

Evaluating Windrower Options with the Machinery Risk Calculator

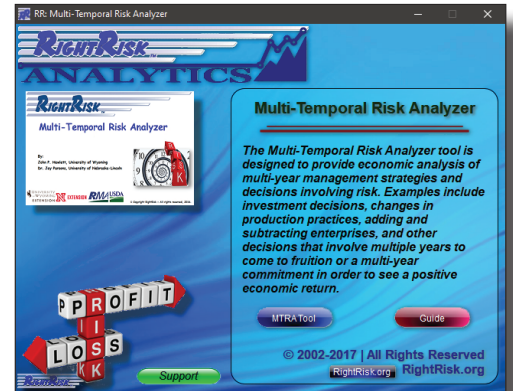
Jim and Sally Butler* are getting ready for their third year in business producing alfalfa hay. The couple has been using custom operators to mow (or windrow) their hay, and have been informed that custom prices will be going up due to high fuel and other costs. They had been paying \$10/acre, and now windrowing will cost \$19/acre.

The Butlers are considering other options in the form of owning or leasing their own machine. After doing some investigating they have found a late model used rotary-disc mower available for \$75,000. The equipment company is offering the option to own it outright (5 year loan term, 6% interest) or lease it at \$22,000 per year.

The Butlers are struggling to make an informed decision on the best option for windrowing their hay based on the basic information in Table 1. Simply looking at the initial purchase price in the form of a yearly loan or lease payment does not give an accurate picture of what they should expect the machine to cost to operate, or the ability to compare it with hiring a custom operator.

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Machinery and equipment is often one of the largest expense categories for a farm or ranch operation, especially for new operators. It is important to have a firm expectation for the annual total of these expenses and not just a best guess of what they could be. Stated in another way, the Butlers need to develop an accurate estimate of their estimated cost per acre to compare with the custom hire option and account for the inherent risk and variability present in their estimates.

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Machinery Risk Calculator

The Machinery Risk Calculator (MRC) is a spreadsheet-based tool that allows users to calculate machinery expenses and estimate the risk sensitivity of these expenses to future changes in input factors. The tool uses a comprehensive list of related expenses to calculate an overall cost, including expected life values, repairs and depreciation, housing, insurance, taxes, and estimated hours of annual use.

The MRC calculates repair and operation costs by entering factors, included in the MRC appendix, related to the desired machine. The MRC can estimate expenses for: powered equipment, three different types of implements, vehicles, powered and non-powered irrigation equipment, as well as field operation costs (power unit, implement, and inputs). Results are based on the specific data entered by the user, and include annual and average operating costs for each machine.

Butlers Machine Example

The first step the Butlers need to take is to estimate an accurate cost per acre using the MRC. The Butlers enter the potential machine purchase information into the input screen of the MRC to begin, Table 2. We assume the machine has a useful life of 5,000 hours and will have around 2,000 hours on it when purchased used. The Butlers estimate they will put 250 hours on the windrower annually, with maximum life of 10 years. For this analysis, we use the cost and repair factors found in the MRC tool appendix, assuming the costs will be on the higher end, as is often the case with used swathers. We input fuel at \$5.00/gallon, opportunity cost (or interest) at 6 percent, and 2 percent for housing, taxes, and insurance. This machine is rated at 75 percent load factor, which is estimated from the maximum horsepower required for field operation.

The MRC generates a detailed results page providing both annual cost and cost per hour summaries. Assuming the Butlers use this machine 250 hours/year, they can expect the machine to cost \$28,747 per year and \$114.99/hour of use, Table 3. As with many high horsepower machines, especially with high diesel prices, fuel and oil expenses total \$16,574 annually and \$66.30/hour, and represent highest expense category, followed by repairs at \$2,813 annually and \$11.25/hour. It is important to note that this is before we include a value for the return for owner labor or management.

The MRC Field Operation tab offers the next step the Butlers should complete. This page allows the user to enter field efficiency and capacity estimates based on machine width and speed. It includes a section for adding inputs, such as chemicals, twine/wire, amendments, etc., and is not needed for our cost analysis of a swather. We enter the field capacity and accomplishment numbers: 16 foot head, 11 miles per

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Table 1. Hay Harvest Options.

	Cost/Acre	Annual Loan or Lease Payment	Purchase Price
Own	--	\$17,805	\$75,000
Lease	--	\$22,000	--
Custom	\$19	--	--

Table 2. Machine Risk Calculator Entries for Butler's Windrower Purchase Example.

POWERED EQUIPMENT			
Equipment Name		WINDROWER	?
Equipment Options			?
Purchase Price		\$75,000.00	?
Year Quoted		2022	?
Useful Life (Hours)		5,000	?
Annual Use (Hours)		250	?
Maximum Life (Years)		10	?
Cost Factor 1		0.791	
Cost Factor 2		0.091	? i
Cost Factor 3		0	
Repair Factor 1		0.06	
Repair Factor 2		2.00	? i
Opportunity Cost Rate		6	?
Tax, Housing & Insur. Rate		2.0	?
Fuel Price		\$5.00	?
Fuel Type		DIESEL	?
PTO Horsepower		200	? i
Percent Load Factor		75	?

Table 3. Machine Risk Calculator Cost Estimates for Proposed Butler Windrower.

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
250	10.0	\$28,747	\$5,601	\$2,820	\$940	\$2,813	\$16,574	\$114.99	\$22.40	\$11.28	\$3.76	\$11.25	\$66.30

hour speed, and 85 percent field efficiency, Table 4. The efficiency factor helps account for things like stops, turns, operator experience, and others that reduce machine efficiency. Field efficiency estimates are also available in the MRC tool appendix. This results in a calculated capacity of 18.13 acres per hour. We enter \$25.00/hour for operator labor and return to management.

Table 4. MRC Field Capacity, Operator Labor, Return to Management, and Risk Analysis Entries for the Butler’s Windrower Purchase Example.

Field Capacity	Width (feet)	Speed (mph)	Efficiency (overall)	Rate Acres/Hour
Operation Accomplishment Rate	16.0	11.0	85%	18.13
Operating Input Description	Units/Acre	Cost/Unit	Cost/Acre	
0.0000	0.00	\$0.00	\$0.00	
0.0000	0.00	\$0.00	\$0.00	
0.0000	0.00	\$0.00	\$0.00	
0.0000	0.00	\$0.00	\$0.00	
TOTAL			\$0.00	

Operator Labor	Dollars/Hour	\$25.00
Return to Management	Dollars/Hour	\$25.00

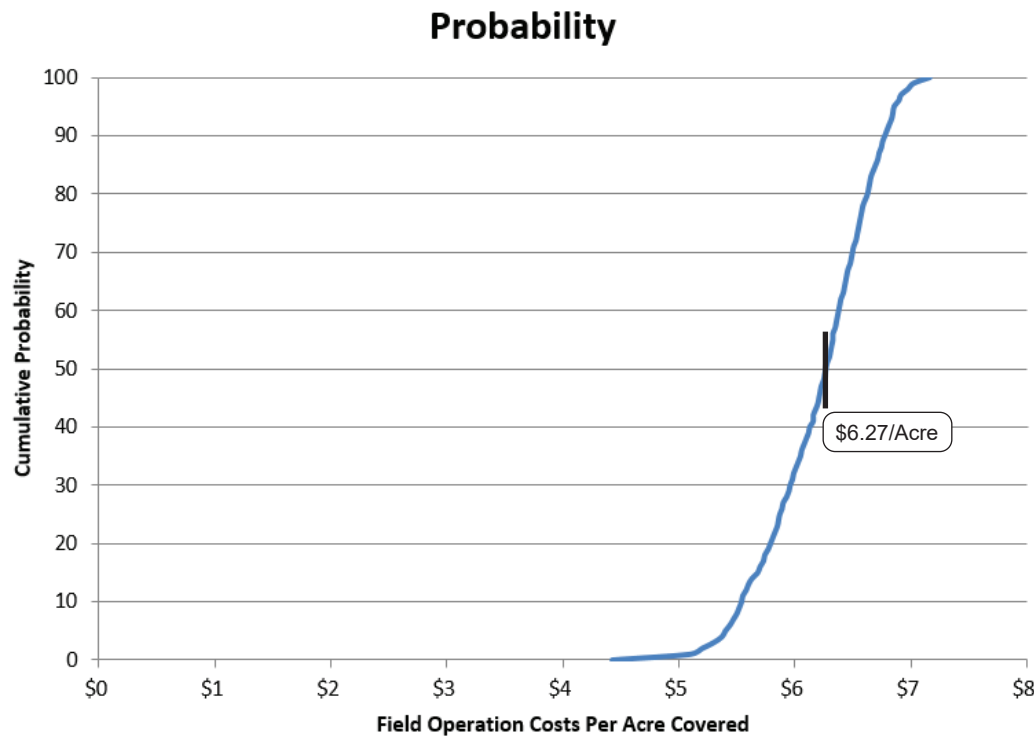
Risk Analysis:	Dollars/Hour		
<Choose a risk factor to evaluate>	Most Likely:	Low	High
	\$66.30	\$30.00	\$80.00

Risk Analysis and Other Considerations

The Machine Risk Calculator offers a unique ability to examine a potential range of values for several cost categories and their effect on the bottom line. The tool performs a risk sensitivity analysis by running randomized simulations based on the entered range for expected costs. This allows for a more accurate reflection of potential costs, as it takes the educated guess factor out of the equation and allows the MRC tool to account for potential variability.

The Butlers are concerned about the effects of fuel and oil prices on the disc mower’s operation cost. The most likely value calculated by the tool is \$66.30 per hour. We enter a low value of \$30.00/hour and a maximum of \$80.00/hour and click RUN to generate a probability forecast, Figure 1. Note that the resulting curve assigns a 50 percent probability (50/50 chance) that the fuel and oil cost will be \$6.27/Acre.

Figure 1. Cumulative Probability Distribution For Field Operation Costs Per Acre With Risk Analysis by Fuel and Oil Expense



The Butlers can expect fuel cost per acre to range from \$4.42/Acre to no more than \$7.17/Acre, given their initial forecasts. This analysis can be performed on any of the cost categories: Depreciation; Opportunity Cost; Taxes, Housing, and Insurance; Repairs; Fuel and Oil; Total Operating Inputs; Operator Labor; and Return to Management.

Total cost per hour of operating the windrower includes an estimate for return to management and labor. The labor cost includes a cost for the operator of the machine—

usually more hours than the machine hours—and return to management reflects the cost to manage tasks associated with keeping the machine operating—planning, overseeing operations, scheduling maintenance, etc.—and are usually fewer hours than total machine hours. If we assume a cost of \$25/hour for each category, this moves the total cost per hour of the machine to \$164.99/Acre. Using the estimated field capacity of 18.13 acres per hour results in a total operating cost of \$9.10/Acre.

The Decision

The Butlers now have a solid estimate for the potential operating costs of the swather. They can use this with the other information in Table 1 to compare their alternatives. At 250 hours per year, the Butlers expect to cover 4,533 acres in a year with the purchased machine. Their cost would be \$13.03/Acre if the windrower is purchased and would be \$13.95/Acre if it is leased, assuming they need all the estimated hours. The Butlers should be able to purchase and operate a windrower for a much lower cost than hiring a custom operator at \$19/Acre, Table 4.

Table 4. Summary of Butler Hay Harvest Options.

	Annual Operating Cost/Acre	Annual Loan or Lease Payment	Loan or Lease Payment/Acre	Total Cost/Acre
Own	\$ 9.10	\$ 17,805	\$ 3.93	\$ 13.03
Lease	\$ 9.10	\$ 22,000	\$ 4.85	\$ 13.95
Custom	\$ 19.00	--		\$ 19.00

Other Considerations

However, there are some additional considerations the Butlers should review before they make their final decision. We have assumed the same operating costs for leasing a machine as owning it—some leases include provisions to cover at least a portion of major repair costs. If this is the case, it could lower operating cost for a leased machine. In addition, the actual number of hours of annual use or acres covered must closely match the Butler’s estimate to result in annual costs that match their forecast. Significantly fewer hours or fewer acres will substantially raise the cost of operating the swather compared with their initial estimate. The Butlers may also have differing cash flow considerations for owning a machine compared to hiring the work done.

Another critical consideration is whether skilled labor is available to operate the windrower. Do Sally, Jim, or an existing employee have the skills to operate the machine? Does the individual have time to operate the machine? Are there important tasks that may not be completed on time if the individual is operating a windrower.

One of the main benefits of owning a windrower is not waiting for a custom operator: being able to cut hay when it is ready and not experiencing quality reductions due to unforeseen circumstances with a delayed custom operator. Another potential benefit is the possibility that the Butlers could use their machine to provide custom services, further enhancing the revenue stream associated with owning it.



* The Jim and Sally Butler operation is 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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