January 1962 A.E. Res. 82

Milking Parlors with Stanchion Barns

An Economic Appraisal

Alan Fox
B. F. Stanton

Department of Agricultural Economics
Cornell University Agricultural Experiment Station
New York State College of Agriculture
A Unit of the State University of New York
Cornell University, Ithaca, New York

MILKING PARLORS WITH STANCHION BARNS
An Economic Appraisal

INTRODUCTION

Research has shown that by using a milking parlor physical effort may be reduced and labor efficiency improved at milking time. As dairymen increase the size of their herds, they also look for ways to handle additional cows with the same labor force. Most dairy barns in New York are of the stall or stanchion type and represent a sizeable fixed investment. Most milking parlors today are associated with loose-housing systems. Nevertheless a few, innovating farmers have concluded that they can increase their efficiency by combining a milking parlor with their present stanchion barn.

Purpose of Study

Combining a milking parlor with an existing stanchion barn system and then learning to move the dairy herd to and from the parlor require some major decisions. This study was intended to provide some information on the experiences of New York dairymen who had already combined a milking parlor with a stanchion barn. With this as background some suggestions are made of the more important problems to consider when making changes in a milking system. A worksheet to use in considering a change has been developed. Answers to the following questions are suggested:

(1) What are some of the more efficient methods of moving cows to and from milking parlors when combined with stanchion barns?

(2) What are the primary factors to consider when locating and integrating a milking parlor into a stanchion barn system?

(3) How large an investment will be required to add a milking parlor to a stanchion barn?

(4) Can a milking parlor pay for itself and if so what are some of the alternative ways of paying for it?

Method of Study

Twenty-five farmers, who had been using a milking parlor with a stall barn for at least one year were interviewed in seven central and five eastern New York counties. The names and addresses of these farmers were obtained from equipment dealers and county agricultural agents. No attempt was made to obtain a complete listing of farmers using milking parlors with stanchion barns. The 12 counties were selected because of the number of milking parlors used with stanchion barns and their location with respect to Ithaca.

Since the study was intended to answer questions of primary interest to commercial dairymen, farms using large amounts of outside capital were excluded. Producer-dealers operating their milking parlors in a manner similar to most commercial dairymen were included. Those who used milking parlors to attract visitors or as a method of advertising were excluded. When milking parlors were designed primarily for public relations an efficient method of handling of cows was not as important as public access to view milking.

Information was obtained on the physical description of the barn, holding area, milking parlor and milkhouse. Sketches of the barn, holding area, milking parlor and milkhouse including flow diagrams for summer and winter cow traffic were made. Besides determining the size and nature of the labor force, a job description for each individual at milking time was developed. Methods used to perform various tasks and the time required to perform each were estimated. In addition, general information about each farmer's experiences with his milking parlor were sought.

Sketches of facilities and flow diagrams were analyzed to determine important factors influencing successful integration of a milking parlor with a stanchion barn. Budgets were prepared to indicate the nature of milking parlor costs and savings in labor which farmers might expect. Previous studies of labor requirements for both stanchion barns and milking parlors served as a basis of estimating labor requirements. Costs were based on information obtained from the Department of Agricultural Engineering, Cornell University and New York equipment dealers.

FARMER EXPERIENCE WITH PARLORS AND STALL BARNS

Physical Description of Facilities

The farms included in this study were larger than average. As a group the farmers were innovators, quick to try new machines and methods. Milk production provided the chief source of income. No attempt was made to evaluate objectively the level of management on these farms, but as a group the farmers appeared to be well above average.

Three types of parlors were found on these farms; the herringbone, walk-through and side-opener. Most farmers used holding areas with their parlors. Many of the farmers had either extensively remodeled their milkhouses or built a new milkhouse when they built the parlor.

Milking Routine

On most of the farms studied (18 of 25) the men working in the milking parlor remained there during the entire milking operation. Dairy chore work was commonly divided into milking jobs and non-milking jobs. A typical winter chore

routine on the farms studied involved two men. The man who did the milking prepared the parlor for the milking operation, brought the milking equipment into the milking parlor and set it up, connected the pipeline to the bulk tank, installed the required filters and prepared to milk. At the same time the barn man released the first group of cows from their stanchions and moved them to the holding area. When the parlor and equipment was ready the parlor operator let part of the first group of cows into the parlor, fed them, prepared them for milking, put the units on the cows, and adjusted them. He then let the rest of the first group of cows into the parlor, fed them and prepared them for milking. By this time the first group was almost finished milking and the operator began to machine strip them and transfer the units to the second group. When all of the first group of cows were milked he released them from the parlor and let in another group. This routine was repeated until all the cows were milked. During this time the barn man fed hay or silage, released more cows from their stanchions, moved them to the holding area, and returned cows to their stanchions as they were released from the parlor. After milking, the parlor operator generally cleaned up the parlor, holding area and milking equipment while the barn man continued to work in the barn either feeding calves and young stock or cleaning the stable. This milking routine varied somewhat with different types of parlors. During the summer only one parlor operator was involved as the cows normally did not go into the barn.

Moving Cows to and From the Parlor

Most farmers (19 of the 25) moved their herds to and from the parlor in small groups. By doing this they were able to keep together those cows that milked alike and were in the same stage of lactation and thus increase the efficiency of the milking operation. Grouping cows in this manner also reduced the size of the holding area required for winter milking as the entire herd was not in the holding area at any one time. The size of each group was usually determined by the number of cows the milking parlor would hold. The groups were commonly equal to this number or some multiple of it.

On two of the farms cows were moved to the parlor one at a time as no holding area had been constructed. This limited the efficiency of the operation considerably as a great deal of time was required for moving cows to and from the parlor.

Very few of the farmers (5 of the 25) put their cows in the barn both summer and winter. One was using a zero grazing system. Three of the farmers were feeding grain in the barn. Stabling cows in the summer to feed supplemental roughage or to save time in gathering cows from pasture usually is not necessary. Cows may be fed or held in a dry lot just as easily without using the barn. Stabling cows in the summer increases chore labor at milking time as someone must move the cows to and from the parlor and clean the stable.

Feeding Grain

In the winter months 18 of the dairymen fed all of the grain in the parlor, six fed part of the grain in the parlor and part in the barn. Four of the six fed a fixed amount in the parlor and the balance in the barn. They felt this was more efficient as they didn't have to keep track of which cow was in the parlor and how much grain she was supposed to have. One fed all of the grain in the barn.

Feeding grain in the parlor adds considerably to labor efficiency at chore time, especially during the pasture season. In the herringbone type of parlor feed is measured into the feeders from a central control panel. In parlors with walk-through and side-opening stalls it is normally measured into the feeders by a metering device at each stall. This has an advantage over the herringbone system because it allows the operator to see that the grain is flowing into the feeder. However, it requires more time and steps for feeding grain than does the herringbone system.

In addition to saving labor, feeding grain in the milking parlor is desirable because it rewards the cows for coming into the parlor and may help to stimulate the let down of milk.

Only three farmers fed any grain in the barn during the summer months. Unless cows must be put in the barn regularly for some good reason during the summer, putting them in just to feed grain seems unnecessary.

Cleaning Parlors and Holding Areas

Milking parlors were usually cleaned twice a day. Total time required for cleaning ranged from 10 to 30 minutes. Holding areas were usually cleaned once a day; only a few were cleaned twice. The time required for cleaning ranged from 5 to 30 minutes depending primarily on the size of the holding area and where manure was scraped.

On several farms the holding areas were constructed so that manure could be scraped into the gutter in the barn. This made cleaning much easier. Where possible this idea is very desirable since a gutter cleaner can then be used to handle manure.

Training Cows

Most farmers experienced little difficulty in training cows to go into the parlor for milking. Some farmers put the cows in the parlor and fed them grain several times there before milking the first time. By doing this the cows became accustomed to the parlor and were more at ease during the first few milkings.

Changes in Labor Force for Milking and Chores

After the milking parlor was installed most farmers were able to milk with less labor although the total labor force was not necessarily reduced. In almost half of the cases (48 per cent) one man was able to do the milking during the winter months. Before the parlor was installed the same number of men milked in the summer as did in the winter. After the parlor was installed the milking crew during the summer months involved only one man on 11 of the farms, two men on 11 other farms, and three men on the remaining three farms.

The most important savings in labor resulting from the use of a parlor was at chore time in the summer. Nineteen of the 23 farmers did not put their cows in the barn during the summer. With the division of labor common on most farms this allowed the men operating the milking parlor to handle the milking operation alone if necessary, freeing men performing non-milking chores for field work at peak work times.

Changes in Herd Size

On most of the farms the savings in labor associated with a milking parlor were not used to reduce the labor force (only three farms did). Information was obtained about the size of the herd before the parlor was installed, when the parlor was first used, and at the time of interview (table 1). Increases in herd size associated with the initial use of the parlor were small, most commonly five to 10 cows. Increases from the time the parlor was first used to the time of interview were larger, most commonly about 15 cows. Only three farmers did not increase the size of their herd after the parlor was installed. All three started with more than 100 cows. Two of these maintained their herd size and one decreased his herd from 180 to 170 cows.

There are many things which may influence the decision by a farmer to increase the size of his herd. The capacity of the farm to handle more cows in terms of housing, roughage and equipment were all important considerations. The desire to lower unit costs and increase the productivity of capital and labor also influenced the decision to expand. Some farmers increase herd size because they like to run a large operation. The desire to use labor more efficiently was perhaps the most important factor in the increases in herd size on these farms.

TABLE 1. SIZE OF DAIRY HERD BEFORE PARLOR WAS INSTALLED, WHEN PARLOR WAS FIRST USED, AND AT TIME OF INTERVIEW
(23 New York Dairy Farms, 1961)

Farm number	Number of cows			Farm number	Number of cows		
	Before	First used	At time of interview		Before	First used	At time of interview
1	32	32	40	13	50	60	100
2	40	40	54	14	55	80	96
3	40	40	55	15	60	60	72
4	40	45	76	16	60	75	92
5	40	50	73	17	65	65	78
6	44	45	45	18	65	80	115
7	44	50	59	19	75	80	100
8	45	55	70	20	78	78	85
9	48	48	54	21	150	150	150
10	50	50	63	22	150	150	150
11	50	52	58	23	180	170	170
12	50	55	72				

TRAFFIC PATTERNS

What constitutes an efficient method of moving cows from a stanchion or stall barn to a milking parlor and back again? Many farmers have questioned whether this can be done efficiently and some have questioned the possibility of doing it at all. To consider this question flow diagrams of cow traffic were obtained for each of the 25 farms. These diagrams were analyzed to determine differences in the methods farmers used to move cows to and from the milking parlor. There is no question that cows can be moved efficiently back and forth from a stanchion barn to a milking parlor. Some farmers were doing it very successfully.

Location of the Parlor

Location of the milking parlor is very important in establishing a good traffic pattern. Short travel distances are obviously desirable as less time is required to move the cows to and from the milking parlor. Cross traffic[1/] should be held

1/ Cross traffic refers to a situation in which cows are moving to and from the parlor by the same path or are continually crossing paths.

to a minimum to keep cows going to the parlor from mixing with cows returning from the parlor. Minimum cross traffic also means moving fewer gates or chains and less congestion in narrow alleys. Cross traffic can usually be minimized by establishing a circular flow of traffic to and from the parlor.

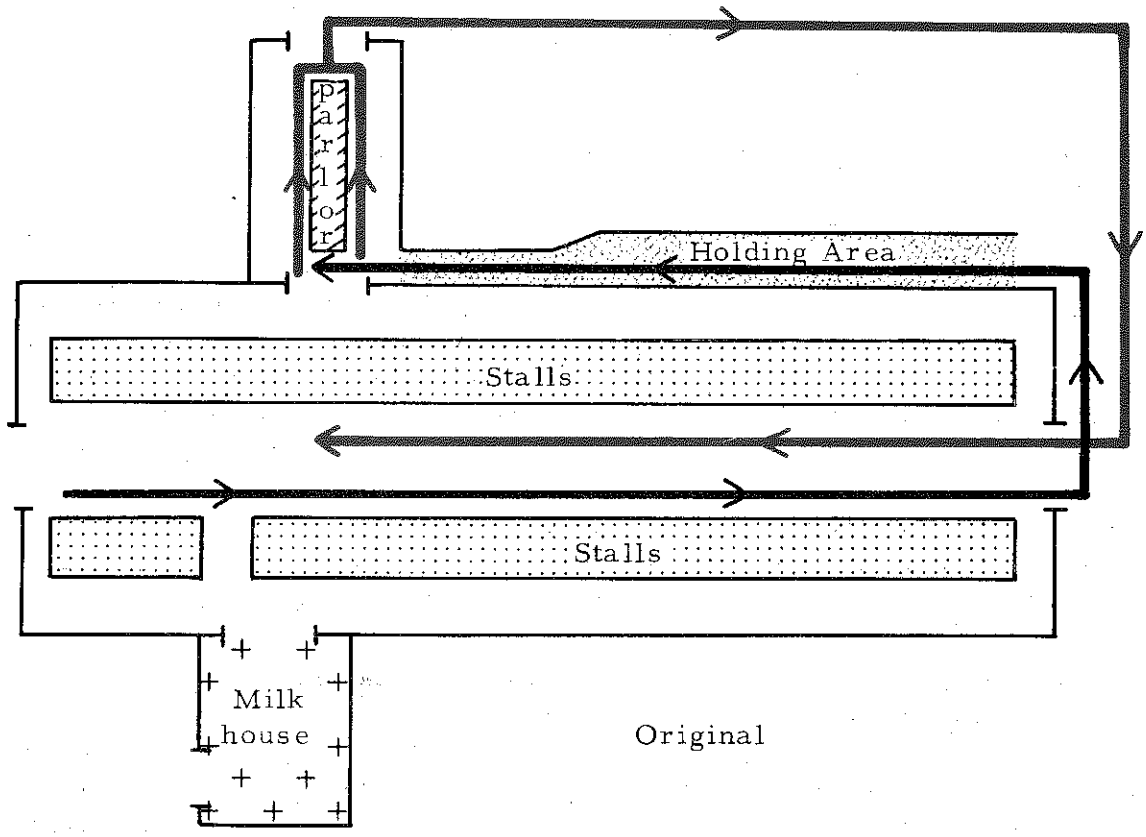
During the summer months cows are moved most efficiently if the milking parlor and holding area are located so that cows do not enter the barn. The holding area does not have to be large enough to hold the entire herd but there should be a suitably partitioned area adjoining the holding area where the herd can be held before milking. It should be divided so that cows leaving the parlor after milking do not have access to it. Many of the farmers found that fencing off part of the barnyard with an electric fence worked very well.

Four situations were developed from the flow diagrams on the 25 farms to illustrate some of the problems encountered in locating a milking parlor and possible solutions which will lead to a good traffic pattern.

In figure 1 an example of the effect of poor location on traffic is presented. Cows must travel the length of the barn to get to the holding area and then must travel three-fourths of the length of the barn to reach the milking parlor. The same distance must be traveled in returning from the parlor to the barn. Cows leave and enter the barn by the same door causing congestion and intermingling of cows returning from the parlor with those going to the parlor. Also the milkhouse is on the opposite side of the barn from the parlor. This is undesirable since the longer distance and possibility of more variation in slope in the pipeline may result in more churning of the milk.

A suggestion for relocating the parlor is also presented in figure 1. Here the parlor lanes are parallel to the rows of stanchions in the barn. By moving one stanchion and making two new doors, a circular traffic flow is established. Travel distances to and from the parlor are shortened and congestion is relieved as cows now return to the barn through a different door than the one by which they leave. The milkhouse is now adjacent to the parlor.

Barns in which the cows face toward the center present more problems than those in which cows face outward. Travel distances are apt to be longer and cross traffic more difficult to avoid. Figure 2 illustrates this well. With the milking parlor located at the end of the barn, travel distances are long and cows returning from the parlor may interfere with cows going to the parlor. This situation can be corrected somewhat by locating the parlor on the side of the barn as suggested in the second part of figure 2. Cows going to the parlor now move toward one end of the barn and into the holding area. Cows return from the parlor near the center of the barn. This traffic pattern shortens travel distances and helps to relieve congestion.



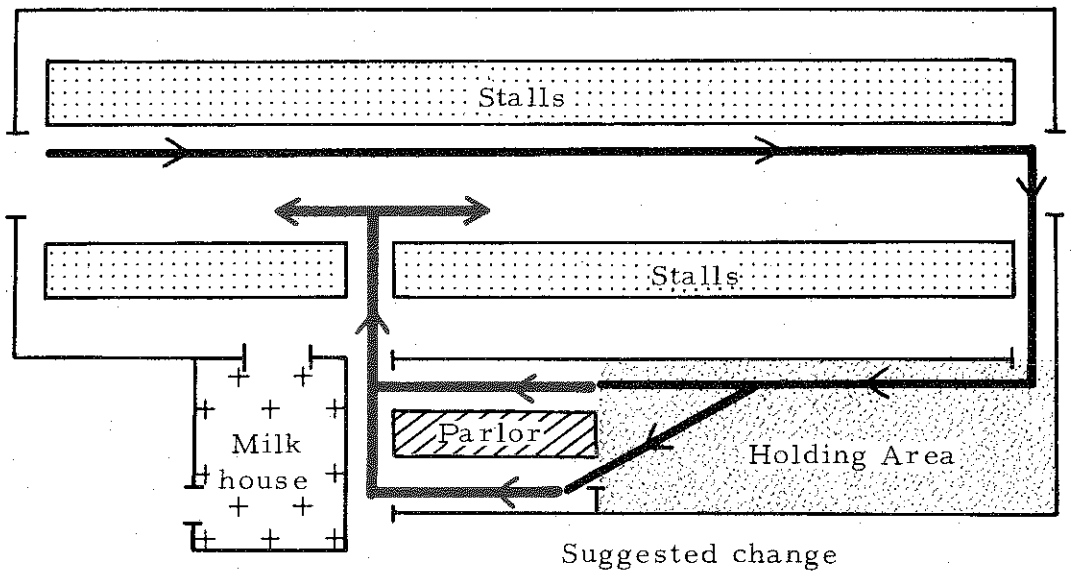


FIGURE 1. ORIGINAL BARN ARRANGEMENT AND COW TRAFFIC WITH SUGGESTED CHANGES
(cows facing out)

Cows going to parlor

Cows returning from parlor

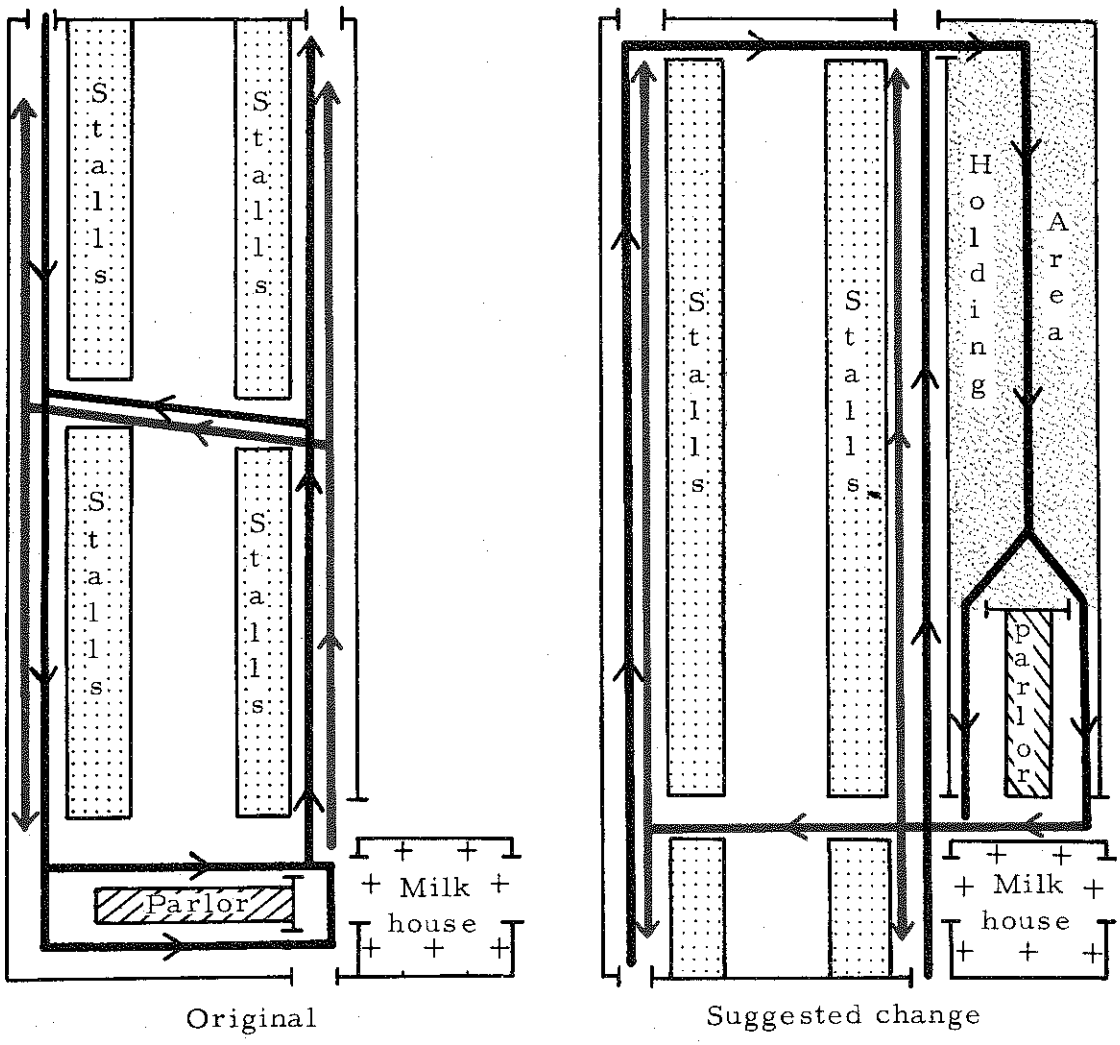


FIGURE 2. ORIGINAL BARN ARRANGEMENT AND COW TRAFFIC WITH SUGGESTED CHANGES
(cows facing in)

Cows going to parlor

Cows returning from parlor

Locating a milking parlor at the end of the barn, whether it be outside the barn or inside, as shown in figure 2, is undesirable as it limits possible future expansion of the barn. Where possible it is best to locate the parlor on the side of the barn. The same principle holds true for locating the holding area.

Primary Factors to Consider in Locating a Milking Parlor

Successful integration of a milking parlor with a stanchion barn depends primarily on the physical location and arrangement of the barn. Some barns are situated so that they cannot be easily adapted to a milking parlor system. Barns built into banks, on steep hillsides, with several wings or with other buildings nearby often make integration difficult.

There are several factors common to all situations that should be kept in mind when attempting to integrate a milking parlor with a stanchion barn.

(1) The parlor should be located so that a circular flow of traffic is established. This helps to minimize cross traffic.

(2) Travel distances should be kept as short as possible. The best means of accomplishing this is to locate the parlor on the side of the barn with the parlor lanes parallel to the rows of stanchions in the barn.

(3) A good holding area is a necessity. It should have a paved surface and be at least partially roofed and protected from raw weather. It should be large enough to hold the largest group of cows that will be in it at milking time during the winter but compact enough so that it may be easily cleaned. It should be located so that it can be expanded if necessary.

(4) Milking parlors and holding areas should be designed and located such that cows do not have to be stanchioned at milking time in the summer. Stanchioning cows in the summer requires additional labor for moving cows to and from the parlor and for removing manure.

(5) When integrating a parlor with a stanchion barn the possibility of future expansion of the herd should be considered. The parlor and holding area should be located so that they will be convenient to any new housing and so that they will not block future expansion of the barn.

CAPITAL INVESTMENT REQUIRED FOR ADDING A MILKING PARLOR TO A STANCHION BARN

While it is quite clear that a milking parlor can be integrated efficiently into a dairy business centered around a stall or stanchion barn, it is not as obvious whether such a move is economically feasible.

To indicate the investment involved in a milking parlor and basic milking equipment, three farm situations were considered. They are intended to serve as guides of what farmers might find when they gather similar information if they consider installing a parlor with a stanchion barn.

The three situations considered are:

No. 1 A double-four herringbone parlor to be located adjoining the milkhouse. No remodeling of the milkhouse is needed. A bulk tank and hot water heater are already installed and considered adequate.

No. 2 A double-three walk through parlor to be located adjoining the milkhouse. No remodeling is needed in the milkhouse. A bulk tank and hot water heater are already installed and considered adequate.

No. 3 A double-three side opening parlor to be located adjoining the milkhouse. No remodeling is needed in the milkhouse. A bulk tank and hot water heater are already installed and considered adequate.

Since milking parlors are very flexible as to the number of cows that can be milked, no herd size was specified for the three farms.

Several manufacturers and distributors of milking parlor equipment were contacted to obtain estimates of the cost of equipment and installation for the three farm situations posed. Estimates of costs for the building and paved holding area were obtained from the Department of Agricultural Engineering, Cornell University.

Cost of the parlor buildings (table 2) was based on an estimate of $4.00 to $4.50 per square foot for concrete block construction. Holding area cost was based on a 20 cow holding area allowing 15 square feet per cow at a cost of $1.20 to $1.75 per square foot. These costs were for purchased materials and hired labor. Farmers may be able to build a parlor for less if they are able to furnish some of the materials and labor themselves. These costs for the building include both plumbing and electricity but no equipment.

The figures in table 2 cover all milking and parlor equipment including an automatic pipeline washer, but do not include a bulk tank or hot water heater. The cost of installing the equipment is also included.

Obviously there is a considerable difference in parlor costs. Side opening parlor buildings cost more because of the design of the parlor. An extra alley is necessary on each side of the milking stalls for movement of cows. The herringbone and walk through use the stalls for alleys and do not require as large a building. The equipment in walk through parlors is of simple design and does not cost as much as the more complex equipment required for herringbone and side opening parlors.

TABLE 2. ESTIMATED INVESTMENT* REQUIRED FOR ADDING A MILKING PARLOR TO A STANCHION BARN
(3 Types of Parlors, New York, 1961)

Item	Parlor Type		
	Double 4 herring-bone	Double 3 walk through	Double 3 side opening
Parlor building	$1350-1525	$1300-1475	$2000-2300
Holding area	360- 525	360- 525	360- 525
Milking and parlor equipment	3900-4200	3400-3675	4000-4100
Total	$5610-6250	$5060-5675	$6360-6925
Typical total	$5900	$5350	$6500

* These totals do not include bulk tank, water heater, heating system for parlor or the building costs for a milk room.

No estimates were made for installing heat in the parlor. Heating methods and associated costs vary a great deal. The method selected for a parlor will depend on personal preferences and available facilities. However, it appears that heating a parlor with heat lamps alone will not be adequate in a number of situations.

LABOR USE IN MILKING PARLORS

Farmers may install a parlor for several reasons. They may wish to reduce the amount of physical effort involved in milking cows. They may also desire to increase labor productivity or reduce the amount of labor required at milking time. They may wish to expand the size of their herd without increasing their labor force. In some instances farmers are only interested in the convenience and ease of milking a parlor offers and are not concerned about the economies of installing a parlor. However, most farmers want to know if a parlor will pay for itself.

Paying for a Parlor With Labor Saved

A farmer must have a profitable alternative use for the labor saved by installing a parlor to make such an investment pay. Some large farms may make some savings by reducing the size of the labor force but most farms are not this large.

Farmers have several alternative ways to use the labor saved by adding a parlor. They may reduce the size of the labor force, add a new enterprise to their business, or they may expand an existing enterprise. Expanding an existing enterprise (usually the dairy enterprise) has been the most common way of utilizing the extra labor.

Expanding an existing enterprise to utilize this labor may cause some additional problems. For example, adding more cows to a herd in order to utilize this labor may increase labor requirements for associated enterprises. Some more labor may be required for fencing and clipping pastures if pasture acreage is expanded to handle the added cows. Producing extra feed for the cows may increase labor requirements considerably during the summer months when labor requirements are already at a peak on many dairy farms.

Increasing pasture or green feed for these extra cows may not be hard if extra land is available or grass yields are generally low. Producing extra roughage for them may be critical on some farms. It will be easiest to expand on farms where roughage is not short. Where it is short it may be possible to buy more hay or produce more corn silage which produces more T.D.N. per acre than hay. A green-chop program has been used successfully by some dairymen.

Comparisons of Labor Used in Milking in Different Situations

How much labor will be saved by installing a milking parlor? To provide a basis for estimating the savings of labor, budgets were prepared for three alternative parlor systems. The three systems were a double-five herringbone, a double-three walk-through and a three in line side-opening. A benchmark situation of a 50 cow herd housed in a stanchion barn and milked with conventional milking machines was used as a standard for comparison.

The basic data for these budgets were obtained from research on the use of labor in milking parlors and stanchion barns as reported in a number of other states. While the purpose of each of these studies was somewhat different from this one, there is no reason to believe that the time required to milk cows in Connecticut, Michigan or Minnesota using similar equipment would be very different from that in New York. While the basic data obtained from these studies are the results of careful research, the standards presented are still average figures. Considerable variability around any standard must be expected. For instance, some men are able to milk more cows per hour in a stanchion barn than other men can milk in a side-opening parlor but on the average more cows can be milked per hour in the side-opening parlor than in the stanchion barn[1/]. This variability may be due to many factors such as the physical layout of the buildings

1/ I. F. Fellows, Economic Effect of Alternative Methods of Housing and Milking Dairy Cattle on Connecticut Farms, University of Connecticut Agricultural Experiment Station Bulletin 355, November 1960.

or the work methods of the operator. The important thing to remember is that this variability does exist and must be kept in mind when referring to any standard or making comparisons for individual farms or farmers with it.

The labor requirements for all tasks performed in the stanchion barn were adapted from a study made at the University of Minnesota [1/] (table 3). These data were not presented originally on a per cow basis but for herd sizes starting with 10 cows and going up to 40 cows by increments of five cows. The Minnesota estimate of labor required for 40 cows was adjusted to reflect some additional efficiency in handling 10 additional cows and then converted to an average requirement per cow for purposes of comparison.

TABLE 3. A COMPARISON OF CHORE LABOR REQUIREMENTS PER COW FOR STANCHION BARN WITH BUCKET TYPE MILKER AND THREE TYPES OF PARLORS*

Task	Milking with			
	Bucket type milkers stanchion barn	Herring-bone parlor	Side opening parlor	Walk-through parlor
	(Hours per cow per year)			
Milking	35.4	16.8	28.5	22.6
Cleaning and preparing equipment	6.0	4.2**	4.9**	3.7**
Feeding grain	2.5	(included in milking time)		
Manure removal (winter)	3.2	3.2	3.2	3.2
(summer)	.7	-	-	-
Moving cows to and from parlor (winter)	-	2.4	2.4	2.4
Feeding roughage (winter)	4.1	4.1	4.1	4.1
Bedding (winter)	1.5	1.5	1.5	1.5
Miscellaneous tasks	2.0	2.0	2.0	2.0

* Sources of basic data:
Day, Aune and Pond, Op. Cit., pp. 17 and 19
Brown, Snyder, Hoglund and Boyd, Op. Cit., p. 911
I. F. Fellows, Op. Cit., p. 9
G. B. Byers, Op. Cit., p. 27

** Includes cleaning parlor and holding area

1/ Day, Aune and Pond, Effect of Herd Size on Dairy Chore Labor, University of Minnesota Agricultural Experiment Station Bulletin 449, June 1959.

Labor requirements for milking (including grain feeding) in the three types of milking parlors were adapted from a Michigan study made by Brown, Snyder, Hoglund and Boyd[1/]. These requirements were originally figured for a 50 cow herd. Labor requirements for cleaning and preparing milking equipment and facilities for the milking parlors were adapted from the Connecticut study by Fellows[2/]. These data were presented for a 100 cow herd. Data for moving cows to and from parlor were adapted from a Kentucky study by Byers[3/]. This was also presented on a per cow basis originally.

One should expect less variability from farm to farm around the milking parlor averages than around those for a stanchion barn. Work methods, equipment and buildings are more standardized for milking parlors. More variability can be expected in stanchion barns as work methods, managers, buildings, and equipment cover a greater range of conditions.

Totals for 50 Cows

Chore labor requirements are compared in table 4 for three milking parlors and a conventional stanchion barn for 50 cows. Only chores that are performed differently in the parlor than in the stanchion barn are included in this summary. For instance, labor required for manure removal in the summer months is included in the requirements for the stanchion barn but not for the parlor because the cows do not normally go into the barn in the summer when a milking parlor is used. Labor necessary to remove manure in the winter months is not included in any of the totals as it was considered to be the same for all systems.

Less labor is required in each of the three parlor systems considered than in the conventional barn. The differences in the three types of parlors are largely related to the number of units handled by an operator at one time. These comparisons were made in the original Michigan study[4/] because the authors felt that this was the normal number of units one operator could handle efficiently in each system. Even if the three milking parlor situations are not directly comparable, the range in time required indicates something of the range of savings in milking time that may be expected with a change to parlor milking.

1/ Brown, Snyder, Hoglund and Boyd, Labor Requirements for Herringbone and Other Milking Systems, Michigan State University Agricultural Experiment Station Quarterly Bulletin, Volume 41, number 4, May 1959.

2/ Fellows, I. F., Op. Cit.

3/ Byers, G. B., Effect of Work Methods and Building Design Upon Building Cost and Labor Efficiency for Dairy Chores, Kentucky Agricultural Experiment Station Bulletin 589, June 1952.

4/ Brown, Snyder, Hoglund and Boyd, Op. Cit.

TABLE 4. ESTIMATES OF CHORE LABOR REQUIREMENT AND SAVINGS WITH THREE TYPES OF PARLORS, 50 COW HERD
(Hours per year)

Task	Stanchion barn (50 cows)	Double 5 herringbone parlor	Double 3 walk through parlor	Three in line side opening parlor
		(Hours per year)		
Milking	1770	840	1130	1425
Cleaning and preparation of equipment	300	210	185	245
Grain feeding	125	(included in milking time)		
Manure removal (summer)	35			
Moving cows to and from parlor (winter)	-	120	120	120
Total	2230	1170	1435	1790
Savings over Benchmark		1060	795	440

Total chore labor requirements per cow were also estimated for each of the three parlor situations (table 5). The number of hours per year used in feeding roughage, manure removal in the winter, bedding and miscellaneous tasks were added to the labor requirements for the chores already considered. These other jobs were considered to be the same for all types of parlors as they are independent of milking time.

These general standards can be converted more directly to an every day situation. Consider a 50 cow herd and two men doing chores with a double-five herringbone parlor. During the winter months both men do chores, one man milking and one feeding roughage, moving cows, cleaning the stable, etc. If it takes them two hours to do chores in the morning and one and one-half hours at night, seven man hours per day are required. Assuming a 200 day winter season this would mean that 1400 man hours are required during the winter. During the summer months one man is able to handle the milking alone. If this required three man hours per day and the summer season was 165 days, 495 hours are required for the summer. This adds to a total of about 1900 hours or somewhat more than is suggested in table 5. On the other hand the standards are not outside the span of farmer experience.

TABLE 5. ESTIMATES OF CHORE LABOR REQUIREMENTS, THREE TYPES OF PARLORS, 50 COW HERD

Tasks	Double 5 herringbone parlor	Double 3 walk through parlor	Three in line side opening parlor
	(Hours per year)		
Milking	840	1130	1425
Cleaning and preparation of equipment	210	185	245
Moving cows to and from parlor (winter)	120	120	120
Feeding roughage (winter)	205	205	205
Manure removal (winter)	160	160	160
Bedding	75	75	75
Miscellaneous tasks	100	100	100
Total	1710	1975	2330
Hours per cow per year	34	40	47

These estimates of chore labor requirements per cow per year are considerably lower than the 100 hours per cow per year commonly used for herds of 40 cows or more in New York State. Part of the difference is attributable to the difference in the tasks included in each. In addition to the tasks included in table 5, the 100 hour figure includes hauling feed, chopping feed or bedding, drawing manure to fields, attending auctions, showing cattle at fairs, and milk hauling done by farm labor. The important figures here are the suggested differences for each system (savings over benchmark). While the standard labor requirements are low, compared with what most farmers are doing, they are consistent throughout. The estimates of the differences may be reasonable even though the basic totals might be questioned.

Using Labor to Milk More Cows

One way to pay for a milking parlor is to produce more with the additional capital resources. The labor saved at milking time which was associated with each of the three types of parlors was divided by the hours of labor per year required per cow in each parlor to estimate the number of additional cows that might be kept to use this labor. For the herringbone parlor about 30 more cows could be milked (1060 hours from table 4 divided by 34 hours per cow from table 5). In a similar manner 20 cows could be added with the walk through

parlor and nine for the side-opening type, assuming no additional labor is required to keep the additional cows except chore labor. These estimates may be quite realistic if only chore labor is considered. However, labor requirements will go up for producing additional roughage and other similar jobs. Hence this is not a complete picture by itself. Additional factors must be considered before making any decisions.

MAKING THE FINAL DECISION

There are many other important factors that must be considered before deciding to add more cows besides using the additional labor made available. A sizeable investment above the costs of the milking parlor may be required for purchasing additional cows and constructing housing for them. In some cases purchasing additional machinery may be necessary. On some farms additional roughage requirements can be met with existing resources. On others this may involve intensifying forage practices by using more fertilizer or improved varieties or the purchase of additional cropland. Some farmers may not be able to do any of these but might buy additional roughage.

Use of a Worksheet

A worksheet was prepared to provide a systematic way of considering some of the more important capital costs, roughage needs, and labor uses associated with a change to a milking parlor. An example of a farmer with a 50 cow dairy considering the addition of a milking parlor and expansion to 70 cows illustrates how this worksheet may be used as well as the wide variety of individual things which must be considered.

First a basic plan is made. The number of milking cows and young stock, the amount of land and labor available, and production levels are determined. The second section of the worksheet looks at capital needs. What may be the major capital outlays? A list of the more common investment costs associated with a change to a milking parlor and a change in herd size is provided including such diverse items as well drilling and additional cropland. In the simple example considered where almost a minimum number of changes are made, the capital cost approaches $20,000 for the parlor barn and 20 cows. Estimates of the amount of investment required for each item can be obtained from a variety of sources. Equipment dealers, local construction firms, and farmers who have recently built a milking parlor are good sources.

On many New York dairy farms forage production is just sufficient to feed the present herd and replacements. Grain production is usually considerably below requirements. Any increase in livestock numbers may result in an increase in forage needs beyond the present capacity to produce forage. The third section of the worksheet provides a way of estimating the difference between current and future forage requirements. With an idea of the difference between current production and future requirements, some means of meeting these requirements can be considered.

TABLE 6. WORKSHEET FOR CONSIDERING THE ADDITION OF A MILKING PARLOR TO A STANCHION BARN

I. BASIC PLAN

	Present	Future
Number of cows	50	70
Number of heifers	25	35
Crop acres	140	140
Man equivalent	2.3	2.3
Milk sold per cow	10,000	10,000

II. ADDITIONAL INVESTMENT REQUIRED FOR CHANGE

Buildings and Real Estate	Value	
Parlor building ($4.00-$4.50 per square foot)	$1,425	
Holding area ($1.20-$1.75 per square foot)	450	
Remodeling of milkhouse		
Parlor heating		
Well drilling		
Rewiring		
Drainage system		
Addition to two story barn ($270-$320 per cow)	6,400	
Addition to one story barn ($200-$250 per cow)		
Silo		
Added land		
Total		$8,275
Equipment		
Milking and parlor equipment	4,050	
Bulk tank		
Gutter cleaner	1,000	
Added machinery		
Total		5,050
Livestock		
Dairy cows 20 @ $ 300	6,000	
Dairy heifers ____ @ $____		
Total		6,000
Other		
Total investment required		$19,325

TABLE 6. (Cont.) WORKSHEET FOR CONSIDERING THE ADDITION OF A MILKING PARLOR TO A STANCHION BARN

III. CHANGES IN FEED REQUIREMENTS

Present Forage Production

	Acres	Yield per acre (tons)	Total yield (tons)		Hay equivalent* (tons)
Hay	90	2.3	207	÷ =	207
Grass silage				÷ =	
Corn silage	25	12	300	÷ =	100
Other					
Totals	115				307

* 3 tons silage = 1 ton hay

New Forage Requirements

Number of cows	70
Hay equivalent per cow and replacement	5.6 tons
Total hay equivalent needed	392 tons
Total hay equivalent produced	307 tons
Net difference	85 tons

Methods of Meeting Forage Needs

A. Forage Production (New Plan)

	Acres	Yield per acre (tons)	Total yield (tons)		Hay equivalent* (tons)
Hay	110	2.3	253	÷ =	253
Grass silage				÷ =	
Corn silage	35	12	420	÷ =	140
Other					

B. Purchases

C. Other

Total tons hay equivalent 393

There are three general ways farmers commonly meet needs for increased forage. They may buy additional hay, intensify their management practices to improve yields on their present cropland, or rent or buy additional cropland. They may also do all or part of these together. Renting or buying additional cropland may have some secondary effects not normally encountered in buying forage or improving yields. As additional cropland is added more machinery may be required to handle the crops, particularly for harvesting. Harvesting crops from additional land also places a larger burden on the labor force at the busiest time of the year.

Planning for Labor Needs

If more cows require more forage from additional cropland or more hay and silage on the same cropland, the existing labor force will face new demands during June and July. It is difficult to plan accurately and directly for these needs but they must be considered. A few key points can be made which apply to most situations.

Labor needs during the summer are of two kinds: (1) chore or milking labor and (2) crop or seasonal labor. A milking parlor can reduce chore labor requirements. One man instead of two can milk at night when harvest work often reaches a peak. But labor saved at milking time will not meet expanded cropping needs alone. Some extra seasonal labor will undoubtedly be needed. The actual amount will depend on the farm and the farmer.

One reasonably simple way of looking at labor needs in June is to list the amount of productive work other than chores that must be done and compare this with the labor available to do these jobs. For example assume a farmer has a regular hired man and a son in high school who helps after school nights and for the balance of the summer after school is out. If the operator does the night milking he has roughly six hours a day (9:00 - 12:00 A.M. and 1:00 - 4:00 P.M.) for field work. In the same manner one could estimate the number of hours per day and the number of days per month available from each man for field work. In this case 25 of the 30 days in June were considered as work days although this number will also differ from farm to farm.

June Field Work					June Labor					
Hay	110	acres @	4	hours = 440	Operator	25	days @	6	hours =	150
Corn	35	acres @	2	hours = 70	Hired man	25	days @	8	hours =	200
Pasture				40	Son	15	days @	3	hours =	45
Miscellaneous						10	days @	8	hours =	80
Rain				(200)						
Total hours needed				550	Total hours available					475

June field work is harder to estimate. If the operator (table 6) plans to harvest 110 acres of hay and cultivate 35 acres of corn for silage once or allow some time out to finish planting it, he must make some kind of estimate of the time required to do these jobs. Likewise, some pasture work will be required. And rain will postpone some jobs or make it necessary to work on jobs other than harvest. The estimates made on page 21 indicate how one might figure out what might happen. Unless this farmer were lucky, worked long hours, or got some extra help at crucial times, it is doubtful if he could harvest all of his 110 acres of hay in June. Some farmers might consider this to be much too formal a way to look at the labor situation for June and July yet some type of similar mental planning must be done if additional feed is to be harvested with the same labor force.

Comparing Changes in Cost With Income

The worksheet just discussed provides a way of looking at some of the important physical changes and capital investments associated with the addition of a milking parlor and herd expansion. The important question of how a parlor can be paid for must also be considered. There is no unique answer to this question. Each case must be considered on its own merits. However, it is clear that one must try to compare the expected change in annual costs after a parlor is added with the expected change, if any, in annual income.

If a parlor is to be paid for by labor saved without changing herd size, either the amount of hired labor must be reduced or some profitable alternative for this labor must be found. It is unlikely that a farmer will be able to reduce his labor force unless he has a large herd. Expansion of a herd of 100 cows or more is also less likely than reducing the labor force if a milking parlor is added. In this case the only new investment will be in the parlor and equipment and not in more cows, housing or land. Reducing hired labor by one man due to savings in chore labor will probably result in a need for hiring some new seasonal labor. Hence, net savings will not equal a full year's wages. For instance, if one less regular hired man is required but three months of hired summer labor are needed, the actual savings will equal approximately nine months. Using $225 per month as the wage rate, the cost of hired labor would be reduced by $2025. If a double-four herringbone were added the original capital outlay would amount to about $6000. Allowing for interest and added operating costs associated with the parlor, a farmer would be able to pay for this parlor in four or five years.

The situation is somewhat different for a farmer who intends to pay for a parlor by increasing the size of his herd. His original investment is much larger and the factors affecting income are more complex. To illustrate this a partial budget, based on the example presented in the worksheet (table 6), is presented in table 7. The simplest set of assumptions is made here. All the feed, hay and bedding needed for the 20 additional cows is purchased.

TABLE 7. ESTIMATED CHANGES IN INCOME AND EXPENSE FROM ADDING 20 COWS
(First Year After Adding a Parlor)

I. ADDED INCOME			
Milk sales (2000 cwt. x $4.25 per cwt.)		$8,500	
Cull cows (5 cows x $165 per cow)		825	
Bob calves (13 calves x $15 per calf)		195	
Total added returns			$9,520
2. ADDED COSTS			
For Cows			
Grain (30 tons x $70 per ton)	$2,100		
Hay (85 tons x $20 per ton)	1,700		
Bedding (10 tons x $15 per ton)	150		
Replacement cows (1 cow x $270)	270		
Vet expense ($10 per cow)	200		
Dairy expense ($20 per cow)	400		
Miscellaneous expenses ($25 per cow)	500		
Total added production costs for cows		$5,320	
For Capital			
Interest, $20,000 @ 6%	$1,200		
Depreciation, $8,000 over 30 years	270		
$5,000 over 15 years	330		
Taxes	500		
Total added costs for capital		$2,300	
Total added costs			$7,620
3. NET CHANGE IN INCOME (Added returns minus added costs)			$1,900

The estimated investment required to make these changes was slightly less than $20,000. If all this money were borrowed at six per cent interest, if taxes were increased in accordance with the added value of real estate, and depreciation were charged on the new buildings and equipment, the added costs resulting from the use of this capital might be similar to those shown in table 7.

Estimates of the direct costs associated with producing milk from 20 more cows were also made. Both the quantities and prices used in this example might be questioned. In general however the figures are conservative. That is, costs are likely to be overstated rather than understated.

The net difference of $1900 would be the amount available annually to apply against the original capital investment. Assuming interest charges would decrease as the original debt of $20,000 was reduced, this budget or plan suggests that in 10 years the added income would pay for this expenditure of capital.

In a somewhat similar manner added income might be compared with added costs if other alternatives were considered besides purchasing all of the additional feed. In most cases these alternatives should reduce feed costs further although not always.

One may fairly conclude after budgeting costs and returns under a number of assumptions that a milking parlor can pay for itself if one regular hired man can be eliminated for most of the year or if the herd is increased in size substantially without adding materially to the present labor force. A milking parlor will reduce effort and time in milking cows. But this alone will not pay for this new capital investment.

SUMMARY AND CONCLUSIONS

Some farmers in the Northeast have successfully combined a milking parlor with existing stanchion or stall barns. Most are enthusiastic about the results. Nearly all these farms were operated by two or more men who had 50 or more cows.

Cows can be moved efficiently to the parlor and back to the barn at milking time. A good traffic pattern is important. Locating a parlor on the side of the barn with parlor lanes parallel to the rows of stalls in the barn helps to create a good circular flow. Cross traffic should be eliminated where possible. In most cases a paved holding area is necessary. It should be protected from raw weather and large enough to hold the largest group of cows turned out at one time for milking in the winter. Possible expansion of the herd must be considered when locating the parlor and holding area. A good plan today could easily be a poor one looking ahead 10 or 20 years.

It takes less labor to milk in a parlor than in a conventional barn. To pay for a parlor, however, a farmer must either reduce the amount of hired labor used or find a profitable alternative use for the labor saved. Only those farms which now have three full time men can hope to reduce the labor force successfully as a means of paying for a milking parlor.

Increased milk production is the most common way of paying for a milking parlor and using the existing labor force more efficiently. But adding to herd size requires many more changes other than the milking parlor itself. New buildings and equipment, more cows and more feed are needed. A careful look at the whole combination of changes is necessary.

To use a milking parlor efficiently with a stall or stanchion barn, most dairymen will need 40 or 50 cows and two men. A good operator can pay for the convenience and efficiency associated with parlor milking. Many farmers may benefit more by improving other aspects of their business such as crop yields or milk production. But on a large dairy farm, adding a milking parlor may make the next 25 years much more pleasant ones and perhaps more profitable ones as well.