

11-1985

## B812: Dairy Farmer Indebtedness in Maine

Wayne L. Thurston

George K. Criner

Ralph A. Reeb

Follow this and additional works at: [https://digitalcommons.library.umaine.edu/aes\\_bulletin](https://digitalcommons.library.umaine.edu/aes_bulletin)

Part of the [Agriculture Commons](#), and the [Business Commons](#)

# **DAIRY FARMER INDEBTEDNESS IN MAINE**

by

Wayne L. Thurston, George K. Criner and Ralph A. Reeb

**MAINE AGRICULTURAL EXPERIMENT STATION  
UNIVERSITY OF MAINE AT ORONO**

TABLE OF CONTENTS

	PAGE
INTRODUCTION	1
THEORETICAL CONSIDERATIONS	2
METHODS	3
RESULTS AND DISCUSSIONS	4
CONCLUSIONS	5
REFERENCES	6

**DAIRY FARMER INDEBTEDNESS IN MAINE**

By

Wayne L. Thurston, George K. Criner and Ralph A. Reeb

MAINE AGRICULTURAL EXPERIMENT STATION  
UNIVERSITY OF MAINE AT ORONO

## TABLE OF CONTENTS

	<u>PAGE</u>
ACKNOWLEDGMENTS	
INTRODUCTION .....	1
THEORETICAL CONSIDERATIONS .....	2
METHODOLOGY .....	4
RESULTS AND DISCUSSIONS .....	5
CONCLUSIONS .....	9
REFERENCES .....	10

## ACKNOWLEDGMENTS

The authors wish to thank the Maine Dairy Industry Association for their partial funding, Joan S. Bouchard for her expert typing, and the reviewers, Drs. Edward S. Micka, Michele C. Marra, and F. Richard King. The authors also wish to thank John M. Nickerson, Professor, Department of Political Science, University of Maine at Orono, for reviewing an earlier draft of this paper and making valuable comments.

The research for this report was financed in part from funds provided under the Hatch Act.

## DAIRY FARMER INDEBTEDNESS IN MAINE

Wayne L. Thurston, George K. Criner and Ralph A. Reeb\*

### INTRODUCTION

The dairy industry in Maine is an important contributor to the agricultural sector and general economy. In 1982 there were 750 employees processing dairy products in Maine drawing a 12 million dollar payroll (Maine Bureau of Labor). The 1983 farm-gate value of milk produced in Maine totaled 108 million dollars, higher than any other single commodity's farm-gate value (Maine Department of Agriculture, Food and Rural Resources). For the past several years the farm level price of milk has remained fairly steady while production costs inflated. This "price-cost" squeeze worsened in 1983 with a 50 cent per hundredweight decrease in the price received by farmers which was authorized by the Dairy and Tobacco Adjustment Act of 1983.

Recently there has been considerable public concern about the financial health of the state's dairy farms. The Council for Northeast Economic Action, anticipating a decline in dairy farm numbers in New England, initiated a study of New England alternatives to dairy farming. The Maine Department of Agriculture, Food and Rural Resources in cooperation with the Maine Cooperative Extension Service created a task force to assist Maine dairy farmers in becoming more cost efficient in producing milk. This effort included farm visits by hired specialists for those dairy farmers interested in obtaining suggestions on how to be more cost efficient.

Limited public information is available concerning the financial health of Maine's dairy farming sector. This aspect is of crucial concern to policy makers in the state. Toward this end the Maine Dairy Industry Association requested that the University of Maine at Orono, in cooperation with the Maine Department of Agriculture, Food and Rural Resources, conduct a study to provide an accurate overall picture of the financial structure and business management practices of Maine's dairy farms.

---

\*Director of the Maine Milk Program, Maine Department of Agriculture, Food and Rural Resources, Augusta, Maine; Assistant Professor, Department of Agricultural and Resource Economics, University of Maine at Orono; and Data Processing Aid III, University of Maine at Orono.

## MAINE AGRICULTURAL EXPERIMENT STATION BULLETIN 812

### THEORETICAL CONSIDERATIONS

Management theory has prescribed the use of credit as leverage to increase farm size and productivity thereby improving financial returns. During the last two decades the general inflation rate matched or exceeded the interest rate charged to borrow money. This effectively reduced the cost of borrowing to zero or below. Now the general inflation rate is below the interest rate so interest is becoming a real cost. Additionally the highly leveraged farmers (those with a high relative level of indebtedness) run an increasing risk of experiencing cash flow difficulties due to their debt payments. Furthermore, when price levels decline in the long run, a financially perilous situation may develop where profit levels drop below the cost of debt service. If this occurs, the owners' equity can be quickly eroded making further borrowing, for whatever reason, impossible. Table 1 shows the potential benefits and dangers of using credit as leverage. The high debt farmer in Table 1 might be a typical young farmer just buying into the dairy farming business. Having put \$80,000 down and borrowed \$320,000 to purchase a \$400,000 operation this farmer has a leverage ratio of 4 (debt divided by owner's equity). The leverage ratio is a measure of financial solvency which is the ability of a farm business to pay off all claims against the business. The leverage ratio is one measure of the security a lender might have in lending funds to the farm business.

Suppose a high debt farmer had revenues and expenses such that his total revenue less all expenses except interest payments equaled \$60,000. This farmer's gross return to capital for the year would be fifteen percent ( $\$60,000/\$400,000$  times 100). By subtracting an interest payment of \$38,400 (an assumed 12 percent on a loan of \$320,000) from the above \$60,000 equals \$21,600 which is the return to the farmer's original investment or equity. Dividing this dollar return by the farmer's \$80,000 equity equals a 27 percent ( $\$21,600/\$80,000$  times 100) return on the farmer's equity.

In the 5 percent gross return example in Table 1 the farmer's return to his equity (his return on his investment) is a negative 23 percent which results from a \$18,400 loss on the farm operation. Dividing the original \$80,000 investment by this \$18,400 loss shows that all of the

MAINE AGRICULTURAL EXPERIMENT STATION BULLETIN 812

TABLE 1

Potential Effects of Leverage

	No Debt Farmer	Low Debt Farmer	Medium Debt Farmer	High Debt Farmer
<b>Capital Structure</b>				
Owner's Equity	400,000	300,000	200,000	80,000
Debt at 12%	<u>0</u>	<u>100,000</u>	<u>200,000</u>	<u>320,000</u>
Total Capital	400,000	400,000	400,000	400,000
Leverage Ratio	0	.33	1	4
(Percent Owner's Equity)	(100)	(75)	(50)	(20)
<b>15 Percent Gross Return</b>				
To Total Capital	60,000	60,000	60,000	60,000
Less Interest on Debt	<u>0</u>	<u>12,000</u>	<u>24,000</u>	<u>38,400</u>
Return to Equity Capital	60,000	48,000	36,000	21,600
Percent Return to Equity	15	16	18	27
<b>5 Percent Gross Return</b>				
To Total Capital	20,000	20,000	20,000	20,000
Less Interest on Debt	<u>0</u>	<u>12,000</u>	<u>24,000</u>	<u>38,400</u>
Return to Equity Capital	20,000	8,000	-4,000	-18,400
Percent Return to Equity	5	2.6	-2	-23

owner equity or net worth would be gone in a little over four years if the farm produced a 5 percent gross return each year. The no-debt farmer might be a typical older farmer having paid off all his debt. At a 15 percent gross returns level this farmer earns exactly 15 percent on equity which is a good return. During the years of 5 percent gross returns, this farmer is earning approximately the same nominal rate as a passbook savings account. While not a high rate of return, this is certainly better than the negative 23 percent which the high debt farmer is experiencing.



## MAINE AGRICULTURAL EXPERIMENT STATION BULLETIN 812

### METHODOLOGY

The Maine Dairy Industry Association (MDIA) maintains a mailing list of Maine dairy farmers which is considered the most current and comprehensive in the state. A self addressed, stamped, one page questionnaire was mailed to all 1,077 farms on the MDIA list. In order to keep the response rate as high as possible, special care was taken in constructing the questionnaire to provide the highest degree of respondent anonymity. Also, questions involving sensitive subjects or great detail were kept to a minimum. For this reason the decision was made to use debt per cow as a proxy for debt as a percent of gross income.

The questionnaire included four categories for debt level and four categories for identifying with whom the majority of debt was held. The debt levels included no debt, low debt of under \$1,000 per cow, medium debt of \$1,000 to \$3,000 per cow, and high debt of over \$3,000 per cow. Categories of lending institutions were Farmer's Home Administration (FmHA), Landbank/Production Credit Association (PCA), family, or banks.

Prudent financial management, though important, is only one part of farming and predicting the demise or success of a particular dairy farm operation is not a simple matter of measuring the debt level per cow. Therefore, the questionnaire asked for responses that would indicate other management clues as well; milk per cow, paid and unpaid labor per cow, acres of corn, alfalfa, and grass per cow, herd size in 1973 and 1983, length of ownership, and source of loans.

Two-hundred-eighty of the 1,077 mailed questionnaires were returned. Since completion and return of the questionnaire were voluntary it was decided to conduct a test for non-response bias. Dairy farmers from the MDIA listing were telephoned at random. Those who stated that they had returned the questionnaire were not interviewed. Of the farmers telephoned, 43 indicated that they had not returned the mail questionnaire and that they were willing to provide the information by telephone. A test of equivalence of means for several continuous variables was constructed using the t-test procedure of the Statistical Analysis System (SAS). In all cases the null hypotheses that the means

## MAINE AGRICULTURAL EXPERIMENT STATION BULLETIN 812

were equivalent could not be rejected at the 5 percent level. Tests of categorical variables (such as indebtedness levels) using the chi-square test also resulted in failure to reject at the 5 percent level the null hypothesis that the distribution of the variables was independent of being obtained by the mail versus the telephone survey. Based on the statistical tests it was concluded that non-response bias was not present. Since it was not concluded that the mail responses and the telephone responses came from different groups, the observations from the telephone survey were added to the mail survey observations.

Forty-eight of the individuals contacted (by mail and phone) stated they had retired or sold their dairy business. Of the 323 telephone and mail respondents this is roughly 15 percent. If this is representative of the Maine dairy industry as a whole then instead of there being 1,077 dairy farmers in the state, there may be 917 ( $1,077 - (48/323) \text{ times } 1,077$ ). However, there are probably new dairy farmers who are not on the MDIA list so the actual number of dairy farmers in Maine is unknown. Surveys without responses to the indebtedness question were dropped which brought the total sample size to 299. If one assumes there are 1,000 dairy farmers in Maine, then the response level was 30 percent ( $299/1,000 \text{ times } 100$ ).

### RESULTS AND DISCUSSION

Table 2 shows selected descriptive and management related variable averages by the four debt categories. Twenty-nine per cent of respondents reported having no debt, 36 percent reported having low debt, 28 percent reported having medium debt, and 7 percent reported having high debt. An inverse relationship between debt per cow and the two average variables, age and entry year, existed over all the debt categories.

The no debt group averaged 59 years of age and entered dairy farming on the average in 1957. In 1983 they had on average 43 cows and had added the least of any group since 1973. Their hours of paid labor per cow per week is the highest of any group and their hours of unpaid labor per cow per week is below the all farm average. Their corn and alfalfa acreage is below the all farm average. Lastly, their DHI participation

MAINE AGRICULTURAL EXPERIMENT STATION BULLETIN 812

TABLE 2

Average Descriptive and Management Variable Values by Debt Level  
from 1983 Maine Dairy Farm Survey Respondents

	No Debt Per Cow (\$0)	Low Debt Per Cow (<\$1,000)	Medium Debt Per Cow (\$1,000-\$3,000)	High Debt Per Cow (>\$3,000)	All Farms
Total Number	86	108	84	21	299
Percent of Respondents	29	36	28	7	100
Owner Age	59	53	47	41	52
Entry Year	1957	1964	1970	1973	1963
1983 Cow Numbers	43	57	65	46	54
1973 Cow Numbers	38	46	47	30	43
1973 to 1983 Cow Number Increase	5	11	18	16	11
Percent DHI Participation	33	53	76	67	54
Hours of Paid Labor Per Cow Per Week	1.35	1.30	1.30	.81	1.29
Hrs. of Unpaid Labor Per Cow Per Week	1.01	.91	1.10	2.26	1.08
Corn Acreage Per Cow	.29	.50	.61	.55	.47
Alfalfa Acreage Per Cow	.15	.15	.20	.18	.17
Grassland Acreage Per Cow	2.78	2.51	2.31	3.33	2.60
1983 Herd Average (Pounds Milk Per Cow)	13,132	13,426	14,628	14,133	13,771

## MAINE AGRICULTURAL EXPERIMENT STATION BULLETIN 812

at 33 percent is the lowest as is their herd average milk production.

The low debt group contained the highest number of respondents. On average they were 53 years old, entered dairy farming in 1964, and had 57 cows. They have a higher percentage of DHI participation, less hours of paid labor per cow per week, nearly twice the corn acreage per cow, and a higher herd average milk production than the no debt group.

The medium debt group has the highest DHI participation level, the highest per cow corn and alfalfa acreage levels, and the highest herd average milk production. Their average year of entry was 1970 and their average age is 47. In 1983 their average herd size equaled 65 cows, which was an increase of 18 cows from their 1973 herd size. This debt group had the largest increase in cow numbers between 1973 and 1983 of any group.

Farmers in the high debt group comprised 7 percent of the total number of dairy farms. They averaged 41 years of age and their average year of entry was 1973. They were the second highest in DHI participation and in milk production per cow. Their rate of growth from 1973 to 1983 was the highest of all groups (53 percent). The hours of unpaid labor per cow per week were higher for this group than any other group (2.26 versus the next highest of 1.10).

An interesting comparison among groups is the comparison between the high and medium debt groups. Although the average entry year for the high debt group was three years after the medium debt average entry year (1973 versus 1970), there are large differences in several average variable levels. Entering those few years later placed these youngest farmers in an unfortunate situation. These farmers on average in 1983 had 46 cows. Although this was a 53 percent increase in their average herd size since 1973, these farms are still small. The necessary investment for their expansion coupled with the relatively high interest rates and rising land prices during their expansion period undoubtedly contributed to their debt situation. Some may have been unable to increase herd size and develop other efficient practices due to high interest rates, high leverage ratios, and a deteriorating price-cost relationship. For instance, this high debt group may not have been able

## MAINE AGRICULTURAL EXPERIMENT STATION BULLETIN 812

to obtain the necessary financing to convert their high level of grassland into corn and alfalfa acreage. On the other hand they may be selling hay and their high debt per cow level may be distorted because the debt from the hay enterprise is lumped in with the dairy enterprise.

The level of debt per cow will affect each farm differently depending on the interest rate at which monies were borrowed and on the profitability (or efficiency) of the operation. Nevertheless, the absolute dollar impact of various combinations of debt and interest rates is quite predictable.

Table 3 lists for various per cow levels of debt and various interest rates, the per cow interest payment and the per cow interest payment as a percent of gross per cow milk revenue. The values in Table 3 were made using a herd average of 13,771 pounds per cow and an average milk price of \$14 per cwt. Using these values a dairy farmer with a \$3,500 per cow debt level and a 12 percent interest rate would have an interest payment of \$420 per cow which is roughly 22 percent or one-fifth of the per cow gross milk revenue. If the farmer can obtain an interest rate of 5 percent, perhaps through FmHA then the \$3,500 per cow debt level amounts to a per cow interest payment of \$175 or 9.08 percent of the per cow gross milk revenue. Of the 21 high debt farmers 18 have loans from FmHA, one with loans from the family, and two not responding. Since the high debt group is relatively young and new in dairy farming, then perhaps those with the FmHA loans qualify and are receiving new farmer loans (at roughly 5 percent interest) from the Farmers Home Administration (FmHA).

MAINE AGRICULTURAL EXPERIMENT STATION BULLETIN 812

TABLE 3

Interest Payment and Interest Payment as Percent of Gross Milk Revenue on a Per Cow Basis for Various Interest Rates

Debt Level Per Cow	Interest Rate					
	5 Percent		10 Percent		12 Percent	
	Annual Interest Cost Per Cow	Interest Payment as Percent of Gross Milk Revenue	Annual Interest Cost Per Cow	Interest Payment as Percent of Gross Milk Revenue	Annual Interest Cost Per Cow	Interest Payment as Percent of Gross Milk Revenue
500	\$ 25	1.30	\$ 50	2.59	\$ 60	3.11
1,000	50	2.59	100	5.19	120	6.22
1,500	75	3.89	150	7.78	180	9.33
2,000	100	5.19	200	10.37	240	12.45
2,500	125	6.48	250	12.97	300	15.56
3,000	150	7.78	300	15.56	360	18.67
3,500	175	9.08	350	18.15	420	21.78
4,000	200	10.37	400	20.75	480	24.90
4,500	225	11.67	450	23.34	540	28.01

CONCLUSIONS

While there is certainly cause for concern over the future of dairy farming in Maine the authors believe that in the short-run there is no danger of a mass exodus of dairy farms due to financial difficulties. The long term health depends on many factors including federal and state dairy policy, technological changes in production and processing, and market developments. There is currently concern that federal dairy policy may undergo some radical changes and there is a need to examine possible effects on the Maine and New England dairy industry. If the thrust of federal policy is toward reducing surplus production in the dairy industry by worsening the price-cost squeeze, those farmer's whose

## MAINE AGRICULTURAL EXPERIMENT STATION BULLETIN 812

interest payment consumes a relatively high proportion of their gross income will be hurt the worst. The results of this survey would seem to indicate that a majority of the dairy farmers in Maine are not in a precarious financial position because of debt.

Nearly 30 percent of the respondents reported have no debt and 65 percent of respondents had no debt or less than \$1,000 debt per cow. The 28 percent of the respondents with medium debt appear to be good managers as revealed by their highest herd average milk production and other management indicators. Thus, there does not appear to be great cause for alarm concerning the short-run health of the Maine dairy farmers although the long-run situation needs investigation.

### REFERENCES

- Maine Bureau of Labor, "Census of Maine Manufactures: 1982," Department of Manpower Affairs, Maine Bureau of Labor, Division of Research and Statistics, Augusta, Maine.
- Maine Department of Agriculture, Food and Rural Resources. 1984. "Maine Agricultural Statistics: 1983," Maine Department of Agriculture, Food and Rural Resources, Augusta, Maine.