

September 2007

MACHINERY COST ESTIMATES

The tables in this publication contain estimates of farm machinery operation costs calculated via an economic engineering approach. The data are intended to show a representative farming industry cost for specified machines and operations.

Machine costs are separated into time-related and use-related categories. Use-related costs are incurred only when a machine is used. They include fuel, lubrication, use-related repairs and labor. Time-related costs, also often referred to as overhead costs, accrue to the owner whether or not a machine is used. Overhead includes time-related economic costs: interest, insurance, personal property taxes, and housing. There are no personal property taxes in Minnesota. Depreciation is both a use- and a time-related cost. Depreciation will be related to use to the extent that increased annual usage shortens years of life and/or reduces salvage value. While not entirely use-related, depreciation is included along with operating expenses and labor costs in the columns labelled "use-related cost/acre".

OVERHEAD COSTS: Time-related costs are prorated over a 12 year economic life except where otherwise indicated. Trade-in values are estimated based on American Society of Agricultural Engineers formulas. Income tax implications are ignored. A housing charge of 33 cents per square foot of shelter space needed per year is made.

A six percent "real" (inflation-adjusted) interest rate is used in the cost estimates. This real rate is calculated by taking a nominal rate charged by lenders, minus a measure of the inflation rate per year expected over the years of ownership. Insurance is charged at 0.85 percent of the undepreciated value. The interest and insurance cost formulas are slightly different from those used in previous years. Adding one year's depreciation to the numerator in effect bases the costs on the value at the beginning of each year owned. This gives a slightly more accurate calculation of the actual costs over the years owned. In states where farm machinery is taxed as personal property, property tax could be calculated in a similar manner, depending on how taxes are assessed.

Formulas used to compute machinery overhead costs:

$$\text{Interest, \$/year} = \frac{\text{purchase cost} + \text{salvage value} + \text{depreciation (\$/year)}}{2} \times \text{"real" interest rate}$$

$$\text{Insurance, \$/year} = \frac{\text{purchase cost} + \text{salvage value} + \text{depreciation (\$/year)}}{2} \times \text{insurance rate}$$

$$\text{Housing, \$/year} = \text{price per sq. foot} \times \text{sq. feet shelter space required}$$

$$\text{Taxes per year} = 0 \text{ (no taxes on personal property in Minnesota)}$$

USE-RELATED COSTS: Fuel cost is calculated by multiplying the fuel consumption by the price of fuel, with fuel consumption assumed to be 0.044 gallons of diesel fuel per PTO horsepower-hour on average for each implement type. Fuel consumption per acre is averaged across sizes within a given implement type. The price of farm diesel fuel is projected at \$2.70 per gallon. All power units, tractors, combines, trucks, etc., use diesel fuel. Lubrication cost is assumed to be 10 percent of fuel cost.

The formulas for repair and maintenance costs estimate total accumulated repair costs based on accumulated hours of lifetime use. Repair and maintenance calculations are based on American Society of Agricultural Engineers formulas. The total cost is then divided by accumulated hours to arrive at an average per hour cost estimate. The amount of annual use of a machine is an estimate of the number of hours a commercial farmer would use that particular machine in one year.

Labor is charged at an hourly wage rate, which includes 30 percent benefits. Charge rates are \$12.00 per hour for unskilled labor and \$15.00 per hour for skilled labor. The skilled labor rate is generally used with the planting and harvesting equipment and sprayers. Labor per acre for an operation such as plowing or disking is calculated by using the work rate on the implement. Less labor per acre is used in a disking operation that covers more acres per hour than in a plowing operation. A small amount of extra labor is added over and above machine time to allow for downtime for tasks such as making adjustments and filling sprayers and planters. The labor adjustment ranges from 2 percent additional time for tillage to 33 percent for spraying.

Economic depreciation is included in use-related costs, calculated using the straight-line formula:

$$\text{Depreciation, \$/year} = \frac{\text{purchase cost} - \text{salvage value}}{\text{years you will use machine}}$$

These estimates will not represent any given individual's cost. Differences in buying power, repair programs, average annual use, and overall replacement programs should be considered when making adjustments. It may be useful to record actual expenses for at least a few of your implements and compare your costs to these estimates. These estimates will differ from records because they are estimates, but also because they are averaged over the use period and are expressed in today's dollars. If these estimates are compared to recorded costs that include repairs or depreciation based on historical costs, one adjustment that would be required for comparability would be to index the historical cost to current prices.

THE COST IMPACT OF ANNUAL USAGE AND TRADE-IN AGE: The adoption of modern equipment such as combines in recent decades has reduced the need for farmers to cooperate with their neighbors in activities such as "threshing bees" and "barn raisings" that were common earlier. As equipment gets larger and more expensive, the practices of using custom operators, purchasing equipment jointly, and trading work may return as more producers are priced out of the market for individual ownership. The table below shows how covering more acreage with a piece of equipment can help control costs. The other variable that enters into the cost calculations is how long the machine will be used before being traded in. Trade-in decisions probably depend on the degree of wear and tear placed on the machine, in case using it over more acres each year probably means trading it sooner than otherwise.

One machine that some producers have considered owning jointly is a baler for the large rectangular bales (in the range of 30" to 36" square by 6' to 8' feet long) that are sometimes used where hay is shipped longer distances. These high-capacity machines can cover quite a few acres in an hour, so annual hours of use would be quite low if used on only one farm.

The top section of the table shows how increased annual use shortens the expected trade-in age, if traded at a given number of hours. For example, if the baler covered 16 acres/hour and the farm had 815 acres to harvest/year (two cuttings x 407 acres/cutting), annual usage would be 50 hours. If traded at 600 hours, a baler used 50 hours/year would be traded at twelve years. If usage is increased to 100 hours/year, the same 600 hour trade-in decision rule would point to a trade-in after only six years instead of twelve. The bottom section of the table shows how the increased usage would affect the total cost per acre to own and operate the baler. (The costs shown are for the baler only, not including the tractor or operator labor.) The 600 hour trade-in rule is shown in the first column. Following the first column down to the 50 hours/year shown on the third line, we estimate that the cost/acre would be \$10.01/acre. The third line shows the cost if usage were increased to 100 hours or 1,630 acres, cost/acre would fall to \$6.62/acre.

Again, both of these cost estimates assume that the baler is traded after 600 hours of use. They also assume that the salvage or trade-in value is determined by the years of age at trade-in, rather than the amount of wear-and-tear. So, the baler is worth more when traded at six years and 600 hours than it would be at twelve years and 600 hours. To be specific, the ASAE formula estimates that after 12 years of use the baler would be worth around 25% of the new price. Trading after only six years, the formula estimates a trade-in value equal to 37% of new.

The ASAE formulas for estimating machinery trade-in values are very useful general guides for estimating machinery costs, but they do have their limitations. One particular limitation is that they only factor in the amount of wear-and-tear (accumulated hours) for tractors and combines, not most implements like balers. The reason they don't consider wear-and-tear for these implements is that the formulas were estimated by economic researchers using auction prices of used equipment as a source (a reference to the original research is available upon request). The database of auction prices also included reported tach hours for tractors and combines that come equipped with tachometers. For other machines without tachometers, wear-and-tear is not factored into the formulas. Wear-and-tear likely does affect trade-in values, however, even though the formulas don't incorporate it. If wear-and-tear is significant, there would be less economic advantage to using the baler more hours/year.

Impact of Annual Usage on Trade-in Age and Cost Per Acre to Own and Operate a Large Rectangular Baler

	<u>Accumulated hours at trade-in</u>			
	600	900	1,200	1,800
Annual use, hrs	- - - Expected years to trade-in - - -			
50	12	18	24	36
75	8	12	16	24
100	6	9	12	18
150	4	6	8	12
200	3	5	6	9
Annual use, hrs	- - Cost/acre (not including tractor or labor) ^a - -			
50	\$10.01	\$8.59	\$7.71	\$6.74
75	\$7.90	\$6.92	\$6.29	\$5.56
100	\$6.62	\$5.89	\$5.43	\$4.88
150	\$5.09	\$4.66	\$4.37	\$4.04
200	\$4.17	\$3.91	\$3.73	\$3.53

^aTractor and labor costs would add \$3.37/acre to the amounts shown.

THE BOTTOM LINE: Machinery costs are substantial; control of them is important. Custom charges are often based upon them. No one should do custom work unless the charge will cover operating costs and use-related depreciation plus a return for one's risk and time. Ideally, all allocated per acre or hour overhead costs should also be covered by anyone offering to do custom work. The market for custom work usually does not cover all costs. The market is usually somewhere in between the Use-related costs and total costs.

Prepared by William Lazarus, Department of Applied Economics, University of Minnesota

ACCESS TO EDUCATIONAL PROGRAMS AND MATERIALS:

The University, including the University of Minnesota Extension Service, is committed to the policy that all persons shall have equal access to its programs, facilities, and employment without regard to race, color, creed, religion, national origin, sex, age, marital status, disability, public assistance status, veteran status, or sexual orientation.

Summary of Per Acre Use-Related Costs and Total Cost for Implements with Associated Power Units, Averaged Over All Sizes by Implement Type

	Use-Related Cost/Acre ¹	Total Cost/Acre		Use-Related Cost/Acre ¹	Total Cost/Acre
Chisel Plow	\$5.97	\$8.08	Hay Swather-Cond	7.46	10.35
Chisel Plow, Front Dsk	8.32	11.17	Swather-Cond, Self-Prop	12.10	19.88
Moldboard Plow	14.00	17.73	Grain Swather, Self-Prop	7.92	12.99
Field Cultivator	3.48	4.63	Hay Baler PTO Twine	9.20	10.83
Tandem Disk	5.25	6.63	Round Baler	12.50	14.53
Tandem Disk H.D.	6.92	9.26	Rd Baler/Wrap	20.66	24.26
Offset Disk	8.36	10.99	Large Rectangular Baler	6.00	8.80
V-Ripper	8.04	10.47	Forage Harvester (Corn Head)	40.30	50.98
Comb Disk & V-Ripper	12.23	16.52	SP Forage Harvester (Corn Head)	38.42	54.64
Row Crop Planter	6.51	9.43	SP Forage Harvester (Pickup Head, 2X Windrows)	21.58	30.78
Min-Til Planter	8.23	11.22	Combine w/Corn Head	29.47	36.85
Potato Planter	24.03	35.28	Combine w/Grain Head	17.29	21.46
Beet Planter	17.41	25.97	Combine w/Belt Pickup Hd	23.45	28.92
Beet Planter, Vacuum	8.05	13.52	Forage Harvester (Corn Head)	38.67	47.86
Presswheel Drill	7.99	10.75	Potato harvester	62.99	72.97
Air Seeder Drill w/Cart	10.59	15.83	Bean Cutter	6.91	8.83
No-Till Drill	11.60	16.04	Bean Rod	6.25	7.77
Row Cultivator	4.16	5.35	Bean Windrower	8.87	11.99
Rotary Hoe	1.69	2.18	Sugar Beet Lifter	45.78	59.33
Potato Cultivator	5.62	7.16	Sugar Beet Topper	9.34	12.77
Sugar Beet Cultivator	9.00	12.68	Sugar Beet Wagon	20.61	28.42
Boom Sprayer, Self-Propelled	3.76	5.39			
Boom Sprayer, Pull-type	1.94	2.43			
Stalk Shredder	8.06	10.63			
Mower-Conditioner	8.72	11.78			
Rotary Mow/Cond	5.77	8.07			
Hay Rake (Hyd)	6.80	7.93			

¹ Use-related cost/acre includes fuel, lubricants, repairs and maintenance, labor, and power and implement depreciation (depreciation is both time-related and use-related). The difference between use-related cost and total cost is that total cost also includes overhead costs (interest, insurance, and housing).

Tractor or Combine HP ¹	Net Cost of a New Power Unit ²	Annual Hours of Use	Fuel & Oil Cost Per Hour	Maintenance & Repair Cost/Hr	Depreciation Cost Per Hour	--Overhead ³ -- Cost Per Year Cost Per Hour		--Total Cost-- Per Year Of Use Per Hour Of Use		Diesel Use/Hr Gallons
Tractors and Combines (Without Heads)										
40	\$19,000	400	\$5.23	\$0.64	\$2.52	\$952	\$2.38	\$4,307	\$10.77	1.76
60	26,000	400	7.84	0.87	3.45	1,295	3.24	6,162	15.40	2.64
75	30,000	400	9.80	1.06	3.86	1,511	3.78	7,401	18.50	3.30
105 MFWD	72,000	450	13.72	2.16	7.75	3,659	8.13	14,295	31.77	4.62
130 MFWD	92,000	450	16.99	2.76	12.41	4,240	9.42	18,713	41.59	5.72
160 MFWD	106,000	500	20.91	3.53	12.95	4,888	9.78	23,582	47.16	7.04
200 MFWD	135,000	500	26.14	4.50	16.49	6,211	12.42	29,772	59.54	8.80
225 MFWD	156,000	400	29.40	4.16	23.54	7,221	18.05	30,062	75.16	9.90
260 4WD (226 PTO)	160,000	400	29.56	2.56	24.14	7,404	18.51	29,910	74.77	9.95
310 4WD (270 PTO)	172,000	400	35.24	2.75	25.95	7,953	19.88	33,534	83.83	11.87
360 4WD (313 PTO)	189,000	400	40.93	3.02	28.52	8,731	21.83	37,720	94.30	13.78
425 4WD (370 PTO)	223,000	400	48.32	3.57	33.65	10,287	25.72	44,502	111.25	16.27
225 Tracked Tractor	154,000	400	29.40	2.46	23.24	7,129	17.82	29,172	72.93	9.90
275 HP Combine	197,000	300	35.94	32.87	43.09	8,756	29.19	42,324	141.08	12.10
340 HP Combine	235,000	300	44.43	39.21	51.40	10,453	34.84	50,965	169.88	14.96
315 HP SP Forage Harvester Base Unit	193,000	200	22.45	14.63	56.18	9,152	45.76	27,804	139.02	7.56
570 HP SP Forage Harvester Base Unit	284,000	200	40.63	21.52	82.67	13,390	66.95	42,354	211.77	13.68

¹HP shown for the smaller tractors is PTO horsepower. Engine HP is shown for the larger tractors. PTO HP for the larger tractors runs about 87% of engine HP, and is shown in parentheses. Fuel use is estimated at 0.044 gallons of diesel fuel per hour per PTO HP.

²Net cost of a new unit assumes no trade-in. Farm machinery is exempt from sales tax in Minnesota so no sales tax is included.

³Overhead costs include interest, insurance, and housing but not depreciation, which is shown separately because it varies to some extent with use. Overhead per hour will vary with annual use.

Implement	Tractor Size (HP)	Net Cost of A New Implement ¹	-- Estimated -- Work Performed Acres/hr Acres/yr		Power Cost Per Acre ²	Labor Cost Per Acre	--Implement Cost/Acre-- Depreciation Over-Head ³ Repairs			Total Cost /Acre ⁴	Use-related Cost /Acre ⁵	Diesel Fuel Gal/Acre
<u>Tillage Equipment</u>												
Chisel Plow 15 Ft	130 MFWD	\$15,000	8.50	680	\$4.69	\$1.44	\$0.54	\$1.25	\$1.15	\$9.07	\$6.81	0.60
Chisel Plow 23 Ft	200 MFWD	\$27,000	13.03	1,043	\$4.36	\$0.94	\$0.63	\$1.47	\$1.30	\$8.70	\$6.45	0.60
Chisel Plow 37 Ft	310 4WD (270 PTO)	\$35,000	20.97	1,677	\$4.11	\$0.58	\$0.51	\$1.18	\$1.06	\$7.45	\$5.44	0.60
Chisel Plow 57 Ft	425 4WD (370 PTO)	\$59,000	32.30	2,584	\$3.74	\$0.38	\$0.56	\$1.29	\$1.12	\$7.10	\$5.18	0.60
Chisel Plow, Front Dsk16.3 Ft	200 MFWD	\$18,000	9.21	737	\$6.51	\$1.33	\$0.38	\$1.39	\$1.25	\$10.86	\$8.26	0.97
Chisel Plow, Front Dsk21.3 Ft Fold	310 4WD (270 PTO)	\$28,000	12.04	963	\$6.92	\$1.02	\$0.45	\$1.65	\$1.45	\$11.48	\$8.38	0.97
Moldboard Plow 4 Bottom-18, 6 Ft	75	\$14,000	2.78	334	\$6.95	\$4.40	\$2.17	\$2.38	\$2.05	\$17.95	\$14.54	1.29
Moldboard Plow 5 Bottom-18, 7.5 Ft	105 MFWD	\$16,000	3.48	417	\$9.01	\$3.52	\$1.98	\$2.17	\$1.89	\$18.58	\$14.35	1.29
Moldboard Plow 6 Bottom-18, 9 Ft	130 MFWD	\$18,000	4.17	542	\$9.72	\$2.93	\$1.98	\$1.88	\$1.64	\$18.16	\$14.26	1.29
Moldboard Plow 8 Bottom-18, 12 Ft	160 MFWD	\$24,000	5.56	723	\$8.54	\$2.20	\$1.98	\$1.88	\$1.63	\$16.24	\$12.85	1.29
Field Cultivator 18 Ft	105 MFWD	\$16,000	12.98	1,558	\$2.33	\$0.94	\$0.43	\$0.58	\$0.53	\$4.81	\$3.66	0.32
Field Cultivator 23 Ft	130 MFWD	\$28,000	16.59	1,991	\$2.42	\$0.74	\$0.59	\$0.80	\$0.70	\$5.24	\$3.98	0.32
Field Cultivator 47 Ft	260 4WD (226 PTO)	\$51,000	33.90	4,068	\$2.28	\$0.36	\$0.52	\$0.71	\$0.62	\$4.49	\$3.32	0.32
Field Cultivator 60 Ft	310 4WD (270 PTO)	\$57,000	43.27	5,193	\$2.06	\$0.28	\$0.46	\$0.62	\$0.54	\$3.97	\$2.97	0.32
Tandem Disk 11 Ft Rigid	60	\$4,000	6.40	640	\$2.65	\$1.91	\$0.21	\$0.37	\$0.37	\$5.51	\$4.63	0.49
Tandem Disk 21 Ft Rigid	160 MFWD	\$27,000	12.22	1,222	\$3.62	\$1.00	\$0.74	\$1.30	\$1.09	\$7.75	\$5.86	0.49
Tandem Disk H.D.30 Ft Fold	360 4WD (313 PTO)	\$39,000	17.45	1,745	\$5.40	\$0.70	\$0.75	\$1.32	\$1.09	\$9.26	\$6.92	0.79
Offset Disk 12 Ft	105 MFWD	\$13,000	5.56	556	\$5.71	\$2.20	\$0.53	\$1.38	\$1.17	\$10.99	\$8.36	0.83
V-Ripper 25 " O.C., 10 Ft	160 MFWD	\$10,000	6.18	618	\$7.20	\$1.98	\$0.52	\$0.92	\$0.84	\$11.46	\$9.03	0.99
V-Ripper 25 " O.C., 18 Ft	260 4WD (226 PTO)	\$17,000	11.13	1,113	\$7.01	\$1.10	\$0.49	\$0.87	\$0.79	\$10.27	\$7.81	0.99
V-Ripper 30 " O.C., 17 Ft	260 4WD (226 PTO)	\$16,000	10.51	1,051	\$7.25	\$1.16	\$0.49	\$0.86	\$0.79	\$10.56	\$8.01	0.99
V-Ripper 30 " O.C., 22.5 Ft	360 4WD (313 PTO)	\$19,000	13.91	1,391	\$6.79	\$0.88	\$0.44	\$0.77	\$0.70	\$9.58	\$7.31	0.99
Comb Disk & V-Ripper17.5 Ft	360 4WD (313 PTO)	\$32,000	9.02	902	10.27	\$1.36	\$0.81	\$2.09	\$1.74	\$16.27	\$12.11	1.47
Comb Disk & V-Ripper22.5 Ft	425 4WD (370 PTO)	\$53,000	11.59	1,159	\$9.78	\$1.06	\$1.04	\$2.70	\$2.19	\$16.77	\$12.36	1.47

Implement	Tractor Size (HP)	Net Cost of A New Implement ¹	-- Estimated -- Work Performed Acres/hr Acres/yr	Power Cost Per Acre ²	Labor Cost Per Acre	--Implement Cost/Acre-- Repairs Depreciation Over-Head ³	Total Cost /Acre ⁴	Use-related Cost /Acre ⁵	Diesel Fuel Gal/Acre			
<u>Planting Equipment</u>												
Row Crop Planter 6 Row-30, 15 Ft	60	\$20,000	7.00 490	\$2.10	\$2.49	\$0.84 \$1.98 \$2.17	\$9.56	\$6.93	0.34			
Row Crop Planter 8 Row-30, 20 Ft	75	\$27,000	9.33 653	\$1.95	\$1.86	\$0.85 \$2.00 \$2.18	\$8.84	\$6.26	0.34			
Row Crop Planter 12 Row-30, 30 Ft	105 MFWD	\$48,000	14.00 980	\$2.30	\$1.24	\$1.01 \$2.37 \$2.56	\$9.49	\$6.34	0.34			
Row Crop Planter 16 Row-30, 40 Ft	130 MFWD	\$71,000	18.67 1,307	\$2.33	\$0.93	\$1.12 \$2.63 \$2.81	\$9.82	\$6.51	0.34			
Min-Till Planter 12 Row-30, 30 Ft	160 MFWD	\$60,000	12.73 1,273	\$3.65	\$1.37	\$2.05 \$2.28 \$2.43	\$11.78	\$8.58	0.53			
Potato Planter 4 Row, 12.6 Ft	130 MFWD	40,000	3.83 214	\$9.79	\$8.74	\$2.40 \$9.03 \$9.45	\$39.42	\$27.50	1.14			
Potato Planter 6 Row, 19 Ft	130 MFWD	60,000	5.75 322	\$7.65	\$5.83	\$2.40 \$9.03 \$9.46	\$34.37	\$23.27	1.14			
Potato Planter 8 Row, 25.3 Ft	160 MFWD	80,000	7.67 429	\$6.80	\$4.37	\$2.40 \$9.02 \$9.46	\$32.05	\$21.31	1.14			
Beet Planter 12 Row, 22 Ft	105 MFWD	37,000	4.67 280	\$6.81	\$3.99	\$1.96 \$6.40 \$6.82	\$25.97	\$17.41	0.99			
Beet Planter, Vacuum 24 Row, 44 Ft	160 MFWD	99,000	22.40 1,008	\$2.11	\$0.83	\$0.80 \$4.76 \$5.03	\$13.52	\$8.05	0.31			
Presswheel Drill 16 Ft	105 MFWD	\$16,000	6.79 509	\$4.55	\$2.45	\$0.75 \$1.69 \$1.61	\$11.05	\$8.24	0.64			
Presswheel Drill 20 Ft	130 MFWD	\$20,000	8.48 636	\$4.79	\$1.96	\$0.75 \$1.69 \$1.61	\$10.80	\$8.07	0.64			
Presswheel Drill 25 Ft	130 MFWD	\$35,000	10.61 795	\$3.92	\$1.57	\$1.04 \$2.36 \$2.22	\$11.12	\$8.01	0.54			
Air Seeder Drill w/Cart 52 Ft	260 4WD (226 PTO)	\$159,000	22.06 1,765	\$3.39	\$0.75	\$2.45 \$4.83 \$4.40	\$15.83	\$10.59	0.45			
No-Till Drill 15 Ft	130 MFWD	\$35,000	6.36 509	\$6.26	\$2.62	\$1.87 \$3.69 \$3.42	\$17.86	\$12.96	0.81			
No-Till Drill 20 Ft	160 MFWD	\$39,000	8.48 679	\$5.49	\$1.96	\$1.56 \$3.08 \$2.87	\$14.97	\$10.95	0.81			
No-Till Drill 30 Ft	200 MFWD	\$70,000	12.73 1,018	\$5.02	\$1.31	\$1.87 \$3.69 \$3.40	\$15.29	\$10.91	0.81			
<u>Crop Maintenance Equipment</u>												
Cultivator 8 Row-30, 20 Ft	130 MFWD	\$8,000	10.30 1,030	\$3.71	\$1.21	\$0.18 \$0.44 \$0.41	\$5.95	\$4.63	0.44			
Cultivator 16 Row-30, 40 Ft	200 MFWD	\$19,000	20.61 2,061	\$2.94	\$0.61	\$0.22 \$0.52 \$0.46	\$4.75	\$3.68	0.44			
Rotary Hoe 21 Ft	105 MFWD	\$9,000	25.96 2,596	\$1.22	\$0.48	\$0.10 \$0.20 \$0.18	\$2.18	\$1.69	0.18			
Potato Cultivator 6 Row, 19 Ft	105MFWD	12,000	8.04 1,126	\$3.95	\$1.55	\$0.53 \$0.60 \$0.53	\$7.16	\$5.62	0.57			
Sugar Beet Cult 12 Row, 22 Ft	105MFWD	15,000	5.60 336	\$5.61	\$2.23	\$0.34 \$2.53 \$2.25	\$12.97	\$9.26	0.81			
Sugar Beet Cult 24 Row, 44 Ft	200MFWD	35,000	11.20 672	\$5.37	\$1.11	\$0.40 \$2.95 \$2.55	\$12.39	\$8.73	0.81			
Boom Sprayer, Self-Prop 60 Ft	None	\$91,000	33.09 3,309	\$0.63	\$0.57	\$1.32 \$1.56 \$1.32	\$5.39	\$3.76	0.11			
Boom Sprayer 50 Ft	60	\$18,000	25.61 2,561	\$0.60	\$0.73	\$0.34 \$0.40 \$0.36	\$2.43	\$1.94	0.10			
Stalk Shredder 20 Ft	130 MFWD	\$20,000	7.76 776	\$5.36	\$1.70	\$0.86 \$1.35 \$1.36	\$10.63	\$8.06	0.74			

Implement	Tractor Size (HP)	Net Cost of A New Implement ¹	-- Estimated -- Work Performed Acres/hr Acres/yr		Power Cost Per Acre ²	Labor Cost Per Acre	--Implement Cost/Acre-- Depreciation Over- Repairs Head ³			Total Cost /Acre ⁴	Use-related Cost /Acre ⁵	Diesel Fuel Gal/Acre
<u>Harvesting Equipment</u>												
Mower-Conditioner 9 Ft	40	\$18,000	4.36	349	\$2.47	\$3.03	\$0.81	\$2.97	\$2.51	\$11.78	\$8.72	0.40
Rotary Hay Mower 6 Ft	40	\$3,000	2.91	291	\$3.70	\$4.13	\$0.61	\$0.54	\$0.57	\$9.54	\$8.15	0.61
Rotary Mow/Cond 12 Ft	75	\$26,000	8.73	698	\$2.31	\$1.44	\$0.51	\$1.94	\$1.87	\$8.07	\$5.77	0.44
Hay Rake (Hyd) 9 Ft	40	\$6,000	3.49	698	\$3.08	\$3.44	\$0.46	\$0.50	\$0.46	\$7.93	\$6.80	0.50
Hay Swather-Cond 14 Ft	60	\$27,000	6.79	543	\$2.37	\$1.77	\$0.78	\$3.03	\$2.41	\$10.35	\$7.46	0.42
Swather-Cond, Self-Prop 16 Ft	None	\$88,000	7.76	621	\$2.37	\$1.55	\$0.73	\$8.64	\$6.60	\$19.88	\$12.10	0.40
Grain Swather, Self-Prop 21 Ft	None	\$72,000	10.18	815	\$1.81	\$1.18	\$0.45	\$5.38	\$4.17	\$12.99	\$7.92	0.30
Hay Baler PTO Twine 12 Ft	40	\$19,000	4.36	873	\$2.47	\$3.82	\$2.20	\$1.26	\$1.09	\$10.83	\$9.20	0.40
Round Baler 1000 Lb, 9 Ft	60	\$11,000	3.01	603	\$4.79	\$4.42	\$3.14	\$1.06	\$0.91	\$14.31	\$12.33	0.77
Round Baler 1500 Lb, 12 Ft	60	\$21,000	4.02	804	\$4.16	\$3.31	\$4.49	\$1.51	\$1.27	\$14.74	\$12.67	0.77
Large Rectangular Baler 24 Ft	130 MFWD	\$75,000	16.29	1,629	\$2.55	\$0.82	\$0.59	\$2.62	\$2.22	\$8.80	\$6.00	0.35
Corn Head for SP Harvstr Base 4 Row, 10 Ft	315 HP SP Forage Harvester Base Unit	\$17,000	3.39	509	42.15	\$4.91	\$0.30	\$2.65	\$1.48	\$51.49	\$36.53	2.63
Corn Head for SP Harvstr Base 6 Row, 15 Ft	570 HP SP Forage Harvester Base Unit	\$24,000	5.09	611	41.42	\$3.27	\$0.23	\$3.12	\$1.68	\$49.72	\$34.89	2.63
Pickup Head for SP Harvstr Base (2X Windrows) 24 Ft	570 HP SP Forage Harvester Base Unit	\$14,000	8.15	652	26.00	\$2.04	\$0.06	\$1.71	\$0.98	\$30.78	\$21.58	1.68
Combine Grain Head 20 Ft	Combine 275 HP	\$22,000	6.79	1,358	19.90	\$2.45	\$0.38	\$1.29	\$0.64	\$24.66	\$19.72	1.49
Combine Grain Head 30 Ft	Combine 275 HP	\$27,000	10.18	2,036	14.74	\$1.64	\$0.31	\$1.05	\$0.53	\$18.26	\$14.87	1.49
Combine Soybean Hd 18 Ft	Combine 275 HP	\$23,000	5.35	1,069	26.21	\$3.11	\$0.50	\$1.71	\$0.86	\$32.40	\$26.08	2.20
Combine Soybean Hd 25 Ft	Combine 275 HP	\$26,000	7.42	1,485	20.71	\$2.24	\$0.41	\$1.39	\$0.70	\$25.45	\$20.82	2.20
Combine Corn Hd 6 Row-30, 15 Ft	Combine 275 HP	\$32,000	4.20	840	32.18	\$3.96	\$0.89	\$3.03	\$1.52	\$41.57	\$33.11	2.41
Combine Corn Hd 8 Row-30, 20 Ft	Combine 340 HP	\$43,000	5.09	1,018	27.80	\$3.27	\$0.98	\$3.35	\$1.68	\$37.09	\$29.67	2.41
Combine Corn Hd 12 Row-30, 30 Ft	Combine 275 HP	\$66,000	7.64	1,527	23.57	\$2.18	\$1.01	\$3.43	\$1.70	\$31.89	\$25.63	2.41
Combine Belt Pickup Hd 14 Ft	Combine	\$18,000	3.56	713	39.59	\$4.67	\$0.59	\$2.01	\$1.01	\$47.86	\$38.67	3.40
Potato Harvester 2 Row, 6 Ft	75	\$60,930	1.38	295	12.35	\$35.35	\$13.60	\$16.40	\$7.97	\$85.68	\$74.97	2.03
Potato Harvester 4 Row, 13 Ft	105MFWD	\$96,300	2.76	590	12.59	\$17.68	\$10.75	\$12.96	\$6.30	\$60.27	\$51.02	2.03

Implement	Tractor Size (HP)	Net Cost of A New Implement ¹	-- Estimated -- Work Performed Acres/hr Acres/yr		Power Cost Per Acre ²	Labor Cost Per Acre	--Implement Cost/Acre-- Depreciation Over-Head ³ Repairs			Total Cost /Acre ⁴	Use-related Cost /Acre ⁵	Diesel Fuel Gal/Acre
Bean Cutter 6 Row-30, 15 Ft	130MFWD	\$12,000	8.73	698	\$4.76	\$1.91	\$0.30	\$1.01	\$0.84	\$8.83	\$6.91	0.66
Bean Cutter 6 Row-30, 15 Ft	130MFWD	\$12,000	8.73	698	\$4.76	\$1.91	\$0.30	\$1.01	\$0.84	\$8.83	\$6.91	0.66
Bean Rod 6 Row-30, 15 Ft	130MFWD	\$6,000	8.73	698	\$4.76	\$1.91	\$0.15	\$0.51	\$0.44	\$7.77	\$6.25	0.66
Bean Windrower 6 Row-30, 15 Ft	130MFWD	\$30,000	8.73	698	\$4.76	\$1.91	\$0.75	\$2.53	\$2.03	\$11.99	\$8.87	0.66
Sugar Beet Lifter 6 Row, 11 Ft	160MFWD	\$73,000	3.03	243	15.30	\$5.49	\$15.58	\$17.75	\$14.11	\$68.23	\$50.90	2.24
Sugar Beet Lifter 8 Row, 14.7 Ft ⁶	200MFWD	\$85,000	4.05	324	14.89	\$4.11	\$13.58	\$15.46	\$12.27	\$60.31	\$44.97	2.24
Sugar Beet Lifter (Higher Usage) 8 Row, 14.7 Ft ⁶	200MFWD	\$85,000	4.05	1,013	14.89	\$4.11	\$12.61	\$12.94	\$4.90	\$49.45	\$41.48	2.24
Sugar Beet Topper 8 Row, 14.7 Ft	75	\$36,000	7.13	570	\$2.95	\$2.10	\$1.55	\$3.72	\$3.00	\$13.32	\$9.79	0.58
Sugar Beet Topper 12 Row, 22 Ft	160MFWD	\$43,000	10.67	853	\$4.19	\$1.41	\$1.23	\$2.97	\$2.42	\$12.22	\$8.88	0.58
Sugar Beet Wagon 20 Ton, 11 Ft	200MFWD	\$50,000	5.20	520	11.77	\$2.31	\$2.14	\$5.67	\$4.61	\$26.50	\$19.50	1.80
Sugar Beet Wagon 24 Ton, 11 Ft	225MFWD	\$56,000	5.20	520	14.14	\$2.31	\$2.40	\$6.35	\$5.14	\$30.34	\$21.73	1.80

¹Net cost of a new unit assumes no trade-in. Farm machinery is exempt from sales tax in Minnesota so no sales tax is included.

²Power cost per acre for the power unit assigned to each implement multiplied times that implement's acres/hour equals that power unit's total cost per hour shown in the "Tractors and Combines (Without Heads)" table above.

³Overhead per acre will vary with annual use.

⁴Total cost/acre is total cost per hour divided by acres per hour. Includes fuel, lubricants, power and equipment repairs and maintenance, labor, and overhead costs including depreciation. Fuel is included in power cost.

⁵Use-related cost/acre includes everything in total cost/acre EXCEPT that non-depreciation overhead costs (interest, insurance, and housing) are omitted. Depreciation is included in use-related cost under the assumption that extra use reduces trade-in value which increases annual depreciation. In other words, depreciation is considered here to be at least partially use-related even though it is commonly thought of as being mainly time-related.

⁶Cost data for the 8 row sugar beet lifter is calculated for two levels of annual usage, 80 and 250 hours. The 250 hours/year is intended to reflect a custom work situation. At the higher usage, the machine is traded after 3 years with a trade-in value of 32% of list price. At the lower 80-hour usage level, it is traded at 12 years with a trade-in value 26% of list.