Debt Payment Capacity and Milk per Cow
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Dairy Farm Debt Payment Capacity

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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 for 1980 and 1981 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 75 to 82 percent of the total cash income. Livestock, mainly cull cows and young calves, provided 10 to 11 percent of cash income. Crop sales were 6 to 12 percent of cash income. The cropping program provided 55 to 77 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 10 to 15 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 15 to 20 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 17 to 20 percent of cash costs.

Purchased Feed. This was mainly grain and protein supplement, but also included salt, minerals, and calf feed. It varied with the crops planted and local feed prices. It was 20 to 26 percent of cash costs for these farms over the two-year period studied.

Livestock. The largest item in this category was milk marketing, which cost 60 to 70 cents per hundredweight of milk sold. Other items were breeding fees, veterinary

Table 1. Yearly Cash Farm Income and Expenses by Milk Per Cow–Dairy Telfarms, Michigan, 1980-1981 Averaged

Item	Pounds of Milk Sold Per Cow							
	9,000 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 to 15,999	16,000 to 16,999	17,000 and Over
Cash Income								
1. Milk	$105,454	$104,916	$119,693	$157,795	$158,656	$171,340	$218,197	$223,212
2. Livestock	14,038	13,177	15,006	24,534	23,906	23,046	30,022	32,802
3. Crops	16,875	6,955	11,770	19,692	24,939	14,357	18,437	16,578
4. Other	4,180	2,807	3,078	4,174	3,832	4,175	3,496	4,788
5. Total Income	$140,547	$127,855	$149,547	$206,195	$211,333	$212,918	$270,152	$277,380
Cash Expenses								
6. Hired Labor	$ 9,776	$ 7,084	$ 10,936	$ 16,058	$ 14,256	$ 15,751	$ 24,778	$ 27,192
7. Machinery Operation	17,848	15,962	17,655	23,964	22,396	22,016	25,457	27,244
8. Building Upkeep	3,780	3,184	4,405	5,106	5,690	5,446	6,192	6,427
9. Crop Production	17,898	13,652	14,990	22,939	26,052	22,746	27,572	25,514
10. Purchased Feed	18,006	18,575	19,834	27,883	28,952	32,871	39,903	45,154
11. Livestock Production	9,142	8,932	11,134	14,969	15,924	18,600	22,327	25,790
12. Other	11,708	10,759	14,240	19,030	17,506	16,872	18,993	19,604
13. Total Expenses	$ 88,158	$ 78,148	$ 93,194	$129,949	$130,776	$134,302	$165,222	$176,925
14. Cash Difference (Net Cash Income)	$ 52,389	$ 49,707	$ 56,353	$ 76,246	$ 80,557	$ 78,616	$104,930	$100,455

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, land rent (cash paid), 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 14 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 either 1980 or 1981. The records over the two-year period were divided into the eight production levels, and all records for each production level were averaged for each year and then the average for the two years was calculated.

Of the 752 farm records summarized in Table 1, 333 were for 1980, and 419 were for 1981. The average production within each group was close to the midpoint. For farms with 17,000 pounds or more of sales, the group average was 18,372. 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.

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 sum of the operator's labor and the unpaid family labor times $5.00 per hour. This amount per farm ranged from $24,320 to $27,870. 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 2 of Table 3. The cash available for debt servicing or capital investment is calculated by subtracting family living from net cash farm income. Table 3 shows that, on the

Table 2. Number, Size, and Labor Force Dairy Telfarms, Michigan 1980-1981 Averaged

Pounds of Milk Sold Per Cow	Number of Farms	Number of Cows	Pounds of Milk Sold Per Cow	Tillable Acres Owned and Rented	Person Equivalents
9,000-10,999	21	76	10,360	397	2.40
11,000-11,999	25	68	11,604	373	2.14
12,000-12,999	45	72	12,555	351	2.40
13,000-13,999	62	88	13,552	441	2.82
14,000-14,999	69	83	14,466	452	2.70
15,000-15,999	62	84	15,840	401	2.75
16,000-16,999	50	101	16,466	445	3.14
17,000 & Over	42	93	18,372	436	3.17

Table 3. Cash Income Less Estimated Family Living Expense Dairy Telfarms, Michigan, 1980-1981

Pounds of Milk Sold Per Cow	Per Cow		
	Net Cash Farm Income	Family Cash Living Expense	Cash Available for Debts or Capital
9,000-10,999	$ 688	$351	$337
11,000-11,999	720	369	351
12,000-12,999	784	362	422
13,000-13,999	868	317	551
14,000-14,999	973	322	651
15,000-15,999	938	323	615
16,000-16,999	1,043	260	783
17,000 & Over	1,079	269	810

average, farms with higher milk sales per cow have more money left for making debt payments or for making capital purchases.

Capital Purchases. These are items such as land, buildings constructed, machinery, and heifers or cows purchased. Machinery is often purchased each year to replace wornout or obsolete items already on the farm. Real estate items may be purchased only once every 5 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 15,000 pounds of milk or more had enough cash left to cover capital purchases without borrowing additional funds.

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.

Table 4. Cash Available for Capital Purchases and Debt Servicing Dairy Telfarms, Michigan, 1980-1981 Averaged

Pounds of Milk Sold Per Cow	Per Cow		
	Cash Available for Debts or Capital	Capital Purchases Made Per Year	Balance above Capital Purchases
9,000-10,999	$337	$633	$-296
11,000-11,999	351	457	-106
12,000-12,999	422	653	-231
13,000-13,999	551	696	-145
14,000-14,999	651	676	-25
15,000-15,999	615	599	16
16,000-16,999	783	573	210
17,000 & Over	810	663	147

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 $422 from Table 3. If money is borrowed at 13 percent interest to be paid back in 10 equal annual payments, the factor from Table 5 is 5.43; multiply $422 by 5.43 and get $2,291. This says the maximum debt a cow producing around 12,500 pounds of milk can repay is $2,291. If there are 40 cows, the maximum farm debt should not exceed $91, 640. 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.

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 13,000 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 5. Size of Loan $1 Per Year Will Repay by Repayment Time and Interest

Years to Repay Loan	Annual Percentage Rate		
	11%	13%	15%
1	.90	.81	.87
2	1.71	1.67	1.63
3	2.44	2.36	2.28
4	3.10	2.97	2.86
5	3.70	3.52	3.35
6	4.23	4.00	3.78
7	4.71	4.42	4.16
10	5.89	5.43	5.02
12	6.49	5.92	5.42
15	7.19	6.46	5.85
20	7.96	7.02	6.26
25	8.42	7.33	6.46
30	8.69	7.50	6.57
40	8.95	7.63	6.64

Table 6. Debt Payment Capacity as Percent of Milk Sales Per Cow Dairy Telfarms, Michigan, 1980-1981 Averaged

	Per Cow		
Pounds of Milk Sold Per Cow	Cash Milk Income	Cash Available for Debts or Capital	Cash Available as Percent of Income
9,000-10,999	$1,387	$337	24
11,000-11,999	1,551	351	23
12,000-12,999	1,666	422	25
13,000-13,999	1,798	551	31
14,000-14,999	1,916	651	34
15,000-15,999	2,040	615	30
16,000-16,999	2,174	783	36
17,000 & Over	2,396	810	34

Example Calculation. Having reviewed how to do a debt payment capacity calculation and provided loan estimation factors (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 $24,534 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 $181,661 and $24,534 were added together, giving $206,195 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 $27,870 and entered as "Family Living Needs." The $129,949 and $27,870 were added together getting $157,819 entered as "Total Cash Out." The $157,819 was subtracted from the $206,195, leaving $48,376 being "Available for Debt Repayment." If the farm could borrow all needed money at 13 percent, paying it off over 10 years with equal annual payments, the factor would be 5.43 (found in Table 5). Multiplying 5.43 times $48,376 gives $262,681.68; 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)	$181,661	
Capital Items Sold (cull cows, machines)	$ 24,534	
Total Cash In		$206,195
Cash Flowing Out		
Cash Expense Items (excluding interest)	$129,949	
Family Living Needs (owner or partners)	$ 27,870	
Total Cash Out		$157,819
Available for Debt Repayment (Cash In Minus Cash Out)		$ 48,376

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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