

MACHINERY COST ESTIMATES: FIELD OPERATIONS

June 2015

Table 2. Per Acre Field Operation Costs.

Operation	Total =	Tractor Overhead +	Implement Overhead +	Fuel & Lube +	Labor	Fuel Use
		----- \$ per acre -----				gal
Primary tillage						
Chisel plow	15.40	6.40	5.20	2.50	1.30	0.8
Horizontal disk, drag, rolling basket	15.40	5.20	6.70	2.20	1.30	0.7
Moldboard plow	36.40	15.10	11.00	6.30	4.00	2.0
Mulch tiller (disk, chisel)	21.40	9.50	6.50	3.60	1.80	1.2
Offset disk	16.30	6.30	4.80	2.60	2.60	0.7
Strip tillage	23.20	5.80	5.80	5.80	5.80	0.8
V-ripper (shanks only)	18.30	8.60	2.30	3.20	4.20	1.5
Secondary tillage						
Field cultivator	10.10	3.70	3.90	1.60	0.90	0.6
Mulch finisher (disk, chisel, drag)	20.10	6.80	8.70	2.80	1.80	1.0
Tandem disk	12.10	3.70	5.90	1.60	0.90	0.5
Planting						
Broadcast seeding	8.00	3.70	0.60	1.40	2.30	0.4
Conventional planter	13.90	2.40	9.60	1.00	0.90	0.3
Split-row planter ¹	12.30	2.50	7.80	1.10	0.90	0.4
No-till planter	14.00	3.50	3.50	3.50	3.50	0.5
Grain drill	13.10	3.90	6.00	1.60	1.60	0.5
No-till drill	19.60	4.90	4.90	4.90	4.90	0.6
Air Seeder	15.10	4.70	7.80	1.80	0.80	0.6
Crop care						
Rotary hoe	5.50	1.50	2.80	0.60	0.60	0.2
Row cultivating	10.60	3.90	4.10	1.60	1.00	0.5
Spraying and ammonia application						
Self-propelled	3.80		3.50	0.10	0.20	0.1
Pull-type	3.70	0.60	2.40	0.30	0.40	0.2
Anhydrous ammonia	13.30	3.20	7.50	1.90	0.70	0.6
Mowing²	31.50	7.80	7.90	7.90	7.90	7.90

¹ Cost applies to soybean acres only.

² Mowing costs are \$126.30 per hour

Table 1 shows estimated costs of performing agricultural field operations. These estimates are useful for determining custom rates and for analyzing machinery costs on farms. Costs include overhead (depreciation, interest, insurance, housing and repairs), fuel and labor charges. Not included are allowances for profit. Charging custom rates at estimated costs should cover all costs, but will not generate a profit. Adding 5 to 15 percent to estimated costs is appropriate for setting custom rates.

Cost Estimates

Formulas published by the American Society of Agricultural Engineers are used to calculate costs. All costs are based on buying new machinery and owning machinery for 10 years. Variables used in calculating costs are shown in Table 2.

Costs in Table 1 are divided into four categories:

Tractor overhead includes depreciation, interest, insurance, housing, and repair charges for the tractor used to pull the implement.

Implement overhead includes depreciation, interest, insurance, housing, and repair charges for the implement.

Fuel charges are based on diesel fuel priced at \$2.50 per gallon. Lubrication cost is calculated as 10 percent of fuel cost.

Labor costs are based on a \$17.00 per hour labor charge. Labor time is 10 percent more than hours for the tractor or self-propelled machine.

Costs shown in Table 1 are estimated for a specific implement size generally associated with a 1,400 acre grain farm. Estimated costs for these and other sized implements are shown in Appendix Table 1. Usually, but not always, total per acre costs decrease slightly as implement size increase. However, total costs for different sized implements do not differ greatly when acres covered are matched to the size of the implement.

Use and Costs

The majority of costs associated with machinery are overhead, including costs for depreciation, interest, insurance, housing, and repair. On an annual basis, depreciation and interest are relatively constant no matter how many acres are covered. As acres increase, yearly depreciation and interest costs are spread over more acres for a given implement size. Therefore, costs per acre decline as acres of use increase for a given implement size.

Appendix Table 1 lists acres used to calculate total costs per acre. On average, acreage decreases of 50 percent result in 80% increases in costs. Acreage increases of 50 percent result in cost decreases of 25 percent. Fuel and labor costs per acre are constant regardless of acres covered.

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Appendix Table 1. Costs for Different Sized Implements.

Implement/size	Tractor HP	List Price	-- Acres per --		Costs per Hour	----- Costs per Acre -----					
			Hour	Year		Total =	Tractor Overhead	Implement + Overhead	Fuel + & Lube	+ Labor	Fuel Use Per Acre
	HP	\$	ac/hr	ac/yr	\$/hr	----- \$ per acre -----					gal.
Chisel plow											
12 ft	140	18,749	7.2	432	114.50	15.90	6.40	4.30	2.60	2.60	0.7
15 ft	155	20,395	9.0	540	121.50	13.50	5.40	3.70	2.30	2.10	0.6
22 ft	240	39,029	13.2	792	187.40	14.20	5.60	4.80	2.40	1.40	0.6
24 ft	270	45,695	14.4	864	221.80	15.40	6.40	5.20	2.50	1.30	0.6
28 ft.	290	49,428	16.8	1,008	238.60	14.20	6.00	4.80	2.30	1.10	0.6
32 ft.	310	52,904	19.2	1,152	251.50	13.10	5.50	4.50	2.10	1.00	0.5
36 ft.	360	56,338	21.6	1,296	241.90	11.20	3.80	4.30	2.20	0.90	0.6
41 ft.	410	58,428	24.6	1,476	260.80	10.60	3.70	3.90	2.20	0.80	0.6
44 ft.	410	81,119	26.4	1,584	295.70	11.20	3.40	5.00	2.10	0.70	0.5
47 ft.	460	85,321	28.2	1,692	321.50	11.40	3.50	5.00	2.20	0.70	0.6
55 ft.	460	92,052	33.0	1,980	330.00	10.00	3.00	4.60	1.80	0.60	0.5
61 ft.	560	97,139	36.6	2,196	369.70	10.10	3.20	4.40	2.00	0.50	0.5
Horizontal disks, drag, rolling basket											
17 ft.	190	47,500	10.2	612	184.60	18.10	6.20	7.60	2.50	1.80	0.6
24 ft.	240	59,000	14.4	864	221.80	15.40	5.20	6.70	2.20	1.30	0.6
30 ft.	290	77,000	18.0	1,080	282.60	15.70	5.60	7.00	2.10	1.00	0.5
40 ft.	410	98,500	24.0	1,440	326.40	13.60	3.80	6.70	2.30	0.80	0.6
Moldboard plow											
6 bottom	140	43,384	4.1	486	128.40	31.70	11.30	11.20	4.60	4.60	1.2
7 bottom	225	49,809	4.7	567	172.00	36.40	15.10	11.00	6.30	4.00	1.6
9 bottom	270	69,498	6.1	729	219.30	36.10	15.20	11.90	5.90	3.10	1.5
10 bottom	290	77,057	6.8	810	239.00	35.40	15.00	11.90	5.70	2.80	1.5
Mulch tiller (disk, chisel shanks)											
6 ft	95	10,500	3.0	180	79.80	26.60	10.50	5.70	4.20	6.20	1.1
8 ft	110	12,500	5.0	300	92.00	18.40	7.70	4.10	2.90	3.70	0.7
11 ft. 3 in.	120	19,183	5.6	338	105.80	18.80	7.10	5.60	2.80	3.30	0.7
13 ft. 9 in.	175	23,792	6.9	413	132.00	19.20	7.40	5.70	3.40	2.70	0.9
16 ft. 3 in.	225	26,779	8.1	488	164.10	20.20	8.80	5.40	3.70	2.30	1.0
18 ft. 9 in.	270	40,264	9.4	563	211.90	22.60	9.80	7.00	3.80	2.00	1.0
21 ft 3 in.	290	42,224	10.6	638	227.40	21.40	9.50	6.50	3.60	1.80	0.9
Offset disk											
10 ft. 7 in	110	19,972	6.3	381	104.70	16.50	6.10	5.20	2.30	2.90	0.6
12 ft. 1 in.	140	21,025	7.2	435	118.10	16.30	6.30	4.80	2.60	2.60	0.7
15 ft. 8 in.	155	25,693	9.4	564	130.70	13.90	5.20	4.50	2.20	2.00	0.6
Strip Till											
12-row	290	77,928	17.5	1,047	319.40	18.30	5.80	9.20	2.20	1.10	0.6
16-row	310	98,165	23.3	1,396	370.00	15.90	4.60	8.70	1.80	0.80	0.5
24-row	560	100,000	34.9	2,095	377.00	10.80	2.30	5.90	2.10	0.50	0.5

Appendix Table 1. Costs for Different Sized Implements, cont.

Implement/size	Tractor HP	List Price	-- Acres per --		Costs per Hour	----- Costs per Acre -----					
			Hour	Year		Tractor Total = Overhead	Implement + Overhead	Fuel + & Lube	+ Labor	Fuel Use Per Acre	
	HP	\$	ac/hr	ac/yr	\$/hr	----- \$ per acre -----					gal.
V-Ripper (shanks only)											
8 ft	110	6,178	4.5	270	82.40	18.30	8.60	2.30	3.20	4.20	0.8
11 ft	240	7,732	5.5	330	137.50	25.00	13.50	2.30	5.80	3.40	1.5
15 ft	270	12,140	7.0	420	166.60	23.80	13.20	2.80	5.10	2.70	1.3
18 ft	310	14,683	9.0	540	190.80	21.20	11.80	2.70	4.60	2.10	1.2
22 ft	360	17,790	11.0	660	177.10	16.10	7.40	2.70	4.30	1.70	1.1
Mulch finisher (disk, chisel, and drag)											
13 ft	110	23,000	6.5	390	109.20	16.80	5.90	5.80	2.20	2.90	0.6
15 ft	140	25,000	7.5	450	124.50	16.60	6.10	5.50	2.50	2.50	0.6
18 ft	155	50,070	9.0	540	170.10	18.90	5.40	9.10	2.30	2.10	0.6
21 ft	225	55,739	10.5	630	211.10	20.10	6.80	8.70	2.80	1.80	0.7
24 ft	240	63,001	12.0	720	228.00	19.00	6.20	8.60	2.60	1.60	0.7
27 ft	240	72,691	13.5	810	244.40	18.10	5.50	8.80	2.40	1.40	0.6
30 ft	270	80,939	15.0	900	279.00	18.60	6.20	8.80	2.40	1.20	0.6
33 ft	270	86,356	16.5	990	288.80	17.50	5.60	8.60	2.20	1.10	0.6
39 ft	310	103,556	19.5	1,170	335.40	17.20	5.40	8.70	2.10	1.00	0.5
45 ft	360	118,011	22.5	1,350	339.80	15.10	3.60	8.60	2.10	0.80	0.5
Field cultivator											
24 ft. 6 in.	155	43,593	16.0	961	160.20	10.00	3.00	4.50	1.30	1.20	0.3
26 ft. 6 in.	225	44,326	17.3	1,040	192.40	11.10	4.10	4.20	1.70	1.10	0.4
30 ft. 6 in.	240	46,981	19.9	1,197	201.40	10.10	3.70	3.90	1.60	0.90	0.4
35 ft. 6 in.	270	50,637	23.2	1,393	229.80	9.90	4.00	3.60	1.50	0.80	0.4
41 ft. 6 in.	270	61,620	27.1	1,628	247.00	9.10	3.40	3.70	1.30	0.70	0.3
45 ft. 6 in.	290	75,090	30.1	1,807	283.10	9.40	3.40	4.10	1.30	0.60	0.3
50 ft. 6 in.	310	79,881	33.4	2,005	297.50	8.90	3.20	3.90	1.20	0.60	0.3
55 ft. 6 in.	310	84,115	36.7	2,204	304.90	8.30	2.90	3.80	1.10	0.50	0.3
60 ft. 6 in.	360	86,937	40.0	2,402	292.30	7.30	2.00	3.60	1.20	0.50	0.3
64 ft. 6 in.	410	88,397	42.7	2,561	298.80	7.00	1.90	3.40	1.30	0.40	0.3
Tandem disk											
23 ft. 7 in.	140	52,959	14.2	854	169.40	11.90	3.20	6.10	1.30	1.30	0.3
26 ft. 5 in.	175	58,872	15.9	957	191.40	12.00	3.20	6.10	1.50	1.20	0.4
29 ft. 3 in.	225	63,379	17.7	1,059	224.20	12.70	4.00	5.90	1.70	1.10	0.4
33 ft. 7 in.	240	72,679	20.3	1,216	245.30	12.10	3.70	5.90	1.60	0.90	0.4
Broadcast seeding											
20 ft.	85	2,200	8.0	358	64.40	8.00	3.70	0.60	1.40	2.30	0.4

Appendix Table 1. Costs for Different Sized Implements, cont.

Implement/size	Tractor HP	List Price	-- Acres per --		Costs	----- Costs per Acre -----				Fuel Use Per Acre	
			Hour	Year	per Hour	Total =	Tractor Overhead	Implement + Overhead	Fuel + & Lube		+ Labor
	HP	\$	ac/hr	ac/yr	\$/hr	----- \$ per acre -----				gal.	
Conventional planter											
6-row	95	35,302	7.6	458	118.40	15.50	4.10	7.40	1.60	2.40	0.4
8-row	110	49,989	10.2	611	151.70	14.90	3.80	7.90	1.40	1.80	0.4
12-row	140	96,356	15.3	916	236.70	15.50	3.00	10.10	1.20	1.20	0.3
16-row	155	121,247	20.4	1222	283.10	13.90	2.40	9.60	1.00	0.90	0.3
24-row	190	183,869	30.5	1833	403.20	13.20	2.10	9.70	0.80	0.60	0.2
32-row	225	246,273	40.7	2444	517.20	12.70	1.80	9.70	0.70	0.50	0.2
36-row	270	311,080	45.8	2749	646.00	14.10	2.00	10.90	0.80	0.40	0.2
Split-row planter (soybean acres only)²											
12-row split	155	42,284	15.3	458	210.80	13.80	3.20	8.10	1.30	1.20	0.3
16-row split	175	53,972	20.4	611	250.50	12.30	2.50	7.80	1.10	0.90	0.3
No-till planter (30" rows)											
8-row	110	57,989	10.2	611	163.90	16.10	3.80	9.10	1.40	1.80	0.4
12-row	155	107,348	15.3	916	259.60	17.00	3.20	11.30	1.30	1.20	0.3
16-row	225	137,247	20.4	1222	340.10	16.70	3.50	10.80	1.50	0.90	0.4
24-row	240	207,869	20.4	1222	458.20	22.50	3.60	16.40	1.60	0.90	0.4
Grain drill											
15 ft.	95	16,500	7.0	400	90.30	12.90	4.50	3.90	1.80	2.70	0.5
25 ft.	140	42,083	11.7	666	152.80	13.10	3.90	6.00	1.60	1.60	0.4
30 ft.	175	53,483	14.0	799	183.40	13.10	3.70	6.40	1.70	1.30	0.4
35 ft.	225	63,715	16.3	933	225.40	13.80	4.40	6.50	1.80	1.10	0.5
No-till drill											
10 ft	110	32,065	7.0	400	125.30	17.90	5.50	7.60	2.10	2.70	0.5
15 ft	140	45,395	9.3	533	158.70	17.00	4.90	8.10	2.00	2.00	0.5
20 ft.	175	66,875	14.0	800	205.80	14.70	3.70	8.00	1.70	1.30	0.4
Air seeder											
28 ft.	290	61,941	14.3	814	260.90	18.30	7.10	7.20	2.70	1.30	0.7
36 ft.	290	84,080	18.3	1046	298.70	16.30	5.50	7.70	2.10	1.00	0.5
44 ft.	310	104,346	22.4	1279	338.20	15.10	4.70	7.80	1.80	0.80	0.5
Rotary hoe											
30 ft.	140	12,000	30.2	400	166.00	5.50	1.50	2.80	0.60	0.60	0.2
40 ft.	225	23,000	40.2	533	281.70	7.00	1.80	4.00	0.70	0.50	0.2

Appendix Table 1. Costs for Different Sized Implements, cont.

Implement/size	Tractor HP	List Price	-- Acres per --		Costs per Hour	Costs per Acre					
			Hour	Year		Total =	Tractor Overhead	Implement + Overhead	Fuel + & Lube	+ Labor	Fuel Use Per Acre
	HP	\$	ac/hr	ac/yr	\$/hr	\$ per acre					gal.
Row-crop cultivator (30" rows)											
8-row	140	12000	9.1	400	108.70	12.00	5.10	2.80	2.00	2.10	0.5
12-row	155	26000	13.6	604	142.60	10.50	3.60	4.00	1.50	1.40	0.4
16-row	225	35000	18.1	806	192.00	10.60	3.90	4.10	1.60	1.00	0.4
Self-propelled sprayer (High-crop ready)											
80 ft boom	85	211403	64.5	5,352	270.80	4.20	0.50	3.20	0.20	0.30	0.1
90 ft boom	85	319215	72.5	6,021	377.20	5.20	0.40	4.30	0.20	0.30	0.1
100 ft boom	85	321353	80.6	6,690	370.80	4.60	0.40	3.90	0.10	0.20	0.0
Self-propelled sprayer											
120 ft boom	85	346008	96.7	8,028	396.60	4.10	0.30	3.50	0.10	0.20	0.0
Field Sprayer											
90 ft.	95	47000	49.6	1,985	183.70	3.70	0.60	2.40	0.30	0.40	0.1
Anhydrous ammonia applicator											
32 ft. 6 in.	140	57365	15.8	1,103	190.70	12.10	2.90	6.80	1.20	1.20	0.3
42 ft. 6 in.	240	72777	20.6	1,442	259.60	12.60	3.60	6.60	1.50	0.90	0.4
47 ft. 6 in.	290	98393	23.0	1,612	343.20	14.90	4.40	8.00	1.70	0.80	0.4
52 ft. 6 in.	360	102596	25.5	1,782	338.50	13.30	3.20	7.50	1.90	0.70	0.5
62 ft. 6 in.	360	113740	30.3	2,121	360.60	11.90	2.70	7.00	1.60	0.60	0.4
Field and ditch mowing											
15 ft	140	19859	5.8	291	126.30	21.70	7.90	7.40	3.20	3.20	0.8
20 ft.	140	25889	7.8	388	138.90	17.90	5.90	7.20	2.40	2.40	0.6