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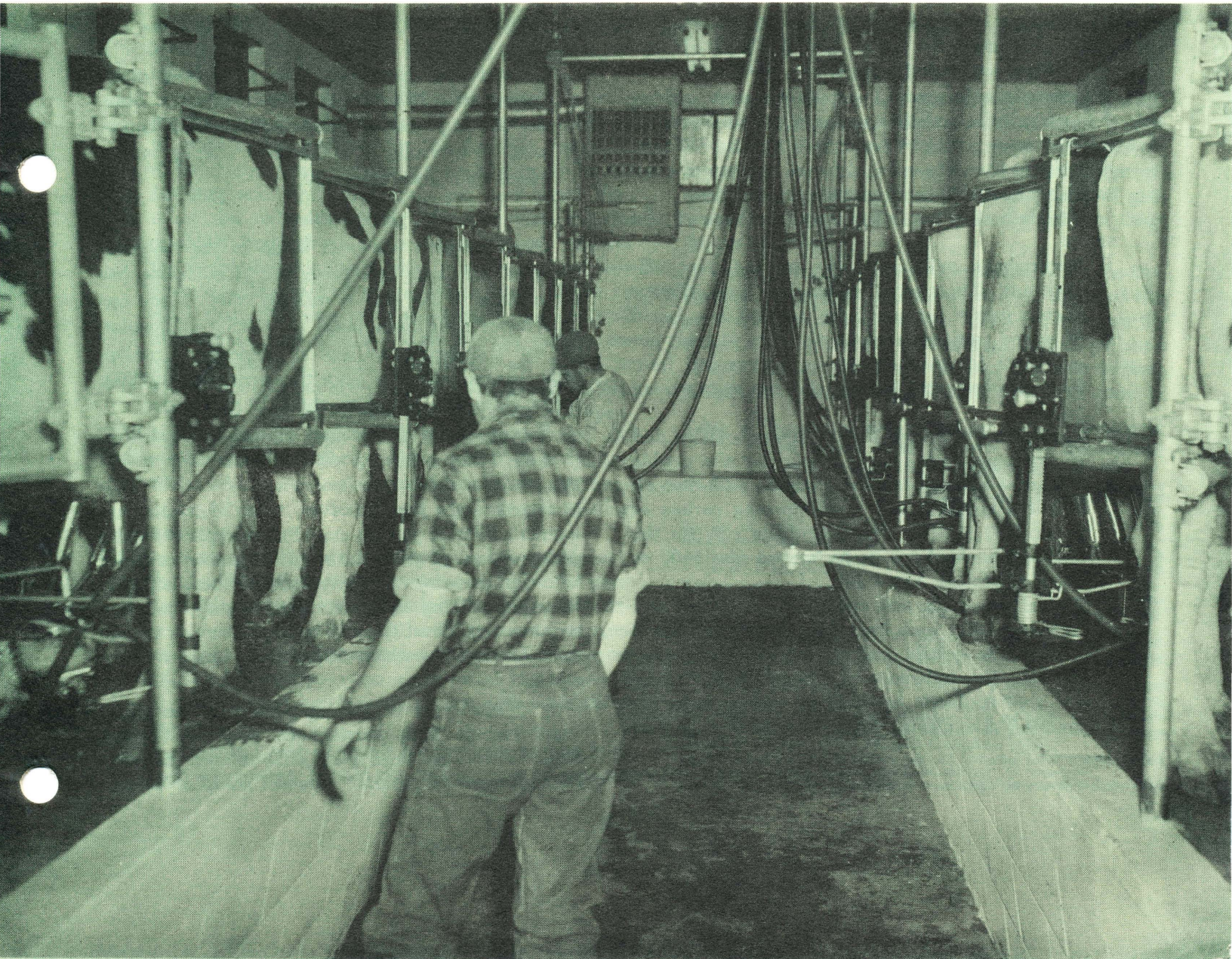
RESEARCH REPORT

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FARM SCIENCE

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Milking Efficiency, Investments and Annual Costs For Milking Parlors



Milking Efficiency, Investments and Annual Costs For Milking Parlors

By C. R. HOGLUND, J. A. SPEICHER and J. S. BOYD¹

Summary

DAIRYMEN PLANNING on installing a new milking parlor or remodelling an existing parlor need to consider many factors in deciding on the size and type of parlor to use. Present and future number of cows and labor available need special consideration.

The following are some major findings of the study:

1. Herringbone milking parlors are the most efficient and side-opening parlors the least efficient in cows milked per man hour. Milking rates based on skilled workers ranged from 35 to 44 cows per man hour for the herringbone parlors and from 26 to 28 cows per man hour for the side-opening parlors.
2. Investments per cow in the milking parlor and all equipment were quite similar for the double 3, 4 and 5 herringbone, the double-3 walk-through and the double 3 and 4 side-opening parlors or about \$130 to \$135. Investment per cow for the double-8 herringbone parlor system was \$100 or about one-fourth less.
3. Annual ownership and operational costs per cow including labor were lowest for double 4, 5 and 8 herringbone systems and highest for side-opening parlors. The difference in annual costs per cow for the double-4 herringbone parlor and the double-3 side-opening parlor was \$39.

4. Labor is the major cost item in milking cows, ranging from 76 to 82 percent of total costs. Scarcity and high cost of labor emphasize the importance of investing in a complete milking system which uses labor efficiently.

Introduction

Much progress has been made in the mechanization of the dairy enterprise, yet little change has taken place in the rate of milking cows. Many improvements have been made in milking equipment, but the arrangement as well as efficiency of parlors have changed very little since the herringbone milking parlor came into operation about 10 years ago.

Recent studies in Michigan (4) and at Cornell (3) showed little or no change in number of cows milked per man hour from those reported for 1959 in a Michigan study (1). However, today dairymen are spending 60 to 80 percent more for a complete milking parlor system. This is the result of higher costs for labor and material, increased mechanization, improvements in milking equipment, and higher sanitation requirements. Most recently built parlors also include room for an office which adds to total space requirements.

Major types of milking parlors sold in recent years include both herringbone and side-opening units. There has been very little interest in walk-through types of parlors. A recent study of 40 new

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Table 1. Cows milked per hour and per man hour, three types of parlors expected milking rates under good management

Milking system and number of stalls	Number of:		Systems adapted to herds of: No. of cows	Number of Cows Milked	
	Men Milking	Milker Units		Per hour	Per man hour
Herringbone					
Double 3	1	3	40-100	35	35
Double 4	1	4	60-120	40	40
Double 5 (a)	1	5	80-130	44	44
Double 6	2	6	100-160	54	27
Double 8	2	8	150 & over	76	38
Walk-Through					
Double 3	1	3	40-100	35	35
Side-Opening					
Three in-line	1	3	40-80	26	26
Four in-line	1	4	50-90	28	28
Double 3	2	6	80-150	50	25
Double 4	2	8	100-160	54	27

(a) Recommended only for top milkers.

free-stall dairy housing systems showed that 33 were herringbone, 6 were side-opening and one was a walk-through parlor (2). Of the herringbone parlors, two-thirds were double-4, one-fourth were double-5 and double-6 with the balance about equally divided among double-3, double-8, and single line 6 and 10 stall parlors.

Dairymen in deciding on a milking system should take into account both present and future numbers of cows milked, the people who will do the milking and the economy of the whole system including costs of labor, ownership, and operation. Increasing size of dairy operations along with high labor costs make it important that dairymen select a complete milking system which is efficient in use of labor and low in cost per cow milked.

Cows Milked Per Hour For Different Systems

Dairymen who expect to use one man to milk and plan on milking from 60 to 120 cows will generally find the double-4 herringbone parlor best adapted to their farms. For dairymen milking somewhat fewer cows and those wanting more time per cow will find the double-3 herringbone parlor desirable. Dairymen who expect to milk 150 or more cows in one parlor should consider the double-8 herringbone system, using two men.

A few dairymen have installed single line herringbone or side-opening parlors to better utilize family labor needing supervision. One dairyman with several teenage children who help milk, installed a 10 in-line herringbone parlor using five milker units. Milking rate was about 35 cows per hour.

Slight revisions were made in the figures from the 1959 study (1) in number of cows milked per hour and per man hour (Table 1). The double-3 herringbone has been included in the table since a few dairymen now operate such units. The rate of milking

for the different systems is based on skilled milkers in physical condition to milk up to 3 hours, twice daily. A few men will surpass the suggested milking rates while others will not attain them.

The double-4 and double-5 herringbone parlors are the most efficient in use of labor. The double-5 herringbone parlor is suited primarily for the exceptionally capable milker. Milking rate per man hour was slightly lower for the double-8 herringbone parlor. Milking rates were estimated as the same (35 cows per man hour) for the new double-3 herringbone and the double-3 walk-through parlors (Table 1). The double-6 herringbone when operated with two milkers is not efficient. Although a few dairymen operate six milker units with one man, the double-6 herringbone parlor is not generally considered a one-man system.

Rate of cows milked per man hour is low for all side-opening parlors. To milk 60 cows would require 30 minutes more time per milking for a side-opening parlor compared to a double-4 herringbone. There is no researched evidence that cows produce differently when milked in the three types of parlors.

Investments in Milking Parlors and Equipment

Investments were calculated for the milking parlor building including stalls and feeders, the milking and heating systems, water and sewage installations, hot water, and other equipment for the various types of parlors (Table 2). The investments are for a complete system including an office and bathroom but excluding the bulk tank and are based on 1968 costs. The investments are based on a moderate level of mechanization including automatic pipe-line milking and bulk tank washing equipment, and gravity grain feeding in the parlor. Eliminating grain feeding in the parlor would reduce investments in feeders by about \$120 per cow (the range from \$60 to \$200 depending on degree of automation) but this would be partially

Table 2. Investments in milking parlors and equipment, 1968 prices (a)

Milking system and number of stalls	Square feet in parlor	Buildings (b) Dollars	Stalls and feeders (c) Dollars	Milking System (d)		Plumbing heat, hot water and other equip. (e) Dollars	Totals Dollars
				Range Dollars	Standard Dollars		
Herringbone							
Double 3	1,000	6,500	1,800	2,400-5,000	3,200	2,400	13,900
Double 4	1,100	7,200	2,400	2,800-5,300	3,800	2,700	16,100
Double 5	1,200	7,800	3,000	3,300-5,700	4,400	3,000	18,200
Double 6	1,300	8,300	3,600	3,800-6,000	5,100	3,300	20,300
Double 8	1,400	8,600	4,400	4,300-7,000	5,800	3,500	22,300
Walk-Through							
Double 3	1,000	6,500	1,700	2,700-5,800	3,300	2,600	14,100
Side-Opening							
Three in-line	1,000	6,500	1,400	2,600-4,300	3,300	2,600	13,800
Four in-line	1,150	7,300	1,800	2,900-4,700	3,800	2,800	15,700
Double 3	1,300	8,300	2,700	4,000-5,800	4,600	3,200	18,800
Double 4	1,450	9,200	3,500	4,600-7,000	5,600	3,500	21,800

(a) Investment will vary due to differences in costs between brands, degree of mechanization of equipment included, and in materials used in the interior and exterior of building.

(b) Includes labor and material for grading, foundation, concrete inside building, lumber, hardware, electrical installations and space for office but not including office equipment.

(c) Includes stalls, gravity feeders, and floor grates and drains.

(d) Range in cost of milking system is from standard, pipeline system with semi-automatic washing to fully automatic with DHIA approved weigh jars. Does not include bulk tank.

(e) Includes all plumbing, water and sewage installations, toilet facilities, heating and hot water systems, and wash racks and equipment.

offset by investments in metering and handling equipment for feeding the grain along with the silage in bunks.

Investments for a double-4 herringbone system, the most numerous system installed today, total \$16,100 or \$2,200 more than for the double-3 herringbone (Table 2). Each increase in number of stalls adds \$1,900 to \$2,200 to total investments but reduces investment per cow milked. Investments in double-3 herringbone and double-3 walk-through parlors both having estimated milking rates of 35 cows per hour, are nearly the same.

A double-8 herringbone parlor capable of a milking rate per man hour of 38 cows costs only slightly more than a double-4 side-opening parlor having a milking rate per man hour of only 27 cows. In selecting a milking parlor system it is important to consider not only the investments and milking rates possible but also the annual cost per cow milked.

Annual Costs of Milking Cows

Milking cows six hours daily

It was assumed that a milker could perform at the average milking rates per man hour as given in Table 1 for three hours twice daily. An hour would be needed in preparation before milking and cleanup after milking twice a day for the different systems. On a basis of a 3-hour milking period twice daily it would be possible for one man milking in the double-4 herringbone at reasonably good efficiency to milk 120 cows twice daily and still work no more than an 8-hour day (Table 3). The number milked per day would be 228 cows for a double-8 herringbone and 162 for a double-4 side-opening parlor, both two-man parlors.

Table 3. Number of cows milked per hour and per day, assuming full time spent on milking, three types and several sizes of milking parlors

Milking system and number of stalls	Number of:		Cows Milked	
	Men milking	Milker units	Per hour	Per day (a) (6 hrs.)
Herringbone				
Double 3	1	3	35	105
Double 4	1	4	40	120
Double 5	1	5	44	132
Double 6	2	6	54	162
Double 8	2	8	76	228
Walk-Through				
Double 3	1	3	35	105
Side-Opening				
Three in-line	1	3	26	78
Four in-line	1	4	28	84
Double 3	2	6	50	150
Double 4	2	8	54	162

(a) Based on 3 hours times twice daily for milking and 2 hours daily for preparation for milking and clean up of parlor and equipment after milking for all types of parlors.

The suggested number of cows that one man can milk twice daily probably appears high but are accepted standards for specialized western dairymen and are attained by many Michigan dairymen. One successful California dairyman with a milk production average of 14,000 pounds suggested that 180 cows per man twice daily is a top limit. It should be pointed out that men who milk cows are highly paid, work an 8-hour day and do nothing but prepare equipment, feed grain, wash cows, milk and clean up the parlor. Quite often there is a helper who brings cows to and returns them from the milking area.

In calculating annual cost of milking it was assumed that the cost of hiring a full-time milker would be \$8,000 annually including fringe benefits. The cost of depreciation, repairs, insurance, and interest on the milking parlor and equipment is shown in Table 4. Depreciation was based on 15 years for

the milking parlor, stalls, and feeders, and on 10 years for the milking and heating systems, and other equipment.

Table 4. Annual costs of labor, parlors and equipment and total per cow, three types of milking parlors. Costs based on 1968 investments

Milking system and number of stalls	Annual Cost of Milking Cows				Per Cow Dollars
	Labor Dollars	Parlor (a) Dollars	Equip-ment (b) Dollars	Total Dollars	
Herringbone					
Double 3	8,000	1,120	1,037	10,157	97
Double 4	8,000	1,296	1,203	10,499	87
Double 5	8,000	1,458	1,369	10,827	82
Double 6	16,000	1,607	1,557	19,164	112
Double 8	16,000	1,755	1,721	19,476	85
Walk-Through					
Double 3	8,000	1,107	1,092	10,199	97
Side-Opening					
Three in-line	8,000	1,066	1,092	10,158	130
Four in-line	8,000	1,228	1,221	10,449	124
Double 3	16,000	1,485	1,443	18,928	126
Double 4	16,000	1,714	1,683	19,397	119

(a) Based on 15 years depreciation on buildings, stalls and feeders, 2.4% on repairs and 7% interest on 50% of original cost.
 (b) Based on 10 years depreciation on milking and heating systems, plumbing, water heater and other equipment, 5% on repairs and 7% interest on 50% of cost.

On the basis of these cost calculations, labor contributed 76 to 82 percent to costs. Scarcity and high cost of labor emphasize the importance of investing in a milking system which uses labor efficiently and at the same time results in high milk production per cow.

Annual costs per cow for milking, and for owning and operating the parlor and equipment averaged \$2 more or \$87 per cow for the double-4 compared to the double-8 herringbone parlors (Table 4). Lower building and equipment costs per cow more than offset the reduced milking rate per man for the double-8 herringbone parlor. Lowest cost was for the double-5 herringbone which is recommended only when excellent milkers operate the system. When no more than 100 cows are milked daily, the double-3 herringbone and double-3 walk-through parlors are quite economical. Total investments are \$2,000 to \$2,200 less than for the double-4 herringbone system.

Annual costs of owning and operating side-opening parlors cost from \$32 to \$39 more per cow annually than for the double-4 herringbone parlor. These costs are a combined measure of the efficiency in use of labor, buildings and equipment in milking cows.

For most dairymen milking up to 100 to 120 cows, the double-4 herringbone would seem to be the most desirable size and kind of parlor. Dairymen who expect to milk more than 120 cows may want to consider the double-8 herringbone system. Dairymen milking 200 or more cows could invest in a double-8 or two double-4 herringbone parlors with costs about the same.

Double-4 and double-8 herringbone parlors both have advantages. Should the milking crew be reduced

to one man, it is much easier to operate with the four milker units. A double-8 parlor can be advantageous for an owner hiring one milker or if the owner has sons who milk. This way they can operate as a team.

Milking cows 4 to 18 hours daily

When the milking parlor is utilized less or more fully than shown in Table 4, costs per cow will change. Investments and annual costs were calculated for the double-4 and double-8 herringbone system when cows were milked for periods of 4 hours, 12 hours and 18 hours per day. The 4-hour milking period represents about 75 percent utilization based on an 8-hour day and the number of cows milked per hour for the two herringbone systems as shown in Table 3. The 12 hours are for milking two groups of cows with separate milkers for each group. The 18 hours represent near maximum utilization based on milking three groups of cows, twice daily. Considering time lost between groups, a fourth group of cows could not be milked twice daily in each parlor.

The number of cows that could be milked twice daily in a double-4 herringbone parlor ranged from 80 to 360 and for the double-8 herringbone parlor from 152 to 684. Some dairymen milk fewer cows than 80 in a double-4 herringbone parlor.

Investments per cow are greatly reduced when two or three groups of cows utilize a single parlor. When a parlor is used 12 hours instead of 6, investments per cow are reduced by 50 percent. Investments per cow are reduced by an additional 17 percent when the parlor is used 18 hours daily for three groups of cows.

Annual costs per cow are very similar for the two sizes of herringbone parlors when they are used the same number of hours a day. Costs per cow are reduced for both sizes of system until parlors are used 12 hours a day with 2 sets of cows and men milking (Table 5). Milking an additional group of cows in

Table 5. Number of cows milked per day, and investment and annual costs per cow when herringbone parlors are utilized varying hours per day

	Hours per day milking parlor is used			
	4	6	12	18
Number of milking crews (a)	1	1	2	3
Number of milkers needed (b)				
Double-4 herringbone	1	1	2	3
Double-8 herringbone	2	2	4	6
Number of cows milked daily				
Double-4 herringbone	80	120	240	360
Double-8 herringbone	152	228	456	684
Investment per cow				
Double-4 herringbone	\$201	\$134	\$ 67	\$ 45
Double 8 herringbone	\$147	\$ 98	\$ 49	\$ 33
Annual costs per year				
Double-4 herringbone	\$112	\$ 87	\$ 78	\$ 75
Double-8 herringbone	\$102	\$ 85	\$ 78	\$ 76

(a) Number of different groups of milkers used per parlor. These groups consist of one man milking at one time in the double-4 and two men milking at one time in the double-8 herringbone parlor.
 (b) Number of full-time milkers but not including relief milkers needed when regular milkers have time off.

these parlors resulted in only \$2 to \$3 reduction in cost per cow.

If a dairyman expected to milk 230 to 240 cows he could invest in a double-4 herringbone parlor and milk the cows in two shifts or invest in a double-8 herringbone parlor and milk them as one group. Each system would use two men to milk. Investments would be \$20 less and annual costs \$7 less per cow for the double-4 herringbone. This would represent a total annual saving of \$1,680 in annual costs for the herd.

There are definite disadvantages in scheduling milking times when a parlor is used two or three times daily. One of the milking times must come either very early in the morning or late in the evening. There is also a possibility for excessive visiting when two hired men milk in a double-8 parlor. This can be minimized

when one man is given major responsibility for direction.

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