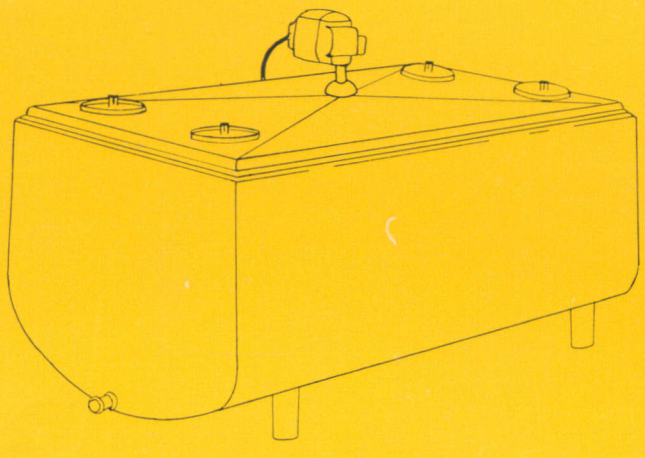
CIRCULAR No. 120 JUNE 1957

Questions and Answers About

BULK MILK TANKS



Agricultural Experiment Station of the

ALABAMA POLYTECHNIC INSTITUTE

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First Printing 6M, June 1957

WHAT IT'S ALL ABOUT

1. Alabama Grade "A" dairymen are rapidly turning to use of bulk milk tanks on their farms.This study concerns costs and other considerations pertaining to tank installation on 15 dairy farms in Calhoun, Montgomery, and Russell Counties.

2. Farmers consider the initial cost of a bulk tank the biggest hurdle. Costs of bulk tanks installed plus any building adjustment costs less receipts from any sales of cans and coolers ranged from $1,525 for a 150-gallon tank to $7,411 for one of 1,500-gallon capacity.

3. After buying tanks the dairymen, as an average, planned to expand their herd from 78 to 91 cows, a 17 per cent increase.

4. Annual costs of ownership and operation of bulk tanks ranged from 5 to 26 cents per hundredweight of milk produced; the average was 13 cents per hundredweight. Comparable costs for cans and coolers on the 15 farms ranged from 3 to 12 cents, with an average of 7 cents per hundredweight. The higher cost for bulk tanks does not consider reduced loss of milk by bulk handling, possibly higher butterfat percentage, or the value of any reduced labor or physical effort that may be associated with bulk handling.

5. A temporary premium of 5 cents per hundredweight for bulk milk was received by eight farmers. Hauling rates were reduced 15 cents per hundredweight for six dairymen and 5 cents per hundredweight for four dairymen.

6. Time records indicated that 11 of the 15 dairymen took less working time per cow per milking after installing a tank. For six farmers, the decrease in time was 1 minute or more per cow per milking. Three dairymen put in pipelines with their tanks. One changed from a stanchion barn to an 8-cow elevated-stall parlor.

7. Advantages to the milk plant include elimination of lifting or handling of cans, reduced route costs with every-other-day pickup, faster receiving, additional storage capacity in tank trucks, and shifting of cooling to a greater extent to the farm. On the other hand, a sizable investment in tank trucks is required and a skilled driver is essential.

8. When considering a bulk tank, advance planning is necessary. The future of dairying on the farm, as well as milk plant and health department requirements must be considered.

9. In general, farmers who have installed tanks like them. One dairyman commented, "I like it better than I meant to."

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Questions and Answers About
BULK MILK TANKS

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BULK MILK TANKS are being installed at a rapid rate on Alabama dairy farms. There were 180 bulk tanks in use in the State as of January 1, 1957.[1] By May 1, the number had increased to about 500, including tanks on order.

Many questions about bulk tanks are being asked by farmers, milk plant operators, and others. The purpose of this circular is to provide basic information on bulk tanks and bulk handling of milk.

The biggest hurdle in going to bulk tanks is the initial investment. This raises the question of best use of limited funds on many dairy farms. In most cases, the alternative is to shift to another major enterprise. If a dairyman figures it best or most profitable to stay with dairying, then complete use will have to be made of the bulk tank. In order to justify the investment, some dairymen will need to expand their herds, or increase production per cow, or both. Before buying a bulk tank of a given size, a dairyman should do some figuring and planning about the future of his dairy operation. Also, plans for any changes should be discussed with milk plant representatives.

Most of the data presented herein were obtained from a study[2] conducted in the summer and fall of 1956. Fifteen dairymen in Calhoun, Montgomery, and Russell Counties were included. Time and motion data, cost information, and sketch of the barn and milk room layout were obtained before the 15 dairymen installed bulk tanks. After tank installation and after allowing a worker adjustment period, comparable information was obtained

[1] Based on reports by county agents.

[2] The authors wish to express appreciation to the farmers, milk plant personnel, and representatives of the Alabama Power Company and Tallapoosa River Electric Cooperative for their cooperation and assistance.

TABLE 1. SIZE OF FARM, NUMBER OF COWS, MILK PRODUCTION, AND RELATED FACTS, 15 FARMS IN 3 ALABAMA AREAS, 1956

Farm	Farm size	Number of dairy cows		Average production per cow	Size of milk tank
	Open acres	In herd	Planned in herd		
	Acres	*Number*	*Number*	*Pounds*	*Gallons*
A	133	42	42	5,450	250
B	250	150	150	5,820	1,500
C	100	17	20	8,210	185
D	68	17	19	6,500	150
E	135	40	25	4,500	250
F	420	140	250	5,300	1,500
G	200	125	150	5,000	1,000
H	445	115	100	6,713	700
J	97	16	25	5,600	185
K	175	24	50	6,500	250
L	354	60	90	6,100	400
M	440	50	75	5,900	500
N	330	214	200	6,450	1,000
O	700	140	140	9,000	1,500
P	130	30	40	5,968	250
Average	265	78	91	6,201 (unweighted)	----

on the bulk-tank operation. Therefore, cost, labor, and other physical data comparisons were made on the same farms between can-cooler and bulk-tank operations.

Size of herds on the 15 dairy farms ranged from 16 to 214 cows; the average was 78, Table 1. Average annual production per cow was 6,201 (unweighted average) pounds of milk. Acres of open land per farm varied from 68 to 700.

THE BULK TANK

1. What is a bulk tank?

A bulk tank is a refrigerated stainless steel vat of a capacity for holding milk from several milkings. It is surrounded by insulation. The vat and insulation are enclosed by an outside shell which may be stainless steel, plastic, or painted steel or enamel baked on steel. Access to the inside is through the top, which is covered by one or two stainless steel lids. These lids have one or more openings through which milk is poured, Figure 1. Bulk tanks have an agitator that speeds cooling of the milk. The agitator motor is usually on top of the tank. In smaller models, agitators are built onto the lid. Large tanks have a stainless steel bridge across the top that holds the agitator motor. The agitator is turned on prior to drawing a butterfat sample. Thus, a representative sample of milk can be obtained.

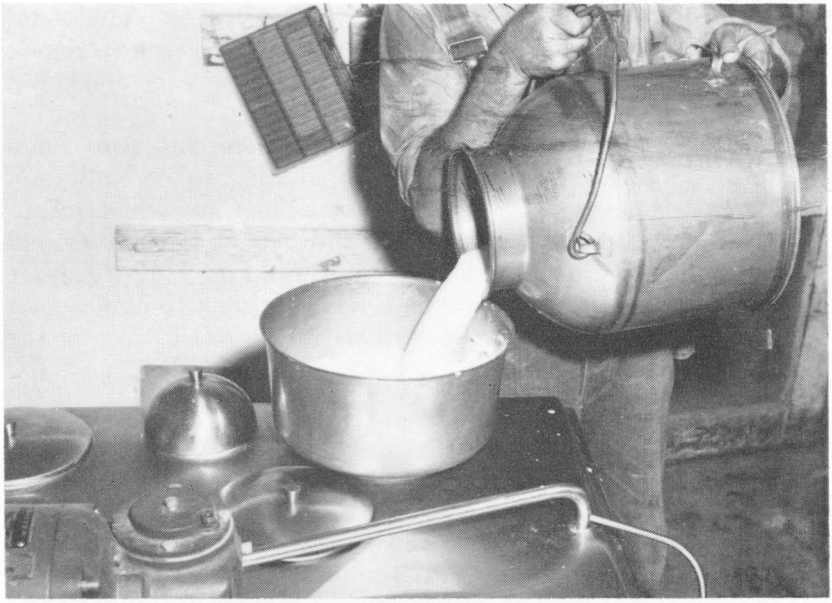

FIGURE 1. Milk is strained in bulk milk tank through hole in tank top.

Each bulk tank has an outlet valve located at one end of the tank. A thermometer is usually provided with each tank. The refrigeration unit in tanks of less than 300-gallon capacity is usually mounted on the bulk tank frame (packaged units). Larger tanks have separate refrigeration units. They are usually located outside the milk room in a "dog house."

2. Is bulk handling a new idea?

No. Farm bulk milk handling began on the West Coast about 1940. The technique spread rapidly to Florida, the Midwest, and to other dairy areas after World War II. Rapid conversion to bulk tanks on Alabama dairy farms began in the fall of 1956.

3. What is difference between direct expansion and ice bank cooling?

There are two main systems of cooling bulk milk, ice bank and direct expansion. When properly operated each will do a good job of cooling milk.

The direct expansion principle involves a refrigerant in direct contact with a metal plate. This plate or cooling surface is an integral part of the tank proper. The compressor operates only when milk is to be cooled.

Water is used in the ice bank type cooling system. The water is chilled by circulation around an ice bank formed by a refrigeration unit. The compressor runs until a sufficient ice bank has been formed.

The direct expansion unit has a larger motor but runs for a shorter period of time than does a comparable size ice bank unit. The compressor motor runs only while cooling milk, which means it runs mainly during milking. The ice bank type unit cannot freeze milk. Sometimes condensation forms on the chilled surface above the milk level inside the tank with ice bank cooling.

All tanks installed by the 15 farmers in the study were of the direct expansion type.

4. Should I buy a bulk tank?

Usually when a plant converts to bulk handling, the patrons have three choices: get a bulk tank, find another market, or quit dairying. No plant can realize savings (in fact, studies show that receiving costs increase) when milk is received in both cans and in bulk. Once started, plants usually convert rapidly to complete bulk handling. In most cases, Alabama plants have specified a date after which they will no longer receive milk in cans.

5. What size tank should I buy?

This question must be carefully answered by each dairyman. Allowances must be made for future herd expansion and/or increased production per cow as well as seasonal variation in production. The tendency in Alabama has been to every-other-day bulk pickup. Therefore, tanks have been selected to hold the milk from five milkings at the peak of production.

6. What do Alabama dairymen who have tanks think of them?

Dairymen who have tanks like them. They like having one container to clean rather than many 10-gallon cans. Some think it costs too much to go bulk. One dairyman said this about his tank, "I like it better than I meant to."

Some say that members of their family like milk handled in tanks better than that handled in cans. Possibly this is due to more rapid cooling and holding milk at a lower temperature than was the case when cans were used. Selling milk at the farm appealed to some dairymen. Reduced hauling rates and premiums for bulk milk also appealed to dairymen.

COST

7. What will a bulk tank cost?

The initial investment in a bulk-tank system is sizable, Table 2. One dairyman paid as much for his tank as he did for his entire farm several years ago. There are usually some costs in addition to the bulk tank and compressor. These include installation, calibration, electrical wiring, plumbing, and sometimes alterations in the milk room. In general, these costs are a small portion of the total expense.

TABLE 2. INITIAL COST AND SIZE OF BULK TANKS INSTALLED[1] ON 15 DAIRY FARMS IN 3 ALABAMA AREAS, 1956

Bulk milk tanks		Cost of tank and installation		Present average daily production
Size	Number	Average per tank	Per cwt. capacity	Per farm
Gal.	*No.*	*Dollars*	*Dollars*	*Gallons*
150	1	1,525	118	35
185	2	1,778	112	36
250	4	1,852	86	59
400	1	2,695	78	117
500	1	2,412[2]	56	188
700	1	3,460	57	246
1,000	2	4,826	56	319
1,500	3	7,411	57	302

[1] Includes cost of tank and compressor installed, cost of building adjustments on eight farms, less any receipt from sale of cooler and cans.
[2] Cost low or not representative for this size tank.

The initial cost per hundredweight of capacity decreases as tank size increases, Table 2.

In addition to initial cost, there are annual costs to be considered. (See Appendix for method of calculating annual costs.) These include depreciation, interest, taxes, repairs, and electri-

TABLE 3. CAN-COOLER AND BULK-TANK ANNUAL COSTS PER HUNDREDWEIGHT OF MILK PRODUCED, 15 FARMS IN 3 ALABAMA AREAS, 1956

Number of farms	Average annual production	Annual costs per hundredweight	
		Bulk tank	Can cooler
No.	*Cwt.*	*Dollars*	*Dollars*
1	1,105	0.19	0.12
2	1,146	.22	.10
4	1,860	.14	.09
1	3,660	.10	.04
1	5,900	.12	.07
1	7,720	.06	.04
2	10,026	.08	.04
3	9,483	.11	.06
Average	5,108	0.13	0.07

city. A comparison of annual bulk-tank and can-cooler costs on the same farms is shown in Table 3.

Annual bulk-tank costs averaged 6 cents higher per hundredweight of milk produced than annual can-cooler costs. Depreciation accounted for 40 per cent of all costs with the can cooler and 53 per cent with the bulk-tank system.

8. How can a bulk tank be financed?

Dairymen often arrange for the financing themselves. In some states, however, milk plants have purchased bulk tanks in carload lots and sold them to their patrons. Often a certain sum of money is deducted from each milk check to cover payment costs. Carload lot purchases have meant savings of 20 to 25 per cent for some plants' patrons. Banks, production credit associations, and other financial institutions and agencies have various financial arrangements and plans available to dairymen.

9. What can I do with my can cooler and cans?

Cans and can cooler may be sold, traded in on new equipment, or kept on the farm. The 15 farmers included in the study realized little from the sale of cans and can coolers. Only four farmers sold cans, some only part of the total number. Six farmers sold their can coolers. They received from $3 to $5 per can and not over $150 for coolers. Dairymen included in the study had from 8 to 45 cans, most of which were of 10-gallon capacity.

SAVINGS

10. What savings can I make by going bulk?

Savings from going bulk vary. Obviously, aerator, cans, and can-cooler costs are eliminated. Some dairymen will save on operating costs when old equipment is very inefficient.

It is not possible to place a cash value on the reduction in physical effort by elimination of can handling. Neither can a price tag be placed on increased pride from bulk tank ownership. Major savings from a labor standpoint center in no lifting of full cans, no handling or washing of empty cans, and no watching for spillage during straining or pouring milk over aerator into cans.

Nelson *(1)* indicates that milk stickage and spillage losses amount to ½ to 2 pounds per 10 gallons of milk handled in cans. The milk lost by stickage probably contains a higher than average

percentage of butterfat. Can stickage is a loss to the dairyman. With tanks loss because of stickage and spillage is a minimum.

11. Are bulk-hauling rates lower than can-hauling rates?

Studies in three Alabama areas in 1956 showed that plants reduced hauling rates 15 cents per hundred in Area A and 5 cents per hundred in Area B. Dairymen in Area C sold milk through a cooperative that had not reduced hauling rates when this study was made. During the period when patrons are installing bulk tanks, can shippers may incur increased hauling rates *(2)*.

12. What amount of premium is paid and why?

A premium for bulk milk is usually paid as an incentive to hasten conversion to bulk handling. The only premium paid to dairymen included in the study was 5 cents per hundredweight for a period of 1 year from date of tank installation. After 1 year, the premium could be discontinued, continued, increased, or decreased at the discretion of the milk plant.

Dunsdon and French *(3)* report that indirect farm savings in the form of dealer premiums will be needed in order to pay for a tank system in many cases.

Cowden *(4)*, in a study in 1955, pointed out that premiums paid for bulk milk ranged from 5 to over 20 cents per hundred pounds. However, 29 per cent of the 91 plants that reported a premium paid 5 cents and 34 per cent paid 10 cents per hundredweight. Fifty-one per cent of the plants did not pay a premium.

13. Will I save time with a bulk tank?

In this study, dairymen were timed during milking before and after installing a bulk tank. Eleven of the 15 farmers showed a lower time requirement per cow per milking with the bulk tank, Table 4. For 6 of the 15 dairymen, the decrease in time was 1 minute or more per cow per milking. Three farmers put in pipelines at the same time they installed tanks. One changed from a 68-cow stanchion barn to an 8-cow elevated-stall parlor. In some cases, comparisons of time before and after were not comparable; that is, the difference in time was due to factors other than those associated with the tank. A pipeline will probably save more time than a bulk tank. Several farms studied used one milking machine and the operator was idle a considerable amount of time. Obviously, two milking machines would reduce the total time required.

TABLE 4. TIME REQUIRED PER COW PER MILKING FOR VARIOUS JOBS WITH CAN-COOLER AND BULK-TANK SYSTEMS, 15 DAIRY FARMS IN 3 ALABAMA AREAS, 1956

Farm	Preparing		Milking		Cleaning equip. & barn		Cleaning bulk tank[1]		Total	
	Can cooler	Bulk tank	Can cooler	Bulk tank	Can cooler	Bulk tank	Total	Per cow	Can cooler	Bulk tank
	Min.	*Min.*	*Min.*	*Min.*	*Min.*	*Min.*	*Min.*	*Min.*	*Min.*	*Min.*
A	1.2	0.6	5.1	4.8	1.3	0.8	35.0	0.3	7.6	6.5
B	.4	.3	3.4	3.3	.7	.6	45.0	.1	4.5	4.3
C	1.0	.8	8.9	7.7	3.4	2.8	40.0	.6	13.3	11.9
D	.5	.5	5.5	4.8	1.6	2.0	14.6	.3	7.6	7.6
E	.6	.4	8.6	7.2	.8	.9	35.0	.3	10.0	8.8
F	1.0	.1	2.8	3.5	.8	.3	35.0	.2	4.6	4.1[2]
G	.5	.2	2.8	5.0	.8	.5	40.0	.1	4.1	5.8[2]
H	1.6	.9	4.9	5.0	1.0	.8	35.0	.1	7.5	6.8[2]
J	.9	.8	8.8[3]	7.6[3]	1.3	1.4	26.0	.6	11.0[3]	10.4[3]
K	.7	.5	4.2	4.7	1.0	1.3	23.9	.2	6.4	6.7
L	1.2	.8	10.2[4]	13.1[4]	1.1	1.8	30.0	.2	12.5[4]	15.9[4]
M	.7	.5	4.2	2.8	.6	.5	30.0	.2	5.5	4.0
N	.4	.3	5.8	4.8	.5	.4	38.0	.1	6.7	5.6
O	.5	.3	3.8	3.8	.7	.3	30.0	.1	5.0	4.5
P	.6	.7	10.0	6.2	1.7	.7	10.4	.1	12.3	7.7

[1] Cleaning of the bulk tank was based on time reported by the dairy farmers and actual timing of this operation when possible. The time per cow was obtained by dividing the total cleaning time by the number of cows milked at four milkings. Bulk milk on all farms was picked up every other day; therefore, the tank required cleaning after every four milkings.

[2] Based on use of pipeline milkers and bulk tank. In the case of Farm F, can-cooler system times were obtained when a stanchion barn was in use. Bulk-tank system times were obtained when an 8-cow milking parlor was used.

[3] Based on hand milking.

[4] Based on hand milking and use of one milking machine.

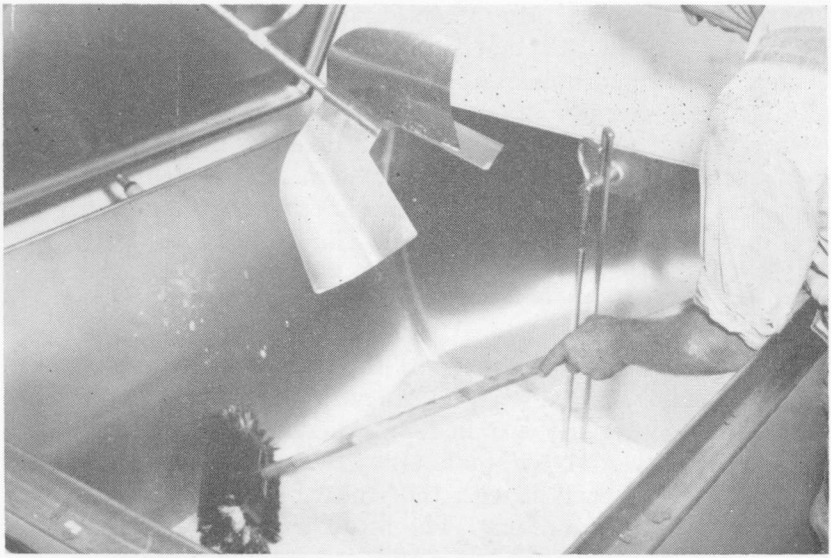

FIGURE 2. Bulk tank is washed every other day after milk is picked up.

Part of the time saved by elimination of can and aerator washing and can handling must be used to wash the bulk tank, Figure 2.

Tank washing time varied with size of tank, the worker, and other factors. The three main steps, rinse, wash, and rinse, were timed at each dairy, and times are reported in Table 4.

A longer cleaning time was required when the bulk tank truck driver did not rinse the tank and the milk film left in the tank dried. In most cases, the tank truck driver rinsed the farm tank. But when a hose or hose connection was not convenient, or water pressure was not adequate, the truck driver did not rinse the tank. Low water pressure also lengthened cleaning time.

14. What about off-flavors in bulk milk?

The problem of weed and feed flavors does not cease after installing a bulk tank. Losses due to off-flavors may be greater with tanks than with cans if the dairyman does not use care. An entire tank of milk may be rejected instead of a 10-gallon can.

15. What change may I expect in bacterial count?

Installation of a bulk tank is not a guarantee of higher quality. Quality of milk depends on the dairyman, cleaning of the tank

and other equipment, other facilities, and numerous other factors. Researchers point out that milk placed in tanks is ordinarily cooled quicker and held at a lower temperature than that in cans.

A common practice in one Alabama area was to cool only the evening milk. The morning milk was taken to the plant without being cooled. If milking began at 3 a.m. and the milk was received at the plant at 10 a.m., some milk was without refrigeration for 7 hours. All milk was cooled in a bulk tank.

16. May I expect rancid milk with a bulk tank?

Redfern and Homme *(5)* report that milk cooled immediately and held below 45° presents no rancidity problem. They further report that improperly installed pipelines are mainly responsible for rancid milk and not bulk tanks. One dairyman who was contacted in connection with the study failed to start his bulk tank after he began milking. The result was loss of 2 days' milk. In addition, disposal of the sour milk presented a problem.

17. Will a bulk tank "pay" on my farm?

For a bulk tank to pay, annual savings must be equal to or greater than costs. Direct savings result from reduced hauling rates and premiums. Indirect savings occur from reduced loss in stickage and spillage and resulting higher butterfat tests. Spillage due to overflow of cans is eliminated. There is no lifting, handling, or washing of cans. The job of milking is made easier. In some cases, a bulk tank may not be justified on a given dairy farm from an economic standpoint. Each dairyman must evaluate his own situation. In many cases, adjustments in size of herd, production per cow, labor, and other factors may be made in order to get the most profits from bulk tanks.

18. Will bulk tanks increase the surplus of milk?

This depends on the situation for each milk plant. Some patrons will expand production after installing a tank. In certain cases, small producers may not continue to sell milk after the plant converts to bulk handling.

The 15 dairymen included in the study, as an average, planned to expand their herd from 78 to 91 cows, or 17 per cent, after buying a bulk tank, Table 1. Three dairymen did not plan to increase and three planned to reduce the size of their herd. One dairyman who planned to reduce his herd did so in connection with elimi-

nation of one worker. Two dairymen who planned to reduce cow numbers realized that culling was necessary.

SALE AND HANDLING OF MILK IN BULK

19. How often is bulk milk picked up?

Most bulk milk routes in Alabama are operated on an every-other-day basis. Therefore, twice as much milk is handled per trip to the farms as was the case with cans. Every-other-day pickup also gives the plant a chance to eliminate Sunday receiving operations.

20. At what point does bulk milk become property of the plant?

Bulk milk is sold at the farm. It becomes plant property when it is pumped out of the farm tank and into the tank truck, Figure 3.

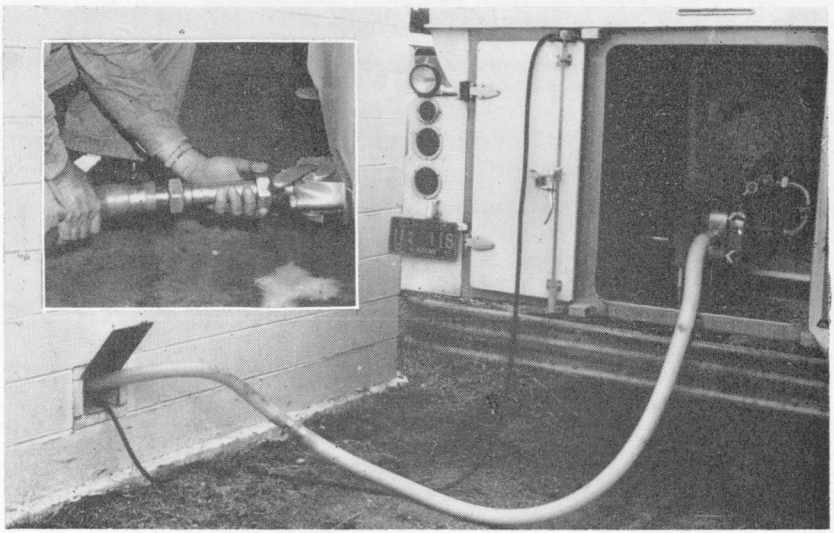

FIGURE 3. Hose is connected to bulk tank (inset) and milk pumped into truck. Milk becomes plant property when loaded into truck.

21. How is bulk milk measured?

Weight of milk is measured by a stainless steel rod similar to the oil dip stick in an automobile, Figure 4. The rod is usually graduated in 1/32-inch increments. The reading in inches is converted to pounds of milk by referring to a table. The tank

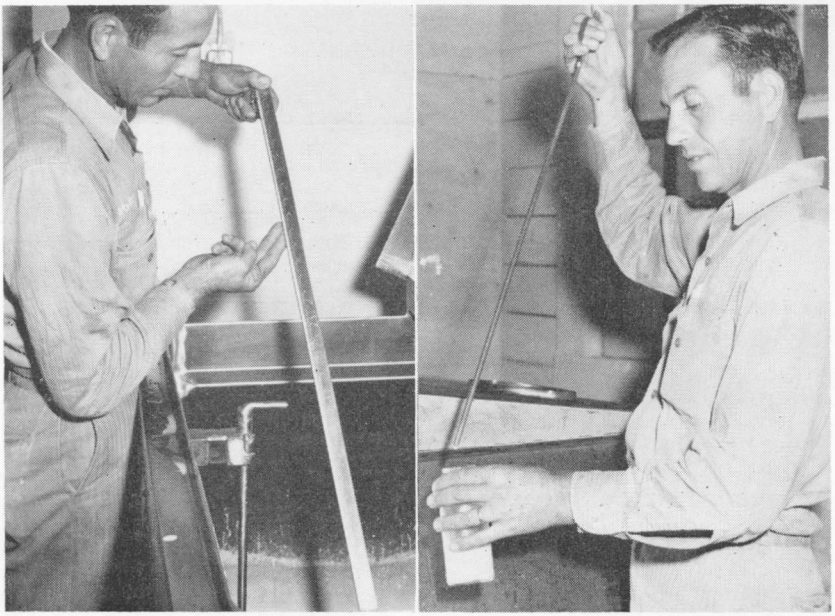

FIGURE 4. Milk is measured with stainless steel rod and measurement converted to pounds (left). Driver also takes butterfat test sample at farm (right).

truck driver measures the milk and completes a receipt, a copy of which is left in the milk room, before the milk is pumped into the tank truck. Thus, the dairyman knows the exact amount of milk sold.

22. Why is the tank truck driver a key person?

Because the tank truck driver is responsible for accepting or rejecting milk, determining the amount of milk in the farm tank, drawing a representative butterfat sample, and finally getting all the milk from the farm tank to the truck tank. Therefore, some operations formerly carried out in the plant receiving room are done on the farm, Figure 4.

CHANGES IN PHYSICAL FACILITIES

23. Can a bulk tank be installed in my present milk room?

The removal of can racks, can coolers, and aerators provided sufficient space for bulk tank installation on 9 out of 15 dairy farms studied in Alabama. Four of the 15 had to enlarge their

old milk rooms. Two built new milk rooms, primarily as the result of installing a pipeline. Eight dairymen had to widen the milk room doorway or tear out a portion of the wall to get the tank inside. One dairyman raised the milk room ceiling so that the lids of his 1,000-gallon bulk tank could be opened.

Usually a 2-foot tank-to-wall clearance on three sides, with a 3-foot clearance in front of the milk tank drain is required by health department regulations.

A complete overhaul may be necessary if milk rooms have badly pitted and/or cracked concrete floors, and non-dust proof ceilings and walls. If this is the situation, local health officers should be consulted before making changes.

24. Can the bulk pickup truck get to my milk room?

Bulk tank trucks are heavy. This presents two questions. First, are the roads and bridges leading to my dairy barn strong enough to carry a heavily loaded bulk truck? When a truck with cans got stuck, full cans of milk could be set off to lighten the load. But a "tanker" stuck in the mud when loaded with 1,800 gallons of milk presents a problem. The second question follows: Can the "tanker" back up to my milk room without a great deal of trouble? Some milk rooms are several feet lower than the ground level on which the tank truck must park This may mean that an extension hose must be added to the regular pickup hose on the bulk truck.

25. How much electrical rewiring is necessary?

Some rewiring is necessary to convert to a bulk system. An outside electrical outlet for the "tanker" pump must be provided. Usually, rewiring costs are a small percentage of total bulk-tank costs.

26. Should I install a pipeline along with a bulk tank?

Installing a pipeline along with a bulk tank means a still greater outlay of funds. However, some dairymen have found it practical and convenient to install both at the same time. At present, pipelines are not required in Alabama.

HEALTH DEPARTMENT REGULATIONS[3]

27. Do present health department regulations apply to farm bulk-tank operations?

Yes. The approval, installation, and operation of farm bulk milk tanks must be in accordance with the "Regulations Governing the Production, Processing, Handling or Distribution of Milk and Certain Milk Products" adopted by the State Board of Health, April 18, 1956. These regulations require any person, firm, or corporation engaged in the production, processing, handling, or distribution of milk and certain milk products intended for sale for human consumption to have a permit signed jointly by the State Board of Health and the County Board of Health.

28. What are 3-A standards and should I buy a tank that meets these standards?

3-A Sanitary Standards are certain material and construction requirements that have been formulated by a committee composed of members of the International Association of Milk and Food Sanitarians, the U.S. Public Health Service, and the Dairy Industry Committee. The manufacturers of farm milk tanks appearing on the approved list must have the approval and meet the requirements of the 3-A Sanitary Standards Committee. This is considered to be one of the best safeguards against inferior material and workmanship that the purchaser may have.

FROM THE PLANT STANDPOINT

29. Does bulk milk handling offer any advantages to the plant?

Yes. Plants save by eliminating or making another use of receiving rooms, can washers, weigh tanks, specialized receiving room labor, and trucks used in hauling cans.

Dunsdon and French *(3)* report plant receiving savings range up to 40 cents per hundredweight of milk handled. Savings per hundredweight are usually higher for smaller plants. Hauling costs vary with local conditions. Baum and Pauls *(6)* report that bulk receiving room costs are about 38 per cent of can receiving room costs.

Shifting from everyday to every-other-day pickup gives a big-

[3] Sincere appreciation is expressed to G. R. Wright, Director, Division of Inspection, Bureau of Sanitation, Alabama Department of Public Health, for answers to the two questions above.

ger volume per farm stop, which is important in reducing hauling costs per hundredweight of milk handled.

Time records on picking up milk in bulk were obtained on 17 dairy farms in the Calhoun County Area. Minutes were recorded from the time the driver stepped from the tank truck until he returned to the truck to leave the farm. Man minutes per hundredweight of milk picked up decreased as the volume of milk increased. About 50 per cent more time was required per hundredweight for "pickups" of less than 600 pounds as compared with those of more than 600 pounds.

Plants that have converted to 100 per cent bulk handling save on storage and refrigeration costs. Milk is stored for a longer period of time on the farm and is received in the plant at a lower temperature. Farmers bear the cost of storage and of maintaining lower temperatures. Bulk tank trucks serve as mobile storage tanks at the plant. In some cases, full tanks of milk are parked at the plant on Saturday and are not unloaded until the following Monday morning.

Bulk handling reduces the need for Sunday receiving operations at the plant. This should improve labor relations. Receiving in bulk is also faster than can receiving, since testing and accepting of milk is done at the farm. The truck driver's job is much easier, since can lifting is eliminated, Figure 5.

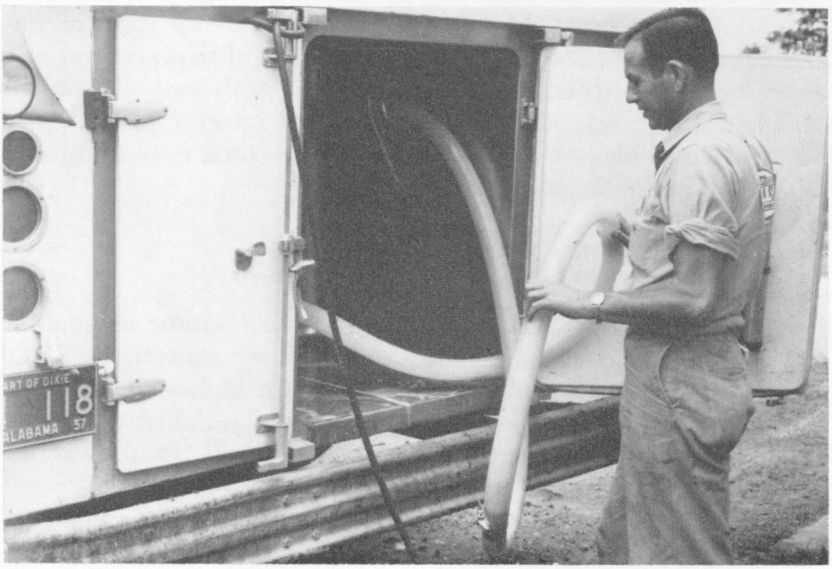

FIGURE 5. Only lifting done by tank truck driver is loading hose.

Nevertheless, there are sizable costs in connection with ownership (or rental) and operation of tank trucks. The original investment in a bulk tank truck is higher than in trucks to haul cans but fewer bulk trucks are needed. A milk plant that converts to bulk handling prior to conversion by competitors may gain a temporary advantage in advertising. In addition, early converters may be able to expand their market area in some cases.

OTHER CONSIDERATIONS

30. My cooler is worn out but milk plant is not converting to bulk handling. What should I do?

First, check with the fieldman where you sell milk. They may be considering bulk tank conversion within a year or so. If so, you might consider installing a bulk tank now to replace your worn out can cooler and "can off" the milk each day or every other day. Or, if it seems desirable to continue using a can cooler for a while, check with dairymen in areas where bulk tanks have been installed. There are usually some good can coolers available at reasonable prices.

31. What effect will a bulk tank have on my income tax return?

The bulk tank is an asset just as the farm tractor, and is subject to depreciation. Therefore, an expense in the form of depreciation is allowed each year. The amount of depreciation will depend on the estimated useful life, cost, and method used in calculating depreciation. In addition, any interest paid during the tax year in connection with financing the tank is an allowable farm expense for income tax purposes.

32. Will the consumer benefit from bulk handling of milk?

Bryant (7) reports that bulk milk is more uniform in quality. This should be a factor to encourage greater consumption per person. Bulk handling of milk will result in higher quality and more uniform milk at a lower cost to the dairy industry. Under competitive conditions, consumers should benefit from lower industry costs over a long period of time.

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APPENDIX

Method of calculating annual ownership and operation costs

The original cost data on cans, can coolers, aerators, and farm bulk milk tanks installed were obtained from the 15 dairymen. Annual depreciation by the straight-line method was calculated on each item using the following years of estimated useful life: can cooler, 10 years; cans, 8 years; aerator, 20 years; bulk tank, 15 years; compressor, 10 years; and building changes, 40 years. Initial cost of the bulk tank proper and compressor was separated so that a different rate of depreciation could be used on each.

Annual repair costs on bulk tanks were estimated at one-fourth of 1 per cent and on compressors at 1 per cent of their original cost. When information on the repair costs of cans and coolers was available, actual repair costs as reported by farmers were used. Two per cent of the original cost was charged each year for repairs if actual figures were not available. Most of the 15 dairymen knew the past retinning costs that had been incurred on milk cans and aerator. Annual repairs on building changes in connection with installation of bulk tanks were charged at one-half of 1 per cent of their original cost.

An interest rate of 5 per cent on one-half the original cost was used to estimate annual interest costs on can cooler and bulk tank equipment.

A property tax rate of $2 per hundred dollars of value (assessment assumed at 30 per cent of original cost) was used on equipment in each of the three areas.

Electricity costs were estimated after information had been obtained on volume of milk produced annually, horsepower of electric motors on can coolers and bulk tanks, and farmers' estimates of hours that compressors operated each day. On seven dairies, electric meters were installed on several items of equipment, including can coolers, bulk tanks, water heaters, and aerators. The meters were installed and removed by personnel of the Alabama Power Company and Tallapoosa River Electric Cooperative. A flat rate of 2 cents per kilowatt-hour was used in calculating electricity costs. In some cases, annual electricity costs were estimated based on the horsepower of motors used.

The annual cost per hundredweight of milk produced before and after installation of a bulk tank was derived by taking the total annual costs of ownership and operation for cans and cooler and for bulk tank and dividing each by the hundredweight of milk produced.