

Machinery Ownership and Leasing

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Purpose of module

- 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:
 - "OwnSeries" (Excel spreadsheets)
 - *OwnBaler.xls*, *OwnCombine.xls*, *OwnSprayer.xls*, and *OwnTractor.xls*
 - *KSU-MachCost.xls*
 - *KSU-GPSguidance.xls*
 - *GuidanceSectionControlProfitCalculator.xls* and *.swf*

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Module:
Machinery Ownership and Leasing

Session:
**Using the machinery decision tools and
machinery homework**

Machinery Decision Tools at www.agmanager.info



OwnCombine.xls



KSU-GPSguidance.xls



OwnBaler.xls



OwnSprayer.xls



KSU-MachCost.xls



OwnTractor.xls

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Guidance & Section Control Profit Calculator

Instructions | Whole Farm Data | Sprayer | Planter | Fertilizer | Other | Whole Farm Results

To Get Started,
Click the Instructions Tab

welcome to the
Guidance & Section Control Profit Calculator

Sponsored by

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OwnSprayer.xls, OwnTractor.xls, OwnCombine.xls ...

- Excel spreadsheets developed to help producers calculate the cost of owning and operating self-propelled sprayers, tractors, and combines.
- **Sprayer & Combine**
 - costs per year, per hour, and per acre
- **Tractor**
 - costs per year and per hour
- Analysis is based on after-tax net present value of costs but summary costs are converted back to pre-tax for rent/hire comparison purposes.
- OwnSprayer.pdf and OwnTractor.pdf – supporting papers available on the web (OwnCombine is standalone)

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Machinery Market Valuation Methods

- KSU – use industry values from “Blue Book” to estimate depreciation for different classes/brands
 - Calculated against advertised / “Resale Cash” price for new
 - $RVP_{age} = 100 \cdot \exp[B_1(\text{age}) + B_2(\text{accumulated hrs}/100)]$

Example KSU market depreciation parameters:

	B_1	B_2
Caselh-3185 sprayer	-0.034234	-0.007216 (<i>OwnSprayer</i>)
JD 2wd/MFWD	-0.045150	-0.003776 (<i>OwnTractor</i>)
Case-IH 4wd	-0.059531	-0.003771 (<i>OwnTractor</i>)
JD 9670STS combine	-0.093717	-0.028173 (<i>OwnCombine</i>)
(also includes an interaction term ($B_3 = -0.001521$))		

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Microsoft Excel - OwnTractor.xls

OwnTractor.xls

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

Information pertaining to tractor depreciation and repairs

Tractor class	Depreciation factors	Repair factors
	RF1	RF2
1 John Deere 2wd and MFWD	-0.0481693	-0.0077789
2 Case IH 2wd and MFWD	-0.0519024	-0.00408182
3 AGCO 2wd and MFWD	-0.0505913	-0.0050833
4 John Deere Full time 4wd	-0.04821542	-0.00463268
5 Case IH full time 4wd	-0.0505913	-0.0077789
6 Cat / JD Track tractors	-0.0078027	-0.00582279

Factors used in analysis = John Deere 2wd and MFWD

Tractor class (1-4)	Section 179 deduction (max of \$20,000 in 2008)
1	50%
2	50%
3	50%
4	50%

Tractor age in years: 2
 Hours on tractor: 1200
 Purchase price of tractor with trade-in: \$118,000
 Market price of tractor: \$118,000
 Cash downpayment: \$40,000
 Calculated new equivalent price (NEP): \$135,138
 No. of seasons (years) before trade (maximum 20): 4
 Hours tractor will be used annually: 600
 Repair adjustment factor (0.8 to 1.2, usually 1) (RAF): 1.00
 Tax, insurance, & shelter (TIS, % of value, decimal): 1.00%
 Bank interest rate (enter as decimal): 7.50%
 State + U.S. marginal income tax rate (decimal): 29%
 Self-employment tax (if self-employed): 10.7%
 Calculated after-tax discount rate: 4.85%
 Calculated after-tax assumption factor: 0.8937
 Calculated 1-year after-tax discount factor: 0.9827

Print

Microsoft Excel - OwnTractor.xls

OwnTractor.xls

Tractor rental rates section

Year	after tax MFWD	after tax MFWD	after tax MFWD	after tax MFWD
	% of value	% of value	% of value	% of value
1	43.25%	37.89%	34.61%	36.50%
2	43.25%	37.89%	34.61%	36.50%
3	43.25%	37.89%	34.61%	36.50%
4	43.25%	37.89%	34.61%	36.50%

Print

Microsoft Excel - OwnTractor.xls

OwnTractor.xls

Tractor analysis summary section

Analysis highlights:

Tractor class used: John Deere 2wd and MFWD

Tractor purchase price	\$118,000
Tractor age when purchased	2
Hours on tractor when purchased	1200
Hours used per year	600
Number of years tractor is used	4
Tractor value when sold	\$69,969
Accumulated repairs over lifetime	\$8,767

Cost breakdown (total cost can be compared to tractor rental rates):

	Expense	Shelter
Opportunity interest	\$5,534	\$10,990
Market depreciation	\$5,764	\$9,461
Repair and maintenance	\$1,571	\$2,820
Tax, insurance, & shelter (TIS)	\$1,319	\$2,300
Total for tractor	\$15,248	\$26,411

Date of analysis: 9/21/08

Print

Machinery homework ...

Example scenarios to give you an opportunity to use *OwnSprayer.xls* to evaluate sprayer ownership and operating costs.

OwnTractor.xls, *OwnCombine.xls*, and *GPS-Guidance.xls* will be used in a following session to examine machinery trading strategies.

Situation:

- ① You are a crop producer moving to no-till and you want to analyze the cost of purchasing your own sprayer and compare that to custom rates.
- ① Because your acres sprayed annually has varied over the last several years, you want your analysis to examine how cost varies with acres (you also want to consider costs versus sprayer use efficiency).
- ① You have some flexibility with regards to tax management so you want to look at how cost varies with regards to the use of Section 179. You also want to consider various years-of-use-before-trading strategies.

Base scenario:

- ① New JD 4830 sprayer cost is \$230,000
- ① Down payment of \$75,000 and finance rest at 5.0%
- ① Expect to use sprayer on 15,000 acres/year for 7 years
- ① Boom width of 90 ft, travel speed of 12 mph, 325 hrs/year
- ① Fuel consumption of 10 gph @ \$2.75/gal (+10% for lube)
- ① Taxes, insurance, and shelter (TIS) of 1.5% of value
- ① Labor hours of 1.25 hours/sprayer engine hour
- ① Labor cost of \$16/hr for sprayer op, \$13 for tendering
- ① Tendering cost of \$1.25/acre (plus labor)
- ① Income tax rate of 20% (15% fed + 5% state), SE = 15.3%
- ① Expect to use Sec 179 of \$0
- ① Depreciation rates are MACRS for 7-yr life asset

Machinery Ownership and Leasing Homework #1 – question #2 ...

2. Beginning with the base scenario, what would per acre costs be if you only sprayed 12,500 acres per year rather than 15,000? What about if you sprayed 17,500 acres? Does a +/- 2,500 acres change from the base have the same impact? What is your intuition as to why we get this result?

For those who want an additional challenge, graph the cost/acre (y-axis) versus acres sprayed annually (x-axis) varying acres sprayed from 10,000 - 20,000.

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Category	Value
Syrayer purchase price	\$230,000
Syrayer age when purchased	0
Hours on sprayer when purchased	0
Total acres covered per year	12,500
Hours used per year	271
Number of years sprayer is used	7
Cost breakdown (total cost can be compared to custom rates):	
Opportunity interest	\$7,793
Market depreciation	\$14,709
Repair and maintenance	\$6,012
Labor	\$5,418
Fuel and lubrication	\$5,194
Tax, insurance, & shelter (TIS)	\$2,338
Total for sprayer only	\$44,463
Tendering cost	\$19,146
Total for sprayer and tendering	\$63,610
Date of analysis	11/8/10

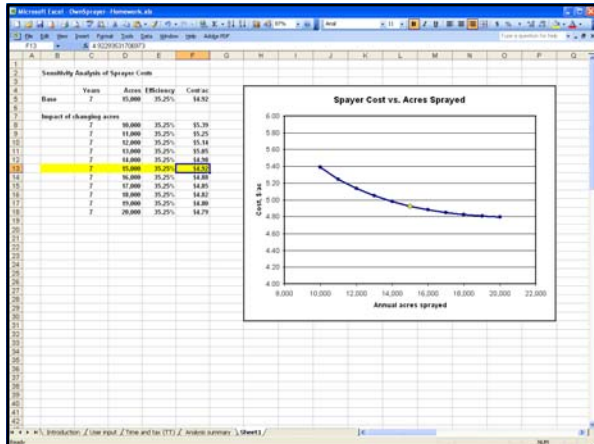
Category	Value
Sprayer analysis summary section	
Analysis highlights:	
Sprayer purchase price	\$230,000
Sprayer age when purchased	0
Hours on sprayer when purchased	0
Total acres covered per year	12,500
Hours used per year	271
Number of years sprayer is used	7
Cost breakdown (total cost can be compared to custom rates):	
Opportunity interest	\$7,793
Market depreciation	\$14,709
Repair and maintenance	\$6,012
Labor	\$5,418
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Tax, insurance, & shelter (TIS)	\$2,338
Total for sprayer only	\$44,463
Tendering cost	\$19,146
Total for sprayer and tendering	\$63,610
Date of analysis	11/8/10

Base cost/ac = \$4.92

Sheet legal and related calculations section (for shaded cells see inputs)									
Information pertaining to sprayer depreciation and repairs									
Sprayer class	age	100 hrs	age 1000 hrs	1000 hrs	1000 hrs	1000 hrs	1000 hrs	1000 hrs	1000 hrs
1	CaseIH 2100	11/10	11/10	11/10	11/10	11/10	11/10	11/10	11/10
2	CaseIH 2100	11/10	11/10	11/10	11/10	11/10	11/10	11/10	11/10
3	CaseIH 2100	11/10	11/10	11/10	11/10	11/10	11/10	11/10	11/10
4	CaseIH 2100	11/10	11/10	11/10	11/10	11/10	11/10	11/10	11/10
5	CaseIH 2100	11/10	11/10	11/10	11/10	11/10	11/10	11/10	11/10
6	CaseIH 2100	11/10	11/10	11/10	11/10	11/10	11/10	11/10	11/10
7	CaseIH 2100	11/10	11/10	11/10	11/10	11/10	11/10	11/10	11/10
8	CaseIH 2100	11/10	11/10	11/10	11/10	11/10	11/10	11/10	11/10
9	CaseIH 2100	11/10	11/10	11/10	11/10	11/10	11/10	11/10	11/10
10	CaseIH 2100	11/10	11/10	11/10	11/10	11/10	11/10	11/10	11/10
11	CaseIH 2100	11/10	11/10	11/10	11/10	11/10	11/10	11/10	11/10
12	CaseIH 2100	11/10	11/10	11/10	11/10	11/10	11/10	11/10	11/10
13	CaseIH 2100	11/10	11/10	11/10	11/10	11/10	11/10	11/10	11/10
14	CaseIH 2100	11/10	11/10	11/10	11/10	11/10	11/10	11/10	11/10
15	CaseIH 2100	11/10	11/10	11/10	11/10	11/10	11/10	11/10	11/10
16	CaseIH 2100	11/10	11/10	11/10	11/10	11/10	11/10	11/10	11/10
17	CaseIH 2100	11/10	11/10	11/10	11/10	11/10	11/10	11/10	11/10
18	CaseIH 2100	11/10	11/10	11/10	11/10	11/10	11/10	11/10	11/10
19	CaseIH 2100	11/10	11/10	11/10	11/10	11/10	11/10	11/10	11/10
20	CaseIH 2100	11/10	11/10	11/10	11/10	11/10	11/10	11/10	11/10
21	CaseIH 2100	11/10	11/10	11/10	11/10	11/10	11/10	11/10	11/10
22	CaseIH 2100	11/10	11/10	11/10	11/10	11/10	11/10	11/10	11/10
23	CaseIH 2100	11/10	11/10	11/10	11/10	11/10	11/10	11/10	11/10
24	CaseIH 2100	11/10	11/10	11/10	11/10	11/10	11/10	11/10	11/10
25	CaseIH 2100	11/10	11/10	11/10	11/10	11/10	11/10	11/10	11/10
26	CaseIH 2100	11/10	11/10	11/10	11/10	11/10	11/10	11/10	11/10
27	CaseIH 2100	11/10	11/10	11/10	11/10	11/10	11/10	11/10	11/10
28	CaseIH 2100	11/10	11/10	11/10	11/10	11/10	11/10	11/10	11/10
29	CaseIH 2100	11/10	11/10	11/10	11/10	11/10	11/10	11/10	11/10
30	CaseIH 2100	11/10	11/10	11/10	11/10	11/10	11/10	11/10	11/10
31	CaseIH 2100	11/10	11/10	11/10	11/10	11/10	11/10	11/10	11/10
32	CaseIH 2100	11/10	11/10	11/10	11/10	11/10	11/10	11/10	11/10
33	CaseIH 2100	11/10	11/10	11/10	11/10	11/10	11/10	11/10	11/10

Sprayer analysis summary section									
4	Analysis highlights:								
5	Sprayer purchase price	\$230,000							
6	Sprayer age when purchased	0							
7	Hours on sprayer when purchased	0							
8	Total acres covered per year	17,500							
9	Hours used per year	379							
10	Number of years sprayer is used	7							
13	Cost breakdown (total cost can be compared to custom rates):								
15	Opportunity interest	\$7,818	\$20.61	\$0.45					
17	Market depreciation	\$16,404	\$43.26	\$0.94					
18	Repairs and maintenance	\$12,146	\$32.00	\$0.70					
19	Labor	\$7,585	\$20.00	\$0.43					
20	Fuel and lubrication	\$11,472	\$30.25	\$0.66					
21	Tax, insurance, & shelter (TIS)	\$2,345	\$6.18	\$0.13					
23	Total for sprayer only	\$57,769	\$152.38	\$3.30					
24	Tendering cost	\$26,805	\$70.68	\$1.53					
26	Total for sprayer and tendering	\$84,574	\$223.07	\$4.83					
30	Date of analysis (mm/dd/yyyy)	11/8/10							

Base cost/ac = \$4.92



Machinery Ownership and Leasing Homework #1 – question #3 ...

3. Beginning with the base scenario, what is the per acre cost if efficiency drops from 35.25% (base) to 26.44% (75% of base)? What if it increases to 44.06% (125% of base)? Which has the greater impact on cost per acre, relative to the base?

For those who want an additional challenge, graph the cost/acre (y-axis) versus expected sprayer efficiency levels (x-axis) varying from approximately 20% to 50%.

Note: when efficiency changes with acres held constant, engine hours must change accordingly

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This screenshot shows a detailed Excel spreadsheet for machinery cost analysis. It includes various input parameters and calculated values for different efficiency levels. Key sections include:

- Input Parameters:** Sprayer age, purchase price, engine hours, and efficiency levels.
- Cost Breakdown:** Detailed calculations for depreciation, fuel, labor, and maintenance costs.
- Summary:** Total cost per acre and tendering cost for each scenario.

This screenshot shows a summary Excel spreadsheet for the sprayer cost analysis. It includes a table with the following data:

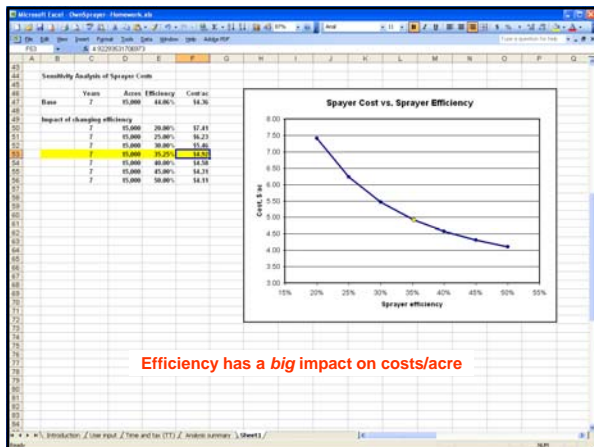
Category	Value
Sprayer purchase price	\$230,000
Sprayer age when purchased	0
Hours on sprayer when purchased	0
Total acres covered per year	15,000
Hours used per year	433
Number of years sprayer is used	7

Category	Year	\$/hour	\$/acre
Opportunity interest	\$7,808	\$18.02	\$0.52
Market depreciation	\$17,201	\$39.50	\$1.16
Repair and maintenance	\$16,096	\$37.14	\$1.07
Labor	\$8,968	\$20.00	\$0.58
Fuel and lubrication	\$13,111	\$30.25	\$0.87
Tax, insurance, & shelter (TIS)	\$2,343	\$5.40	\$0.16
Total for sprayer only	\$65,227	\$150.50	\$4.36
Tendering cost	\$24,384	\$56.26	\$1.63
Total for sprayer and tendering	\$89,612	\$206.76	\$5.97

Base cost/ac = \$4.92

Input	Value	Unit	Formula	Value	Unit	Formula
Market price of sprayer	\$230,000			\$230,000		
Hours used per year	200	hours		200	hours	
Number of years sprayer is used	7	years		7	years	
Total sprayer cost	\$230,000			\$230,000		
Market price of sprayer	\$230,000			\$230,000		
Hours used per year	200	hours		200	hours	
Number of years sprayer is used	7	years		7	years	
Total sprayer cost	\$230,000			\$230,000		

Category	Item	Value	Unit	Formula	Value	Unit	Formula
Cost breakdown (total cost can be compared to custom rates):	Opportunity interest	\$7,787	\$29.94		\$0.52		
	Market depreciation	\$14,533	\$55.89		\$0.97		
	Repairs and maintenance	\$5,521	\$21.23		\$0.27		
	Labor	\$5,201	\$20.00		\$0.35		
	Fuel and lubrication	\$7,866	\$30.25		\$0.52		
	Tax, insurance, & shelter (TIS)	\$2,336	\$9.98		\$0.16		
	Total for sprayer only	\$43,244	\$166.29		\$2.88		
	Tendering cost	\$22,131	\$85.10		\$1.48		
	Total for sprayer and tendering	\$65,375	\$251.40		\$4.36		
	Base cost/ac = \$4.92						



Machinery Ownership and Leasing Homework #1 – question #4 ...

4. Make sure efficiency is back to the base level (i.e., 35.25%). What is the annual cost if you purchased a 2-year old machine with 550 hours on it for \$170,000 and used it for 5 years before trading, and increase repair adjustment factor (RAF) from 1.0 to 1.1?

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Item	Value	Unit	Rate	Factor	Result	
Information pertaining to sprayer depreciation and repair						
Sprayer class	100 hrs	100 hrs	0.00	2	2000	
Cost of purchase	170000		0.00	2	340000	
Hours on sprayer when purchased	550		0.00	2	1100	
Hours used per year	325		0.00	2	650	
Number of years sprayer is used	5		0.00	2	10	
Factors used in analysis	0.00000	0.00000	0.00000	0.00	2	2000
Sprayer class	100 hrs		0.00	2	2000	
Hours on sprayer	550		0.00	2	1100	
Hours used per year	325		0.00	2	650	
Number of years sprayer is used	5		0.00	2	10	
Cost of purchase	170000		0.00	2	340000	
Cost of depreciation	170000		0.00	2	340000	
Cost of repair	170000		0.00	2	340000	
Cost of fuel	170000		0.00	2	340000	
Cost of labor	170000		0.00	2	340000	
Cost of maintenance	170000		0.00	2	340000	
Cost of insurance & shelter	170000		0.00	2	340000	
Cost of tendering	170000		0.00	2	340000	
Cost of total	170000		0.00	2	340000	

Sprayer analysis summary section			
Analysis highlights:			
Sprayer purchase price		\$170,000	
Sprayer age when purchased		2	
Hours on sprayer when purchased		550	
Total acres covered per year		15,000	
Hours used per year		325	
Number of years sprayer is used		5	
Cost breakdown (total cost can be compared to custom rates):			
		\$/year	\$/hour
Opportunity interest	\$6,410	\$19.72	\$0.43
Market depreciation	\$13,776	\$39.30	\$0.85
Repair and maintenance	\$10,900	\$33.53	\$0.73
Labor	\$6,501	\$20.00	\$0.43
Fuel and lubrication	\$9,823	\$30.26	\$0.66
Tax, insurance, & shelter (TIS)	\$1,923	\$5.92	\$0.13
Total for sprayer only	\$48,344	\$148.72	\$3.22
Tendering cost	\$22,976	\$70.68	\$1.53
Total for sprayer and tendering	\$71,320	\$219.41	\$4.75
Date of analysis	11/8/10		

Base cost/ac = \$4.92

Machinery Ownership and Leasing Homework #1 – question #4 ...

4. Make sure efficiency is back to the base level (i.e., 35.25%). What is the annual cost if you purchased the 2-year old machine with 550 hours on it for \$170,000 and used it for 5 years before trading (and increasing RAF to 1.1)?

At what purchase price, holding *market price* constant at \$170,000, is the cost per acre of the used sprayer equal to the new sprayer? That is, how “good of a deal” do you need or how much of a “premium” can you pay?

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Information pertaining to sprayer depreciation and repair	Year	Age	Price	Age	Price	Age	Price
1 - Current price of 2008 model (170,000)	0	0.00	170,000	0	0.00	0	0.00
2 - Current price of 2007 model (150,000)	1	0.00	150,000	1	0.00	1	0.00
3 - Current price of 2006 model (130,000)	2	0.00	130,000	2	0.00	2	0.00
4 - Current price of 2005 model (110,000)	3	0.00	110,000	3	0.00	3	0.00
5 - Current price of 2004 model (90,000)	4	0.00	90,000	4	0.00	4	0.00
6 - Current price of 2003 model (70,000)	5	0.00	70,000	5	0.00	5	0.00

Factor	Value	Rate	Value
Initial investment	170,000		170,000
Salvage value	0		0
Depreciation	170,000	100%	170,000
Operating cost	100,000	100%	100,000
Trade-in value	130,000		130,000
Net cost	40,000		40,000
Cost/acre	4.92		4.92

Machinery Ownership and Leasing Homework #1 – question #5 ...

5. Start back with the base scenario, what happens to cost per acre if you can take Section 179 of \$130,000?

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Item	Unit	Value	Rate	Value	Rate	Value	Rate
Input data							
Market price of sprayer	\$	120,000					
Market price of sprayer when purchased	\$	120,000					
Hours used per year	hrs	305					
Number of years sprayer is used	yr	7					
Cost breakdown (total cost can be compared to custom rates)							
Opportunity interest	\$	7,580	\$23.32	\$0.51			
Market depreciation	\$	15,109	\$48.48	\$1.01			
Repair and maintenance	\$	50,243	\$26.28	\$0.57			
Labor	\$	56,501	\$20.00	\$0.43			
Fuel and lubrication	\$	59,833	\$30.25	\$0.66			
Tax, insurance, & shelter (TIS)	\$	2,274	\$7.00	\$0.15			
Total for sprayer only	\$	149,540	\$153.33	\$3.32			
Tendering cost	\$	122,975	\$70.68	\$1.53			
Total for sprayer and tendering	\$	272,515	\$224.01	\$4.85			
Date of analysis		11/8/10					

Item	Unit	Value	Rate	Value	Rate	Value	Rate
Input data							
Market price of sprayer	\$	120,000					
Market price of sprayer when purchased	\$	0					
Hours on sprayer when purchased	hrs	0					
Total acres covered per year	acres	18,000					
Hours used per year	hrs	305					
Number of years sprayer is used	yr	7					
Cost breakdown (total cost can be compared to custom rates)							
Opportunity interest	\$	7,580	\$23.32	\$0.51			
Market depreciation	\$	15,109	\$48.48	\$1.01			
Repair and maintenance	\$	50,243	\$26.28	\$0.57			
Labor	\$	56,501	\$20.00	\$0.43			
Fuel and lubrication	\$	59,833	\$30.25	\$0.66			
Tax, insurance, & shelter (TIS)	\$	2,274	\$7.00	\$0.15			
Total for sprayer only	\$	149,540	\$153.33	\$3.32			
Tendering cost	\$	122,975	\$70.68	\$1.53			
Total for sprayer and tendering	\$	272,515	\$224.01	\$4.85			
Date of analysis		11/8/10					

Machinery Ownership and Leasing Homework #1 – question #5 ...

- Start back with the base scenario, what happens to cost per acre if you can take Section 179 of \$100,000?

What is the \$100,000 Section 179 tax benefit worth in terms of purchase price? That is, how much more could you pay for the new sprayer such that cost per acre is equal to the base scenario?

Sheet Input and related calculations for the following cells are inputs		Price	
Information pertaining to sprayer depreciation and repair			
Sprayer class	age	100 hrs	age 1000 hrs
1. CaseIH 2200 and 2200-4000	0.061613	0.011013	0.011013
2. CaseIH 2200 and 2200-4000	0.061613	0.011013	0.011013
3. John Deere S700	0.060905	0.010905	0.010905
4. John Deere S700	0.074315	0.014315	0.014315
5. John Deere S700	0.074315	0.014315	0.014315
6. Special equipment (e.g. 2200-4000)	0.061613	0.011013	0.011013
Factors used in analysis	0.060905	0.010905	0.010905
Sprayer class	Bank interest rate (percent)		5.00%
Hours per year	Calculated after tax discount rate		5.49%
Price per acre	Make + 15% (not used because tax rate given)		95.1%
Market price of sprayer at trade in	Self-employment tax @ 13.9%		95.1%
Market price of sprayer	Section 179 deduction limit of \$50,000 in 2016		150,000
Cost depreciation			170,000
Calculated level replacement price (MRP)	Calculated level 1 (used for depreciation)		170,000
No. of seasons operated before trade in (N)			10
Sprayer hours available	1st year MRP/250 (depreciation rate)		68.71%
Sprayer hours used in year	2nd year MRP/250 (depreciation rate)		85.17%
Calculated acres per hour at 100% efficiency	3rd year MRP/250 (depreciation rate)		10.01%
Annual expected efficiency (percent)	4th year MRP/250 (depreciation rate)		12.25%
Calculated acres per hour	5th year MRP/250 (depreciation rate)		12.25%
Total acres sprayed annually	6th year MRP/250 (depreciation rate)		12.25%
Calculated efficiency accumulated annually	7th year MRP/250 (depreciation rate)		12.25%
Labor	8th year MRP/250 (depreciation rate)		6.13%
Total labor hours per year per engine hour	Calculated after tax amortization factor		9.80%
Labor cost per hour	Calculated 1st year after tax discount factor		9.80%
Calculated labor cost per acre	Leveling cost per acre		11.25
Fuel and maintenance	Calculated fuel cost per acre		11.11
Sprayer fuel consumption per hour (gallons)	Leveling cost per acre		11.25
Fuel cost per gallon	Calculated after tax MRP from 11 (section)		1147.26
Oil and maintenance per hour of fuel cost	Calculated after tax amortization MRP from 11		323.26
Calculated fuel and maintenance cost per hour	Calculated after tax amortization MRP from 11		323.26
Calculated fuel and maintenance cost per acre	Price of fuel (not used because MRP given)		32.80
Repair and maintenance	Price of fuel (not used because MRP given)		114.72
Repair cost per hour after trade-in	Price of fuel (not used because MRP given)		11.25
Repair cost per hour after trade-in	Price of fuel (not used because MRP given)		11.25
Sum, interest, & labor (10% of value, discount)	Price of fuel (not used because MRP given)		11.25
Sum, interest, & labor (10% of value, discount)	Price of fuel (not used because MRP given)		11.25

Cost/vac = \$4.92

Machinery Ownership and Leasing Homework #1 – question #6 ...

6. Start back with the base scenario (Sec 179 = \$0), how does cost per acre vary as the years the sprayer is used for trading varies from 1 to 10?

Sheet Input and related calculations for the following cells are inputs		Price	
Information pertaining to sprayer depreciation and repair			
Sprayer class	age	100 hrs	age 1000 hrs
1. CaseIH 2200 and 2200-4000	0.061613	0.011013	0.011013
2. CaseIH 2200 and 2200-4000	0.061613	0.011013	0.011013
3. John Deere S700	0.060905	0.010905	0.010905
4. John Deere S700	0.074315	0.014315	0.014315
5. John Deere S700	0.074315	0.014315	0.014315
6. Special equipment (e.g. 2200-4000)	0.061613	0.011013	0.011013
Factors used in analysis	0.060905	0.010905	0.010905
Sprayer class	Bank interest rate (percent)		5.00%
Hours per year	Calculated after tax discount rate		5.49%
Price per acre	Make + 15% (not used because tax rate given)		95.1%
Market price of sprayer at trade in	Self-employment tax @ 13.9%		95.1%
Market price of sprayer	Section 179 deduction limit of \$50,000 in 2016		150,000
Cost depreciation			170,000
Calculated level replacement price (MRP)	Calculated level 1 (used for depreciation)		170,000
No. of seasons operated before trade in (N)			10
Sprayer hours available	1st year MRP/250 (depreciation rate)		68.71%
Sprayer hours used in year	2nd year MRP/250 (depreciation rate)		85.17%
Calculated acres per hour at 100% efficiency	3rd year MRP/250 (depreciation rate)		10.01%
Annual expected efficiency (percent)	4th year MRP/250 (depreciation rate)		12.25%
Calculated acres per hour	5th year MRP/250 (depreciation rate)		12.25%
Total acres sprayed annually	6th year MRP/250 (depreciation rate)		12.25%
Calculated efficiency accumulated annually	7th year MRP/250 (depreciation rate)		12.25%
Labor	8th year MRP/250 (depreciation rate)		6.13%
Total labor hours per year per engine hour	Calculated after tax amortization factor		9.80%
Labor cost per hour	Calculated 1st year after tax discount factor		9.80%
Calculated labor cost per acre	Leveling cost per acre		11.25
Fuel and maintenance	Calculated fuel cost per acre		11.11
Sprayer fuel consumption per hour (gallons)	Leveling cost per acre		11.25
Fuel cost per gallon	Calculated after tax MRP from 11 (section)		1147.26
Oil and maintenance per hour of fuel cost	Calculated after tax amortization MRP from 11		323.26
Calculated fuel and maintenance cost per hour	Calculated after tax amortization MRP from 11		323.26
Calculated fuel and maintenance cost per acre	Price of fuel (not used because MRP given)		32.80
Repair and maintenance	Price of fuel (not used because MRP given)		114.72
Repair cost per hour after trade-in	Price of fuel (not used because MRP given)		11.25
Repair cost per hour after trade-in	Price of fuel (not used because MRP given)		11.25
Sum, interest, & labor (10% of value, discount)	Price of fuel (not used because MRP given)		11.25
Sum, interest, & labor (10% of value, discount)	Price of fuel (not used because MRP given)		11.25

