TRACTOR TESTS

Conducted at Fremont, Nebraska

July 26 to August 2, 1917, by the Agricultural Engineering Department of the University of Nebraska

Prof. L. W. Chase in Charge

THE following report is on tests made on Case Tractors operating standard farm implements, conducted by the Department of Agricultural Engineering of the University of Nebraska under the direction of Professor L. W. Chase, assisted by Professor O. W. Sjogren, Mr. Louis Runnels and Mr. Ray W. Carpenter.

OBJECT: The object of the experiments was to determine under actual farm conditions the amount of fuel required and the rate of doing various field operations, and to study the quality of the work done. Also to determine how different depths of plowing in the same field affected these factors as shown by the first three tests. The tests were not of competitive nature, but were made with the object in view of determining the factors involved in practical operations of tractors on farms.

EQUIPMENT: The tractors used were the Case 9-18, Case 10-20, and Case 12-25 kerosene tractors, all new, and Grand Detour plows furnished by the J. I. Case T. M. Co. The other implements were one John Deere 8-foot double action engine disc harrow, one 20-foot four section, Ajex, steel, spike tooth harrow, and a 16-single disc, end wheel Van Brunt drill, all loaned by the John Deere Plow Company.

FIELD: The tests were conducted in two separate fields—one of about nine acres lying about one mile northwest of Fremont—the other a twenty-five acre field about four miles northwest of town. Both fields are level. Tests No. 1 to 3, inclusive, were made in the first field, and all the other tests in the second field.

The first field was wheat stubble; the soil varied, the greater part was sandy loam with gumbo in places. The soil was extremely dry and the draft was therefore greater than it would have been with the ground in ordinary condition. The second field was oats stubble; the soil was sandy loam and uniform. The ground was dry although in better shape than the first field.

METHOD: Both fields were plowed in the same manner. Lands were laid out lengthwise, and each test was made on a separate land. The turning at one end was done on a head land about fifty feet wide left for that purpose, and at the other end on a road. The outfits were operated by different operators who changed about. The area plowed was measured at the completion of each test by the men in charge. The time required to turn each furrow and make each turn was recorded to the nearest five seconds.

Before each test, the tractors were drained and the fuel, both gasoline and kerosene, was weighed in. At the completion of the test, the remaining fuel was weighed again and the difference represented the amount used. The motors were started in beginning each test and gasoline was used until they warmed up, except in one test, when the motor was sufficiently hot to start on kerosene. The gasoline used was charged to each test and the quantity varied because the operators sometimes neglected to change fuels as soon as they might have.

FUEL: The fuel used was Perfection kerosene, 45 Baume test and the weight per gallon was 6.6 lbs. Red Crown gasoline 59 Baume test, weighing 6.125 lbs. per gallon was used.

The price of the kerosene delivered in the field was 8½ cents per gallon and the gasoline 21¼ cents. The cost of fuel per acre is based on these prices.

Case 10-20 Tractor Pulling 3-Bottom 14-Inch Plow, 4 Inches Deep

Test No. 1. July 26, 1917

RESULTS:

Net amount of land plowed during test ..... 1.71 A.

TIME:	Hours	Minutes	Seconds
Plowing	1	38	30
Turning at ends		13	35
Total	1	52	5

FUEL—Amount of Fuel Used During Test:	Gallons
Gasoline	.810
Kerosene	3.015
Total	3.825
Average per acre	1.776
Per 10-hour day	19.2

PLOWING DATA:

Depth of plowing	4 in.
Width of land plowed	186 ft., 6 in.
Length of furrow	700 ft.
Rate of traveling while plowing	2.26 miles per hour
Percentage of time spent in turning at ends	12 per cent
Average time required to plow an acre	1 hr. 5.4 min.
Or	.915 A. per hour
COST OF FUEL PER ACRE	16 cents

Case 10-20 Tractor Pulling 3-Bottom 14-Inch Plow, 6 Inches Deep

Test No. 2. July 26, 1917

RESULTS:

Net amount of land plowed during test ..... 1.62 A.

TIME:	Hours	Minutes	Seconds
Plowing	1	39	40
Turning at ends		12	15
Total	1	51	55

FUEL—Amount of Fuel Used During Test:	Gallons
Gasoline	.08
Kerosene	4.26
Total	4.34
Average per acre	2.66
Per 10-hour day	23.22

PLOWING DATA:

Depth of plowing	6 in.
Width of land plowed	101 ft.
Length of furrow	700 ft.
Rate of travel while plowing	2.215 miles per hour
Percentage of time spent in turning at ends	10.9 per cent
Average time required to plow an acre	1 hr. 9 min.
Or	.87 A. per hour
COST OF FUEL PER ACRE	21 cents

Case 10-20 plowing, pulling 3-bottom plow over clay hills

Case 10-20 Tractor Pulling 3-Bottom 14-Inch Plow, 8 Inches Deep

Test No. 3. July 27, 1917

RESULTS:

Net amount of land plowed during test ..... 1.62 A.

TIME:	Hours	Minutes	Seconds
Plowing	2	5	30
Turning at ends		16	25
Total	2	21	55

FUEL—Amount of Fuel Used During Test:	Gallons
Gasoline	.10
Kerosene	6.08
Total	6.18
Average per acre	3.77
Per 10-hour day	25.9

PLOWING DATA:

Depth of plowing	8 in.
Width of land plowed	101 ft.
Length of furrow	700 ft.
Rate of travel while plowing	1.775 miles per hour
Percentage of time spent in turning at ends	11.7 per cent
Average time required to plow an acre	1 hr. 27 2/3 min.
Or	.697 A. per hour
COST OF FUEL PER ACRE	33 cents

REMARKS: The field in which the foregoing three tests were made had gumbo spots and had never been plowed as deep in those places before. The 8-inch test was also considerably below the depth of any previous plowing, necessitating the breaking up of a hard pan. The draft was therefore greatly increased in that test and where the gumbo spots were encountered in the other tests. The field had last been plowed with a 16-inch sulky plow drawn by three horses. This had been too big a load and therefore deeper plowing could not be accomplished. The advantage of tractor plowing is here plainly shown; the most desirable depth may be secured.

Case 10-20 Tractor Pulling 3-Bottom 14-Inch Plow, 6 Inches Deep

Test No. 4. July 28, 1917

RESULTS:

Net amount of land plowed during test ..... 1.78 A.

TIME:	Hours	Minutes	Seconds
Plowing	1	51	42
Turning at ends		7	54
Total	1	59	38

FUEL—Amount of Fuel Used During Test:	Gallons
Gasoline	.163
Kerosene	3.94
Total	4.103
Average per acre	2.3
Per 10-hour day	20.6

PLOWING DATA:

Depth of plowing	6 in.
Width of land plowed	62 ft. 3 in.
Length of furrow	1260 ft.
Rate of travel while plowing	2.29 miles per hour
Percentage of time spent in turning at ends	7 per cent
Average time required to plow an acre	1 hr. 6¾ min.
Or	.895 A. per hour
COST OF FUEL PER ACRE	20½ cents

NOTE—The recommended depth of plowing in this field was 6 inches, and therefore this and subsequent tests were made at that depth.

Case 9-18 Tractor Pulling 2-Bottom 14-Inch Plow, 6 Inches Deep

Test No. 5. July 31, 1917

RESULTS:

Net amount of land plowed during test ..... 1.4 A.

TIME:	Hours	Minutes	Seconds
Plowing	2	4	55
Turning at ends		7	15
Total	2	12	10

FUEL—Amount of Fuel Used During Test:	Gallons
Gasoline	.03
Kerosene	3.12
Total	3.15
Average per acre	2.225
Per 10-hour day	14.6

PLOWING DATA:

Depth of plowing	6 in.
Width of land plowed	48 ft. 11 in.
Length of furrow	1250 ft.
Rate of travel while plowing	2.265 miles per hour
Percentage of time spent in turning at ends	6 per cent
Average time required to plow an acre	1 hr.34 1/3 min.
Or	.636 A. per hour
COST OF FUEL PER ACRE	19⅛ cents