

# Forage Machinery Costs



Machinery costs for haying operations are a significant portion of total annual costs, with operator labor, fuel, repairs and maintenance, and fixed costs accounting for 35–45 percent of total annual costs. Because of this significant expense, producers should include machinery costs when budgeting for their hay enterprise.

Farm records are the best source of information to develop your costs, but, if adequate farm records are not available, you can calculate estimates using [MSU Extension Publication 3543 \*Farm Machinery Cost Calculations\*](#) and the accompanying spreadsheet. In this publication, we will use that spreadsheet to calculate machinery costs for a representative set of machines used on a 40-acre mixed-grass hay enterprise with three cuttings per year for an estimated annual yield of 3.25 tons per acre.

Equipment for this representative hay operation includes a 130-horsepower four-wheel-drive tractor, 8-foot mower, 18-foot tedder, 17-foot double hay rake, and medium round baler. Information for the equipment is included in Table 1. The calculations use engineering data from the American Society of Agricultural and Biological Engineers (ASABE) Standards 2011 and 2013 to provide estimates of cost parameters.

The equipment information required for the calculations includes purchase cost, expected useful life, width in feet, annual use in hours, field efficiency, field speed, and field capacity. The annual use for tractors includes use for all enterprises, not just the haying enterprise. The width of the baler is the effective width, or the width that the hay rake pulls into a windrow. In this case, the hay rake is 17 feet wide and pulls hay across 17 feet into a single windrow, so the effective width of the baler is 17 feet. Field efficiency, field speed, and field capacity are estimated using ASABE Standards.

Total annual costs for each piece of equipment, shown in Table 2, are calculated by adding total annual ownership costs, which include depreciation, interest, taxes, insurance, and housing, plus total annual operating costs, which include repairs, fuel, lubricants, and labor. Total annual costs per hour are calculated for each piece of equipment by dividing the total annual costs by the annual use.

Combined costs per hour are calculated for each implement by adding the annual cost per hour for the tractor to the annual cost per hour for each implement. The combined cost per acre is calculated by dividing total cost per hour by the field capacity in acres per hour. The combined cost per ton is calculated by dividing total cost per acre by the expected yield in tons per acre. The combined cost per bale is calculated by dividing total cost per acre by the expected yield in bales per acre.

The costs for this scenario with 40 acres of hay are as follows:

- total annual machinery costs of \$12,092
- total annual machinery costs per acre of \$305
- total annual machinery costs per ton of \$94
- total machinery costs per bale of \$56

With direct expenses of fertilizer, herbicide, and other supplies of \$57 per ton, the total cost of production of the mixed-grass hay in this example is \$151 per ton, which is considerably more than the market price of mixed-grass hay.

This scenario can be used as an example for producers to calculate the machinery costs on their operations. These costs are very sensitive to the number of acres on which the equipment is used, estimated annual use in hours, and purchase cost. Strategies to reduce machinery costs include purchasing used equipment, extending the expected useful life past 10 years, and increasing acres on which the equipment is used.

**Table 1. Equipment information.**

Description	Purchase cost (\$)	Expected useful life (years)	Width (feet)	Annual use (hours)	Field efficiency (%)	Field speed (mph)	Field capacity (ac/hr)
Tractor, 130 hp 4WD	125,000	20		400			
Mower (8 ft)	11,000	10	8	22	80	7	5.4
Tedder (18 ft)	7,200	10	18	9	80	8	14.0
Rake, double (17 ft)	7,000	10	17	10	80	7	11.5
Round baler	42,500	10	17	22	65	4	10.7

**Table 2. Machinery cost (\$) calculations.**

Description	Tractor, 130 hp 4WD	Mower (8 ft)	Tedder (18 ft)	Rake, double (17 ft)	Round baler
Depreciation	4,430	764	496	490	3,032
Interest	4,035	359	236	228	1,367
Taxes, insurance, and housing	1,211	108	71	68	410
<b>Total annual ownership costs</b>	<b>9,676</b>	<b>1,231</b>	<b>803</b>	<b>786</b>	<b>4,809</b>
Repairs	2,496	233	17	19	580
Fuel	3,432				
Lubrication and filters	515				
Labor	7,200				
<b>Total annual operating costs</b>	<b>13,643</b>	<b>233</b>	<b>17</b>	<b>19</b>	<b>580</b>
<b>Total annual costs</b>	<b>23,318</b>	<b>1,464</b>	<b>820</b>	<b>805</b>	<b>5,389</b>
Ownership costs per hour	24.19	55.69	93.42	75.56	214.71
Operating cost per hour	34.11	10.56	1.96	1.84	25.88
<b>Total cost per hour</b>	<b>58.30</b>	<b>66.25</b>	<b>95.38</b>	<b>77.40</b>	<b>240.59</b>
Combined cost per hour		124.55	153.67	135.69	298.89
Combined cost per acre		68.82	33.03	35.28	167.37
Combined cost per ton		21.17	10.16	10.85	51.50
Combined cost per bale		12.70	6.10	6.51	30.90

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