

Machinery Issues

Ag Profitability Conferences
Spring 2006

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www.agmanager.info



Purpose of machinery education

- Develop an understanding of the costs associated with owning and operating machinery
- Trying to reduce decisions to numbers
 - Custom hire
 - Own vs. rent
 - Lease vs. purchase
 - Trading strategies
- ... targeting the decision tools:
 - *OwnSpray.xls, OwnTractor.xls*
 - *OwnCombine.xls, OwnBaler.xls*
 - *KSU-MachCost.xls*

Machinery cost categories

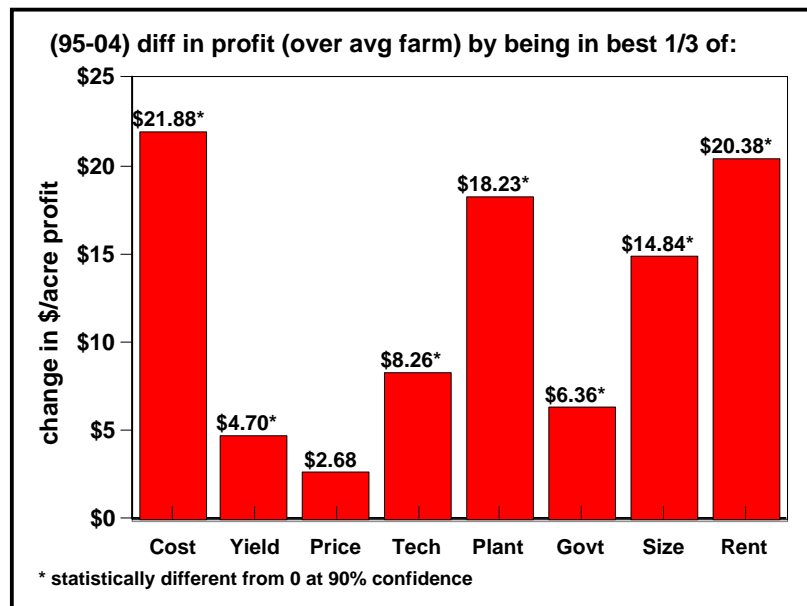
- **Repair and maintenance**
- **Labor**
- **Depreciation (market, not tax depreciation)**
- **Interest (opportunity interest)**
- **Fuel and lubrication**
- **Taxes insurance and shelter**

3

Costs Matter to the Bottom Line

**Machinery is an Especially Important
Cost**

4



Machinery large part of costs, but other stuff matters too

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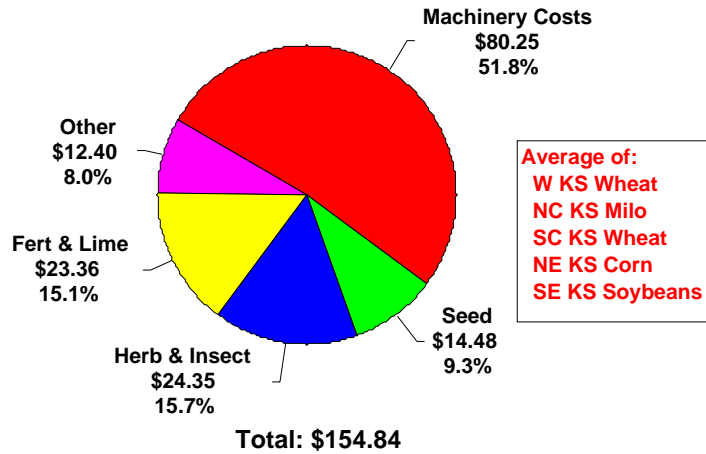
**How important are farm machinery costs for Kansas farmers?
a 5-year analysis**

Kansas Farm Management Association Enterprise Analysis Nonirrigated Crops – State Averages, 2000-2004							
	Corn	Irr Corn	Sorghum	Wheat	Soybean	Alfalfa	Total Ac
Number of Farms	68	28	121	216	119	40	2,222
Average Acres	318	538	325	588	332	120	
Costs, \$ per Acre							Wtd Avg
Seed	\$26.51	\$43.80	\$9.21	\$5.92	\$21.76	\$7.01	\$20.95
Fertilizer	33.94	46.52	21.99	17.95	3.59	9.16	25.13
Herb-Ins	22.50	40.09	19.73	5.29	17.03	11.61	20.39
Crop Ins	5.28	11.45	3.52	3.48	4.38	0.12	5.63
Machinery	74.09	111.05	55.66	58.32	64.39	79.01	74.98
Other	19.88	99.28	16.11	15.66	18.55	22.71	37.39
Land	36.07	51.24	18.49	20.93	26.12	42.33	32.01
Interest	17.81	33.40	13.07	12.15	15.12	16.87	18.94
Total Cost	\$236.07	\$436.83	\$157.78	\$139.70	\$170.94	\$188.83	\$235.41
Machinery, %	31.4%	25.4%	35.3%	41.7%	37.7%	41.8%	31.9%

Machinery costs would be larger if we prorated interest appropriately. Cost reflect operator costs on owned and rented land.

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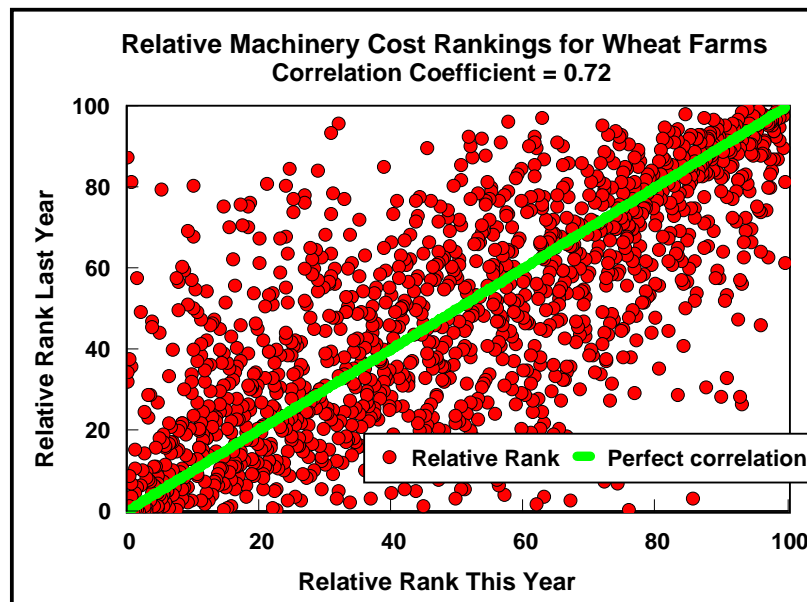
**Non-Land Crop Production Costs Per Acre, Kansas, 2000
Farm Management Guides**



Last year machinery costs were split out in Farm Management Guides was 2000

**Machinery costs are highly variable across farms ...
a 5-year analysis**

Kansas Farm Management Association Enterprise Analysis Nonirrigated Crops -- State Averages, 2000-2004							
	Corn	Irr Corn	Sorghum	Wheat	Soybean	Alfalfa	
Number of Farms	68	28	121	216	119	40	
Average Acres							Total Ac
High profit farms	413	681	471	713	450	102	2,728
Mid profit farms	316	572	308	680	345	165	2,221
Low profit farms	226	357	197	372	202	89	1,353
Machinery Costs, \$/acre							Wtd Avg
High profit farms	\$57.89	\$90.74	\$45.05	\$48.62	\$53.37	\$71.06	\$60.70
Mid profit farms	\$64.99	\$105.81	\$53.48	\$51.89	\$62.11	\$71.65	\$69.46
Low profit farms	\$98.99	\$137.19	\$68.49	\$74.45	\$77.62	\$94.90	\$94.68
High less low, \$	-\$41.10	-\$46.45	-\$23.44	-\$25.83	-\$24.25	-\$23.84	-\$33.98
High less low, %	-41.5%	-33.9%	-34.2%	-34.7%	-31.2%	-25.1%	-35.9%



But, relative machinery costs are somewhat repeatable

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Machinery costs are important in explaining profitability differences across farms ... (a 5-year analysis)

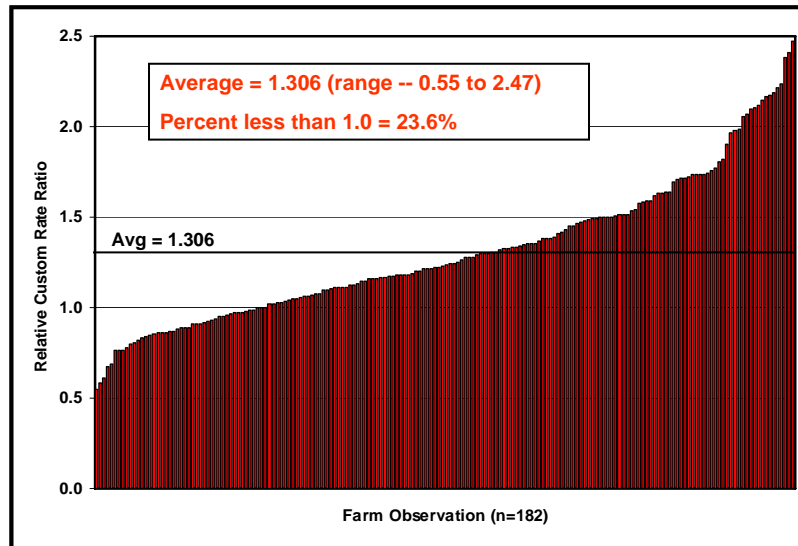
Kansas Farm Management Association Enterprise Analysis Nonirrigated Crops -- State Averages, 2000-2004							
	Corn	Irr Corn	Sorghum	Wheat	Soybean	Alfalfa	
Number of Farms	68	28	121	216	119	40	
Machinery Costs, \$/acre							Wtd Avg
High profit farms	\$57.89	\$90.74	\$45.05	\$48.62	\$53.37	\$71.06	\$60.70
Mid profit farms	\$64.99	\$105.81	\$53.48	\$51.89	\$62.11	\$71.65	\$69.46
Low profit farms	\$98.99	\$137.19	\$68.49	\$74.45	\$77.62	\$94.90	\$94.68
High less low, \$	-\$41.10	-\$46.45	-\$23.44	-\$25.83	-\$24.25	-\$23.84	-\$33.98
High less low, %	-41.5%	-33.9%	-34.2%	-34.7%	-31.2%	-25.1%	-35.9%
Differences between high profit farms and low profit farms in ...							
Net returns	\$96.69	\$120.63	\$73.15	\$70.38	\$71.16	\$140.10	\$83.04
Total costs	-\$103.44	-\$91.99	-\$63.07	-\$58.83	-\$55.74	-\$77.20	-\$70.23
Cost/net returns	107.0%	76.3%	86.2%	83.6%	78.3%	55.1%	84.6%
Mach/total costs	39.7%	50.5%	37.2%	43.9%	43.5%	30.9%	48.4%
Mach/net returns	42.5%	38.5%	32.0%	36.7%	34.1%	17.0%	40.9%

Machinery bigger part of costs for alfalfa relative to other crops. Managing costs really matters for corn – matters for alfalfa but revenue does too.

13

Benchmarking Machinery Costs

Relative custom rate ratio



KSU-MachCost.xls has grown out of this work.

Crop Machinery Investment, Kansas, 2004, \$/a

2004	as is /cropland	as is /crop	"if don't hire custom work"		\$custom-to-mkt investment factor
			/cropland	/crop	
NW	\$89	\$110	\$103	\$127	1.8
SW	\$90	\$149	\$106	\$176	1.6
NC	\$125	\$123	\$138	\$137	1.5
SC	\$131	\$132	\$149	\$149	1.8
NE	\$152	\$154	\$166	\$168	1.6
SE	\$161	\$147	\$174	\$159	1.8
KS	\$127	\$136	\$141	\$152	1.7

For benchmarking, multiply the factor times the \$/year of custom machine work you hire (NET of what you do for others) to estimate the additional machinery investment you might have if you did the work in house. Don't forget machine hire embedded in bundled charges (e.g., herbicide application).

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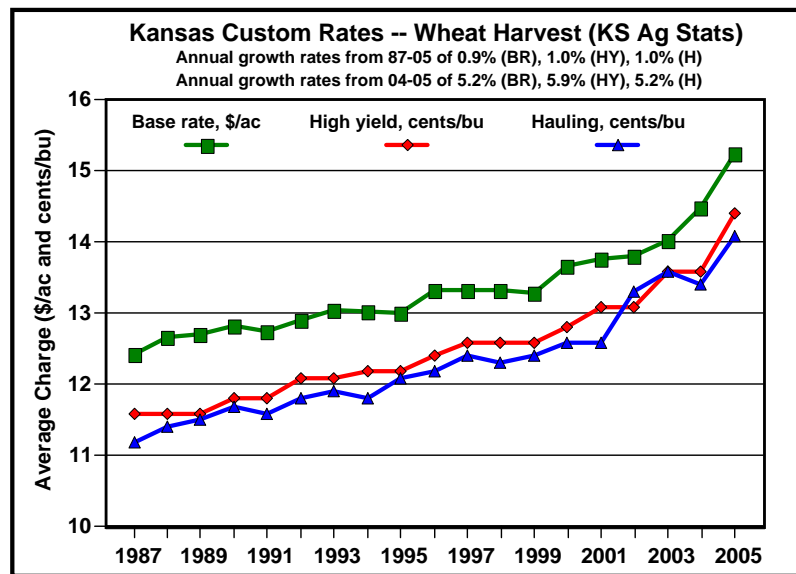
External benchmarking will become harder over time ...

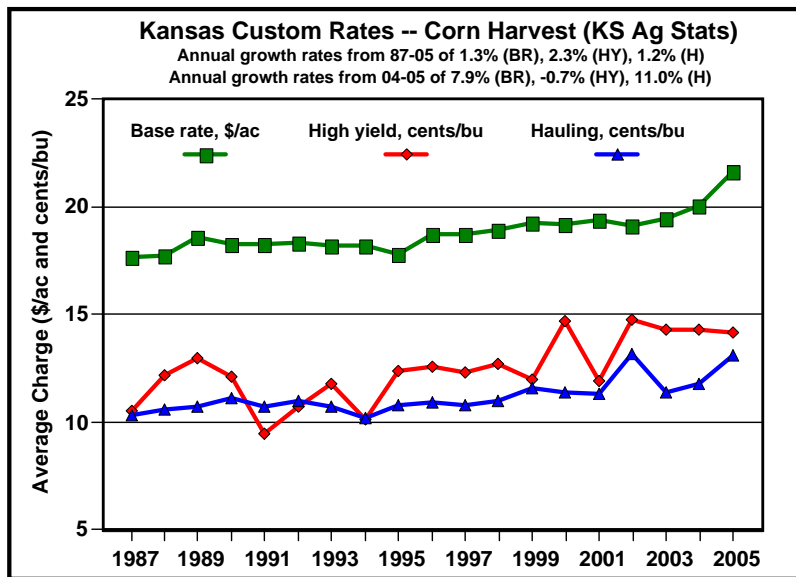
- Some farms do more custom hire
- Some farms rent machines
- Some farms do less tillage
- Some farms raise specialty crops

... external benchmarking may need to be done on broader categories (internal benchmarking will still be important but it is also affected by these factors)

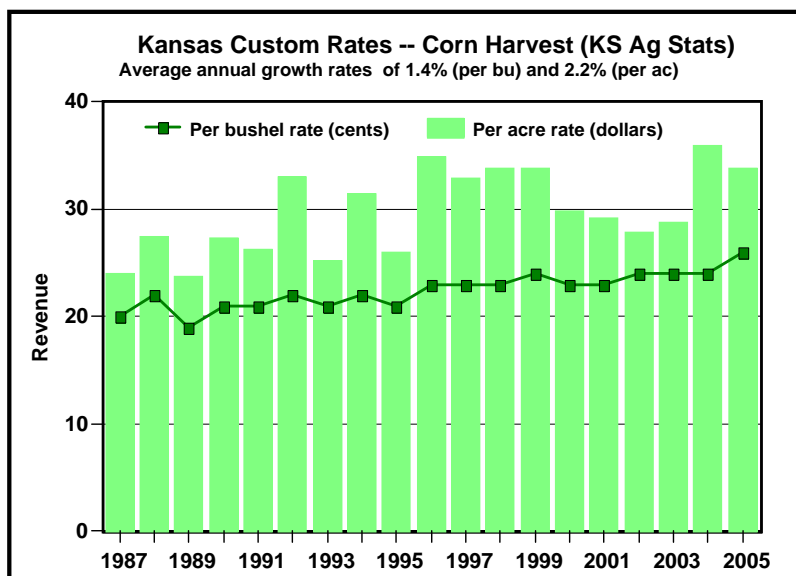
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Custom Rates

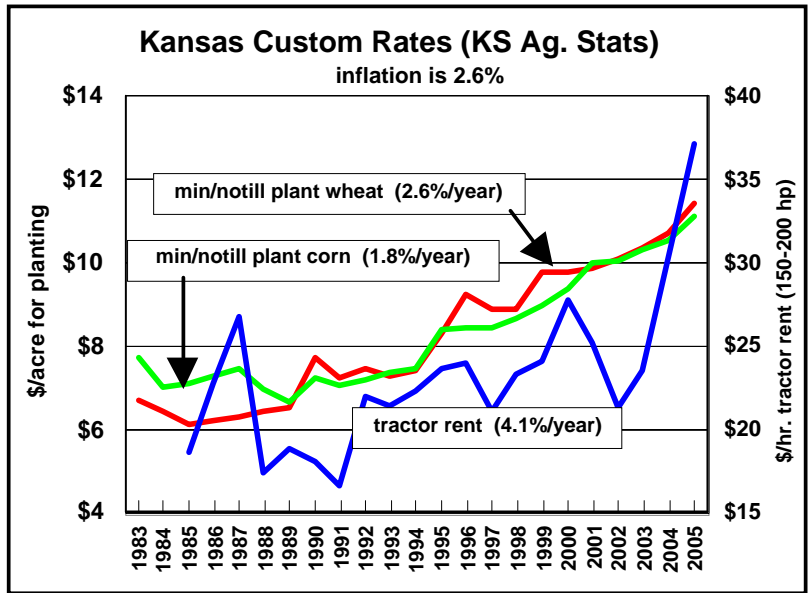
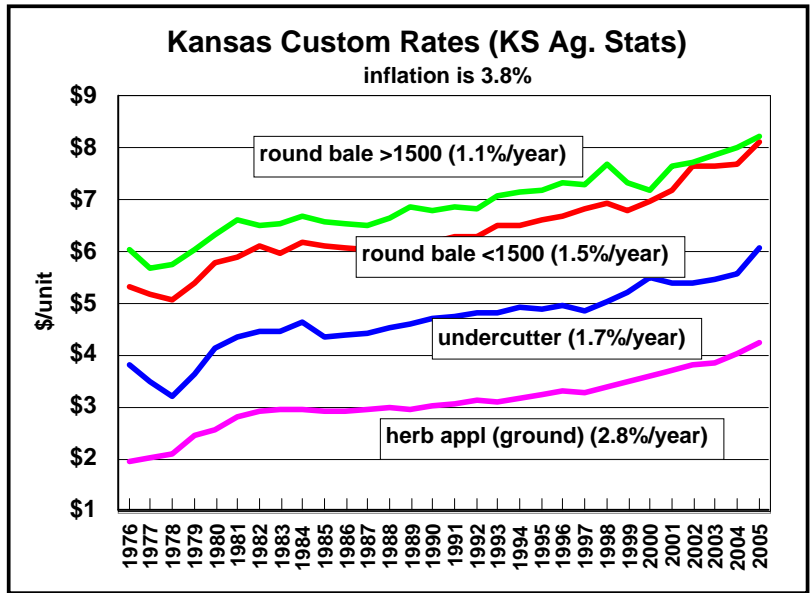


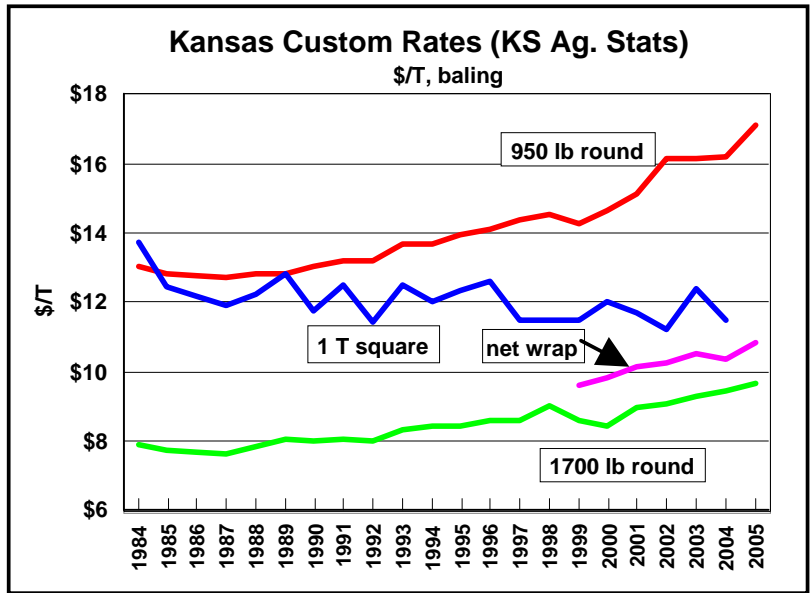


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Machinery Decision Tools at www.agmanager.info



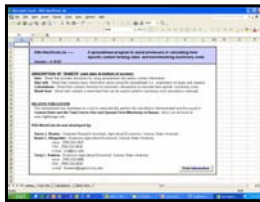
OwnCombine.xls



OwnBaler.xls



OwnSpray.xls



KSU-MachCost.xls



OwnTractor.xls

40

Microsoft Excel - OwnTractor(Oct2005).xls

File Edit View Insert Format Tools Data Window Help Adobe PDF

Type a question for help

Anal 12 B / I U \$ % +

1 A B C D E F G H I J K L M N O

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3

4 OwnTractor.xls --- A spreadsheet program to evaluate the economic costs of

5 owning and operating a tractor.

6

7 Version 10-17-05

8

9 **INPUTS vs CALCULATED VALUES**

10 In the "User input" tab all blue numbers are inputs and all black numbers are calculated from these

11 inputs.

12 **DESCRIPTION OF INPUTS:**

13 Several input cells (i.e., blue number) have a red diamond in the upper right hand corner of the

14 cell. By moving your mouse cursor over this diamond, a brief description of the input will be

15 displayed on the screen.

16

17 **MACROS**

18 This spreadsheet uses macros to print the three different pages, however printing can also be done

19 manually by highlighting the desired range and using the menu print commands.

20

21 **COMPANION PUBLICATION**

22 For explanation of the inputs used in this spreadsheet see the supporting paper OwnTractor.pdf.

23

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start

8:15 PM

Microsoft Excel - OwnTractor(Oct2005).xls

File Edit View Insert Format Tools Data Window Help Adobe PDF

Type a question for help

Anal 12 B / I U \$ % +

1 A B C D E F G H I J K L M N

2

3 User input and related calculations section (blue shaded cells are inputs)

4

5 Information pertaining to tractor depreciation and repairs

6

7 Tractor class

8 1 John Deere 2wd and MFWD

9 2 Case-IH 2wd and MFWD

10 3 AGCO 2wd and MFWD

11 4 John Deere full time 4wd

12 5 Case-IH full time 4wd

13 6 Cat / JD Track tractors

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15 Factors used in analysis => John Deere 2wd and MFWD

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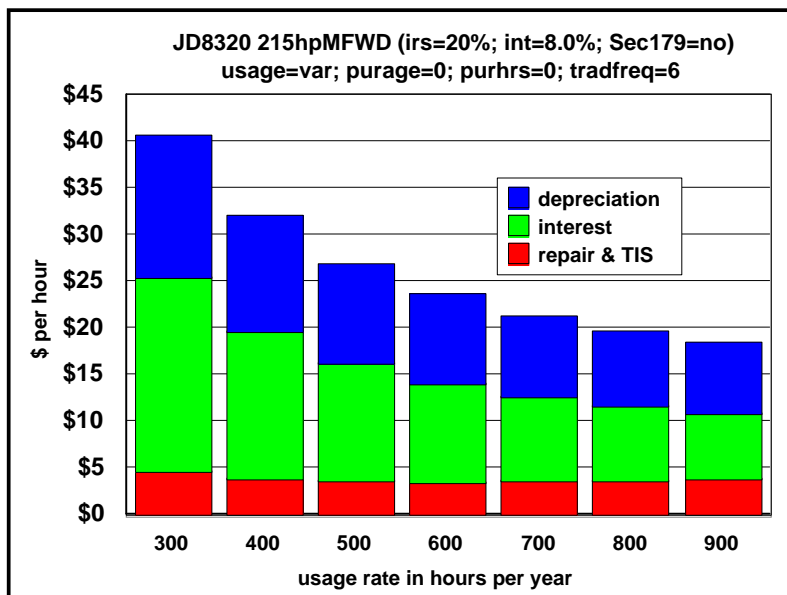
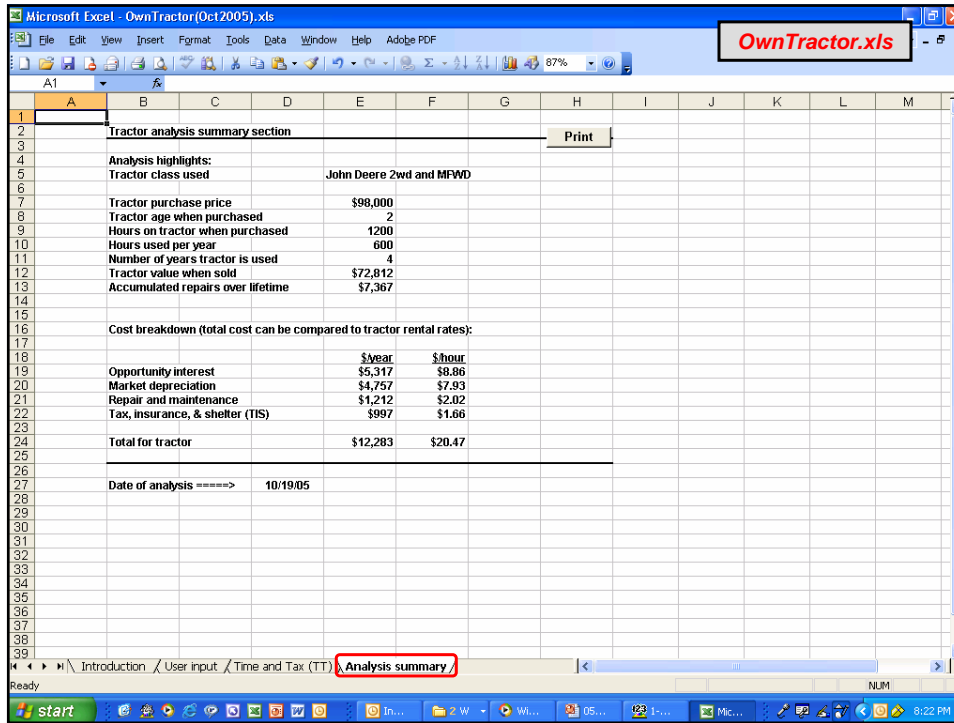
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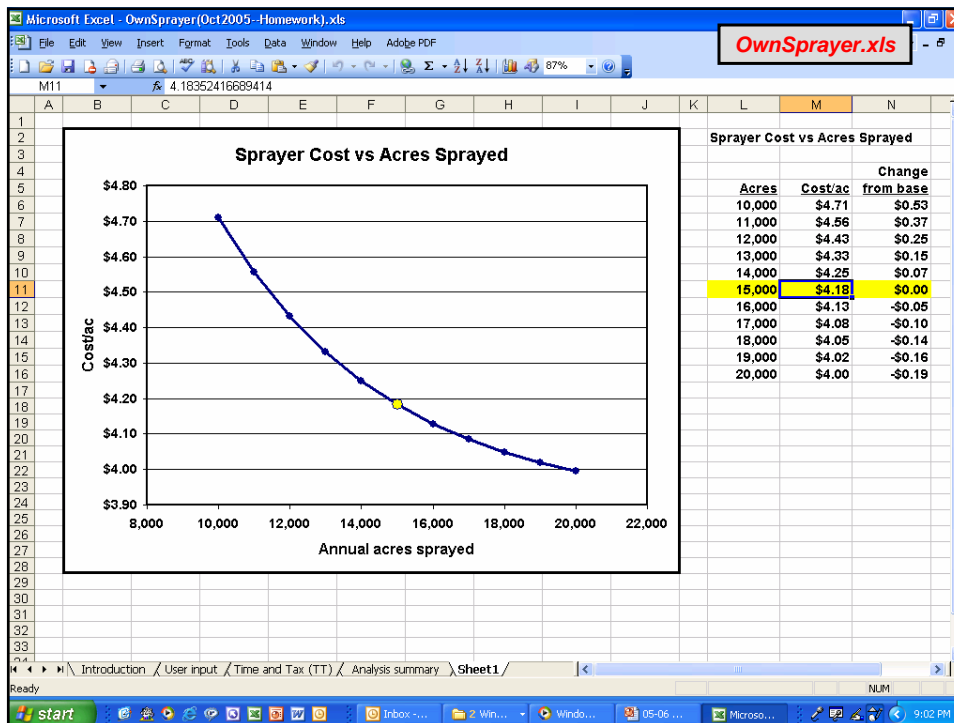
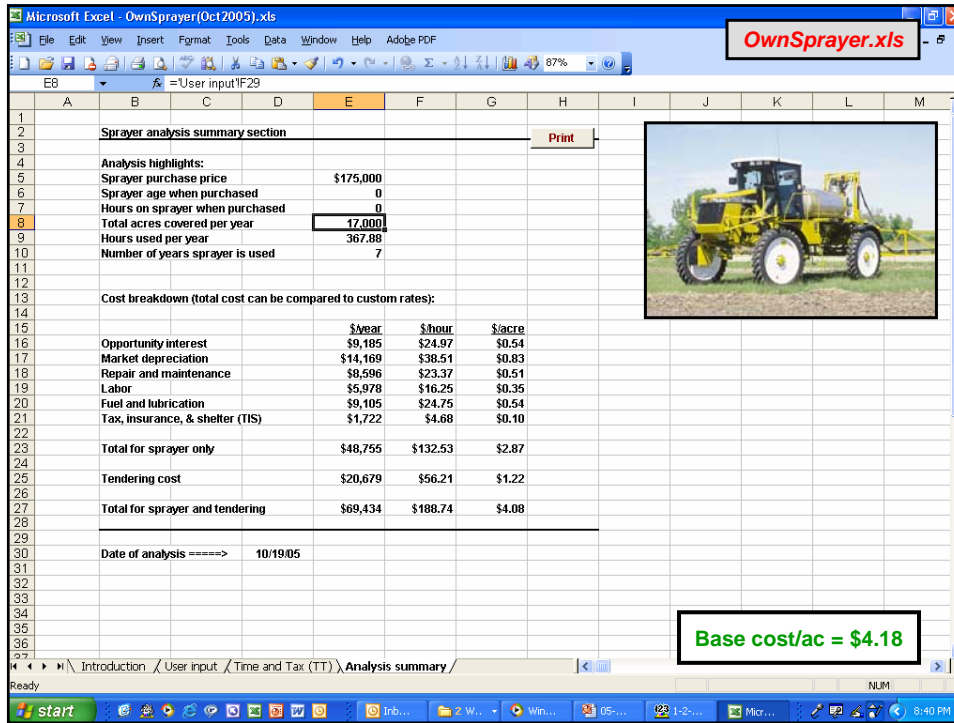
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Not a trading strategy, but putting more hours on per year really pays off




Microsoft Excel - OwnCombine(Oct12004).xls

OwnCombine.xls

Combine analysis summary section Print

Analysis highlights:
 Combine class used: JD 9660 (spread 8r corn 30' rigid)

Combine purchase price	\$180,000
Combine age when purchased	0
Hours on combine when purchased	0
Hours used per year	250
Total acres harvested per year	2,750
Number of years combine is used	14
Combine value when sold	\$29,887
Accumulated repairs over lifetime	\$113,550



Cost breakdown:

	\$/year	\$/hour	\$/acre
Opportunity interest	\$6,356	\$25.42	\$2.31
Market depreciation	\$10,580	\$42.32	\$3.85
Repair and maintenance	\$6,854	\$27.42	\$2.49
Tax, insurance, & shelter (TIS)	\$1,467	\$5.87	\$0.53
SUBTOTAL¹	\$25,257	\$101.03	\$9.18
Labor	\$5,357	\$21.43	\$1.95
Fuel and lubrication	\$6,531	\$26.13	\$2.38
SUBTOTAL	\$11,888	\$47.55	\$4.32
Total for combine	\$37,145	\$148.58	\$13.51

¹ Can be compared to combine rental rates if labor and fuel & lubrication are excluded.

Date of analysis =====> 11/30/04

Navigation: Introduction / User input / Time and Tax (TT) / **Analysis summary**


Microsoft Excel - OwnBaler(Oct2005).xls

OwnBaler.xls

Baler analysis summary section Print

Analysis highlights:
 Baler class used: Large round baler (using 0% twine and 100% net wrap)

Baler purchase price	\$29,000
Baler age when purchased	0
Bales on baler when purchased	0
Estimated hours on baler when purchased	0
Average weight of bales in lb	1,700
Bales made by baler per year	5,000
Tons of hay baled per year	4,250
Hours put on baler per year	168.90
Hours put on tractor hourmeter per year	295.57
Total acres baled per year	3,542
Number of years baler will be used	3
Baler value when sold	\$23,615
Accumulated repairs over lifetime	\$5,798



Cost breakdown:

	\$/year	\$/bale	\$/ton	\$/hour	\$/acre
Opportunity interest	\$2,114	\$0.42	\$0.50	\$12.51	\$0.60
Market depreciation	\$1,234	\$0.25	\$0.29	\$7.31	\$0.35
Repair and maintenance	\$1,806	\$0.36	\$0.42	\$10.69	\$0.51
Tax, insurance, & shelter (TIS)	\$396	\$0.08	\$0.09	\$2.35	\$0.11
SUBTOTAL¹	\$5,550	\$1.11	\$1.31	\$32.86	\$1.57
Twine or net wrap	\$6,651	\$1.33	\$1.56	\$39.38	\$1.88
Tractor rental charge	\$8,867	\$1.77	\$2.09	\$52.50	\$2.50
Labor	\$7,685	\$1.54	\$1.81	\$45.50	\$2.17
Fuel and lubrication	\$5,852	\$1.17	\$1.38	\$34.65	\$1.65
SUBTOTAL	\$29,055	\$5.81	\$6.84	\$172.03	\$8.20
Total for baling operation²	\$34,606	\$6.92	\$8.14	\$204.89	\$9.77

¹ Can be compared to baler rental rates since tractor, labor, and fuel & lubrication are excluded.
² Can be approximately compared to custom rates for **baling** if cost of related vehicles such as pickups is added.

Navigation: Introduction / User input / Time and Tax (TT) / **Analysis summary** / Baler Models

Own vs. Rent

- Weigh the \$/acre or \$/hour number coming out of the ownership spreadsheet against “rental rates” while considering timeliness issues and annual usage constraints associated with a lease arrangement

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Loan vs. Lease

- This can be more complicated, typically meriting a unique spreadsheet setup
 - Timing of cash flows always matters
 - Income tax always matters

 - Almost always is presented incorrectly by the folks providing the advice
 - Meaning the decision you make based on advice given is often wrong!

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Comparing The Options

In the Nov. 2005 issue of *CropLife*, a chart in the "Buy vs. Lease" story on p. 40 had incorrect numbers in some columns. Here are the correct figures.

New John Deere Sprayer 4720

Selling Price	\$160,000.00		
Amount Financed	\$128,000.00		
	Installment	Lease Program	Lease Program
Finance Option	Note**		
Term	60 months	60 months	36 months
Hrs			600
Down Payment			N/A
Amount Financed			60,000.00
Advance Payment			34,841.00
Purchase Option	N/A	\$51,000.00	\$79,500.00
Rate (fixed)	6.60%	N/A	N/A
Payment	\$30,890.00	\$29,083.00	\$34,841.00
Total Operating Cost	\$186,450.00	\$196,415.00	\$184,023.00
Difference In Operating Cost From Installment Note		(\$9,965.00)	\$2,427.00

What about when payments are made?

What about income tax implications?

Why not compare with buying outright for \$160,000?

*The above example is for illustrative purposes only.

**E

Always

SOURCE: John Deere Credit

5 payments of \$29,083

+ \$51,000 purchase

3 payments of \$34,841

+ \$79,500 purchase

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Total Operating Cost	\$186,450.00	\$196,415.00	\$184,023.00
Difference In Operating Cost From Installment Note		(\$7,742)	(\$12,990)

If tax rates are fed 15%, state 5%, SE 15.3%, below is the correct assessment

More importantly, the loan will always look better in this case, no matter what the tax rate

*The above example is for illustrative purposes only.

**Equipment ownership through installment note financing may also create depreciation tax deductions.

Always discuss your equipment acquisition plans with a qualified accountant or tax consultant.

SOURCE: John Deere Credit

Questions ???



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