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BULK MILK TANKS ON FARMS

COSTS AND ECONOMIC ASPECTS

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Costs and Economic Aspects

by

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SUMMARY

This report gives the results of a study of the costs of operating bulk milk collecting tanks on seven Wigtownshire farms. For comparison, the cost is shown of cooling and storing milk on four comparable farms from which collection is in churns.

As the farms concerned differed in factors other than the method of cooling and storage, the information obtained was used to estimate the costs on three hypothetical farms which differ in this factor only. They are as follows:- (1) Ice-bank type of tank; (2) Holding tank and cooler; (3) Cooler and churns. Comparison of the estimated costs show that the running cost and depreciation on equipment on the tank farms are a little less than those on the farms using churns only, but when interest on capital outlay is added, the bulk tank farms cost a little more than the churn farms. The differences, however, are slight and are probably no more than would be obtained on different farms of the same type.

Information is given on equipment, labour and other factors which affect the use of bulk milk tanks. Various points which should be considered when changing over from churns to bulk tanks are discussed.

INTRODUCTION

Many improvements have been made in recent years in the methods of handling farm produce, and among these, the bulk collection of milk from tanks on farms instead of in churns, has aroused considerable interest. In manufacturing industry, liquids have been moved in bulk for many years. The practice has increased since the war and has been a means of reducing costs and labour. This principle was first applied to milk on farms some years ago in the United States and since then it has been extended to cover a wide range of farms throughout that country.

In view of the interest which the new method had aroused in this country, the Scottish Milk Marketing Board started a trial scheme in Kirkcudbrightshire in 1954. This Scheme was financed initially by the Board who were responsible for obtaining the tanks and equipment. After it had been in operation for a year it was reported that the scheme was working smoothly(1). It was considered that it gave several advantages to the farmer and there were considerable savings in the cost of transporting milk to the Creamery.

Another scheme was started in Wigtownshire in 1956, this time initiated by a number of local farmers, who purchased their own tanks and equipment. Since the scheme was on a fully commercial basis it provided a suitable opportunity for examining the new system and its economic advantages to the farmer. An investigation was therefore made by the writer in Wigtownshire to find out the costs of operating bulk milk tanks and to compare them with the cost of cooling and despatching milk on farms using churns only. The results are given in this report. It must be pointed out that owing to the small number of farms concerned, and because some of the costs could be estimated only approximately, the results may not be absolutely typical but they do represent the best estimates available.

A brief description of bulk milk collection is desirable. On farms where the milk is collected in churns, after the milk has been cooled, it is stored in churns in a cool place until it is despatched. Where bulk milk tanks have been installed, the milk is stored in a refrigerated tank, the morning milk being mixed with that from the night before. The milk is collected by motor tanker. After it has been checked for quality and the quantity measured with a graduated dip-stick, it is pumped from the tank outlet into the tanker by a pump housed at the rear of the latter.

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(1) Scottish Milk Marketing Board. Milk Collection by Tanker.

On the farms concerned in this investigation two different types of tank were in use. In one, the tank is fitted with a chilled water jacket operated on the ice-bank principle. When the milk is poured into this it is cooled to 40°F. and is kept at this temperature until the tank is emptied. In the other type of tank, the milk is first cooled to 40°F. or less by pouring it over a corrugated direct expansion cooler, from which it passes to a holding tank. Here it is kept at 40°F. by means of a small direct expansion cooling unit. The cooler may be in two parts, the first of which cools the milk by means of cold water only and the second, which reduces the temperature further in the refrigerated unit. The refrigerating units for both types of tank are usually air-cooled but water-cooled units can be obtained.

In the Wigtownshire Scheme the milk is collected daily except for a period during the winter when production is low, when collection takes place on alternate days only. Immediately after it has been emptied, the tank must be cleaned with water and detergent and sterilised with a hypochorite solution.

METHOD OF INVESTIGATION

Information on labour requirements and costs of production were obtained from seven farms in Wigtownshire which had installed bulk milk tanks about a year previously. In addition, four farms which used churns only and were as comparable as possible in type and size with the bulk tank farms were selected and similar information was obtained from them, so that the two methods could be compared.

The number of cows on these farms varied from 68 to 138 and the average production per cow ranged from 650 to 975 gallons per annum.

The cost of all equipment used for cooling and despatching milk was ascertained - tanks, coolers, milk churns, pumps etc., including the cost of installation and of alterations to buildings where this was necessary. The farmer's opinion of the probable length of life of each item of equipment was recorded and the annual cost of repairs to the equipment was estimated. The approximate annual cost of consumable stores - brushes, detergents, filter pads, fuel etc - was obtained.

For each farm, an annual charge for depreciation on plant, buildings and equipment was calculated by dividing the cost of each item by the estimated length of life, due allowance being made for scrap value.

In order to ascertain the amount of work involved, time studies were made on each farm of the work done in the dairy during and after milking, in the despatching of milk and in the cleaning of tanks or churns and other equipment. From these, the time taken to carry out the dairy work each day was obtained, and from this it was but a step to calculate the total requirement per year. Where the time required for a job was liable to vary according to the quanity or number of items processed, e.g. the number of churns of milk produced, the total time taken for the job was expressed as a fixed time plus so much time per variable (e.g. per churn). In this way it was possible to estimate the time taken for any quantity of the variable factor. Owing to their seasonality of production the amount of milk produced daily on these farms differs widely from summer to winter, so the total labour requirement was based on the average daily sales, due allowance being made, in the case of the bulk tank farms, for the time during which collection was on alternate days only. Labour was charged at 3/9d per hour and the total cost per annum was calculated.

INDIVIDUAL FARM COSTS

Of the farms observed, four had ice-bank tanks and three had holding tanks. An attempt has been made to compare the costs of operating these two types, but unfortunately the financial data for two of the holding tank farms is incomplete.

The cost of cooling and storing milk on the different farms was calculated from the data described above and is shown in Table I.

TABLE I

Cost of Milk Cooling and Storage. 1956 - 1957

Farm No.	Gallons of Milk Sold	Depreciation on Equipment	Repairs and Replacements	Consumable Stores used (including fuel)	Labour	Total Cost	Cost per gallon of milk
		£ s	£ s	£ s	£ s	£ s	
Ice Bank Tanks							
A	104,400	113: 14	50: 8	93: 6	75: 0	332: 8	.76d.
B	70,112	80: 16	25: 7	243: 6	143: 16	493: 5	1.69d.
C	60,168	66: 19	33: 4	104: 4	46: 1	250: 8	1.00d.
D	78,000	77: 13	33: 10	103: 19	85: 19	301: 1	.93d.
Holding Tanks							
E	125,000	80: 19	65: 14	249: 2	136: 5	552: 0	1.02d.
Churn only Farms							
H	55,985	38: 1	2: 16	75: 19	129: 7	246: 3	1.06d.
J	59,800	67: 10	14: 10	146: 12	120: 5	348: 17	1.35d.
K	81,450	49: 19	25: 15	80: 14	217: 9	373: 17	1.10d.
L	38,593	46: 8	19: 11	85: 3	157: 10	308: 12	1.26d.

In calculating these costs no allowance has been made for interest on capital nor for income tax allowances. The real incidence of these varies according to the farmer's individual circumstances.

On all farms but J the milk was brought from the byre to the dairy in churns and a milk pump was used to convey it to the tank or to the cooler. Farms A, E and H had electric pumps and on the remaining farms the pumps were vacuum operated.

Under the heading of Consumable Stores is included the cost of electricity. For bulk tanks, the average consumption of electricity by ice-bank tanks has been estimated by the South of Scotland Electricity Board to be 1 unit for about 14 gallons of milk and 1 unit for about 28 gallons of milk by holding tanks - including coolers. On one farm of each type where the cooling units were on a separate meter, it was found that over a period of 15 months, with the ice-bank tank, approximately 12½ gallons of milk had been cooled per unit consumed and with the holding tank approximately 46 gallons had been cooled per unit of electricity.

It was not possible to ascertain the cost of electricity used for heating water and steam raising. It was, however, assumed that the cost would be roughly proportional to the number of hours during which the heaters were in use, and this multiplied by the rated consumption of the installation was taken as the daily consumption. The cost of a unit of electricity is taken at 1d. This is the lowest charge after the higher charges for the initial consumption have been worked off, and it is assumed that the electricity used for cooling milk would normally be paid for at this rate.

The cost of current consumed by the electric milk pumps is not included. No corresponding estimate could be made of the cost of operating the suction milk pumps.

No account has been taken of the amount of water used as there was no method by which this could be measured. Most of the farms visited had their own supply, some gravity fed, for which the cost was negligible, while others had a pumped supply and had to bear the cost of pumping. Other farms have to pay for water by meter from the county supply.

From Table I it can be seen that the cost of cooling and storing milk in the bulk tanks lay between .76d and 1.7d per gallon. It should however be stated that on Farm B, heavy consumption of coal by an old boiler made the cost of expendable stores high, while for various reasons the cost of labour was unduly high. (Measures had already been taken to reduce these excessive costs). On the farms using churns only the costs varied from 1.06d. to 1.35d. per gallon of milk produced.

When a farm is changing over from churn collection to bulk collection, some revenue may be expected from the sale of old equipment. On the farms visited, the sales were largely confined to milk churns and, in the case of three farms, coolers. The sum obtained for these was £1 to £2 per churn and £30 to £40 for a cooler. The total revenue from this source might be about £100 depending on the number of churns sold. This revenue has not been taken into consideration in computing the costs above.

COMPARISON OF METHODS

In order to make an accurate comparison of the costs of different methods the farms compared should differ only in respect of those methods. The farms observed differed in many factors - quantities of milk produced, routine of work, method of steam raising and so on - so that a direct comparison of the averages from different categories of farms would not necessarily give a true representation of the different costs. To overcome this difficulty, three hypotchetical farms have been postulated, which differ only in the method of cooling and despatching the milk. The data obtained from the farms observed have been used to calculate the cost of cooling and storing milk on the hypothetical farms, and in doing so, they have been adjusted to suit the situation that has been assumed for these farms.

The data assumed are as follows:-

Stock

80 cows producing 750 gallons each per annum
= 60,000 gallons of milk per annum.

Equipment common to all farms

4 K.W. electric steam raiser & water heater
Suction milk pump to tank or cooler
Churn barrow
4 carrying churns - 10 gallons each
Steam chest & wash up sink in scullery.

Distances on all farms

Dairy door to milk pump	10 feet
" " " wash up in scullery	45 "

Equipment specific to each farm

(1) Ice-Bank Tank type farm

300 gallon ice-bank tank with refrigerating unit.

(2) Holding Tank type farm

300 gallon holding tank with refrigerating unit.
Direct expansion refrigerated cooler - capacity 65 gallons per minute.

(3) Churns only type farm

Direct expansion refrigerated cooler - capacity 65 gallons per minute.
50 10-gallon churns
Steam jet and block in scullery.

The cost of tanks and refrigerators is taken at the current cost (Spring 1958). Other items are charged at the approximate average of their cost on the observed farms. Average figures are also used for the cost of the installation of the tank and the necessary building alterations to the dairy.

In estimating the cost of labour, comparable work routines have been assumed for each farm type and the times that would be required to carry them out have been calculated from the appropriate data in the time studies(1).

The estimated cost per annum for interest on capital is shown in Table No.II. Although these figures represent only an estimate of the costs, they do fall within the range of costs shown on individual farms and to that extent may be assumed to be reasonably representative of the type of farm.

The cost of dairy work on the farms using the two types of tank is only a very little less than the cost on the farm where milk is despatched in churns. If a charge for interest on capital at 5% per annum is added, (Table IIa) the order of costs is reversed and the cost per annum on the tank farms slightly exceeds that of the churn farm. The differences are too small to be significant and it is probable that a similar difference might occur between two farms using the same method.

The ice-bank installation has the higher capital cost but this is offset by a lower labour requirement. While the capital cost of equipment is low on the churn farms, the labour cost is high, and it is clear that a considerable reduction in labour can be effected by the use of bulk tanks.

As with the individual farms no account has been taken of the amount of water used. Where water has to be paid for according to the quantity used, the balance of advantage would lie with the ice-bank tanks which are more economical in their use of water.

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(1)For those who are interested in the work study aspect of this investigation, it may be said that the job times are based partly on the synthesis of individual element times and partly on the average times for groups of elements.

TABLE II

Estimated Cost of Cooling and Storing Milk (excluding Interest on Capital)

Farm Type	Cost of Equipment	Depreciation on Equipment	Repairs and Replacements	Expendable Stores	Labour	Total Cost (less interest on Capital)	Cost per gallon of milk
	£	£ s.	£ s.	£ s.	£ s.	£ s.	
Ice-bank Tank	1961	94: 4	29: 18	85: 4	63: 13	272: 19	1.09d.
Holding Tank	1579	75: 11	39: 18	77: 3	86: 8	279: 0	1.12d.
Churns	609	46: 7	30: 4	70: 18	165: 3	312: 12	1.25d.

TABLE IIA

Estimated Cost of Cooling and Storing Milk (including Interest on Capital)

Farm Type	Cost less interest on Capital	Interest on Capital	Total Cost (including Interest)	Cost per gallon of Milk
	£ s.	£ s.	£ s.	
Ice-bank Tank	272: 19	98: 1	371: 0	1.48d.
Holding Tank	279: 0	78: 19	357: 19	1.43d.
Churns	312: 12	30: 9	343: 1	1.37d.

The only water they require for cooling is that contained in the jacket surrounding them, which has to be replenished only occasionally, in comparison with the constant flow required by the corrugated cooler during use.

SOME FACTORS AFFECTING THE USE OF BULK TANKS

Steam Raising

Raising Steam and heating water form an important item in the cost of handling milk on the farm. Different sources of heat were used on different farms and on the 11 farms studied they were as follows:-

Table III

Type of Steam Raiser	Bulk Tank Farms	Churn Farms
Coal burning boiler	2 (B and D)	2 (H and K)
Oil fired boiler	1 (E)	1 (J)
Electric	4 (A,C.F and G)	1 (L)

(Farm B was about to change to an electric steam raiser)

It was not possible to ascertain the quantity of steam used on each farm but an estimate of the cost of raising steam (fuel, depreciation and repairs but not labour) was made for the coal and oil-burning farms. (Farms with electric steam raisers were excluded since their actual consumption of electricity was not known). Although too much reliance cannot be placed on figures obtained from only a few farms, it is interesting to note that the cost of raising steam by the coal and oil burning boilers, varied from 10/- to 55/- per 100 gallons of milk produced. (Such a wide variation suggests that on some farms there may be room for economies in this item of expenditure).

It is generally agreed that farms with bulk milk tanks, which are sterilised with hypochlorite, require less steam than those on which milk churns have to be steamed. Some of the farms which changed from churns to bulk milk tanks have replaced their boilers by electric steam raisers. The smaller consumption of steam makes it possible to use a smaller heating unit than before, and some electric steam raisers are designed to take advantage of the lower cost of off-peak electric current. The time spent in lighting and stoking a steam boiler may be anything from 10 to 15 minutes upwards per day. This labour is replaced by the simple expedient turning a switch off and on and even this may be avoided where off-peak current, operated by a time-switch, is used. Electric steam raisers also have the advantage that they are cleaner to operate than boilers.

Electricity consumption

The consumption of electricity varies from farm to farm according to the situation in which the condenser unit is placed. Air-cooled condensers require a steady flow of cool air to cool the refrigerating liquid and the more efficient the air cooling the lower the consumption of electricity. In the Kirkcudbrightshire scheme the farm with the lowest electricity consumption draws the cooling air from over a running stream.

Detergents and Disinfectants

The expenditure on detergents and disinfectants, on both tank and churn farms, varied irrespective of the size of tank or number of churns to be cleaned. (It is possible that on some farms there is room for economy in this item without reducing the effectiveness of cleaning). On all types of farm the cost of detergents was a little more than the cost of hypocholorite. On the churn farms the cost of these together was about two-thirds of the cost on tank farms with a similar production of milk.

Milk Pumps

All but one of the farms observed brought the milk from the byre to the dairy in churns and used a milk pump to convey the milk from the churn to the tank or cooler. Three farms used electric pumps and the remainder had

vacuum lifts operated by the milking machine vacuum. Generally the vacuum lifts worked efficiently but on one or two farms the lifts were operating at the limit of the vacuum power so that pumping slowed down from time to time when a full load was being taken on the system.

Where electric pumps were in use, the milk was poured from the churn into a small tank on the ground, from which it was pumped into the bulk milk tank or to the cooler. With a vacuum lift the more common practice was to set the churn down beside the pump and put the suction tube from the pump directly into the churn. When one churn was emptied the tube was changed to another. With this system, where milk was being brought in faster than the pump could deal with it, the dairyman had to wait till a churn was empty before changing the tube to the next churn. On the other hand, on one farm where two vacuum pumps were in use, the milk was passing to the tank faster than it was brought to the dairy and this entailed special journeys by the dairyman from the byre to the dairy, to shut off the vacuum when the churn was empty. On two of the farms a vacuum pump drew milk from a small ground tank by a method similar to that used with electric pumps.

Labour

The time taken to carry out the dairy work on different farms varied according to the different circumstances on each farm. Observations were made of the work done in the dairy as distinct from the byre, at milking time and immediately after when the utensils were washed, of the despatch of milk, and the forenoon cleaning of tanks or churns and equipment. Table IV shows the estimated time required per day for these jobs on the hypothetical type farms, producing 17 churns of milk a day.

TABLE IV

Time required for Dairy Work. Minutes per day

Job	Ice-bank Tank farms	Holding Tank farms	Churns farms
Dairy Work at milking	28	42	70
Washing tanks	26	29	-
Washing and fixing equipment (forenoon)	5	9	-
Loading and unloading churns	-	-	13
Washing churns and equipment	-	-	62

The difference in time between the holding tanks farms and the ice-bank tank farms for dairy work at milking and the forenoon washing of equipment represents the extra time spent on cleaning the milk cooler.

Comparing the routine of dairy work as observed on farms using tanks and the churn farms, the impression was gained that the routines on the tank farms were tidier and more precise than those on the churn farms. It may be that the tanks lend themselves to a more exact routine than does collection in churns.

Seasonality of Milk Production

The situation on the farms concerned in this investigation was affected by the seasonality of their production. All the farms on which observations were made were mainly summer producers and their minimum winter production was anything from a half to one tenth of their summer maximum. Since the bulk tanks must be adequate for maximum production, larger tanks were required than would have been needed if the production had been level throughout the year.

Again, where production is seasonal the cost of collection will be higher. On the route concerned, the tanker made two journeys a day at the height of the season but as production decreased this was reduced to one journey a day and in the winter to a single journey on alternate days. Unless alternative employment is available for the tanker when it is not collecting milk from farms, it would be considerably underemployed at certain times of the year and the cost of collection would be correspondingly increased. This might well offset the application of the ¼d. reduction in the standard haulage charge. (See next section).

THE CHOICE OF METHODS

These figures provide some guidance to farmers who may be considering changing over from churns to bulk tank collection. The first essential is for as many neighbouring farmers to agree to change over, as is necessary to enable a scheme to be started.

Cost of Operation

There seems to be little difference in the full annual cost to the farmer of operating bulk milk tanks and churn collection of milk. The capital expenditure needed to install tanks is roughly about £1000 to £2000 depending on the size of installation and the alterations necessary to the buildings.

The cost of a holding tank is rather less than that of the ice-bank type but the saving in labour is also less. There may be an advantage in putting in a holding tank where a suitable refrigerated cooler is already in use - the saving in capital cost being roughly from £300 to £600 according to the capacity of the cooler. It must be borne in mind, however, that the refrigerated cooler has a limited life and would have to be replaced, most probably before the milk tank had worn out.

Where economy in the use of water has to be considered, the lower water consumption of the ice-bank tank may weigh heavily in its favour.

Labour Requirements

The estimated saving of labour by using tanks rather than churns amounts roughly to about 540 hours per annum for a 300 gallon size ice-bank tank and about 412 hours per annum for a holding tank of the same size. Further, it is clear that the work with tanks is easier than with churns so that there is a saving of human energy. The energy saved in lifting heavy churns alone is quite considerable. If the time and energy saved can be profitably applied elsewhere the value of the labour saved might be round £80 to £100 per annum. The saving of time and of fatigue may well be regarded as a means of improving working conditions for the staff and from this the farmer stands to benefit. In fact, there are already signs that the best dairymen prefer farms which have bulk milk tanks.

Farm Improvements

The installation of a bulk milk tank may well contribute to the general improvement of the fixed equipment of the farm. It may entail improvements to the dairy which would not otherwise be made. The opportunity may be taken to change over from a steam boiler to an electric steam raiser and although this may or may not lead to financial savings, the electric heater is cleaner and tidier and a further saving in labour may be expected.

Milk Quality

Investigations made by the Milk Utilisation Department of the College have shown that the quality of milk from farms with bulk tanks is not inferior than that from farms where the milk is despatched in churns. Indeed the evidence suggests that it may be easier to produce clean milk where bulk tanks are used. The milk undergoes less handling and consequently the chances of infection are reduced. It is also stored at a lower temperature than is usual for milk in churns so that the development of bacteria is curtailed.(1)

Revenue

When a bulk collection scheme shows a saving in the cost of transport to the Scottish Milk Marketing Board of not less than ¼d. per gallon, the Board have agreed to reduce their standard haulage charge by ¼d. per gallon. To the farmer, this in effect corresponds to an increase of ¼d. a gallon on the price of his milk.

Many of the farmers who have adopted the method prefer bulk collection because the milk is purchased at the farm instead of at the creamery.

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(1)Smillie, Orr and McLarty. Bulk Milk Collection in Wigtownshire. Dairy Industries Vol. XXIII No.4. et seq.

Payment is based on the quantity in the tank as shown by the dip-stick. If he so wishes, the farmer can verify this quantity for himself at the time of collection. With churn collection, a slight loss of milk occurs at the creamery from the small quantity which adheres to the bottom and sides of each churn after it has been emptied. According to American figures, such handling losses may amount to from ½ to 2 lbs of milk per 10 gallon churn. Although this may not appear to be very great, the total loss over a year's production can be appreciable, but with milk collection this loss is avoided.

Maintenance of Equipment

As far as can be foreseen, the tank itself requires little maintenance but on some tanks rusting had occurred on the under-surface next to the dairy floor. Occasional inspection underneath the tank and the application of a rust-resisting paint would help to prevent corrosion. It may be that the manufacturers will pay more attention to this point as the design of tanks develops.

Refrigerating units require attention from time to time and some farmers pay the refrigerator agents an annual sum for two maintenance inspections a year. It is understood that some makes of tank can be fitted with different makes of refrigerating unit. It is an advantage to choose a make of unit for which servicing facilities can be obtained near at hand. In the case of one make of refrigerator, the nearest service agent was some 120 miles from the farms and the cost of the service engineers transport added to the cost of maintenance - particularly if a special journey to a single farm was necessary.

Size of Farm

The information obtained from this investigation relates mainly to farms producing 50,000 gallons of milk per annum and over, and having tanks with a capacity of 200 gallons or more. Smaller tanks are available with capacities of down to 80 gallons and are suitable for smaller farms. While smaller tanks may cost less and be cheaper to operate than large ones, the reduction is not proportionate to the size of the tank. The capital cost on small farms may therefore be rather greater in proportion to the quantity of milk produced. The figures given cannot, therefore, necessarily be taken as applying to small tanks, and for any farm the probable cost of operation ought to be calculated on the basis of the situation which exists there.

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APPENDIX I

THREE HYPOTHETICAL TYPE FARMS

Cost of Dairy Work per Annum

Equipment: Cost and Depreciation

Items	Type of Farm: Ice-bank Tank — Capital Cost	Ice-bank Tank — Depreciation	Type of Farm: Holding Tank — Capital Cost	Holding Tank — Depreciation	Churns — Capital Cost	Churns — Depreciation
	£	£ s.	£	£ s.	£	£ s.
Steam Raiser	180	12: 0	180	12: 0	180	12: 0
Steam Cabinet	30	1: 0	30	1: 0	30	1: 10
Wash-up	10	-: 10	10	-: 10	10	-: 10
Steam jet & block	-		-		5	-: 3
Milk Cooler	-		321	16: 10	250	12: 10
" Tank.	1380	69: 0	677	33: 17	-	
" Pump	30	1: 10	30	1: 10	30	1: 10
Churn barrow	4	-: 4	4	-: 4	4	-: 4
10 gallon churns	12	1: 0	12	1: 0	180	18: 0
Installation of Tank	60	3: 0	60	3: 0	-	
Electric Work	75	3: 0	75	3: 0	-	
Alteration to buildings	180	3: 0	180	3: 0	-	
	£1961	£94: 4	£1579	£75: 11	£689	£46: 7

Equipment: Repairs and Replacements

Steam Raiser	£1: 7: 6	£1: 7: 6	£1: 7: 6
Steam Cabinet	-: 5: 0	-: 5: 0	-: 5: 0
Wash up	-: 5: 0	-: 5: 0	-: 5: 0
Milk Cooler	-	10: 0: 0	10: 0: 0
Milk Tank	25: 0: 0	25: 0: 0	-
Milk Pump	1: 5: 0	1: 5: 0	1: 5: 0
Milk Churns	-: 5: 0	-: 5: 0	15: 5: 0
Jet and Block	-	-	-: 6: 6
Pails	1: 10: 0	1: 10: 0	1: 10: 0
	£29: 17: 6	£39: 17: 6	£30: 4: 0

Expendable Stores Used

Electricity	£47: 7: 6	£37: 16: 6	£40: 6: 0
Dairy brushes	1: 10: 0	1: 10: 0	1: 15: 0
Detergents	12: 0: 0	13: 0: 0	9: 0: 0
Disinfectants	11: 10: 0	12: 0: 0	7: 0: 0
Sieves, etc.	-: 5: 0	-: 5: 0	-: 5: 0
Filter pads	12: 12: 0	12: 12: 0	12: 12: 0
	£85: 4: 6	£77: 3: 6	£70: 18: 0

Labour Cost

Hours of work per annum	340	469	881
Cost @ 3/9d. per hour	£63: 13: 2	£87: 17: 6	£165: 2: 6
Total Cost	£272: 19: 2	£280: 9: 6	£312: 11: 6
Cost per gallon of Milk produced	1.09d.	1.12d.	1.25d.