

# Canterbury Chamber of Commerce

Agricultural Bulletin

## TRACTOR COSTS

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### Introduction.

The replacement of horse power by motor power in various countries since the period of the Great War has effected a revolution in farming. The rapid increase in automobiles and tractors has resulted in a decrease in the area of land required to be devoted to provision of horse feed, and liberated further land for production of other farm products. In 1919 there were 363,000 horses (of which 208,000 were draught horses) and 136 tractors; in 1931 there were 297,000 horses (of which 183,000 were draught horses) and 5000 tractors. These figures indicate that in New Zealand the use of tractors has not involved the actual displacement of an equivalent number of draught horses on the farm. In many cases more and better cultivation is being performed, and in some cases tractors are being used for emergency periods only. On a few farms, however, tractors are being used to full capacity, necessitating often two shifts per day in the busy season, and worked either in conjunction with horses or entirely displacing horses from the farm.

### Methods of Arriving at Tractor Costs.

The costs of maintaining a tractor for any period can be arrived at by totalling all the direct costs of fuel, oil, and grease delivered on the farm, repairs, sundries, housing, attention, etc., and adding all the estimated indirect costs of interest and depreciation on the tractor, on the tractor shed, and on the special implements and other equipment required. When the total so obtained is divided by the number of hours worked, or the number of acres ploughed, etc., and an allowance is also made for the special costs of labour and implements used, then the total cost per hour worked or per acre ploughed, etc., can be arrived at. Thanks are due to the owners of 31 tractors who have assisted in the compilation of this Bulletin by supplying their own individual costs. These and other returns have been used in the general conclusions drawn. The actual costs quoted, however, are of little use to the individual unless he makes out his own costs. With his own costs as a guide he can decide how to alter his system of farming to suit changing prices and conditions.

In twenty-five instances examined, petrol or kerosene tractor costs were found to vary considerably, and ranged between 3s and 9s per hour worked, and in the case of six crude oil tractors costs were found to range between 2s and 3s 2d per hour worked. Three examples of average costs for 1000 hours' work are set out below. On the higher priced tractors, however, it is certain that a longer than 5000-hour life could be secured.

TRACTOR WORKING	SCHEDULE.		
	Kero- sene.	Kero- sene.	Crude oil.
Type of tractor	10/20	15/30	15/30
Horse power ..			
Approx. cost price of tractor ..	£350	£450	£500
Costs of working per year:	£	£	£
Direct costs—			
Fuel ..	90	100	36
Oil and grease ..	20	20	17
*Repairs ..	7	13	10
Indirect costs—			
*Est. dep'n. at 20 cent. ..	70	90	100
*Est. Int. at 6 per cent. ..	10	14	15
Est. total cost ..	£197	£237	£178

### PLOUGHING COST SCHEDULE.

	s. d.	s. d.	s. d.
Estimated cost per hour worked ..	3 11	4 9	3 7
Estimated cost per day of 8 hours ..	31 4	38 0	28 8
Estimated cost of labour per day ..	14 0	14 0	14 0
Estimated total cost per day ..	45 4	52 0	42 8
Estim'd. area ploughed per day ..	6 acres	8 acres	8 acres
	s. d.	s. d.	s. d.
Estimated cost per acre	7 7	6 6	5 4
Estimated cost for use of plough per acre ..	9	11	11
Total cost of plough- ing per acre ..	8 4	7 5	6 3

\*Note.—In the above examples depreciation at 20 per cent. of the cost price is calculated, and interest on one-half the original cost because in succeeding years interest costs would decrease as the value of the tractor was reduced. If a 6 to 10-year tractor life is obtained depreciation costs after five years would be nil, but repair costs would tend to increase.

### Variation in Tractor Costs.

While the total costs for the use of a tractor increases the more the tractor is worked, the costs per acre cultivated or per hour of work done tends to decrease with longer hours of work.

The direct costs vary with the type of tractor, horse power, and load given, state of repair of the tractor and skill of working. Indirect costs vary with interest and depreciation on the tractor for the period considered and with the number of days or hours worked. Good tractor management depends upon never overloading, constant provision of fresh oil and grease as required, immediate repair of any parts the moment they require attention, and careful driving. The necessary mechanical knowledge can best be acquired by learning as a youth, although special mechanical classes if instituted at agricultural or university colleges would probably receive support from farmers generally; such classes are well attended at some of the Canadian Agricultural Colleges.

### Variation in Individual Items of Tractor Working Costs in Thirty-one Cases Examined.

Direct costs of fuel average 1s 8d and range from 6½d to 3s per hour worked. The cost of the fuel ranges around 1s 2d to 1s 4d per gallon for kerosene and petrol and 7d per gallon for crude oil. Although none of the semi-Diesel tractors quoted has yet been costed for more than three years, they cost at the present price of crude oil much less to run per hour and per amount of work done than the petrol or kerosene type. A large area of land must be cultivated to warrant the use of any large or high-priced tractor.

Oil and grease costs average 4d, and range from 1½d to 8d per hour worked. Repairs, etc., average 3d, and range from nil to 7d per hour worked. Total direct costs average 2s 3d, and range from 8d to 4s 3d per hour worked.

### "Indirect Costs Include Depreciation and Interest."

The actual total depreciation is measured by the difference between the original cost of the tractor delivered fully equipped on the farm, and the scrap value of the tractor when discarded. If the tractor is sold without having been used for its full life, the total depreciation will depend on the difference between the cost price and the

price received for the tractor. The new tractor would be valued at cost, and thereafter depreciated in value by 20 per cent. per annum, or according to anticipated length of life. Depreciation costs average 1s 6d per hour worked, and in the estimates given varied from 8d to 4s 6d per hour worked.

In the returns examined interest at 6 per cent. per year on the average value of the tractor on hand over the whole period was calculated. Interest costs average 4d per hour worked and range from 2d to 2s per hour in extreme cases, where tractors are high-priced and little used.

Total indirect costs average 1s 10d and range from 10d to 6s 6d per hour worked.

#### Comparison with Horses.

In Bulletin No. 12 the question of costs of horse labour was detailed. On a basis of comparison of horse and tractor costs, tractors, particularly low fuel consumption tractors, are cheaper than horses per unit of work done, provided the sufficient area is cultivated. By enabling the cultivation to be done early and in season, tractors under these conditions allow of a greater net production.

The advisability of purchasing a tractor depends upon whether such a purchase will tend to increase the net income of the individual farmer over the full period for which the tractor is to be used. In estimating the difference in the net returns and additional costs and gains involved by the purchase of a tractor, care must be taken to allow

not only for the cost of interest and depreciation on the tractor, but also for the cost of purchase and conversion of other implements to tractor use and extra wear and tear of implements due to additional work.

As a general rule tractors are profitable under the following conditions:—

1. Where the use of a tractor reduces the labour cost of working the land and enables increased production to be secured.

2. Where, as on heavy cropping land, a tractor is required as a supplement to the six-horse team for rush periods.

3. Where, as on the light plains land, horse feed is expensive to grow and a powerful low fuel consumption tractor handling a large acreage for sheep feed can be economically used.

4. Where, as on back country, all the available supplementary feed is required for the sheep, and the costs for provision of sheep feed can be kept down by the use of a low-priced light tractor.

5. When general prices are rising and increased production from the area previously required for growing feed and pasture for horses can be sold at a profit. When wool is selling at 1s 3d per pound, fat lambs at 9d per pound, butterfat at 1s 6d per pound, and wheat at 5s 6d per bushel, then costs approaching these figures can be incurred in production of an extra unit of these commodities, but when selling prices are reduced, wool at 5d, fat lambs at 5d, butterfat at 1s, and wheat at 4s, costs must not exceed these figures. As shown above, the total average outlay per annum for running a tractor will be around

£200, but, whatever the outlay, it will require a corresponding increase in income from the use of the tractor. When prices are low, this income is difficult to obtain. Lower interest and depreciation costs are involved in the use of horses, and when labour and land has little earning value, the use of horses involves little money outlay, except for chaff-cutting, twine, use of sacks, etc. As a general rule, the use of tractors on steep land is unprofitable.

#### Conclusion.

The use of tractors, therefore, represents an advance in the standard of living, of farming, and of farm production, which depends for its continuance on how far it can be made to pay. Under normal conditions, the proper way to decide whether or not to buy a tractor is to make out budgets of the estimated returns obtainable from the property run by horse labour, by tractor power, by horse and tractor power, or without cultivation. Costs are of value to a farmer only when related to his individual farm returns; for example, a horse ploughing cost of 10s per acre might be profitable on one particular farm, while a tractor ploughing cost of 5s per acre might be unprofitable on another farm.

If the conditions to be met on any particular farm are given in detail to Canterbury Agricultural College, advice will be offered as to whether the use of a tractor would be economical.

Copies of this bulletin may be obtained from the Secretary, Canterbury Chamber of Commerce, P.O. Box 187, Christchurch.