

MACHINERY COST ESTIMATES: FIELD OPERATIONS

May 2008

This publication 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

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	11.90	3.80	3.90	3.10	1.10	0.9
Horizontal disk, drag, rolling basket	12.40	3.50	5.00	2.80	1.10	0.8
Moldboard plow	26.60	8.70	6.90	7.60	3.40	2.2
Mulch tiller (disk, chisel)	17.80	6.40	5.20	4.70	1.50	1.4
Offset disk	12.30	3.90	3.60	3.00	1.80	0.9
Strip tillage	11.40	3.90	3.80	2.80	0.90	0.8
V-ripper (shanks only)	18.40	8.40	1.70	6.50	1.80	1.9
Secondary tillage						
Field cultivator	8.30	2.50	3.00	2.00	0.80	0.5
Mulch finisher (disk, chisel, drag)	15.60	3.90	3.90	3.90	3.90	0.9
Tandem disk	9.60	2.60	4.10	2.10	0.80	0.5
Planting						
Broadcast seeding	6.70	2.60	0.40	1.70	2.00	0.4
Conventional planter	10.30	1.70	6.50	1.30	0.80	0.3
Split-row planter ¹	10.80	1.80	6.70	1.50	0.80	0.4
No-till planter	12.20	2.00	7.60	1.80	0.80	0.4
Grain drill	10.00	3.10	3.30	2.20	1.40	0.5
No-till drill	15.50	3.80	7.30	2.70	1.70	0.7
Air Seeder	14.90	3.40	8.20	2.60	0.70	0.6
Crop care						
Rotary hoe	4.80	1.20	2.30	0.80	0.50	0.2
Row cultivating	8.50	2.30	3.30	2.00	0.90	0.5
Spraying and ammonia application						
Self-propelled	3.10		2.80	0.10	0.20	0.0
Pull-type	4.10	1.00	1.60	0.80	0.70	0.2
Anhydrous ammonia	9.30	3.50	1.70	2.50	1.60	0.6
Mowing²	18.90	6.10	5.80	4.30	2.70	1.0

¹ Cost applies to soybean acres only.

² Mowing costs are \$116.40 per hour

(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 may be appropriate for determining custom rates. Per acre costs for different field operations are shown in Table 1.

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:

Table 2. Factors Used in Calculating Costs.

Purchase price	85%	of list price
Interest rate	7.0%	of remaining value
Insurance and housing	1.0%	of remaining value
Diesel fuel	\$3.75	per gallon
Lubrication cost	10%	of fuel costs
Tractor hours	300	per year
Years of life	10	years
Labor charge	\$14.50	per hour
Labor time	1.10	times tractor hours

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 \$3.75 per gallon. Lubrication cost is calculated as 10 percent of fuel cost.

Labor costs are based on a \$14.50 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 1,200 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
Chisel plow	HP	\$	ac/hr	ac/yr	\$/hr	----- \$ per acre -----					gal.
12 ft	140	13,000	7.2	432	100.8	14.00	5.00	3.30	3.50	2.20	1.0
15 ft	150	14,100	9.0	540	103.5	11.50	3.90	2.80	3.00	1.80	0.9
24 ft	250	31,500	14.4	864	171.4	11.90	3.80	3.90	3.10	1.10	0.9
28 ft.	275	34,000	16.8	1,008	193.2	11.50	4.00	3.60	3.00	0.90	0.9
32 ft.	325	36,400	19.2	1,152	217.0	11.30	4.00	3.40	3.10	0.80	0.9
36 ft.	375	38,900	21.6	1,296	220.3	10.20	3.20	3.20	3.10	0.70	0.9
41 ft.	425	40,200	24.6	1,476	236.2	9.60	3.00	2.90	3.10	0.60	0.9
47 ft.	475	57,900	28.2	1,692	293.3	10.40	3.10	3.70	3.00	0.60	0.9
55 ft.	475	62,500	33.0	1,980	300.3	9.10	2.60	3.40	2.60	0.50	0.8
61 ft.	530	66,000	36.6	2,196	325.7	8.90	2.60	3.30	2.60	0.40	0.8
Horizontal disks, drag, rolling basket											
17 ft.	180	24,000	10.2	612	135.7	13.30	4.30	4.20	3.20	1.60	0.9
24 ft.	225	40,000	14.4	864	178.6	12.40	3.50	5.00	2.80	1.10	0.8
30 ft.	275	52,500	18.0	1,080	230.4	12.80	3.80	5.30	2.80	0.90	0.8
40 ft.	425	66,900	24.0	1,440	288.0	12.00	3.10	5.00	3.20	0.70	0.9
Moldboard plow											
6 bottom	140	20,200	4.1	486	99.2	24.50	8.80	5.60	6.20	3.90	1.8
7 bottom	200	28,800	4.7	567	125.7	26.60	8.70	6.90	7.60	3.40	2.2
9 bottom	250	33,600	6.1	729	153.7	25.30	9.10	6.20	7.40	2.60	2.2
10 bottom	275	37,300	6.8	810	175.5	26.00	10.00	6.20	7.40	2.40	2.2
Mulch tiller (disk, chisel shanks)											
6 ft	95	8,500	3.0	180	70.8	23.60	7.50	5.10	5.70	5.30	1.7
8 ft	110	11,000	5.0	300	79.0	15.80	4.60	4.00	4.00	3.20	1.2
11 ft	125	13,600	5.5	330	90.2	16.40	4.90	4.50	4.10	2.90	1.2
13 ft	165	16,900	6.5	390	113.8	17.50	5.70	4.70	4.60	2.50	1.3
16 ft	200	19,000	8.0	480	127.2	15.90	5.10	4.30	4.50	2.00	1.3
18 ft	250	28,600	9.0	540	168.3	18.70	6.20	5.70	5.00	1.80	1.5
21 ft	275	30,000	10.5	630	186.9	17.80	6.40	5.20	4.70	1.50	1.4
Offset disk											
10 ft	110	13,600	6.0	360	84.0	14.00	3.90	4.10	3.30	2.70	1.0
12 ft	140	14,400	7.2	432	103.0	14.30	5.00	3.60	3.50	2.20	1.0
15 ft	150	17,900	9.0	540	110.7	12.30	3.90	3.60	3.00	1.80	0.9
Strip Till											
12-row	275	30,600	17.5	1,047	199.0	11.40	3.90	3.80	2.80	0.90	0.8
16-row	325	34,500	23.3	1,396	225.7	9.70	3.30	3.20	2.50	0.70	0.7
21-row	475	54,100	30.5	1,833	287.1	9.40	2.20	3.90	2.80	0.50	0.8
24-row	530	67,000	34.9	2,095	328.1	9.40	2.00	4.20	2.70	0.50	0.8
V-Ripper (shanks only)											
6 ft	110	3,000	3.0	180	64.2	21.40	7.70	1.80	6.60	5.30	1.9
10 ft	200	4,400	5.0	300	101.0	20.20	8.20	1.60	7.20	3.20	2.1
14 ft	250	5,800	7.0	420	127.4	18.20	7.90	1.50	6.50	2.30	1.9
18 ft	325	8,600	9.0	540	165.6	18.40	8.40	1.70	6.50	1.80	1.9
22 ft	375	11,775	11.0	660	173.8	15.80	6.20	1.90	6.20	1.50	1.8

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 -----					
Mulch finisher (disk, chisel, and drag)											
13 ft	110	17,600	6.5	390	91.7	14.10	3.60	4.90	3.10	2.50	0.9
15 ft	140	19,000	7.5	450	111.8	14.90	4.80	4.60	3.40	2.10	1.0
18 ft	150	35,600	9.0	540	142.2	15.80	3.90	7.10	3.00	1.80	0.9
21 ft	200	39,600	10.5	630	163.8	15.60	3.90	6.80	3.40	1.50	1.0
24 ft	225	44,700	12.0	720	187.2	15.60	4.20	6.70	3.40	1.30	1.0
27 ft	225	51,600	13.5	810	201.2	14.90	3.80	6.90	3.00	1.20	0.9
30 ft	250	57,500	15.0	900	220.5	14.70	3.70	6.90	3.00	1.10	0.9
33 ft	250	61,400	16.5	990	227.7	13.80	3.40	6.70	2.70	1.00	0.8
39 ft	325	73,600	19.5	1,170	282.8	14.50	3.90	6.80	3.00	0.80	0.9
Field cultivator											
23 ft.	150	30,000	15.0	902	132.4	8.80	2.30	3.60	1.80	1.10	0.5
27 ft.	200	31,900	17.7	1,059	150.1	8.50	2.30	3.30	2.00	0.90	0.6
31 ft.	225	33,400	20.3	1,216	168.3	8.30	2.50	3.00	2.00	0.80	0.6
35 ft.	225	34,900	22.9	1,373	169.4	7.40	2.20	2.70	1.80	0.70	0.5
41 ft.	250	42,700	26.8	1,609	195.7	7.30	2.10	2.90	1.70	0.60	0.5
43 ft.	275	51,500	28.5	1,707	227.7	8.00	2.40	3.30	1.70	0.60	0.5
47 ft.	325	53,800	31.1	1,866	245.7	7.90	2.40	3.10	1.90	0.50	0.6
51 ft.	325	55,400	33.8	2,025	249.8	7.40	2.20	3.00	1.70	0.50	0.5
54 ft	375	57,200	35.7	2,144	253.7	7.10	1.90	2.90	1.90	0.40	0.6
60 ft	425	60,000	39.7	2,383	266.1	6.70	1.70	2.70	1.90	0.40	0.6
Tandem disk											
23 ft	140	34,800	13.9	833	138.8	10.00	2.60	4.50	1.80	1.10	0.5
26 ft	165	36,200	15.7	942	149.1	9.50	2.40	4.20	1.90	1.00	0.6
29 ft	200	43,000	17.5	1,050	169.8	9.70	2.30	4.40	2.10	0.90	0.6
32 ft.	225	44,100	19.3	1,159	185.4	9.60	2.60	4.10	2.10	0.80	0.6
Broadcast seeding											
20 ft.	75	1,500	8.0	358	53.9	6.70	2.60	0.40	1.70	2.00	0.5
Conventional planter											
6-row	95	32,000	7.6	458	111.5	14.60	2.90	7.40	2.20	2.10	0.6
8-row	110	35,000	10.2	611	122.2	12.00	2.30	6.10	2.00	1.60	0.6
12-row	140	76,600	15.3	916	212.3	13.90	2.30	8.90	1.70	1.00	0.5
16-row	150	75,237	20.4	1,222	209.7	10.30	1.70	6.50	1.30	0.80	0.4
24-row	180	130,000	30.5	1,833	320.7	10.50	1.40	7.50	1.10	0.50	0.3
32-row	200	176,400	40.7	2,444	407.3	10.00	1.00	7.70	0.90	0.40	0.3
36-row	250	196,400	45.8	2,749	462.8	10.10	1.20	7.60	1.00	0.30	0.3
Split-row planter (soybean acres only)²											
8-row split	110	25,000	10.2	305	141.5	13.90	2.30	8.00	2.00	1.60	0.6
12-row split	150	38,000	15.3	458	201.6	13.20	2.30	8.10	1.80	1.00	0.5
16-row split	165	42,000	20.4	611	219.9	10.80	1.80	6.70	1.50	0.80	0.4
No-till planter (30" rows)											
8-row	110	35,900	10.2	611	123.2	12.10	2.30	6.20	2.00	1.60	0.6
12-row	150	63,400	15.3	916	189.4	12.40	2.30	7.30	1.80	1.00	0.5
16-row	200	88,000	20.4	1,222	248.4	12.20	2.00	7.60	1.80	0.80	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		Total	Tractor = Overhead	Implement + Overhead	Fuel + & Lube	+ Labor	Fuel Use Per Acre
	HP	\$	ac/hr	ac/yr	\$/hr	----- \$ per acre -----					gal.
Grain drill											
15 ft.	95	16,400	7.0	400	86.1	12.30	3.20	4.30	2.50	2.30	0.7
25 ft.	140	21,000	11.7	666	116.7	10.00	3.10	3.30	2.20	1.40	0.6
30 ft.	165	34,900	14.0	799	147.0	10.50	2.70	4.60	2.10	1.10	0.6
35 ft.	200	52,100	16.3	933	189.5	11.60	2.50	5.90	2.20	1.00	0.6
No-till drill											
10 ft	110	28,100	7.0	400	110.6	15.80	3.30	7.40	2.80	2.30	0.8
15 ft	140	36,800	9.3	533	144.7	15.50	3.80	7.30	2.70	1.70	0.8
20 ft.	165	53,730	14.0	800	182.0	13.00	2.70	7.10	2.10	1.10	0.6
Air seeder											
28 ft.	275	73,600	14.3	814	268.0	18.80	4.70	9.50	3.50	1.10	1.0
36 ft.	275	86,200	19.3	1,105	292.1	15.10	3.50	8.20	2.60	0.80	0.8
44 ft.	325	100,000	22.4	1,279	333.8	14.90	3.40	8.20	2.60	0.70	0.8
Rotary hoe											
30 ft.	140	9,100	30.2	400	144.9	4.80	1.20	2.30	0.80	0.50	0.2
40 ft.	200	17,100	40.2	533	221.3	5.50	1.00	3.20	0.90	0.40	0.3
Row-crop cultivator (30" rows)											
8-row	140	8,600	9.1	400	96.9	10.70	3.90	2.20	2.80	1.80	0.8
12-row	150	19,500	13.6	604	123.6	9.10	2.60	3.30	2.00	1.20	0.6
16-row	200	26,000	18.1	806	153.9	8.50	2.30	3.30	2.00	0.90	0.6
Self-propelled sprayer (High-crop ready)											
90 ft boom	75	244,400	72.5	6,021	319.2	4.10		3.70	0.20	0.20	0.1
100 ft boom	75	245,900	80.6	6,690	330.5	3.80		3.40	0.20	0.20	0.1
120 ft boom	75	247,400	96.7	8,028	319.2	3.10		2.80	0.10	0.20	0.0
Self-propelled sprayer											
60 ft boom	75	96,200	48.4	4,014	154.8	3.20	0.40	2.20	0.30	0.30	0.1
Field Sprayer											
40 ft.	95	12,500	22.1	882	90.4	4.10	1.00	1.60	0.80	0.70	0.2
Anhydrous ammonia applicator											
21 ft.	140	9,000	10.2	713	94.7	9.30	3.50	1.70	2.50	1.60	0.7
32 ft.	225	24,800	15.5	1,086	156.7	10.10	3.30	3.20	2.60	1.00	0.8
42 ft.	275	25,900	20.4	1,425	183.3	9.00	3.30	2.50	2.40	0.80	0.7
52 ft.	375	40,600	25.2	1,765	232.0	9.20	2.70	3.20	2.70	0.60	0.8
62 ft.	375	50,300	30.1	2,104	252.5	8.40	2.30	3.30	2.30	0.50	0.7
Field and ditch mowing											
15 ft	140	14,800	5.8	291	110.0	18.90	6.10	5.80	4.30	2.70	1.3
20 ft.	140	21,500	7.8	388	127.2	16.40	4.60	6.40	3.30	2.10	1.0