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*Tractors*

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UNIVERSITY OF NOTTINGHAM  
SCHOOL OF AGRICULTURE



THE ECONOMY OF DIESEL TRACTORS.

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DEPARTMENT OF AGRICULTURAL ECONOMICS  
SUTTON BONINGTON  
LOUGHBOROUGH

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### Definitions.

In this report tractors are described according to the fuel used. These fuels have various trade names.

<u>Type of Tractor.</u>	<u>Fuel used in Engine.</u>
Diesel tractor.	Gas oil.
Paraffin tractor.	Vaporising oil.
Petrol tractor.	Petroleum spirit.

### Acknowledgement.

The Department wishes to record its thanks to the tractor drivers for the care taken in completing the weekly records.



## THE ECONOMY OF DIESEL TRACTORS.

### The Increase in Diesel Tractors on Farms in Great Britain.

In 1939, some 47,000 tractors were recorded on farms in England and Wales, and in 1958 there are now more than 400,000 tractors over 10 h.p. in addition to the smaller market garden types.

During the last twenty years, tractor design has advanced in two stages. By 1947, British manufacturers had introduced a new range of tractors fitted with self-starters, battery and coil ignition, power take off shafts, power lifts and row crop equipment. In this advance they were influenced by the popularity of these features on the imported American machines and by the Ferguson system. As a result, the tractor became more flexible in its use upon the farm, easier to start and more reliable.

About this time, advance in the design of the diesel engine made it suitable for use in tractors, and there has since been a considerable increase in the numbers of diesel tractors on farms in Great Britain.

In January, 1954, the machinery census recorded 55,100 diesel tractors in a total of 378,100 tractors over 10 h.p. on farms in Great Britain<sup>1</sup>. Sales of diesel tractors to the home market during the two years 1954 and 1955 were 64,000. New registrations indicate that a further 70,000 were sold in 1956 and 1957 and the majority of these will have been diesel tractors. It is unlikely that many diesel tractors have been disposed off the farms whilst some paraffin and petrol tractors have been converted to diesel. Therefore, by January, 1958, it is estimated that the probable number of diesel tractors was 190,000. In January, 1956, the total number of tractors was 412,400, an increase in the last two years of about  $4\frac{1}{2}$  per cent per annum. Assuming a lower rate of increase, say 4 per cent per annum, it is estimated that the total number of tractors in January, 1958 was 455,000, of which 190,000, or 42 per cent, were diesel tractors.

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<sup>1</sup>Data from:-

- (a) Machinery Surveys. Ministry of Agriculture, Fisheries and Food.
- (b) Digest of Statistics. Central Statistical Office. (Monthly).
- (c) Society of Motor Manufacturers and Traders - quoted in RICKARD, R.C. "Tractor operating costs and performances on a sample of Farms in South-West England, June, 1955." Report No. 95. University of Bristol, Department of Economics, (Agricultural Economics), Province II., 1 Courtney Park, Newton Abbot, Devon.

Unless there is a change in the relative prices of fuels or in the design of tractors, it is likely that within a few years a high proportion of tractors in this country will be diesel types.

In the immediate future, the market for diesel tractors is likely to change. Saturation point is being reached in the total numbers of tractors over 10 h.p. on farms in Great Britain and the majority of sales to the home market will be for replacement. In the absence of any major advance in design, manufacturers will rely more upon minor improvements, sales campaigns and service in order that they may maintain their place in such a market. Taxation relief through the initial allowance and higher wear and tear allowances in the first three or four years encourage some farmers to replace their tractors before major repairs become necessary. To satisfy this replacement market, leading manufacturers are offering the farmer a choice of horse-power within their own range of tractors instead of concentrating upon a single type, low, medium or high b.h.p., e.g. Ferguson, Fordson Major and International B.M.D. respectively. Such a policy meets the bias in favour of a particular make and service agent, since a farmer can obtain from one supplier tractors suited to his particular power requirements, whether he requires several of the same power or a variety of powers.

An Investigation into the Costs and Use of 18 Diesel Tractors  
in Nottinghamshire and Leicestershire.

The main object of the investigation was to obtain information about costs and the work done by wheeled diesel tractors in the horse-power range 25 to 45 b.h.p., suitable for most types of cultivations and haulage. Thirteen farmers in Leicestershire and Nottinghamshire provided records for 16 wheeled tractors (12 Fordson Majors, 3 Fergusons and 1 David Brown Cropmaster) and 2 heavy tractors (a Farmall Super B.M.D. and a Fordson County Tracklayer). On these farms 21 other tractors and two horses were not recorded. The farms were on a variety of soils - heavy clay, medium loams and light sands, and they were under various systems of management - milk, crops and stock, intensive cropping.

The period covered was 52 weeks during July, 1956 to August, 1957. For each tractor, a weekly record was completed showing the hours worked on each job, the fuel and oil used, the time spent on maintenance and repairs, the cost of spare parts and the cost of repairs and maintenance carried out by the appointed agents.

The period included the upset to the oil industry brought about by the Suez affair. In practice, the supplies of diesel fuel to farms were not seriously affected and any adjustment to tractor use

was due more to patriotic motives than to actual restrictions. There were no obvious changes shown in the records, but some care was probably exercised in haulage work during the four months December, 1956 to March, 1957. Prices of diesel fuel were increased by threepence per gallon early in December, 1956, and by a further twopence about the 19th March. Three weeks later there was a reduction of one penny per gallon and successive reductions followed until the end of July, 1957, when prices were only one penny per gallon more than in July, 1956. On these farms, fuel storage capacity varied from two up to 12 months supplies so that the date of purchase influenced the price of fuel on each farm. Particulars of price changes were obtained from two of the major distributing companies and averaged on a weekly basis for the 52 weeks. For bulk deliveries of 500 gallons and over the average price in the general or Midland zone was 1s. 6d. per gallon and in the outer or North Eastern zone 1s. 5½d. per gallon. For deliveries below 500 gallons with a minimum of 100 gallons in one case and 200 gallons in the other, prices were one penny per gallon more. All conditions were met with on these farms, and it was decided to charge diesel fuel at a standard rate of 1s. 6d. per gallon.

Major repairs which last for more than a year, e.g. tyre replacements and engine overhauls are treated as capital costs. The replacement of parts costing up to £20., such as new batteries or reconditioned starter motors, fuel pumps, dynamos, are included under annual repairs together with service, minor breakdowns and spare parts which require regular replacement, e.g. filters, fan belts and injectors. Farm labour on repairs and service is charged at 4s. Od. per hour.

The running costs for 16 wheeled tractors averaged £76. 14s. per tractor for the 52 weeks, the average number of hours worked was 954 and the average running cost per hour was 19.4 pence<sup>1</sup>.

As a result of the fall in fuel prices in the latter part of 1957 and the early part of 1958 the average price of diesel fuel is about 1s. 4½d. per gallon. At this price the cost per hour would be 18.5 pence and the total cost per tractor for 52 weeks £73. 1s.

The running costs of individual tractors varied from 11.7 to 35.5 pence per hour and diesel fuel consumption varied from 0.33 to 0.82 gallons per hour. (Appendix Table 1.). Some of these variations are due to the human element and it is recognised that fuel consumption and wear on working parts vary with individual drivers.

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<sup>1</sup>Note : The average running cost per hour is the sum of the 16 individual costs per hour divided by the number of tractors. Similarly the average fuel consumption is the sum of the 16 individual averages divided by 16.

AVERAGE RUNNING COSTS - 16 DIESEL TRACTORS  
- FOR 52 WEEKS 1956-57.

TABLE 1.

Per tractor and per hour.

	Total costs per tractor for 52 weeks.	Cost per hour.
	£. s.	Pence
Fuels, oils, grease.	47. 17.	12.0
Repairs and service.	24. 1.	6.1
Licence and insurance.	4. 16.	1.3
Total running costs.	76. 14.	19.4
Average number of hours worked	954 hours.	
Average consumption of diesel fuel.	0.61 gallons per hour.	

It is difficult under normal farm conditions to record accurately the fuel consumed and the work done. Diesel fuel is not easy to handle and the accurate recording of quantities put into the tractor tanks needs special apparatus. Drivers were asked to make a fair estimate and some took the trouble at each filling to put in four or five gallons measured in a can. It is likely that over a period of 52 weeks, the errors tend to cancel out and that the totals recorded for each tractor give a reasonable indication of the quantities used.

The work done is much more difficult to define. In previous investigations of this nature, "one tractor hour" has meant that a man was with the tractor for an hour and that for most of that hour the engine was running. As far as possible this interpretation is used in this investigation but two developments tend to upset it. Firstly, the self starter and easy starting enable the engine to be switched off when the tractor is standing idle. This results in economy in fuel use and means that the engine is running fewer hours to do the same amount of work. Drivers tend to consider this and for the same amount of work record fewer tractor hours than they would have recorded prior to the general adoption of self starters. Secondly, some tractors are fitted with meters to record the work done and their drivers may have been influenced by the meter hours when recording the number of hours worked. These meters are concerned mainly with engine output and will record more hours on heavy than on light work relative to the actual time worked. Their purpose is



to encourage regular servicing, e.g. engine oil, filter and injector changes. Both these factors probably reduce the number of hours recorded by comparison with earlier investigations and they make it necessary to treat with caution variations between tractors included in this investigation.

RUNNING AND CAPITAL COSTS DIESEL TRACTORS 1956-57.

TABLE 2.

Tractor No.	Capital costs	Running costs	Total costs	Diesel fuel used per hour	Total hours for year
	Pence	per	hour	Gallons	
<u>FORDSON</u>					
11	10.6	16.7	27.3	0.49	929
14(a)	18.4	20.9	39.3	0.80	967½
14(b)	40.7	16.7	57.4	0.57	617
14(c)	48.7	18.2	66.9	0.82	542
18(a)	17.0	11.7	28.7	0.33	1,274
18(b)	17.9	21.0	38.9	0.38	684
24	24.9	18.4	43.3	0.73	1,466
27	32.0	18.0	50.0	0.67	892
28	22.8	18.4	41.2	0.76	1,282
32(a)	19.7	15.1	34.8	0.39	949½
32(b)	43.5	19.5	63.0	0.64	909½
32(c)	17.8	27.7	45.5	0.68	1,213
<u>FERGUSON</u>					
4	30.9	18.2	49.1	0.62	1,065½
8	6.6	35.9	42.5	0.53	803
14	38.3	19.5	57.8	0.72	853
<u>DAVID BROWN 25D.</u>					
29	21.4	14.9	36.3	0.57	819½
<u>AVERAGE 16 TRACTORS</u>					
	25.7	19.4	45.1	0.61	954
<u>OTHER TRACTORS</u>					
Farmall Super	15.5	25.3	40.8	0.98	774
County Tracklayer	143.0	26.4	169.4	1.14	453

Fuel consumption and wear on working parts vary according to the type of work done. Thus the high fuel and repairs costs of tractors Nos. 8 and 32 (c) are associated with a high proportion of field work, over 90% in both cases. On the other hand certain types of haulage work, e.g. general carting for stock and dung carting are associated with high fuel and repair costs, e.g. tractor No. 18(b). Most of the tractors spent about two thirds of their time on field work and one third on haulage work. The exaggeration of "hours worked" on haulage may affect the costs per hour of these tractors and explain the tendency for lower running costs to be associated with a higher proportion of haulage work.

The average fuel consumption was 0.61 gallons per hour. In some cases consumption was between 0.30 and 0.40 gallons per hour and this agrees with the data from the N.I.A.E. field trials. It seems that there is room for improvement in fuel consumption on some of these farms. A saving of 0.06 gallons per hour is equal to a saving of one penny per hour, or £4. per year, and can be achieved by careful driving, regular maintenance and regular replacement of injectors.

#### The Annual Cost of Running Repairs.

The low annual cost of repairs is an important factor in the economy of the modern diesel tractor. In most cases and apart from mischance, the annual expenditure on spares and service by agents did not exceed about £10. (Appendix Table 3.). This expenditure covers regular replacement of filters and injectors, an occasional puncture, antifreeze, and minor repairs to various parts, e.g. clutch, brakes, power lifts. This differs from the Fordson recommendations which include an engine service every 400 hours - on this basis the annual cost should be £15. to £20. according to the number of hours worked. Batteries are reliable - only two were purchased during the year and farmers did not report upon them as a major expense. The makers suggest that a battery should last at least three years under normal conditions and this is borne out by the experience of a local service agent. Due to exceptional working conditions in two cases, Nos. 8 and 32(c), tyre replacements and major repairs are incurred annually and, therefore, have been included in running repairs.

The modern diesel tractor is very reliable. The weekly records of the 18 tractors show that work was not held up by an actual breakdown or failure to start other than on one or two occasions in all. The infrequency of breakdowns is reported in the N.I.A.E. field tests<sup>1</sup>,

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<sup>1</sup>MANBY, T.C.D. "Recent Developments in Tractor Testing Techniques"  
Journal of the Institution of British Agricultural Engineers,  
Vol. XIII., No. 3., 1957.

of new tractors, in which the average number of hours lost per year were six per tractor. The cost of a breakdown is not limited to the cost of repairs, but includes the loss in time of men and loss of crop due to delay in cultivations or harvesting.

Very little repair work was done by farm workers. Some minor repairs may be included in service by farm labour. Five drivers recorded from  $2\frac{1}{2}$  to 5 hours on repair work and one, No. 11, carried out repairs and service normally done by a service agent.

The average annual cost of running repairs for 16 tractors was £24. 1s., equal to 6.1 pence per hour. These tractors tended to be well maintained by careful drivers and owners, but even these did not seem to follow out the manufacturers' recommendations to the full.

#### Capital Costs.

In this investigation the Inland Revenue rate of 28  $\frac{1}{8}$ th per cent of the written down value has been used to calculate the capital cost, namely the value of the tractors at the beginning and end of the year, and the wear and tear allowance. A proportional allowance has been made for a part year. Special tax concessions such as Investment and Initial Allowances have been ignored. The figures for each tractor are shown in Appendix Table 2., and they average £93. 17s. per tractor.

In addition the cost of major repairs is incurred from time to time. A set of rear tyres usually lasts three or four years and an engine overhaul may be necessary after the third or fourth year. Lesser replacements have been included under running costs. The annual cost of major repairs has been calculated arbitrarily as the total cost divided by the apparent life in years.

Major repairs were incurred for five of the 16 tractors and they amounted to £213. 8s. (Appendix Table 3.). Spread over several years and the 16 tractors this is an annual charge of £3. 19s. per tractor.

On this basis the annual capital cost for the 52 week period 1956-57 was £97. 16s. per tractor, or 25.7 pence per hour.

The actual cost may differ from this and an estimate can be made based upon data and experience. Today, a farmer pays about £500. for a wheeled diesel tractor. The average estimated life of the 16 tractors was six years and several farmers, basing their original estimate upon paraffin tractors, commented that the tractor might last another year or two longer. Assuming that a tractor purchased now is replaced after eight years, improvements in design and monetary inflation might increase

the price to £650. for a similar tractor. The farmer might be allowed £100. to £150. for an eight year old tractor, well maintained, provided the present market for traded-in second-hand tractors continues. Assuming that the tyres were due for replacement the lower price would be realised and the replacement cost would be £550.

During the eight years the following major repairs might have been incurred :-

	£.
Sets of retread rear and front tyres.	50.
An engine overhaul.	100.
At least one major breakdown.	<u>50.</u>
	<u>£200.</u>

Thus the total capital cost in eight years would be £750., or £94. per year, or 23 pence per hour for 960 hours.

Alternatively, the high taxation allowances might induce the farmer to exchange a tractor at four to five years, and avoid any expense on major repairs. The new tractor might cost £620., the trading-in allowance might be £300., and the total capital cost would be £320., £80. per year or 1s. 8d. per hour.

Taxation allowances and interest on capital have not been included in these estimates, since, in the long run, they are not likely to vary in total whichever method of replacement is adopted.

On this evidence, the capital cost would seem to be between £80. and £90. per year, equivalent to a cost per hour between 1s. 8d. and 1s. 11d. This suggests that the figure obtained for the recorded tractors is high.

Experience with road vehicles indicates a diesel engine life of 100,000 miles before a major overhaul is necessary. Bearing in mind the type of work and the method of recording hours, it might be assumed that a farm tractor does the equivalent of 15 road miles per "tractor hour", and it will last six to seven years before a major engine overhaul is necessary.

Seven years is probably longer than the period for a major engine overhaul to a paraffin tractor and this gives more flexibility in the use of capital reserved for equipment replacement. Thus a farmer can replace a tractor when capital is available and not required for the urgent purchase of other equipment.

A Comment on Repairs.

The decision to call a particular repair "major" or "running" has been influenced by the conditions on the farm concerned. Thus the need for considerable expenditure each year upon tractor No. 8 and for a set of retreads each year for tractor No. 32c led to the inclusion of these costs, £50. and £30. respectively, in running costs, although by definition they could have been treated as capital costs.

The effect upon certain items of cost resulting from the treatment of these costs as capital costs is given in Table 3. :-

TABLE 3.

	Tractor No. 8.	Tractor No. 32(c)	16 Tractors.
<u>PER TRACTOR</u>			
Capital cost	£72. 0s.	£60. 0s.	£98. 17s.
Running cost	-	-	£71. 14s.
<u>PENCE PER HOUR</u>			
Repairs paid	7.5	6.1	3.5
Running costs	21.0	21.8	18.3
Wear and tear	21.5	23.7	26.8

Overall Cost per Tractor Hour.

To sum up, at the present price of diesel fuel, the running costs per tractor hour have been estimated to be 1s. 6½d., whilst under present conditions for new and second-hand tractors the capital cost per hour has been estimated to be from 1s. 8d. to 1s. 11d. Thus the overall cost per hour, to cover normal running expenses and capital replacement is 3s. 2½d. to 3s. 5½d. per hour.

Weekly Work Demand and Regular Maintenance.

The weekly record of tractor work shows that the peak demand for tractors comes in two periods October to November and March to April.



The demand in August and September depends upon the time of the corn harvest. There was a delayed harvest in 1956 and many tractors stood idle for two to three weeks during the middle of August. Under normal conditions one would expect a slight rise in the August figure and a corresponding shift forward of work. From year to year much depends upon the corn and root harvest but the general level is spread between August and Christmas. January and February appear to be ideal months to put wheeled tractors in for any overhauls and a second opportunity occurs in July between grass conservation and corn harvest. Nevertheless the long stretch of work from the start of the corn harvest in August to Christmas exceeds the recommended 400 hours for a special service and it may be worth while to ensure that this service is carried out at the proper time to avoid a breakdown or higher fuel consumption.

#### Drivers - Jobs - Tractors.

On the farms with several tractors, there was a tendency for each tractor to be concerned with certain jobs, (Appendix Table 4.). On a dairy farm No. 18 and a mixed arable dairy farm No. 14, one tractor did a high proportion of the haulage work of the farm and only about one fifth of its time on field work. Similarly on farm No. 32 there were five tractors, three diesel tractors primarily concerned with field work, one paraffin tractor for general haulage and a diesel tractor for general use. This tendency to specialisation was associated also with the driver and most of the recorded tractors were driven by one driver.

On some farms it proved impossible to obtain records of tractor operating costs and work done because the tractors were used communally. Under these conditions no one individual could be made responsible for the records of a particular tractor. Unless there was careful supervision of maintenance and a sense of responsibility among the workers to use the tractors carefully, it is probable that this type of organisation could lead to a higher running cost.

#### The Number of Tractors to Keep.

According to data from the N.F.U. Farm Accounts Scheme<sup>1</sup> farmers are adding to the size of their individual tractor force and this calls for a consideration of the optimum number to keep. As field work becomes more mechanised each worker tends to become a machine operator and the tractor is his mobile unit. This will tend towards the principle

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<sup>1</sup>N.F.U. Information Service. December, 1955, Vol. 10., No. 7.  
National Farmers Union of England and Wales.

of one man, one tractor, the total number depending upon the work available. Similarly a livestock unit often requires the regular daily movement of feed and other materials and it may be more economical to have a tractor attached to each unit and driven by one of the stockmen concerned than to employ a man and tractor to carry out the haulage work for all the livestock units. For this purpose an aged tractor may be used so that its cost is limited to fuel and repairs whilst the capital invested is much less. Thus the tendency will be to have sufficient tractors to supply with a tractor each worker concerned with crop work and each livestock unit.

The use of mounted equipment may influence the number of tractors required. Whilst manufacturers stress the ease with which equipment is changed, the time to change cannot be avoided unless the farmer has sufficient tractors to enable each set of operations to be carried through without changing. Thus for corn seeding, it may be better to put three tractors into a field so that work can proceed smoothly from one operation to another - e.g. one tractor to haul out supplies and move as required during the day, another fitted with cultivators to prepare the ground and a third fitted with drill and harrows to sow the seed and fertiliser. Under some conditions, this leads to the keeping of more tractors than there are drivers available, whilst under others it leads to the communal use of tractors. The final decision as to the optimum size of the tractor force will be influenced by the size of the farm, its soil and its livestock and cropping policy.

#### The Place of the Heavy and Tracklayer Tractor.

It has been shown<sup>1</sup> that most tractors are rarely employed to the full capacity of their power, yet farmers purchase tractors with power suited to the specific tasks and the expense is considered apart from just cost per hour. Thus on a heavy land farm of 400 acres in mid-Leicestershire a 50 h.p. Farmall Super B.M.D. is kept mainly for heavy cultivations and to draw heavier harvesting equipment such as silorators, balers and combines. This tractor cost £800. and is expected to last 12 years. In 1956-57, six to seven years old and very carefully maintained, it worked 774 hours at an average cost of 40.8 pence per hour. It stood unused for 16 weeks and in other four-week periods worked from 12 to 28 hours per week. Assuming that this tractor will depreciate by £700. in 12 years the annual cost will be £60. for capital replacement, £10. for major repairs and £80. for running costs, a total cost of £150. per year.

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<sup>1</sup>Journal of the Institution of British Agricultural Engineers. Ibid.

Similarly, on a 400 acre farm with some very heavy and difficult land in the Vale of Belvoir, Nottinghamshire, the running costs of a tracklayer were 26.4 pence per hour for 453 hours in the year, not much more than for a normal four wheeled tractor. The tractor and plough cost £1,400. though the price for a similar tractor has risen since. At its present rate of working this tractor should last for 20 years and still have a second-hand value, probably £200., so that its capital replacement cost is £60. per year. It was expected to cost £300. every four years for track repairs, i.e. £75. per year and will probably require one major overhaul, including the engine, costing £200. or £10. per year, making the total capital cost £145. per year. The major overhaul and track repairs can be carried out between April and July when the tractor is not in use. The annual running costs for 450 hours work are about £55. so that this tractor costs the farmer £200. per year or 10s. Od. per acre farmed.

Both these heavy tractors enable their owners to grow a greater acreage of corn and utilise land which it may be difficult to graze. In addition corn yields are probably higher because the land has been cultivated efficiently and at the right time. To some extent, these tractors replace a normal wheeled tractor so that their capital cost is not wholly an abnormal investment though they will be using more fuel on those tasks in which they merely replace a lighter wheeled tractor. These two farmers consider that these extra costs are recovered in the sales of corn from arable cropping rather than livestock from leys.

#### SUMMARY.

Under present conditions the diesel tractor is replacing the paraffin tractor as the main type of mobile power for haulage and cultivations on farms in Great Britain.

An investigation into the costs of operating 16 wheeled diesel tractors in Leicestershire and Nottinghamshire shows that the average annual running costs are £76. 14s. for the year August, 1956 to July, 1957 or £73. at the present price of diesel fuel.

The capital costs have been considered and it is suggested that the capital cost of replacement and the cost of major repairs will be from £80. to £90. per year.

The average cost per hour during the period recorded was 45.1 pence but if this is adjusted for the decrease in the price of fuel and for the estimated capital costs, the estimated average cost at the present time is within the range 3s. 2½d. to 3s. 5½d. per hour.

The average fuel consumption per hour is 0.61 gallons and this is considered to be high.

Repairs costs were examined and it appears that the farmers were not carrying out strictly manufacturers' recommendations. January, February and July are convenient months for special attention.

The number of tractors required varies with the farm, the work done and the number of workers employed.

Two examples of high-priced and high-powered tractors were considered and it is suggested that the extra cost was justified by the ability to produce corn rather than livestock.





APPENDIX: Tables.

- Table 1. Running Costs per Hour. Diesel Tractors 1956-57.
2. Capital Costs and Summary of Costs per Hour.  
Diesel Tractors 1956-57.
3. Total Repairs during 1956-57. Diesel Tractors.
4. Tractor Use by Type of Work. July 1956 - August 1957.
5. Four Weekly Tractor Use. July 1956 - August 1957.
6. Standard Table. Running Costs 16 Wheeled Diesel  
Tractors 1956-57.

RUNNING COSTS PER HOUR - DIESEL TRACTORS 1956-57.

TABLE 1.

Pence per hour.

Tractor No.	Total repairs	Annual charges Licence & insurance	Fuel			Total running costs	Diesel fuel	Total hours for year
			Diesel	Other oil & grease	Total fuel		Used per hour	
<u>FORDSON</u>								
11	5.1	1.1	9.0	1.5	10.5	16.7	0.49	929
14(a)	3.3	1.2	14.6	1.8	16.4	20.9	0.80	967 $\frac{1}{2}$
14(b)	3.6	1.9	10.3	0.9	11.2	16.7	0.57	617
14(c)	1.0	2.2	14.7	0.3	15.0	18.2	0.82	542
18(a)	4.0	0.9	5.9	0.9	6.8	11.7	0.33	1,274
18(b)	11.6	1.6	6.9	0.9	7.8	21.0	0.38	684
24	4.0	0.8	13.1	0.5	13.6	18.4	0.73	1,466
27	4.0	1.2	12.1	0.7	12.8	18.0	0.67	892
28	2.9	0.8	13.7	1.0	14.7	18.4	0.76	1,282
32(a)	5.8	1.3	7.0	1.0	8.0	15.1	0.39	949 $\frac{1}{2}$
32(b)	5.5	1.4	11.5	1.1	12.6	19.5	0.64	909 $\frac{1}{2}$
32(c)	13.8	1.0	12.2	0.7	12.9	27.7	0.68	1,213
<u>FERGUSON</u>								
4	5.5	1.0	11.2	0.5	11.7	18.2	0.62	1,065 $\frac{1}{2}$
8	23.5	1.5	9.5	1.4	10.9	35.9	0.53	803
15	2.0	1.3	13.0	3.2	16.2	19.5	0.72	853
<u>DAVID BROWN 25D</u>								
29	2.5	1.2	10.0	1.2	11.2	14.9	0.57	819 $\frac{1}{2}$
<sup>1</sup> Average of 16 Tractors	6.1	1.3	10.9	1.1	12.0	19.4	0.61	954
<u>OTHER TRACTORS</u>								
FARMALL SUPER	5.0	1.4	17.7	1.2	18.9	25.3	0.98	774
COUNTY TRACK-LAYER	3.0	1.6	20.6	1.2	21.8	26.4	1.14	453

<sup>1</sup>See page 3.

CAPITAL COSTS OF DIESEL TRACTORS 1956-57.

TABLE 2.

Tractor No.	Age		Purchase price	Value at start of year	Wear & Tear allowance for year	Major Since		Repairs Purchase		Capital Costs	
	At start of year	Estimated life				Total	Charge for year	Total	Per hour		
	Years	Years	£.	£.	£.	£. s.	£. s.	£. s.	Pence		
<u>FORDSON</u>											
11	4	10 <sup>1</sup>	547	146	41	-	-	41. 0	10.6		
14(a)	3	7	620	245	69	20. 16	5. 4	74. 4	18.4		
14(b)	2	7	620	340	95	38. 12	9. 13	104.13	40.7		
14(c)	-	7	620	510	110	-	-	110. 0	48.7		
18(a)	2	10	620	320	90	-	-	90. 0	17.0		
18(b)	4	10	550	147	41	40. 0	10. 0	51. 0	17.9		
24	$\frac{1}{2}$	4	612	540	152	-	-	152. 0	24.9		
27	1	10 <sup>1</sup>	603	423	119	-	-	119. 0	32.0		
28	1	5	595	433	122	-	-	122. 0	22.8		
32(a)	3	5 <sup>1</sup>	655	242	68	30. 0	10. 0	78. 0	19.7		
32(b)	$\frac{1}{4}$	5 <sup>1</sup>	620	586	165	-	-	165. 0	43.5		
32(c)	2	5 <sup>1</sup>	620	320	90	-	-	90. 0	17.8		
<u>FERGUSON</u>											
4	$\frac{1}{2}$	5	582	487	137	-	-	137. 0	30.9		
8	5	6	380	79	22	-	-	22. 0	6.6		
15	$\frac{1}{2}$	2	595	483	136	-	-	136. 0	38.3		
<u>DAVID BROWN 25D</u>											
29	4	7	600	160	45	84. 0	28. 0	73. 0	21.4		
Average of 16 Tractors	2	6	590	341	£. s. 93. 17	-	3. 19	97.16	25.7		
<u>OTHER TRACTORS</u>											
FARMALL SUPER	5	12	800	154	44	50. 0	6. 0	50. 0	15.5		
COUNTY TRACK-LAYER	1	- <sup>2</sup>	1,200	962	270	-	-	270. 0	143.0		

<sup>1</sup>Indefinite

<sup>2</sup>Indefinite - Tracks 4 years.

TOTAL REPAIRS DURING 1956-57. DIESEL TRACTORS

Tractors listed in order of age.

TABLE 3.

Tractor No.	Age at start of year	Major Repairs		Running Repairs						Total hours	Comment
		Year	Cost	Spares & service agent	Farm Labour				Total		
					Repairs	Service					
	Years		£. s.	£. s.	£. s.	£. s.	£. s.	£. s.			
8	5	-	-	75. 0	-	3. 12	78. 12	803	See text page 9		
11	4	-	-	2. 0	5. 6	12. 10	19. 16	929			
18(b)	4	54-55	40. 0	25. 14	16	6. 11	33. 1	684	New battery £14		
29	4	55-56	84. 0	5. 0	10	2. 16	8. 6	819½	Engine overhaul & tyres		
14(a)	3	56-57	20. 16	8. 6	18	4. 1	13. 5	967½	Tyres		
32(a)	3	55-56	30. 0	17. 0	-	6. 1	23. 1	949½	Tyres		
14(b)	2	56-57	38. 12	7. 11	-	1. 15	9. 6	617	Tyres		
18(a)	2	-	-	8. 2	-	13. 1	21. 3	1,274			
32(c)	2	-	-	60. 12	10	8. 8	69. 10	1,213	Retreads every year £30		
	Months										
27	13	-	-	8. 10	-	6. 6	14. 16	892			
28	12	-	-	8. 10	-	6. 15	15. 5	1,282			
15	7	-	-	3. 0	1. 0	3. 6	7. 6	853			
4	6	-	-	23. 14	-	1. 0	24. 14	1,065½	Replaced filter pipe		
24	5	-	-	7. 17	-	16. 4	24. 1	1,466			
32(b)	4	-	-	15. 0	-	5. 10	20. 10	909½			
14(c)	new	-	-	1. 4	-	1. 2	2. 6	542			
Total		-	213. 8	277. 0	9. 0	98. 18	384. 18	15,266½			
Per Tractor		-	-	17. 6	11	6. 4	24. 1	954			

TRACTOR USE BY TYPE OF WORK JULY 1956 - AUGUST 1957.

Calculated as percentage of total hours worked in the year.

TABLE 4. Per cent.

Tractor No.	FIELDWORK							HAULAGE					BELT WORK
	Heavy Cults.	Light Cults.	Drilling	Mowing Grass	Grass & Corn Harvest	Root Harvest	TOTAL	Grass & Corn	Roots	F.Y.M.	General	TOTAL	
11	21.2	6.0	11.7	3.6	12.8	2.4	57.7	9.9	10.9	16.6	4.9	42.3	-
14(a)	31.3	5.7	10.2	3.6	9.3	5.0	65.1	9.5	-	4.6	7.1	21.2	13.7
14(b)	2.7	4.6	0.8	0.5	7.8	-	16.4	12.8	4.7	15.0	26.4	58.9	24.7
14(c)	42.7	19.8	5.9	1.1	6.5	-	76.0	4.6	3.1	11.0	4.7	23.4	0.6
18(a)	28.6	5.5	4.5	6.7	8.9	3.2	57.4	9.9	9.9	6.4	13.3	39.5	3.1
18(b)	9.9	6.3	2.5	-	1.5	-	20.2	22.0	15.4	6.4	32.9	76.7	3.1
24	45.7	4.8	5.9	-	3.3	-	59.7	19.1	2.7	3.3	10.0	35.1	5.2
27	38.6	8.5	12.4	4.1	17.7	-	81.3	6.3	3.9	4.8	2.6	17.6	1.1
28	29.2	5.6	4.5	4.1	19.5	-	62.9	5.2	11.1	11.9	4.0	32.2	4.9
32(a)	11.2	21.8	-	1.8	27.5	7.4	69.7	-	-	20.2	9.8	30.0	0.3
32(b)	58.8	1.0	5.6	3.0	0.2	-	68.6	23.9	-	0.9	5.2	30.0	1.4
32(c)	38.4	13.9	3.7	22.1	7.3	7.7	93.1	1.0	-	1.8	3.8	6.6	0.3
4	33.7	6.9	15.8	1.3	12.0	9.2	78.9	9.4	0.4	0.1	11.2	21.1	-
8	55.1	7.0	13.5	-	9.9	11.2	96.7	-	-	2.2	1.1	3.3	-
15	54.2	13.5	6.9	2.3	3.3	-	80.2	10.1	-	3.8	4.9	18.8	1.0
29	31.6	3.7	1.4	2.4	14.2	28.1	81.4	4.8	1.3	10.4	2.1	18.6	-
Weighted Average 16 Tractors	34.0	8.1	6.7	4.1	10.3	4.5	67.7	9.3	4.0	7.1	8.4	28.8	3.5
17	51.9	5.0	2.5	4.8	30.3	-	94.0	2.8	-	-	2.7	5.5	-
7	100.0	-	-	-	-	-	100.0	-	-	-	-	-	-



FOUR-WEEKLY TRACTOR USE. JULY 1956 - AUGUST 1957.

Calculated as Percentage of Total Hours worked in the Year.

TABLE 5.

Per cent.

From... To.....	FOUR WEEK PERIOD												
	6 Aug 2 Sep	3 Sep 30 Sep	1 Oct 28 Oct	29 Oct 25 Nov	26 Nov 23 Dec	24 Dec 20 Jan	21 Jan 17 Feb	18 Feb 17 Mar	18 Mar 14 Apr	15 Apr 12 May	13 May 9 Jun	16 Jun 7 Jul	8 Jul 4 Aug
<u>Tractor</u> No.													
11	5.0	9.4	10.1	7.6	7.9	6.1	8.6	8.9	14.8	8.6	2.5	5.7	4.8
14(a)	4.2	6.3	9.3	9.5	4.4	0.8	3.4	4.7	16.3	14.0	19.2	5.5	2.4
14(b)	8.0	12.1	12.3	8.0	6.2	2.6	2.4	7.1	7.6	3.6	8.3	14.7	7.1
14(c)	Purch	15 Oct	2.7	6.4	5.1	1.6	1.1	4.7	23.1	22.2	18.5	9.3	5.3
18(a)	8.5	9.0	9.3	10.4	10.2	5.3	1.8	4.5	8.8	10.0	3.5	12.0	6.4
18(b)	1.2	10.8	16.6	14.3	10.1	2.3	7.6	6.2	7.8	6.8	2.3	8.1	5.9
24	4.0	11.2	12.8	7.8	8.0	2.5	4.6	9.9	7.5	6.4	10.9	8.5	5.9
27	4.6	14.6	10.4	10.3	10.6	7.3	2.9	3.5	12.7	5.0	3.6	8.8	5.7
28	5.9	11.0	6.3	4.1	6.6	5.7	7.6	9.0	14.6	12.4	6.6	7.1	3.1
32(a)	8.3	7.9	8.4	7.3	4.2	2.0	3.2	3.8	11.8	7.8	16.7	14.2	4.4
32(b)	6.3	9.2	2.9	9.4	7.6	0.8	1.4	5.4	13.3	11.8	12.0	10.3	9.6
32(c)	6.0	6.6	9.5	8.6	10.8	0.3	1.8	2.5	13.3	11.3	10.6	10.3	8.4
4	4.7	7.0	12.6	14.1	11.0	8.4	5.8	2.2	9.5	5.4	6.3	7.3	5.7
5	0.9	10.2	9.7	14.7	6.7	5.2	-	0.8	8.5	16.9	8.9	10.9	6.6
15	4.3	9.5	13.1	14.2	11.2	8.0	2.5	2.6	16.7	9.5	0.8	7.6	sold
29	5.2	9.3	14.3	13.5	13.6	10.5	2.6	-	13.1	6.5	4.8	3.8	2.8
Weighted Average 16 Tractors	5.0	9.2	10.0	9.8	8.5	4.3	3.7	5.0	12.1	9.7	8.4	8.9	5.4
17	7.3	10.6	12.9	10.8	6.3	-	-	-	8.7	9.2	10.1	14.7	9.4
7	5.0	-	16.9	29.3	11.9	4.0	-	2.7	23.8	-	-	-	6.4

Tractor No. 14(c) purchased 15th October. An additional tractor to 14(a) and (b).

Tractor No. 15 had completed a year's work although sold before the end of the year.

Work done prior to 6th August, 1956 has been included in period 8th July to 4th August, 1957.

STANDARD TABLE. RUNNING COSTS. 16 WHEELED DIESEL TRACTORS 1956-57.

Total Costs and Average Cost per Tractor for 52 Weeks

July, 1956 to August, 1957.

TABLE 6.

	T O T A L S				Per Tractor
	12 FORDSON	3 FERGUSON	1 DAVID BROWN	All 16	
	£. s.	£. s.	£. s.	£. s.	£. s.
<u>REPAIRS</u>					
Paid Repairs and Spares	170. 6.	101.14.	5. 0.	277. 0.	17. 6.
Repairs farm labour	7.10.	1. 0.	10.	9. 0.	11.
Service farm labour	88. 4.	7.18.	2.16.	98.18.	6. 4.
Total	266. 0.	110.12.	8. 6.	384.18.	24. 1.
<u>STANDING CHARGES</u>					
Licence	24. 0.	6. 0.	2. 0.	32. 0.	2. 0.
Insurance	34. 3.	8. 9.	2. 0.	44.12.	2.16.
<u>FUEL</u>					
Diesel Fuel	535.15.	127. 8.	34. 6.	697. 9.	43.12.
Oil and Grease	45.14.	18. 6.	4. 5.	68. 5.	4. 5.
TOTAL COSTS	£905.12.	£270.15.	£50.17.	£1,227. 4.	£76.14.
Consumption of Diesel Fuel (Gals.)	7,138½	1,698	457½	9,294	518
Total Hours worked	11,725½	2,721½	819½	15,266½	954

For Capital Costs see Table 2. (Appendix)

