



The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

No endorsement of AgEcon Search or its fundraising activities by the author(s) of the following work or their employer(s) is intended or implied.

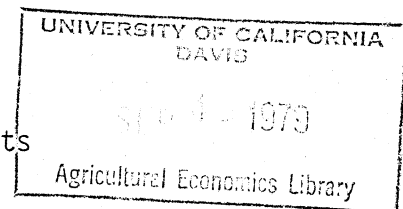
Dairying
C

1979

Abstract

Budgeting the Impact of Dairy Investments
by

Dr. Gerald D. Schwab and Dr. Sherrill B. Nott



A whole farm budgeting and cash flow analysis of 60 cow and 100 cow dairy farms investing in new barn and milking facilities is reported. At medium investment levels, a 60 cow farm would need 80 cows or 15,000 lbs. of milk per cow to maintain profit levels.

Key words: dairy, farm management, budgeting, cash flow, investment analysis

*Presented at AAEA meeting, Pullman,
July 29-Aug. 1, 1979.*

BUDGETING THE IMPACT OF DAIRY INVESTMENTS

by

Dr. Gerald D. Schwab and Dr. Sherrill B. Nott

Introduction

The new purchase price of farm machinery and buildings about doubled from 1972 to 1977 as indicated by the index number of prices paid by farmers. (5)^{1/} A Michigan survey was initiated in 1977 to determine the actual investments required in early 1977 to build and equip new dairy cow barns and milking parlors. (4) This report analyzes the impact on net income and cash flow if typical investments as indicated by the survey had been made on 60 or 100 cow base farms in Michigan.

Methodology and Assumptions

A whole farm budgeting analysis was done to evaluate annual net income and cash flow resulting from a new free stall barn and milking parlor. The base farms were size group and production level group averages for 1976 from specialized dairy Telfarm reports. (3)

The assumed investment levels for the 2 farm sizes are given in Tables 1 and 2. The annual cost computations were done in accordance with generally accepted farm management cost calculation procedures. The assumed salvage value was zero for all investments. Net present value computations were not made for this report. The barn structure costs were done on a per cow basis to enhance break-even size calculations. Manure handling, feed handling and milking parlor investments were fixed at one point.

^{1/} Numbers in parentheses refer to bibliography list.

Analyses were designed to answer the following questions in terms of both management income and cash flow.

1. What will the impact be if the only change is the new investment?
2. How many cows must be added to maintain base level income?
3. How much more milk per cow must be sold to maintain base level income at constant herd size?

The management income budgeting was done on the livestock enterprises only.

Management Income and New Investments

A review of several annual summaries of Telfarm dairy accounting data show that management income varies according to herd size and by milk sold per cow. (3) Larger farms and farms with greater pounds of milk sold per cow tend to have higher management incomes. These findings prompted the use of size and production sort summaries for the base farms and their budgeted alternatives.

Table 1 showed 3 alternative investment levels. Each investment level was assumed capable of housing, feeding and milking a herd of dairy cows. Labor cost per cow for the low investment level was assumed to be 5 percent less than it was on the base situation. For the medium and high investment levels it was assumed that labor cost would be 10 percent and 15 percent less, respectively. Although the systems in Tables 1 and 2 were not specifically designed to obtain these labor efficiencies, ample evidence exists which indicates higher per unit investments often result in lower labor costs.(2)

The first column of Table 3 indicates the annual results for the 60 cow farm with low level investments and the double 4 milking parlor. If the owner made the additional investments and no other changes took place, the

Table 1. ASSUMPTIONS FOR FREE STALL DAIRY BARNS
Investment and Annual Costs

Item	Investment Levels		
	Low	Medium	High
Barn, per cow			
Investment	\$ 341.00	\$ 572.00	\$ 798.00
Average Value	170.50	286.00	399.00
Depreciation: 20 yr, straight line	17.05	28.60	39.90
Interest on average value at 7.5%	12.79	21.45	29.92
Real estate tax: average value at 0.7%	1.19	2.00	2.79
Insurance: average value at 1.5%	2.56	4.29	5.98
Manure Handling, total	1,000	3,000	5,000
Depreciation: 7 yr., straight line	143.	429.	714.
Average value	500.	1,500	2,500
Int. on average value at 7.5%	38.	112.	188.
Insurance average value at 1.5%	8.	22.	38.
Feed Handling, Waterers, total	2,000	4,000	6,000
Depreciation: 8 yr, straight line	250.	500.	750.
Average value	1,000	2,000	3,000
Int. on average value at 7.5%	75.	150.	225.
Insurance: average value at 1.5%	15.	30.	45.

Table 2. ASSUMPTIONS FOR TWO MILKING PARLOR SIZES
 Total Investment and Annual Costs

Item	60 Cows Double 4	100 Cows Double 6
Parlor Building, Total		
Investment	\$ 13,700	\$ 20,600
Depreciation, 20 yr. straight line	685	1,030
Average value	6,850	10,300
Interest on average value at 7.5%	514	772
Insurance on average value at 1.5%	103	154
Real estate tax on average value at .7%	48	72
Equipment in Parlor, Total		
Investment	19,100	34,900
Depreciation; 8 yr. straight line	2,388	4,362
Average value	9,550	17,450
Interest on average value at 7.5%	716	1,309
Insurance on average value at 1.5%	143	262

management income for the base farm enterprise would drop to -\$1,577. At the medium and high investment levels the management income would be even worse.

Most dairy farmers require new investments of this magnitude to result in either some per unit cost reductions or added volume of sales. The next line on Table 3 shows the number of cows required to get a zero management income. A management income of zero means all owned assets receive 7 1/2 percent interest and all operator plus unpaid family labor receive \$3.50 per hour. These reflect opportunity costs of capital and labor. At the low investment levels, 69 cows would be required to maintain a zero management income. At the medium level of investment 79 cows would be required. In budgeting this answer, the income and cost levels were taken for the average farm with 75 to 99.9 cows. This was done to capture any economies of scale or changes in per unit cost due to size in the dairy enterprise.

The next budgets were calculated assuming the farmer wanted to maintain the base management income level of \$3,965. This would require 75 cows with a low level of investment. The larger size group was again used for the costs as the farm moved to this larger size category. For medium and high investment levels 83 and 93 cows were required, respectively.

The last line on Table 3 shows the amount of milk sales per cow required if the farm operator were to keep 60 cows and maintain the base management income of \$3,965. For the low investment level the milk sales per cow would have to move up to 14,879 pounds per cow. The base farm situation was 60 cows at 13,413 pounds of milk sold per cow; this production fitted into the production sort of 13,000 to 14,000 pounds of milk sold per cow. In calculating the last line of Table 3 the milk production sorts of 14,000 to 15,000 pounds of milk

Table 3.

REQUIREMENTS TO MAINTAIN MANAGEMENT INCOME LEVELS

60 Cow Base with New Barn and Parlor

	Low Investment	Medium Investment	High Investment
Situation Prior to Change:			
Base cow numbers annual average	60	60	60
Base milk sales per cow, lbs.	13,413	13,413	13,413
Base management income on total dairy enterprise	\$ 3,965	\$ 3,965	\$ 3,965
Build new barn and parlor:			
Management income with base cow numbers	\$-1,577	\$-2,985	\$-4,367
Cow numbers needed to get 0 management income	69	79	89
Cow numbers to hold base management income	75	83	93
Milk sales per cow to hold base cow numbers and base management income; lbs. milk sold	14,879	15,049	15,289

per cow and 15,000 to 16,000 pounds were used to reflect the higher cost per cow and the higher feed requirements per cow that go with these higher milk production levels. At the medium investment level milk sales had to move up to 15,049 pounds per cow, and at the high investment level 15,289 pounds sold per cow were needed.

Table 4 contains the computations for a hundred cow dairy herd. Table 4 should be interpreted the same as was the above Table 3.

Cash Flow and New Investments

Whole farm cash flow analyses were carried out for the 60 and 100 cow farm organizations assuming low, medium and high investment levels for new free stall barns and milking parlors. The cash flow analyses ignored the non-cash items of depreciation, opportunity cost of interest on net worth and inventory changes. It was assumed the base farm organization would have to pay off any debt which already existed plus borrow the full amount of the new investment. It was assumed the total debt would be paid off with an amortized annual payment loan.

An unpublished set of Telfarm summaries were used for the base farm situations. They are a subset of farms already used. (3) The subset was selected to insure consistent and complete reporting of cash flow and balance sheet data. The cash flow information includes both crop enterprises and livestock enterprises. The required investments in new barns and milking parlors were given in Tables 1 and 2. These investments were converted into annual debt repayments with the use of amortization tables. (1) It was assumed that with low investment there would be a 5 percent less cash labor needed than on the base farm. For the medium and high investment levels the reduction in cash hired labor was 10 and 15 percent, respectively.

Table 4. REQUIREMENTS TO MAINTAIN MANAGEMENT INCOME LEVELS
100 Cow Base with New Barn and Parlor

	Low Investment	Medium Investment	- High Investment
Situation Prior to Change:			
Base cow numbers annual average	100	100	100
Base milk sales per cow, lbs.	13,680	13,680	13,680
Base management income on total dairy enterprise	\$10,884	\$10,884	\$10,884
Build new barn and parlor:			
Management income with base cow numbers	\$ -929	\$-3,041	\$-5,107
Cow numbers needed to get 0 management income	105	116	129
Cow numbers to hold base management income	159	174	192
Milk sales per cow to hold base cow numbers and base management income ; lbs	15,332	15,556	15,748

Table 5

ANNUAL DEBT REPAYMENT CAPACITY AND NEEDED CHANGES
60 Cow Base with New Barn and Parlor

	Low Investment	Medium Investment	High Investment
Debt repayment capacity available:	\$348.40	\$353.54	\$358.68
Repayment needed			
Original Debt ^{1/}	\$210.28	\$210.28	\$210.28
New Buildings ^{2/}	57.96	81.48	104.49
New Equipment ^{3/}	94.70	111.84	128.97
Total needed:	<u>362.94</u>	<u>403.60</u>	<u>443.74</u>
Debt Repayment Available minus needed:	\$-14.54	\$-50.06	\$-85.06
Added cows needed at same production level to provide total needed payment, head:	3	8	14
Added milk sold per cow To provide total needed payment, pounds:	148	508	864
Added milk sold per cow To provide needed payment and base net cash flow, pounds:	1,498	1,858	2,214

^{1/} Reported total debts assumed to be repaid in 10 years at 9 percent APR.

^{2/} Assumed to be repaid in 25 years at 9 percent APR.

^{3/} Assumed to be repaid in 5 years at 9 percent APR.

For the 60 cow base plan, Table 5 indicates that the needed debt payment to cover the original debt and the new investments was \$14.54 more per cow than what was available given low investment levels assuming no changes in size or performance. The short falls in available cash amounted to \$50.06 and \$85.06 per cow at the medium and high investment levels, respectively. In order to make the available repayment capacity exactly equal to the repayment required, the low investment situation would require an added 148 pounds of milk sold per cow per year at \$9.85 per hundredweight for milk. The medium investment would require an added 508 pounds and the high investment would require an added 864 pounds of milk sold per cow if cow numbers remained at 60. If the production per cow remained at the base level, then an added 3, 8, and 14 cows would be needed for the three investment levels, respectively. If the new system is to repay all debts and maintain the surplus cash flow position of the base situation with no change in cow numbers, then the milk sold per cow will have to increase by 1,498 pounds, 1,858 pounds and 2,214 pounds. Table 6 shows similar information for the hundred cow base plan.

Discussion of Results

Management income would go from positive to negative if either a 60 cow or a 100 cow dairy farm built a new free stall barn and milking parlor with no change in cow numbers or milk per cow assuming 1976 price levels. Dairy farmers considering new barn and parlor investments will have to either milk more cows or get more milk production per cow than they were previously getting if profit levels are to be maintained. The authors intentionally ignored the alternative of bargaining for a higher milk price. Net cash flow would also go from a positive to a negative given the same assumptions. Two examples illustrate the messages found in Tables 3, 4, 5 and 6.

Example 1. A Michigan dairy farmer with 60 cows selling an average amount

Table 6.

ANNUAL DEBT REPAYMENT CAPACITY AND NEEDED CHANGES
100 Cow Base with New Barn and Parlor

	Low Investment	Medium Investment	High Investment
Debt repayment capacity available:	\$332.03	\$340.05	\$348.07
Repayment needed: ^{1/}			
Original debt ^{2/}	\$224.06	\$224.06	\$224.06
New buildings ^{3/}	55.69	79.21	102.21
New equipment	97.44	107.72	118.01
Total needed:	<u>377.19</u>	<u>410.99</u>	<u>444.28</u>
Debt Repayment Available minus needed:	\$-45.16	\$-70.94	\$-96.21
Added Cows needed at same production level to provide total needed payment, head:	14	21	28
Added milk sold per cow to provide total needed payment, pounds:	458	720	977
Added milk sold per cow to provide needed payment capacity and base net cash flow, pounds:	1,473	1,735	1,991

1/ Reported total debts assumed to be repaid in 10 years at 9 percent APR.

2/ Assumed to be repaid in 25 years at 9 percent APR.

3/ Assumed to be repaid in 5 years at 9 percent APR.

of milk per cow wants to replace the fully depreciated stanchion barn with a new free stall barn and double-4 milking parlor. The desired barn facilities will require a medium level of investment. The farmer wants to maintain previous levels of family living and financial strength. The new investment will be done entirely with borrowed capital. The farmer has 2 choices: 1) if the milk sold will remain about 13,500 pounds per cow, the barn should be built for 80 to 85 cows and kept full, or 2) if only 60 cows will be kept, then milk sold must increase to 15,000 pounds or more per cow.

Example 2. A Michigan dairy farmer with 100 cows selling an average amount of milk per cow has an inconvenient 20 year old parlor and a poorly laid out set of open barns. The farmer would like to junk the present buildings and put in a new system half a mile away. The current net farm income and cash flow are adequate. The farmer wants to maintain a sound financial status. A double 6 milking parlor and medium investment level barn facilities would be built. If income and financial goals are to be attained, this dairy farmer has 2 choices: 1) build for about 175 cows and keep the barn full if milk sold per cow remains at 13,400 pounds, or 2) build for 100 cows and make sure milk sold stays above 15,200 pounds per cow.

Bibliography

1. Brake, John R., Amortization Tables for Annual and Monthly Repayment of Loans, Agr. Econ. Staff Paper 1975-76, Michigan State University, East Lansing, Michigan 48824, Sept., 1975, 10 pp.
2. Hoglund, C.R., Dairy Systems Analysis Handbook, Agr. Econ. Report No. 300, Michigan State University, East Lansing, Michigan 48824, April, 1977, 49 pp.
3. Nott, S.B. and L.H. Brown, Business Analysis Summary for Specialized Michigan Dairy Farms, 1976, Agr. Econ. Report No. 322, Michigan State University, East Lansing, Michigan 48824, Sept. 1977, 29 pp.
4. Nott, Sherrill B., New Dairy Farm Building Investments in Michigan, Agr. Econ. Staff Paper No. 78-34, Michigan State University, East Lansing, Michigan 48824, June 1978, 9 pp.
5. United State Department of Agriculture, Agricultural Prices, series of monthly publications, SRS, Crop Reporting Board, Washington, D.C.