FARM BUSINESS MANAGEMENT

Machinery Cost Estimates:
Field Operations

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MACHINERY COST ESTIMATES: FIELD OPERATIONS

September 2021

Table 1. Per Acre Field Operation Costs.

Operation	**Total** =	Tractor Overhead +	Implement Overhead +	Fuel & Lube +	Labor	Fuel Use
Primary tillage			$ per acre			gal
Chisel plow	**13.60**	6.00	4.60	2.00	1.00	0.7
Disk ripper (disk, chisel, rolling bk)	**27.70**	9.00	10.90	6.10	1.70	2.0
Combination ripper	**29.10**	9.40	11.60	6.40	1.70	2.1
Vertical tillage, rolling basket	**13.20**	4.40	6.60	1.40	0.80	0.5
Moldboard plow	**40.30**	17.40	12.50	5.70	4.70	1.9
Mulch tiller (disk, chisel)	**21.60**	10.10	5.50	3.30	2.70	1.1
Offset disk	**18.80**	8.50	5.20	2.80	2.30	0.9
Strip tillage	**17.30**	5.10	8.80	2.50	0.90	0.8
V-ripper (shanks only)	**23.40**	13.80	2.70	4.50	2.40	1.5
Secondary tillage						
Field cultivator	**11.10**	3.70	5.10	1.60	0.70	0.5
Mulch finisher (disk, chisel, drag)	**16.60**	5.50	8.30	1.80	1.00	0.6
Tandem disk	**13.70**	4.40	6.60	1.60	1.10	0.5
High performance disk	**14.30**	4.00	6.60	3.00	0.70	1.0
Planting						
Broadcast seeding	**9.10**	4.30	0.70	1.40	2.70	0.5
Conventional planter	**17.20**	4.00	10.80	1.30	1.10	0.4
Split-row planter[1]	**14.90**	4.20	8.10	1.50	1.10	0.5
No-till planter	**19.00**	4.20	12.20	1.50	1.10	0.5
Grain drill	**15.40**	4.60	7.30	1.60	1.90	0.5
No-till drill	**27.20**	7.70	13.80	2.60	3.10	0.9
Air Seeder	**18.10**	5.60	9.70	1.80	1.00	0.6
Crop care						
Rotary hoe	**6.10**	1.80	3.00	0.60	0.70	0.2
Row cultivating	**15.10**	4.70	7.60	1.60	1.20	0.5
Spraying and ammonia application						
Self-propelled	**4.50**		4.20	0.10	0.20	0.0
Pull-type	**4.60**	0.70	3.20	0.30	0.40	0.1
Anhydrous ammonia	**17.10**	5.20	9.30	1.60	1.00	0.5
Liquid Fertilizer Applicator	**7.70**	2.60	3.50	0.90	0.70	0.3
Mowing[2]	**25.10**	9.20	8.90	3.20	3.80	1.0

[1] Cost applies to soybean acres only.

[2] Mowing costs are $146.00 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 $2.75 per gallon. Lubrication cost is calculated as 10 percent of fuel cost.

Labor costs are based on a $20.00 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 -- Hour	Year	Costs per Hour	Costs per Acre: **Total** = Overhead	Tractor + Overhead	Implement + & Lube	Fuel + Labor	Fuel Use Per Acre
	HP	$	ac/hr	ac/yr	$/hr	$ per acre				gal.
Chisel plow										
21 ft	205	47,440	12.6	882	197.80	**15.70**	6.50	5.30	2.20	1.70	0.7
23 ft	225	55,661	13.8	966	216.70	**15.70**	6.20	5.70	2.20	1.60	0.7
27 ft.	260	60,028	16.2	1,134	256.00	**15.80**	7.10	5.20	2.10	1.40	0.7
30 ft.	285	64,097	18.0	1,260	268.20	**14.90**	6.60	5.00	2.10	1.20	0.7
35 ft.	310	68,114	21.0	1,470	285.60	**13.60**	6.00	4.60	2.00	1.00	0.7
40 ft.	390	70,247	24.0	1,680	292.80	**12.20**	5.00	4.10	2.20	0.90	0.7
44 ft.	440	97,103	26.4	1,848	343.20	**13.00**	4.80	5.20	2.20	0.80	0.7
47 ft.	440	102,022	28.2	1,974	352.50	**12.50**	4.50	5.10	2.10	0.80	0.7
55 ft.	490	109,879	33.0	2,310	382.80	**11.60**	4.20	4.70	2.00	0.70	0.7
61 ft.	590	119,126	36.6	2,562	420.90	**11.50**	4.20	4.60	2.10	0.60	0.7
Disk Ripper (disk, chisel, rolling basket)										
12 ft	205	50,388	7.2	504	218.20	**30.30**	11.40	9.90	5.90	3.10	1.9
17 Ft	310	64,314	10.2	714	304.00	**29.80**	12.40	8.90	6.30	2.20	2.1
22 Ft	390	101,293	13.2	924	365.60	**27.70**	9.00	10.90	6.10	1.70	2.0
27 Ft	490	117,511	16.2	1,134	409.90	**25.30**	7.30	10.30	6.30	1.40	2.1
Combination Ripper (disk, disk, ripper, closing disk, rolling basket)										
14 ft	310	79,201	9.8	686	323.40	**33.00**	12.90	11.40	6.50	2.20	2.1
18 ft	390	95,790	12.6	882	356.60	**28.30**	9.40	10.80	6.40	1.70	2.1
18 ft	390	103,355	12.6	882	366.70	**29.10**	9.40	11.60	6.40	1.70	2.1
22 ft	490	130,703	15.4	1,078	426.60	**27.70**	7.70	12.00	6.60	1.40	2.2
24 ft	590	152,905	16.8	1,176	480.50	**28.60**	7.10	12.90	7.30	1.30	2.4
Vertical tillage, rolling basket										
25 ft 5 in	260	105,127	22.9	1,601	320.30	**14.00**	5.00	6.50	1.50	1.00	0.5
30 ft 3 in	285	126,362	27.2	1,906	359.40	**13.20**	4.40	6.60	1.40	0.80	0.5
33 ft 10 in	390	140,288	30.4	2,131	389.70	**12.80**	3.90	6.50	1.70	0.70	0.6
43 ft 6 in	440	177,139	39.2	2,741	462.00	**11.80**	3.30	6.40	1.50	0.60	0.5
49 ft 6 in	590	209,281	44.6	3,119	552.40	**12.40**	3.50	6.60	1.80	0.50	0.6
Moldboard plow										
6 bottom	175	50,306	4.1	486	155.90	**38.50**	14.70	12.70	5.70	5.40	1.9
7 bottom	205	57,753	4.7	567	190.40	**40.30**	17.40	12.50	5.70	4.70	1.9
9 bottom	260	80,584	6.1	729	253.90	**41.80**	18.90	13.60	5.70	3.60	1.9
10 bottom	285	89,350	6.8	810	270.00	**40.00**	17.60	13.50	5.60	3.30	1.8
Mulch tiller (disk, chisel shanks)										
11 ft. 3 in.	140	22,528	5.6	394	126.60	**22.50**	9.60	5.70	3.30	3.90	1.1
13 ft. 9 in.	175	27,915	6.9	481	144.40	**21.00**	8.70	5.70	3.40	3.20	1.1
16 ft. 3 in.	205	31,419	8.1	569	175.50	**21.60**	10.10	5.50	3.30	2.70	1.1
18 ft. 9 in.	240	47,208	9.4	656	209.10	**22.30**	9.50	7.10	3.40	2.30	1.1
21 ft 3 in.	260	49,509	10.6	744	241.20	**22.70**	10.80	6.60	3.20	2.10	1.0
Offset disk										
10 ft.	120	30,634	6.0	420	130.20	**21.70**	8.20	7.20	2.60	3.70	0.9
14 ft..	155	33,656	8.4	588	147.00	**17.50**	6.80	5.70	2.40	2.60	0.8
16 ft.	205	35,609	9.6	672	180.50	**18.80**	8.50	5.20	2.80	2.30	0.9

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

Implement/size	Tractor HP	List Price	-- Acres per -- Hour	Year	Costs per Hour	Costs per Acre **Total**	Tractor = Overhead	Implement + Overhead	Fuel + & Lube	+ Labor	Fuel Use Per Acre
	HP	$	ac/hr	ac/yr	$/hr	$ per acre					gal.
Strip Till											
12-row	285	88,842	17.5	1,222	342.10	**19.60**	6.80	9.30	2.20	1.30	0.7
16-row	440	111,597	23.3	1,629	402.60	**17.30**	5.10	8.80	2.50	0.90	0.8
24-row	640	147,500	34.9	2,444	495.70	**14.20**	3.40	7.80	2.40	0.60	0.8
V-Ripper (shanks only)											
10 ft 6 in	175	7,607	5.3	368	115.50	**22.00**	11.40	2.00	4.40	4.20	1.4
14 ft 7 in	240	9,100	7.3	510	156.00	**21.40**	12.20	1.80	4.40	3.00	1.4
15 ft	260	14,286	7.5	525	191.30	**25.50**	15.30	2.70	4.60	2.90	1.5
18 ft 4 in	310	17,279	9.2	642	214.50	**23.40**	13.80	2.70	4.50	2.40	1.5
21 ft 8 in	440	20,932	10.8	758	228.60	**21.10**	11.00	2.70	5.40	2.00	1.8
Mulch finisher (disk, chisel, and drag)											
21 ft 9"	225	77,479	13.1	914	246.60	**18.90**	6.50	8.40	2.30	1.70	0.8
24 ft 9"	240	86,630	14.9	1,040	265.80	**17.90**	6.00	8.30	2.10	1.50	0.7
27 ft 9"	260	99,319	16.7	1,166	311.40	**18.70**	6.90	8.40	2.10	1.30	0.7
30 ft 9"	285	111,338	18.5	1,292	335.80	**18.20**	6.50	8.50	2.00	1.20	0.7
33 ft 9"	285	117,559	20.3	1,418	346.30	**17.10**	5.90	8.20	1.90	1.10	0.6
38 ft 3"	310	135,118	23.0	1,607	381.00	**16.60**	5.50	8.30	1.80	1.00	0.6
44 ft 3"	390	159,975	26.6	1,859	416.80	**15.70**	4.50	8.50	1.90	0.80	0.6
50 ft 3"	490	178,752	30.2	2,111	458.30	**15.20**	3.90	8.40	2.20	0.70	0.7
56 ft 3"	590	191,146	33.8	2,363	489.40	**14.50**	3.50	8.00	2.30	0.70	0.8
Field cultivator											
29 ft. 6 in.	240	71,109	19.3	1,350	241.10	**12.50**	4.60	5.20	1.60	1.10	0.5
31 ft. 6 in,	240	72,129	20.6	1,442	245.10	**11.90**	4.30	5.00	1.50	1.10	0.5
35 ft. 6 in.	285	75,342	23.2	1,625	283.20	**12.20**	5.10	4.60	1.60	0.90	0.5
40 ft. 6 in.	310	104,462	26.5	1,854	339.00	**12.80**	4.80	5.60	1.60	0.80	0.5
44 ft. 6 in.	310	108,954	29.1	2,037	343.40	**11.80**	4.30	5.30	1.40	0.80	0.5
48 ft. 6 in.	390	115,953	32.1	2,247	356.30	**11.10**	3.70	5.10	1.60	0.70	0.5
52 ft. 6 in.	390	120,215	34.7	2,432	361.40	**10.40**	3.40	4.90	1.50	0.60	0.5
56 ft. 6 in.	440	126,544	37.4	2,617	381.40	**10.20**	3.20	4.80	1.60	0.60	0.5
60 ft. 6 in.	490	128,670	40.0	2,803	384.40	**9.60**	3.00	4.50	1.60	0.50	0.5
64 ft. 6 in.	590	148,987	42.7	2,988	426.90	**10.00**	2.80	4.90	1.80	0.50	0.6

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

Implement/size	Tractor HP	List Price	-- Acres per -- Hour	Year	Costs per Hour	---------- Costs per Acre ---------- **Total** = Tractor Overhead	Implement + Overhead	Fuel + & Lube	+ Labor	Fuel Use Per Acre
	HP	$	ac/hr	ac/yr	$/hr	---------- $ per acre ----------				gal.
Tandem disk										
23 ft. 7 in.	175	69,131	14.2	996	202.10	**14.20**	4.20	6.90	1.60	1.50	0.5
26 ft. 5 in.	205	76,591	15.9	1116	239.20	**15.00**	5.10	6.80	1.70	1.40	0.6
29 ft. 3 in.	225	82,300	17.7	1236	252.50	**14.30**	4.80	6.60	1.70	1.20	0.6
33 ft. 7 in.	240	94,099	20.3	1419	277.70	**13.70**	4.40	6.60	1.60	1.10	0.5
40 ft. 8 in.	285	122,945	24.5	1718	353.50	**14.40**	4.90	7.10	1.50	0.90	0.5
44 ft. 11 in.	310	151,283	27.2	1901	402.00	**14.80**	4.60	7.90	1.50	0.80	0.5
High Performance Disk										
17 ft 7 in.	260	93,275	17.6	1231	323.50	**18.40**	6.50	7.50	3.10	1.30	1.0
24 ft 4 in.	310	100,173	24.3	1703	352.80	**14.50**	5.20	5.80	2.60	0.90	0.9
30 ft	440	139,844	30.0	2100	429.00	**14.30**	4.00	6.60	3.00	0.70	1.0
35 ft	490	154,216	35.0	2450	458.50	**13.10**	3.40	6.20	2.90	0.60	0.9
40 ft	590	165,714	40.0	2800	500.00	**12.50**	3.00	5.90	3.00	0.60	1.0
Broadcast seeding										
20 ft.	85	2,839	8.0	358	73.20	**9.10**	4.30	0.70	1.40	2.70	0.5
Conventional planter										
6-row	120	45,133	7.6	535	150.40	**19.70**	6.40	8.30	2.10	2.90	0.7
8-row	140	60,261	10.2	713	179.20	**17.60**	5.30	8.30	1.80	2.20	0.6
12-row	175	123,718	15.3	1069	276.40	**18.10**	3.90	11.30	1.50	1.40	0.5
16-row	205	157,182	20.4	1425	350.30	**17.20**	4.00	10.80	1.30	1.10	0.4
24-row	240	240,945	30.5	2138	479.60	**15.70**	2.90	11.10	1.00	0.70	0.3
32-row	260	430,825	40.7	2851	769.70	**18.90**	2.80	14.80	0.80	0.50	0.3
36-row	310	463,887	45.8	3207	843.10	**18.40**	2.80	14.20	0.90	0.50	0.3
Split-row planter (soybean acres only)[2]										
12-row split	205	52,578	15.3	535	261.20	**17.10**	5.40	8.50	1.80	1.40	0.6
16-row split	225	67,125	20.4	713	303.40	**14.90**	4.20	8.10	1.50	1.10	0.5
No-till planter (30" rows)										
8-row	140	70,181	10.2	713	193.50	**19.00**	5.30	9.70	1.80	2.20	0.6
12-row	175	138,598	15.3	1069	297.80	**19.50**	3.90	12.70	1.50	1.40	0.5
16-row	225	177,022	20.4	1425	386.90	**19.00**	4.20	12.20	1.50	1.10	0.5
24-row	260	270,705	30.5	2138	549.80	**18.00**	3.80	12.40	1.10	0.70	0.4
Grain drill										
13 ft.	110	20,784	6.1	346	117.10	**19.30**	7.70	5.60	2.40	3.60	0.8
25 ft.	140	52,698	11.7	666	179.70	**15.40**	4.60	7.30	1.60	1.90	0.5
30 ft.	175	66,977	14.0	799	215.60	**15.40**	4.30	7.80	1.70	1.60	0.6
35 ft.	225	79,790	16.3	933	264.60	**16.20**	5.20	7.90	1.80	1.30	0.6
No-till drill										
10 ft	110	51,760	4.7	267	167.50	**35.90**	10.10	18.00	3.10	4.70	1.0
15 ft	140	59,666	7.0	400	190.40	**27.20**	7.70	13.80	2.60	3.10	0.9
20 ft.	175	87,974	9.3	533	248.30	**26.60**	6.40	15.30	2.50	2.40	0.8

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

Implement/size	Tractor HP	List Price	-- Acres per -- Hour	Year	Costs per Hour	Costs per Acre: **Total** = Tractor Overhead	Implement + Overhead	Fuel + & Lube	+ Labor	Fuel Use Per Acre
	HP	$	ac/hr	ac/yr	$/hr	$ per acre				gal.
Air seeder										
28 ft.	285	79,121	14.3	814	306.50	**21.50**	8.40	9.00	2.60	1.50	0.9
36 ft.	285	107,401	18.3	1,046	353.70	**19.30**	6.50	9.50	2.10	1.20	0.7
44 ft.	310	133,287	22.4	1,279	405.40	**18.10**	5.60	9.70	1.80	1.00	0.6
Rotary hoe										
30 ft.	140	13,415	30.2	400	184.10	**6.10**	1.80	3.00	0.60	0.70	0.2
41 ft.	225	24,230	41.2	547	301.10	**7.30**	2.10	4.00	0.70	0.50	0.2
Row-crop cultivator (30" rows)										
8-row	140	29,153	9.1	400	153.90	**17.00**	5.90	6.70	2.00	2.40	0.7
12-row	155	52,177	13.6	604	206.40	**15.20**	4.20	7.90	1.50	1.60	0.5
16-row	225	66,771	18.1	806	273.40	**15.10**	4.70	7.60	1.60	1.20	0.5
Self-propelled sprayer (High-crop ready)										
80 ft boom	85	283,409	64.5	5,352	335.30	**5.20**	0.50	4.20	0.20	0.30	0.1
90 ft boom	85	413,029	72.5	6,021	464.30	**6.40**	0.50	5.40	0.20	0.30	0.1
100 ft boom	85	415,613	80.6	6,690	459.50	**5.70**	0.40	4.90	0.10	0.30	0.0
Self-propelled sprayer										
120 ft boom	85	426,590	96.7	8,028	474.00	**4.50**		4.20	0.10	0.20	0.0
Field Sprayer										
90 ft.	95	61,776	49.6	1,985	228.30	**4.60**	0.70	3.20	0.30	0.40	0.1
Anhydrous ammonia applicator										
27 ft. 6 in.	175	79,373	13.3	933	250.70	**18.80**	4.50	10.90	1.70	1.70	0.6
37 ft. 6 in.	240	99,663	18.2	1,273	325.50	**17.90**	4.90	10.10	1.70	1.20	0.6
47 ft. 6 in.	285	117,251	23.0	1,612	393.80	**17.10**	5.20	9.30	1.60	1.00	0.5
52 ft. 6 in.	390	122,291	25.5	1,782	417.50	**16.40**	4.70	8.80	2.00	0.90	0.7
62 ft. 6 in.	490	135,218	30.3	2,121	451.50	**14.90**	3.90	8.20	2.10	0.70	0.7
Liquid Fertilizer Applicator										
40 ft.	205	59,899	31.0	2,172	238.90	**7.70**	2.60	3.50	0.90	0.70	0.3
60 ft.	260	82,536	46.5	3,258	325.80	**7.00**	2.50	3.30	0.70	0.50	0.2
Field and ditch mowing										
15 ft	140	24,329	5.8	291	146.00	**25.10**	9.20	8.90	3.20	3.80	1.0
20 ft.	140	31,339	7.8	388	160.60	**20.70**	6.90	8.60	2.40	2.80	0.8