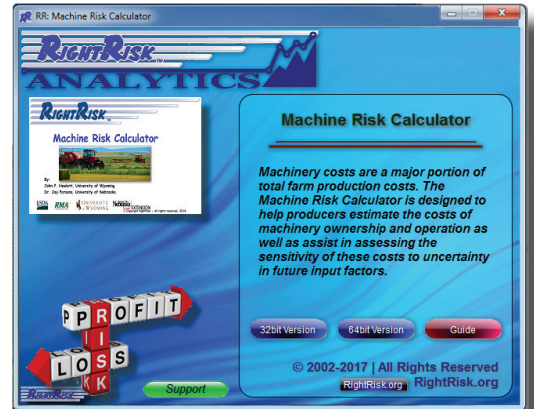


Estimating Custom Rates and Machinery Costs

Machinery and equipment is often one of the largest expense categories for a farm or ranch operation. Many producers do not know their machinery and equipment cost for a given activity.

Some expenses, such as fuel, repair, and other general costs are fairly easy to quantify; calculating individual expenses for a given machine and field activity is more difficult. The nature of most agricultural activities provides a wide variation in machinery expenses, depending on operation size, scope, and other factors. Incorrect assumptions about expenses could negatively affect the bottom line.



Machinery Cost Solution

The Machine Risk Calculator (MRC) from RightRisk.org can help producers estimate rates for custom field operations and individual machinery costs. The tool will also estimate the risk sensitivity of those costs to changes in various factors. The MRC uses a comprehensive list of related expenses to calculate an overall cost, including expected life (years), repairs, depreciation, housing, insurance, taxes, and annual use (hours).

RightRisk Analytics

Tools and guides are available at no cost at the website <http://RightRisk.org>

Users can estimate expenses for powered equipment, three different implement types, vehicles, powered irrigation equipment, non-powered irrigation equipment, and field operation costs. The MRC generates results based on the data entered, providing estimates of annual and average operating costs for each machine.

ARA-20170511.701

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Figure 1 Machine Risk Calculator Entries for Example Disc Windrower

POWERED EQUIPMENT		
Equipment Name	WINDROWER, SELF-PROPELLED	?
Equipment Options	CAB, AIR, 16FT DISC HEAD	?
Purchase Price	\$75,000.00	?
Year Quoted	2017	?
Useful Life (Hours)	5,000	?
Annual Use (Hours)	500	?
Maximum Life (Years)	10	?
Cost Factor 1	0.791	?
Cost Factor 2	0.091	?
Cost Factor 3	0	?
Repair Factor 1	0.06	?
Repair Factor 2	2.00	?
Opportunity Cost Rate	6	?
Tax, Housing & Insur. Rate	2.0	?
Fuel Price	\$2.00	?
Fuel Type	DIESEL	?
PTO Horsepower	200	?
Percent Load Factor	75	?

The risk analysis section is a unique feature. The tool allows the user to select an expense variable and enter a range (maximum, minimum, and most likely) of values; the MRC tool then generates a probability curve showing a range of possible outcomes.

Allowing a user to account for variability is important. For example, let's say you believe fuel prices will most likely be \$1.90 per gallon but could go as high as \$2.75 and as low as \$1.50. The MRC tool

can account for this variability and estimate the corresponding range in machinery operation costs.

Included in the tool are tables showing ranges of reported custom rates and field information for selected activities (Figure 2). These provide the user a range of values for various field operations: size of power unit and implement, as well as an accomplishment rate per 10-hour period. The values offer a basis for estimating field operation costs (custom rates), both for comparison to quoted rates and for estimates of operator-completed operations.

Fremont County Example

Fremont county ranchers Jim and Sally Butler* are looking at upgrading windrowers, moving from a self-propelled sickle-type machine to a rotary-disc mower. The newer windrower comes at a considerably higher cost (\$75,000 compared to \$35,000 for their current machine). Jim believes the rotary machine's increased productivity makes it more favorable than the old one. Sally is concerned that the machine's cost per acre will be higher than what they operate now.

They are considering purchasing a used, self-propelled disc mower-conditioner for \$75,000. Further, they also expect the following: a 5,000-hour useful life, 250 hours per year, and a 10-year useful life.

The MRC tool estimates repair and operation costs by using various cost factors contained in the tool and related to the described machine.

Figure 2 Machine Risk Calculator Information on Custom Harvesters

Table 7. Custom Tillage, Planting and Harvest Operation Parameters: Power Unit, Implement, and Accomplishment Rate Estimates from Survey Results, continued.*

CUSTOM HARVESTERS*	power unit	implement	10 hours
Hay Harvesting:	94HP	14 feet	56
Swath only, with conditioner	30-250	12-16	20-100
Small square bales - Farm Areas:	85HP	14X18 -	34
Bale only, includes wire/twine	13-115	16X18	15-50
Stack only, in field or short hauls	117HP	62 bales	18
	90-150	55-69	10-32
Round bales, includes twine:	129HP	5 ft wide -	350
Bale only, 1,000-1,200# bales	90-150	6 ft diameter	350-350
Big rectangular bales, includes wire: bale only	203HP	1 Ton	115
	160-225	1-1	70-160
Cube hay:	212HP	U/A	20
Cube from windrow, owner hauls	212-212		20-20
Chop hay:	160HP	12 feet	50
Chop only, dry hay, owner hauls	160-160	12-12	50-50
Swath, chop, short haul, 70% moist	85HP	11 feet	310
	85-85	8-14	70-550
Green chop and short haul	340HP	9 feet	212
	160-450	6-12	35-550
Small-Grain Harvesting:	58HP	16 feet	72
Swath, highest rates for small jobs	10-85	12-25	50-100
Thresh, barley/wheat/oats, low yield	183HP	22 feet	105
	145-245	11-32	40-280
Thresh, barley/wheat/oats, high yield	164HP	20 feet	83
	100-260	11-32	30-200
Bale straw, small squares, includes wire	100HP	14X18	U/A
	100-100		



For a detailed explanation and formulas to determine your own more specific cost factors, view the MRC Technical Guide found at RightRisk.org.

In this example, we assume \$2/gallon diesel fuel, with a 200 horsepower machine, operating at a 75 percent load factor. The MRC tool generates a cost summary page after all the data is entered (Figure 3).

Figure 3 Self-Propelled Windrower (Disc Head) Information

From these results, we move to the field operation input page and enter the field capacity and accomplishment factors: 16-foot head, 13 miles per hour speed, and a 90 percent field efficiency resulting in a calculated 22.69 acres per hour. From this, the MRC tool generates a per-acre operating cost (not including operator labor and return to management) of \$3.31 per acre and a total annual cost of \$18,803.

WINDROWER, SELF-PROPELLED CAB, AIR, 16FT DISC HEAD													
Purchase Price:	\$ 75,000	Year Quoted:	2017										
Hours to Wearout:	5,000	Maximum Life:	10 Years										
Cost Factor 1:	0.791	Annual Use:	500 Hours										
Cost Factor 2:	0.091	Repair Factor 1:	0.060										
Cost Factor 3:	0.0000	Repair Factor 2:	2.00										
PTO Horsepower:	200	Fuel Price:	\$2.00 Per Gal.										
Fuel Type:	DIESEL	Percent Load Factor:	75.0 percent										
Fuel Consumption:	11.53 Gal/Hr	Oil Consumption:	0.05 Gal/Hr										
Percent of Average Investment Charged for Opportunity Interest:		6.00 percent											
Percent of Average Investment Charged for Tax, Housing & Insurance:		2.00 percent											
ESTIMATED ANNUAL COSTS AND COST PER HOUR													
Annual Use HOURS	YRS TO TRADE	ANNUAL COSTS						COST PER HOUR					
		TOTAL COST	DEPR	OPP COST	THI	REPAIRS	FUEL & OIL	TOTAL COST	DEPR	OPP COST	THI	REPAIRS	FUEL & OIL
500	10.0	\$33,870	\$5,601	\$2,820	\$940	\$11,250	\$13,260	\$67.74	\$11.20	\$5.64	\$1.88	\$22.50	\$26.52

We compare these results to the Butler's current windrower: a 16-foot, sickle-head machine with 2,500 hours useful life remaining and a \$35,000 value. This machine is considerably slower when compared with the potential disc mower machine. Assume a 6 mile-per-hour average field speed, 80 percent efficiency, 550 hours annual use, and a 75 percent load factor. The total field cost per acre (not including operator labor and return to management) is \$3.66 per acre. The total annual cost for this machine is estimated to be \$17,048, including repairs/maintenance, fuel/oil, depreciation, and opportunity interest cost (Figure 4).

Figure 4 Self-propelled Windrower, 16-Foot sickle Head Cost Data

WINDROWER 16FT SICKLE HEAD, CAB, AIR													
Purchase Price:	\$ 35,000	Year Quoted:	2017										
Hours to Wearout:	2,500	Maximum Life:	5 Years										
Cost Factor 1:	0.791	Annual Use:	500 Hours										
Cost Factor 2:	0.091	Repair Factor 1:	0.060										
Cost Factor 3:	0.0000	Repair Factor 2:	2.00										
PTO Horsepower:	120	Fuel Price:	\$2.00 Per Gal.										
Fuel Type:	DIESEL	Percent Load Factor:	75.0 percent										
Fuel Consumption:	6.92 Gal/Hr	Oil Consumption:	0.03 Gal/Hr										
Percent of Average Investment Charged for Opportunity Interest:		6.00 percent											
Percent of Average Investment Charged for Tax, Housing & Insurance:		2.00 percent											
ESTIMATED ANNUAL COSTS AND COST PER HOUR													
Annual Use HOURS	YRS TO TRADE	ANNUAL COSTS						COST PER HOUR					
		TOTAL COST	DEPR	OPP COST	THI	REPAIRS	FUEL & OIL	TOTAL COST	DEPR	OPP COST	THI	REPAIRS	FUEL & OIL
500	5.0	\$17,048	\$4,584	\$1,412	\$471	\$2,625	\$7,956	\$34.10	\$9.17	\$2.82	\$0.94	\$5.25	\$15.91



The two machines are very similar in total annual costs but differ in cost per hour. The disc machine provides gains in efficiency through higher field speed, efficiency, and fewer hours of use needed, albeit at a higher cost per hour when compared to the Butler's current machine. This puts to rest one of their concerns of the Butlers: the purchase price of the new machine would not be offset by its efficiency gains.

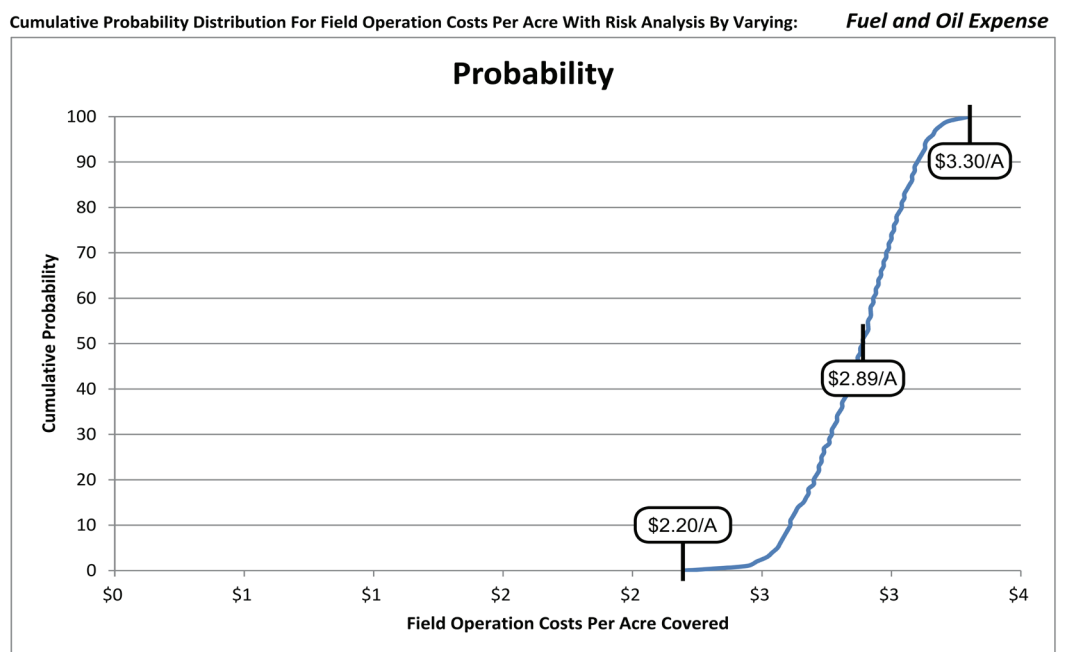
Risk Sensitivity Analysis

A unique feature of the MRC tool is the ability to evaluate a range of values for up to six cost categories (risk analysis). This allows for a more accurate reflection of potential costs; "educated guesses" are taken out of the equation and allows the MRC user to account for expected variability in costs.

Suppose the Butlers are anxious about the effect of fuel price on the disc mower's cost per acre. The most likely value estimated by the tool was \$26.52 per hour.

If we now enter a low value of \$10/hour, a high of \$35/hour, and \$20 per hour each for operator labor and return to management, the tool generates a probability curve (Figure 5), describing a range of \$2.20 to \$3.30 per acre, with a 50/50 chance of a cost of \$2.89 per acre.

Figure 5 Self-propelled Windrower, 16-Foot Sickle-head Cost Per Acre, Varying Fuel and Oil Expense



* The Butler family and their operation are a case study example created to demonstrate RightRisk tools and their applications. No identification with actual persons (living or deceased), places, or agricultural operation is intended nor should be inferred.

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