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Calculating Costs for Custom Haying Operations

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Rising machinery costs have made owning an entire set of equipment questionable for some farms—especially those too small to utilize expensive machines efficiently. When available, custom hiring to perform some farming operations is feasible for many farmers.

Haymaking is a mechanized operation that lends itself to custom hiring. This report is presented to those interested in custom haymaking as an economic venture. It can also be useful to others to calculate costs for their haying operations and decide if they have enough acres to justify machine ownership rather than hiring custom operators.

The cost calculation chart on page 3 will help a custom haying operator determine the costs associated with each operation and calculate a rate per acre which will cover all costs and provide a reasonable return on the investment. Investment and costs will vary; each operator should use his own figures to determine his custom rate.

Information from the rate calculation chart then will help the custom operator find his break-even point for haymaking. Break-even is that point where total revenues equal total costs—no profit is made and no loss is sustained. However, costs include the operator's time and an interest charge on the investment. Once the operator finds his break-even point, he can compare the acreage he feels he can hay each season to the acreage he must hay in order to break even. He can then weigh this venture's profitability against that of alternative ventures and decide whether haymaking will be worthwhile.

Rate Calculation

The following is a step by step example of calculating the cost of operating a 14-foot self-propelled swather purchased for $16,350. Estimates are that the machine will last 10 years of normal operation and will have a salvage value of $1,635 when traded in at the end of its life. To calculate the average value of the swather, add the expected salvage value to the original cost, then divide by 2:

cost		salvage		Average Value
$16,350	+	$1,635	=	$8,993
2				

The next step is to determine average annual fixed costs. These are the costs which will be incurred regardless of the number of hours the machines are operated or how much hay is harvested. Annual costs include expenses for depreciation, shelter, taxes, insurance and interest on investment. The cost calculations are as follows:

Yearly Depreciation

cost		salvage		Depreciation
$16,350	–	$1,635	=	$1,472
10				
Life of Equipment				

Shelter Cost

average value				Shelter Cost
$8,993	x	.01	=	$90

Taxes

average value		assessed value		mill levy		Yearly Taxes
$8,993	x	.20	x	.095	=	$171

Insurance Costs

average value				Yearly Insurance Costs
$8,993	x	.005	=	$45

Interest on Investment Cost

average value				Average Annual Interest Cost
$8,993	x	.08	=	$719

Add all the average annual costs to get the total average fixed costs per year of $2,497 for the 14-foot swather.

The next step is to calculate the variable costs per hour. These are costs which will vary in proportion to machine use. They include fuel, repairs, lubrication, and labor, as well as transportation, moving costs, management, supplies, etc. The calculations for these costs are as follows:

Fuel

hourly consumption per horsepower		horsepower		price per gallon		Hourly Fuel Cost
.06	x	150	x	.46	=	$4.14

Repairs and Lubrication

original cost				Hourly Costs
$16,350	x	1.2*	=	for Repairs and Lube
10 life	x	451 hours of use annually		$4.35

*1.2 is a factor converted from studies by Armstrong and Faris. 1964. Farm Machinery: Costs, Performance Rates and Combinations, Southern San Joaquin Valley, California. California Ag. Exp. Sta., Giannini Foundation of Agricultural Economics Report 273.

Labor

wage rate		labor, including down time		FICA	=	Hourly Labor Costs
$4	x	1.43	x	1.0585	=	$6.05

Transportation, moving, management, and supplies costs are combined and roughly estimated to be 30 cents for each hour of use.

Add all the variable costs to obtain a total variable cost figure of $14.84 per hour.

Convert total variable costs per hour to total variable costs per acre by dividing variable costs per hour for each machine by the number of acres per hour that can be worked by that machine. This calculation for the swather is as follows:

$$\frac{\text{total variable costs per hour } \$14.84}{\text{4.75 acres per hour}} = \text{Total Variable Costs Per Acre } \$3.12$$

Total annual fixed costs, calculated to be $2,497; included a return on the investment of 8 percent. Fixed cost per acre would vary depending on the number of acres handled. Determine the number of acres necessary to break even in this analysis after a custom rate for the area is known. Do this as follows:

$$\frac{\text{annual fixed cost } \$2,497}{\text{\$5.00 custom rate} - \text{\$3.12 variable costs}} = 1{,}328 \text{ acres}$$

In other words, 1,328 acres would be required to pay all costs including interest on investment if $5.00 per acre were charged for the service. Each acre over 1,328 would contribute $1.88 to net returns above all costs.

If continually operated during a haying season of 60 working days, one swather could be used to harvest about 2,100 acres. This would reduce the average fixed costs to $1.19 per acre. Average total cost per acre at the 2,100 acre level would be $4.31.

Total cost per acre for all operations can be found as follows:

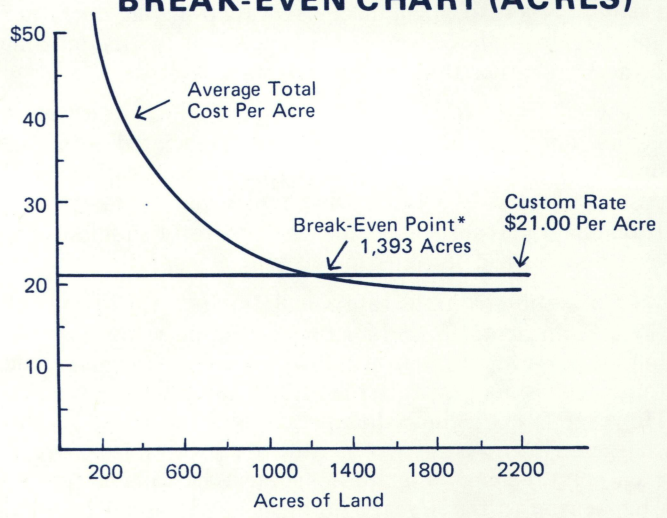
$$\text{Total Cost per Acre} = \frac{\text{Total fixed cost } \$8{,}189 + \text{Variable cost per acre } \$15.12 \times \text{(Number of acres) } 2000}{\text{2000 Number of acres}}$$

$$\text{Total Cost per Acre for 2000 Acres} = \frac{\$8{,}189 + 30{,}240}{2000} = \$19.21$$

Note that the cost per acre changes as the number of acres change.

The same procedure is used for calculating rates and break-even points for other operations included in custom haymaking. Each operator is encouraged to complete the attached form to determine the profitability of his own venture.

BREAK-EVEN CHART (ACRES)



*At the break-even point $29,251 of annual cost is invested ($8,189 of fixed cost and $21,062 of operating cost). Note that if the custom rate was increased to $25.00 per acre, the break-even point would occur near 800 acres.

BREAK-EVEN CALCULATIONS (ACRES)

	Fixed Costs	÷ (	Custom Rate Per Acre	−	Variable Costs Per Acre)	=	Break-Even Point (Acres)
Swathing	$2,497	÷	$ 5.00	−	$ 3.12	=	1,328
Baling	2,271	÷	10.00	−	8.33	=	1,360
Hauling/Stacking	3,421	÷	6.00	−	3.67	=	1,468
Total Venture	$8,189	÷	$21.00	−	$15.12	=	1,393

COST CALCULATION CHART

ITEM	SELF-PROPELLED 14' SWATHER	TRACTOR/BALER[1]		BALE WAGON	TOTAL
Cost	$16,350	$10,000	$4,800	$22,400	$53,550
Expected Life	10 years	10 years	10 years	10 years	
Salvage Value	$ 1,635	$ 1,000	$ 480	$ 2,240	$ 5,355
Average Value $\frac{\text{cost + salvage}}{2}$	$ 8,993	$ 5,500	$ 2,640	$ 12,320	$ 29,453
Hours of use annually[2]	451	600	600	489	xxx
ANNUAL COSTS					
Depreciation $\frac{\text{(cost - salvage)}}{\text{life}}$	$ 1,472	$ 900	$ 432	$ 2,016	$ 4,820
Shelter (average value x .01)	$ 90	$ 55	$ 26	$ 123	$ 294
Taxes[3] (average value x assessed value x mill levy)	$ 171	$ 105	$ 50	$ 234	$ 560
Insurance (average value x .005)	$ 45	$ 28	$ 24	$ 62	$ 159
Interest[4] (average value x .08)	$ 719	$ 440	$ 211	$ 986	$ 2,356
TOTAL FIXED COSTS PER YEAR	$ 2,497	$ 1,528	$ 743	$ 3,421	$ 8,189
VARIABLE COSTS PER HOUR					
Fuel (.06 gal/hr x h.p. x price/gal)	$4.14	$1.38	$ .83	$4.21	xxx
Repairs and Lube $\left(\frac{\text{cost x 1.2}}{\text{life x hours of use annually}}\right)$	$4.35	$2.00	$ .96	$5.50	xxx
Labor[5] ($4.00/hr x 1.43 x 1.0585)	$ 6.05	$6.05	N/A	$ 6.05	xxx
Transportation, moving costs, mgt., supplies, etc.	$ .30	$ .30	$18.20[6]	$ .30	xxx
TOTAL VARIABLE COSTS PER HOUR	$14.84	$9.73	$19.99	$16.06	xxx
TOTAL VARIABLE COSTS PER ACRE $\left(\frac{\text{total variable costs per hour}}{\text{acres per hour}^7}\right)$	$ 3.12	$2.73	$ 5.60	$3.67	$ 15.12
TOTAL FIXED COSTS PER ACRE[8] $\left(\frac{\text{total annual fixed costs}}{\text{2000 acres}}\right)$	$ 1.25	$ .76	$ .37	$ 1.71	$ 4.09
TOTAL COSTS PER ACRE	$ 4.37	$3.49	$ 5.97	$ 5.38	$ 19.21
CUSTOM RATE PER ACRE[9]	$ 5.00	$10.00		$ 6.00	$ 21.00
NET RETURN PER ACRE (given custom rate and at 2000 acres/yr.)	$ .63	$ .54		$ .62	$ 1.79

[1] The tractor/baler combination is considered one operation.

[2] Hours of use annually is an estimate of the number of hours each machine might be used during the haying season.

[3] The assessed value and mill levy factors will vary from area to area and can be obtained from the local county assessor.

[4] When capital is borrowed to invest in the venture, the yearly interest should be determined and added into the annual costs. Interest on investment was charged at 8% for this example. This can be adjusted to fit the situation.

[5] The 1.43 factor in this calculation covers actual machine operation time as well as labor costs incurred while the machine isn't being operated because of servicing.

[6] This includes an allowance for baling wire.

[7] Operating speed is calculated by the following formula:

$$\left(\frac{\text{speed of equipment x width of row x 5,280 feet}}{\text{43,560 square feet per acre}}\right) \text{ 70 percent efficiency}$$

[8] Fixed cost per acre is a function of the number of acres harvested. It can only be calculated after the acreage to be harvested is known. It is found as follows:

$$\frac{\text{Total fixed cost}}{\text{No. of acres}} = \text{Total fixed cost per acre}$$

[9] Custom rate per acre is used only for illustration. Use whatever rate is appropriate for your area.

COST CALCULATION CHART

ITEM	SELF-PROPELLED 14' SWATHER	TRACTOR/BALER[1]	BALE WAGON	TOTAL
Cost				
Expected Life				
Salvage Value				
Average Value $\frac{\text{cost + salvage}}{2}$				
Hours of use annually[2]				
ANNUAL COSTS				
Depreciation $\frac{\text{(cost - salvage)}}{\text{life}}$				
Shelter (average value x .01)				
Taxes[3] (average value x assessed value x mill levy)				
Insurance (average value x .005)				
Interest[4] (average value x .08)				
TOTAL FIXED COSTS PER YEAR				
VARIABLE COSTS PER HOUR				
Fuel (.06 gal/hr x h.p. x price/gal)				
Repairs and Lube $\left(\frac{\text{cost x 1.2}}{\text{life x hours of use annually}}\right)$				
Labor[5] ($4.00/hr x 1.43 x 1.0585)				
Transportation, moving costs, mgt., supplies, etc.				
TOTAL VARIABLE COSTS PER HOUR				
TOTAL VARIABLE COSTS PER ACRE $\left(\frac{\text{total variable costs per hour}}{\text{acres per hour}^7}\right)$				
TOTAL FIXED COSTS PER ACRE[8] $\left(\frac{\text{total annual fixed costs}}{\text{2000 acres}}\right)$				
TOTAL COSTS PER ACRE				
CUSTOM RATE PER ACRE[9]				
NET RETURN PER ACRE (given custom rate and at 2000 acres/yr.)				

BREAKEVEN CALCULATION

	Fixed Costs	÷	Custom Rate Per Acre	–	Variable Costs Per Acre	=	Breakeven Point (Acres)
Swathing		÷		–		=	
Baling		÷		–		=	
Hauling/Staking		÷		–		=	
Total Venture		÷		–		=	

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