

MINNESOTA FARM MACHINERY ECONOMIC COST ESTIMATES FOR 2001

William Lazarus
 Extension Economist - Farm Management
 Department of Applied Economics, University of Minnesota

The tables in this publication contain estimates of farm machinery operation costs for 2001. The estimates use 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. Time-related costs occur only when a machine is used. They include fuel, lubrication, use related repairs and labor. 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. Trade-in values are estimated based on American Society of Agricultural Engineers formulas. Purchase prices are discounted from manufacturers' list prices. A ten percent discount off list price appears "normal." 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:

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

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

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

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

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

OPERATING 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 \$1.00 per gallon. All power units, tractors, combines, trucks, etc., use diesel fuel. Lubrication cost is assumed to be 15 percent of fuel cost.

The formulas for repair and maintenance costs estimate total accumulated repair costs according to the 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 \$10.50 per hour for unskilled labor and \$13.00 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.

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.

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.

The following tables provide the year 2001 machinery operation costs broken down into several categories. Some relevant supporting data also are included. A spreadsheet template is also available for downloading from the Department of Applied Economics web site, for use in analyzing specific situations or just to better understand the methods used to calculate the numbers. The address is: <http://apecon.agri.umn.edu/crop.html>

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	3.78	5.30	Anhydrous Applicator	5.59	8.32
Chisel Plow, Front Dsk	6.09	8.64	Fert Spreader	1.81	2.68
Moldboard Plow	10.13	13.44	Corn Stalk Chopper	5.93	7.49
Reversible Plow	12.13	15.48	Potato Shredder	6.00	8.13
Field Cultivator	2.27	3.08	Stalk Shredder	5.69	7.76
Tandem Disk	4.08	5.35	Rock Picker	30.58	40.70
Tandem Disk H.D.	4.96	6.83	Mower-Conditioner	6.90	9.25
Offset Disk	5.91	7.90	Rotary Hay Mower	7.11	8.57
V-Ripper	5.35	7.37	Rotary Mow/Cond	5.41	7.41
Comb Fld Cult Incorp	3.83	5.35	Hay Rake (Hyd)	5.35	6.37
Comb Disk & V-Ripper	8.44	12.01	Hay Swather-Cond	5.97	8.27
Disk,Fld Cult Finish	4.74	6.71	Swather-Cond, Self- Prop	8.69	13.87
Roller Harrow	3.45	4.68	Grain Swather, Pull Type	3.25	4.54
Springtooth Drag	1.24	1.83	Grain Swather, Self- Prop	6.01	9.58
Row Crop Planter	5.04	7.14	Hay Baler PTO Twine	7.65	9.13
Min-Til Planter	6.25	8.68	Round Baler	9.39	11.04
Potato Planter Filler	2.74	5.09	Rd Baler/Wrap	14.53	17.17
Potato Row Marker	8.47	12.90	Large Rectangular Baler	6.18	9.95
Potato Planter	17.79	26.63	Forage Harvester	35.19	48.75
Beet Planter	15.18	23.69	Forage SP Harvstr	41.90	65.64
Grain Drill	5.18	7.60	Combine Grain Head	10.51	13.34
Presswheel Drill	6.82	9.91	Combine Soybean Hd	16.18	20.58
Air Seeder Drill	6.65	10.10	Combine Corn Hd	17.25	22.21
No-Till Drill	8.50	12.50	Potato Windrower	30.97	44.09
Cultivator	3.01	3.94	Potato Harvester Seed	59.67	74.18
Cultivator High Residue	4.06	5.49	Potato Harvester	53.08	66.81
Rotary Hoe	1.19	1.54	Disk Bean Top Cutter	6.47	8.76
Potato Cultivator	4.07	5.12	Sugar Beet Lifter	25.44	34.81
Sugar Beet Cult	7.03	10.37	Sugar Beet Topper	7.99	11.20
Boom Sprayer, Self- Prop	2.88	4.17	Sugar Beet Wagon	12.97	18.46
Boom Sprayer	1.45	1.77	Hay Stacker	11.42	13.87
Sprayer High Pressure	2.07	2.77			
Hooded Sprayer	2.83	3.54			

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	19,700	400	2.02	0.66	2.89	944	2.36	3,176	7.94	1.76
60	24,400	400	3.04	0.82	3.59	1,165	2.91	4,142	10.35	2.64
75	30,200	400	3.80	1.07	4.34	1,453	3.63	5,134	12.83	3.30
105 MFWD	57,600	450	5.31	1.73	6.70	2,852	6.34	9,035	20.08	4.62
130 MFWD	76,100	450	6.58	2.28	8.85	3,755	8.35	11,725	26.06	5.72
160 MFWD	93,900	500	8.10	3.13	10.92	4,440	8.88	15,516	31.03	7.04
200 MFWD	112,800	500	10.12	3.76	13.12	5,324	10.65	18,826	37.65	8.80
225 MFWD	124,200	400	11.39	3.31	17.93	5,889	14.72	18,938	47.35	9.90
225 Tracked Tractor	135,800	400	11.39	2.17	19.60	6,431	16.08	19,695	49.24	9.90
260 (226 PTO) 4WD	110,200	400	11.45	1.76	15.91	5,234	13.09	16,880	42.20	9.95
310 (270 PTO) 4WD	120,700	400	13.65	1.93	17.42	5,725	14.31	18,925	47.31	11.87
360 (313 PTO) 4WD	133,900	400	15.85	2.14	19.33	6,342	15.85	21,269	53.17	13.78
425 (370 PTO) 4WD	156,300	400	18.71	2.50	22.56	7,389	18.47	24,898	62.24	16.27
220 HP Combine	124,400	300	11.13	20.75	28.03	5,485	18.28	23,460	78.20	9.68
275 HP Combine	149,500	300	13.92	24.94	33.68	6,599	22.00	28,361	94.54	12.10

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	Labor Cost Per Acre	--Implement Cost/Acre-- Repairs Deprec- iation Over- head ²			Total Cost /Acre ³	Use-related Cost /Acre ⁴	Diesel Fuel Gal/Acre
Tillage Equipment												
Chisel Plow 11 Ft	75	5,900	6.23	499	2.13	1.72	0.29	0.64	0.70	5.48	4.20	0.59
Chisel Plow 15 Ft	130 MFWD	7,600	8.50	680	2.98	1.26	0.27	0.61	0.65	5.76	4.13	0.59
Chisel Plow 19 Ft	160 MFWD	13,200	10.77	861	2.81	0.99	0.38	0.83	0.82	5.84	4.19	0.59
Chisel Plow 23 Ft	200 MFWD	16,600	13.03	1,043	2.80	0.82	0.39	0.86	0.84	5.72	4.05	0.59

¹See footnotes at end of table.

Implement	Tractor Size (HP)	Net Cost of A New Implement ¹	-- Estimated --		Power Cost Per Acre	Labor Cost Per Acre	--Implement Cost/Acre--			Total Cost /Acre ²	Use-related Cost /Acre ³	Diesel Fuel Gal/Acre
			Work Performed Acres/hr	Acres/yr			Repairs	Deprec- iation	Over- head			
Tillage Equipment (continued)												
Chisel Plow 31 Ft	225 MFWD	21,000	17.57	1,405	2.73	0.61	0.37	0.81	0.79	5.31	3.68	0.59
Chisel Plow 37 Ft	310 4WD	23,900	20.97	1,677	2.29	0.51	0.35	0.77	0.76	4.68	3.24	0.59
Chisel Plow 57 Ft	425 4WD	38,700	32.30	2,584	2.03	0.33	0.37	0.81	0.77	4.31	2.97	0.59
Chisel Plow, Front Dsk 8.8 Ft	105 MFWD	10,100	4.96	397	4.07	2.16	0.40	1.51	1.33	9.46	6.86	0.95
Chisel Plow, Front Dsk 16.3 Ft	200 MFWD	18,100	9.21	737	4.09	1.16	0.38	1.46	1.24	8.32	5.93	0.95
Chisel Plow, Front Dsk 18.8 Ft Fold	260 4WD	23,800	10.63	850	3.99	1.01	0.44	1.66	1.38	8.47	5.86	0.95
Chisel Plow, Front Dsk 21.3 Ft Fold	310 4WD	27,400	12.04	963	3.89	0.89	0.44	1.69	1.39	8.30	5.72	0.95
Moldboard Plow 4 Bottom-18, 6 Ft	75	11,400	2.78	334	4.76	3.85	1.77	1.85	1.72	13.95	10.93	1.32
Moldboard Plow 5 Bottom-18, 7.5 Ft	105 MFWD	14,100	3.48	417	5.76	3.08	1.75	1.83	1.71	14.13	10.60	1.32
Moldboard Plow 6 Bottom-18, 9 Ft	130 MFWD	16,700	4.17	542	6.18	2.57	1.84	1.67	1.56	13.82	10.26	1.32
Moldboard Plow 8 Bottom-18, 12 Ft	160 MFWD	22,400	5.56	723	5.64	1.93	1.85	1.68	1.56	12.65	9.49	1.32
Moldboard Plow 10 Bottom-18, 15 Ft	260 4WD	29,900	6.95	1,043	5.94	1.54	2.22	1.55	1.43	12.68	9.36	1.32
Reversible Plow 2 Bottom-18, 3 Ft	60	2,600	1.39	209	7.48	7.70	0.96	0.67	0.73	17.55	14.73	1.93
Reversible Plow 5 Bottom-18, 7.5 Ft	160 MFWD	7,800	3.48	522	8.82	3.08	1.16	0.81	0.79	14.65	11.31	1.93
Reversible Plow 5 Bottom-18, 7.5 Ft HD	160 MFWD	10,900	3.48	522	8.82	3.08	1.62	1.13	1.10	15.75	12.09	1.93
Reversible Plow 8 Bottom-18, 12 Ft	225 MFWD	15,300	5.56	835	8.68	1.93	1.42	0.99	0.96	13.99	10.37	1.93
Field Cultivator 12.5 Ft	75	6,300	9.02	1,082	1.39	1.19	0.24	0.32	0.33	3.47	2.73	0.33
Field Cultivator 18 Ft	105 MFWD	10,700	12.98	1,558	1.52	0.83	0.29	0.37	0.37	3.38	2.52	0.33
Field Cultivator 28 Ft	160 MFWD	17,400	20.19	2,423	1.52	0.53	0.30	0.39	0.39	3.13	2.30	0.33
Field Cultivator 37 Ft	225 MFWD	22,700	26.68	3,202	1.73	0.40	0.30	0.38	0.38	3.19	2.26	0.33
Field Cultivator 47 Ft	260 4WD	32,500	33.90	4,068	1.29	0.32	0.33	0.43	0.42	2.79	1.99	0.33
Field Cultivator 60 Ft	310 4WD	40,300	43.27	5,193	1.16	0.25	0.32	0.42	0.40	2.55	1.82	0.33
Tandem Disk 8.8 Ft Rigid	40	5,900	5.09	509	1.70	2.10	0.26	0.69	0.60	5.35	4.29	0.47
Tandem Disk 11 Ft Rigid	60	6,600	6.40	640	1.68	1.67	0.35	0.61	0.56	4.87	3.85	0.47
Tandem Disk 15 Ft Rigid	105 MFWD	12,800	8.73	873	2.23	1.23	0.49	0.87	0.76	5.57	4.09	0.47
Tandem Disk 21 Ft Rigid	160 MFWD	19,900	12.22	1,222	2.41	0.88	0.55	0.97	0.82	5.62	4.07	0.47
Tandem Disk H.D.12 Ft Rigid	130 MFWD	10,400	6.98	698	3.66	1.53	0.50	0.88	0.77	7.35	5.38	0.76
Tandem Disk H.D.18 Ft Fold	160 MFWD	19,800	10.47	1,047	3.06	1.02	0.63	1.12	0.96	6.80	4.99	0.76

Implement	Tractor Size (HP)	Net Cost of A New Implement ¹	-- Estimated --		Power Cost Per Acre	Labor Cost Per Acre	--Implement Cost/Acre--			Total Cost /Acre ²	Use-related Cost /Acre ³	Diesel Fuel Gal/Acre
			Work Performed Acres/hr	Acres/yr			Repairs	Deprec- iation	Over- head			
Tandem Disk H.D.30 Ft Fold	360 4WD	33,400	17.45	1,745	3.01	0.61	0.64	1.13	0.94	6.34	4.49	0.76
Offset Disk 7 Ft	60	5,700	3.25	325	3.21	3.30	0.40	1.04	0.89	8.84	7.05	0.83
Offset Disk 12 Ft	105 MFWD	10,400	5.56	556	3.61	1.93	0.42	1.11	0.95	8.02	5.93	0.83
Offset Disk 16 Ft	130 MFWD	12,900	7.42	742	3.58	1.44	0.40	1.03	0.91	7.36	5.32	0.83
Offset Disk 21 Ft Wing	200 MFWD	18,400	9.74	974	3.78	1.10	0.43	1.12	0.95	7.38	5.34	0.83
V-Ripper 25" O.C., 10 Ft	160 MFWD	11,700	6.18	618	4.86	1.73	0.61	1.03	0.99	9.22	6.79	1.00
V-Ripper 25" O.C., 14 Ft	200 MFWD	14,300	8.65	865	4.33	1.24	0.53	0.89	0.87	7.87	5.77	1.00
V-Ripper 25" O.C., 18 Ft	260 4WD	18,300	11.13	1,113	3.92	0.96	0.53	0.89	0.87	7.17	5.12	1.00
V-Ripper 25" O.C., 25 Ft	360 4WD	22,100	15.45	1,545	3.57	0.69	0.46	0.77	0.76	6.26	4.47	1.00
V-Ripper 30" O.C., 12.5 Ft	200 MFWD	9,700	7.73	773	4.72	1.39	0.41	0.68	0.68	7.87	5.81	1.00
V-Ripper 30" O.C., 17 Ft	260 4WD	12,400	10.51	1,051	4.08	1.02	0.38	0.64	0.64	6.76	4.87	1.00
V-Ripper 30" O.C., 22.5 Ft	360 4WD	17,900	13.91	1,391	3.84	0.77	0.42	0.70	0.70	6.42	4.58	1.00
Comb Fld Cult Incorpor 16 Ft	160 MFWD	17,700	11.54	1,154	2.62	0.93	0.49	0.91	0.77	5.71	4.18	0.55
Comb Fld Cult Incorpor 23 Ft	200 MFWD	29,100	16.59	1,659	2.29	0.65	0.57	1.04	0.87	5.41	3.90	0.55
Comb Fld Cult Incorpor 25 Ft	260 4WD	31,400	18.03	1,803	2.34	0.59	0.56	1.03	0.87	5.39	3.80	0.55
Comb Fld Cult Incorpor 33 Ft	310 4WD	40,000	23.80	2,380	2.04	0.45	0.54	1.00	0.84	4.87	3.43	0.55
Comb Disk & V-Ripper 12.5 Ft	225 MFWD	21,400	6.44	644	7.30	1.66	0.76	1.97	1.61	13.30	9.40	1.49
Comb Disk & V-Ripper 17.5 Ft	360 4WD	27,400	9.02	902	5.85	1.19	0.69	1.80	1.50	11.03	7.77	1.49
Comb Disk & V-Ripper 22.5 Ft	425 4WD	47,400	11.59	1,159	5.47	0.92	0.93	2.42	1.96	11.71	8.15	1.49
Disk,Fld Cult Finish 13 Ft	130 MFWD	13,000	6.70	670	3.74	1.60	0.44	1.15	1.06	7.99	5.68	0.72
Disk,Fld Cult Finish 22 Ft	200 MFWD	23,500	11.33	1,133	3.26	0.95	0.47	1.23	1.06	6.96	4.96	0.72
Disk,Fld Cult Finish 30 Ft	260 4WD	31,500	15.45	1,545	2.82	0.69	0.46	1.21	1.03	6.21	4.34	0.72
Disk,Fld Cult Finish 38 Ft	310 4WD	38,200	19.58	1,958	2.55	0.55	0.44	1.16	0.98	5.67	3.96	0.72
Roller Harrow 12 Ft	75	9,900	7.42	742	1.71	1.44	0.30	0.79	0.71	4.95	3.76	0.43
Roller Harrow 28 Ft	160 MFWD	25,900	17.31	1,731	1.81	0.62	0.34	0.89	0.75	4.41	3.15	0.43
Springtooth Drag 30 Ft	60	9,000	21.64	649	0.46	0.52	0.08	0.75	0.69	2.51	1.69	0.11
Springtooth Drag 48 Ft	75	11,400	34.62	1,212	0.39	0.33	0.07	0.51	0.50	1.80	1.19	0.11
Springtooth Drag 58 Ft	105 MFWD	13,200	41.83	4,183	0.48	0.25	0.10	0.17	0.17	1.17	0.85	0.11

Implement	Tractor Size (HP)	Net Cost of A New Implement ¹	-- Estimated --		Power Cost Per Acre	Labor Cost Per Acre	--Implement Cost/Acre--			Total Cost /Acre ²	Use-related Cost /Acre ³	Diesel Fuel Gal/Acre
			Work Performed Acres/hr	Acres/yr			Repairs	Deprec- iation	Over- head			
Planting Equipment												
Row Crop Planter 4 Row-36, 12 Ft	40	13,300	5.60	392	1.45	2.69	0.70	1.65	1.83	8.32	6.07	0.34
Row Crop Planter 6 Row-30, 15 Ft	60	13,500	7.00	490	1.44	2.15	0.57	1.34	1.50	7.00	5.08	0.34
Row Crop Planter 8 Row-30, 20 Ft	75	20,700	9.33	653	1.36	1.62	0.65	1.54	1.69	6.86	4.78	0.34
Row Crop Planter 12 Row-30, 30 Ft	105 MFWD	30,700	14.00	980	1.45	1.08	0.64	1.52	1.67	6.37	4.24	0.34
Min-Til Planter 4 Row-36, 12 Ft	60	12,000	5.09	356	2.05	2.96	0.69	1.64	1.83	9.17	6.76	0.53
Min-Til Planter 6 Row-30, 15 Ft	75	17,300	6.36	509	2.03	2.37	0.92	1.65	1.82	8.79	6.40	0.53
Min-Til Planter 8 Row-30, 20 Ft	105 MFWD	23,000	8.48	594	2.35	1.78	0.80	1.88	2.06	8.86	6.06	0.53
Min-Til Planter 12 Row-30, 30 Ft	160 MFWD	45,100	12.73	1,273	2.41	1.18	1.54	1.72	1.84	8.70	6.16	0.53
Min-Til Planter 16 Row-30, 40 Ft	200 MFWD	59,900	16.97	2,206	2.23	0.89	2.04	1.32	1.42	7.91	5.86	0.53
Potato Planter Filler 19 Ft	None	13,900	5.75	322	0.04	-	0.62	2.10	2.33	5.09	2.74	0.02
Potato Row Marker 4 Row, 12.6 Ft	130 MFWD	13,000	4.98	214	4.98	3.24	0.22	2.95	3.13	14.52	9.72	0.93
Potato Row Marker 6 Row, 19 Ft	160 MFWD	20,300	7.47	321	4.14	2.16	0.23	3.07	3.26	12.86	8.41	0.93
Potato Row Marker 8 Row, 25.3 Ft	160 MFWD	26,000	9.97	429	3.37	1.62	0.22	2.95	3.14	11.30	7.27	0.93
Potato Planter 4 Row, 12.6 Ft	130 MFWD	33,300	3.83	214	6.39	7.61	2.00	7.54	7.88	31.41	21.36	1.14
Potato Planter 6 Row, 19 Ft	130 MFWD	44,400	5.75	322	4.70	5.07	1.77	6.70	7.02	25.26	16.79	1.14
Potato Planter 8 Row, 25.3 Ft	160 MFWD	57,800	7.67	429	4.30	3.80	1.73	6.54	6.85	23.22	15.21	1.14
Beet Planter 12 Row, 22 Ft	105 MFWD	38,900	4.67	280	4.28	3.45	2.06	6.75	7.15	23.69	15.18	0.97
Beet Planter 24 Row, 44 Ft	200 MFWD	88,900	9.33	560	4.06	1.73	2.36	7.71	8.15	24.00	14.72	0.97
Grain Drill 25 Ft	130 MFWD	26,600	10.61	848	2.40	1.36	0.85	1.52	1.66	7.79	5.35	0.49
Grain Drill 30 Ft	130 MFWD	34,600	12.73	1,018	2.09	1.13	0.92	1.65	1.78	7.58	5.14	0.49
Grain Drill 35 Ft	160 MFWD	40,400	14.85	1,188	2.11	0.97	0.92	1.65	1.78	7.43	5.06	0.49
Presswheel Drill 12 Ft	75	19,400	5.09	382	2.48	2.83	1.21	2.47	2.65	11.65	8.28	0.61
Presswheel Drill 16 Ft	105 MFWD	25,200	6.79	509	2.88	2.13	1.18	2.40	2.58	11.17	7.65	0.61
Presswheel Drill 20 Ft	130 MFWD	27,100	8.48	636	3.00	1.70	1.01	2.07	2.23	10.02	6.80	0.61
Presswheel Drill 30 Ft	160 MFWD	39,800	12.73	1,018	2.51	1.13	1.06	1.90	2.04	8.64	5.91	0.61
Presswheel Drill 40 Ft	200 MFWD	52,200	16.97	1,358	2.33	0.85	1.05	1.87	2.00	8.09	5.47	0.61
Air Seeder Drill 36 Ft	260 4WD	61,300	15.27	1,222	2.76	0.94	1.36	2.44	2.59	10.10	6.65	0.65
No-Till Drill 15 Ft	130 MFWD	25,700	6.36	509	3.99	2.27	1.37	2.45	2.64	12.72	8.77	0.81

Implement	Tractor Size (HP)	Net Cost of A New Implement ¹	-- Estimated --		Power Cost Per Acre	Labor Cost Per Acre	--Implement Cost/Acre--			Total Cost /Acre ²	Use-related Cost /Acre ³	Diesel Fuel Gal/Acre
			Work Performed Acres/hr	Acres/yr			Repairs	Deprec- iation	Over- head			
No-Till Drill 20 Ft	160 MFWD	40,800	8.48	679	3.63	1.70	1.63	2.92	3.11	13.00	8.84	0.81
No-Till Drill 30 Ft	200 MFWD	60,400	12.73	1,018	3.09	1.13	1.61	2.88	3.06	11.77	7.88	0.81
Crop Maintenance Equipment												
Cultivator 4 Row-36, 12 Ft	75	3,800	6.18	618	1.99	1.77	0.14	0.33	0.34	4.58	3.65	0.46
Cultivator 6 Row-30, 15 Ft	60	4,800	7.73	773	1.48	1.41	0.15	0.34	0.34	3.72	3.00	0.46
Cultivator 8 Row-30, 20 Ft	130 MFWD	6,400	10.30	1,030	2.42	1.06	0.15	0.34	0.34	4.31	3.15	0.46
Cultivator 12 Row-30, 30 Ft	160 MFWD	12,200	15.45	1,545	2.02	0.71	0.19	0.43	0.41	3.75	2.76	0.46
Cultivator 16 Row-30, 40 Ft	200 MFWD	15,500	20.61	2,061	1.87	0.53	0.18	0.41	0.39	3.37	2.47	0.46
Cultivator High Residue 4 Row-36, 12 Ft	75	6,700	6.18	618	2.17	1.77	0.25	0.59	0.57	5.34	4.19	0.61
Cultivator High Residue 6 Row-30, 15 Ft	105 MFWD	9,200	7.73	773	2.62	1.41	0.28	0.64	0.62	5.57	4.13	0.61
Cultivator High Residue 8 Row-30, 20 Ft	160 MFWD	12,500	10.30	1,030	2.93	1.06	0.29	0.66	0.62	5.56	4.07	0.61
Cultivator High Residue 12 Row-30, 30 Ft	225 MFWD	21,300	15.45	1,545	3.03	0.71	0.32	0.75	0.69	5.50	3.86	0.61
Rotary Hoe 15 Ft	75	4,100	18.55	1,855	0.70	0.59	0.06	0.13	0.12	1.60	1.28	0.18
Rotary Hoe 21 Ft	105 MFWD	6,500	25.96	2,596	0.78	0.42	0.07	0.15	0.13	1.55	1.17	0.18
Rotary Hoe 30 Ft	160 MFWD	9,700	37.09	3,709	0.83	0.29	0.07	0.15	0.14	1.49	1.11	0.18
Potato Cultivator 4 Row, 12.6 Ft	75	4,800	5.36	778	2.37	2.04	0.33	0.33	0.31	5.38	4.39	0.59
Potato Cultivator 6 Row, 19 Ft	105 MFWD	7,200	8.04	1,126	2.52	1.36	0.32	0.35	0.33	4.87	3.75	0.59
Sugar Beet Cult 12 Row, 22 Ft	105 MFWD	14,400	5.60	336	3.56	1.95	0.33	2.32	2.21	10.37	7.03	0.81
Sugar Beet Cult 24 Row, 44 Ft	200 MFWD	30,600	11.20	672	3.38	0.98	0.35	2.47	2.29	9.46	6.22	0.81
Boom Sprayer, Self-Prop 47 Ft	None	59,800	25.92	2,592	0.24	0.63	1.11	1.12	1.18	4.28	2.98	0.11
Boom Sprayer, Self-Prop 60 Ft	None	74,500	33.09	3,309	0.24	0.49	1.08	1.09	1.15	4.06	2.79	0.11
Boom Sprayer 30 Ft	40	4,900	15.36	1,229	0.51	1.06	0.14	0.19	0.24	2.15	1.75	0.11
Boom Sprayer 50 Ft	60	5,500	25.61	2,561	0.41	0.63	0.10	0.10	0.13	1.39	1.14	0.11
Sprayer High Pressure 50 Ft	60	26,000	23.64	2,364	0.44	0.69	0.53	0.53	0.58	2.77	2.07	0.11
Hooded Sprayer 8 Row, 20 Ft	40	6,800	10.24	819	0.78	1.59	0.30	0.40	0.48	3.54	2.83	0.17
Anhydrous Applicator 30 Ft	160 MFWD	19,700	12.73	509	2.44	1.10	0.87	1.88	2.04	8.32	5.59	0.55
Fert Spreader 4 T, 40 Ft	60	10,100	23.76	713	0.44	0.59	0.22	0.69	0.75	2.68	1.81	0.11
Corn Stalk Chopper 12 Ft	60	9,000	4.65	465	2.22	2.48	0.65	1.21	0.93	7.49	5.93	0.57
Potato Shredder 18 Ft	130 MFWD	13,200	6.98	698	3.73	1.65	0.63	1.18	0.94	8.13	6.00	0.82
Stalk Shredder 20 Ft	130 MFWD	15,500	7.76	776	3.36	1.49	0.67	1.25	1.00	7.76	5.69	0.74

Implement	Tractor Size (HP)	Net Cost of A New Implement ¹	-- Estimated --		Power Cost Per Acre	Labor Cost Per Acre	--Implement Cost/Acre--			Total Cost /Acre ²	Use-related Cost /Acre ³	Diesel Fuel Gal/Acre
			Work Performed Acres/hr	Acres/yr			Repairs	Deprec- iation	Over- head			
Rock Picker 6 Ft	75	13,200	1.42	85	9.05	8.88	5.53	9.68	7.56	40.70	30.58	2.33
Harvesting Equipment												
Mower-Conditioner 9 Ft	40	13,300	4.36	349	1.82	2.65	0.59	2.38	1.81	9.25	6.90	0.40
Rotary Hay Mower 6 Ft	40	3,800	2.91	291	2.73	3.61	0.77	0.81	0.65	8.57	7.11	0.61
Rotary Mow/Cond 9 Ft	75	16,000	6.55	524	1.96	1.68	0.42	1.91	1.44	7.41	5.41	0.50
Hay Rake (Hyd) 9 Ft	40	4,500	3.49	698	2.27	3.01	0.35	0.40	0.34	6.37	5.35	0.50
Hay Swather-Cond 12 Ft	60	17,200	5.82	465	1.78	1.80	0.58	2.30	1.81	8.27	5.97	0.45
Swather-Cond, Self-Prop 16 Ft	None	63,200	7.76	621	0.92	1.35	0.52	6.35	4.72	13.87	8.69	0.40
Grain Swather, Pull Type 18 Ft	75	10,500	8.73	698	1.44	1.20	0.08	0.94	0.82	4.48	3.24	0.35
Grain Swather, Pull Type 21 Ft	75	15,500	10.18	815	1.29	1.03	0.10	1.19	1.00	4.60	3.25	0.35
Grain Swather, Self-Prop 21 Ft	None	55,800	10.18	815	0.70	1.03	0.35	4.27	3.22	9.58	6.01	0.30
Hay Baler PTO Twine 12 Ft	40	16,600	4.36	873	1.82	3.31	1.92	1.14	0.94	9.13	7.65	0.40
Round Baler 1000 Lb, 9 Ft	60	11,200	3.01	603	3.31	3.87	3.19	1.11	0.91	12.39	10.52	0.77
Round Baler 1500 Lb, 12 Ft	60	11,700	4.02	804	2.70	2.90	2.50	0.87	0.72	9.69	8.25	0.77
Rd Baler/Wrap 1000 Lb, 9 Ft	60	21,300	3.01	603	3.44	3.87	6.07	2.12	1.68	17.17	14.53	0.88
Large Rectangular Baler 24 Ft	130 MFWD	56,000	16.29	815	1.60	0.72	0.25	4.12	3.26	9.95	6.18	0.35
Forage Harvester 2 Row, 5 Ft	105 MFWD	25,900	1.38	138	14.56	10.47	3.49	11.27	8.96	48.75	35.19	3.35
Forage SP Harvstr 2 Row, 5 Ft	None	159,900	1.70	255	6.23	8.50	5.65	39.84	28.32	88.55	57.12	2.71
Forage SP Harvstr 3 Row, 7.5 Ft	None	165,600	2.55	382	6.23	5.67	3.90	27.51	19.60	62.92	40.20	2.71
Forage SP Harvstr 6 Row, 15 Ft	None	236,600	5.09	764	6.23	2.83	2.79	19.65	13.95	45.46	28.39	2.71
Combine Grain Head 20 Ft	220 HP Combine	10,700	6.79	1,358	11.38	2.13	0.18	0.51	0.37	14.57	11.51	1.31
Combine Grain Head 30 Ft	275 HP Combine	19,300	10.18	2,036	9.42	1.42	0.22	0.61	0.43	12.11	9.51	1.31
Combine Soybean Hd 15 Ft	220 HP Combine	14,500	4.45	891	17.38	3.24	0.38	1.05	0.75	22.80	17.95	2.02
Combine Soybean Hd 18 Ft	275 HP Combine	15,900	5.35	1,069	17.41	2.70	0.35	0.96	0.69	22.11	17.30	2.02
Combine Soybean Hd 25 Ft	275 HP Combine	18,800	7.42	1,485	13.18	1.94	0.29	0.82	0.58	16.82	13.28	2.02
Combine Corn Hd 6 -30, 15 Ft	220 HP Combine	23,500	4.20	840	18.19	3.44	0.65	1.81	1.28	25.37	19.73	1.93
Combine Corn Hd 8 -30, 20 Ft	220 HP Combine	30,500	5.09	1,018	15.39	2.83	0.70	1.94	1.37	22.24	17.27	1.93
Combine Corn Hd 12 -30, 30 Ft	275 HP Combine	46,900	7.64	1,527	12.78	1.89	0.72	1.99	1.39	18.76	14.49	1.93
Potato Windrower 2 Row, 6.3 Ft	75	33,300	1.49	149	8.21	7.59	5.06	13.90	10.47	45.24	32.34	1.88
Potato Windrower 4 Row, 12.6 Ft	105 MFWD	73,100	2.99	299	7.10	3.80	5.56	15.26	11.23	42.95	29.59	1.88

Implement	Tractor Size (HP)	Net Cost of A New Implement ¹	-- Estimated --		Power Cost Per Acre	Labor Cost Per Acre	--Implement Cost/Acre--			Total Cost /Acre ²	Use-related Cost /Acre ³	Diesel Fuel Gal/Acre
			Work Performed Acres/hr	Acres/yr			Repairs	Depreciation	Overhead			
Potato Harvester Seed 2 Row, 6.3 Ft	130 MFWD	70,500	1.38	295	17.70	30.82	15.74	14.33	11.17	89.76	72.54	3.11
Potato Harvester Seed 4 Row, 12.6 Ft	130 MFWD	111,500	2.76	590	10.64	15.41	12.44	11.33	8.77	58.60	46.80	3.11
Potato Harvester 2 Row, 6.3 Ft	130 MFWD	57,600	1.84	294	14.17	23.12	8.59	11.75	9.19	66.81	53.08	3.11
Disk Bean Top Cutter 6 Row, 11 Ft	105 MFWD	13,800	6.40	512	3.14	2.25	0.47	1.60	1.31	8.76	6.47	0.72
Sugar Beet Lifter 4 Row, 7.3 Ft	105 MFWD	50,200	3.47	277	5.66	4.16	9.38	10.73	8.48	38.41	28.11	1.22
Sugar Beet Lifter 6 Row, 11 Ft	130 MFWD	62,200	5.20	426	5.14	2.78	7.80	8.64	6.84	31.21	22.76	1.22
Sugar Beet Topper 6 Row, 11 Ft	75	19,900	5.33	427	2.43	2.44	1.14	2.76	2.26	11.04	8.09	0.64
Sugar Beet Topper 12 Row, 22 Ft	160 MFWD	47,100	10.67	853	2.89	1.22	1.35	3.27	2.64	11.37	7.89	0.64
Sugar Beet Wagon 8 Ton, 7.3 Ft	75	10,700	3.47	277	4.35	3.03	0.64	2.32	1.98	12.32	9.29	1.52
Sugar Beet Wagon 20 Ton, 11 Ft	200 MFWD	43,300	5.20	520	7.04	2.02	1.86	5.00	3.98	19.89	13.86	1.52
Sugar Beet Wagon 24 Ton, 11 Ft	225 MFWD	50,000	5.20	520	8.66	2.02	2.14	5.77	4.57	23.16	15.76	1.52
Hay Stackers 1 Ton, 12 Ft	60	24,100	4.15	829	2.74	3.48	2.93	1.74	1.40	12.29	10.20	0.85
Hay Stackers 3 Ton, 12 Ft	75	35,600	4.84	1,064	2.71	2.98	3.91	2.01	1.60	13.21	10.86	0.73
Hay Stackers 6 Ton, 12 Ft	105 MFWD	57,400	5.53	1,548	3.40	2.61	6.12	2.22	1.77	16.12	13.21	0.64

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.

²Overhead per acre will vary with annual use.

³Total cost per acre is total cost per hour divided by acres per hour. Includes fuel, lubricants, repairs and maintenance, labor, and overhead costs including depreciation. Fuel is included in power cost.

²Use-related cost/acre includes fuel, lubricants, power and equipment repairs and maintenance, labor, and power and equipment 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).

Implement	Tractor Size (HP)	Net Cost of A New Implement	-- Estimated -- Work Performed Hours/yr	Power Cost Per Hour	Labor Cost Per Hour	--Implement Cost/Hour-- Deprec- Overhead	Repairs	Total Cost Per Hour	Use-related Cost Per Hour	Diesel Fuel Gal/Hour	
Miscellaneous - Per Hour Calculations Only											
Rd Bale Wrapper Silage	60	18,300	150	10.35	10.50	13.71	7.32	5.73	47.61	38.97	2.64
Bale Wrapper Dry Hay	40	7,900	150	7.94	10.50	5.92	3.16	2.55	30.07	25.16	1.76
Forage Blower	60	6,100	50	10.35	10.50	0.99	7.32	5.80	34.96	26.25	2.64
Manure Spreader 150 Bu	75	7,200	100	12.83	10.71	5.32	3.92	3.65	36.44	29.16	3.30
Manure Spreader 300 Bu	105 MFWD	11,500	100	20.08	10.71	8.50	6.26	5.78	51.33	39.21	4.62
Manure Spreader 400 Bu	130 MFWD	14,100	100	26.06	10.71	10.42	7.68	7.10	61.97	46.52	5.72
Liquid Manure Spreader 9500 Gal	225 Tracked Tractor	44,300	70	49.24	10.71	29.43	34.46	31.55	155.38	107.76	9.90
Grain Cart 500 Bu	60	15,500	130	10.35	10.50	3.74	7.15	5.98	37.73	28.83	2.64
Gravity Grain Box 240 Bu	75	3,300	130	12.83	10.50	0.80	1.52	1.70	27.35	22.02	3.30
Baled Hay Wagon	40	3,400	250	7.94	21.00	1.00	0.82	0.89	31.64	28.39	1.76
Forage Wagon 14 Ft Long	40	11,400	130	7.94	10.50	2.65	5.26	4.53	30.88	23.99	1.76
Forage Wagon 16 Ft Long	40	12,700	130	7.94	10.50	2.95	5.86	4.86	32.11	24.89	1.76
Soil scraper bucket 12 Cu Yd	260 4WD	36,900	80	42.20	14.43	7.17	24.98	22.18	110.97	75.70	9.95