MILK PRODUCTION COSTS in 1998 on Selected WISCONSIN DAIRY FARMS

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Introduction

Total cost of production per hundredweight equivalent of milk ($14.90) was less than the US average milk price in 1998 ($15.41). This is the first year (since our study of milk production costs began in 1992) that the milk price has exceeded total economic costs. The total economic costs in 1997 were $14.14 and the milk price was $13.36.

The overall cost of producing a hundredweight equivalent of milk increased in 1998 when compared to 1997, but is still lower than costs were in 1996. In addition, farms with 51 to 75 cows continued to have near the lowest "Basic Cost" of any of the six farm size groups studied. Basic Costs are all cash and non-cash costs except labor and capital.

In this study of 1998 records, 780 dairy farms averaged a basic cost of $8.23 per hundredweight equivalent (CWT EQ) on income of $15.41 per CWT EQ (U.S. average per hundredweight milk price in 1998). In 1997, the basic cost was $7.86 per CWT EQ on income of $13.36 (The U.S. average milk price in 1997.). Basic costs were 53.4 percent of income in 1998. In 1997 and 1996 basic costs were 57.6 and 58.0 percent of income, respectively.

In 1998, the total allocated expenses per CWT EQ of milk sold averaged $12.42. Total allocated expenses do not include a charge for unpaid labor and management or a return to equity capital. When these opportunity costs are calculated at $8.50 per hour for unpaid labor, $10.00 per hour for unpaid management, plus five percent return on the fair market value of equity capital, the total cost of production is $14.90 per CWT EQ.

Data Source

Lakeshore Farm Management Association, Fox Valley Management Association and Wisconsin County Agents[2] originally collected this data. Personnel affiliated with these associations helped individual farm managers reconcile their financial data. Individual farm managers used a number of different manual and computerized record keeping systems to enter the initial financial records, including the Agricultural Accounting and Information Management System (AAIMS©).

In 1998, 950 financial data sets were received from Lakeshore Farm Management and Fox Valley Associations and 55 data sets from those participating in the Dairy Farm Business Summary (DFBS) program. Some of these records had milk income that was less than 60 percent of their total income. Those farms are not included in this analysis. However, the dairy farms left in the study still had a total of more than 77,500 cows and produced more than 1,566,000,000 pounds of milk.

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Table 1
Statement of Cash Flows in 1998
(per cow)

Operating Activities

Cash Received from Operations	$	3,538
+ Total Non-Farm Income	$	135
minus Cash Paid for Purchased Resale Livestock	$	10
- Cash Paid for Purchased Feed	$	663
- Cash Interest Paid	$	226
- Wages and Benefits Paid	$	348
- Cash Paid for Other Operating Expenses	$	1,377
Net Cash Income	$	1,049
minus Cash Family Living Expenditures	$	389
- Income & Social Security Taxes Paid	$	37
Net Cash Provided by Operating Activities	**$**	**623**

Investing Activities

Cash Received from Sale of Farm Assets	$	30
+ Cash Received from Sale of Personal Assets	$	4
minus Amount Paid for Breeding Livestock	$	138
- Boot Price Paid for Machinery & Equipment	$	250
- Amount Paid for Real Estate	$	295
- Amount Paid for Coop Stock, Etc.	$	19
- Amount Paid for Personal Assets	$	40
Net Cash Provided by Investing Activities	$	(709)

Financing Activities

Net Proceeds from Operating & CCC Loans	$	(4)
+ Proceeds from Added Term Debt	$	404
+ Net Capital Contribution, Gifts, Etc.	$	1
+ Net Proceeds for Personal Debt	$	(1)
minus Scheduled Repayment of Term Debt	$	280
- Unscheduled Repayment of Term Debt	$	8
- Principal Payments on Capital Lease Obligations	$	-
Net Cash Provided by Financing Activities	$	113

Cash at End of Year	$	115
Cash at Beginning of Year	$	84
Net Increase (Decrease) in Cash	$	31
Cash Flow Accuracy*	**$**	**(4)**

* This value is the amount of cash paid out in excess of the amount recorded and/or reported for use in this "Statement of Cash Flows."
Or, if negative, the amount cash inflow was in excess of the amount recorded.

The "Statement of Cash Flows" provides a break down of the cash inflows and outflows into three activities. They are operating, investing and financing activities.

The operating activity includes non-farm income and cash family living expenditures plus income and social security taxes paid. The investing activity includes the purchase and sale of assets, both farm and personal. The financing activity includes both new borrowing and debt repayment on farm and personal loans.

The net cash provided by the three activities are summed and compared to the change in the cash on hand. This leads to a single number -- "Cash Flow Accuracy." The cash flow accuracy should be within a half cent per dollar of all cash incomes (between $-18 and $18, in this case).

The cash flow accuracy for this data set is $-4 per cow. This translates into a cash flow discrepancy of less than $400 per farm. This is well within the acceptable range.

Comparing the Studied Dairy Farms to Other Wisconsin Dairy Farms

The average number of cows per farm increased 7 cows to 99.5 cows in 1998, with 20,198 pounds of milk sold per cow. In 1993 the farms in this study average 71 cows and 17,801 pounds of milk sold per cow. In comparison, Wisconsin's 1998-herd size averaged 60 cows, with an average of 16,685 pounds of milk sold per cow. AgSource DHI (1998) herds averaged 70.6 cows, with production per cow estimated at 20,500 pounds.

Table 2 shows the range and distribution of milk sold per cow on the farms studied and on AgSource DHI farms.

Table 2
Milk Sold per Cow

	Study Farms		AgSource DHI
Pounds per Cow	Number of Farms	Percent of Farms*	Percent of Herds*
Less than 13,000	36	5	2
13,000 – 15,000	57	7	5
15,001 – 17,000	96	12	12
17,001 – 19,000	157	20	20
19,001 – 21,000	196	25	25
21,0001 – 23,000	135	17	20
Greater than 23,000	103	13	17

* Percent columns may not add to 100 due to rounding.

Table 3 shows the per farm averages in six herd size categories. This table contains six columns of numbers. To assist in your understanding of the entire table, the "Range in Herd Size – 76 to 100" is used as an example.

There were 132 herds in the data set that had more than 75 cows and less than 101 cows. Those herds averaged 87 cows and sold on average of 19,984 pounds of milk per cow. They farmed 339 crop acres.

The average amount of purchased feed was $48,292 per farm. In addition, they paid $6,531 for crop chemicals, $9,552 for fertilizer, $21,610 for repairs, and $8,010 for vet & medicine. They also had some non-cash "Basic Costs." This was a change in prepaid expenses of $4,337 (This equates to a negative accrual adjustment to expense) and a decrease in accounts payable of $1,561. Total Basic Costs were $167,205 per farm in 1998 versus $169,072 in 1997.

In addition to Basic Costs, the study farms had $26,355 of paid labor costs (11,489 to dependents and 14,866 to non-dependents). Some of this was paid as Social Security Taxes and Benefits ($6,261) and the remainder ($20,094) as wages. There was also $18,329 (10,009 plus 8,320) of interest expense, and $37,192 of depreciation. Some of that depreciation (5,030) was on taken on purchased livestock.

The Total Allocated Costs are $249,080 per farm in 1998 versus $247,135 in 1997. The Total Income is $324,164 versus $282,908 in 1997. The Net Farm Income from Operations (NFIFO) in 1998 was $75,083. Note: this is not the return to the owner-operator-manager's (and family's) labor, management and equity capital. To obtain that number you need to add the amount paid to dependents to the NFIFO. The return is then $86,572 and this compares very favorably with the return to the owner-operator-manager's (and family's) labor, management and equity capital in 1997, which was $46,122.

Table 3 should not be used to compare costs among farms, however Tables 4 and 8 can be used to compare costs among farms in the different size categories.

Table 3
Milk Production Costs per Farm in 1998

Range in Herd Size	<=50 cows	51 to 75	76 to 100	101 to 150	151 to 250	>250 cows
Number of Farms	210	266	132	85	37	50
Pounds Milk Sold per Cow	18,083	19,243	19,984	20,410	20,042	22,038
Average Number of Cows	41	62	87	122	187	471
Total Crop Acres Farmed	174	244	339	438	510	1,037
Milk Price Received	14.97	15.27	15.37	15.37	15.57	15.79
Cost of Resale Livestock Sold	54	1,755	211	1,096	-	2,910
Auto & Truck Expense	1,391	1,661	1,385	1,525	1,909	3,338
Crop Chemicals	2,336	3,862	6,531	8,646	9,392	27,560
Custom Heifer Raising	13	97	584	4,181	7,159	42,224
Custom Hire (Other)	2,518	4,211	8,799	11,223	20,909	44,705
Feed Purchased	19,906	32,904	48,292	73,656	130,830	421,196
Fertilizer & Lime	4,804	7,901	9,552	16,854	20,421	35,197
Freight & Milk Hauling	721	944	1,110	1,300	4,094	8,947
Fuels & oil	2,610	3,641	5,291	7,009	9,017	23,327
Insurance	2,043	2,813	4,049	5,094	6,051	15,275
Milk Marketing & Hedging	1,349	2,167	3,103	4,569	6,360	20,751
Rent/Lease Equipment	305	897	1,222	3,273	7,159	18,249
Rent-Farm & Pasture	3,759	6,967	12,097	15,676	26,409	49,684
Repair & Maintenance.	9,236	13,420	21,610	30,907	37,759	84,770
Seed & Plants Purchased	3,469	5,450	8,141	11,832	13,855	32,853
Supplies	4,811	7,129	10,038	12,758	16,447	42,344
Taxes	3,114	3,874	5,201	7,145	9,264	15,382
Utilities	2,922	4,217	5,817	7,928	10,147	22,844
Vet & Medicine	3,530	5,017	8,010	12,353	17,837	53,287
Breeding Fees	1,717	2,507	3,652	4,943	5,611	10,720
Other Farm Expenses	1,030	1,524	2,438	4,952	5,670	14,093
Other Crop Expenses	997	1,489	1,695	2,462	3,213	6,861
Other Livestock Expenses	1,080	2,378	4,487	10,038	17,264	68,225
Accounts Payable Adjustment	-489	-1,032	-1,561	-2,522	-3,968	-8,433
Prepaid Expense Adjustment	-929	-2,668	-4,337	-7,195	-10,128	-33,856
Basic Costs	**72,245**	**111,373**	**167,205**	**248,608**	**372,681**	**1,019,543**
Livestock Depreciation	1,814	4,224	5,030	7,856	20,669	71,398
Basic Cost + Lvst Depr	*74,059*	*115,597*	*172,234*	*256,464*	*393,351*	*1,090,941*
Mortgage Interest	4,121	6,332	10,009	13,502	18,199	57,008
Other Interest	4,165	6,220	8,320	11,213	25,518	68,620
SST & Employee Benefits (Dep)	3,047	4,148	4,162	3,679	3,137	4,401
SST & Employee Ben (Non-Dep)	488	948	2,099	4,425	5,515	28,834
Labor Hired (Dependents)	3,812	6,342	7,327	7,403	10,496	19,150
Labor Hired (Non-Dependents)	1,643	4,166	12,767	27,467	41,559	178,659
Other Depreciation	15,159	25,437	32,162	39,880	58,371	129,252
Total Allocated Costs	**106,493**	**169,191**	**249,080**	**364,032**	**556,146**	1,576,865
Total Income	135,183	219,039	324,164	454,314	674,093	1,862,729
Net Farm Income from Operations	**28,689**	**49,849**	**75,083**	**90,281**	**117,947**	**285,865**

Table 4
Milk Production Costs per Cow in 1998

Range in Herd Size	<=50 cows	51 to 75	76 to 100	101 to 150	151 to 250	>250 cows
Number of Farms	210	266	132	85	37	50
Pounds Milk Sold per Cow	18,083	19,243	19,984	20,410	20,042	22,038
Average Number of Cows	41	62	87	122	187	471
Total Crop Acres per Cow	4.21	3.91	3.89	3.60	2.73	2.20
Total Number of Cows	8,679	16,581	11,496	10,348	6,912	23,561
Cost of Resale Livestock Sold	1	28	2	9	-	6
Auto & Truck Expense	34	27	16	13	10	7
Crop Chemicals	57	62	75	71	50	58
Custom Heifer Raising	0	2	7	34	38	90
Custom Hire (Other)	61	68	101	92	112	95
Feed Purchased	482	528	554	605	700	894
Fertilizer & Lime	116	127	110	138	109	75
Freight & Milk Hauling	17	15	13	11	22	19
Fuels & oil	63	58	61	58	48	50
Insurance	49	45	46	42	32	32
Milk Marketing & Hedging	33	35	36	38	34	44
Rent/Lease Equipment	7	14	14	27	38	39
Rent-Farm & Pasture	91	112	139	129	141	105
Repair & Maintenance.	223	215	248	254	202	180
Seed & Plants Purchased	84	87	93	97	74	70
Supplies	116	114	115	105	88	90
Taxes	75	62	60	59	50	33
Utilities	71	68	67	65	54	48
Vet & Medicine	85	80	92	101	95	113
Breeding Fees	42	40	42	41	30	23
Other Farm Expenses	25	24	28	41	30	30
Other Crop Expenses	24	24	19	20	17	15
Other Livestock Expenses	26	38	52	82	92	145
Accounts Payable Adjustment	-12	-17	-18	-21	-21	-18
Prepaid Expense Adjustment	-22	-43	-50	-59	-54	-72
Basic Costs	**1,748**	**1,787**	**1,920**	**2,042**	**1,995**	**2,164**
Livestock Depreciation	44	68	58	65	111	152
Basic Cost + Lvst Depr	*1,792*	*1,854*	*1,978*	*2,107*	*2,106*	*2,315*
Mortgage Interest	100	102	115	111	97	121
Other Interest	101	100	96	92	137	146
SST & Employee Benefits (Dep)	74	67	48	30	17	9
SST & Employee Ben (Non-Dep)	12	15	24	36	30	61
Labor Hired (Dependents)	92	102	84	61	56	41
Labor Hired (Non-Dependents)	40	67	147	226	222	379
Other Depreciation	367	408	369	328	312	274
Total Allocated Costs	**2,577**	**2,714**	**2,860**	**2,990**	**2,977**	**3,346**
Total Income	3,271	3,514	3,722	3,732	3,609	3,953
Net Farm Income from Operations	**694**	**800**	**862**	**742**	**631**	**607**

Table 4 shows the per cow averages in six herd size categories. The 50 farms in the ">250 cows" category have more total cows than do the 266 farms in the "51 to 75" category. Also, the 50 farms in the ">250 cows" category have approximately three times as many total cows as the 210 farms in the "<=50 cows" category.

Remember: table 3 should not be used to compare costs among farms, however Tables 4 and 8 can be used to compare costs among farms in the different size categories.

Table 4 shows that the larger (based on cow numbers) farms have fewer crop acres per cow and lower property taxes per cow. However, larger farms have higher purchased feed costs per cow ($894 versus $482 for the smallest size category). Also, larger farms have much higher "Other Livestock Expenses", $145 versus $26. This could be related to BST use as farm managers are instructed to place BST costs in the "Other Livestock Expense" category. Other data suggests that larger farms use BST on a higher percentage of their herd.

The Basic Costs per cow in the largest herd size category exceeded the Basic Costs in the "51 to 75" category by $377 (2,164 versus 1,787). This is largely due to the difference in purchased feed cost. The amount of livestock depreciation almost triples from the two smallest herd-size categories to the largest. The interest paid per cow increases from approximately $200 per cow for herds of 100 cows or less to nearly $270 for the largest herd size category. The amount paid per cow for labor increases from $251 in the "51 to 75" category to $490 in the ">250 cows" category. (In 1997, these numbers were $251 and $458.) Soon, on larger farms, NFIFO will need to be redefined as only the return to the equity capital.

The Total Allocated Costs per cow are $632 (3,346 minus 2,714) higher in largest farm size category than in the "51 to 75" size category. However, those larger farms generate approximately $400 more income per cow and they have lower <u>per cow</u> unpaid labor (family living) draws.

The "76 to 100 cow" herd size category has the highest return per cow to the owner-operator-manager's (and family's) labor and equity capital at $967 (862 plus 84 plus 48). In largest herd size category it equals $657. However when the number of cows is multiplied by these values, the owner-operator-managers of the larger herds average $309,416 for family living and a return to equity capital versus $86,572 for the farms in the "76 to 100 cow" category.

Table 5 shows the average per cow costs for all farms in the study. The purchased feed per cow did not decline even though the price of corn and SBOM declined substantially from 1996 to 1998. (Feed cost per cow were $663, $657 and $662 in 1998, 1997 and 1996, respectively.) This is a continuation of the industry trend of buying more of the total feed requirements. In addition, custom hire costs have increased substantially from 1996 to 1998. In 1996 total custom hire costs per cow were only $53 and in 1998 they are $124 per cow ($87 for machine work and $37 for custom heifer raising). Most other Basic Costs items changed only marginally from 1996 to 1998.

Cash Basic Costs were up $171 per cow from 1997, but accrual Basic Costs were up only $73 per cow from 1997 and only $19 from 1996. In 1996, the "Non-cash Adjustments" to Basic Costs was negative. This meant that farm mangers were prepaying for Basic Cost items, however they increased only $15 per cow in 1997. In 1998, the increase in items prepaid was $71 per cow. Total prepaid expense at the end of 1998 stood at $106 per cow.

Interest costs per cow continue to rise, even with lower interest rates. They were $226, $218, $212 and $205 in 1998, 1997, 1996, and 1995, respectively. Also, the amount of paid labor costs per cow continues to rise. It totaled $353, $323, $300 and $237, respectively in those 4 years.

Table 5
Study Farms' Average Cost per Cow - Selected Expense Categories
1998 & 1996

Item	Average Cost Per COW 1998	1996	Difference	Item	Average Cost per COW 1998	1996	Difference
Car & Truck Expense	$ 17	$ 18	$ -1	Utilities	$ 61	$ 64	$ -3
Chemicals	$ 62	$ 48	$ 14	Vet Fees & Medicine	$ 97	$ 87	$ 10
Custom Hire	$ 87	$ 53	$ 34	Breeding Fees	$ 34	$ 29	$ 5
Feed Purchase	$663	$662	$ 1	Other Expenses	$105	$123	$ -18
				Custom Heifer Raising	$ 37	$ -	$ 37
Fertilizer and Lime	$ 107	$111	$ -4				
Freight and Trucking	$ 16	$ 18	$ -2	Non-cash Adjustments	$ -71	$ -15	$ -56
Fuel and Oil	$ 56	$ 66	$ -10	**Basic Costs / Cow***	**$1943**	**$1924**	**$ 19**
Farm Insurance	$ 40	$ 41	$ -1	Mortgage Interest &			
Marketing & Hedging	$ 38	$ 44	$ -6	Other Interest	$226	$212	$ 14
Rent/Lease Equipment	$ 25	$ 24	$ 1	Emp Benefit Program	$ 72	$ 70	$ 2
Rent/Lease Other	$116	$115	$ 1	Labor Hired	$276	$230	$ 46
Repairs & Maintenance	$214	$193	$ 21				
				Depreciation	$430	$433	$ -3
Seeds & Plants Pur	$ 83	$ 76	$ 7	**Other Costs / Cow***	**$1003**	**$945**	**$ 58**
Supplies Purchased	$104	$ 102	$ 2				
Taxes	$ 53	$ 66	$ -13				

* Columns may not add due to rounding.

Cost of Production Calculation Method Used

There are three commonly used methods to calculate the cost of production. They are "Cost per Unit of Primary Product", "Cost per Unit of Equivalent Production", and "Residual Cost per Unit of Primary Product." All three of these methods will yield the same answer if the production process has just a single product. However, if the production process has joint products the results can be quite different. Dairy farms producing milk have numerous joint products: cull cows, calves, CCC milk assessment refund, cooperative dividends, property tax credit on income taxes, crop-related government payments, etc. Therefore, knowing the cost of production calculation method used in a study is essential.

Each method has some advantages and disadvantages.[3] This study uses the "Cost per Unit of Equivalent Production" method to calculate the cost of producing milk. It was chosen because using this method the cost of milk production can be compared directly to the price of milk. This method also permits individual expense item cost of production calculations.

[3] Frank, Gary G. 'Cost of Production versus Cost of Production", Published on the Center for Dairy Profitability website at: www.wisc.edu/dairy-profit, July 1998.

Basic Cost of Production per Hundredweight Equivalent

"Basic costs" are "total allocated expenses" minus interest paid, wages and benefits paid, and depreciation expenses. Basic cost is a useful measure when comparing one farm to another because it is not influenced by the farm's debt structure, the amount of paid versus unpaid labor, or the capital consumption claimed (depreciation).

An average Basic Cost of $8.23 per CWT EQ was calculated by summing the total basic costs on all farms and dividing by the total number of CWT EQ produced. Forty-seven percent of the farms had a basic cost of $8.00 per CWT EQ or less, a decrease from the 58 percent who had Basic Costs of $8.00 or less in 1997. However, only 35 percent of the farms had Basic Costs of $8.00 or less in 1996. In Table 6 selected ranges of basic costs are presented. It shows the number and percent of farms in each range.

The $8.23 average basic cost means that the average farmer in this study had $7.18 of income available per CWT EQ to use for other costs (US average milk price in 1998 = $15.41 minus basic expenses of $8.23 per CWT EQ). Other costs are items such as hired labor, scheduled principal and interest payments, a down payment when purchasing assets, and/or a family living draw.

Table 6
Number of Herds in Basic Cost Production Ranges
(780 Farms)

Expenses per CWT EQ	Number of Farms	Percent of Farms*
Less than $ 5.00	12	2
5.01 - 6.00	36	5
6.01 - 7.00	136	17
7.01 - 8.00	182	23
8.01 - 9.00	205	26
9.01 - 10.00	122	16
greater than 10.00	87	11

* Percent column may not add to 100 due to rounding.

Table 7 shows the average costs per CWT EQ for selected expense categories that match the expense categories on Schedule F (Federal tax form) for 1998 and 1996. It also shows opportunity cost unpaid labor, unpaid management, and interest on equity calculations. The comparison year of 1996 was chosen for Table 7 because 1996's milk price was closer to 1998 milk price than the 1997 price and it was felt that would lead to a more useful comparison table.

The Basic Cost of Production decreased by $0.32 from 1996 to 1998 (See Table 6). This occurred even though the Basic Costs per cow increased by $19. Feed costs contributed $0.17 to this decrease, even though feed costs per cow were unchanged. The total expenditures for custom hire increased over 100 percent from 1996. Custom hire costs in 1996 were $0.24 per hundredweight equivalent and were $0.51 in 1998, $0.36 for custom machine hire and $0.15 for custom heifer raising. Custom hire costs were first separated into these two categories in 1997

Most of the other expense categories changed by very small amounts and percentages. The exceptions are "Fuel and Oil" and "Property Taxes." The both decreased by $0.07 per hundredweight equivalent or by more than 20 percent. The decrease in "Fuel and Oil" is likely due to lower fuel prices and decreased crop acres per cow and higher milk sold per cow. The decrease in property taxes is likely from the same combination of factors.

The current goal for Basic Costs per CWT EQ is $8.00 or less. The average column on Table 7 will help you identify categories of expense that are above average. The "Calculating Your Milk Production Costs and Using the Results to Manage Your Expenses" paper, available on the Center for Dairy Profitability's website at www.wisc.edu\dairy-profit under "Papers & Publications" will help you do the calculations. For instance, suppose your fuel and oil costs are $0.55 per CWT EQ while the average is $0.23, you should find out why this difference exists and what you can do about changing the level of that cost.

Table 7
Study Farms' Average Cost per CWT EQ - Selected Expense Categories
1998 & 1996

Item	Average Cost Per CWT EQ 1998	1996	Difference
Car & Truck Expense	$0.07	$0.08	-0.01
Chemicals	0.26	0.21	0.05
Custom Hire	0.36	0.24	0.12
Custom Heifer Raising+	0.15	0.00	0.15
Feed Purchase	2.77	2.94	-0.17
Fertilizer and Lime	0.45	0.49	-0.04
Freight and Trucking	0.07	0.08	-0.01
Fuel and Oil	0.23	0.30	-0.07
Farm Insurance	0.17	0.18	-0.01
Marketing Fees	0.16	0.20	-0.04
Rent/Lease Equipment	0.10	0.11	-0.01
Rent/Lease Other	0.49	0.51	-0.02
Repairs & Maintenance	0.90	0.86	0.04
Seeds & Plants Purch	0.35	0.34	0.01
Supplies Purchased	0.43	0.45	-0.02
Taxes	0.22	0.29	-0.07

+ Didn't collect this information in 1996.

Item	Average Cost per CWT EQ 1998	1996	Difference
Utilities	$0.25	$0.28	-0.03
Vet Fees & Medicine	0.40	0.39	0.01
Breeding Fees	0.14	0.12	0.02
Other Expenses	0.55	0.55	0.00
Non-cash Adjustments	-0.30	-0.06	-0.24
Basic Costs / CWT EQ*	**$ 8.23**	**$8.55**	**-$0.32**
Mortgage Interest & Other Interest	0.94	0.94	0.00
Emp Benefit Program	0.30	0.32	-0.02
Labor Hired	1.15	1.03	0.12
Depreciation	1.80	1.92	-0.12
Other Costs / CWT EQ*	**$4.19**	**$4.21**	**-0.02**
Unpaid Labor[1]	1.14	1.25	-0.11
Unpaid Management[2]	0.41	0..41	0.00
Interest on Equity[3]	0.93	1.12	-0.19
Opportunity Costs	**2.48**	**2.78**	**-0.30**
	======	======	====
Total Cost / CWT EQ*	**$14.90**	**$15.53**	**-$0.63**

* Columns may not add due to rounding.

1. Total labor required was estimated at 50 hours per cow plus 5 hours per heifer plus 3 hours per acre per year and a wage of $8.50 per hour. The unpaid labor is the difference between the estimated total labor cost and the recorded paid labor.
2. The total management cost was assumed to be unpaid and was estimated at 10 hours per cow per year and at $10.00 per hour.
3. The interest on the fair market value equity, with no reduction in the fair market value of the farm assets for transaction costs, was estimated at 5 percent. Transaction costs can substantially reduce the owner's equity in the event the assets are sold and the net proceeds invested in non-farm assets. See the discussion of "Contingent Liabilities" in the "1998 Financial Benchmarks on Selected Wisconsin Dairy Farms" paper.

The "Non-cash Adjustments" to the cash expenses incurred in producing milk were a negative $0.24, when comparing 1996 to 1998. This means that dairy farmers increased the level of prepaid expenses and reduced the level of accounts payable. In fact, the amount of prepaid expenses per farm more than doubled from 1997 to 1998. This likely occurred because dairy farmers were trying to move cash

Table 8
Milk Production Cost per CWT EQ in 1998

Range in Herd Size	<=50 cows	51 to 75	76 to 100	101 to 150	151 to 250	>250 cows
Number of Farms	210	266	132	85	37	50
Pounds Milk Sold per Cow	18,083	19,243	19,984	20,410	20,042	22,038
Average Number of Cows	41	62	87	122	187	471
Total Crop Acres per cow	4.21	3.91	3.89	3.60	2.73	2.20
Total Crop Acres Farmed	174	244	339	438	510	1,037
Cost of Resale Livestock Sold	0.01	0.12	0.01	0.04	-	0.02
Auto & Truck Expense	0.16	0.12	0.07	0.05	0.04	0.03
Crop Chemicals	0.27	0.27	0.31	0.29	0.21	0.23
Custom Heifer Raising	0.00	0.01	0.03	0.14	0.16	0.35
Custom Hire (Other)	0.29	0.30	0.42	0.38	0.48	0.37
Feed Purchased	2.27	2.31	2.30	2.50	2.99	3.48
Fertilizer & Lime	0.55	0.56	0.45	0.57	0.47	0.29
Freight & Milk Hauling	0.08	0.07	0.05	0.04	0.09	0.07
Fuels & oil	0.30	0.26	0.25	0.24	0.21	0.19
Insurance	0.23	0.20	0.19	0.17	0.14	0.13
Milk Marketing & Hedging	0.15	0.15	0.15	0.15	0.15	0.17
Rent/Lease Equipment	0.03	0.06	0.06	0.11	0.16	0.15
Rent-Farm & Pasture	0.43	0.49	0.58	0.53	0.60	0.41
Repair & Maintenance.	1.05	0.94	1.03	1.05	0.86	0.70
Seed & Plants Purchased	0.40	0.38	0.39	0.40	0.32	0.27
Supplies	0.55	0.50	0.48	0.43	0.38	0.35
Taxes	0.35	0.27	0.25	0.24	0.21	0.13
Utilities	0.33	0.30	0.28	0.27	0.23	0.19
Vet & Medicine	0.40	0.35	0.38	0.42	0.41	0.44
Breeding Fees	0.20	0.18	0.17	0.17	0.13	0.09
Other Farm Expenses	0.12	0.11	0.12	0.17	0.13	0.12
Other Crop Expenses	0.11	0.10	0.08	0.08	0.07	0.06
Other Livestock Expenses	0.12	0.17	0.21	0.34	0.39	0.56
Accounts Payable Adjustment	-0.06	-0.07	-0.07	-0.09	-0.09	-0.07
Prepaid Expense Adjustment	-0.11	-0.19	-0.21	-0.24	-0.23	-0.28
Basic Costs	**8.24**	**7.84**	**7.95**	**8.43**	**8.52**	**8.43**
Livestock Depreciation	0.21	0.30	0.24	0.27	0.47	0.59
Basic Cost + Lvst Depr	*8.44*	*8.13*	*8.19*	*8.70*	*8.99*	*9.03*
Mortgage Interest	0.47	0.45	0.48	0.46	0.42	0.47
Other Interest	0.47	0.44	0.40	0.38	0.58	0.57
SST & Employee Benefits (Dep)	0.35	0.29	0.20	0.12	0.07	0.04
SST & Employee Ben (Non-Dep)	0.06	0.07	0.10	0.15	0.13	0.24
Labor Hired (Dependents)	0.43	0.45	0.35	0.25	0.24	0.16
Labor Hired (Non-Dependents)	0.19	0.29	0.61	0.93	0.95	1.48
Other Depreciation	1.73	1.79	1.53	1.35	1.33	1.07
Total Allocated Costs	**12.14**	**11.90**	**11.84**	**12.35**	**12.71**	**13.05**
Total Income	15.41	15.41	15.41	15.41	15.41	15.41
Net Farm Income from Operations	**3.27**	**3.51**	**3.57**	**3.06**	**2.70**	**2.36**

expenses into 1998 to reduce their 1998 income tax liability. Also, some farmers had major decreases in their accounts payable in 1998.

In 1996, the first good price year in the 90's, dairy farmers made a small reduction in account payable and/or increases in prepaid expenses, $0.06 per hundredweight equivalent. In 1998, farmers reduced accounts payable and/or increased prepaid expenses by $0.30 per hundredweight equivalent.

The "other costs" decreased by $0.02 and Opportunity Costs decreased by $0.30 per CWT EQ to cause a $0.67 decrease in the total cost of producing milk from 1996 to 1998. This lower total cost includes an increase in the opportunity wage from $8.00 to $8.50. The average milk price increased by $0.66 (from $14.75 to $15.41) during these years.

Table 8 shows the cost of milk per CWT EQ for 6 herd size ranges. Custom Heifer Raising is not really a cost item for smaller farms, but for the largest farm group it amounts to $0.35 per CWT EQ. Vet. & Medicine costs are approximately 20 percent higher per CWT EQ in herds over 250 cows versus herds of 51 to 100 cows. Other Livestock Expenses increase by $0.38 or over 200 percent per CWT EQ from the smallest to the largest herd size groups. It is presumed this is the cost of BST.

The "51 to 75 cow" farms have the lowest Basic Costs per CWT EQ ($7.84). The range in per CWT EQ costs, among farm size groups, is $0.59. Livestock depreciation is only $0.21 per CWT EQ in the smallest herd size group but $0.59 per CWT EQ in the herd over 250 cows.

The "76 to 100 cow" farms have the highest NFIFO per CWT EQ ($3.57). They have a return to the owner-operator-manager (and their family's) labor & management and equity capital of $4.12 per CWT EQ. In 1997, the "51 to 75 cow" farms had the highest NFIFO per CWT EQ and in 1998 they were second best with a NFIFO of $3.51 per CWT EQ.

Additional Information

Tables 9-11 show results using different farm characteristics to sort the farms and the overall average for selected items. The tables also show averages for selected items for the lowest quintile (20 percent) of farms (156) on that item sort, the middle 60 percent (468 farms), and the highest quintile. Margin per farm is the dollars available to pay the total labor and management costs (including family living) and total capital costs, including interest paid and opportunity interest on equity. ROROA is calculated by using the following formula: (NFIFO *plus* interest paid *minus* unpaid labor and management charges *divided* by the average total farm assets).

Table 9
Study Farms Sorted by **Basic Cost of Production per Hundredweight Equivalent** (CWT EQ)

	Basic Cost of Production / CWT EQ	Total Allocated Costs / CWT EQ	Average No. of Cows	Crop and Pasture Acres Per Cow	Pounds Milk Sold per Cow	Margin per Farm	ROROA
Average	$8.23	12.42	99.5	3.27	20,198	170,989	9.20%
Low 20%	$6.23	10.60	83.2	3.75	19,721	183,381	12.92%
Mid 60%	$8.16	12.37	103.4	3.23	20,560	184,371	9.89%
High 20%	$10.20	14.19	103.8	3.03	19,498	118,451	3.27%

Table 9 shows that the quintile of the farms with the lowest basic cost (low cost farms) had an average basic cost of $6.23 versus $6.04 in 1997. The quintile of the farms with the highest basic cost (high cost farms) had a basic cost of $10.20, a difference of almost $4.00 per CWT EQ. The difference in the ROROA on the low and the high cost farms is 8.75% (12.92 – 3.27) versus 10.70% (9.04 – (-1.66)) in 1997.

The average margin of the low cost farms was $64,930 (55%) greater than the high cost farms' average margin versus $66,237 (98%) in 1997. Therefore, it appears that margin per farm increased by nearly the same absolute amount regardless of the farm's underlying basic cost. On average, the low cost farms had $1.55 available for each $1.00 the high cost farm had available to pay non-basic cost items. Non-basic cost items are wages, benefits, family living, principal, interest, and make down payments on new capital purchases. Also, the low cost farms accomplished this with fewer cows per farm. The mid-cost farms had just slightly more margin per farm but required additional 20.2 cows to produce that margin.

Table 10
Study Farms Sorted by **Milk Sold per Cow**

	Basic Cost of Production / CWT EQ	Total Allocated Costs / CWT EQ	Average No. of Cows	Crop and Pasture Acres Per Cow	Pounds Milk Sold per Cow	Margin Per Farm	ROROA
Low 20%	$8.26	12.51	66.2	3.89	14.162	82,008	3.61%
Mid 60%	$8.28	12.44	96.6	3.28	19,687	160,179	8.90%
High 20%	$8.16	12.36	141.4	2.98	24,071	292,399	12.15%

Table 10 shows that the quintile of the farms with the lowest milk sold per cow sold almost 10,000 pounds less milk per cow than the high quintile.

It shows the low production farms had an average basic cost of $8.26 per CWT EQ. The quintile of the farms with the highest milk sold per cow had a basic cost of $8.16, a difference of $0.10 per CWT EQ. The difference in 1997 was $0.11 per CWT EQ and has been very small since this study began. The higher milk sold farms had averaged 75.2 more cows per farm and 9717 pounds more milk sold per cow.

The average margin of the "higher milk sold" farms was $210,331 (256%) greater than the "lower milk sold" farms' versus $123,470 (197%) in 1997. Of this extra margin, only about $3,400 is due to a lower basic cost of production per CWT EQ, the remainder was due to volume. The average amount of milk sold per farm on the "higher milk sold" farms was 3,402,953 pounds versus 2,698,770 pounds in 1997. This compares to an average amount of milk sold of 937,427 pounds versus 857,197 pounds in 1997, on the "lower milk sold" farms. Therefore, on average, the "higher milk sold" farms sold about 3.5 times as much milk per farm as the "lower milk sold" farms.

Statistical tests (correlation and regression analysis) showed neither production per cow and number of cows per farm had any explanatory power versus basic costs per CWT EQ on the 780 farms studied. However both were significant (*t* Statistic in excess of 2), at the 95% confidence level, in determining basic cost per CWT EQ. Moreover both were significant in determining Rate of Return on Assets (ROROA) and milk production per cow had marginal explanatory power versus ROROA (R^2=0.17).

Table 11
Study Farms Sorted by **Average Number of Cows per Farm**

	Basic Cost of Production / CWT EQ	Total Allocated Costs / CWT EQ	Average No. of Cows	Crop and Pasture Acres Per Cow	Pounds Milk Sold per Cow	Margin Per Farm	ROROA
Low 20%	$8.25	12.21	38.6	4.11	17,096	55,528	4.20%
Mid 60%	$7.92	11.90	69.3	3.93	19,586	121,459	7.93%
High 20%	$8.46	12.85	250.9	2.61	21,180	435.038	11.61%

In 1996 when the study farms were sorted by the "Number of Cows per Farm" the low quintile had 38 cows per farm. However, the "Mid" and the "High" categories had 64 and 186 cows, respectively. In 1997, the low quintile on this table had 38 cows per farm, the "mid" 67, and the "high" 223. Now, in 1998, the low quintile has 38.6 cows per farm, the "Mid" 69.3, and the "High" 250.9. This is a 35 percent increase in the number of cows in the "High" cows per farm group with almost no increase in the "low" group. It appears the small farms are remaining the same size and the larger farms are rapidly increasing in size.

Table 11 sorts the farms by the number of cows in the herd. It shows that the quintile of the farms with the "low cow numbers" farms had an average basic cost of $8.25 per CWT EQ versus $8.12 in 1997. The quintile of the farms with the highest cow numbers had a basic cost of $8.46, a difference of $0.21 per CWT EQ in favor of the smaller farms. Notwithstanding, the "high cow numbers" farms averaging 212.3 more cows per farm and 4084 additional pounds of milk sold per cow. This increase in basic cost per CWT EQ on the larger farms can not be explained by higher interest or labor costs, because those costs are not included in basic costs.

The average margin of the "high cow numbers" farms was $379,510 (683%) greater than the "lower cow numbers" farms versus $261,483 (660%) in 1997. This margin could have been over $11,000 more had the large farm produced milk for the same basic cost as the small farms. The milk sold per farm on the "higher cow numbers" farms was 5,314,187 pounds versus 4,403,158 in 1997. These compare to an average of 635,160 pounds of milk sold per farm on the "lower cow numbers" farms versus 632,390 pounds in 1997. The large farms are growing even more rapidly than the change in cow numbers suggests.

Summary

The average herd size in our study group of farms was 99.5 cows. This is an increase of 7 cows per farm compared with an increase of 8.5 cows per farm in 1997. The milk sold per cow averaged 20,198 pounds. The rapid increase in cow numbers is due to expansion by the larger farms in the sample. These farms are also increasing production per cow more rapidly than the farms with smaller herds.

Total cost of production per hundredweight equivalent of milk was $0.51 ($15.41 – $14.90) less than the US average milk price in 1998. This is the first year (since our study of milk production costs began in 1992) that the milk price has exceeded total economic costs.

Purchased feed costs remain the largest cost item. They did not decline even though the price of corn and SBOM declined substantially from 1996 to 1998. The changing size of dairies is causing the acres farmed per cow to decline (3.5 acres in 1996 versus 3.27 in 1998) and the amount of feed purchased per cow to increase. This caused the overall purchased feed costs to remain nearly constant even as prices of individual feeds declined. Purchased feed costs per cow were $663, $657 and $662 in 1998, 1997 and 1996, respectively. Purchased feed costs per CWT EQ were $2.77, $2.76 and $2.94, in 1998, 1997 and 1996, respectively.

Total income per cow averaged $3,688, of which $3,129 was milk income, $47 calves sold and $134 cull cow sales. Therefore, 90 percent of total income was from the sale of products directly related to the dairy enterprise (milk, cull cows, and calves). In 1997, 91 percent of the total income was from dairy. Total allocated expenses per cow averaged $2,973, versus $2,811 in 1997. The return to the farmers (and family's) unpaid labor, management, and equity capital (Net Farm Income from Operations - NFIFO) was $716. This is almost double the NFIFO per cow in 1997 of $370. The corresponding 1996 values were total income per cow, $3,318; total allocated expenses per cow, $2,870; and NFIFO per cow, $448.

The NFIFO (on both a per cow and ratio basis) had been slowly eroding. This year, NFIFO per cow increased even though the paid labor costs per cow increased $30. Paid labor totaled $353, $323, $300 and $237, in 1998, 1997, 1996 and 1995, respectively with more of these dollars being paid to dependent family members.

As a larger percent of labor & management required to operate a dairy is paid, the definition of NFIFO is slowly changing from the money available for family living draw to a return to the farm equity. This change in how the industry operates needs to be recognized and collected by our record keeping systems. The collection system used by the Center for Dairy Profitability and the Farm Management Associations has been separating wages and benefits paid to dependent family members since 1996. The wages paid to dependent family members was $79, $113 and $118 per cow in 1996, 1997 and 1998, respectively.

In 1998, total allocated expenses per CWT EQ averaged $12.51 and basic costs average $8.23 versus $11.81 and basic costs averaged $7.86 in 1997. The business term equivalent to "basic costs" is the "cost of goods." Business managers want to know their "cost of goods" per dollar of income. Basic costs or cost of goods per dollar of income averaged 53 cents (the $8.23 basic cost divided by the $15.41 average milk price in 1998). The other 47 cents, per dollar of income, is available for hiring labor, principal and interest payments, down payments or payment for asset purchases, and/or family living draw.

The ROROA had remained relatively steady (approximately 5.5 percent) from 1995 through 1997. However, in 1998 it increased to 9.20 percent. More details on the financial status of these 780 farms is published in the paper titled “1998 Financial Benchmarks on Selected Wisconsin Dairy Farms.” This paper benchmarks the 16 Farm Financial Standard Task Force measures and others. It is also available on the Center for Dairy Profitability’s website at www.wisc.edu\dairy-profit under “Papers & Publications.”