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Power and Equipment Costs in the Brown Loam Area of Mississippi

By

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POWER AND EQUIPMENT COSTS IN THE BROWN LOAM AREA OF MISSISSIPPI

Thomas E. Tramel and James T. Long

INTRODUCTION

As power and equipment are substituted for labor, the cost of these items form a larger and larger part of farm expenses. Thus power and equipment costs are becoming more and more important considerations in planning the most profitable organization of

Mississippi farms. This study was made for the purpose of determining the costs incurred by farmers in the Brown Loam Area of Mississippi in the operation of the major items of farm power and equipment.

METHOD OF STUDY

Three counties — one in the Northern, one in the Central, and one in the Southern part of the area — were selected as representative of the Brown Loam Area. Each of the three counties was then divided into sub-areas and approximately one-third of the sub-areas selected as "study areas." All farmers within each of the "study areas" who used tractors and related equipment were interviewed. Information relative to costs associated with power and equipment and amount of annual use was obtained from 212 farmers in the three counties.

In addition to information obtained from farmers, certain information from the *Agricultural Engineers' Handbook*¹ was used in calculating power and equipment costs. This book reports the averaged hours required for the different items of power and equipment to "wear out" as well as the

number of years for the different items of power and equipment to become obsolete if not worn out. These data were used in calculating depreciation as indicated below.

Depreciation: In calculating depreciation, the average amount of annual use by farmers in the area was calculated. The number of years required to wear out the item of power and equipment with this amount of annual use was then determined. Years of useful life of specific equipment were assumed to be the lesser of either the calculated number of years the equipment would last with average use or the number of years required for obsolescence. Due to the small size of most of the farms in the Brown Loam Area, and the resulting low level of annual use, the number of years for obsolescence was used in most instances. The cost of replacing the item of power or equipment at 1962 prices was depreciated over the number of years involved.

Interest on investment: Through-

¹Richey, C. B., *Agricultural Engineers' Handbook*, McGraw-Hill Book Company, Inc., New York, 1961.

out the life of an item of power or equipment, the average investment in the item is about one-half the original cost. For purposes of this study interest on investment was calculated at six percent on one-half the cost of replacing the item at 1962 prices.

Repairs: Costs of minor repairs were considered as an annual expense. Major overhauls, tires, and batteries were estimated to last longer than a year. (See Appendix Table 3). The costs of these three items were prorated over their estimated life spans. In all cases repair costs are based on costs re-

ported by the farmers interviewed.

Fuel: Since fuel costs depend upon the implement being used with the tractor, tractor fuel costs were estimated separately for the different items of equipment. Farmer estimates were used in determining the amount of fuel required when using the different items of equipment.

Performance rates: In determining power and equipment costs per acre, the time required to cover an acre must be known. Performance rates are based upon estimates provided by the farmers interviewed.

REPORTED COSTS

Power and equipment costs calculated in the manner indicated above are reported in the tables below. Tractor costs are presented in Table 1, equipment costs in Table 2, fuel costs in Table 3, total costs per acre for the tractor, fuel, and equipment in Table 4 and truck costs in Table 5. These costs are

based on the actual use made of the items of power and equipment. Since for most items "years required for obsolescence" rather than "hours required to wear out" was used in calculating depreciation, fixed costs could be reduced by more intensive use.

Table 1. Tractor costs excluding fuel, Brown Loam Area, Mississippi, 1962.

Item	Size		
	1-row	2-row	4-row
Annual fixed cost:			
Depreciation	\$136.67	\$200.13	\$295.00
Interest	61.50	90.06	106.20
Total	\$198.17	\$290.19	\$401.20
Annual variable cost:			
Repairs	\$ 70.10	\$109.34	\$210.03
Tires	17.96	35.12	61.35
Lubricants	12.76	25.33	26.82
Total	\$100.82	\$169.79	\$298.20
Total annual cost	\$298.99	\$459.98	\$699.40
Annual use (hrs.)	489	762	936
Fixed cost per hr.	\$.41	\$.38	\$.43
Variable cost per hr.	.21	.22	.32
Total cost per hr.	\$.62	\$.60	\$.75

Table 2a. Equipment costs, Brown Loam Area, Mississippi, 1962.

Item	Ammonia applicator 2-row ^a		Breaking plow		Implement			
			1-row	2-row	Combine		Corn-Picker	
	1-row	2-row	1-row	2-row	Pull type	Self-propelled	1-row	2-row
Annual fixed cost:								
Depreciation	\$ 70.00 ^b	\$ 17.13	\$ 11.67	\$ 19.47	\$ 217.90	\$ 612.50	\$ 115.40	\$ 321.88
Interest	21.00	7.71	5.25	8.76	65.37	183.75	34.62	77.25
Total	\$ 91.00	\$ 24.84	\$ 16.92	\$ 28.23	\$ 283.27	\$ 796.25	\$ 150.02	\$ 399.13
Annual variable cost:								
Repairs	\$ 30.60	\$ 8.40	\$ 2.75	\$ 43.33	\$ 60.77	\$ 223.09 ^c	\$ 49.62	\$ 80.83
Grease	2.40	1.42	.91	4.32	6.41	9.00	3.91	7.44
Total	\$ 33.00	\$ 9.82	\$ 3.66	\$ 47.65	\$ 67.18	\$ 232.09	\$ 53.53	\$ 88.27
Annual use (hrs.)	55	58	92	85	75	74	87	186
Annual use (acres)	175	58	46	127	75	177	61	186
Acres per hour	3.2	1.0	.5	1.5	1.0	2.4	.7	1.0
Fixed cost per hr.	\$ 1.65	\$.43	\$.18	\$.33	\$ 3.78	\$ 10.76	\$ 1.72	\$ 2.15
Variable cost per hr.	.60	.17	.04	.56	.90	3.14	.62	.47
Total cost per hr.	\$ 2.25	\$.60	\$.22	\$.89	\$ 4.68	\$ 13.90	\$ 2.34	\$ 2.62
Fixed cost per acre	\$.52	\$.43	\$.37	\$.22	\$ 3.78	\$ 4.50	\$ 2.46	\$ 2.15
Variable cost per acre	.19	.17	.08	.38	.90	1.31	.88	.47
Total cost per acre	\$.71	\$.60	\$.45	\$.60	\$ 4.68	\$ 5.81	\$ 3.34	\$ 2.62

Table 2b. Equipment costs. Brown Loam Area, Mississippi, 1962.

Item	Implement							
	Cotton picker		Culti-packer		Cultivator		Disc	
	1-row	2-row	1-row	2-row	1-row	2-row	1-row	2-row
Annual fixed cost:								
Depreciation	\$1000.00	\$ 12.80	\$ 14.58	\$ 22.17	\$ 13.00	\$ 19.75	\$ 54.88	
Interest	300.00	7.68	5.25	7.98	7.80	11.85	26.34	
Total	\$1300.00	\$ 20.48	\$ 19.83	\$ 30.15	\$ 20.80	\$ 31.60	\$ 81.22	
Annual variable cost:								
Repairs	\$ 362.50	\$ 5.23	\$ 4.50	\$ 13.19	\$ 3.33	\$ 17.15	\$ 63.33	
Grease	17.04	1.32	1.20	1.70	1.87	5.11	6.84	
Total	\$ 379.54	\$ 6.55	\$ 5.70	\$ 14.89	\$ 5.20	\$ 22.23	\$ 70.17	
Annual use (hrs.)	207	39	169	158	58	53	124	
Annual use (acres)	124	112	135	301	46	84	347	
Acres per hour	.6	2.9	.8	1.9	.8	1.6	2.8	
Fixed cost per hr.	\$ 6.28	\$.53	\$.12	\$.19	\$.36	\$.60	\$.66	
Variable cost per hr.	1.83	.17	.03	.09	.23	.42	.57	
Total cost per hr.	\$ 8.11	\$.70	\$.15	\$.28	\$.45	\$ 1.02	\$ 1.23	
Fixed cost per acre	\$ 10.48	\$.18	\$.15	\$.10	\$.45	\$.38	\$.23	
Variable cost per acre	3.06	.06	.04	.05	.11	.26	.20	
Total cost per acre	\$ 13.54	\$.24	\$.19	\$.15	\$.56	\$.64	\$.43	

Table 2c. Equipment costs, Brown Loam Area, Mississippi, 1962.

Item	Implement							
	Flame cultivator 4-row	Forage harvester	Front end loaders	Grain drill	Harrow			Hay baler
					1-row	2-row	4-row	
Annual fixed cost:								
Depreciation	\$ 55.00	\$158.33	\$ 17.93	\$ 26.45	\$ 6.50	\$ 7.10	\$ 12.70	\$187.92
Interest	16.50	57.00	8.07	15.87	3.90	4.26	7.62	67.65
Total	\$ 71.50	\$215.33	\$ 26.00	\$ 42.32	\$ 10.40	\$ 11.36	\$ 20.32	\$255.57
Annual variable cost:								
Repairs	\$ 10.00	\$ 3.00	\$ 3.34	\$ 17.56	\$ 1.00	\$ 1.93	\$ 14.29	\$ 75.16
Grease	XX	4.63	2.40	2.30	XX	XX	XX	5.76
Total	\$ 10.00	\$ 7.63	\$ 5.74	\$ 19.86	\$ 1.00	\$ 1.93	\$ 14.29	\$ 80.92
Annual use (hrs.)	90	72	60	40	38	31	63	95
Annual use (acres)	225	36	XX	103	76	100	295	124
Acres per hour	2.5	.5	XX	2.6	2.0	3.2	4.7	1.3
Fixed cost per hr.	\$.79	\$ 2.99	\$.43	\$ 1.06	\$.27	\$.37	\$.32	\$ 2.69
Variable cost per hr.	.11	.11	.10	.50	.03	.06	.23	.85
Total cost per hr.	\$.90	\$ 3.10	\$.53	\$ 1.56	\$.30	\$.43	\$.55	\$ 3.54
Fixed cost per acre	\$.32	\$ 5.98	XX	\$.41	\$.15	\$.11	\$.07	\$ 2.06
Variable cost per acre	.04	.21	XX	.19	.01	.02	.05	.65
Total cost per acre	\$.36	\$ 6.19	XX	\$.60	\$.16	\$.13	\$.12	\$ 2.71

Table 2d. Equipment costs, Brown Loam Area, Mississippi, 1962.

Item	Highboy 6- row	Implement			Planter		Post emerge shoe 2-row
		Middle breaker, 2-row	Mower		1-row	2-row	
		Rotary	Sickle	1-row	2-row	4-row	
Annual fixed cost:							
Depreciation	\$ 176.70	\$ 36.08	\$ 28.42	\$ 8.35	\$ 14.10	\$ 53.81	\$ 9.20
Interest	53.01	12.99	10.23	5.01	8.46	25.83	2.76
Total	\$ 229.71	\$ 49.07	\$ 38.65	\$ 13.36	\$ 22.56	\$ 79.64	\$ 11.96
Annual variable cost:							
Repairs	\$ 54.82 ^c	\$ 20.98	\$ 29.13	\$ 10.00	\$ 13.49	\$ 26.67	\$ 8.25
Grease	7.20	4.06	2.98	1.39	1.85	3.24	XX
Total	\$ 62.02	\$ 25.04	\$ 32.11	\$ 11.39	\$ 15.34	\$ 29.91	\$ 8.25
Annual use (hrs)	77	111	53	50	39	75	44
Annual Use (acres)	345	256	106	35	71	300	88
Acres per hour	4.5	2.3	2.0	.7	1.8	4.0	2.0
Fixed cost per hr.	\$ 2.98	\$.44	\$.73	\$.27	\$.58	\$ 1.06	\$.27
Variable cost per hr.	.81	.23	.61	.23	.39	.40	.19
Total cost per hr.	\$ 3.79	\$.67	\$ 1.34	\$.50	\$.97	\$ 1.46	\$.46
Fixed cost per acre	\$.67	\$.19	\$.36	\$.38	\$.32	\$.27	\$.14
Variable cost per acre	.18	.10	.30	.33	.22	.10	.09
Total cost per acre	\$.85	\$.29	\$.66	\$.71	\$.54	\$.37	\$.23

Table 2e. Equipment costs, Brown Loam Area, Mississippi, 1962.

Item	Implement					
	Rake, side delivery	Rotary- hoe, 2-row	Sprayer, 6-row	Stalk shredder 2-row	Sub- soiler, 1- chisel	Trailer
					2-w	4-w
Annual fixed cost:						
Depreciation	\$ 30.47	\$ 15.40	\$ 24.00	\$ 35.90	\$ 9.47	\$ 7.13
Interest	13.71	6.93	7.20	10.77	4.26	3.21
Total	\$ 44.18	\$ 22.33	\$ 31.20	\$ 46.67	\$ 13.73	\$ 10.34
Annual variable cost:						
Repairs	\$ 32.27	\$ 4.88	\$ 14.44	\$ 15.85	\$ XX	\$ 5.67
Grease	2.23	.94	1.22	2.98	XX	.62
Total	\$ 34.50	\$ 5.82	\$ 15.66	\$ 18.83	\$ XX	\$ 6.29
Annual use (hrs.)	42	32	93	81	28	100
Annual use (acres)	127	93	417	170	33	XX
Acres per hour	3.0	2.9	4.5	2.1	1.2	XX
Fixed cost per hr.	\$ 1.05	\$.70	\$.34	\$.58	\$.49	\$.10
Variable cost per hr.	.82	.18	.17	.23	XX	.06
Total cost per hr.	\$ 1.87	\$.88	\$.51	\$.81	\$.49	\$.16
Fixed cost per acre	\$.35	\$.24	\$.07	\$.27	\$.42	\$ XX
Variable cost per acre	.27	.06	.04	.11	XX	XX
Total cost per acre	\$.62	\$.30	\$.11	\$.38	\$.42	\$ XX

^aDoes not include cost of chemical to be applied.

^bDoes not include depreciation for ammonia storage tank.

^cIncludes charges for maintenance of power plant.

Table 3. Fuel cost per hour for operating one-, two-, and four-row tractors with specified farm equipment, Brown Loam Area, Mississippi, 1962.^A

Item	Tractor size		
	One-row	Two-row	Four-row
Ammonia applicator	--	.53	--
Breaking plow	.34	.53	.87
Combine (pull type)	--	.64	--
Corn picker	.66	.74	--
Cotton picker ^B	--	.58	--
Cultipacker	--	.40	--
Cultivator	.32	.45	.85
Disc	.32	.50	.98
Flame cultivator ^C	--	--	.53
Forage harvester	--	.66	--
Front-end loader	--	.40	--
Grain drill	--	.48	--
Harrow	.27	.40	.53
Hay baler	--	.58	--
Middle breaker	--	.48	--
Mower (rotary)	--	.42	--
Mower (sickle)	--	.40	--
Planter	.24	.37	.64
Post emerge shoe	--	.40	--
Rake (side delivery)	--	.40	--
Rotary hoe	--	.37	--
Spray equipment ^D	--	.37	--
Stalk shredder	--	.42	--
Subsoiler (1-chisel)	--	.69	--
Trailer (2-w)	--	.32	--
Trailer (4-w)	--	.40	--
Other ^E	--	--	--

^AFuel costs @ \$.265 per gal.

^BOne-row, mounted.

^CFuel for power only.

^D6-row capacity.

^ESelf-propelled combine, \$.78 per hour. Fuel for flame computed @ 3.0 gals. per hr. @ \$.125 per gal. Highboy spray-rig, \$.37 per hour.

Table 4. Tractor, fuel, and implement cost per acre, Brown Loam Area, Mississippi, 1962.^A

Item	Cost			Total
	Implement	Tractor	Fuel	
Ammonia applicator (2-r)	.71	.19	.17	1.07
Breaking plow (1-r)	.45	1.24	.68	2.37
Breaking plow (2-r)	.60	.60	.53	1.73
Breaking plow (4-r)	.60	.50	.58	1.68
Combine (pull-type)	4.68	.60	.64	5.92
Combine (self-propelled)	5.81	- -	.32	6.13
Cornpicker (1-r)	3.34	.86	.94	5.14
Cornpicker (2-r)	2.62	.60	.74	3.96
Cottonpicker (1-r)	13.54	1.00	.97	15.51
Cultipacker (2-r)	.24	.21	.13	.58
Cultivator (1-r)	.19	.78	.40	1.37
Cultivator (2-r)	.15	.32	.24	.71
Cultivator (4-r)	.16	.18	.20	.54
Disc (1-r)	.56	.78	.40	1.74
Disc (2-r)	.64	.38	.31	1.33
Disc (4-r)	.43	.27	.35	1.05
Flame cultivator (4-r)	.36	.30	.36 ^B	1.02
Forage harvester	6.19	1.20	1.32	8.71
Grain drill	.60	.23	.18	1.01
Harrow (1-r)	.15	.31	.14	.60
Harrow (2-r)	.13	.19	.12	.44
Harrow (4-r)	.12	.13	.11	.36
Hay baler	2.71	.46	.45	3.62
Highboy	.85	- -	.08	.93
Middlebreaker (2-r)	.50	.35	.28	1.13
Mower (rotary)	.29	.26	.18	.73
Mower (sickle)	.66	.30	.20	1.16
Planter (1-r)	.71	.89	.34	1.94
Planter (2-r)	.54	.33	.21	1.08
Planter (4-r)	.37	.19	.16	.72
Post emerge shoe (2-r)	.23	.30	.20	.73
Rake (side delivery)	.62	.20	.13	.95
Rotary-hoe (2-r)	.30	.21	.13	.64
Sprayer (6-r)	.11	.13	.08	.32
Stalk shredder (2-r)	.38	.29	.20	.87
Subsoiler (1-chisel)	.42	.50	.58	1.50

^ATractor and fuel costs calculated on the basis of the size tractor usually used with each item of equipment.

^BIncludes fuel for flame at \$.15 per acre.

Table 5. Truck costs, Brown Loam Area, Mississippi, 1962.

Item	Size	
	Light ^A	Heavy ^B
Annual fixed cost:		
Depreciation	\$206.20	\$241.17
Interest	61.86	86.82
Total	\$268.06	\$327.99
Annual variable cost:		
Repairs	\$ 98.65	\$121.95
Lubricants	27.91	24.56
Fuel	183.86	171.97
Tires	50.34	90.54
Miscellaneous ^C	73.65	122.44
Total	\$434.41	\$531.46
Total annual cost	\$702.47	\$859.45
Annual use (miles)	9,316	6,697
Fixed cost per mile	\$.03	\$.05
Variable cost per mile	.05	.08
Total cost per mile	\$.08	\$.13

^A1/2- and 3/4-ton pickups.

^BMostly 2-ton capacity but includes approximately equal numbers of 1 1/2- and 2 1/2-ton capacity.

^CIncludes insurance, taxes, and licenses.

Appendix Table 1. Miscellaneous information relative to power and equipment cost, Brown Loam Area, Mississippi, 1962.

Item	Replacement cost	Hrs. to wear out	Yrs. to obsolescence	Annual use	
				Acres	Hrs.
Tractor (1-r)	\$ 2,050	12,000	15	--	481
Tractor (2-r)	3,002	12,000	15	--	762
Tractor (4-r)	3,540	12,000	15	--	936
Truck (light) ^A	2,062	100,000 miles	12	--	9,316 miles
Truck (heavy) ^B	2,894	100,000 miles	12	--	6,697 miles
Ammonia applicator (2-r)	700	1,500	10	175	55
Ammonia tank (1000 gal.)	750	--	10	--	--
Breaking plow (1-r)	175	2,000	15	46	92
Breaking plow (2-r)	257	2,000	15	58	58
Breaking plow (4-r)	292	2,000	15	127	85
Combine (pull-type)	2,179	2,000	10	75	75
Combine (self-propelled)	6,125	2,000	10	177	74
Corn picker (1-r)	1,154	1,500	10	61	87
Corn picker (2-r)	2,575	1,500	10	186	186
Cotton picker (1-r mounted)	10,000	2,000	10	186	186
Cultivator (2-r)	256	1,500	20	112	39
Cultivator (1-r)	175	2,500	12	135	169
Cultivator (2-r)	266	2,500	12	301	158
Cultivator (4-r)	956	2,500	12	1,350	321
Disc (1-r)	260	2,000	20	46	58
Disc (2-r)	395	2,000	20	84	53
Disc (4-r)	878	2,000	20	347	124
Flame cultivator (4-r)	550	1,500	10	225	90
Forage harvester	1,900	2,000	12	36	72
Front-end loader	269	2,000	15	--	60
Grain drill (2-r)	529	1,200	20	103	40
Harrow (1-r)	130	2,500	20	76	38
Harrow (2-r)	142	2,500	20	100	32
Harrow (4-r)	254	2,500	20	295	63
Hay baler (pull-type)	2,255	2,500	12	124	95
High-boy (6-r)	1,767	1,500	10	345	77
Middlebreaker (2-r)	267	2,000	15	65	38
Mower (rotary)	433	2,000	12	256	111
Mower (sickle)	341	2,000	12	106	53
Planter (1-r)	167	1,200	20	35	50
Planter (2-r)	282	1,200	20	71	39
Planter (4-r)	861	1,200	20	300	75
Post emerge shoe (2-r)	92	800	10	88	44
Rake (side delivery)	457	1,500	15	127	42
Rotary hoe (2-r)	231	1,500	15	93	32
Spray equip. (6-r)	240	1,500	10	417	93
Stalk shredder (2-r)	359	2,500	10	170	81
Subsoiler (1-chisel)	142	1,500	15	33	28
Trailer (2-w)	107	5,000	15	--	100
Trailer (4-w)	314	5,000	15	--	160

^A1/2- and 3/4-ton pickups.

^BMostly 2-ton capacity but includes approximately equal numbers of 1 1/2- and 2 1/2-ton capacity.

Appendix Table 2. Costs for fuel and maintenance items, Brown Loam Area, Mississippi, 1962.^a

Item	Unit	Implement				
		Truck		Tractor		
		Light	Heavy	1-row	2-row	4-row
Oil filter	each	\$ 1.85	\$ 1.72	\$ 1.72	\$ 1.46	\$ 1.27
Batteries ^b	each	18.79	17.09	15.71	16.50	21.73
Tires (front) ^c	each	21.39	55.12	15.50	19.26	22.22
Tires (rear) ^c	each	27.50	62.98	57.50	78.36	96.66
Major overhaul	each	141.55	200.39	97.50	155.11	282.86
Licenses	yr.	29.55	63.94	--	--	--
Insurance ^d	yr.	44.10	58.50	--	--	--

^aCost of other items are as follows: gasoline for trucks, \$.29; gasoline for tractors, \$.265 per gallon; L. P. fuel, \$.125 per gallon; oil for trucks, \$.36 per quart; oil for tractors, \$.31 per quart; grease, \$.24 per pound; and antifreeze, \$.61 per quart.

^bAverage price paid for Highboy batteries was \$16.50 and for self-propelled combines \$17.67.

^cCost of tires for other implements calculated as part of annual maintenance.

^dIncludes minimum liability and medical coverage each year with collision the first three years pro-rated over the life of the vehicle.

Appendix Table 3. Estimated years of useful life for selected repair items, Brown Loam Area, Mississippi, 1962.

Item	Implement				
	Truck		Tractor		
	Light	Heavy	1-row	2-row	4-row
Major overhaul	4.3	5.8	4.5	4.6	3.4
Battery ^a	2.4	2.3	2.0	1.9	1.9
Tires (front)	2.0	4.0	7.0	4.5	2.9
Tires (rear)	1.9	4.0	8.5	5.9	4.2

^aAverage battery life for Highboy was 2.5 years and self-propelled combines 2.6 years