

Evaluating the Custom Harvesting Decision: Pros and Cons

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November 30, 1999

Introduction

Farm managers have employed custom harvesting operators for many years. The harvesting operations of “thrashing oats” and “filling silo” were the domain of custom operators through much of this century. Over the last 30 years – until 5 or 6 years ago, custom harvesting of forages had declined. Custom harvesting of grains, however, was increasing as the cost of combine ownership steadily increased. Now the number of farm managers employing custom operators for harvesting their forages is increasing. This has led to inquiries about timing, forage quality, labor management, opportunity cost of management time, return on assets, borrowing capacity, and storage structures. Of course there are still concerns about the cost.

The operating and ownership costs calculated here is from general information provided by farm managers and custom operators on the price of the various implements and power units, the time required to traverse an acre with each operation, and many other aspects of forage harvesting operations. These pieces of information were entered into the Agricultural Budget Calculation Software (ABCS) and/or an Excel program especially designed to calculate forage-harvesting costs.

The ABCS software program provides the most detail about forage harvesting costs but it also requires a large number of inputs. The Excel program is quite straightforward and provides a nearly identical “bottom line”, but with less detail. The basis for this paper is an Excel program called “OwnvsCus.xls” and may be downloaded from the Center for Dairy Profitability’s Internet site at: <http://cdp.wisc.edu>. Click on *Tools and Other Resources* then *Decision Making Tools*. You must have Excel 5.0 or better to run this program. ABCS is a stand-alone program that can be purchased from the Center for Dairy Profitability.

Tractors, Trucks, and Other Power Units

Most tractors and trucks are used by more components of the farm business than just forage harvesting. The calculation of their ownership costs is difficult because it must be prorated based on the percentage of time it is used in each component of the farm business. This becomes doubly difficult if you wish to look at a range of use and/or take into account the change in the ending value of a tractor or truck when it is used more intensively.

These problems led to the use, in the Excel program, of a per-hour “rental” value to replace the ownership cost for tractor and trucks. It is realized that most farm managers will not be renting the tractors and trucks they are using in their forage harvesting from others. They will, will in

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effect, be renting from themselves. It was felt however that this was the most efficient way of handling tractor and truck ownership costs.

The ownership costs of the “dedicated” power units is calculated using the Capital Recovery Charge (CRC) method. That method uses initial value, salvage value, years of useful life, and interest to determine ownership costs. The ownership costs of all the other equipment is also calculated using the CRC method.

Information Required

The Excel program has an input form that can be printed and used by the farm manager to gather the necessary information to evaluate the ownership versus custom harvesting decision. That form is shown in Figure 1. Both a person investigating starting a custom harvesting business and a farm manager analyzing the ownership versus custom harvesting decision can use this form and program.

FIGURE 1

Labor and Management				Haylage		Corn Silage	
	Salary	Number					
Managers	<input type="text"/>	<input type="text"/>		Number of	Chopping	<input type="text"/>	<input type="text"/>
Office Help	<input type="text"/>	<input type="text"/>		Additional	Cutting	<input type="text"/>	<input type="text"/>
				Employees	Hauling	<input type="text"/>	<input type="text"/>
				Needed for:	Merging	<input type="text"/>	<input type="text"/>
					Blowing/Packing	<input type="text"/>	<input type="text"/>
Wage \$/H for Additional Employees	<input type="text"/>			Total		<input type="text"/>	<input type="text"/>
				Haylage		Corn Silage	
Investment Costs				Rental Info:			
	Cost per Unit	Units	SV %	At End of	Number of	Haylage	Corn Silage
				___ Years	Rented	Chopping	Chopping
Chopper Base	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	Tractors	Cutting	<input type="text"/>
Hay Head	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	Needed for:	Hauling	<input type="text"/>
Corn Head	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>		Merging	<input type="text"/>
Haybine	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>		Blowing/Packing	<input type="text"/>
Merger	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	Total		<input type="text"/>
Blower/Blade	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	Tractor Rental Rate \$/H	<input type="text"/>	<input type="text"/>
Hauling*	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	Trucks Rented	<input type="text"/>	<input type="text"/>
* Investment in Trucks or Wagons				SV = Salvage Value			
				Haylage		Corn Silage	
Harvested Acres & Rates				Repair Costs, Etc.			
	Acres	Haylage	Corn				
		<input type="text"/>	Silage	<input type="text"/>	Per Acre in Corn Silage		
Harvest. Rate Acres/H	<input type="text"/>	<input type="text"/>		<input type="text"/>	Per Acre in Haylage		
					OR		
Yield Per Acre (tons)	<input type="text"/>	<input type="text"/>		<input type="text"/>	Percent of Machinery Investment		
Price per ton	<input type="text"/>	<input type="text"/>		<input type="text"/>	Insurance & Misc Costs (%)		
				Fuel Costs			
Loan Terms *							
	Loan Length	Interest Rate	Years (%)				
	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	Per Acre in Corn Silage		
				<input type="text"/>	Per Acre in Haylage		
Down Payment:	<input type="text"/>		or equity in harvesting equip				
* Required for the cash flow analysis.							

In the “Labor and Management” boxes be careful not to double count. If the “manager” is also the person who does the “cutting” don’t enter both. Decimal numbers such as 1.5 or 0.3333 can also be entered.

In the “Investment Costs” box enter the cost of each item, the number of units of each item, and the salvage value percentage (SV %) after a certain number of years (At End of __ Years). Be careful not to enter a “tractor rented” in the “Rental Info” box if you have entered the cost of a self-propelled item (such as a chopper or haybine) in the “Investment Costs” box. Also, enter the estimated average tractor rental rate per hour if you require more than one tractor.

Enter the haylage acres as number of acres summed over all cuts in the “Harvested Acres & Rates” box. For example: you have 250 acres of hay. You plan to harvest first crop on all those acres as haylage. In addition, 200 acres of second crop, 200 acres of third crop, and 150 of fourth crop will be harvested as haylage. In this case enter the acres of haylage as 800. If you are investigating starting a custom harvesting business, enter the total number of acres you hope to harvest.

Example Input

Figure 2 shows the inputs that were used to generate the output that follows. This decision (ownership versus custom harvesting) is a site-specific decision. In other words, you need to run the numbers that apply to your farm business to make that decision. Therefore, any cell in the program that is in color can be changed.

FIGURE 2

Management and Labor					Haylage Corn Silage		
	Salary	Number					
Managers	\$40,000	0		Number of	Chopping	1	1
Office Help	\$20,000	0		Additional	Cutting	1	0
				Employees	Hauling	1	1
				Needed for:	Merging	0.2	0
				Blowing/Packing		0	0
				Total		3.2	2
				Wage \$/H for Additional Employees		\$11.00	

Investment Costs					Rental Info:			
				At End of	Haylage Corn Silage			
				-- Years				
	Cost per Unit	Units	SV %					
Chopper Base	\$20,000	1	50.00%	7	Number of	Chopping	1	1
Hay Head	\$5,000	1	50.00%	7	Rented	Cutting	1	0
Corn Head	\$5,000	1	50.00%	7	Tractors	Hauling	1	1
Haybine	\$12,000	1	50.00%	7	Needed for:	Merging	0.2	0
Merger/Rake	\$2,500	1	50.00%	7	Blowing/Packing		1	1
Blower/Blade	\$5,000	1	50.00%	7	Total		4.2	3
Hauling*	\$8,000	3	50.00%	7	Tractor Rental Rate \$/H		\$20.00	\$25.00
					Trucks Rented		0	0
					Truck Rental Rate \$/H		\$50.00	\$50.00

* Investment in Trucks or Wagons SV = Salvage Value

Harvested Acres & Rates				Repair Costs, Etc.			
				Corn			
				Haylage	Silage		
	Acres	Haylage	Silage				
Harvest. Rate Acres/H	4.5	800	200	\$6.00	Per Acre in Corn Silage		
Yield Per Acre (tons)	9	4.5	2	\$3.00	Per Acre in Haylage		
Price per ton	50	9	20	OR			
	50	9	25	5%	Percent of Machinery Investment		
	50	9	25	2%	Insurance & Misc Costs (%)		

Loan Terms				Fuel Costs	
	Loan Length	5	Years		
	Interest Rate	8.00%	(%)	\$5.00	Per Acre in Corn Silage
	Down Payment:	\$50,000	or equity in harvesting equip		
* Required for the cash flow analysis.					
				\$3.00	Per Acre in Haylage

Remember that the results are only as good as the quality of your inputs.

Example Results

The results in Figure 3 show that in the long run it would be more profitable to custom hire the forage harvesting done on the example farm. The economic cost of ownership and operation is \$53,454, given the information above. The custom harvesting charges are \$52,400, using \$43 per acre for haylage and \$90 per acre for corn silage.

FIGURE 3

Ownership & Operating Costs		
Item	Profit	Cash Flow
Management	\$0	\$0
Labor	\$10,234	\$10,234
Fuel	\$3,400	\$3,400
Repairs	\$3,675	\$3,675
Ins & Misc	\$1,470	\$1,470
CRC Interest	\$4,749	Loan
Depreciation	\$5,250	\$5,886 Payment
T & T Rental	\$24,677	\$24,677
Total	\$53,454	\$49,341
Custom Harvesting Charges		\$52,400
Return above Costs (Profits from ownership)	(\$1,054)	←-----\$\$\$
Short Term Cash Advantage		\$3,059

The cash flow shows somewhat different results. The cash flow is calculated by removing the economic interest and depreciation costs and replacing them with a loan payment. The amount of the loan is determined by subtracting the down payment (or equity in the harvesting equipment) from the value of the harvesting equipment. The loan payment is calculated using this value and the loan interest rate and length. They are in the input section.

The short-term cash flow advantage to ownership is \$3,059. This increases to \$13,293 if labor costs are not considered a cash cost. The difference between the economic costs and the short-term cash cost may explain why many farm managers continue to do their own forage harvesting.

Note: If the program returns an answer of "#VALUE!" instead of a number it means you have used the "space bar" to enter a zero value. To correct, enter the number zero (0).

FIGURE 4

Economic Profits from Ownership at Various Acres of Haylage and Corn Silage					
Acres of Haylage (sum of all crops)					
	700	750	800	850	900
150	(\$2,976)	(\$2,626)	(\$2,276)	(\$1,926)	(\$1,576)
175	(\$2,365)	(\$2,015)	(\$1,665)	(\$1,315)	(\$965)
200	(\$1,754)	(\$1,404)	(\$1,054)	(\$704)	(\$354)
225	(\$1,143)	(\$793)	(\$443)	(\$93)	\$257
250	(\$532)	(\$182)	\$168	\$518	\$868

Values inside the ()'s are negative.

Point estimates of costs are very valuable. However those point estimates are sensitive to a number of factors. Sensitivity analysis is necessary to gain a better understanding of the

data used to calculate the information shown in Figure 3. Figure 4 shows how sensitive the economic profits from ownership are to the number of acres of haylage and corn silage

harvested. If only 700 acres of haylage and 150 of corn silage are harvested, the economic profit is almost \$2,000 less than initially calculated. It falls to -\$2,976 versus the original -\$1,054.

FIGURE 5

**Short Term Cash Flow Advantage to Ownership
at Various Acres of Haylage and Corn Silage**
Acres of Haylage (sum of all crops)

		700	750	800	850	900
Acres of	150	\$1,137	\$1,487	\$1,837	\$2,187	\$2,537
	175	\$1,748	\$2,098	\$2,448	\$2,798	\$3,148
Corn	200	\$2,359	\$2,709	\$3,059	\$3,409	\$3,759
	225	\$2,970	\$3,320	\$3,670	\$4,020	\$4,370
Silage	250	\$3,581	\$3,931	\$4,281	\$4,631	\$4,981

Values inside the ()'s are negative.

Figure 5 shows the same sensitivity information for the short-term cash flow result.

FIGURE 6

**Short Term Cash Flow Advantage to Ownership
at Various Acres of Haylage and Corn Silage**
Acres of Haylage (sum of all crops)

		400	600	800	1000	1200
Acres of	100	\$8,048	\$9,448	\$10,849	\$12,249	\$13,649
	150	\$9,270	\$10,670	\$12,071	\$13,471	\$14,871
Corn	200	\$10,492	\$11,892	\$13,293	\$14,693	\$16,093
	250	\$11,714	\$13,114	\$14,515	\$15,915	\$17,315
Silage	300	\$12,936	\$14,336	\$15,737	\$17,137	\$18,537

Values inside the ()'s are negative.

Figure 6 shows results of the cash flow sensitivity analysis when labor cost is not considered a cash cost. Also, the range in acres harvested was expanded. It still shows a short-term

cash flow advantage of \$8,048 at 400 acres of haylage and 100 acres of corn silage. However, the economic profit has decreased to a -\$6,299 (this figure is not shown).

Other Factors

Other factors include but are not limited to: timing, forage quality, labor management, opportunity cost of management time, return on assets, borrowing capacity, and storage structures.

FIGURE 7

**Economic Profits from Ownership
When Custom Harvester Improves Quality (%)**
Average Percent Quality Change in Haylage

		5.0%	2.5%	0.0%	-2.5%	-5.0%
Percent	5.0%	(\$24,054)	(\$15,054)	(\$6,054)	\$2,946	\$11,946
	2.5%	(\$21,554)	(\$12,554)	(\$3,554)	\$5,446	\$14,446
Change in	0.0%	(\$19,054)	(\$10,054)	(\$1,054)	\$7,946	\$16,946
	Corn	-2.5%	(\$16,554)	(\$7,554)	\$1,446	\$10,446
Silage	-5.0%	(\$14,054)	(\$5,054)	\$3,946	\$12,946	\$21,946

Values inside the ()'s are negative.

Timing of the harvest maybe part of forage quality. So it and forage quality are looked at in Figure 7. It shows that once you inject a change in forage quality into your calculations of economic profits,

even at only 2.5%, the custom harvesting decision becomes clear. If you feel custom harvesting will improve the overall quality of either your haylage or corn silage, you will custom harvest. If

you feel custom harvesting will decrease the quality of either your haylage or corn silage you will likely continue to own harvesting equipment. Note: the acres harvested are 200 corn silage and 800 haylage.

The issues of labor management and the opportunity cost of management time are involved with the quality and availability of labor in your area. If these factors will add costs to the ownership side of the equation enter those on the input sheet under “Management and Labor.” Example: if you feel you need one-tenth of a \$40,000 manager each year to coordinate your forage harvesting operations, enter 0.1 in the “number” column.

The issue of rate of return on assets can be addressed by changing the interest rate charged in the “Loan Terms.” box. If you want a 12% return on the investment you have in harvesting equipment, enter 12% there. Note: this will also change your cash flow.

If you are near your ability to borrow and must upgrade your harvesting equipment; the decision is made for you. You will need to custom harvest.

If you have all vertical storage structures for your forage, you may not be able to custom harvest because you can not place the feed in storage fast enough. In that case you will need to look at your long-range goals before trying to make a decision between ownership and custom harvesting.

Summary

The costs of ownership can vary for several reasons. The biggest factors in ownership costs are prices paid for the various pieces of equipment and harvesting efficiency (acres per hour).

The calculations shown here are for demonstration only. The actual costs you have are very site-specific and the charge for custom harvesting will depend on the supply and demand for custom operators in your area. To calculate your costs download “OwnvsCus.xls” from the Center for Dairy Profitability’s Internet site at: <http://cdp.wisc.edu>. Click on *Tools and Other Resources* then *Decision Making Tools*. You must have Excel 5.0 or better to run this program. ABCS is a stand-alone program that can be purchased from the Center for Dairy Profitability.

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The amount you can “afford to pay” depends on both your estimated costs and the opportunity cost of your labor and capital. If you are a great cow person, the opportunity cost of your time could be much more than the \$11 per hour used in these calculations. Therefore, the amount you could “afford to pay” for custom harvesting, so you can concentrate on your cows, could far exceed local custom rates.

There are other difficult issues in the ownership versus custom hire debate. The first of these is “dependability.” Another related issue is quality. However once you add either a negative or positive quality adjustment into the profit equation, you have determined the outcome of your analysis. If you feel custom harvesting will decrease the quality of your forage, you will have a

profit reason for not custom harvesting, and likely will not custom harvest. If you feel custom harvesting will increase the quality of your forage, you are likely custom harvesting now.

Other intuitive factors (labor management, etc.) are important, but the quality issue is paramount.