joint Ownership of Machinery - example

- 2 farmers operating 1,000 acres each
- Each own a combine, 6 row corn head and 20 foot grain platform
- Potential savings in owning 1 combine together
- Use machinery economic tools to demonstrate

Joint Ownership of Machinery - example

Central Illinois farm, corn soybean rotation
Complete harvesting between Sept. 10 and Nov. 1

Acres	Combine size	Chance of completing	Completion date (ave.)	Cost per acre	Additional savings/year	Additonal savings/10 yr.
2 -1,000	2 - 6-row, 20'	99%	Oct. 14	$25.31	----	----
2,000	1 - 8-row, 25'	44%	Nov. 1	$18.65	$13,320	$133,200
2,000	1 - 12-row, 30'	99%	Oct. 18	$18.09	$14,440	$144,400

Machinery Ownership – Lease vs. Buy?

- Lease vs. buy examples
- Machinery example
- Machine shed example
- Combine rollover example
- Use machinery economic tools to demonstrate

True Tax Lease – May be Considered Contract Purchase if:

- Part of payment goes toward equity interest
- Get title to property after you make a stated amount of required payments
- Pay much more than current fair rental value of property
- You have an option to buy the property at a nominal price compared to the fair market value when option exercised

True Tax Lease – May be Considered Contract Purchase if:

- The agreement designates part of the lease payments as interest
- The amount you must pay to use the property for a short period of time is a large part of the amount you would pay to get title to the property
- Facts and circumstances of agreement

Custom Work – Does it Pay?

Typical Per Acre Costs of Operations

	Fuel	Labor	Repairs	Depr.	Other Overhead	Total
Chisel plow	$1.50	$2.10	$1.19	$3.78	$2.23	$10.80
Disk	0.70	1.00	$0.74	$2.35	$1.91	6.70
Field cultivate	0.70	1.00	$0.55	$1.75	$1.00	5.00
Planter	0.70	1.40	$0.87	$2.77	$2.16	7.90
Row cultivate	0.80	1.50	$0.51	$1.61	$0.18	4.60
Field sprayer	0.70	0.60	$0.26	$0.84	$0.00	2.40
Anhydrous application	0.80	1.40	$0.84	$2.66	$1.90	7.60
Combine	2.75	2.30	$2.79	$8.89	$8.67	25.40
Total	$8.65	$11.30	$7.75	$24.65	$18.05	$70.40
Cumulative	xxx	$19.95	$27.70	$52.35	$70.40	

Summary

- Machinery cost calculations and examples
- What's the right machinery size
- Machinery ownership alternatives
- Custom work