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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 labeled "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 \$3.15 per gallon. All power units, tractors, combines, trucks, etc., use diesel fuel. Lubrication cost is assumed to be 10 percent of fuel cost.

A related spreadsheet is available at:

<http://www.apec.umn.edu/faculty/wlazarus/interests-farmmachinery.html>.

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 right column. Following the first column down to the 50 hours/year line, we estimate that the cost/acre would be \$10.58/acre. The third line shows that if usage were increased to 100 hours or 1,630 acres, cost/acre would fall to \$7.45/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

	Accumulated hours at trade-in			
	1,800	1,200	900	600
Annual use, hrs	- - - Expected years to trade-in - - -			
50	36	24	18	12
75	24	16	12	8
100	18	12	9	6
150	12	8	6	4
200	9	6	5	3
Annual use, hrs	- - Cost/acre (not including tractor or labor) ^a - -			
50	\$7.10	\$8.07	\$8.98	\$10.58
75	\$5.83	\$6.59	\$7.31	\$8.60
100	\$5.10	\$5.73	\$6.34	\$7.45
150	\$4.27	\$4.74	\$5.22	\$6.13
200	\$3.78	\$4.17	\$4.58	\$5.37

^aTractor and labor costs would add \$3.63/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.

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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	\$6.44	\$8.66	Mower-Conditioner	9.33	12.46
Chisel Plow, Front Dsk	9.08	12.05	Rotary Mow/Cond	6.49	8.78
Moldboard Plow	15.02	19.01	Hay Rake (Hyd)	7.17	8.35
Field Cultivator	3.85	5.18	Hay Swather-Cond	7.89	10.91
Tandem Disk	5.61	7.05	Swather-Cond, Self-Prop	12.76	21.07
Tandem Disk H.D.	7.50	9.95	Grain Swather, Self-Prop	8.36	13.78
Offset Disk	8.97	11.74	Hay Baler PTO Twine	9.61	11.33
V-Ripper	8.72	11.26	Round Baler	13.20	15.31
Comb Disk & V-Ripper	13.29	17.78	Rd Baler/Wrap	21.75	25.53
Row Crop Planter	6.88	9.94	Large Rectangular Baler	6.44	9.36
Min-Til Planter	8.74	11.88	Forage Harvester (Corn Head)	42.93	54.17
Potato Planter	25.32	37.13	Corn Head for SP Harvstr Base	40.32	57.62
Beet Planter	18.45	27.45	Pickup Head for SP Harvstr Base (2X Windrows)	22.62	32.46
Beet Planter, Vacuum	8.52	14.26	Combine Corn Hd	30.92	38.94
Presswheel Drill	8.33	11.30	Combine Grain Head	18.32	22.80
Air Seeder Drill w/Cart	10.75	16.43	Combine Soybean Hd	24.92	30.80
No-Till Drill	12.02	16.81	Combine Belt Pickup Hd	41.12	50.94
Prairie Grass Drill	10.56	15.74	Potato harvester	61.40	73.48
Row Cultivator	4.48	5.74	Bean Cutter	7.39	9.41
Cultivator High Residue	8.25	10.86	Bean Rod	6.70	8.30
Cultivator High Residue, Guidance System, Higher Speed	5.23	7.52	Bean Windrower	9.46	12.73
Rotary Hoe	1.82	2.34	Sugar Beet Lifter	50.39	64.49
Potato Cultivator	6.03	7.65	Sugar Beet Topper	9.92	13.53
Sugar Beet Cult	9.66	13.53	Sugar Beet Wagon	22.05	30.28
Boom Sprayer, Self-Prop	3.72	5.56			
Boom Sprayer	1.98	2.51			
Stalk Shredder	8.87	11.48			

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	\$20,000	400	\$6.10	\$0.67	\$2.66	\$1,000	\$2.50	\$4,770	\$11.93	1.76
60	27,000	400	9.15	0.91	3.58	1,344	3.36	6,799	17.00	2.64
75	32,000	400	11.43	1.13	4.12	1,609	4.02	8,284	20.71	3.30
105 MFWD	76,000	450	16.01	2.28	8.18	3,860	8.58	15,773	35.05	4.62
130 MFWD	97,000	450	19.82	2.91	13.09	4,468	9.93	20,587	45.75	5.72
160 MFWD	111,000	500	24.39	3.70	13.56	5,116	10.23	25,941	51.88	7.04
200 MFWD	142,000	500	30.49	4.73	17.34	6,530	13.06	32,813	65.63	8.80
225 MFWD	164,000	400	34.30	4.37	24.75	7,587	18.97	32,957	82.39	9.90
260 4WD (226 PTO)	168,000	400	34.49	2.69	25.35	7,770	19.43	32,780	81.95	9.95
310 4WD (270 PTO)	181,000	400	41.12	2.90	27.31	8,365	20.91	36,896	92.24	11.87
360 4WD (313 PTO)	198,000	400	47.75	3.17	29.88	9,143	22.86	41,462	103.65	13.78
425 4WD (370 PTO)	234,000	400	56.37	3.74	35.31	10,790	26.98	48,961	122.40	16.27
225 Tracked Tractor	162,000	400	34.30	2.59	24.45	7,496	18.74	32,032	80.08	9.90
275 HP Combine	207,000	300	41.93	34.53	45.28	9,194	30.65	45,716	152.39	12.10
340 HP Combine	247,000	300	51.84	41.21	54.03	10,978	36.59	55,100	183.67	14.96
315 HP SP Forage Harvester Base Unit	203,000	200	26.20	15.39	59.09	9,618	48.09	29,752	148.76	7.56
570 HP SP Forage Harvester Base Unit	298,000	200	47.40	22.59	86.74	14,042	70.21	45,388	226.94	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.

	Tractor	Net Cost	--Estimated--		-Power Cost/Acre ² -		Labor	--Implement Cost/Acre--			Total	Use-related	Diesel
	Size	of a New	Work-Performed				Cost		Deprec-		Cost	Cost	Fuel
	(HP)	Implement ¹	Acres/hr	Acres/yr	Fuel	Other	Per Acre	Repairs	iation	Overhead ³	Per Acre ⁴	Per Acre ⁵	Gal/Acre
<u>Tillage Equipment</u>													
Chisel Plow 15 Ft	130 MFWD	\$15,800	8.50	680	\$2.09	\$3.05	\$1.44	\$0.57	\$1.32	\$1.20	\$9.68	\$ 7.30	0.60
Chisel Plow 23 Ft	200 MFWD	\$28,400	13.03	1,043	\$2.09	\$2.70	\$0.94	\$0.67	\$1.54	\$1.36	\$9.30	\$ 6.94	0.60
Chisel Plow 37 Ft	310 4WD (270 PTO)	\$36,800	20.97	1,677	\$2.09	\$2.44	\$0.58	\$0.54	\$1.24	\$1.11	\$8.00	\$ 5.90	0.60
Chisel Plow 57 Ft	425 4WD (370 PTO)	\$62,000	32.30	2,584	\$2.09	\$2.04	\$0.38	\$0.59	\$1.36	\$1.18	\$7.64	\$ 5.63	0.60
Chisel Plow, Front Dsk 16.3 Ft	200 MFWD	\$18,900	9.21	737	\$3.36	\$3.82	\$1.33	\$0.40	\$1.51	\$1.29	\$11.71	\$ 9.00	0.97
Chisel Plow, Front Dsk 21.3 Ft Fold	310 4WD (270 PTO)	\$29,400	12.04	963	\$3.36	\$4.25	\$1.02	\$0.47	\$1.80	\$1.49	\$12.39	\$ 9.16	0.97
Moldboard Plow 4 Bottom-18, 6 Ft	75	\$14,700	2.78	334	\$4.46	\$3.33	\$4.40	\$2.28	\$2.50	\$2.15	\$19.12	\$ 15.53	1.29
Moldboard Plow 5 Bottom-18, 7.5 Ft	105 MFWD	\$16,800	3.48	417	\$4.46	\$5.48	\$3.52	\$2.08	\$2.28	\$1.98	\$19.81	\$ 15.36	1.29
Moldboard Plow 6 Bottom-18, 9 Ft	130 MFWD	\$18,900	4.17	501	\$4.46	\$6.21	\$2.93	\$1.95	\$2.14	\$1.87	\$19.57	\$ 15.32	1.29
Moldboard Plow 8 Bottom-18, 12 Ft	160 MFWD	\$25,200	5.56	668	\$4.46	\$4.94	\$2.20	\$1.95	\$2.14	\$1.85	\$17.55	\$ 13.86	1.29
Field Cultivator 18 Ft	105 MFWD	\$16,800	12.98	1,298	\$1.10	\$1.47	\$0.94	\$0.42	\$0.73	\$0.66	\$5.32	\$ 4.00	0.32
Field Cultivator 23 Ft	130 MFWD	\$29,400	16.59	1,659	\$1.10	\$1.56	\$0.74	\$0.57	\$1.00	\$0.88	\$5.85	\$ 4.38	0.32
Field Cultivator 47 Ft	260 4WD (226 PTO)	\$53,600	33.90	3,390	\$1.10	\$1.40	\$0.36	\$0.51	\$0.90	\$0.78	\$5.05	\$ 3.69	0.32
Field Cultivator 60 Ft	310 4WD (270 PTO)	\$59,900	43.27	4,327	\$1.10	\$1.18	\$0.28	\$0.45	\$0.78	\$0.68	\$4.48	\$ 3.31	0.32
Tandem Disk 11 Ft Rigid	60	\$4,200	6.40	640	\$1.71	\$1.23	\$1.91	\$0.22	\$0.39	\$0.39	\$5.85	\$ 4.93	0.49
Tandem Disk 21 Ft Rigid	160 MFWD	\$28,400	12.22	1,222	\$1.71	\$2.25	\$1.00	\$0.78	\$1.37	\$1.15	\$8.26	\$ 6.28	0.49
Tandem Disk H.D. 30 Ft Fold	360 4WD (313 PTO)	\$41,000	17.45	1,745	\$2.74	\$3.20	\$0.70	\$0.79	\$1.39	\$1.14	\$9.95	\$ 7.50	0.79
Offset Disk 12 Ft	105 MFWD	\$13,700	5.56	556	\$2.88	\$3.42	\$2.20	\$0.56	\$1.45	\$1.23	\$11.74	\$ 8.97	0.83
V-Ripper 25 " O.C., 10 Ft	160 MFWD	\$10,500	6.18	618	\$3.44	\$4.45	\$1.98	\$0.55	\$0.96	\$0.88	\$12.26	\$ 9.72	0.99
V-Ripper 25 " O.C., 18 Ft	260 4WD (226 PTO)	\$17,900	11.13	1,113	\$3.44	\$4.27	\$1.10	\$0.52	\$0.91	\$0.83	\$11.07	\$ 8.49	0.99
V-Ripper 30 " O.C., 17 Ft	260 4WD (226 PTO)	\$16,800	10.51	1,051	\$3.44	\$4.52	\$1.16	\$0.52	\$0.91	\$0.83	\$11.37	\$ 8.70	0.99
V-Ripper 30 " O.C., 22.5 Ft	360 4WD (313 PTO)	\$20,000	13.91	1,391	\$3.44	\$4.02	\$0.88	\$0.46	\$0.82	\$0.73	\$10.35	\$ 7.98	0.99
Comb Disk & V-Ripper 17.5 Ft	360 4WD (313 PTO)	\$33,600	9.02	902	\$5.08	\$6.20	\$1.36	\$0.85	\$2.20	\$1.82	\$17.50	\$ 13.15	1.47
Comb Disk & V-Ripper 22.5 Ft	425 4WD (370 PTO)	\$55,700	11.59	1,159	\$5.08	\$5.70	\$1.06	\$1.09	\$2.83	\$2.30	\$18.06	\$ 13.43	1.47
Rotary Harrow 30 Ft	75	\$21,000	30.91	1,731	\$0.37	\$0.30	\$0.40	\$0.10	\$0.72	\$0.60	\$2.48	\$ 1.75	0.11

	Tractor	Net Cost	--Estimated--		-Power Cost/Acre ² -		Labor	--Implement Cost/Acre--			Total	Use-related	Diesel
	Size	of a New	Work-Performed				Cost		Deprec-		Cost	Cost	Fuel
	(HP)	Implement ¹	Acres/hr	Acres/yr	Fuel	Other	Per Acre	Repairs	iation	Overhead ³	Per Acre ⁴	Per Acre ⁵	Gal/Acre
<u>Planting Equipment</u>											\$99.00		
Row Crop Planter 6 Row-30, 15 Ft	60	\$21,000	7.00	490	\$1.18	\$1.12	\$2.49	\$0.88	\$2.08	\$2.27	\$10.02	\$ 7.27	0.34
Row Crop Planter 8 Row-30, 20 Ft	75	\$28,400	9.33	653	\$1.18	\$0.99	\$1.86	\$0.89	\$2.11	\$2.29	\$9.33	\$ 6.61	0.34
Row Crop Planter 12 Row-30, 30 Ft	105 MFWD	\$50,400	14.00	980	\$1.18	\$1.36	\$1.24	\$1.06	\$2.49	\$2.69	\$10.02	\$ 6.72	0.34
Row Crop Planter 16 Row-30, 40 Ft	130 MFWD	\$74,600	18.67	1,307	\$1.18	\$1.39	\$0.93	\$1.17	\$2.76	\$2.94	\$10.39	\$ 6.91	0.34
Min-Til Planter 6 Row-30, 15 Ft	75	\$21,000	6.36	509	\$1.85	\$1.46	\$2.73	\$1.12	\$2.00	\$2.18	\$11.34	\$ 8.53	0.53
Min-Til Planter 8 Row-30, 20 Ft	105 MFWD	\$31,500	8.48	594	\$1.85	\$2.24	\$2.05	\$1.09	\$2.57	\$2.78	\$12.58	\$ 8.79	0.53
Min-Til Planter 12 Row-30, 30 Ft	160 MFWD	\$63,000	12.73	1,273	\$1.85	\$2.16	\$1.37	\$2.15	\$2.40	\$2.55	\$12.47	\$ 9.12	0.53
Min-Til Planter 16 Row-30, 40 Ft	200 MFWD	\$77,700	16.97	2,206	\$1.85	\$2.07	\$1.03	\$2.65	\$1.71	\$1.83	\$11.13	\$ 8.53	0.53
Potato Planter 4 Row, 12.6 Ft	130 MFWD	\$42,000	3.83	214	\$3.94	\$6.77	\$8.74	\$2.52	\$9.48	\$9.92	\$41.37	\$ 28.85	1.14
Potato Planter 6 Row, 19 Ft	130 MFWD	\$63,000	5.75	322	\$3.94	\$4.51	\$5.83	\$2.52	\$9.48	\$9.93	\$36.20	\$ 24.55	1.14
Potato Planter 8 Row, 25.3 Ft	160 MFWD	\$84,000	7.67	429	\$3.94	\$3.59	\$4.37	\$2.52	\$9.48	\$9.93	\$33.81	\$ 22.54	1.14
Beet Planter 12 Row, 22 Ft	105 MFWD	\$38,900	4.67	280	\$3.43	\$4.08	\$3.99	\$2.06	\$6.73	\$7.16	\$27.45	\$ 18.45	0.99
Beet Planter, Vacuum 24 Row, 44 Ft	160 MFWD	\$104,000	22.40	1,008	\$1.09	\$1.23	\$0.83	\$0.84	\$5.00	\$5.28	\$14.26	\$ 8.52	0.31
Presswheel Drill 16 Ft	105 MFWD	\$16,800	6.79	509	\$2.20	\$2.81	\$2.45	\$0.78	\$1.60	\$1.76	\$11.60	\$ 8.58	0.64
Presswheel Drill 20 Ft	130 MFWD	\$21,000	8.48	636	\$2.20	\$3.06	\$1.96	\$0.78	\$1.60	\$1.75	\$11.36	\$ 8.43	0.64
Presswheel Drill 25 Ft	130 MFWD	\$36,800	10.61	795	\$1.87	\$2.44	\$1.57	\$1.10	\$2.24	\$2.42	\$11.64	\$ 8.29	0.54
Presswheel Drill 30 Ft	160 MFWD	\$42,000	12.73	1,018	\$2.20	\$2.16	\$1.31	\$1.12	\$2.00	\$2.15	\$10.94	\$ 7.99	0.64
Air Seeder Drill w/Cart 52 Ft	260 4WD (226 PTO)	\$167,000	22.06	1,765	\$1.56	\$2.15	\$0.75	\$2.57	\$4.58	\$4.81	\$16.43	\$ 10.75	0.45
No-Till Drill 15 Ft	130 MFWD	\$36,800	6.36	509	\$2.80	\$4.07	\$2.62	\$1.97	\$3.50	\$3.74	\$18.69	\$ 13.39	0.81
No-Till Drill 20 Ft	160 MFWD	\$41,000	8.48	679	\$2.80	\$3.24	\$1.96	\$1.64	\$2.93	\$3.13	\$15.70	\$ 11.36	0.81
No-Till Drill 30 Ft	200 MFWD	\$73,500	12.73	1,018	\$2.80	\$2.76	\$1.31	\$1.96	\$3.50	\$3.71	\$16.03	\$ 11.30	0.81
Prairie Grass Drill 10 Ft	60	\$23,100	5.15	258	\$1.63	\$1.52	\$3.03	\$0.91	\$4.81	\$4.46	\$16.36	\$ 11.25	0.47
Prairie Grass Drill (Twinned) , 21 Ft	105 MFWD	\$49,400	10.82	541	\$1.63	\$1.76	\$1.44	\$0.93	\$4.90	\$4.47	\$15.13	\$ 9.86	0.47

	Tractor	Net Cost	--Estimated--		-Power Cost/Acre ² -		Labor	--Implement Cost/Acre--			Total	Use-related	Diesel
	Size	of a New	Work-Performed				Cost		Deprec-		Cost	Cost	Fuel
	(HP)	Implement ¹	Acres/hr	Acres/yr	Fuel	Other	Per Acre	Repairs	iation	Overhead ³	Per Acre ⁴	Per Acre ⁵	Gal/Acre
<u>Crop Maintenance Equipment</u>											\$99.00		
Row Cultivator 8 Row-30, 20 Ft	130 MFWD	\$8,400	10.30	1,030	\$1.54	\$2.52	\$1.21	\$0.19	\$0.46	\$0.43	\$6.35	\$ 4.96	0.44
Row Cultivator 16 Row-30, 40 Ft	200 MFWD	\$20,000	20.61	2,061	\$1.54	\$1.71	\$0.61	\$0.23	\$0.55	\$0.49	\$5.12	\$ 4.00	0.44
Cultivator High Residue 6 Row-30, 15 Ft	130 MFWD	\$21,000	7.73	773	\$2.38	\$3.36	\$1.62	\$0.64	\$1.54	\$1.32	\$10.86	\$ 8.25	0.69
Cultivator High Residue, Guidance System, Higher Speed 6 Row-30, 15 Ft	130 MFWD	\$26,300	15.45	773	\$1.28	\$1.68	\$0.81	\$0.17	\$1.93	\$1.65	\$7.52	\$ 5.23	0.37
Rotary Hoe 21 Ft	105 MFWD	\$9,500	25.96	2,596	\$0.62	\$0.73	\$0.48	\$0.10	\$0.22	\$0.19	\$2.34	\$ 1.82	0.18
Potato Cultivator 6 Row, 19 Ft	105 MFWD	\$12,600	8.04	1,126	\$1.99	\$2.37	\$1.55	\$0.55	\$0.63	\$0.55	\$7.65	\$ 6.03	0.57
Sugar Beet Cult 12 Row, 22 Ft	105 MFWD	\$15,800	5.60	336	\$2.79	\$3.40	\$2.23	\$0.36	\$2.67	\$2.36	\$13.81	\$ 9.91	0.81
Sugar Beet Cult 24 Row, 44 Ft	200 MFWD	\$36,800	11.20	672	\$2.79	\$3.14	\$1.11	\$0.42	\$3.11	\$2.68	\$13.24	\$ 9.40	0.81
Boom Sprayer, Self-Prop 60 Ft	None	\$95,600	33.09	3,309	\$0.73	-\$0.37	\$0.57	\$1.39	\$1.40	\$1.47	\$5.56	\$ 3.72	0.11
Boom Sprayer 50 Ft	60	\$18,900	25.61	2,561	\$0.36	\$0.31	\$0.73	\$0.36	\$0.36	\$0.40	\$2.51	\$ 1.98	0.10
Stalk Shredder 20 Ft	130 MFWD	\$21,000	7.76	776	\$2.55	\$3.34	\$1.70	\$0.91	\$1.65	\$1.33	\$11.48	\$ 8.87	0.74
<u>Harvesting Equipment</u>											\$99.00		
Mower-Conditioner 9 Ft	40	\$18,900	4.36	349	\$1.40	\$1.34	\$3.03	\$0.85	\$3.30	\$2.56	\$12.46	\$ 9.33	0.40
Rotary Hay Mower 6 Ft	40	\$3,200	2.91	291	\$2.10	\$2.00	\$4.13	\$0.65	\$0.67	\$0.57	\$10.11	\$ 8.68	0.61
Rotary Mow/Cond 12 Ft	75	\$27,300	8.73	698	\$1.53	\$1.06	\$1.44	\$0.53	\$2.38	\$1.83	\$8.78	\$ 6.49	0.44
Hay Rake (Hyd) 9 Ft	40	\$6,300	3.49	698	\$1.75	\$1.67	\$3.44	\$0.48	\$0.55	\$0.47	\$8.35	\$ 7.17	0.50
Hay Swather-Cond 14 Ft	60	\$28,400	6.79	543	\$1.46	\$1.16	\$1.77	\$0.82	\$3.19	\$2.53	\$10.91	\$ 7.89	0.42
Swather-Cond, Self-Prop 16 Ft	None	\$92,400	7.76	621	\$2.77	-\$1.38	\$1.55	\$0.76	\$9.07	\$6.92	\$21.07	\$ 12.76	0.40
Grain Swather, Self-Prop 21 Ft	None	\$75,600	10.18	815	\$2.11	-\$1.05	\$1.18	\$0.48	\$5.65	\$4.37	\$13.78	\$ 8.36	0.30
Hay Baler PTO Twine 12 Ft	40	\$20,000	4.36	873	\$1.40	\$1.34	\$3.82	\$2.31	\$1.33	\$1.14	\$11.33	\$ 9.61	0.40
Round Baler 1000 Lb, 9 Ft	60	\$11,600	3.01	603	\$2.66	\$2.61	\$4.42	\$3.31	\$1.12	\$0.95	\$15.06	\$ 12.99	0.77
Round Baler 1500 Lb, 12 Ft	60	\$22,100	4.02	804	\$2.66	\$1.95	\$3.31	\$4.73	\$1.59	\$1.33	\$15.57	\$ 13.41	0.77
Rd Baler/Wrap 1000 Lb, 9 Ft	60	\$33,600	3.01	603	\$3.04	\$2.61	\$4.42	\$9.58	\$3.23	\$2.66	\$25.53	\$ 21.75	0.88
Large Rectangular Baler 24 Ft	130 MFWD	\$78,800	16.29	1,629	\$1.22	\$1.59	\$0.82	\$0.62	\$2.80	\$2.31	\$9.36	\$ 6.44	0.35
Forage Harvester (Corn Head) 2 Row, 5 Ft	105 MFWD	\$28,400	1.38	276	\$11.61	\$13.81	\$12.08	\$5.80	\$5.85	\$5.02	\$54.17	\$ 42.93	3.35
Corn Head for SP Harvstr Base 3 Row, 7.5 Ft	315 HP SP Forage Harvester	\$9,500	2.55	509	\$9.11	\$48.15	\$6.54	\$0.30	\$1.06	\$1.07	\$66.23	\$ 46.26	2.63

	Tractor	Net Cost	--Estimated--		-Power Cost/Acre ² -		Labor	--Implement Cost/Acre--			Total	Use-related	Diesel
	Size	of a New	Work-Performed				Cost	Deprec-		Cost	Cost	Fuel	
	(HP)	Implement ¹	Acres/hr	Acres/yr	Fuel	Other	Per Acre	Repairs	iation	Overhead ³	Per Acre ⁴	Per Acre ⁵	Gal/Acre
Corn Head for SP Harvstr Base 4 Row, 10 Ft	315 HP SP Forage Harvester	\$17,900	3.39	509	\$9.11	\$36.11	\$4.91	\$0.32	\$2.00	\$1.85	\$54.29	\$ 38.27	2.63
Corn Head for SP Harvstr Base 6 Row, 15 Ft	570 HP SP Forage Harvester	\$25,200	5.09	611	\$9.11	\$35.27	\$3.27	\$0.24	\$2.34	\$2.10	\$52.33	\$ 36.43	2.63
Pickup Head for SP Harvstr Base (2X Windows) 24 Ft	570 HP SP Forage Harvester	\$14,700	8.15	652	\$5.82	\$22.04	\$2.04	\$0.06	\$1.28	\$1.21	\$32.46	\$ 22.62	1.68
Combine Grain Head 20 Ft	275 HP Combine	\$23,100	6.79	1,358	\$5.15	\$16.27	\$2.45	\$0.40	\$1.07	\$0.78	\$26.12	\$ 20.82	1.49
Combine Grain Head 30 Ft	275 HP Combine	\$28,400	10.18	2,036	\$5.15	\$10.85	\$1.64	\$0.32	\$0.88	\$0.64	\$19.47	\$ 15.82	1.49
Combine Soybean Hd 18 Ft	275 HP Combine	\$24,200	5.35	1,069	\$7.63	\$20.66	\$3.11	\$0.53	\$1.42	\$1.05	\$34.41	\$ 27.63	2.20
Combine Soybean Hd 25 Ft	275 HP Combine	\$27,300	7.42	1,485	\$7.63	\$14.88	\$2.24	\$0.43	\$1.16	\$0.85	\$27.19	\$ 22.21	2.20
Combine Corn Hd 6 Row-30, 15 Ft	275 HP Combine	\$33,600	4.20	840	\$8.34	\$26.30	\$3.96	\$0.93	\$2.52	\$1.84	\$43.89	\$ 34.75	2.41
Combine Corn Hd 8 Row-30, 20 Ft	275 HP Combine	\$45,200	5.09	1,018	\$8.34	\$21.70	\$3.27	\$1.03	\$2.79	\$2.04	\$39.17	\$ 31.11	2.41
Combine Corn Hd 12 Row-30, 30 Ft	340 HP Combine	\$69,300	7.64	1,527	\$8.34	\$17.26	\$2.18	\$1.06	\$2.85	\$2.07	\$33.76	\$ 26.90	2.41
Combine Belt Pickup Hd 14 Ft	275 HP Combine	\$18,900	3.56	713	\$11.77	\$31.00	\$4.67	\$0.62	\$1.67	\$1.22	\$50.94	\$ 41.12	3.40
Potato Harvester 2 Row, 6.3 Ft	75	\$64,000	1.38	295	\$7.05	\$6.73	\$35.35	\$14.29	\$12.57	\$10.13	\$86.11	\$ 73.07	2.03
Potato Harvester 4 Row, 12.6 Ft	105 MFWD	\$101,100	2.76	590	\$7.05	\$6.91	\$17.68	\$11.28	\$9.93	\$8.00	\$60.84	\$ 49.73	2.03
Bean Cutter 6 Row-30, 15 Ft	130 MFWD	\$12,600	8.73	698	\$2.27	\$2.97	\$1.91	\$0.31	\$1.06	\$0.88	\$9.41	\$ 7.39	0.66
Bean Cutter 6 Row-30, 15 Ft	130 MFWD	\$12,600	8.73	698	\$2.27	\$2.97	\$1.91	\$0.31	\$1.06	\$0.88	\$9.41	\$ 7.39	0.66
Bean Rod 6 Row-30, 15 Ft	130 MFWD	\$6,300	8.73	698	\$2.27	\$2.97	\$1.91	\$0.16	\$0.53	\$0.46	\$8.30	\$ 6.70	0.66
Bean Windrower 6 Row-30, 15 Ft	130 MFWD	\$31,500	8.73	698	\$2.27	\$2.97	\$1.91	\$0.78	\$2.66	\$2.13	\$12.73	\$ 9.46	0.66
Sugar Beet Lifter 6 Row, 11 Ft	160 MFWD	\$76,700	3.03	243	\$7.75	\$9.06	\$5.49	\$16.37	\$18.65	\$14.82	\$72.14	\$ 53.95	2.24
Sugar Beet Lifter 8 Row, 14.7 Ft ⁶	200 MFWD	\$89,300	4.05	324	\$7.75	\$8.67	\$4.11	\$14.27	\$16.24	\$12.89	\$63.92	\$ 47.81	2.24
Sugar Beet Lifter (Higher Usage) 8 Row, 14.7 Ft ⁶	200 MFWD	\$89,300	4.05	1,013	\$7.75	\$8.67	\$4.11	\$13.25	\$18.85	\$4.79	\$57.41	\$ 49.40	2.24
Sugar Beet Topper 8 Row, 14.7 Ft	75	\$37,800	7.13	570	\$2.01	\$1.30	\$2.10	\$1.62	\$3.91	\$3.15	\$14.10	\$ 10.39	0.58
Sugar Beet Topper 12 Row, 22 Ft	160 MFWD	\$45,200	10.67	853	\$2.01	\$2.58	\$1.41	\$1.30	\$3.12	\$2.54	\$12.96	\$ 9.46	0.58
Sugar Beet Wagon 20 Ton, 11 Ft	200 MFWD	\$52,500	5.20	520	\$6.23	\$6.76	\$2.31	\$2.25	\$5.85	\$4.87	\$28.27	\$ 20.89	1.80
Sugar Beet Wagon 24 Ton, 11 Ft	225 MFWD	\$58,800	5.20	520	\$6.23	\$9.25	\$2.31	\$2.52	\$6.55	\$5.44	\$32.30	\$ 23.21	1.80

Footnotes

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.