

Calculating Your Milk Production Costs and Using the Results to Manage Your Expenses

by
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Introduction

Dairy farms producing milk have numerous sources of income: milk, cull cows, calves, crop sales, CCC milk assessment refund, cooperative dividends, property tax credit on income taxes, crop-related government payments and more. In addition, on most dairy farms the cost of producing crops sold for cash cannot be separated from the cost of producing crops fed to the dairy herd. This large number of income sources makes determining the cost of producing milk more difficult than just dividing costs by the hundredweight of milk sold.

The most meaningful divisor when calculating cost of milk production on a dairy-crop is an output (income) equivalent unit. This measure is calculated by summing the income from the sale of all products produced on the farm and then dividing by the price of milk. The resulting value is the milk production (hundredweight) required to generate an equivalent income. That is, if the farm produced only milk, how much milk would it have had to produce in order to have an identical income. A farm's total income (including cash sales of crops and changes in the value of feed and cattle inventories) must be included when calculating output equivalent units. This method does not generate satisfactory results when cropping enterprises income exceed 20 percent of total income. Example: if you plan to use this method and your total income is \$200,000, your crop sales should not exceed \$40,000 and total non-dairy income should not exceed \$60,000.

Calculating Your Hundredweight Equivalent Production

The first step in calculating your CWT EQ is to calculate your total income. Using Worksheet No. 1, calculate your total income (lines 1 through 6), then divide line 6 by line 7 to arrive at the hundredweight equivalents of milk sold by your farm. This is the critical value. (Note: This method may give unsatisfactory results if your dairy enterprise income is less than 70 percent of your total income. In that case, you will need to do a more detailed and time consuming cost of milk production calculation.)

Worksheet No. 1

	Example	Your Farm
1. Total Schedule F Income (Schedule F, line 11)	\$125,709	_____
2. Form 4797 Income ¹	\$ 12,143	_____

3.	Change ² in Feed Inventory	-\$ 4,127	_____	
4.	Change ² in Livestock Inventory	\$ 10,500	_____	
5.	Other	\$ 0	_____	
6.	Total Farm Income (On this worksheet, add lines 1 through 5.)	\$144,225	_____	
7.	Average Milk Price ³	\$ 12.86 ³	_____	
8.	Hundredweight Equivalents (CWT EQ) of Milk Produced (On this worksheet, divide line 6 by line 7)	11,215	_____	<u>Critical Value</u>

¹ Form 4797 usually contains only income from the sale of culled raised dairy livestock. In those cases, simply enter the income reported. However, Form 4797 can contain the "one-time" sale of some other asset(s), such as an old plow. If your Form 4797 contains these items, subtract the amount of their sale from the total Form 4797 income before recording it on line 2.

² "Change" equals the ending amount minus the beginning amount. The best way to get this value is to ask yourself if there was any change in the **quantity** of this item on hand during the year in question. If the answer is "yes" then follow with the question, "how much?" and multiply that figure by a long run average price. This method avoids having to determine the absolute inventory level at the beginning and end of the year in question.

³ If you wish to compare your costs to the costs of other farms, use the US average all milk price for the year in question. It was \$13.74, \$12.27, \$13.15, \$12.86, \$13.03 and \$12.86 in 1990 - 1995, respectively. Using these prices allows you to compare your costs to the averages presented here regardless of the actual price you received for your milk. Or you can divide your total milk income (before any deductions for hauling, marketing, etc.) by the number of hundredweight of milk you sold during the year to calculate the average milk price on your farm. However, then you can only accurately compare your costs this year to your costs in previous years.

Calculating Your "Basic Cost" per Hundredweight Equivalent

"Basic Cost" is defined as your total accrual adjusted costs excluding all wages and benefits, (both paid and unpaid) all interest costs, (both cash and non-cash) and all depreciation. This cost is similar to the "Cost of Goods" value used by non-farm businesses in evaluating the performance of their businesses.

Worksheet No. 2 is used to calculate "Basic Costs per CWT EQ." It starts by adjusting the expenses you reported on Schedule F for changes in accounts payable and prepaid expenses (lines 1 to 4). Next the wages, benefits, interest, and depreciation claimed on Schedule F are subtracted (lines 5 to 7). The result (line 8) is your "Total Basic Costs." (Note: Since the Schedule F does not include a cost for unpaid wages and benefits (unpaid labor and management) nor a cost for non-cash interest (opportunity interest), these costs must not be subtracted in this computation.)

Worksheet No. 2.

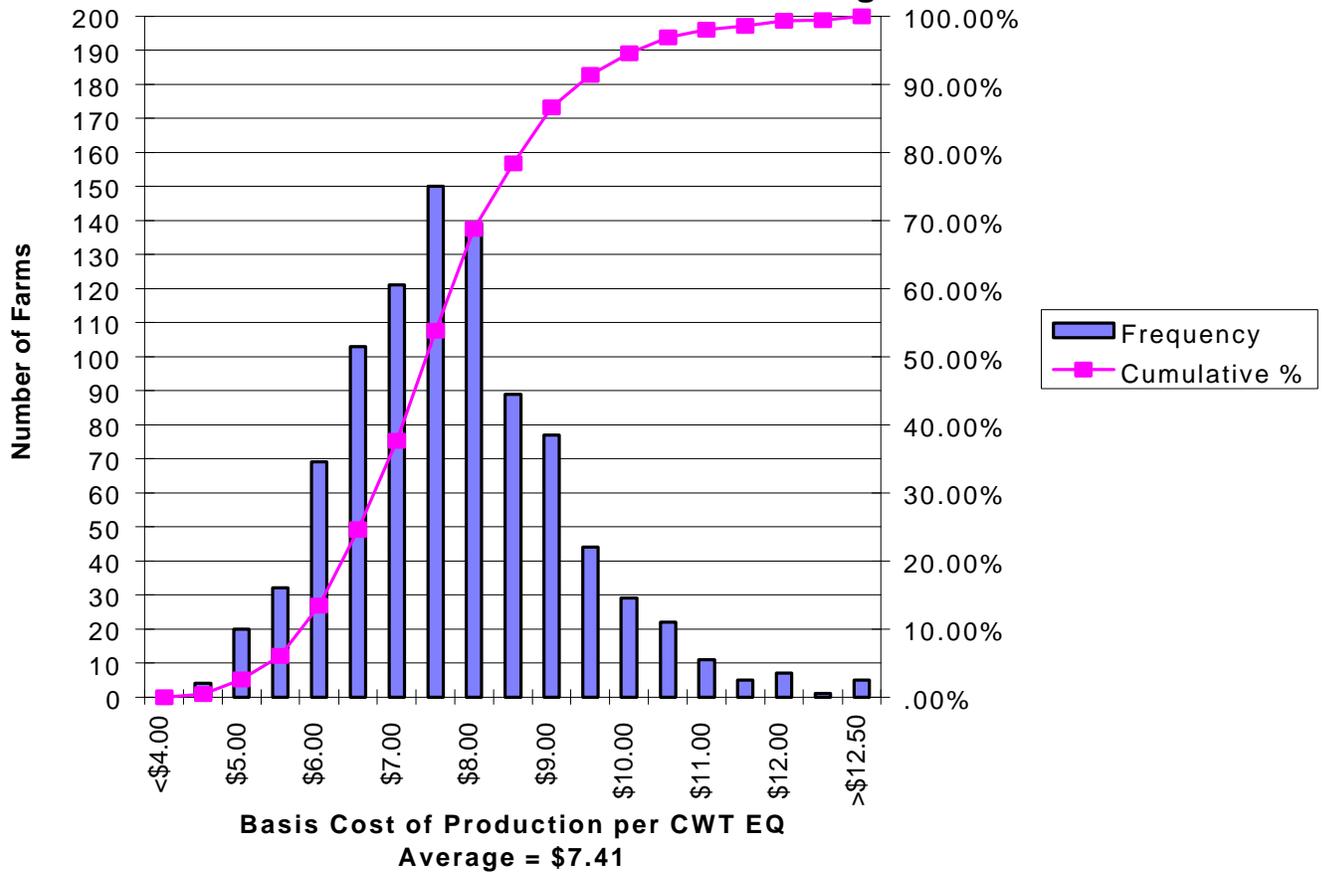
		Example	Your Farm
1.	Total Schedule F Expenses (Schedule F, line 35)	\$111,306	_____
2.	Change ¹ in Accounts Payable	\$ 1,543	_____
3.	Change ¹ in Prepaid Expenses	\$ 1,200	_____
4.	Total Allocated Costs (On this worksheet, add lines 1 and 2, then subtract line 3)	\$111,649	_____
5.	Total Interest Paid (Add Schedule F lines 23a and 23b)	\$ 8,470	_____
6.	Wages and Benefits Paid (Only those reported on Schedule F; to obtain this value add Schedule F lines 17, 24, and 25)	\$ 12,682	_____
7.	Depreciation Claimed (Schedule F line 16 minus Depr. claimed on livestock)	\$ 15,346	_____
8.	Total Basic Costs (On this worksheet, line 4 minus lines 5, 6, and 7)	\$ 75,151	_____
9.	Basic Cost per CWT EQ (On this worksheet, line 8 divided by line 8 on Worksheet No. 1)	\$ 6.70	_____

¹ "Change" equals the ending amount minus the beginning amount.

Chart No. 1, from a study of 928 farms belonging to the Lakeshore and Fox Valley Farm Management Associations, shows that 150 farms had basic costs of production per CWT EQ in the \$7.01 to \$7.50 range and that 55 percent of the farms in this study had basic costs of \$7.50 or less. Another example: 29 farms had basic costs in the \$9.51 to \$10.00 range and 95 percent of farms had basis costs of \$10.00 or less.

Chart No. 1

Number of Farms in Various Basic Cost Ranges and the Cumulative Percentage - 1995



After you calculate your basic cost per CWT EQ, compare it to (mark it on) Chart No. 1. This will show you how your basic costs compares to the other farms in this study. A reasonable goal for basic cost per CWT EQ is \$7.00 or less. This goal is based on a milk price of about \$13.00 and average dairy-crop farm mix of land (3 acres per cow) and capital (owning most of your own tillage, planting, and harvesting equipment). If your basic farm costs are above \$7.00 per CWT EQ, you should place some effort into cost containment.

Comparing Your Schedule F Expenses to Averages

Effective cost containment requires direction and focus of your financial management resources. One way to obtain direction is to compare your farm's costs to an "average" farm's costs. The 1995 average costs, by category, are shown in Table 1. The 928 dairy farms used to calculate these averages had a combined total of more than 70,000 cows and produced more than 1.3 billion pounds of milk. These averages were calculated by dividing the total income on each farm by the US average milk price for 1995 (\$12.86) to obtain the farm's CWT

EQ. That CWT EQ was divided into the amount of expense in each cost category and averaged.

In order for you to use this table, you will need to go to your Schedule F and divide the expenses you have in a category by the CWT EQ you calculated on Worksheet No. 1 (line 8). Enter the results in the space provided and compare your value to the value in the "Average" column.²

Table 1

Study Farms' Cost per CWT EQ in 1995 - Selected Expense Categories

Item	Cost Per CWT EQ			Item	Cost per CWT EQ			Your Farm
	Average	Low 20%	Your Farm		Average	Low 20%	Your Farm	
Car & Truck	\$0.05	\$0.05	_____	Utilities	\$0.28	\$0.25	_____	
Chemicals	0.18	0.16	_____	Vet Fees & Medicine	0.37	0.27	_____	
Custom Hire	0.21	0.13	_____	Breeding Fees	0.15	0.14	_____	
Feed Purchase	2.12	1.44	_____	Other Expenses	0.32	0.23	_____	
Fertilizer and Lime	0.47	0.41	_____	Non-cash Adjustments	<u>-0.02</u>	<u>-0.15</u>	_____	
Freight and Trucking	0.11	0.10	_____	Basic Costs / CWT EQ	\$ 7.41*	\$5.66*		
Fuel and Oil	0.26	0.22	_____	Mortgage Interest &				
Farm Insurance	0.18	0.16	_____	Other Interest	0.92	0.71	_____	
Marketing Fees	0.28	0.27	_____	Emp Benefit Program	0.24	0.25	_____	
Rent/Lease Equipment	0.07	0.03	_____	Labor Hired	0.83	0.81	_____	
Rent/Lease Other	0.54	0.30	_____	Depreciation	<u>1.57</u>	<u>1.78</u>	_____	
Repairs & Maintenance	0.77	0.69	_____	Other Costs / CWT EQ	\$ 3.55*	\$3.55*		
Seeds & PlantsPurch	0.33	0.30	_____		=====	=====	=====	
Supplies Purchased	0.44	0.35	_____	Total Cost / CWT EQ	\$10.96*	\$9.21*		
Taxes	0.30	0.34	_____					

* Totals may not add due to rounding.

The average column on Table 1 will help you identify categories of expense that are above average. For instance, if your insurance costs are \$0.40 per CWT EQ and the average is \$0.18, you should investigate why this difference exists.

Your investigation can lead to one of three results. First, you have miscoded some of your expenses. Second, you are managing the category of expenses correctly and the difference that exists is explainable (you have high insurance costs because you live in a flood plain). Third, you are managing the category of expenses incorrectly and do not know it. It is this third observation that will give you insights into reducing your costs.

Examine each category that is above average, try to find out why it is above average and if there is anything you can do about it. If there is, do it! Closely examine a category even if it is only 2 or 3 cents above average. There are over 20 categories and a couple of pennies on each adds to over a half dollar quickly.

Production costs can be reduced by increasing production, if the cost of producing the additional output is less than your current average cost. In addition, some categories are related to one another. Example: low fertilizer costs may lead to high purchased feed costs.

Information in the low 20% column on Table 1 should be used when setting long term goals. It contains the costs of the 181 farms in this sample with the lowest basic cost per CWT EQ.

Basic Costs are Satisfactory, But...

You have checked over all your costs and they are in range, but you are still not cash flowing and/or profitable. Where should you look next for financial management opportunities? Three possibilities are:

One: Total interest paid per CWT EQ

Sum the amounts on lines 23a and 23b, Schedule F, and divide this sum by line 8 from Worksheet No. 1 (your hundredweight equivalent production).

The goal is \$1.35 per CWT EQ or less. If your total interest paid is greater than \$1.35 you will likely need to restructure debt or get interest concessions to stay in business.

Two: Labor and Management costs (including family living draw) per CWT EQ

Sum the amounts on lines 17, 24, and 25, Schedule F, and your family living expenses (draw) in excess of what you paid yourself or your dependents (as defined by Federal Tax Code). Divide this sum by line 8 from Worksheet No. 1.

The goal is \$3.00 per CWT EQ or less. If your labor costs are greater than \$3.00 per CWT EQ you will need to get more productivity for each unit of labor or reduce the pay of existing workers.

Three: Principal and down payments per CWT EQ

Unfortunately, there is not a nice, concise source to look at to find your total principal and down payments. You will need to find them, sum them, and divide the sum by line 8 from Worksheet No. 1.

The goal is \$1.65 per CWT EQ or less. This measure is not clean cut because it is split into two components: an amount for principal payments against current loans and an amount for down payment on new investments. If you use all \$1.65 per CWT EQ as principal payments, you may have to borrow all of the moneys needed for any new investments.

You may be wondering how these “goals” were obtained and how they figure into the big picture. The interest paid goal is a combination of acceptable debt load per cow and interest rates. Use of either of these alone isn’t sufficient because of the number of financing options available and used by dairy farmers.

The labor paid goals were derived from a family’s presumed abilities and needs. Those were presumed to be: one - a family can provide the labor for a 50 cow dairy; two - 50 cows should produce at approximately 10,000 CWT EQ per year; and three - a family can not live on less than \$30,000 per year (when buying health insurance and paying the required social security and income taxes). Therefore a least \$3.00 per CWT EQ is thought to be needed for labor.

The goal for principal and down payments is based on the assumption that a farm must have the ability to repay existing debts in 5 to 8 years. The average investments and indebtedness per cow are \$5,000 to \$8,000 and 30 percent, respectively. These values translate into a debt per cow of \$1500 to \$2500. In order to repay that debt in 5 to 8 years the manager needs to repay approximately \$300 of debt per cow per year. As stated above, some of these moneys may be used as down payment on new investments plus new borrowing may occur, so the farm will not likely be debt free in 5 to 8 years. However, if applying all available dollars to current debt would not reduce it to zero in 5 to 8 years, this area of financial management needs attention.

In addition, the amount of investment per CWT EQ is important. That goal is \$32.50 or less, when the assets are valued on a market basis. If your investment is greater than the goal , you have three options. One, reduce your investment without reducing output (example: sell some land). Two, increase output without increasing investment or basic costs per CWT EQ (example: increase production per cow). Three, expand (example: if the amount invested per additional CWT EQ is less that your current investment, the average investment per CWT EQ will decrease.)

All three of the solutions mentioned in the previous paragraph revolve around the output of the farm business in question. The size (output) of a farm business is important because even an efficient (low basic costs per CWT EQ) farm business needs an adequate size to cover family living and other fixed costs.

Basic costs were defined as your total accrual adjusted costs excluding all wages and benefits, both paid and unpaid; all interest, both cash and non-cash; and all depreciation. Therefore, if the basic cost is subtracted from the average milk price you obtain the dollars per CWT EQ available to cover those costs. (In this example: $\$12.86 - \$6.70 = \$6.16$) Multiplying that dollar value by the CWT EQ produced on this farm will yield the total dollars available to cover those costs. (In this example: $\$6.16 \times 11,215 = \$69,084$.) This value may be enough to support a family, additional labor needs, interest, and capital on a 50 cow dairy, but a 25 cow dairy (5,608 CWT EQ of production) that is just as efficient may not survive because it would only have \$34,545 to cover the costs of the same items.

Calculate this total dollars available to cover non-basic costs each year and compare the amount to both previous years and needs.

Summary

Does this all add up? The summary below shows that if one category of expense is not meeting its goal, then some other area must exceed its goal or that farm business may not be able to meet its financial obligations. Farm businesses that start with \$8.50 or more in basic costs can still be providing a living for the family that is operating it. However, that can only be accomplished by having a very low debt load and/or low labor and management charges (family living).

Basic Costs:	\$7.00
Interest Costs:	\$1.35
Labor and Management Costs:	\$3.00
Principal and Down Payments:	<u>\$1.65</u>
Total:	\$13.00

If the sum of Basic, Interest, Labor, and Management costs exceed their goals, then there will be additional moneys available to the manager of this dairy business for principal and down payments. In this case, the manager should be inquiring about investment strategies for those surpluses. Some individuals like to invest in agriculture and they will likely expand. Others may like some liquid off-farm investments; they should invest in stocks, bonds, and CD's. Still others like non-liquid off-farm investments; they should invest in rental properties - houses, apartments, or recreational.

A key concept: Don't start expanding until you have understood how to control your basic costs. Expansion may help you control your basic costs, but don't count on it. Expand only after basic costs are in order.

Remember, all investments (farm and non-farm) have risks associated with them. The biggest risk in agriculture is price and that risk is beyond your control. Therefore, measure twice and cut once. It is easier to find and correct your mistakes on paper than to correct them after the cement has been poured.

This analysis of production costs should be considered a first step. Some farm mangers may want to calculate the production cost of a bushel of corn, a ton of hay or corn silage, etc. In order to do this they will need more detail in their farm accounting records. Some of the detail they will need is cash income and expense by enterprise, non-cash income and expense by enterprise, capital use by enterprise, and labor and management required by enterprise. There is a spreadsheet program (ENTERPR.WK1 - for Lotus and Quattro users and ENTERPR.XLS - for Excel users) available from the Center for Dairy Profitability to assist in this task. The cost is \$15.00. The address is: 6175 Observatory Dr., Madison, WI 53706.

Endnotes:

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² **Caution:** If you have changes in accounts payable or prepaid expenses, you will need to adjust the appropriate categories to reflect those changes. Example: you had an increase in the amount due at the feed mill of \$5,000. The feed expense you entered on your Schedule F would not have included that \$5,000. Therefore, in order to get the correct answer for the category “Feed Purchased” per CWT EQ, you will need to add that \$5,000 to the amount on the Feed Purchased line before dividing by the CWT EQ value calculated above.