

MACHINERY COST ESTIMATES: FIELD OPERATIONS

June 2017

Table 1. Per Acre Field Operation Costs.

Operation	Total =	Tractor Overhead +	Implement Overhead +	Fuel & Lube +	Labor	Fuel Use
----- \$ per acre -----						gal
Primary tillage						
Chisel plow	16.50	7.20	5.80	2.10	1.40	0.8
Vertical tillage, rolling basket	11.40	4.10	5.30	1.20	0.80	0.5
Moldboard plow	36.40	15.60	11.40	5.20	4.20	2.1
Mulch tiller (disk, chisel)	21.70	10.00	6.80	3.00	1.90	1.2
Offset disk	14.10	5.40	4.80	1.80	2.10	0.7
Strip tillage	16.10	4.80	9.00	1.40	0.90	0.6
V-ripper (shanks only)	20.80	12.10	2.80	3.70	2.20	1.5
Secondary tillage						
Field cultivator	9.80	3.40	4.70	1.00	0.70	0.4
Mulch finisher (disk, chisel, drag)	19.50	6.40	9.90	1.90	1.30	0.8
Tandem disk	12.30	3.80	6.20	1.30	1.00	0.5
Planting						
Broadcast seeding	8.10	3.90	0.60	1.10	2.50	0.4
Conventional planter	14.20	2.50	9.90	0.80	1.00	0.3
Split-row planter ¹	12.60	2.60	8.10	0.90	1.00	0.4
No-till planter	17.00	3.60	11.20	1.20	1.00	0.5
Grain drill	13.40	4.10	6.30	1.30	1.70	0.5
No-till drill	23.00	6.80	11.20	2.20	2.80	0.9
Air Seeder	15.40	5.00	8.00	1.50	0.90	0.6
Crop care						
Rotary hoe	5.60	1.60	2.80	0.50	0.70	0.2
Row cultivating	10.60	4.10	4.10	1.30	1.10	0.5
Spraying and ammonia application						
Self-propelled	3.90		3.60	0.10	0.20	0.1
Pull-type	4.10	0.70	2.80	0.20	0.40	0.1
Anhydrous ammonia	15.90	4.20	9.20	1.40	1.10	0.6
Mowing²	21.80	8.20	7.60	2.60	3.40	1.0

¹ Cost applies to soybean acres only.

² Mowing costs are \$126.80 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 \$2.25 per gallon. Lubrication cost is calculated as 10 percent of fuel cost.

Labor costs are based on a \$18.00 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	----- Costs per Acre -----					
			Hour	Year	per Hour	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	20,865	7.2	432	118.10	16.40	6.70	4.80	2.10	2.80	0.8
15 ft	155	22,568	9.0	540	124.20	13.80	5.60	4.10	1.90	2.20	0.8
21 ft	240	41,337	12.6	756	191.50	15.20	6.10	5.40	2.10	1.60	0.8
23 ft	270	48,642	13.8	828	227.70	16.50	7.20	5.80	2.10	1.40	0.8
27 ft.	290	52,524	16.2	972	241.40	14.90	6.50	5.30	1.90	1.20	0.8
30 ft.	310	56,137	18.0	1,080	257.40	14.30	6.20	5.10	1.90	1.10	0.8
35 ft.	370	59,708	21.0	1,260	254.10	12.10	4.60	4.70	1.90	0.90	0.8
40 ft.	420	61,584	24.0	1,440	271.20	11.30	4.40	4.20	1.90	0.80	0.8
44 ft.	420	85,484	26.4	1,584	311.50	11.80	4.00	5.30	1.70	0.80	0.7
47 ft.	470	89,855	28.2	1,692	329.90	11.70	4.00	5.20	1.80	0.70	0.7
55 ft.	470	96,817	33.0	1,980	339.90	10.30	3.40	4.80	1.50	0.60	0.6
61 ft.	570	102,141	36.6	2,196	380.60	10.40	3.60	4.60	1.70	0.50	0.7
Vertical tillage, rolling basket											
20 ft 9 in	190	58,791	17.6	1,058	202.80	11.50	3.70	5.50	1.20	1.10	0.5
26 ft 6 in	240	72,505	22.5	1,352	243.30	10.80	3.40	5.30	1.20	0.90	0.5
29 ft 3 in	270	79,854	24.9	1,492	280.90	11.30	4.00	5.30	1.20	0.80	0.5
30 ft 8 in	290	83,646	26.1	1,564	297.20	11.40	4.10	5.30	1.20	0.80	0.5
33 ft 7 in	370	91,593	28.5	1,713	308.30	10.80	3.40	5.30	1.40	0.70	0.6
40 ft 8 in	570	119,555	34.6	2,074	411.40	11.90	3.80	5.70	1.80	0.60	0.7
Moldboard plow											
6 bottom	140	45,137	4.1	486	129.60	32.00	11.80	11.60	3.70	4.90	1.5
7 bottom	225	51,821	4.7	567	172.00	36.40	15.60	11.40	5.20	4.20	2.1
9 bottom	270	72,306	6.1	729	223.60	36.80	16.30	12.40	4.80	3.30	1.9
10 bottom	290	80,170	6.8	810	241.00	35.70	15.70	12.40	4.70	2.90	1.9
Mulch tiller (disk, chisel shanks)											
6 ft	95	10,950	3.0	180	81.00	27.00	11.00	6.00	3.40	6.60	1.4
8 ft	110	13,000	5.0	300	95.00	19.00	8.30	4.30	2.40	4.00	1.0
11 ft. 3 in.	120	19,979	5.6	338	109.10	19.40	7.80	5.80	2.30	3.50	0.9
13 ft. 9 in.	175	24,765	6.9	413	133.40	19.40	7.80	5.90	2.80	2.90	1.1
16 ft. 3 in.	225	27,875	8.1	488	163.30	20.10	9.10	5.60	3.00	2.40	1.2
18 ft. 9 in.	270	41,911	9.4	563	216.60	23.10	10.60	7.30	3.10	2.10	1.2
21 ft 3 in.	290	43,951	10.6	638	230.60	21.70	10.00	6.80	3.00	1.90	1.2
Offset disk											
10 ft. 7 in	110	19,989	6.3	381	106.60	16.80	6.60	5.20	1.90	3.10	0.8
12 ft. 1 in.	140	22,335	7.2	435	119.60	16.50	6.60	5.10	2.10	2.70	0.8
15 ft. 8 in.	155	27,288	9.4	564	132.60	14.10	5.40	4.80	1.80	2.10	0.7
Strip Till											
12-row	290	81,077	17.5	1,047	322.90	18.50	6.10	9.50	1.80	1.10	0.7
16-row	310	102,131	23.3	1,396	374.70	16.10	4.80	9.00	1.40	0.90	0.6
24-row	570	104,000	34.9	2,095	394.50	11.30	2.80	6.10	1.80	0.60	0.7

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

Implement/size	Tractor HP	List Price	-- Acres per --		Costs	----- Costs per Acre -----					
			Hour	Year	per Hour	Total	Tractor + 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	6,726	4.2	250	84.50	20.30	10.00	2.60	2.90	4.80	1.2
11 ft	240	8,342	5.5	330	136.40	24.80	14.00	2.50	4.70	3.60	1.9
15 ft	270	12,929	7.5	450	168.80	22.50	13.20	2.80	3.90	2.60	1.6
18 ft	310	15,575	9.2	550	190.60	20.80	12.10	2.80	3.70	2.20	1.5
22 ft	420	18,807	10.8	650	191.80	17.70	8.90	2.80	4.20	1.80	1.7
Mulch finisher (disk, chisel, and drag)											
21 ft 9"	225	64,731	10.9	653	224.00	20.60	6.80	9.80	2.20	1.80	0.9
24 ft 9"	240	72,383	12.4	743	241.30	19.50	6.20	9.60	2.10	1.60	0.8
27 ft 9"	240	82,965	13.9	833	258.10	18.60	5.50	9.80	1.90	1.40	0.8
30 ft 9"	270	92,999	15.4	923	299.80	19.50	6.40	9.90	1.90	1.30	0.8
33 ft 9"	270	98,195	16.9	1,013	308.80	18.30	5.90	9.50	1.70	1.20	0.7
38 ft 3"	310	111,578	19.1	1,148	348.10	18.20	5.80	9.60	1.80	1.00	0.7
44 ft 3"	370	132,319	22.1	1,328	373.90	16.90	4.40	9.80	1.80	0.90	0.7
50 ft 3"	370	147,780	25.1	1,508	399.50	15.90	3.90	9.60	1.60	0.80	0.6
56 ft 3"	420	158,101	28.1	1,688	419.10	14.90	3.40	9.20	1.60	0.70	0.6
Field cultivator											
29 ft. 6 in.	155	55,006	19.3	1,157	177.50	9.20	2.60	4.70	0.90	1.00	0.4
31 ft. 6 in.	225	55,732	20.6	1,236	210.10	10.20	3.60	4.40	1.20	1.00	0.5
35 ft. 6 in.	240	58,138	23.2	1,393	218.20	9.40	3.30	4.10	1.10	0.90	0.4
40 ft. 6 in.	270	80,494	26.5	1,589	278.10	10.50	3.70	5.00	1.10	0.70	0.4
44 ft. 6 in.	270	83,900	29.1	1,746	285.20	9.80	3.40	4.70	1.00	0.70	0.4
48 ft. 6 in.	290	89,329	32.1	1,926	304.90	9.50	3.30	4.60	1.00	0.60	0.4
52 ft. 6 in.	310	92,551	34.7	2,085	319.70	9.20	3.20	4.40	1.00	0.60	0.4
56 ft. 6 in.	310	97,439	37.4	2,244	325.30	8.70	3.00	4.30	0.90	0.50	0.4
60 ft. 6 in.	370	98,938	40.0	2,402	320.30	8.00	2.40	4.10	1.00	0.50	0.4
64 ft. 6 in.	420	100,587	42.7	2,561	333.00	7.80	2.30	3.90	1.10	0.50	0.4
Tandem disk											
23 ft. 7 in.	140	56,200	14.2	854	176.50	12.40	3.40	6.50	1.10	1.40	0.4
26 ft. 5 in.	175	62,475	15.9	957	193.00	12.10	3.30	6.40	1.20	1.20	0.5
29 ft. 3 in.	225	67,258	17.7	1,059	227.80	12.90	4.20	6.20	1.40	1.10	0.6
33 ft. 7 in.	240	77,129	20.3	1,216	249.30	12.30	3.80	6.20	1.30	1.00	0.5
Broadcast seeding											
20 ft.	85	2,350	8.0	358	65.20	8.10	3.90	0.60	1.10	2.50	0.4

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

Implement/size	Tractor HP	List Price	-- Acres per --		Costs	----- Costs per Acre -----					
			Hour	Year	per Hour	Total	Tractor = Overhead	Implement + Overhead	Fuel + & Lube	+ Labor	Fuel Use Per Acre
	HP	\$	ac/hr	ac/yr	\$/hr	----- \$ per acre -----					gal.
Conventional planter											
6-row	95	36,549	7.6	458	121.40	15.90	4.30	7.70	1.30	2.60	0.5
8-row	110	51,728	10.2	611	156.80	15.40	4.10	8.20	1.20	1.90	0.5
12-row	140	98,708	15.3	916	241.30	15.80	3.10	10.40	1.00	1.30	0.4
16-row	155	125,614	20.4	1222	289.20	14.20	2.50	9.90	0.80	1.00	0.3
24-row	190	190,508	30.5	1833	409.30	13.40	2.10	10.00	0.70	0.60	0.3
32-row	225	265,724	40.7	2444	545.70	13.40	1.80	10.50	0.60	0.50	0.2
36-row	270	322,167	45.8	2749	664.40	14.50	2.20	11.30	0.60	0.40	0.2
Split-row planter (soybean acres only)²											
12-row split	155	43,993	15.3	458	215.30	14.10	3.30	8.40	1.10	1.30	0.4
16-row split	175	56,118	20.4	611	256.60	12.60	2.60	8.10	0.90	1.00	0.4
No-till planter (30" rows)											
8-row	110	60,000	10.2	611	170.00	16.70	4.10	9.50	1.20	1.90	0.5
12-row	155	111,116	15.3	916	265.70	17.40	3.30	11.70	1.10	1.30	0.4
16-row	225	142,158	20.4	1222	346.20	17.00	3.60	11.20	1.20	1.00	0.5
24-row	240	215,324	30.5	1833	467.30	15.30	2.50	11.30	0.90	0.60	0.4
Grain drill											
15 ft.	95	17,160	7.0	400	91.70	13.10	4.70	4.10	1.50	2.80	0.6
25 ft.	140	43,782	11.7	666	156.30	13.40	4.10	6.30	1.30	1.70	0.5
30 ft.	175	55,644	14.0	799	184.80	13.20	3.80	6.60	1.40	1.40	0.6
35 ft.	225	66,289	16.3	933	228.70	14.00	4.50	6.80	1.50	1.20	0.6
No-till drill											
10 ft	110	41,277	4.7	267	141.90	30.40	8.90	14.70	2.60	4.20	1.0
15 ft	140	47,181	7.0	400	161.00	23.00	6.80	11.20	2.20	2.80	0.9
20 ft.	175	69,665	9.3	533	207.20	22.20	5.70	12.40	2.00	2.10	0.8
Air seeder											
28 ft.	290	64,127	14.3	814	263.70	18.50	7.40	7.50	2.20	1.40	0.9
36 ft.	290	87,048	18.3	1046	302.40	16.50	5.80	7.90	1.70	1.10	0.7
44 ft.	310	108,030	22.4	1279	345.00	15.40	5.00	8.00	1.50	0.90	0.6
Rotary hoe											
30 ft.	140	12,000	30.2	400	169.00	5.60	1.60	2.80	0.50	0.70	0.2
40 ft.	225	23,000	40.2	533	277.70	6.90	1.80	4.00	0.60	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	12,000	9.1	400	108.70	12.00	5.30	2.80	1.70	2.20	0.7
12-row	155	26,000	13.6	604	141.30	10.40	3.70	4.00	1.20	1.50	0.5
16-row	225	35,000	18.1	806	192.00	10.60	4.10	4.10	1.30	1.10	0.5
Self-propelled sprayer (High-crop ready)											
80 ft boom	85	226,148	64.5	5,352	277.30	3.80		3.40	0.10	0.30	0.04
90 ft boom	85	331,180	72.5	6,021	384.50	4.90		4.50	0.10	0.30	0.04
100 ft boom	85	333,394	80.6	6,690	386.90	4.40		4.10	0.10	0.20	0.04
Self-propelled sprayer											
120 ft boom	85	358,919	96.7	8,028	406.30	3.90		3.60	0.10	0.20	0.04
Field Sprayer											
90 ft.	95	53,586	49.6	1,985	203.50	4.10	0.70	2.80	0.20	0.40	0.1
Anhydrous ammonia applicator											
27 ft. 6 in.	140	71,215	13.3	933	216.00	16.20	3.60	10.00	1.10	1.50	0.4
37 ft. 6 in.	240	89,420	18.2	1,273	289.10	15.90	4.20	9.20	1.40	1.10	0.6
47 ft. 6 in.	290	103,372	23.0	1,612	352.40	15.30	4.60	8.40	1.40	0.90	0.6
52 ft. 6 in.	370	107,855	25.5	1,782	358.90	14.10	3.80	7.90	1.60	0.80	0.6
62 ft. 6 in.	470	119,450	30.3	2,121	390.90	12.90	3.20	7.30	1.70	0.70	0.7
Field and ditch mowing											
15 ft	140	20,568	5.8	291	126.80	21.80	8.20	7.60	2.60	3.40	1.0
20 ft.	140	26,803	7.8	388	142.00	18.30	6.20	7.50	2.00	2.60	0.8