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Calculating Custom Rates For Forage Harvesting

Custom work serves a valuable function in spreading the cost of expensive machines over many farms. For farmers who have low annual requirements for a specific machine, hiring custom work versus owning the machine, may result in lower cost. For those who have extra machine capacity and time to do custom work for others, hiring out should help reduce the per unit overhead cost of a specialized machine and bring in added earnings.

One of the more important functions affecting per acre or per hour cost for machinery is the annual use of the machine. High investment cost spread over greater acreage will reduce per acre cost. Many farmers consider custom work as a way of reducing their per acre cost where they cannot fully utilize a machine on their own farms. Doing custom work, therefore, requires an estimate of the owner's cost so that he may establish a profitable custom rate for both himself and his customer.

Custom rates may vary from covering only operating cost to covering total cost plus an allowance for risk and profit. Charges for custom work must be a function of the owner's costs, but local "going" rates for custom work must also be considered. Adjustments may be necessary to keep charges in line with other local operators, but charges should not be set so low as to be unprofitable.

Calculating Ownership Cost

Annual ownership costs take into account depreciation, interest on investment, insurance, and housing. Investment credit, salvage value, and years of useful life are used in estimating the depreciation figure.

Annual ownership cost can be approximated by multiplying the new cost of the machinery times a factor for annual ownership cost, which includes the components of ownership cost mentioned above.

Table 1 gives the ownership cost factors for specified types of forage equipment according to the years of useful life for which the machine is intended. The formula for annual ownership costs is:

$$(1) \text{ Ownership Cost Per Year} = \frac{\text{New Cost of Equipment} \times \text{Ownership Cost Factor}}{\text{Hours Per Year}^*}$$

(Include Tractor if used)

$$(2) \text{ Ownership Cost Per Hour} = \frac{\text{Ownership Cost Per Year}}{\text{Hours Per Year}^*}$$

* Annual hours of use for all functions.

Calculating Operating Cost

Operating costs consist of fuel, lubrication, repair and maintenance, and a labor charge for the operator. Average machine operating cost per hour can be obtained from table 2. These figures are for machine operating cost only and do not include tractor cost. Total per hour tractor costs, as well as, ownership, and operating costs per hour are included in table 3. The labor charge per hour will be what the operator figures his time is

worth to run the machine or what he has to pay to get the job done. To estimate a per hour cost, add the machine's operating cost per hour, tractor operating cost per hour (if a tractor is used), and labor cost per hour:

$$(3) \text{ Operating Cost Per Hour} = \frac{\text{Machine Operating Cost Per Hour}}{\text{Hour}} + \frac{\text{Tractor Operating Cost Per Hour}}{\text{Hour}} + \frac{\text{Labor Cost Per Hour}}{\text{Hour}}$$

Calculating Total Cost and Custom Returns

Ownership cost per hour and the operating cost per hour are added to obtain the total cost per hour of operating the equipment. The sum of the two costs is multiplied times the annual hours of use for a specific function to obtain the total cost per year. The operator should be able to provide a reasonable estimate of annual hours of use.

$$(4) \text{ Total Cost Per Year} = \left(\frac{\text{Ownership Cost}}{\text{Per Hour}} + \frac{\text{Operating Cost}}{\text{Per Hour}} \right) \times \frac{\text{Hours of Use}}{\text{Per Year}^*}$$

* Annual hours of use for a specific function (e.g. baling).

A factor of 1.2 is multiplied by the total cost per year to estimate custom returns. This is the total to be charged by the operator for the custom equipment in one year at full use for a specific function. It covers total cost and gives the operator a 20 percent margin for risk and returns to management:

$$(5) \text{ Total Custom Returns} = \frac{\text{Total Cost}}{\text{Per Year}} \times 1.2$$

The Custom Rate per Unit of Work

The custom operator must decide how he wants to charge for custom work. The operator could charge on a per hour, per acre, per bushel, per ton, per bale, or stack basis. To get these figures, divide the total custom work returns by the number of hours, acres, bushels, tons, bales, or stacks expected to be done in one year. This will give the custom rate per unit to be charged:

$$(6) \text{ Custom Rate Per Unit} = \frac{\text{Total Custom Returns}}{\text{Units}} \div \text{Per Year}$$

(units may be hours, acres, tons, etc.)

This value is the rate per unit to be charged to cover total cost and allow for a 20 percent margin for profit and risk associated with performing the operation.

Remember that custom rates will not be the same for all operators because of differences in machinery as well as differences in the amount of time the equipment is used. Differences also may occur as a result of the custom operator trying to cover less than total cost or seeking a different margin for profit and risk.

The following formulas summarize this discussion:

$$(1) \text{ Ownership Cost Per Year} = \text{New Cost of Equipment} \times \text{Ownership Cost Factor}$$

$$(2) \text{ Ownership Cost Per Hour} = \frac{\text{Ownership Cost Per Year} \div \text{Hours Per Year}^*}{\text{Per Year}^*}$$

* Annual hours of use for all functions.

$$(3) \text{ Operating Cost Per Hour} = \frac{\text{Machine Operating Cost Per Hour} + \text{Tractor Operating Cost Per Hour} + \text{Labor Cost Per Hour}}{\text{Per Hour}}$$

$$(4) \text{ Total Cost Per Year} = \left(\frac{\text{Operating Cost Per Hour} + \text{Ownership Cost Per Hour}}{\text{Per Hour}} \right) \times \text{Hours of Use Per Year}^*$$

* Annual hours of use for a specific function (e.g. baling).

$$(5) \text{ Total Custom Returns} = \text{Total Cost Per Year} \times 1.2$$

$$(6) \text{ Custom Rate Per Unit} = \frac{\text{Total Custom Returns} \div \text{Units Per Year}}{\text{Per Unit}}$$

(units may be hours, acres, tons, etc.)

The hourly rate is often used by custom operators when work is conducted under adverse conditions such as wet fields. Adverse weather and poor field conditions will reduce work accomplishment so calculations should be based on hourly values.

The person contracting for the work should pay for the increased cost associated with the adverse conditions he asks the custom operator to face. This increased cost should not be placed on the custom operator, and an hourly charge is the best method of shifting cost and still accomplishing the job.

The custom rate per acre is the method of charging generally used when operating conditions are normal. This allows the custom operator to operate efficiently and possibly benefit by being able to do more work than expected, thereby increasing profits by his own efficiency. This puts the burden of risk on the custom operator, and the person contracting for the work knows beforehand the total amount due.

For a given machine, the total cost can be affected by the size of the tractor; varying amounts of machine use per year, and varying field performances. An operator may choose to cover only his operating cost in the case of providing the service for a relative or friend, or his custom rates can cover his total cost or cover total cost plus 20 percent.

There is no one custom rate that is fair or appropriate for every custom operator doing a particular job. For individual operators, cost will vary by type of machine, yield, condition of crop, size and shape of field, and the wage rate. Doing custom work is a business, so it should be done in a businesslike manner. Have the charges and work to be done in a written agreement before the work is actually done. Don't set custom rates after the fact. Be fair, be business-like, be honest and be busy next year doing custom work for repeat customers.

Table 1. Estimated Ownership Cost Factors

Years of Useful Life	Factors			
	Tractors	Forage harvesters, blowers, baler	Conditioners, rakes, mowers	S.P. windrowers
10	.110	.126	.124	.121
9	.114	.131	.129	.126
8	.124	.138	.135	.132
7	.123	.146	.142	.138
6	.130	.161	.157	.152
5	.145	.175	.170	.164

Table 3. Estimated Costs Per Hour For Tractors

Tractor H.P. (Diesel)	Operating Cost/Hour	Ownership Cost/Hour	Total Cost/Hour
20	.93	1.27	2.20
30	1.27	1.38	2.65
40	1.82	2.16	3.98
60	2.56	2.76	5.32
75	3.48	4.17	7.65
100	4.41	4.50	8.91
120	5.21	5.20	10.41
140	6.01	5.93	11.94

Table 2. Estimated Capacities and Costs of Forage Equipment

Machine	Size	Time Required	Variable Costs Per Hour	Typical New Price
Mower mounted	7'	.28-.34 hr/acre	\$.66	\$1,250
Mower mounted	9'	.22-.26 hr/acre	.77	1,450
Hay conditioner	7'	.26-.32 hr/acre	.51	1,150
Swather, self propelled	12'	.15-.19 hr/acre	4.56	7,500
Swather, self propelled	15'	.13-.15 hr/acre	4.61	7,650
Swather, self propelled	18'	.10-.12 hr/acre	4.73	7,900
Swather, self propelled	20'	.09-.11 hr/acre	4.83	8,200
Swather conditioner, s.p.	12'	.16-.20 hr/acre	5.04	8,600
Swather conditioner, s.p.	15'	.14-.17 hr/acre	5.09	8,725
Hay rake	10'	.26-.32 hr/acre	.66	1,500
Baler PTO twine		.16-.25 hr/ton	1.43	4,075
Baler PTO wire		.16-.25 hr/ton	1.86	5,300
Large round baler 1,500 lbs.		.13-.20 hr/ton	2.27	4,300
1 ton stacker		.14-.21 hr/ton	2.57	6,200
3 ton stacker		.12-.19 hr/ton	5.29	11,000
6 ton stacker		.11-.16 hr/ton	6.26	16,970
Forage harvester PTO 1 row		.95-1.17 hr/acre	2.11	5,850
Forage harvester PTO 2 row		.54-.66 hr/acre	2.80	7,780
Forage harvester S.P. 2 row		.44-.54 hr/acre	13.96	30,200
Forage blower		.03-.05 hr/ton	.50	1,435
Hay wagon	8'		.19	555
Wagon self unloading	7' x 15'		1.25	3,560
Front end loader			.20	2,000
Bale spear (for large round bales)			—	200

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