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UNIVERSITY OF MINNESOTA
Department of Agriculture

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TRACTOR COSTS AND RATES OF PERFORMANCE

A preliminary report of data secured in 1938 covering
the cost of operation and the rate of performance
on farm tractors in Minnesota
and summaries for 1933, 1934, 1935, 1936 and 1937

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TRACTOR COST AND RATES OF PERFORMANCE*

Source of Data

The operators of 19 tractors submitted records of the cost of operating their tractors and of the amount and kind of work done by them during the year 1938 to the Minnesota Agricultural Experiment Station. These records were obtained from 15 farms. On four of these farms, two tractors were used. Eighteen of the records cover the use of tractors for the full calendar year, and one covers a tractor that was purchased during the year. Two of these tractors were purchased in 1929, five in 1930 to 1935, inclusive, and twelve in 1936 to 1938, inclusive. They include three McCormick-Deering, Model F-12; two McCormick-Deering, Model F-20; one McCormick-Deering, Model 10-20; two John Deere, Model GP; one Allis Chalmers, Model W-C; one McCormick-Deering, Model F-30; one Minneapolis Moline, Model MTA; one Case, Model CC; three John Deere, Model A; one McCormick-Deering, Model WK-40; one Case, Model L; one John Deere, Model D; and one Diesel Caterpillar, Model RD-6. The average age estimate of the operators as to the total life of these tractors was eleven years. In Tables 6, 7, 8 and 9, the tractors equipped with rubber tires are indicated. The average life of the tires is estimated at six and three-fourths years. The separation into two-plow, three-plow and one-, four-, and five-plow classifications is more or less arbitrary and is based largely on the horse-power rating of the tractor. The tractors included in Table 1 were all rated as 2-plow tractors and those in Table 2 as 3-plow tractors. Data for each individual tractor in the one-plow, four-plow, and five-plow groups are presented in Table 3; but the number in each group was too small to provide a significant average. The actual number of plow bottoms used with each tractor varied in some cases from the arbitrary rating assigned. This may be noted in Tables 6 and 7.

Cost of Tractor Operation

The cost per hour of operating each individual tractor in 1938 is shown in Tables 1, 2, and 3. Fuel and lubricants were charged at the purchase price. Man labor spent in servicing and repairing was charged at 25 cents per hour. Annual depreciation was determined by dividing the purchase price of the tractor by the farmer's estimate of the number of years it would last. Interest is charged at six per cent on the average value of the tractor in 1938. Average costs are also shown for both size groups in 1938 and for the tractors for which records were kept in 1933, 1934, 1935, 1936 and 1937.

There is a wide variation among different tractors in each of the items of cost. To a considerable extent, this reflects differences among the operators in their ability to handle their tractors economically and to provide adequate work for them. To a lesser extent, it reflects chance differences such as variations in fuel prices in different localities and the irregularity with which repairs and over-hauling are necessary. Fuel is the most variable item of operating costs. The amount of fuel per hour varied from .8 to 1.1 gallons for the one-plow tractors; 1.3 to 1.9 gallons for the two-plow tractors; 1.7 to 2.0 gallons for the three-plow tractors; 2.5 to 3.2 gallons for the four-plow tractors. Gasoline was used exclusively as fuel in seven tractors, distillate was used except for starting in seven, kerosene in one, and in four a mixture of gasoline and distillate was used. The average price per gallon of these fuels was gasoline, 14 cents; kerosene, 10 cents; and distillate, 8.6 cents. Fuel costs for the three-plow tractors averaged 5 cents

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per hour higher than for the two-plow tractors. Of the total fuel used, 54 per cent was distillate, 41 per cent was gasoline, and 5 per cent kerosene.

The fixed charges per hour varied relatively more among different tractors than did the operating costs. This variation is largely due to differences in the number of hours of work annually for which the tractors were used. In general, the larger the number of hours of work annually the lower the fixed charges per hour. There is also some variation in the operators' estimates of the length of life of different tractors. Since this was used as a basis for the depreciation charge, these variations in the operators' judgment are reflected in the fixed charges.

Amount and Kind of Work Done Annually

The annual hours and type of use of the tractors included in Tables 1, 2, and 3 are shown in Table 4. The distribution of tractor work between belt and drawbar work and between home and custom work are also shown in this table. 89 per cent of the drawbar work is done on the home farm, but only 58 per cent of the belt. 84 per cent of the total work is home work and 16 per cent custom work.

Some information concerning the number of days tractors are used and the hours of tractor use per day is shown in Table 5. There is a wide range among the different tractors in both of these items. Most of the days a tractor is used it is operated only a portion of the day. Only 29 per cent of the days of tractor work were of sufficient length to be considered a full day of eight hours or more. One of the advantages of the tractor over horses is that it can be operated 24 hours a day if necessary. Apparently the tractors were used much below their capacity as only about half of the tractors were operated as many as 12 hours a day at any time during the year, and of the total work days for all of them less than 3 per cent were 12 hours or more in length. It appears that the potential 24-hour service is not generally needed, or at least not utilized.

Rate of Tractor Performance

The rate at which various operations were performed with these tractors is shown in Tables 6, 7, 8 and 9. The rate of performing drawbar operations varied with the size of implement used, the kind and condition of the soil, the size and shape of field, the distance travelled to work, and the yield of crops. Undoubtedly, the rate for tillage operations varied somewhat with the amount of overlapping in case of such items as disking, harrowing, and field cultivating. In case of feed grinding, the output was expressed in bushels, but the kind of grain was not specified. In these cases, the weight per bushel was estimated at 40 pounds. It is quite apparent that the proportion of the capacity of the tractor utilized for belt operations varies widely. These tables include all tractors for which records are available for any portion of the year. They do not include minor operations for which no output is recorded or which are performed by only one tractor or under conditions that vary widely from farm to farm. Average rates of performance in 1933, 1934, 1935, 1936 and 1937 are shown in comparison with the 1938 average rate.

Use of Data

These summaries should be useful to the individual tractor operator for purposes of comparison with his own figures. They should point out cost items in which economies might well be adopted. They should also indicate to some degree, at least, the effectiveness with which he is securing a satisfactory rate of performance. Furthermore, they may suggest the possibilities of using the tractor for operations for which it is not now used and the advantage of using implements large enough to utilize the capacity of the tractor to best advantage. In some cases, full utilization of the capacity of the tractor may be secured by using a combination of two implements at the same time. Two operations may be performed at the same time at very little additional expense since none of the items of tractor cost except fuel would be materially affected by the heavier load and the rate of travel would probably be the same. A comparison of the equipment used by different operators of tractors of the same rating also suggests that many operators are not using implements sufficiently large to utilize the full power of the tractor most effectively. Much of the potential advantage of tractor operation is sacrificed when the tractor is operated materially below capacity.

Table 1

Cost per Hour of Operating Two-Flow Tractors in 1938 with Averages for 1933, 1934, 1935, 1936, 1937

Tractor no.:	1082	1122	1132	3122	2022	2082	Averages					
							1938	1937	1936	1935	1934	1933
Operating Cost:												
Fuel	\$.171	\$.187	\$.125	\$.138	\$.162	\$.154	\$.156	\$.161	\$.153	\$.137	\$.154	\$.141
Lubricants	.015	.015	.023	.035	.040	.029	.026	.024	.036	.031	.050	.037
Labor	.023	.011	.020	.011	.012	.030	.018	.018	.019	.014	.018	.019
Cash repairs	.159	.024	.018	-	.028	.051	.056	.037	.036	.026	.028	.025
Total	.368	.237	.186	.184	.242	.264	.256	.240	.244	.208	.250	.222
Fixed Charges												
Depreciation	.136	.209	.165	.129	.054	.030	.121	.145	.212	.159	.214	.233
Interest at 6% on avg. value	.025	.075	.049	.078	.035	.012	.046	.043	.060	.056	.066	.083
Total	.161	.284	.214	.207	.089	.042	.167	.188	.272	.215	.280	.316
Total cost per hour	.529	.521	.400	.391	.331	.306	.423	.428	.516	.423	.530	.538
Hours of work per year	687 $\frac{1}{2}$	798 $\frac{3}{4}$	563 $\frac{1}{2}$	699 $\frac{1}{4}$	1093 $\frac{1}{2}$	581 $\frac{3}{4}$	737	742	574	728	516	587
Labor and Materials per 100 Hours:												
Servicing, hours	3.9	5.9	4.8	4.2	3.2	3.6	4.4	4.5	4.8	4.5	5.5	5.1
Repairing, hours	5.7	-	3.2	-	1.5	8.6	3.2	2.9	2.9	1.1	1.1	3.1
Fuel: Gasoline, gal.	24.9	157.7	23.0	26.5	81.7	14.6	54.7	37.3	52.4	25.0	40.0	54.0
Kerosene, gal.	-	-	65.5	8.6	-	-	12.3	18.7	15.2	13.5	35.0	22.0
Distillate, gal.	165.9	-	45.6	104.3	69.7	165.0	91.8	104.2	92.6	121.6	95.0	92.0
Total	190.8	157.7	134.1	139.4	151.4	179.6	158.8	160.2	160.2	160.1	170.0	168.0
Cylinder oil, gal.	2.8	2.4	5.3	1.7	5.5	4.1	3.6	3.5	6.8	3.9	7.1	5.8
Transmission oil, gal.	-	-	-	-	-	-	-	.4*	.5*	-	-	-
Grease, lbs.	-	.4	3.0	17.9	1.1	-	5.6*	3.0*	3.2*	3.2*	16.1*	12.9*

*Average of farms reporting

Table 2

Cost per Hour of Operating Three-Flow Tractors in 1938 with Averages for 1933, 1934, 1935, 1936, 1937

Tractor no.:	1013	3193	1133	2193	1193	1183	Averages					
							1938	1937	1936	1935	1934	1933
Operating Cost:												
Fuel	\$.183	\$.332	\$.169	\$.184	\$.213	\$.156	\$.206	\$.176	\$.275	\$.246	\$.256	\$.160
Lubricants	.022	.014	.035	.031	.020	.050	.029	.034	.045	.041	.057	.036
Labor	.009	.012	.016	.019	.015	.013	.014	.016	.028	.016	.022	.015
Cash repairs	.043	.010	.009	.069	.014	.024	.028	.017	.086	.039	.045	.033
Total	.257	.368	.229	.303	.262	.243	.267	.243	.434	.342	.380	.244
Fixed Charges:												
Depreciation	.252	.173	.210	.151	.156	.081	.170	.162	.289	.254	.308	.227
Interest at 6% on avg. value	.146	.105	.080	.059	.051	.048	.082	.069	.098	.099	.110	.075
Total	.398	.278	.290	.210	.207	.129	.252	.231	.387	.353	.418	.302
Total cost per hour	.655	.646	.519	.513	.469	.372	.519	.474	.821	.695	.798	.546
Hours of work per year	556	817½	553¾	604½	800½	1279½	769	775	414	564	406	664
Labor and Materials per 100 Hours:												
Servicing, hours	.1	4.2	5.6	4.5	4.8	4.7	4.0	4.2	4.7	4.5	5.4	4.5
Repairing, hours	3.1	.7	.7	3.3	1.3	.5	1.6	2.4	6.5	1.8	3.2	1.5
Fuel: Gasoline, gal.	170.3	200.7	21.7	15.3	4.7	16.9	71.6	49.0	153.2	135.1	83.0	17.0
Kerosene, gal.	-	-	112.7	-	-	-	18.8	35.8	25.8	17.1	65.0	-
Distillate, gal.	-	-	52.3	174.8	187.8	149.9	94.1	94.3	73.9	95.7	123.0	201.0
Total	170.3	200.7	186.7	190.1	192.5	166.8	184.5	179.1	252.9	247.9	271.0	218.0
Cylinder oil, gal.	3.3	2.8	6.3	6.3	3.3	6.8	4.6	5.2	7.0	8.0	9.7	7.5
Transmission oil, gal.	.2*	-	9.0*	-	1.9*	-	3.7*	1.2*	.6	-	-	-
Grease, lbs.	1.3*	-	1.9*	-	8.1*	1.9*	3.3*	3.5*	2.0	6.3*	19.3*	20.1*

*Average of farms reporting.

Table 3.

Table 3.

Cost per Hour of Operating One-, Four-, and Five-Plow Tractors in 1938

Tractor No.	1111*	1021*	1041*	1034+	1014+	2124+	1255‡
Operating Costs:							
Fuel	\$.113	\$.146	\$.152	\$.479	\$.202	\$.263	\$.273
Lubricants	.045	.065	.017	.043	.018	.029	.266
Labor	.007	.014	.007	.062	.007	.024	.012
Cash Repairs	.088	.052	.003	.356	.085	.110	-
Total	.253	.277	.179	.940	.312	.426	.551
Fixed Charges:							
Depreciation	.193	.083	.120	.486	.387	.217	.424
Interest at 6% on Average Value	.059	.033	.075	.189	.175	.085	.317
Total	.252	.116	.195	.675	.562	.302	.741
Total Cost per Hour	.505	.393	.374	1.615	.874	.728	1.292
Hours of Work Done	478	972	435½	185	415½	448	562½
Labor and Materials per 100 Hours:							
Servicing, hrs.	2.7	.10	3.0	16.2	2.7	7.3	4.8
Repairing, hrs.	-	.04	-	8.2	-	2.3	-
Fuel: Gasoline, gal.	84.1	114.7	108.9	315.1	98.5	9.0	2.1
Kerosene, gal.	-	-	-	-	-	-	-
Distillate, gal.	-	-	-	-	149.8	264.8	240.4
Total	84.1	114.7	108.9	315.1	248.3	273.8	242.5
Cylinder Oil, gal.	4.1	8.2	2.8	7.0	2.6	4.9	5.3
Transmission Oil, gal.	-	.09	-	-	-	-	6.2
Grease, lbs.	1.6	.04	-	-	1.2	-	124.4

*One-plow tractors.

+Four-plow tractors.

‡Five-plow tractors.

Table 4

Amount of Drawbar and Belt Work per Tractor and Proportion of Custom Work

Tractor No.	Hours of Work			Hours Custom Work			Per. Cent Custom Work		
	Drawbar	Belt	Total	Drawbar	Belt	Total	Drawbar	Belt	Total
<u>Two-Flow Tractors</u>									
1041*	405 $\frac{3}{4}$	29 $\frac{1}{2}$	435 $\frac{1}{4}$	21	1 $\frac{1}{2}$	22 $\frac{1}{2}$	5	5	10
1021*	744 $\frac{1}{4}$	227 $\frac{3}{4}$	971 $\frac{3}{4}$	120 $\frac{3}{4}$	-	120 $\frac{3}{4}$	16	-	16
1111*	461 $\frac{1}{4}$	16 $\frac{3}{4}$	478	231	-	231	50	-	50
1132	545	18 $\frac{3}{4}$	563 $\frac{1}{2}$	-	-	-	-	-	-
1082	594 $\frac{1}{4}$	93	687 $\frac{1}{4}$	16	-	16	3	-	2
2082	385	188 $\frac{3}{4}$	581 $\frac{3}{4}$	66	124	190	17	66	33
1122	748	50 $\frac{3}{4}$	798 $\frac{3}{4}$	15	-	15	1	-	2
3122	642	57 $\frac{1}{4}$	699 $\frac{1}{4}$	-	19	19	-	33	3
2022	950 $\frac{3}{4}$	142 $\frac{3}{4}$	1093 $\frac{3}{4}$	254 $\frac{1}{2}$	104 $\frac{1}{2}$	359	27	73	33
Avg. hours	645	92	737	59	41	100	-	-	-
Percentage	88	12	100	59	41	100	8	28	12
<u>Three-Flow Tractors</u>									
1133	515 $\frac{1}{4}$	38 $\frac{1}{2}$	553 $\frac{3}{4}$	-	-	-	-	-	-
1013	533 $\frac{1}{2}$	22 $\frac{1}{2}$	556	39 $\frac{3}{4}$	3 $\frac{1}{2}$	43 $\frac{1}{4}$	7	17	8
3193	534	283 $\frac{3}{4}$	817 $\frac{1}{2}$	62 $\frac{3}{4}$	205 $\frac{1}{2}$	268	12	73	33
2193	562 $\frac{1}{2}$	42	604 $\frac{1}{2}$	128	-	128	23	-	21
1193	773 $\frac{1}{4}$	27 $\frac{1}{4}$	800 $\frac{1}{2}$	75 $\frac{1}{2}$	-	75 $\frac{1}{2}$	10	-	9
1183	1036 $\frac{1}{4}$	243 $\frac{3}{4}$	1279 $\frac{1}{2}$	118 $\frac{1}{4}$	122 $\frac{1}{4}$	240 $\frac{1}{2}$	11	50	19
1034+	124	61	185	11	27 $\frac{1}{4}$	38 $\frac{1}{4}$	9	44	53
2124+	326	122	448	-	39 $\frac{3}{4}$	39 $\frac{3}{4}$	-	33	33
1014+	84 $\frac{3}{4}$	330 $\frac{1}{2}$	415 $\frac{1}{4}$	4 $\frac{1}{4}$	187 $\frac{1}{2}$	191 $\frac{3}{4}$	5	57	62
1255+	562 $\frac{3}{4}$	-	562 $\frac{3}{4}$	-	-	-	-	-	-
Avg. Hours	659	110	769	71	55	126	-	-	-
Percentage	86	14	100	56	44	100	11	24	15
<u>All Tractors</u>									
Avg. hours	554	104	658	61	44	105	-	-	-
Percentage	84	16	100	58	42	100	10	24	20

*One-Flow Tractors.
 +Four-Flow Tractors.
 †Five-Flow Tractors.

Table 5

Number of Days Tractors are Operated and Hours of Tractor Work per Day								
Tractor No.	Under 2 hours	2 - 3 $\frac{3}{4}$ hours	4 - 5 $\frac{3}{4}$ hours	6 - 7 $\frac{3}{4}$ hours	8 - 9 $\frac{3}{4}$ hours	10 hours and over	Total days operated	Average hours per day
103 ⁴	12	21	10	6	4	-	53	3.5
113 ²	40	29	21	33	10	11	144	3.9
113 ³	37	27	19	20	21	2	126	4.4
108 ²	29	27	34	22	14	13	149	4.6
208 ²	19	19	27	25	20	6	116	5.0
212 ⁴	20	15	21	7	15	10	88	5.1
102 ¹	51	34	33	27	19	26	190	5.1
101 ³	23	18	17	17	19	11	105	5.3
112 ²	6	24	53	48	15	1	147	5.4
312 ²	16	20	21	32	27	6	122	5.7
101 ⁴	10	11	12	13	19	6	71	5.8
319 ³	14	31	34	19	25	18	141	5.8
104 ¹	8	18	13	18	6	11	74	5.9
219 ³	7	20	22	22	12	17	100	6.0
119 ³	7	29	27	26	30	14	126	6.3
118 ³	15	31	24	29	34	55	188	6.8
111 ¹	7	13	11	7	4	27	69	6.9
202 ²	3	21	14	25	26	49	138	7.9
125 ⁵	-	1	4	1	34	21	61	9.2
Averages	17	22	22	21	18	16	116	5.7
Percentage	15	19	19	17	16	14	100	-

¹One-plow.

²Two-plow.

³Three-plow.

⁴Four-plow.

⁵Five-plow.

Table 6

Size of Implement and Acres per Hour for Drawbar Operations with Two-Plow Tractors in 1938 with Averages for 1933, 1934, 1935, 1936, and 1937

Operation: Tractor No.	Plowing		Disking		Spike-tooth Harrowing		Spring-tooth Harrowing		Field Cultivating		Seeding Grain	
	Size	Acres	Size	Acres	Size	Acres	Size	Acres	Size	Acres	Size	Acres
1041	2-14"	.57	10'	3.04	20'	.68 ⁺	-	-	8'	2.02	-	-
3122*	2-14"	.48	9	2.32	20'	7.41	-	-	7½'	1.85	-	-
1021	2-14"	.91	10'single	1.70	12'	4.00	6'	1.44	-	-	8'	2.21
1082*	2-14"	.69	15'single	3.06	20'	5.29	9'	3.04	-	-	10'	2.64
1111*	2-14"	.60	7'tandem	1.20	-	-	-	-	-	-	-	-
1122*	2-14"	.77	-	-	15'	4.73	10'	2.96	-	-	-	-
1132*	2-16"	.76	8'tandem	2.76	22'	9.82	-	-	-	-	-	-
1183*	2-16"	.99	15'	4.26	22'	12.00	7'	3.06	-	-	22'	3.69
1193	2-16"	.94	8'	4.00	20'	10.26	9	3.20	-	-	10'	3.72
2022*	2-14"	.88	11'single	5.31	20'	9.43	10'	2.40	-	-	-	-
2082	2-14"	.62	15'single	3.84	20'	4.91	-	-	-	-	10'	3.33
2193	2-14"	.74	11'single	3.43	23'	3.33	7'	1.33	-	-	10'	4.02
Average 1938		.75		3.49		7.12		2.49		1.99		3.27
1937		.75		3.37		7.31		2.66		2.47		3.40
1936		.73		3.44		8.05		3.14		2.42		3.52
1935		.83		3.21		7.87		3.44		2.99		2.84
1934		.83		3.21		7.45		2.97		2.58		3.33
1933		.85		3.30		8.02		-		2.60		3.32

*Equipped with rubber tires.

+Not included in averages.

Table 6 (continued)

Operation:		Cutting Grain		Planting Corn		Cultivating Corn		Cutting Corn		Picking Corn		Mowing Hay	
Tractor No.	Size	Acres	Size	Acres	Size	Acres	Size	Acres	Size	Acres	Size	Acres	
1041	10'	1.97	-	-	-	-	1-row	.64 ⁺	-	-	-	-	
3122*	7'	1.53	-	-	2-row	1.72	-	-	1-row	.72	-	-	
1021	8'	2.36	-	-	2-row	2.39	1-row	.99	-	-	8'	2.40	
1082*	10'	1.72	3-row	2.91	3-row	3.25	-	-	1-row	.87	-	-	
1111*	8'	1.03 ⁺	-	-	-	-	-	-	-	-	-	-	
1122*	8'	1.75	-	-	2-row	2.20	-	-	-	-	-	-	
1132*	-	-	4-row	2.31	2-row	2.12	-	-	1-row	.90	7'	3.02	
1183*	10'	2.32	-	-	2-row	2.30	-	-	2-row	1.37	-	-	
1193	7'-10'	3.63	-	-	2-row	4.24 ⁺	-	-	2-row	1.43	-	-	
2022*	10'	3.17	-	-	2-row	2.83	-	-	2-row	1.67	-	-	
2082	10'	2.05	-	-	-	-	1-row	.89	1-row	.89	-	-	
2193	8'	2.47	-	-	2-row	2.42	1-row	.80	-	-	-	-	
<hr/>													
Averages	1938	2.30		2.61		2.40		.89		1.11		2.71	
	1937	1.87		2.27		2.37		1.08		.95		-	
	1936	2.06		2.25		2.35		.99		1.07		2.50	
	1935	1.92		2.60		2.60		1.12		.92		2.33	
	1934	1.97		2.41		2.19		1.33		1.03		2.58	
	1933	1.45		2.73		2.29		.82		.80		-	

*Equipped with rubber tires

⁺Not included in averages.

Table 7

Size of Implement and Acres per Hour for Drawbar Operations with Three-Plow Tractors in 1938 with
Averages for 1933, 1934, 1935, 1936, and 1937

Operation: Tractor No.	Plowing		Disking		Spiketooth Harrowing		Springtooth Harrowing		Field Cultivating		Seeding Grain	
	Size	Acres	Size	Acres	Size	Acres	Size	Acres	Size	Acres	Size	Acres
3193*	3-14"	.98	15'	5.06	23'	9.05	7½'	2.40	-	-	10'	2.73
1013*	3-14"	1.07	10'tandem	3.14	26'	8.24	-	-	11½'	3.49	24'	4.02
1014	3-14"	1.16	-	-	-	-	8'	3.00	11½'	3.50	-	-
1034	3-14"	1.08	10'tandem	4.12	-	-	11'	4.24	-	-	-	-
1133*	3-16"	1.29	10'tandem	4.32	22'	8.54	-	-	10'	3.41	-	-
2124	3-14"	1.15	15'	3.89	-	-	-	-	9'	2.27	-	-
1255	-	-	-	-	74'	24.03 ⁺	-	-	12'	3.38	11'	10.58 ⁺
Average 1938		1.12		3.91		8.61		3.21		3.21		3.38
1937		1.17		4.03		8.71		3.12		3.13		3.60
1936		1.28		4.47		8.10		4.23		3.17		3.22
1935		1.10		3.46		6.98		3.16		3.04		3.64
1934		1.22		3.33		8.62		3.71		3.25		4.00
1933		1.36		3.16		-		-		3.11		3.52

*Equipped with rubber tires

+Not included in averages.

(Table 7 continued)

Operation:	Cutting Grain		Cultivating Corn		Cutting Corn		Picking Corn		Combining Grain	
Tractor No.	Size	Acres	Size	Acres	Size	Acres	Size	Acres	Size	Acres
3193*	10'	3.09	-	-	-	-	2-row	1.18	-	-
1013*	8'	2.03	2-row	1.91	1-row	1.07	-	-	-	-
1014	-	-	-	-	-	-	-	-	-	-
1034	8'	2.00	-	-	-	-	-	-	-	-
1133*	-	-	2-row	2.06	-	-	-	-	12'	2.26
2124	10'	2.26	-	-	-	-	2-row	1.25	-	-
1255	-	-	-	-	-	-	-	-	16'	3.75
Average 1938		2.35		1.99		1.07		1.21		3.00
1937		2.41		2.41		.95		1.29		-
1936		2.44		1.95		-		1.76		-
1935		2.19		1.92		-		1.44		-
1934		2.12		1.69		-		1.14		-
1933		1.70		2.17		-		.99		-

*Equipped with rubber tires

Table 8

Size of Implement and Rate of Performance of Belt Operations of
Two-Plow Tractors in 1938

Operation:	Grinding Feed	Shelling Corn	Filling Silo	Threshing	Shredding Corn
Tractor No.	Mill Pounds per hour	Type Bushels per hour	Tons per hour	Size Bushels per hour	Type Bushels per hour
1021	8" burr 1200	-	7.20	-	4-roll 9.92
1082*	10" burr 1992	-	-	26" W. Bros. 25.8 ⁺	-
1111*	8" burr 558	cylinder 56.0	-	-	-
1122*	8" burr 974	-	5.11	-	-
1132*	#1 hammer 1400	#2 cyl. 118.8	8.67	-	-
1183*	#30 B.S. 2850	-	-	28"-46" 102.4	-
1193	-	-	-	-	-
2082	10" burr 2341	-	-	26" 43.3	-
2193	-	-	-	-	-
1041	10" burr 1183	cylinder 57.5	-	-	-
3122*	8" burr 2586	-	11.20	28" 101.0	-
2022*	-	-	-	22"x38" 91.1	-
Average 1938	1276	77.4	8.0	72.7	9.90
1937	1285	89.4	7.2	73.6	-
1936	1986	77.8	6.4	74.5	-
1935	1786	68.3	8.1	82.5	-
1934	1544	50.4	8.1	76.6	-
1933	2254	93.0	8.7	128.0	-

*Equipped with rubber tires. †Not included in averages.

Table 9

Size of Implement and Rate of Performance of Belt Operations of
Three-Plow Tractors in 1938

Operation:	Grinding Feed	Shelling Corn	Filling Silo	Threshing	Shredding Corn
Tractor No.	Mill Pounds per hour	Type Bushels per hour	Tons per hour	Size Bushels per hour	Type Bushels per hour
3193*	#1 hammer 476 ⁺	-	9.54	28" 110.32	-
1013*	10 $\frac{1}{2}$ " burr 2892	-	-	-	-
1014	10 $\frac{1}{2}$ " burr 2762	-	8.15	32-51 110.20	4-roll 30.57
1034	8" burr 1876	-	10.18	-	-
1133*	#1 hammer 1660	#2 cyl. 100.90	-	-	-
2124	8" burr 3576	#5 cyl. 96.54	5.19	28" 90.56	-
1255	-	-	-	-	-
Average 1938	2553	98.7	8.3	103.6	30.6
1937	2359	131.3	9.3	106.7	43.4
1936	2580	92.9	9.6	131.7	36.2
1935	2146	83.8	10.2	102.3	27.8
1934	1666	104.9	10.2	73.3	-
1933	1889	160.0	12.4	138.0	-

*Equipped with rubber tires. †Not included in averages.