Debt Payment Capacity and Milk per Cow
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The objectives of dairy farm financial management should include generating enough income to cover all cash farm expenses, support the families involved with the business and manage debt commitment so that all interest and principal payments can be made. Before making a commitment to a new debt structure, managers should calculate the money left for making interest and principal payments after all other needs are met. This is the debt payment capacity. The simplified format is:

DEBT PAYMENT CAPACITY

Cash Flowing In

Items Produced to Sell (milk, crops, calves)	$_____	
Capital Items Sold (cull cows, machines)	$_____	
Total Cash In		$_____

Cash Flowing Out

Cash Expense Items (excluding interest)	$_____	
Family Living Needs (owner or partners)	$_____	
Total Cash Out		$_____

Available for Debt Repayment $_____
(cash **in** minus cash **out**)

For farm use, this format must be expanded by using more subheadings. It is easiest if the subheadings are the same as those used in the farm's accounting records. Table 1 shows how dairy farm income and expense subheadings may be added to the above format. It also shows actual results obtained by specialized Michigan dairy farmers from 1974 through 1976 when grouped by milk sales per cow. Table 1 does not show total production costs or income, as no noncash items such as depreciation and inventory changes are included. The items in Table 1 are explained below.

Cash income. Money received from milk sales for the year is shown on line 1; it was 80 to 84 percent of the total cash income. Livestock, mainly cull cows and young calves, provided 8 to 9 percent of cash income. Crop sales were 5 to 8 percent of cash income. The cropping program provided 70 to 80 percent of the herd's needs, but the cash part of farm-grown feed is within line 9, the crop production expenses. Such things as custom work, refunds, forest products and government payments are other income and amount to less than 3 percent. Milk price, production levels and beef price are major influences on available cash.

Hired labor. This included wages, social security, workers' compensation insurance, plus any other cash paid to labor. Much of the labor on dairy farms is furnished by the farm operator and members of the family and is not included in cash expenses unless a child or other family member was actually paid cash. Hired labor expense was 11 to 13 percent of cash expenses for these farms.

Machinery operation. The cash items were repairs and fuel for farm machinery including trucks plus the farm share of the automobile. The cash cost of custom hired or leased machinery was included. Machinery was 13 to 17 percent of total expenses.

Building upkeep. This included repairs and insurance on buildings, fences, tile drains and other farm improvements which are a part of the real estate. Also included is conservation expense which includes bulldozing fence rows, cleaning ditches, etc. Building upkeep was 4 to 5 percent of cash expenses.

Crop production. This included the cost of fertilizer, lime, seed, herbicides, insecticides, irrigation, fuel and marketing. It was 19 to 21 percent of cash costs.

Purchased feed. This was mainly grain and protein supplement, but also included salt, minerals and calf feed. It varies with the crops planted on the individual farm and local feed prices. It varied from 23 to 28 percent of cash costs for these farms over the three-year period studied.

Table 1. Yearly Farm Cash Income and Expenses, by Milk per Cow
Dairy Telfarms, 1974-1976 Averaged

Item	Pounds of Milk Sold per Cow						
	9,000 to 9,999	10,000 to 10,999	11,000 to 11,999	12,000 to 12,999	13,000 to 13,999	14,000 to 14,999	15,000 and over
Cash Income							
1. Milk	53,170	62,480	81,460	92,780	104,960	108,620	109,940
2. Livestock	5,700	7,190	9,210	10,320	11,740	11,100	12,550
3. Crops	4,890	6,370	9,980	9,900	9,560	7,950	6,280
4. Other	2,030	2,240	2,150	3,670	3,060	2,250	2,900
5. Total income	65,790	78,280	102,500	116,670	129,320	129,920	131,670
Cash Expenses							
6. Hired labor	5,380	5,110	7,900	9,180	10,590	9,390	8,040
7. Machinery operation	6,940	7,400	9,440	10,510	11,120	10,240	10,080
8. Building upkeep	1,620	2,260	2,840	2,930	2,880	3,110	3,420
9. Crop production	8,080	9,560	13,100	14,290	15,180	14,800	14,490
10. Purchased feed	9,360	10,950	15,400	17,460	20,040	22,200	20,450
11. Livestock production	4,760	5,700	7,820	8,730	10,230	10,680	10,800
12. Other	5,090	5,880	7,050	8,300	8,570	8,570	8,020
13. Total expenses	41,230	46,860	63,550	71,400	78,610	78,990	75,300
14. Cash Difference (Net cash income)	24,560	31,420	38,950	45,270	50,710	50,930	56,370

Livestock production. The largest item in this category was milk marketing, which cost 40 to 50 cents per hundredweight of milk sold. Other items were breeding fees, veterinary fees, medical supplies, milkhouse supplies and livestock marketing. Livestock production was 11 to 14 percent of cash costs.

Other expenses. The main items were real estate taxes, cash, land rent and utility bills. It included a miscellaneous "catchall" which may amount to 1 or 2 percent of total cash expenses. The other expense category was 11 to 12 percent of cash expenses.

Interest expense. Cash interest paid was *not* included as a cash expense item in Table 1. In the debt payment capacity format, the residual amount being calculated is the cash available for debt repayment, or cash interest and principal amounts. If we count cash interest as an outgoing expense item, the true amount left for principal and interest payment will be underestimated.

Net cash income. This is the difference between cash income and cash expenses. It is the amount from which living expenses, income taxes, debt servicing and savings must be made. It may contribute to new capital expenditures, but a large part of these expenditures are made with borrowed funds.

Some Facts About the Farms

The data in Table 1 came from Michigan dairy farmers who chose to keep their annual financial records on Telfarm, a computer-based accounting system sponsored by the Michigan State University Cooperative Extension Service. A dairy farm record was included in the study if the records were complete for any of the years 1974 through 1976. The records over the three-year period were divided into the seven production levels, and all records for each production level were averaged for each year and then the average for the three years was calculated.

Of the 1,370 farm records summarized in Table 1, 428 were for 1974, 470 for 1975 and 472 for 1976. The average production within each group was close to the midpoint. For farms with 15,000 pounds or more of sales, the group average was 16,014. Table 2 gives more information about the sample farms. Farms within the levels of 11,000 pounds and higher were quite similar in size and labor force.

Table 2. Number, Size and Labor Force
Sample Telfarms, 1974-1976

Pounds of Milk Sold per Cow	Number of Farms	Cows	Average Number of Owned and Rented Tillable Acres	Person Equivalents
9,000 to 9,999	82	60.9	301	2.2
10,000 to 10,999	136	64.5	329	2.3
11,000 to 11,999	219	76.8	368	2.6
12,000 to 12,999	277	80.6	387	2.8
13,000 to 13,999	268	85.1	396	2.8
14,000 to 14,999	211	82.3	377	2.7
15,000 or more	177	75.1	351	2.8

Remaining cash per cow. To remove size differences, the last line in Table 1 was divided by the cow numbers in Table 2. The result is the net cash farm income per cow in the second column of Table 3. The family cash living expense was estimated as the operator's plus unpaid family labor times $3.50 per hour. This amount per farm ranged from $16,750 to $20,783. From this, the family had to buy food and life insurance, maintain the family dwelling, operate the

family automobile, pay social security payments, medical expenses and income taxes plus any other expenses not chargeable to the farm business. The family cash living expenses per cow are shown in column 3 of Table 3. The cash available for debt servicing or capital investment is calculated by subtracting family living from net cash farm income. The result in Table 3 shows that, on the average, farms with higher milk sales per cow have more money left for making debt payments or for making capital purchases.

Table 3. Cash Income Less Family Living Expense Per Cow, 1974-1976

Pounds of Milk Sold Per Cow	Net Cash Farm Income	Family Cash Living Expense	Cash Available for Debts or Capital
9,000 to 9,999	$400	$275	$128
10,000 to 10,999	487	285	202
11,000 to 11,999	507	237	270
12,000 to 12,999	561	218	343
13,000 to 13,999	596	210	386
14,000 to 14,999	619	223	396
15,000 to 15,999	752	277	475

Capital purchase. These are items such as land, buildings constructed, machinery and heifers or cows purchased. Machinery is often purchased each year to replace worn-out or obsolete items already on the farm. Real estate items may be purchased only once every five to 10 years on an individual farm. The average amount of capital purchases per cow by milk production is given in the middle column of Table 4. In the Telfarm sample it is not possible to show whether the capital purchases were made by using cash withdrawals from the business, by borrowing cash or by some combination of cash withdrawals plus borrowings. The last two columns of Table 4 indicate that only those dairy farms selling 13,000 pounds of milk or more had enough cash left to cover capital purchases without borrowing additional funds.

Table 4. Capital Purchases per Cow, 1974-1976 Cash Spent and Cash Available

Pounds of Milk Sold per Cow	Capital Purchases Made per Year	Cash Available for Capital Purchases
9,000 to 9,999	$265	$128
10,000 to 10,999	319	202
11,000 to 11,999	366	270
12,000 to 12,999	430	343
13,000 to 13,999	344	386
14,000 to 14,999	387	396
15,000 to 15,999	366	475

Debt servicing. We have just shown that lower producing herds probably used borrowed money to cover at least a portion of their capital purchases. We expect that several farms within the highest milk production groups did also. To illustrate the maximum amount of debt a dairy farm can repay, we'll now assume that all capital purchases were made with borrowed funds. Of the cash available for debt services or capital purchases, none will be used for capital items and all will be used for debt servicing.

The dollars in the fourth column of Table 3 will be used for annual payments of interest plus principal repayment. The size of loan that can be repaid, or carried, with a given amount of annual payment depends on the interest rate and the length of time given to repay the principal.

Table 5 gives the factors for calculating the size of loan that can be paid off with equal annual payments if the interest and length of time are known. To illustrate, the average cash available for interest and principal payments for farms with 12,000 to 12,999 pounds of milk sold is $343 from Table 3. If money is borrowed at 10-percent interest to be paid back in 10 equal annual payments, the factor from Table 5 is 6.14; multiply 343 by 6.14 and get 2,106. This says the maximum debt a cow producing around 12,500 pounds of milk can repay is $2,106. If there are 40 cows, the maximum farm debt should not exceed $84,240. For an individual farm, we'd expect the cash available for interest and principal payments would have to be divided among two or three loans, each with its own interest rate and repayment period.

Table 5. Size of Loan $1 per Year Will Repay By Repayment Time and Interest

Years to Repay Loan	Annual Percentage Rate 8%	10%	12%
1	.925	.909	.890
2	1.78	1.74	1.69
3	2.58	2.49	2.40
4	3.31	3.17	3.04
5	3.99	3.79	3.60
6	4.62	4.36	4.11
7	5.21	4.87	4.56
10	6.71	6.14	5.65
12	7.54	6.81	6.19
15	8.56	7.61	6.81
20	9.82	8.51	7.47
25	10.67	9.08	7.84
30	11.26	9.43	8.06
40	11.92	9.78	8.24

Debt payment as a percent of milk sales. A common rule of thumb for dairy farms has been that debt payments should not exceed 25 percent of the milk check if the farm is to meet all other expected cash demands. Table 6 shows how this works out on the sample Telfarms. The cash milk income was calculated from Tables 1 and 2. The cash available for

debts or capital was taken from Table 3 and results from the total farm operation shown as a per-cow value. Table 6 shows that once 11,000 pounds of milk sold per cow is reached, the percentage stays at about 30. If all bills were paid and the family living held at the assumed levels, the better sample farmers had 25 to 30 percent of the milk check available for principal plus interest payments. This assumes all capital purchases are made with borrowed money.

Table 6. Debt Payment Capacity as Percent of Milk Sales Per Cow, 1974-1976

Pounds of Milk Sold per Cow	Cash Milk Income per Cow	Cash Available for Debts or Capital	Cash Available as a Percent of Income
9,000 to 9,999	$ 873	$128	15%
10,000 to 10,999	969	202	21%
11,000 to 11,999	1,061	270	25%
12,000 to 12,999	1,151	343	30%
13,000 to 13,999	1,233	386	31%
14,000 to 14,999	1,320	396	30%
15,000 to 15,999	1,465	475	32%

Example calculation. Having reviewed how to do a debt payment capacity calculation and provided loan estimation factor (Table 5) above, an example follows. Using the data from Table 1 for farms averaging 13,000 to 13,999 pounds of milk sold per cow, the livestock sales of $11,740 are entered as "Capital Items Sold." Most of this amount was from cull cow sales. The remaining income items of milk, crops, etc., were combined and entered as "Items Produced to Sell." The $117,580 and $11,740 were added together, giving $129,320 as "Total Cash In." The total cash expense on line 13 of Table 1 was entered as "Cash Expense Items." Family living and income tax cash expenses were estimated to be $17,700 and entered as "Family Living Needs." The $78,610 and $17,700 were added together getting $96,310 entered as "Total Cash Out." The $96,310 was subtracted from the $129,320, leaving $33,010 being "Available for Debt Repayment." If the farm could borrow all needed money at 8 percent, paying it off over 10 years with equal annual payments, the factor would be 6.71 (found in Table 5). Multiply 6.71 times $33,010 gives $221,497.10; this is the maximum loan management could expect to safely repay from farm earnings.

DEBT PAYMENT CAPACITY

Cash Flowing In		
Items Produced to Sell (milk, crops, calves)	$117,580	
Capital Items Sold (cull cows, machines)	$ 11,740	
Total Cash In		$129,320
Cash Flowing Out		
Cash Expense Items (excluding interest)	$ 78,610	
Family Living Needs (owner or partners)	$ 17,700	
Total Cash Out		$ 96,310
Available for Debt Repayment (cash **in** minus cash **out**)		$ 33,010

Summary

This fact sheet was developed to show the reader how to calculate debt repayment capacity for a dairy farm business, how debt repayment capacity varied with milk sold per cow on specialized dairy Telfarms and to encourage the readers to estimate the amount available on their own farms. Prudent financial managers selling 12,000 pounds or more of milk per cow per year should keep their total annual payments of interest plus principal repayment below 30 percent of total dollars received from milk sales.

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