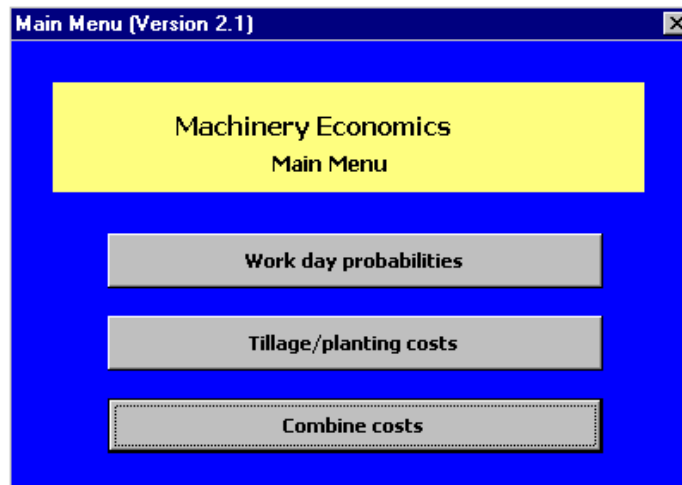


Machinery Economics: Program Overview

The Machinery Economics program provides three types of information to users: (1) Chance of completing fieldwork within a certain time period, 2) Costs of tillage and planting operations, and (3) Costs of combining.

Each section operates independently and can be accessed using the Main Menu shown below, or by clicking on the page tabs located at the bottom of the Excel screen called work, tillage, and combine.



Workday Probabilities

This section of the program is used to evaluate the chance of completing fieldwork within a certain time period. The user enters inputs in two sections: Number of Workdays and Implement Specifications. The program also contains "workday probabilities" for different parts of Illinois. To view the "workday probability" table, click on the "unhide workday probabilities" button.

NUMBER OF WORKDAYS: This section calculates the chance of completing field work between two dates.

Inputs: The user enters three types of data into this portion of the program.

1. Beginning and ending dates for field work: These dates should refer to the usage of the implement that is being analyzed.
2. Location within Illinois: Choose Northern, Central, Southern, or Other. The program contains defaults for workday probabilities for locations in Illinois, so it is important to select the appropriate location.
3. Machine type: There are five types of machines available for this analysis: planter, drill, planter/drill, combine, and other. To select a machine, click on the machine listed and a drop-down box will appear. Click on the arrow, scroll down, and highlight the machine to analyze.

In the following example, a user is analyzing planting corn and soybeans between April 15th and May 14th in Central Illinois (see upper left hand box).



Version 2.1

Menu

No. of Workdays

Workdays between:	
Beginning date	14-Apr
End date	15-May
Location	Central
Machine	Planter
Unhide workday probabilities	
Total days between begin and end date	32 days
Average work days	10 days
Workdays between:	Chance
0 and 6	12%
7 and 12	76%
13 and 18	12%
19 and 24	0%
25 and 30	0%

Planter

		<i>Suggestions</i>
Row width	30 inch	30
No. of row	24	
Speed	6 mph.	6
Hours worked	12 per day	
Field efficiency	65% percent	70
Acres	1600 no.	
Acres per hour	28.4	
Acres per day	340.4	
Workdays to complete	4.7	
Chance of completing work between dates	94%	
Average ending date	29-Apr	
Chance of completing work between dates with	Chance	
8 row	3%	
12 row	49%	
16 row	78%	
24 row	94%	

Output: The user is provided with information detailing days available for fieldwork. In the above example, there are 32 days between April 14 and May 15 (see lower left hand box). On average, ten days will be fit for fieldwork. There is a 12 percent chance of having less than six days available for work; a 76 percent chance of having between 7 and 12 days available; and a 12 percent chance of having over 13 days available.

IMPLEMENT SPECIFICATIONS: This section calculates the efficiency of the implement with respect to the dates entered for work.

Inputs: The user describes the field implement. In the above example, the user entered information about a planter having 24 rows that are 30 inches apart (see upper right hand box). The user will operate the planter at 6 miles per hour for 12 hours per day. The user calculated the field efficiency, or percentage of time the implement is maintaining the given speed, to be 65 percent. A total of 1,600 acres is farmed.

Outputs: The output describes the chance of getting the fieldwork accomplished (see lower right hand box). In the above example, the planter will cover 28.4 acres per hour, or 340.4 acres per day. A total of 4.7 workdays are needed to perform planting and there is a 94 percent chance that planting will get done between April 14th and May 15th. On average, work will be completed by April 29th. The bottom section of the output provides probabilities of completing work with different sized machinery. There is a 3 percent chance of completing work with an 8 row planter; a 49 percent chance with a 12 row planter; a 78 percent chance with a 16 row planter; and a 94 percent chance with a 24 row planter.

Tillage/Planting Costs

This section of the program is used to evaluate the costs of tillage and planting operations using a tractor and an implement. In the program, there is a database of field operations and costs for each type of tractor and implement that are used as defaults. The user may change these numbers to better represent the operation for their analysis.

There are 3 input boxes in this section: (1) Main Input, (2) Tractor, and (3) Implement.

Main Input

Purchase price	85%	% of list price
Interest rate	8%	% of remaining value
Housing, insurance	1.0%	% of remaining value
Diesel fuel cost	\$1.00	\$ per gallon
Lubrication cost	10%	% of fuel cost
Labor cost	\$12.50	\$ per hour
Labor time	110%	% of tractor time

The Main Inputs refer to the Tractor and the Implement.

In the Main Input screen above, the user entered the purchase price of the tractor and implement as 85% of the list price. The list price for each is entered in their specific section. The interest rate for the purchase will be 8% of the remaining value on the loan. The housing and insurance costs are 1% of the remaining value of the tractor and implement. Diesel fuel is estimated to cost \$1.00 per gallon and the lubrication cost is estimated to be 10% of the fuel cost. A \$12.50 per hour rate was entered for labor cost, of which is estimated to be 110% of the tractor time.

Tractor

Tractor type	150 PTO Hp
List price	\$83,100 \$
Horsepower	150 no.
Years of life	10 no.
Hours of use	300 per year

There are 14 different tractor types included in this analysis. To select the tractor type, click on the input box where it says "150 PTO Hp", and a drop down box will appear. Select (highlight) the tractor for the analysis, and then click elsewhere on the page. This activates the program to enter the default information for the tractor type.

The inputs can be changed by: (1) clicking on the blue information, (2) enter the new information, (3) click elsewhere on the page or hit "enter".

In the Tractor screen above, the tractor being analyzed is a 150 PTO Hp tractor. Its list price is \$83,500 and is expected to last 10 years at a rate of 300 hours per year.

Implement

Implement/size	Row-crop Cultivator (30" rows) (16-row)
List price	\$26,700 \$
Speed	4.5 m.p.h.
Width	40 feet
Field efficiency	83% percent
Load	50% percent of max
Acres per year	806 per year
Years of life	10 number
Hours of use	45 per year
Acres per hour	18.1 per hour
Suggested h.p.	185 p.t.o. h.p.

There are 43 different implements included in this analysis. To select the implement, click on the input box where it says "Row-Crop Cultivator (30"rows) (16-row)", and a drop down box will appear. Select (highlight) the implement for the analysis, and then click elsewhere on the page. This activates the program to enter the default information for the tractor type.

The implement inputs can be changed by: (1) clicking on the blue information, (2) enter the new information, (3) click elsewhere on the page or hit "enter".

In the Implement screen, a 16-row Crop Cultivator with 30" rows will be analyzed. It costs \$26,700; is 40 feet wide; and should last 10 years cultivating 806 acres per year. It is recommended that this cultivator be used at 4.5 mph, providing 83 percent field efficiency, with a 50% maximum load.

The program calculates the usage per year of 45 hours per year, 18.1 acres per hour, and a suggested horsepower of 185 PTO.

There are three output reports in this section: (1) Tractor Costs, (2) Implement Costs, and (3) Tractor and Implement Costs.

Tractor costs		
Item	Per Year	Per Hour
Depreciation	\$4,065	\$13.55
Interest	3,545	11.81
Housing, insurance	443	1.47
Repairs	524	1.74
Fuel and lubrication	2,168	7.22
Labor	4,125	13.75
Total	\$14,870	\$49.54

The tractor costs on the left are calculated per year and per hour.

The 150 PTO Hp tractor costs \$14,870 per year to operate, or \$49.54 per hour.

Implement costs			
Item	Per Year	Per Hour	Per Acre
Depreciation	\$1,492	\$33.52	\$1.85
Interest	1,050	23.59	1.30
Housing, insurance	131	2.94	0.16
Repairs	228	5.12	0.28
Fuel and lubrication	xxxx	xxxx	xxxx
Labor	xxxx	xxxx	xxxx
Total	\$2,901	\$65.17	\$3.59

The implement costs on the left are calculated per year, per hour, and per acre.

The 16-row Crop Cultivator with 30" rows costs \$2,901 per year to operate, or \$65.17 per hour. The estimated per acre cost is \$3.59 per acre.

Tractor and Implement costs			
Item	Per Year	Per Hour	Per Acre
Depreciation	\$2,095	\$47.07	\$2.59
Interest	1,575	35.40	1.95
Housing, insurance	196	4.41	0.24
Repairs	305	6.86	0.37
Fuel and lubrication	321	7.22	0.39
Labor	612	13.75	0.75
Total	\$4,171	\$114.71	\$6.29

The tractor and implement costs on the left are calculated per year, per hour, and per acre.

The 150 PTO Hp tractor and 16-row Crop Cultivator with 30" rows costs \$4,171 per year, or \$114.71 per hour. The estimated per acre cost is \$6.29 per acre.

Combine Costs


This section of the program is used to evaluate the costs of a combine. The user enters inputs in two sections: Combine Inputs and Main Input. The combine program is shown below.

The combine inputs section requires information about the corn head and grain platform. The combine inputs can be entered/changed by: (1) clicking on the blue information, (2) enter the new information, (3) click elsewhere on the page or hit "enter".

In the diagram below, a 190 horsepower combine is being analyzed. Its list price is \$126,000 and is to be kept for 10 years. The analysis includes a 6-row corn head with a list price of \$26,000, a width of 15 feet, and 62% field efficiency. It will be operated at 3.5 mph over 400 acres of corn at 85% load. The analysis also includes a 20-foot grain platform that costs \$17,100, has a width of 20 feet, and has 65% field efficiency. It will be operated at 3.5 mph over 400 acres of soybeans at 85% load.

The main inputs section requires information about financing the purchase of the combine, maintenance costs, and labor.

In the diagram below, the purchase price of the combine is 85% of the list price. The interest rate is 8% of the remaining value, while the housing and insurance costs are 1% of the remaining value. Diesel fuel is estimated to cost \$1.00 per gallon, while lubrication costs 10% of the fuel cost. Labor is estimated at \$12.50 per hour and represents 110% of the tractor time.

<table border="1"> <thead> <tr> <th>Description</th> <th>190 hp combine</th> <th colspan="3">Combine inputs</th> </tr> </thead> <tbody> <tr> <td>List price</td> <td>\$126,000</td> <td colspan="3" rowspan="4" style="text-align: center;">Use defaults</td> </tr> <tr> <td>Horsepower</td> <td>190</td> </tr> <tr> <td>Years held</td> <td>10</td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td>Corn</td> <td>Grain</td> <td colspan="2"></td> </tr> <tr> <td></td> <td>Head</td> <td>Platform</td> <td colspan="2"></td> </tr> <tr> <td>Size</td> <td>6 row</td> <td>20 ft</td> <td colspan="2"></td> </tr> <tr> <td>List price</td> <td>\$26,000</td> <td>\$17,100</td> <td colspan="2"></td> </tr> <tr> <td>Width</td> <td>15</td> <td>20 feet</td> <td colspan="2"></td> </tr> <tr> <td>Field efficiency</td> <td>62%</td> <td>65%</td> <td colspan="2"></td> </tr> <tr> <td>Load</td> <td>85%</td> <td>85%</td> <td colspan="2"></td> </tr> <tr> <td>Miles per hour</td> <td>3.5</td> <td>3.5</td> <td colspan="2"></td> </tr> <tr> <td>Acres</td> <td>400</td> <td>400</td> <td colspan="2"></td> </tr> </tbody> </table>					Description	190 hp combine	Combine inputs			List price	\$126,000	Use defaults			Horsepower	190	Years held	10				Corn	Grain				Head	Platform			Size	6 row	20 ft			List price	\$26,000	\$17,100			Width	15	20 feet			Field efficiency	62%	65%			Load	85%	85%			Miles per hour	3.5	3.5			Acres	400	400						
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Hours of use	101	73	heads)	174	Acres per hour	4.0	5.5	4.6																																																													
Depreciation	\$1,272	\$836		\$6,163	Depreciation	\$10.88	\$9.79	\$10.34																																																													
Interest	1,109	729		5,375	Interest	9.49	8.54	9.02																																																													
Insurance, house	139	91		672	Insurance, house	1.19	1.07	1.13																																																													
Repairs	106	35		1,613	Repairs	2.61	1.78	2.19																																																													
Fuel and lub				2,486	Fuel and lub	3.61	2.61	3.11																																																													
Labor				2,393	Labor	3.47	2.51	2.99																																																													
Total Costs	\$2,626	\$1,691	\$18,702	\$23,019	Total Costs	\$31.25	\$26.30	\$28.78																																																													

There are three output reports for this section: Yearly Use and Costs, Per Acre Use and Costs, and Sensitivity of Average Per Acre Costs to Total Acres Harvested.

The Yearly Use and Costs report provides the yearly costs for the corn head, grain platform, combine (without heads), and as a total. It also gives the yearly hours of use based on the inputs. The report above shows a total yearly cost for this analysis of \$23,019, with a total usage of 174 hours.

The Per Acre Use and Costs report provides the per acre costs for the corn head, grain platform, and an average of the two. It also reports the number of acres that each attachment can complete per hour. The report shows that the 6-row corn head completes 4 acres per hour at a cost of \$31.25 per acre while the 20-foot grain platform completes 5.5 acres per hour at a cost of \$26.30 per acre. The average cost per acre is \$28.78.

The Sensitivity of Average Per Acre Costs to Total Acres Harvested table and graph below represent how the total cost per acre is reduced as more acres are harvested. In the table, a combine that harvests 400 acres has a cost of \$48.09 per acre, while the cost for harvesting 2,000 acres is only \$20.26 per acre. This represents a 1600 acre difference in farm size harvested with a \$27.83 per acre difference in costs.

