

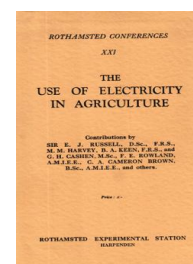
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# The Use of Electricity in Agriculture

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## Calculation of Costs (Threshing)

### Rothamsted Research

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## CALCULATION OF COSTS (THRESHING)

Although the purpose of the Rothamsted experiments is to compare equivalent consumptions of fuel and electricity; the use of these figures is to provide the basis for comparing the relative costs of the two forms of power. The electrical installation at Rothamsted is designed for both experimental and normal farm work, hence our own costings data would not directly apply to commercial farm conditions. In the following calculations typical commercial farm conditions for a farm of similar size and cereal acreage to Rothamsted are assumed.

### METHODS OF COSTING

#### (1) *Starting and Running Costs.*

The only labour costs which have been considered are those for lining up the source of power with the thresher. During actual threshing, the number of men employed was the same whether the motor or tractor was used: the labour charge is therefore the same for all sources of power. The cost of labour was estimated on a basis of 1s. per hour for the tractor driver and 8d. per hour for general labour.

The cost of electricity for the quarter in which the threshing was done was 1.42d. per kWh: the tariff was 1d. per kWh, the additional 0.42d. representing the quarterly fixed charge spread over a consumption of 3,061 kWh. The price of the petrol used was 1s. 2½d. per gallon, and of the paraffin 6d. per gallon. Lubricating oil, for a consumption of one pint for each experiment, cost 1.9d per hour.

#### (2) *Overhead Costs.*

The overhead costs are strictly those for maintenance and depreciation: interest on capital invested is actually a charge against profit and not a cost, but it has been included in this report as a cost since the report does not contain a final profit and loss account, where the effect of different capital investments would normally be shown.

To derive the average overheads for each type of plant, some assumptions must be made as to the working life and maintenance costs, items which are more speculative for the electrical equipment than for the tractors.

The farm records show that the old tractor has performed 7,000 hours' work in seven years, and it is considered that this tractor is capable of another 1,000 hours' work at least before it will be scrapped. Consequently, a life of 8,000 hours over eight years has been allowed for the tractors.

The motor, under industrial conditions, might be expected to have a life of at least 20,000 hours, which would correspond to 40 years at 500 hours per annum. The damper conditions on a farm, combined with intermittent use, would result perhaps in a somewhat shorter life.

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Again, the life and maintenance costs of the circuit are as yet not known with certainty.

The following tentative estimates supplied to us from authoritative sources have been used :

Motor.—Life, 20 years ; annual maintenance 2 per cent of original cost.

Circuit.—Life, 25 years ; annual maintenance  $2\frac{1}{2}$  per cent of original cost.

Tractor—Annual maintenance figure 3.75 per cent. of original cost.

The depreciation has been calculated from the rate of wear and tear normally allowed for income tax purposes for farming plant and machinery :  $22\frac{1}{2}$  per cent for tractors and  $7\frac{1}{2}$  per cent for electric motors.

The interest charge is calculated as 5 per cent. of the value of the plant at the beginning of the year.

In calculating the average overhead charges, the total depreciation over the working life (calculated on the rates of wear and tear previously mentioned), and the total interest charges have been found, and the mean cost per year worked out. (In practice, the depreciation rate allowed for income tax purposes on electrical equipment does not apply to an electrical circuit which is not counted as plant or machinery. For the purposes of these calculations the rate of  $7\frac{1}{2}$  per cent. has, however, been assumed to apply.)

The full details of the costings have been given in an interim Report to the Royal Agricultural Society of England, so in the present paper only the summary is given. (Table 4).

Table 4

*Charges for one hour's threshing.*

(20 h.p. electric motor ; 10-20 h.p. tractor ; each running at half load. Output : 2 tons of grain per hour.)

|                             | <i>Electrical<br/>equipment<br/>d.</i> | <i>Tractor<br/>d.</i>            |
|-----------------------------|--|----------------------------------|
| Fuel + oil ; or Electricity | 11.4<br>(8.0 kWh.)                     | 10.1<br>(Mean for 9 experiments) |
| Overheads .. ..             | 4.8                                    | 9.4                              |
| Total .. .. .               | 16.2                                   | 19.5                             |

This table shows that for the conditions at Rothamsted, electricity is the cheaper form of power. Although the cost of electricity for one hour was 11.4d. as against 10.1d. for paraffin, the overhead charges for the motor are only half those for the tractor.

The cost of electricity was, as stated above, 1.42d. per kW hour. This figure will have to rise above 1.85d. per kW hour before electricity becomes the more costly form of power under the conditions given.