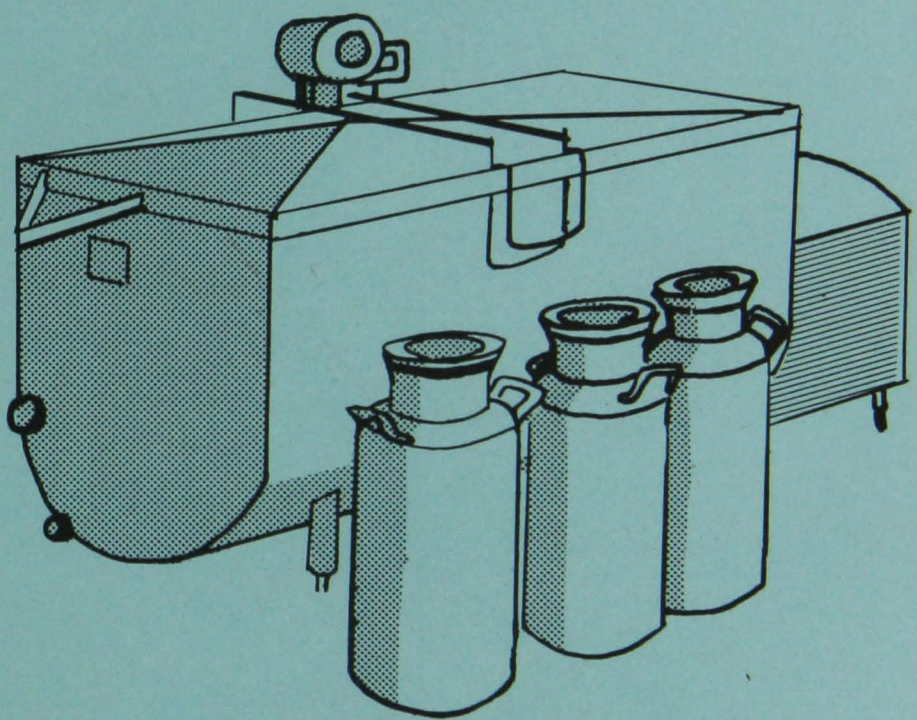
What Shall it Be... Bulk Tanks or Cans?



W. H. DANKERS, Extension Economist - Market

J. GHOLSON, Extension Specialist - Dairy Products

F. L. OLSON, Extension Marketing Assistant

University of Minnesota

AGRICULTURAL EXTENSION SERVICE

U.S. Department of Agriculture

Index

Part I. Introduction

Dairy farmers are faced with the problem -- what shall it be, bulk or cans? The handling of milk in farm bulk tanks is relatively new in Minnesota although some large milk producers in California already used this system over 20 years ago. Whether a farmer should have a bulk tank should be determined by whether it will add to his net income from his dairy herd and his farming operations.

From a survey of farm bulk tanks it was found that in December, 1956, there were 5,200 tanks in use in Minnesota compared to about 2,000 a year earlier. Similar rapid upward trends have been noted in other states. While the 5,200 tanks were owned and used by about 5 percent of the dairy farmers in Minnesota, actually about 17 percent of the total volume of milk delivered by producers in Minnesota was handled this way, indicating that the larger producers have shifted to this system of handling milk. In the earlier period the shift to bulk tanks was largely on farms where Grade A milk was produced or where a farmer was shifting to the sale of Grade A milk. More recently many tanks have been installed on farms where milk is produced for manufacturing purposes.

The rapid positive cooling of milk in farm bulk tanks has made it easier to retain milk quality. However, some producers have depended on this too much and have relaxed their cleaning and their efforts in sanitation, so that they deliver an inferior product in spite of a farm bulk tank. Top quality milk still requires clean equipment and sanitary methods even at cooling temperatures as low as 35° to 40°F.

Because of improved quality and lower temperatures, the methods used for testing quality may have to be modified, but the resulting expense should not be larger than under the present system.

The bulk tank method of handling milk on the farm can result in savings on the farm and at the plant and in quality improvement. Consideration must be given to all of these in determining whether the shift to this system should be made.

Part II. Advantages and Disadvantages

This list of advantages and disadvantages of handling milk in farm bulk tanks compared with the handling of milk in cans has been prepared so that all the factors which are involved may be given careful consideration when a change-over is contemplated. The factors which have been given an (*) are considered to be more significant than the others. The number of factors does not have any bearing on whether the total advantages outweigh the total disadvantages or vice versa. This will vary greatly with individual circumstances.

In listing advantages a complete shift to the bulk tank handling and receiving of milk at the processing plant has been assumed. If only a partial change-over is made and milk is picked up at the farm and received at the plant in both bulk tanks and cans, there is a costly duplication of investment in facilities. Thereby the advantages are less and the disadvantages are more and the total operating costs may actually be larger than they were before the shift was made.

A. For Milk Producers

Advantages

*1. Milk can be kept at higher quality more easily for a longer period of time because the milk is cooled to 40°F. or lower soon after milking.

*2. Can costs are eliminated - the savings may be direct or indirect to the farmer depending on whether he or the plant furnishes the cans.

*3. Hauling costs are considerably lower with every other day pickup of milk. However, total hauling costs might actually be higher if bulk tank truck and a can truck from the same plant cover the same area.

*4. The loss of fat and non-fat milk solids is reduced -- losses which normally occur in handling milk in cans are greater than the losses incurred in handling milk in farm bulk tanks.

5. Heavy lifting is reduced.

6. Labor is saved in some instances, especially when the producer has a pipeline milker.

7. Investment in other milk cooling facilities isn't required.

8. Producers may check weights and tests if desired.

Disadvantages

*1. A high initial investment is required in a bulk tank. This is more serious for small producers because of low volume of production.

*2. Remodeling and rewiring of the milk house is frequently necessary.

3. An all-weather road is required to the milk house.

4. More electricity is probably used because milk is cooled to a much lower temperature.

5. The bulk tank must be washed and sanitized by the producer -- cans were washed at the plant.

6. If milk is rejected, the supply from 4 milkings is lost.

B. At the Receiving and Processing Plants

Advantages

*1. The can intake and can washing facilities are not needed when all milk is received in bulk. This greatly reduces the investment and operating costs at the plant.

*2. The milk is usually of higher average quality when received.

*3. It is not necessary to receive milk seven days a week, except possibly during peak seasons.

*4. The costs of procuring milk are lower when all milk is picked up from farm bulk tanks, and when every other day pickup is in effect.

5. Refrigeration costs at the plants are usually lower -- milk is at lower temperatures when received.

6. Every other day milk receipts from individual farms reduce the handling and bookkeeping costs.

Disadvantages

*1. When both methods of procurement are used, procurement costs will be higher.

*2. Enclosed facilities are needed at the plant for washing truck tanks.

* 3. Plant alterations are necessary -- redesigning of receiving room facilities.

* 4. Qualified truckers must be selected. The truckers must be the weighers, samplers, and graders as well as truck drivers.

* 5. A larger investment is usually required in milk procurement facilities. The haulers may or may not own the truck, but the plant usually owns the truck tank.

6. Quality control costs may increase. Milk rejected at the farm may involve more special visits.

7. A single compartment tank truck can pick up only one grade of milk at a time.

C. For Milk Haulers

Advantages

*1. Mechanical loading saves time and effort -- the lifting of cans is eliminated.

* 2. Hauling milk seven days a week is not necessary -- except possibly during peak season.

3. Possibility of increased earnings per hour for haulers - more responsibility is assumed and a larger volume of milk is picked up per stop and per hour with every other day pickup.

Disadvantages

* 1. Haulers need more technical training and a wider experience in the milk business. They must be qualified to sample and grade milk.

2. There is a limitation in the selection of patrons because special equipment is required on the farm.

3. There is a somewhat greater investment in hauling equipment if the hauler owns the tank. In case the hauler does not own the tank his investment might be lower.

4. Fewer haulers are needed, but the remaining haulers have the possibility of greater earnings.

Part III. Costs and Savings

A. General Considerations

Some of the differences in the cost of handling milk in bulk tanks or cans can be quite accurately calculated on the basis of a hundredweight of milk. Can costs and dumping losses, for example,

can be quite accurately determined. However, costs per hundredweight of hauling and receiving vary considerably from plant to plant and from area to area. The cost per hundredweight of using a bulk tank also varies considerably with the size of the herd.

One midwest milk marketing association has computed the following savings when milk is handled in bulk instead of in cans.

Item	Savings per cwt.
1. Elimination of cans	1.4 cents
2. Elimination of dumping loss	2.5 cents
3. Consolidation of hauling (with 100 percent conversion)	5.0 cents
4. Elimination of can washing and closing of intakes (with 100 percent conversion)	7.8 cents
Total savings per cwt. of milk	16.7 cents

This is how they figure the savings:

1. Elimination of Can Costs - The can costs were based on a 10 year average life of a milk can. Two cans are required to ship one can of milk. The price of two cans = ... $17.20

   Replacement of a can cover. Experience indicated that one cover is lost during the life of two cans. The cost of one can cover =. . . . . $ 1.45

   Retinning two cans. Each can needs retinning twice before it is worn out. The cost of four retinning jobs at $3.75 each = ... $15.00

   Cost of shipping one can full of milk daily for 10 years . . . $33.65

   Cost of shipping one can full of milk daily for 1 year = . . . $ 3.37

   Total volume of milk shipped in one can for one year is 23,360 pounds when the can is filled to capacity of 64 pounds.

   Cost of cans per hundredweight of milk ($3.37 ÷ 23,360) = 1.4 cents per cwt.

2. Elimination of dumping loss:

   The minimum loss of milk per eight gallon can is 1/2 pound.

   The minimum loss of milk per hundredweight is .8 pound.

   Extent of loss per hundredweight when the price of milk for manufacturing purposes is figured at $3.10 per cwt. (.8 x$3.10)= 2.5 cents per cwt.

3. Savings from Consolidation of Hauling:

This association figured that the savings from consolidation of hauling and rerouting of trucks with every other day pickup, and with a complete shift from cans to bulk by all the producers in the area, was approximately = ... 5.0 cents per cwt.

Note: Other associations may find that their hauling costs are lowered by a greater or lesser amount depending on their particular situation.

4. Elimination of can washings and closing of can intakes = ... 7.8 cents per cwt.

This association made the above calculation on the basis of eliminating can washing at the plants of some of their distributors to which milk was delivered directly from farms, and for which the association is making a reimbursement, and on the basis of eliminating the milk intake equipment at their own receiving stations.

Note: The milk intake and can washing costs will vary considerably from one plant or association to another, hence the savings in eliminating these operations might vary considerably from the 7.8 cents per cwt. listed above. (See Plant Receiving Room Costs, table 3, page 10)

B. Producer Considerations

Table 1, on the following page, can be used by producers as a guide in determining the advisability of shifting to bulk tanks.

Note:

1. A production of 6,000 pounds of milk per cow was figured, which is close to the Minnesota annual average for 1950-54. Herds with larger production per cow may require a larger tank. The production during the peak day of the year is assumed to be 150 percent of average daily production (column 3-Table 1).

2. The required size of the bulk tank was figured on the basis of every other day pickup and with use at 3/4 capacity during the peak milk production season (column 5-Table 1). The reason for considering use at only three-fourths capacity of the tank is to allow for increased production per cow, more cows in the herd, and a possible delay in milk pickup. The average production per cow in Minnesota increased 39 percent in the 20 year period from 1935-39 to 1956.

Table 1. Additional Costs of Handling Milk in Bulk Tanks Compared with Savings

Number of cows in herd	Production: Average day	Production: Peak day	Annual production of herds	Required cooling equipment: Bulk Tanks: Size (a)	Bulk Tanks: Price (b)	Mechanical Can Coolers: Size (a)	Mechanical Can Coolers: Price (b)	Additional investment for bulk tanks
Col. (1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	gals.	gals.	pounds	gals.	dollars	no. cans	dollars	dollars
7	13	20	42,000	75	1,033	4	390	643
10	19	29	60,000	110	1,237	4	390	847
15	29	43	90,000	150	1,375	6	455	920
25	48	72	150,000	250	1,717	10	600	1,117
40	776	115	240,000	360	2,162	16	875	1,287
60	115	172	360,000	500	2,778	22	1,250	1,528

Number of cows in herd	Additional cost of a bulk tank (c) when allowance is made for interest on investment and complete depreciation of the tank in: 10 Years: Per year	10 Years: Per cwt.	20 Years: Per year	20 Years: Per cwt.	Gross savings per cwt. (see page 5)	Net Savings per cwt. When a bulk tank is used and when allowance is made for interest and complete depreciation of the tank in: 10 Years	20 Years
Col. (1)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	dollars	cents	dollars	cents	cents	cents	cents
7	80	19.0	48	11.4	16.7	-2.3	5.3
10	106	17.7	64	10.7	16.7	-1.0	6.0
15	115	12.8	69	7.7	16.7	3.9	9.0
25	140	9.3	84	5.6	16.7	7.4	11.1
40	161	6.7	97	4.0	16.7	10.0	12.7
60	191	5.3	115	3.2	16.7	11.4	13.5

(a) The size of the cooling equipment was arbitrarily selected to show differences in costs. Equipment is available in other sizes.

(b) The price of bulk tanks and mechanical coolers will vary with the type of construction, etc.

(c) No consideration was given to differences in electrical power requirements between operating a bulk tank or a mechanical can cooler.

3. The United States Public Health Code and many cities require that milk delivered at a plant must be under 50°F. However, a temperature of 40°F. is more certain to maintain quality and the Minnesota Grade A code states that if two or more consecutive milkings are mixed together, such milk shall be cooled to 40°F., or lower, within two hours after the completion of milking and at no time shall exceed 50°F. To meet a 50°F. temperature requirements a mechanical cooler of some type is practically required on the farm even when cans are used. Therefore, in deciding if a bulk tank is a good investment, only the additional cost of a bulk tank above that of a can cooler can logically be considered (column 9-Table 1). The required size of can cooling equipment was figured at half the required size of the bulk tank because the can cooling system requires every day pickup (column 7-Table 1).

4. The lifetime of a bulk tank is probably about 20 years. However, a bulk tank may become obsolete in less than 20 years. Therefore, the "additional cost per year" in using a bulk tank was calculated for both a 10 and 20 year life.

5. In order to find the additional cost per year of a bulk tank when allowance is made for interest on investment and complete depreciation in 10 years (column 10-Table 1) multiply column 9 by .125; when depreciated in 20 years (column 12-Table 1) multiply column 9 by .075. This calculation includes a 5 percent interest charge.

6. The additional cost per hundredweight of a bulk tank (columns 11 and 13-Table 1) was obtained by dividing the additional cost per year (column 10 and 12-Table 1) by the hundredweights of milk produced per year (column 4-Table 1).

7. The savings from consolidation of hauling and from lowering transportation and handling costs, when the shift is made to bulk milk handling, will vary from plant to plant and area to area depending on volume of milk sold by the patrons, the distance between patrons, and the prevailing efficiency in the existing milk receiving room. The savings from bulk milk hauling will be greater with large volume producers because it takes very little more time to pick up milk from a larger producer than it does to pick up from a smaller producer. The greater the distance between patrons the greater will be the savings from bulk milk hauling because the milk is picked up every other day, more milk is picked up per stop and therefore, more miles can be saved. If the existing can receiving system is comparatively efficient the savings in eliminating the receiving room will be less.

   Each association should figure their own savings per hundredweight from consolidation of hauling and from lower receiving costs. These savings should then be added to the savings from elimination of cans (1.4 cents) and elimination of dumping loss (2.5 cents) and the total savings compared with the additional cost per hundredweight of using a bulk tank.

8. If the gross saving per hundredweight is 16.7¢ (column 14-Table 1) and subtracted from the additional cost per hundredweight of using a bulk tank (column 11 and 13-Table 1) it is possible to determine the net savings (column 15 and 16-Table 1).

9. According to the calculations given in Table 1, producers with herds of seven or more cows would benefit by having a bulk tank if the tank could be used effectively for 20 years. If, on the other hand, the tank could be used effectively for only 10 years, then only the producer with herds of some over 10 cows would benefit by shifting to the use of a farm bulk tank.

C. Association considerations

When all the patrons of a plant are asked to convert to a bulk tank system, the smaller ones may actually lose while the larger ones have substantial savings. There should be a benefit to the group as a whole if a conversion is made to bulk milk handling. The directors and management of a dairy association can determine the net savings for the various size patrons from their records.

ble 2. Net Savings of an Association if it Shifted from the Handling of Milk in Cans to Bulk Tanks

ze of lk tanks	Number of patrons in each tank size group		Annual milk receipt from each size group		Net savings per cwt. when allowance is made for interest on investment and complete depreciation of the tank in:		Net savings per year when allowance is made for interest on investment and complete depreciation of the tank in:	
					10 Yrs.	20 Yrs.	10 Yrs.	20 Yrs.
l. (1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
gal.	number	percent	pounds	percent	cents per cwt.		dollars	
75	101	46	4,161,137	24	-2.3	5.3	-957	2,205
10	47	22	3,411,700	20	-1.0	6.0	-341	2,047
50	36	16	3,672,630	22	3.9	9.0	1,432	3,305
50	30	14	4,708,500	28	7.4	11.1	3,484	5,226
60	4	2	957,395	6	10.0	12.7	957	1,216
00	--	--	--	--	11.4	13.5	--	--
tal for the sociation	218	100	16,911,362	100	2.7¢	8.3¢	$4,575	$13,999

Note:

1. The required size of the bulk tanks was figured on the basis of every other day pickup and with use at 3/4 capacity during peak milk production season. (column 2-Table 2)

2. The net savings per year (column 8 and 9 - Table 2) was calculated by multiplying the hundredweight of milk (column 4-Table 2) by the net savings (column 6 and 7-Table 2).

3. The total annual net saving for this group of patrons is the sum of the net savings and net losses of the individual patrons.

4. For the total group of patrons there was a net saving. One hundred forty-eight (148) patrons or 68 percent of the total had net losses when a life of 10 years was figured for the bulk tanks. But these patrons furnished only 44 percent of the milk handled by the association. The net loss for individual groups of patrons ranged from 1.0 to 2.3 cents per cwt. The groups of larger patrons had savings up to 10 cents per cwt. which offset the loss of some of the groups of smaller patrons.

D. The Savings are Different in Large and Small Plants

The costs of receiving milk in cans decreases as the volume of milk received per day increases. Recently a study of milk receiving room costs was made in the Midwest. These receiving costs varied from less than 10¢ per hundredweight in a plant receiving 160,000 pounds per day to 25¢ per hundredweight in a receiving station buying only 40,000 pounds per day.

Costs of receiving milk in bulk tanks at a plant changes very little as the volume of milk received increases and is about 3¢ per hundredweight. The following table shows the comparative costs and savings for plants with various volumes.

Table 3

	Daily Volume of Milk Received		
	40,000 pounds	75,000 pounds	160,000 pounds
	Cost per cwt. of receiving milk		
Milk received in cans	25¢	14¢	10¢
Milk received in bulk tanks	3¢	3¢	3¢
Savings when milk is received in bulk instead of in cans	22¢	11¢	7¢

Note:

1. The savings from receiving milk in bulk result only if the can receiving room is eliminated and all of the milk is received in bulk. If the can receiving room is kept open, the costs would actually be higher.

2. The savings of receiving milk in bulk instead of in cans is much greater in small plants than in large plants.