June 2013

EB 2013-10

Milking Center Cost Study
New York State
2010-2011

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The Milking Center Cost Study was funded in part by

NY farm viability INSTITUTE

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B. Howland[1], J Karszes[1] K. Skellie[2]

Milking centers represent a large investment on dairy farms and the process of harvesting milk uses a large percentage, 34.6%[3], of the dairy's labor force during the year. For these reasons, PRO-DAIRY specialists, in partnership with business consultants from Farm Credit East, ACA and support from the New York Farm Viability Institute, set out to determine the cost of harvesting and storing milk, with an emphasis on milk harvest. A template was developed in partnership with Brad Hilty, of HBI Information Service, Inc. and was used to calculate milk harvest and storage costs. This template is available for download on PRO-DAIRY's website. The purpose of the study was to determine the areas of the milking center that are the main drivers in milk harvest and storage costs, and to explore how management practices on farms may affect milk harvest costs. The study did not examine milking procedures on farm and their effect on cow health, milk quality, or production.

Study Methodology

For this study, surveys were utilized to collect data associated with owning and operating the milking center on 30 participating farms in 2010 and 2011. Parlors were of various types and sizes, ranging from eight-unit flat barn parlors to 60 stall rotary and parallel parlors. Data was collected for a period of 3 months. Producers provided detail in the following areas:

- Milking Parlor Investment
- Information System Investment
- Labor and Management Hours and Wages
- Utility Costs for Parlor and Storage[4]
- Storage Investment
- Milking Supplies Costs
- Repair and Maintenance Costs
- Herd Production Information

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[1] PRO-DAIRY Program, Cornell University, Ithaca, NY
[2] Current Address: El-Vi Farms, Newark, NY
[3] Average percent of the total annual worker equivalents as reported in the Dairy Farm Business Summary for farms participating in study.
[4] Because utility costs related to milk harvesting were difficult to accurately separate from the dairies' other utility costs, the study's main focus was on the costs, net electricity.

This data set is not intended to represent the average cost of harvesting milk among dairy farms in New York. It is a descriptive study of what contributes to the cost of harvesting milk across the 30 participating farms.

Cost per Hundredweight of Milk Sold

The majority of the cost of owning and operating the milking center comes from the cost of operating the milking parlor itself, rather than from the cost of storing milk. Storage costs averaged less than 5% of total milk harvest and storage costs as shown in Table 1. The first section will present the cost of operating the milking parlor only. Total cost of operating the milking parlor averaged $1.39 per cwt. with a range from $0.88 to $2.25. The single largest contributor to total costs was labor at 67.3%. Milking labor costs averaged $11.64 per hour with a range from $8.90 to $17.10. Labor costs per cwt. for the milking parlor averaged $0.92 with a range from $0.47 to $1.82 per cwt., a difference of $1.35.

Supply costs were the second highest contributor to total costs at 15.8%. Supply costs averaged $0.22 per cwt. with a range from $0.05 to $0.38. Ownership Costs for the milking parlor averaged $0.15 per cwt. with a range from $0.01 on a fully depreciated facility to $0.47 for a newly constructed parlor.

Table 1

	Cost of Operating a Milking Parlor					
	Per cwt of Milk Sold					
	30 Farms, 2010-2011					
Average Parlor Size		33.7 stalls	Total Milk Sold, Cwt.			278,358
MILKING PARLOR			Average	Min	Max	Percent of Total
	Ownership Costs	Depreciation	$0.09	$0.01	$0.30	6.8%
		Interest	$0.06	$0.00	$0.17	4.3%
		Total Ownership Costs	$0.15	$0.01	$0.47	11.2%
	Labor Costs	Milking Labor	$0.67	$0.37	$1.19	48.7%
		Other labor	$0.25	$0.10	$0.63	18.6%
	Cost per Hour		$11.64	$8.90	$17.10	
		Total Labor Costs	$0.92	$0.47	$1.82	67.3%
Total Ownership & Labor Costs			$1.08	$0.60	$1.94	78.5%
	Total Supplies		$0.22	$0.05	$0.38	15.8%
	Repair & Maintainence		$0.05	$0.00	$0.21	3.9%
	Electrical Usage (28 farms reporting)		$0.11	$0.02	$0.34	
	Cost per KWH		$0.11	$0.07	$0.15	
	Heat		$0.02	$0.00	$0.07	
	Water Usage		$0.003	$0.00	$0.04	
Total, All Costs, Milking Parlor			$1.47	$0.99	$2.32	
Total of All Costs,net Electric			$1.37	$0.88	$2.25	

The average parlor size for the 30 farms in the study was 33.7 stalls and average annual milk production per cow was 25,305 lbs. Twenty-eight (28) of the farms were milking three times per day and the average herd size, including milking and dry cows, for the 30 farms was 1,110, ranging from 165 to 2,900. Some characteristics of the parlors on the lower end of total costs were parlors where there was one operator in the parlor at all times, parlors with high daily utilization, and low capital investment (fully depreciated facility).

Labor Costs

Harvesting milk is labor intensive. Labor costs represent the largest portion of milk harvesting costs, and show the greatest range. Labor costs for the 30 farms in the study averaged $0.92 per cwt. This included both labor in the milking parlor and labor associated with bringing cows to the parlor. The labor associated with just milking averaged $0.67 per cwt. and represented 49% of total milking parlor costs. The range in labor costs associated with just milking was from $0.37 to $1.19 per cwt., with 20 of the farms falling within the range of $0.50 to $0.75 per cwt. The person bringing cows to the parlor (other labor) made up an additional 18.6% of the total milking parlor costs.

There are a number of factors that affect labor costs associated with harvesting milk. Cost per hired labor hour, number of cow milkings per labor hour, and amount of milk harvested per labor hour are key factors impacting the labor cost per cwt. Cost per labor hour ranged from $9.00 to $14.45 per hour for 29 of the farms with one farm outside of the range at $17.10 per hour. Table 2 ranks the dairies by quintile by labor cost per cwt. for milking and bringing cows to the parlor and compares them to selected measures. The farms with the lowest labor costs per cwt. harvested the most milk per labor hour, averaged the highest cows milked per labor hour, but did not average the lowest labor cost per hired worker. With labor representing 67% of the total cost to harvest milk, the farms with the lowest labor costs also averaged the lowest total costs to harvest milk.

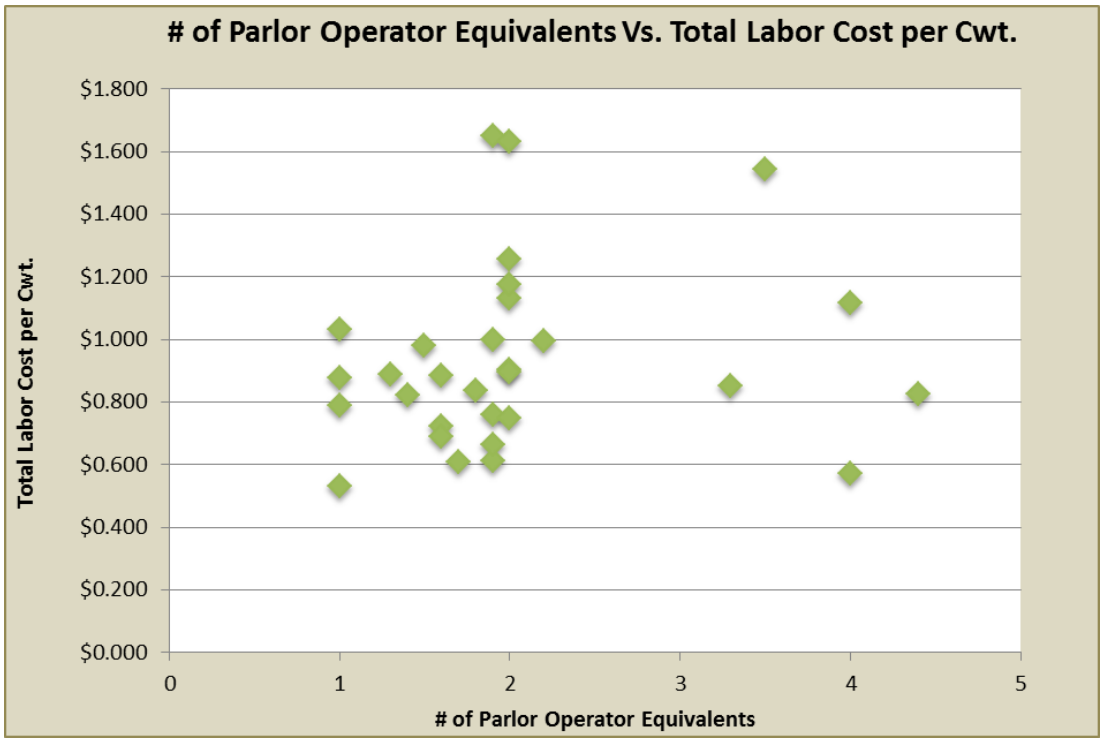
Table 2

Labor Cost per Cwt. for Milking and Cow Pushing versus Selected Measures 30 Farms, 2010-2011						
Labor Cost per Cwt., Milking Parlor	Worker Equivalents, Milking Parlor	Milk sold per Milking Labor Hour	Cows Milked per Daily Labor Hour	Parlor Stalls per Worker Equivalent	Cost per Labor Hour	Total Cost of Harvest Milk, Net Electric
$ 0.60	7.37	2,319	92.4	5.3	$ 10.71	$ 1.01
$ 0.77	7.2	1,794	65.2	6.5	$ 10.26	$ 1.23
$ 0.87	8.29	1,902	72.7	4.7	$ 11.73	$ 1.28
$ 0.97	6.96	1,661	58.8	5.2	$ 12.03	$ 1.48
$ 1.39	7.88	1,442	59	3.9	$ 14.47	$ 1.85

Labor management in the milking parlor varies greatly from farm to farm. When evaluating a possible correlation between number of operators in a milking parlor and labor cost per cwt., the results showed there is great variation in parlors with the same number of operator equivalents as demonstrated in Chart 1. The average number of operators in the milking parlor for these farms was 2.05, with a range from 1 to 4.4 operator equivalents.

Variation among farms with the same number of operator equivalents in the parlor was from the difference in cows milked per labor hour and milk harvested per labor hour. Parlor pressure, as estimated by parlor utilization in a 24 hour period, may be impacting both the cows milked per labor hour and milk harvested per labor hour. The farm with the lowest labor cost is a double 12 parallel parlor running 87.5% of the day with high throughput on cows per milking labor hour basis with one operator in the parlor at all times. The other farms with only one operator were milking for less of a percentage of the day and were not seeing the same amount of throughput at the lowest cost farm. All four farms with one person in the parlor averaged a cost per labor hour of $11-$12.

Chart 1



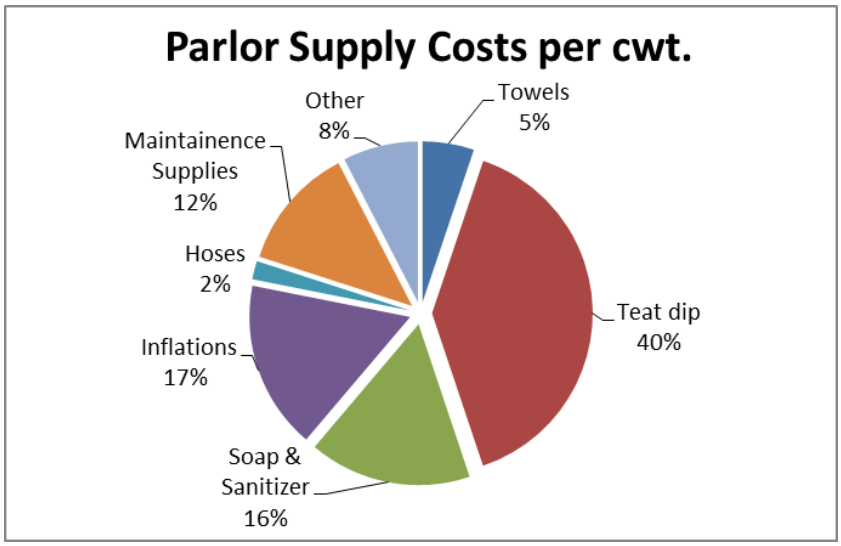
Supply Costs

Table 3 and Chart 2 detail the supply costs associated with the milking parlor, averaged $0.22 per cwt. with a range from $0.05 to $0.38. Teat dip was the largest driver of total supply costs, at an average of $0.09 per cwt. or 40% of total supply costs. Soaps & Sanitizers and Inflations were the next highest contributors to total supply costs per cwt. at $0.04 each.

Table 3

Milking Parlor Supply Costs				
Per cwt of Milk Sold				
30 Farms, 2010-2011				
Average Parlor Size	33.7 stalls	Total Milk Sold, Cwt.		278,358
	Average	Min	Max	Percent of Total
Towels	$ 0.011			5.2%
Teat dip	$ 0.086			39.7%
Soap & Sanitizer	$ 0.035			16.3%
Inflations	$ 0.037			16.9%
Hoses	$ 0.004			1.9%
Maintainence Supplies	$ 0.027			12.5%
Other	$ 0.016			7.6%
Total Supply Costs	$ 0.22	$ 0.05	$ 0.38	

Chart 2



The costs were also calculated for the supplies on a per cow milking basis (Table 4). An average total supply cost per cow milking was $0.06 with a range from $0.02 to $0.11. Teat dip remains the largest contributor to total costs at $0.02 per cow milking. Percent contribution to the total supply cost per cow milking was the same as per cwt.

Table 4

Milking Parlor Supply Costs				
Per Cow Milking				
30 Farms, 2010-2011				
Average Parlor Size	33.7 stalls	Total Milk Sold, Cwt.		278,358
	Average	Min	Max	Percent of Total
Towels	$ 0.003			5.2%
Teat dip	$ 0.022			39.6%
Soap & Sanitizer	$ 0.009			16.7%
Inflations	$ 0.010			16.9%
Hoses	$ 0.001			1.8%
Maintainence Supplies	$ 0.007			12.0%
Other	$ 0.005			7.9%
Total Supply Costs	$ 0.057	$ 0.02	$ 0.11	

Ownership Costs

Parlor ownership costs, including depreciation and interest, are the third highest area representing 11.2% of total parlor costs as shown in Table 6. Costs ranged widely from 1 cent per cwt. to 47 cents per cwt. with an average of 15 cents per cwt. Age of parlor equipment in the study ranged from one year to 22 years with an average age of 12 years. Buildings that housed the parlors ranged in age from one year to 50 years with an average age of 20 years.

Investment per stall of the milking parlor ranged from $3,875 to $30,903 for 28 farms in the study. Two farms reported investment costs of $1,250 or less per stall and were not included in the calculations for investment per stall. These parlors were 30 year old parlors with no significant upgrades made to them. The average investment per stall of the remaining 28 farms was $13,305. Range in investment per stall is dependent on parlor age and construction costs. Some parlors were new, turn-key operations; others were built with farm labor or used equipment and in existing facilities.

Table 5

	Milking Parlor Ownership Costs					
	Per cwt of Milk Sold					
	30 Farms, 2010-2011					
Average Parlor Size		33.7 stalls	Total Milk Sold, Cwt.			278,358
			Average	Min	Max	Percent of Total
	Ownership Costs	Depreciation	$0.09	$0.01	$0.30	6.8%
		Interest	$0.06	$0.00	$0.17	4.3%
		Total Ownership Costs	$0.15	$0.01	$0.47	11.2%
	Investment Per Stall *28 Farms		$13,305	$3,875	$30,903	
	Parlor Age, years		12	1	22	
	Building Age, years		20	1	50	

It is possible for farms with similar investment level to have different ownership costs as exhibited in Chart 3. The difference in ownership cost for these farms is impacted by two areas; total utilization of the parlor in a 24 hour period and total amount of milk produced on the farm. Farms utilizing the parlor for more hours of the day, harvesting higher levels of milk production were able to spread out the overhead costs over more cwt. of milk.

Storage Costs

Milk storage costs make up less than 5% of the total cost of the milking center. The total cost of milk storage, net electric is $0.07 per cwt. with a range from $0.01 to $0.16 as seen in Table 6. Ownership costs make up 66.2% of total storage costs at $0.04 per cwt. Labor costs, which includes time spent cleaning and working in the milk house, is 14.7% of storage costs. Repair costs are 8.9% of total storage costs.

Parlor Capacity and Parlor Efficiency

There are many different ways to measure the capacity and efficiency of a milking parlor. Table 7 below summarizes the factors that were examined as part of this study. One trend that could be observed is a relationship between cows per milking labor hour and total cost of parlor net electric as exhibited in Chart 4.

Chart 3

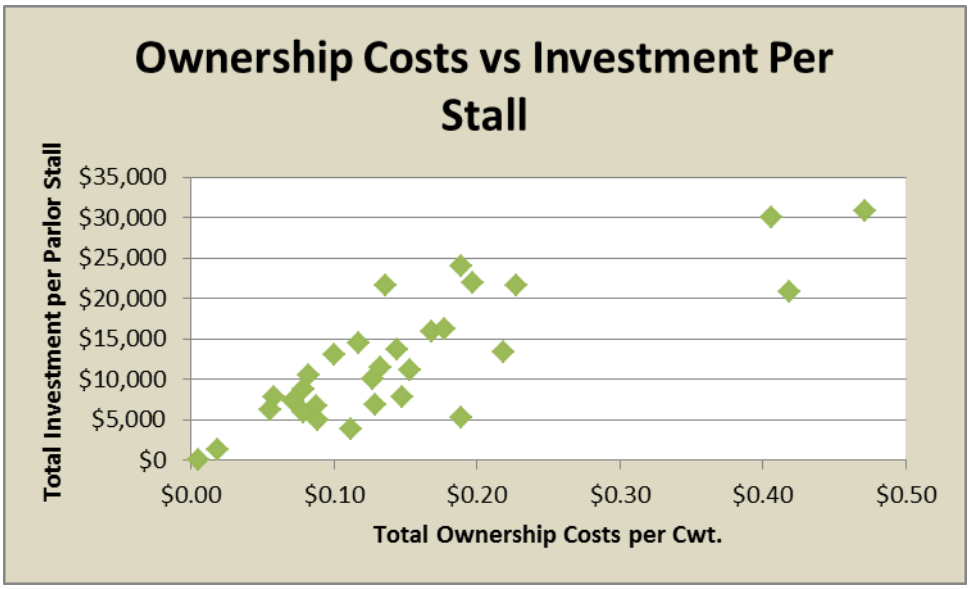


Table 6

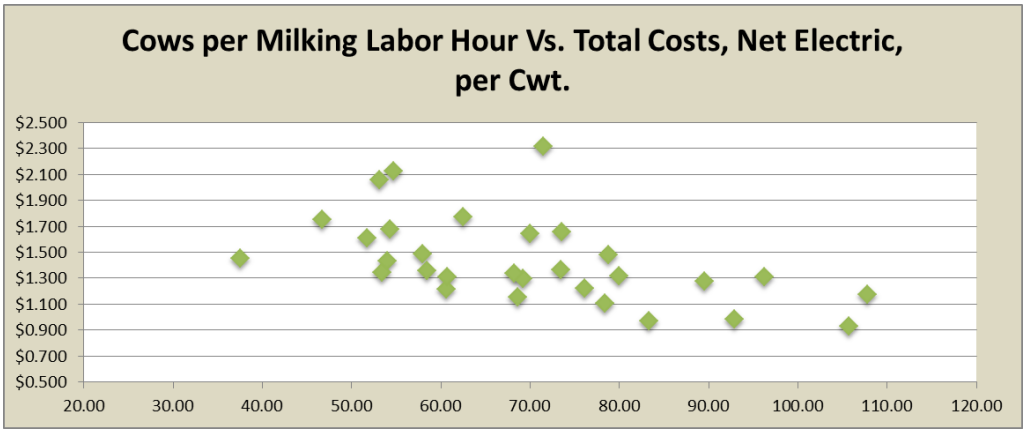
Cost of Milk Storage					
Per cwt of Milk Sold					
30 Farms, 2010-2011					
Average Parlor Size	33.7 stalls	Total Milk Sold, Cwt.			278,358
STORAGE		Average	Min	Max	Percent of Total
Ownership Costs	Depreciation	$0.03			40.5%
	Interest	$0.02			25.7%
	Total Ownership Costs	$0.04			66.2%
Labor Costs	Milking Labor	$0.00			
	Other labor	$0.01			
Cost per Hour		$10.84			
	Total Labor Costs	$0.01			14.7%
Total Ownership & Labor Costs		$ 0.05	$0.01	$0.16	80.9%
Repair & Maintainence		$ 0.01			8.9%
Electrical Usage (28 farms reporting)		$ 0.06			
Cost per KWH		$ 0.09			
Heat		$ 0.01			
Water Usage		$ 0.00			
Total, All Costs, Milk Storage		$ 0.12	$0.02	$0.23	
Total of All Costs,Net Electric		$ 0.07	$0.02	$0.16	

Table 7

Milk Harvest and Storage Cost Study			
Parlor Effiency and Parlor Capacity Summary			
30 Farms, 2010-2011			
Average Parlor Size	**33.7 stalls**	**Total Milk Sold, Cwt.**	**278,358**
Parlor Efficiency	**Average**	**Min**	**Max**
Cows per Milking Labor Hour	70	38	108
Percent Parlor Utilization of 24 Hour Day	79%	33%	94%
Cows per Hour of Parlor Operation	147	38	371
Turns per Hour	4.42	2.77	6.61
Milk Sold Per Dollar Milking Labor, lbs.	160	84	270
Milking Center Investment per Cow, Total Herd	510	0	1,404
Milk Sold per Milking Hour Operation, lbs.	3,843	1,464	10,522
Annual Milk Sold per Milking Unit, lbs.[1]	811,808	345,463	1,344,193
Annual Milk Sold per Parlor Stall, lbs.[1]	802,633	275,250	1,344,193
Milk Sold per Dollar of Annual Ownership Cost, lbs.	1,638	212	20,857
Parlor Capacity	**Average**	**Min**	**Max**
% Actual vs Theoretical Capacity, Lbs. Milk Sold	70%	38%	97%
% Actual vs. Theoretical Capacity, Cows per Hour	90%	59%	111%
% Actual vs. Theoretical Capacity, Herd Size	79%	44%	108%

[1] Difference between these two measures comes from swing style parlors

Chart 4



Costs of Parallel Parlors

Twenty of the 30 dairies in the study were operating parallel parlors. Table 8 highlights information for the 20 parallel parlors in the data set. The average cost of operating a milking parlor, net electric was $1.34 per cwt. with a range from $0.88 to $2.25. Similar to all of the

parlors, labor was the highest contributor to total costs at 65.5% of total costs, net electric. Milking labor in these parallel parlors averaged $0.63 per cwt. with a range of $0.37 to $1.06. Average cost per hour of labor was $11.61. Supply costs were the third largest contributor to total costs at 16.3% or an average of $0.22 per cwt. Teat dip was the largest contributor to total supply costs. Ownership costs average $0.17 per cwt., slightly higher than the average of all 30 parlors, with a range from $0.02 to $0.47.

Table 8

Cost of Operating a Parallel Milking Parlor and Selected Measures					
Per cwt of Milk Sold					
20 Farms, 2010-2011					
Average Parlor Size	35.9 stalls	Total Milk Sold, Cwt.			562,754
MILKING PARLOR		Average	Min	Max	% of Total
Ownership Costs	Depreciation	$0.11	$0.01	$0.30	7.9%
	Interest	$0.07	$0.01	$0.17	5.1%
	Total Ownership Costs	$0.17	$0.02	$0.47	12.9%
Labor Costs	Milking Labor	$0.63	$0.37	$1.06	47.1%
	Other labor	$0.25	$0.10	$0.47	18.4%
Cost per Hour		$11.61	$8.90	$17.10	
	Total Labor Costs	$0.88	$0.47	$1.54	65.5%
Total Ownership & Labor Costs		$1.05	$0.68	$1.94	78.5%
Total Supplies		$0.22	$0.05	$0.38	16.3%
Repair & Maintainence		$0.04	$0.00	$0.21	3.2%
Electrical Usage		$0.11	$0.02	$0.34	
Cost per KWH		$0.10	$0.07	$0.15	
Heat		$0.02	$0.00	$0.07	
Water Usage		$0.002	$0.00	$0.04	
Total, All Costs, Milking Parlor		$1.44	$0.99	$2.32	
Total All Costs, Net Electric		$1.34	$0.88	$2.25	
Cows per Daily Labor Hour		72.4	46.7	107.8	
Percent of 24 Hour Period Utilized		82.7%	37.5%	93.8%	

Total Cost of Milk Harvest and Storage

Table 9 is a summary of the costs associated with the milking center including both the milking parlor and storage area. The average total cost of operating the milking center, net electric was $1.44 per cwt. The range was 92 cents per cwt. to $2.31 per cwt. for a difference of $1.39 from lowest to highest. With harvesting milk being very labor intensive the area contributing the most to total costs was labor costs at 64.9% of the total. Milking labor averaged $0.67 per cwt. Cost per hour of labor averaged $11.24. Supply costs represented 15% of total costs with an

average of $0.22 per cwt. Supply costs were divided in to several different categories which were highlighted earlier in the report.

Table 9

Cost of Operating a Milking Center					
Per cwt. of Milk Sold					
30 Farms, 2010-2011					
Average Parlor Size	33.7 stalls	Total Milk Sold, Cwt.	278,358		
		Average	Min	Max	Percent of Total
Ownership Costs	Depreciation	$0.12	$0.01	$0.37	8.3%
	Interest	$0.08	$0.00	$0.22	5.3%
	Total Ownership Costs	$0.20	$0.01	$0.59	13.7%
Labor Costs	Milking Labor	$0.67	$0.37	$1.19	46.5%
	Other labor	$0.26	$0.11	$0.64	18.4%
Cost per Hour		$11.24	$4.45	$17.10	
	Total Labor Costs	$0.93	$0.48	$1.83	64.9%
Total Ownership & Labor Costs		$1.13	$0.48	$2.42	78.6%
Total Supplies		$0.22	$0.05	$0.38	15.0%
Repair & Maintenance		$0.06	$0.00	$0.21	4.1%
Electrical Usage (28 farms reporting)		$0.17	$0.07	$0.34	
Cost per KWH		$0.10	$0.03	$0.15	
Heat		$0.03	$0.00	$0.16	
Water Usage		$0.003	$0.00	$0.04	
Total, All Costs, Milking Center		$1.59	$1.15	$2.43	
Total of All Costs, Net Electric		$1.44	$0.93	$2.31	

Summary

The milking center is one of the largest investments on a dairy farm. It is important to minimize the costs associated with harvesting milk while maintaining cow health and milk quality. By knowing the cost of the milking center, the impact of management changes on costs can be determined. The range in costs associated operating the milking center is wide, with the total cost, net electric ranging from $0.93 per cwt. to $2.31 per cwt. which is a wide range. For a 1000 cow dairy shipping 22,000 pounds of milk per cow, the cost difference represents a change of $303,600, or $303.60 dollars per cow. In addition, while this study provides a snapshot of the costs associated with the operating the milking center on these 30 farms and highlights the areas where the differences in costs are; it is not a representative study that can be used to draw any conclusions on what may or may not be the best parlor management choices to achieve the highest amount of efficiency at the lowest possible costs or the management strategies that maximize overall farm profitability in any given year.

OTHER A.E.M. EXTENSION BULLETINS

EB No	Title	Fee (if applicable)	Author(s)
2013-09	Marketing Module 8 - Promotion		Gómez, M. and S .Cuellar-Healey
2013-09i	Marketing Module 8 - Promotion Example		Cuellar-Healey, S. and M. Gómez
2013-09ii	Marketing Module 8 - Promotion Teaching Slides		Cuellar-Healey, S. and M. Gómez
2013-08i	Marketing Module 7 - Placement/Distribution Example		Cuellar-Healey, S. and M. Gómez
2013-08ii	Marketing Module 7 - Placement/Distribution Teaching Slides		Cuellar-Healey, S. and M. Gómez
2013-07	Marketing Module 6 - Price		Gómez, M. and S .Cuellar-Healey
2013-07i	Marketing Module 6 - Price Teaching Example		Cuellar-Healey, S. and M. Gómez
2013-07ii	Marketing Module 6 - Price Teaching Slides		Cuellar-Healey, S. and M. Gómez
2013-06	Marketing Module 5 - Product		Gómez, M. and S .Cuellar-Healey
2013-06i	Marketing Module 5 - Product Example		Cuellar-Healey, S. and M. Gómez
2013-06ii	Marketing Module 5 - Product Teaching Slides		Cuellar-Healey, S. and M. Gómez
2013-05	Marketing Module 4 - Competitor Analysis		Gómez, M. and S .Cuellar-Healey
2013-05i	Marketing Module 4 - Competitor Analysis Example		Cuellar-Healey, S. and M. Gómez
2013-05ii	Marketing Module 4 - Competitor Analysis Teaching Slides		Cuellar-Healey, S. and M. Gómez
2013-04	Marketing Module 3 - Company Analysis		Gómez, M. and S .Cuellar-Healey
2013-04i	Marketing Module 3 - Company Analysis Example		Cuellar-Healey, S. and M. Gómez
2013-04ii	Marketing Module 3 - Company Analysis Teaching Slides		Cuellar-Healey, S. and M. Gómez, M.
2013-03	Marketing Module 2 - Customer Analysis		Gómez, M. and S .Cuellar-Healey
2013-03i	Marketing Module 2 - Customer Analysis Example		Cuellar-Healey, S. and M. Gómez

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