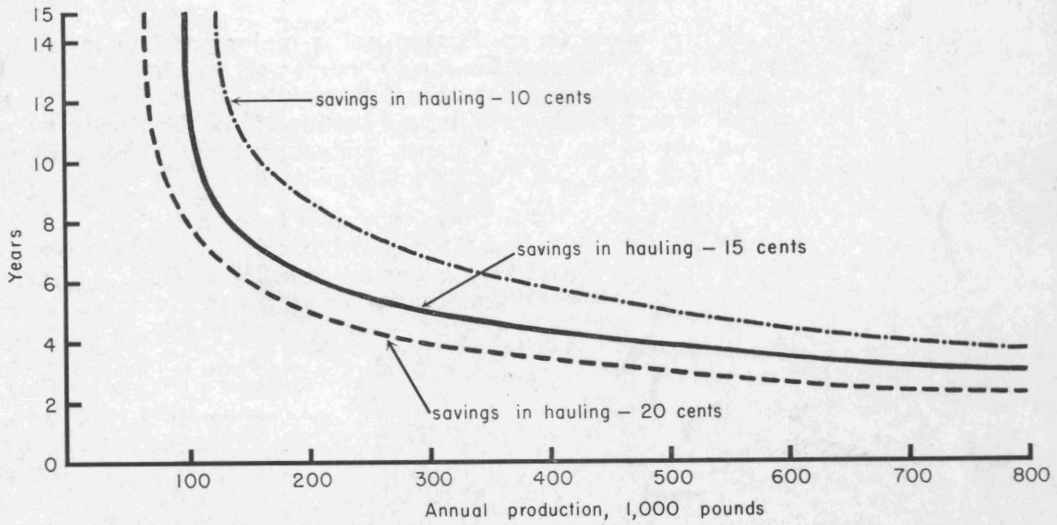
BULLETIN 904 MAY 1958

Costs, Savings and Financing Bulk Tanks on Texas Dairy Farms



Estimated number of years required for savings from a bulk tank to equal additional costs at different levels of production and savings in hauling costs.

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SUMMARY

This study presents information which will help dairy farmers determine whether a bulk tank will be profitable. It also presents data to help dairy farmers and lending agencies in financing bulk tanks.

Data on costs, savings and financing were obtained by interviews with 191 bulk tank owners in the North Texas market area and 36 tank owners in the Corpus Christi market area. Additional information on costs also was obtained from bulk tank dealers in North Texas.

Additional costs involved in changing to the bulk system of handling milk include cost of purchasing and installing the tank and compressor, a new hot water heater in most instances, remodeling and rewiring the barn and milkroom, interest on the additional investment, and expense for repairs, upkeep, taxes and insurance. The major savings item is lower hauling charges. About one-half of the tank owners interviewed reported a savings of 15 cents per hundredweight of milk, while about one-fourth reported a savings of 20 cents and the remaining one-fourth a savings of 10 cents per hundredweight. Additional savings result from less milk wastage, elimination of the investment in can equipment and some savings in labor.

The length of time a tank will last and the savings in hauling charges determine whether a bulk tank will be profitable. If the tank lasts only 10 years and savings in hauling charges average 10 cents per hundredweight over the 10-year period, annual milk production must amount to about 160,000 pounds for the tank to pay for itself out of savings. If the tank lasts 15 years and savings in hauling amount to 15 cents per hundredweight, an annual production of about 100,000 pounds would be needed. A production of about 75,000 pounds of milk per year will be needed, however, if the tank lasts 20 years and savings in hauling costs average 20 cents over the full life of the tank.

The ability to obtain credit was not a major problem to most farmers. Commercial banks and bulk tank dealers were the major sources of credit. The most common interest rate was 6 percent; however, in a number of instances, interest was charged against the full face amount of the loan rather than against the unpaid balance. For slightly over one-half of the credit purchases, the terms of the loans were 3 years, with repayment conditions usually providing for monthly installments deducted directly from the milk checks.

Although 3 years was the most common term, a longer period of time would be necessary for savings from a bulk tank to equal the additional costs for all except dairymen with the largest production. Therefore, repayment of a 3-year loan in most instances would need to come partly from sources other than savings from the tank.

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MOST GRADE A MILK PRODUCED IN THIS COUNTRY was handled in 10-gallon cans until a few years ago. Dairymen usually poured the milk into the cans at milking and cooled it in water-bath can coolers. The milk was picked up daily at the farm by trucks and delivered to the plant.

Since 1954, many Texas dairy farmers have been replacing milk cans with the bulk system of handling milk. This change is part of a general nationwide trend occurring in varying degrees in different sections of the country. Under the bulk system the milk is stored in stainless steel tanks which vary from a capacity of 150 to more than 1,000 gallons. It is cooled by a refrigerant and is picked up, usually every other day, by tank trucks. These trucks pump the milk mechanically, directly from the farm tank to the truck.

ADVANTAGES AND DISADVANTAGES OF BULK TANKS

Although bulk handling has spread rapidly in Texas during the past 4 years, nearly three-fourths of the Grade A dairy farmers in the State are still using the can system. Many of them are wondering about the advantages of purchasing a tank. These dairymen should weigh carefully the advantages and disadvantages of the bulk system.

The most important advantages of the bulk system are:

1. Lower hauling costs.
2. Savings in the cost of cans and can coolers.
3. Savings in wastage.
4. Elimination of can lifting.
5. Savings in labor.
6. Opportunity for increasing milk quality.
7. Possible savings in electricity.

The disadvantages of bulk tanks are:

1. High initial investment for bulk equipment.
2. Possible expense for remodeling and rewiring the milkroom.
3. Possible losses in disposing of the can equipment on hand.
4. Need of an all-weather road to the milkhouse.
5. Possibility of losing four milkings if the milk is rejected.

PURPOSE AND METHOD OF STUDY

The purpose of this study is to present information on the major factors involving costs and savings associated with bulk tanks and to develop a systematic means by which these can be compared at different production levels. This information should be valuable to dairymen and to lending agencies financing bulk tanks. Since the size of capital investment required involves a major financing problem to many farmers, the financing aspects of this adjustment are discussed under the section on "Financing."

A survey was made of 191 Grade A dairy producers who have bulk tanks in the North Texas milkshed. These producers, selected at random, included approximately one-third of all Texas dairymen in the milkshed who had purchased bulk tanks by January 1957. Data also were obtained from 36 or approximately one-third of the bulk tank producers in the Corpus Christi milkshed. Interviews also were obtained from 179 or approximately one-tenth of the North Texas producers still using milk cans. A more comprehensive report of the sampling procedure used in these surveys and the general economic implications of bulk handling are presented in Texas Agricultural Experiment Station Bulletin 894, "Bulk Handling of Milk on Texas Dairy Farms."

Tables were developed to compare the additional costs with anticipated savings at different production levels. Since each farm differs in certain respects from other farms, the costs and savings from bulk handling also vary. Individual dairymen may need to adjust the figures to fit their own situations. For example, the costs of remodeling the barn and milkroom for a particular farm might be larger than the figures shown in Table 1 and should be adjusted accordingly.

ADDITIONAL COSTS

The most important cost item is the price of the tank. First, it is necessary to decide on the tank size needed, keeping in mind that the tank will be used for at least 10 to 15 years and should be large enough to take care of anticipated production increases over this period. Although no substantial increase in herd size may be

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planned, some production increase is likely to occur through increased productivity per cow due to herd improvements.

The amount of seasonal fluctuation in production also should be considered when deciding on the size of tank needed. The tank should be large enough to handle the expected peak seasonal output. Large fluctuations, however, result in tank use at less than capacity during periods of low production. This increases the cost per gallon of cooling.

The dairyman should consider the following when deciding on the size of tank to purchase: his present average daily production, how frequently his milk is picked up (daily or every other day), seasonal fluctuations in production and anticipated increases in total production during the life of the tank. To illustrate a method for determining the tank size to purchase, let us assume a situation such as that given in the first line of Table 1, where the present annual production is 80,000 pounds (column 1). Dividing this by 365 gives the average daily production of 219 pounds, or about 25 gallons. Every-other-day pickup is the usual custom for bulk handling on Texas farms. Most health codes require that the tank be large enough to handle five milkings if the milk is picked up every other day. The average daily production of 25 gallons would therefore be multiplied by 2½ days' milk production.

Anticipated production increases and seasonal peaks in production also must be considered. In Table 1, it is assumed that the tank would be used for 15 years and that a small increase in herd size and increased productivity per cow would increase total production one-fourth by the end of the 15-year period. This is probably a conservative estimate for many dairymen. It also is assumed that an allowance of 25 percent above the yearly average daily production is needed to handle peak seasonal loads. Dairy records indicate that this is approximately the degree of seasonal variation in production by the average Texas dairy farmer.

The size of tank needed may be determined by multiplying the annual daily production (25 gallons) by 2½ to allow for every-other-day pickup, by 1¼ to allow for increased total production and by 1¼ to allow for season peaks. This amounts to 98 gallons. A dairyman with an annual production of 80,000 pounds and under the conditions stated in the preceding paragraphs for increased production, frequency of pickup and seasonal fluctuations would need a 150-gallon tank, which is the smallest size commonly available on the market. Many dairymen may wish to make different allowances for increases in production and seasonal peaks. Since the average tank will last many years, adequate allowances and careful planning should be made for the future; otherwise tank capacity might restrict future production changes.

The costs for tanks of various sizes are shown in column 4, Table 1. The prices are typical of those paid by farmers for direct expansion type tanks installed on the farm. Some variation in price exists according to brand and type of tank. The two major types manufactured are the ice bank and direct expansion. The ice bank cooler builds up layers of ice around refrigerating coils located between the walls of the tank. A pump circulates water over this "ice bank" to the cooling surface of the tank. In the direct expansion cooler, the refrigerant is pumped through coils

TABLE 1. ESTIMATED ADDITIONAL COSTS AT DIFFERENT LEVELS OF PRODUCTION IF DAIRY PRODUCERS SHIFTED TO BULK TANK HANDLING

Total annual production	Peak production per pickup[1]	Size tank needed	Cost of tank[2]	Cost of hot water heater	Cost of remodeling barn and milkroom	Total added investment	Annual depreciation[3]	Annual interest cost[4]	Annual expense for upkeep, repairs, taxes and insurance[5]	Total added annual cost
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Pounds	— Gallons —		— —	— —	— —	—	Dollars —	—	—	—
80,000	98	150	1,750	140	120	2,010	134	60	80	274
120,000	148	150	1,750	140	130	2,020	135	61	81	277
160,000	199	200	1,970	140	130	2,240	150	68	90	308
200,000	250	250	2,330	140	130	2,600	175	79	105	359
300,000	375	400	3,120	140	130	3,390	226	102	136	464
400,000	496	500	3,650	140	140	3,930	262	118	157	537
500,000	621	700	4,300	140	150	4,590	306	138	184	628
600,000	746	800	4,645	140	160	4,945	330	148	198	676
700,000	871	900	4,960	140	170	5,270	351	158	211	720
800,000	996	1000	5,250	140	180	5,570	371	167	223	761

[1]Assuming every-other-day pickup, that the seasonal peak daily production will exceed the year-round daily average by 25 percent and that the annual production will increase by one-fourth during the life of the tank due to increased herd size and increased production per cow.
[2]The costs listed are for direct expansion type tanks.
[3]Assuming a life of 15 years.
[4]Calculated at 6 percent on undepreciated balance of total added investment.
[5]Calculated at 4 percent of total added investment.

that cool the stainless steel inner wall. While the initial cost of the ice bank type is generally lower than the direct expansion type, the ice bank type usually consumes more electricity because its motors must run longer. The type of tank purchased probably would not affect the results of this analysis significantly.

Most dairymen purchasing bulk tanks also purchase new hot water heaters (column 5, Table 1). Dairymen usually incurred some expense also for remodeling the milkroom and barn and for rewiring in order to provide ample space and facilities for the tank and to comply with health regulations. Most costs of remodeling ranged from $100 to $200, although in a few instances they were substantially more. The remodeling costs shown in column 6 of Table 1 were the ones most commonly paid by the dairymen interviewed.

The total added investment for converting to the bulk system of handling milk (column 7, Table 1) is computed by adding columns 4, 5 and 6. It is assumed that the tank will last 15 years, so the annual depreciation charge may be computed by dividing the total added investment by 15 (column 8, Table 1). It is questionable whether tanks will have a salvage value at the end of their useful life, and no allowance was made for this factor.

The annual depreciation charge does not include expenses incurred after the initial investment is made. A charge should be made for the amount of new capital invested since it must be assumed that the capital could have been put to some other productive use. An annual interest charge of 6 percent on the undepreciated balance of the added investment was used, since this was the rate most commonly paid by those using credit to purchase tanks (column 9).

Cost of upkeep and repairs should be considered. However, little information exists on which to base an estimate, since most of the dairymen interviewed had not operated their tanks long enough to estimate what these expenses might amount to over the life of the tank. Some expense will be necessary eventually for repairing and replacing motors and other parts subject to wear and for complying with health regulations. It was assumed in Table 1 that annual expenses for these purposes plus additional expenses for taxes and insurance would average 4 percent of the total added investment. This amount includes allowance for replacing the cooling unit.

The total added annual cost for converting to the bulk system of handling milk is computed by adding the annual depreciation and interest charges and the estimated annual expense for upkeep and repairs, and is shown in column 11 of Table 1. The total annual savings will be estimated next and compared with the annual costs.

SAVINGS

Estimated annual savings resulting from bulk tanks are shown in Table 2. They have been computed for the same levels of production as the data on annual costs shown in Table 1. The most important saving appears to be in hauling charges. Approximately one-half of the dairymen interviewed indicated that hauling charges after they had changed to the bulk system were 15 cents per hundredweight less than they had been under the can system. About one-fourth stated

TABLE 2. ESTIMATED ANNUAL SAVINGS AT DIFFERENT LEVELS OF PRODUCTION IF DAIRY PRODUCERS SHIFTED TO BULK TANK HANDLING

Total annual production now	Savings in hauling[1]	Savings in wastage[2]	Savings in cans[3]	Savings in can coolers[4]	Savings in electricity[5]	Interest on investment in can equipment[6]	Total annual savings	Total added annual cost[7]	Annual net difference between cans and bulk tanks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Pounds					Dollars				
80,000	135	45	16	30	4	13	243	274	—31
120,000	202	68	24	39	5	17	355	277	78
160,000	270	90	32	47	7	21	467	308	159
200,000	338	112	39	55	9	24	577	359	218
300,000	506	169	59	83	14	37	868	464	404
400,000	675	225	79	83	18	39	1119	537	582
500,000	844	281	98	118	22	54	1417	628	789
600,000	1012	338	118	138	27	64	1697	676	1021
700,000	1181	394	138	167	32	77	1989	720	1269
800,000	1350	450	158	197	36	90	2281	761	1520

[1]Assuming savings of 15 cents per hundredweight calculated on the average annual production over the estimated 15-year life of the tank.
[2]Calculated at 1 percent of average annual production over the 15-year life period and valued at $5 per hundredweight.
[3]Assuming cans cost $10.50 each, and had a life of 4 years.
[4]Assuming a life of 12 years.
[5]Assuming a savings of 0.2 kilowatt-hours per 100 pounds at 2 cents per kilowatt-hour.
[6]Calculated at 6 percent on undepreciated balance of investment in cans and coolers.
[7]From column 11 of Table 1.

Figure 1. Until 1954, can trucks were the major means of transporting milk from the farm to the dairy plant.

that the savings amounted to 20 cents per hundredweight while the remaining one-fourth indicated a savings of 10 cents. A saving in hauling of 15 cents per hundredweight is used in Table 2.

A second major saving arises from reduced wastage of milk. Under the tank system, payment to the producer is based on the volume of milk in his tank just before it is withdrawn. Under the can system, measurement of the volume sold is taken after the milk is dumped into the weigh vat at the receiving station. Thus the producer under the can system bears the losses arising from stickage to the can and spillage in handling. This loss varies considerably, depending partly on the way the milk is handled. Available data indicate that one can expect about 1 percent saving from less wastage. A savings in wastage of 1 percent of average annual production was used in this study; these savings were valued at $5 per hundredweight (column 3, Table 2).

Figure 2. The hauling charges generally are lower with tank trucks because larger loads can be handled, less labor is involved and the milk usually is picked up every other day rather than daily.

Under the bulk system of handling milk, there is no investment in milk cans and can coolers. Although savings in cans and can coolers are substantial, they are considerably less than the added annual investment involved in purchasing a bulk tank (columns 4 and 5, Table 2). In computing the annual savings in cans and can coolers, a useful life of 4 years for cans and 12 years for can coolers is assumed.

Since this analysis applies to direct expansion type tanks, some slight savings may be expected in electricity costs, but this difference would be affected by the efficiency of the cooling units. There might be more savings where old and obsolete can equipment is replaced. Data from the Department of Agricultural Engineering indicate that on the average, a saving of 0.2 kilowatt-hours per 100 pounds of milk cooled can be expected when direct expansion type tanks are used. These savings were valued at 2 cents per kilowatt (column 6, Table 2). Electricity costs would probably be somewhat higher for the ice bank type tank.

Some savings also would arise from interest on the capital which normally would be tied up in can equipment (column 7, Table 2). These savings, however, would be smaller than the added cost of interest on tank equipment since investment is larger for tanks.

Another source of saving with bulk tanks might be that less time is required for cleaning the equipment and handling the milk. Since the labor saved is slight, between 20 and 30 minutes a day, and it is questionable whether it would be used productively, no allowance is made for possible savings in labor in this analysis.

Total annual savings (column 8, Table 2) are calculated by adding columns 2 through 7. A comparison of the total annual savings with the added annual costs indicates how a typical dairyman with the productivity indicated might be expected to fare with a bulk tank, if savings of 15 cents per hundredweight in hauling charges continue and if the tank is used for 15 years. With these assumptions, the savings from a tank eventually would pay for the added cost of switching to a bulk tank system if annual milk production amounted to about 100,000 pounds. With an annual production of only 80,000 pounds, a bulk tank would result in a net loss of $31 per year. For farms with considerably larger production, however, savings would exceed costs by a substantial amount. On a farm which had an annual production of 300,000 pounds, for example, savings would exceed costs by an average of $404 per year, or a total of about $6,000 over the 15-year life of the tank.

These differences are determined largely by the life of the tank and savings in hauling charges. The question arises as to how realistic the assumption is that a difference of 15 cents per hundredweight in hauling may continue over

the 15-year life of the tank. Although about half of the bulk tank producers in North Texas reported this difference, there is no assurance that it will continue indefinitely, even though available data indicate that milk normally can be transported more cheaply in bulk trucks than in can trucks. Since milk transporting in most cases is done by contract haulers, the degree of competition among haulers may be important in determining future hauling charges.

Although a 15-year life was assumed in the preceding analysis, tanks have been used an insufficient time to show life expectancy. Obsolescence may be a factor which would shorten the useful period to less than 15 years. However, the tanks themselves appear durable and if obsolescence is not important, perhaps a life use exceeding 15 years could be expected. Table 3 shows the anticipated outcome with various assumptions regarding the life of the tank and differences in hauling rates. Columns 2, 3 and 4, for example, indicate what might be expected with a 10-year tank life and savings in hauling of 10 cents, 15 cents and 20 cents per hundredweight. Other columns indicate the calculated outcome with these differences in hauling costs with a tank life of 15 years and 20 years.

For columns 2, 3 and 4 of Table 3, where a tank life of 10 years is assumed, annual expenses for upkeep, repairs, taxes and insurance are calculated at a rate of only 2 percent of total added investment. This is used instead of the 4 percent rate when a tank life of 15 or 20 years is assumed, since it is unlikely that the cooling unit would need replacing within 10 years. With this exception, the method used in computing the data in Table 3 is the same as the method used in Tables 1 and 2.

Table 3 indicates that a bulk tank will pay for itself in time with an annual production of about 160,000 pounds or more, even if savings in hauling amount to only 10 cents per hundredweight and if the tank lasts only 10 years. If annual production is much below 160,000 pounds, a larger savings in hauling or a longer life will be necessary for the tank to pay out. For the most favorable assumption (a tank life of 20 years and a savings in hauling of 20 cents) an annual production of about 75,000 pounds will be necessary.

Table 3 shows the net differences between savings and additional costs averaged over the expected life of the tank. It does not indicate the time required for savings to equal additional costs. This is particularly important to dairymen and to lenders if credit is used to purchase the tank.

The estimated number of years required for annual savings to equal the initial investment outlay plus interest on investment and annual expenses for upkeep and repairs is given in Table 4. It is assumed in this table that the tank will be used for 15 years.

TABLE 4. ESTIMATED NUMBER OF YEARS NEEDED FOR SAVINGS TO OFFSET COSTS OF CONVERTING TO A BULK TANK[1]

Total annual production	Savings in hauling per cwt. of		
	10¢	15¢	20¢
Pounds	— — — —	Years	— — — —
80,000	[2]	[2]	14
120,000	14	8	7
160,000	9	6½	5½
200,000	8½	6	5
300,000	6½	5	4
400,000	6	4½	3½
500,000	5	4	3
600,000	4½	3½	2½
700,000	4	3	2½
800,000	3½	3	2

[1]Tank life assumed to be 15 years.
[2]The tank would never pay for itself at this level of production and with this savings in hauling.

TABLE 3. ESTIMATED ANNUAL DIFFERENCE IN FAVOR OF BULK TANKS WITH VARYING ASSUMPTIONS REGARDING THE LIFE OF THE TANK AND SAVINGS IN HAULING COSTS

Total annual production now	Estimated annual difference in favor of bulk tanks, assuming tanks have a life of 10 years and savings in hauling amount to:			Estimated annual difference in favor of bulk tanks, assuming tanks have a life of 15 years and savings in hauling amount to:			Estimated annual difference in favor of bulk tanks, assuming tanks have a life of 20 years and savings in hauling amount to:		
	10¢ cwt.	15¢ cwt.	20¢ cwt.	10¢ cwt.	15¢ cwt.	20¢ cwt.	10¢ cwt.	15¢ cwt.	20¢ cwt.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Pounds	— — — — — — — — — —				Dollars	— — — — — — — — — —			
80,000	—107	—63	—19	—76	—31	14	—39	7	53
120,000	— 21	45	111	11	78	146	50	119	118
160,000	32	120	208	69	159	249	113	205	297
200,000	63	173	283	105	218	328	149	274	389
300,000	177	342	507	236	404	574	303	476	648
400,000	287	507	727	357	582	807	397	627	857
500,000	464	739	1014	507	789	1069	613	900	1188
600,000	633	963	1293	684	1021	1359	793	1138	1483
700,000	746	1131	1516	876	1269	1664	991	1394	1796
800,000	920	1360	1800	1070	1520	1970	1197	1630	2117

Table 4 shows that several years would be required for bulk tanks to be self-liquidating for many dairy producers. For example, a dairyman with an annual milk production of 80,000 pounds and a 15-cent saving in hauling would never be able to recover the costs of the tank from savings. If he had an annual production of 200,000 pounds, however, savings would offset costs in about 6 years, while with an annual production of 800,000 pounds the tank could be paid for out of savings in 3 years.

By using the chart on the cover, one can determine the length of time needed for savings to offset additional costs at different levels of production and at different savings in hauling. It is assumed that the tank will last 15 years. Each curve, representing different savings in hauling charges, shows the approximate number of years required for the tanks to be self-liquidating. For example, with an annual production of 200,000 pounds the tank would pay for itself in about 4½ years with a savings in hauling of 20 cents per hundredweight. With savings in hauling of 15 cents, the tank would pay for itself in about 6 years, while slightly over 8 years would be required with savings in hauling of 10 cents.

The number of cows milked in attaining a given volume of production also is important. A dairyman with an annual production of 200,000 pounds, for instance, will be in a much stronger financial position if this is attained with 25 cows producing 8,000 pounds each rather than with 50 cows producing 4,000 pounds each. Good management will become increasingly important in the future in determining ability to obtain and repay credit and to operate a profitable business; a high quality herd usually is evidence of good management.

FINANCING

The high cost of bulk handling equipment means that many farmers must use credit if they purchase a tank. One of the objectives of this study is to find out if difficulty in obtaining credit is a major problem to Texas dairymen and also to find out the sources, cost and types of credit used.

Approximately one-sixth of the tank owners interviewed paid cash for their bulk equipment (Table 5). This may appear to be a large proportion of cash purchases for an adjustment requiring such a large capital expenditure; however, it is probably influenced by a tendency for the larger operators with more capital to make adjustments of this type first. For instance, dairymen in North Texas who had purchased milk tanks averaged about 20 more cows in their milking herds and operated on the average about 90 more acres of land than the dairymen who were still using cans. This suggests that those who have yet to make the adjustment to bulk handling may need to use more credit than the dairymen who have already purchased tanks, since the smaller operators usually have less cash available for purchases of this size. This was shown in the North Texas survey where about one-third of the dairymen who had herds of 70 cows or more paid cash as compared with only 8 percent of the dairymen who had herds of less than 40 cows. There was little or no indication, however, that inability to obtain credit was a major obstacle to the shift to bulk handling. None of the 179 can producers contacted indicated that they had tried to obtain financing and had been unable to do so. The major obstacles appeared to be a reluctance to go into debt for this purpose and doubt that the adjustment would be economical.

TABLE 5. PROPORTION OF DAIRYMEN WHO USED CREDIT IN PURCHASING BULK TANKS

Item	North Texas area		Corpus Christi area	
	Number	Percent	Number	Percent
Dairymen using credit	159	83.2	31	86.1
Dairymen paying all cash	32	16.8	5	13.9
Total	191	100.0	36	100.0

The proportion of dairymen paying cash to purchase pipelines was even larger than the proportion paying cash for bulk tanks. More than one out of four, 28 percent, of those who purchased pipelines paid cash. Capital requirements for pipelines are somewhat smaller than for bulk tanks, which probably accounted for the larger proportion of cash purchases.

Expenses for barn and milkroom remodeling apparently was not a serious capital problem to most dairymen. Many of them used their own labor to do the remodeling and required capital only to purchase materials. Of those who incurred some expenses for barn and milkroom remodeling, only about 5 percent used credit; the remainder paid cash.

Sources of Financing

In the North Texas area, commercial banks financed almost one-half, 47.8 percent, of the bulk tanks purchased on credit. Dealers were the next major source in North Texas, accounting for a little over one-third of the credit purchases (Table 6). It appeared, however, that dealers played an even more active role than this figure might indicate. In some instances where they did not make the original loans themselves, they arranged for the financing with a local bank. In other instances, they made the original loan or conditional sales contract, later discounting or selling these to lending institutions.

The North Texas Producers Association financed approximately 6 percent of the bulk tank purchases, with funds obtained through a loan from the Houston Bank for Cooperatives. The production credit associations did not appear to be active in financing this adjustment. They made only a small proportion of the loans, 4 per-

cent, which primarily were cases where the associations already were rendering other credit services to the borrowers. This also appeared to be true of the Farmers' Home Administration. Financing by the national farm loan associations appeared to arise mainly in those cases where conversion to bulk handling was part of a general farm improvement program. Milk handlers financed only a scattering of producers in North Texas; this was done by several of the companies which were approaching 100 percent conversion to bulk tanks among the dairymen selling milk to them. Where the financing was done by other lenders, however, handlers guaranteed the payments.

While commercial banks were the major source of credit in North Texas, they financed none of the dairymen who were interviewed in the Corpus Christi area. Dealers were the major source of credit in that area, and financed more than one-half, 58.1 percent, of the bulk tank purchases. Milk handlers financed most of the remainder, other sources of credit being relatively unimportant. In some instances, however, the handlers who did the original financing apparently later discounted with lending institutions. Although sources of credit in the Corpus Christi area apparently were somewhat more restricted than in North Texas, none of the dairymen interviewed indicated that they had encountered any difficulty in financing.

Down Payments

In North Texas, the most common practice was to turn in the old can equipment as either down payment or part down payment on the purchase price of a bulk tank. Nearly two-thirds, 63 percent, of the bulk tank operators in North Texas purchased a tank on this basis and over two-fifths, 42 percent, paid no cash above the trade-in allowance. Usually the amount allowed on old equipment ranged between 10 and 20 percent of the purchase price. About one-fifth, 21 percent, of those purchasing a tank, however, neither turned in old equipment nor made a cash down payment; they borrowed the entire amount of the purchase price. Each of the lending groups did some financing without down payments.

In the Corpus Christi area, old can equipment usually was not accepted in trade-in allowances because of the lack of a market for it. In this area, the usual procedure was for the producers to make a cash down payment—generally about 15 percent of the purchase price—and borrow the remainder. Approximately two-thirds of the bulk tank operators purchased a tank on this basis. About 17 percent purchased a tank with no cash down payment, while the remainder paid all cash.

Interest Rates

The most common rate of interest charged on bulk tanks purchased on credit was 6 percent. Approximately one-half of the credit purchases in North Texas had this rate, while slightly over one-fourth had a rate of 5 percent (Table 7). The 6 percent rate was most common for commercial banks, nearly two-thirds of their loans bearing this charge, as compared with about one-third of the purchases financed by dealers.

TABLE 6. SOURCES OF CREDIT USED TO PURCHASE BULK TANKS

Source	North Texas area		Corpus Christi area	
	Number	Percent	Number	Percent
Local banks	76	47.8	0	0.0
Dealers	55	34.6	18	58.1
North Texas Producers Association	9	5.6	0	0.0
Production credit associations	6	3.8	1	3.2
Farmers Home Administration	5	3.1	1	3.2
Milk handlers	4	2.5	9	29.1
National farm loan associations	2	1.3	0	0.0
Other or not available	2	1.3	2	6.4
Total	159	100.0	31	100.0

The rate of interest in itself does not necessarily indicate the actual interest charge on a loan repaid in installments, however, since the rate may apply either to the full face amount for the entire life of the loan or to the unpaid balance only. If the interest rate is charged against the face amount of a 1-year loan with 12 monthly installments, for example, and charged for the full 12-month period, the charge will be almost twice as great as it would be if it applied only to the unpaid balance. In some instances where credit was used to purchase bulk tanks both in North Texas and in the Corpus Christi area, the interest charge evidently was applied to the full face amount of the sum borrowed. The proportion of such instances could not be

Figure 3. Since a substantial additional investment is necessary for a shift to bulk handling, dairy farmers should consider carefully the savings and costs involved. If credit is required, one of the first things a dairyman should do is to discuss his plans with his regular lending agency.

TABLE 7. INTEREST RATES ON CREDIT USED TO FINANCE THE PURCHASE OF BULK TANKS

Interest rate	North Texas area		Corpus Christi area	
Percent	Number	Percent	Number	Percent
Less than 4.0	4	2.5	0	0.0
4.0 - 4.9	11	6.9	0	0.0
5.0 - 5.9	46	28.9	6	19.4
6.0 - 6.9	76	47.8	9	29.0
7.0 - 7.9	2	1.3	4	12.9
8.0 and over	4	2.5	2	6.4
Not specified[1]	16	10.1	10	32.3
Total	159	100.0	31	100.0

[1]A number of these loans involved a carrying charge instead of an interest charge.

determined however, because in many cases the borrowers did not know if the interest charge was applied to the unpaid balance or the full face amount. In other words, the borrowers evidently had not determined the full cost of the credit they were using and did not know if they were using the cheapest source of financing.

Carrying charges also were used in some instances as a means of charging interest on bulk tank purchases. This method involves the addition of an extra sum to the face amount of the loan. Typically, the use of carrying charges involves a higher interest cost than when a conventional loan is obtained. This method of charging interest was used infrequently in North Texas but accounted for nearly one-third of the credit purchases in the Corpus Christi area.

Since the interest rate alone may not indicate full financing costs, dairymen may determine their true interest charges by using the following formula:

$$\frac{\text{Total finance charges}}{\frac{1}{2} \text{ of original loan}} \times \frac{\text{No. of payments}}{\text{No. of years}} \times \frac{1}{\text{No. of payments} + 1} = \text{Actual annual rate of interest}$$

The computation of interest charges by this formula may be illustrated by an actual case of a dairyman in North Texas. This operator purchased a 400-gallon tank and a 40-gallon hot water heater at a total cost of $3,250. He was allowed a credit of $800 for old can equipment, leaving a balance due of $2,450. In his financing arrangement, which presumably involved a rate of 6 percent, he agreed to pay 36 monthly installments of $79.60 each. Thus his total payments over the 3-year period will amount to $2,865.60 ($79.60 x 36 = $2,865.60). The total finance charges will therefore be $415.60 ($2,865.60 − $2,450 = $415.60). Substituting these figures in the preceding formula gives:

$$\frac{\$415.60}{\$1,225} \times \frac{36}{3} \times \frac{1}{37} = \frac{\$14,961.60}{\$135,975.00} = 11.0 \text{ percent.}$$

Thus, this dairyman was paying an actual interest charge of 11.0 percent instead of the 6 percent rate indicated in his note.

TABLE 8. LENGTH OF REPAYMENT PERIODS FOR CREDIT USED TO FINANCE THE PURCHASE OF BULK TANKS

Repayment period	North Texas area		Corpus Christi area	
Years	Number	Percent	Number	Percent
Less than 1	3	1.9	0	0.0
1.0 - 1.9	15	9.5	1	3.2
2.0 - 2.9	11	6.9	0	0.0
3.0 - 3.9	87	54.7	26	83.9
4.0 - 4.9	14	8.8	1	3.2
5.0 - 5.9	15	9.4	2	6.5
6.0 and over	4	2.5	0	0.0
Open account	2	1.3	0	0.0
Not specified	8	5.0	1	3.2
Total	159	100.0	31	100.0

Repayment Conditions

In North Texas, the usual length of repayment period on bulk tank credit transactions was 3 years, over one-half, 55 percent, of the loans bearing this term (Table 8). While both commercial banks and dealers did most of their financing on the basis of 3-year terms, there were significant differences in the frequency with which they made longer term loans. Commercial banks seldom made a loan with a term of more than 3 years; loans not written with terms of 3 years were written with terms of 1 or 2 years. Where the loans were made with the shorter terms, however, there was usually an understanding that they would be renewed if the borrowers showed good faith. Dealers rarely made a loan for less than 3 years, while approximately one-third were made with terms of 4 or 5 years. In the Corpus Christi area, the 3-year term was even more prevalent than in North Texas and more than four-fifths, 84 percent, of all financing was on this basis.

About nine-tenths of the loans provided for monthly repayments, usually deducted directly from the milk check. Usually the repayment terms called for the payment of a stipulated sum each month, although in some cases there were provisions for a larger sum to be paid if milk production exceeded a specified volume. Another method of repayment less frequently used was the provision of a stipulated sum to be deducted per hundredweight of milk sold. Thus, the amount of repayment varied with the volume of milk marketed.

Recommendations

The following recommendations based on the findings in this study may be helpful in considering the use of credit to purchase a bulk tank:

1. Adapt the information in Tables 1, 2, 3 and 4 to individual farm conditions. It will indicate how profitable a bulk tank may be on your farm.

2. Consider the length of time that you plan to remain in dairying. If you plan to sell out within a few years, you may have difficulty in recovering the full undepreciated balance of the purchase price.

3. Discuss your credit problems with your regular lending agency first if you plan to use credit to purchase a bulk tank.

4. It usually is a good policy to do all your financing through one agency. This practice has several advantages: it gives the agency a better opportunity to become thoroughly familiar with your farming operations and financial problems; it increases their confidence in your integrity and good faith; and, consequently, they may be more willing to extend you credit through periods of adversity.

5. If you do finance the purchase of a bulk tank through another credit source, be sure to let your regular credit agency know. By not keeping your agency fully informed of all financial obligations, you might increase your difficulties for future financing.

6. Know your financing costs. If you are uncertain of the actual interest charge, use the formula in the section on "Interest Rates."

7. Consider whether the purchase of a bulk tank is the most profitable use for your capital. The same amount of money spent in improving or increasing the dairy herd or in pasture improvement, for instance, may bring higher returns. If this is true, it would mean more money to you to delay the purchase of a tank and put the money to more profitable uses.

8. Take the quality of the dairy herd in consideration. This is particularly important if the volume of production is so small that a long period of time is required for savings to offset costs. Dairymen with poor producing animals will have much more difficulty in meeting family living and operating expenses and in paying off expensive equipment than will those with high producing animals.

ACKNOWLEDGMENTS

Appreciation is expressed to the management of the North Texas Producers Association of Arlington and the Coastal Bend Milk Producers Association of Corpus Christi for their cooperation in this study.

The help given by the North Texas Milk Market Administrator's Office in furnishing production and marketing data for the North Texas area is gratefully acknowledged.

Special acknowledgment is made to the dairy producers who cooperated with this study.

Data for this study were obtained with the help of funds contributed by the Southern Regional Farm Management Project S-27, "An Economic Evaluation of Forage Production and Use on Beef and Dairy Farms."

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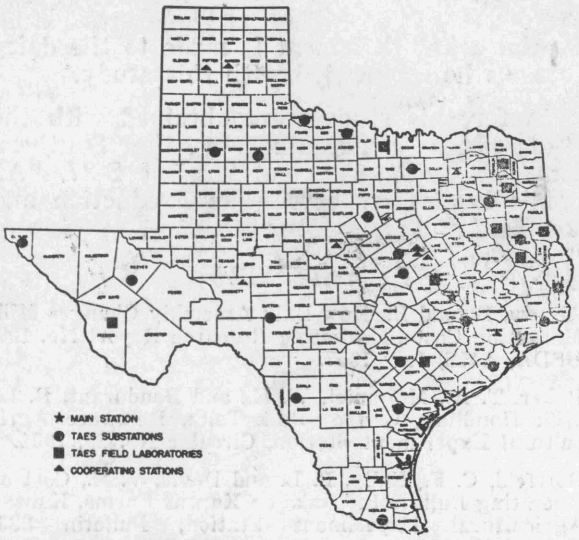

Location of field research units of the Texas Agricultural Experiment Station and cooperating agencies

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