Investment Analysis of Alternative Dairy Systems under MILC

Phillip R. Eberle
Department of Agribusiness Economics
Southern Illinois University Carbondale
Carbondale, IL 62901-4410
618-453-1715 email eberlep@siu.edu

Darren E. Moody
USDA-AMS, F&V PACA Branch
800 Roosevelt Road
Building A, Suite 360
Glen Ellyn, IL 60137-5832
Darren.Moody@usda.gov

C. Matthew Rendleman
Department of Agribusiness Economics
Southern Illinois University Carbondale
Carbondale, IL 62901-4410
mattr@siu.edu

William C. Peterson
Department of Agribusiness Economics
Southern Illinois University Carbondale
Carbondale, IL 62901-4410
wpetersn@siu.edu

Selected Paper prepared for presentation at the
Southern Agricultural Economics Association Annual Meetings
Little Rock, Arkansas, February 5-9, 2005

Abstract

Three dairy systems, 120-cow grazing, 120-cow conventional, and 600-cow concentrated, were evaluated by internal rate of return (IRR) accounting for the Milk Income Loss Contract (MILC). With MILC, the grazing and conventional systems had higher IRRs. Without MILC, the 600-cow dairy had the highest IRR. Results were sensitive to assumptions.

Key Words: Concentrated feeding, conventional, grazing, internal rate of return

JEL Classifications: Q12, Q14

Investment Analysis of Alternative Dairy Systems under MILC

Abstract

Three dairy systems, 120-cow grazing, 120-cow conventional, and 600-cow concentrated, were evaluated by internal rate of return (IRR) accounting for the Milk Income Loss Contract (MILC). With MILC, the grazing and conventional systems had higher IRRs. Without MILC, the 600-cow dairy had the highest IRR. Results were sensitive to assumptions.

Key Words: Concentrated, conventional, grazing, internal rate of return

JEL Classifications: Q12, Q14

Introduction

A study by Short indicates that the Heartland has higher cost per hundredweight of milk produced than the Northern Crescent and the Western Fruitful Rim. The Western Fruitful Rim also has a cost advantage over the Northern Crescent. This cost difference is a likely explanation for the structural changes occurring in the Heartland and the Northern Crescent. Illinois, a Heartland State, from 1997 to 2002 had a 25% decline in dairy numbers, a 14% decline in cow numbers, a 7% decline in milk production (USDA-NASS). Similar trends in dairy farm and cow numbers occurred in Wisconsin, a Northern Crescent State, but their milk production has remained constant. Idaho, a Fruitful Rim State, had declines in farm numbers for this same period, but had a 43% increase in cow numbers and a 57% increase in milk production (USDA-NASS).

To further illustrate the structural change, table 1 provides a comparison between Illinois, Wisconsin, California and the U.S. California has larger dairy herds, greater milk production per cow, and lower cost of production per cwt of milk than Illinois and Wisconsin. It is apparent Illinois' dairy industry will need to be more cost competitive to sustain or expand its dairy industry.

Milk producers in Illinois and other Heartland States will need to reduce their costs of production in order to sustain milk production. A review of literature and farm business records suggests three means to reduce the cost or improve the returns to dairy. These methods are intensive grazing, increase size of operation to 600 cows to capture size economies, increase milk yield per cow above average yields and reduce other inefficiencies.

A report by Hamilton, Young, and Hurley has described the advantages of the intensive grazing system as reduced feed purchases, reduced investment in machinery and buildings, and reduced labor in feed preparation and waste management. Studies by Hanson et al., Kriegl, and CIAS found that pasture dairy systems were more profitable than conventional systems of similar size.

Short indicated that dairy farms of 500 cows or more had lower operating and ownership costs. Larger farms make better use of capital and labor and typically have higher milk yields per cow.

A study of farm records by Tauer suggests that most of the high costs on small farms are due to inefficiencies. Once inefficiencies are equalized, costs for a 50-cow farm are only 4% higher than a 500-cow farm. Analysis of Illinois Farm Business Records indicates milk yields of the top one-third of farms have milk yields comparable to the average yield of western states.

Changes in farm programs since 2002 have implications for dairy farms considering investments in a dairy system. The Milk Income Loss Contract (MILC) administered by the USDA Farm Service Agency and authorized in the 2002 Farm Bill financially compensates milk producers when domestic milk prices fall below a specified level (USDA-FSA). Payments are issued up to a maximum of 2.4 million pounds of milk produced and marketed by the operation per fiscal year (USDA-FSA) which would be the amount of milk produced by about a 120 cow dairy herd. Thus the program payments benefit small producers more than large producers. The MILC program is scheduled to expire September 30, 2005. The program faces opposition for renewal from taxpayer advocacy groups and from milk producers from western states. President Bush declared support for the program during campaign stops in Wisconsin (Doane's Agricultural Report). Possible continuation of the MILC program would impact investment decisions of smaller dairy farms relative to larger farms.

This study evaluated investments in three alternative dairy systems: a 120-cow intensive grazing pasture system with cows producing 17,000 lbs of milk per cow, a more efficient conventional 120-cow system with cows producing 21,000 lbs of milk per cow, and a 600-cow concentrated feeding system with cows producing 21,000 lbs of milk per cow. The 120-cow operations were selected to take full advantage of MILC payment limits. Also, a 120-cow operation would employ two full-time operators. This allows for planning vacations and time-off that has been considered a drawback to a single person operation.

Objective

The specific research questions addressed in this paper are: (1) How much capital investment is required to implement each of the three dairy systems? (2) How does the type of system and investment affect the revenues and cost structure of the dairy operation? (3) How profitable is the investment in terms of rate of return on investment? (4) How will the type of dairy system affect the ability to finance the investment under alternative loan terms? (5) How sensitive are the results to changes in assumptions about milk yields, investment outlay for facilities and equipment and government programs?

Method

Investments were analyzed using internal rate of return. Differences in the size of initial investment between systems ruled out comparisons of net present value. Internal rate of return is the discount rate (i) that results in a net present value (NPV) of zero. Net present value is the future discounted annual net cash flows resulting from the investment minus the investment outlay.

$$NPV=P_1/(1+i)^1 + P_2/(1+i)^2 + \ldots + P_n/(1+i)^n + S_n/(1+i)^n - C$$

where P_i = annual net cash flow in year i as a result of the investment,

i = discount rate,

S_n = salvage value of investment or terminal value

C = initial outlay for the investment.

Annual net cash flow (P_i) for this analysis is defined as:

$$P_i = CI_i - CE_i - T_i$$

Where CI_i = cash inflow from project for year i,

CE_i = cash expenses from project for year I,

T_i = federal and state income tax liability for year i,

T_i = $(CI_i - CE_i - D_i) \times t$,

D_i = depreciation or cost recovery for year i, and

t = marginal federal and state tax rate assumed to be 33%.

Sources of data for each component of the IRR model are discussed.

Budgets and capital requirements for each system were developed from secondary sources including budgets and planning guides from Michigan State, Kansas State, University of Illinois, University of Missouri-Columbia, Ohio State University and Virginia Tech (See Bailey et al, Bhandary et al, Dartt and Schwab, Groover, Jones and Murphy, and Moore). This investment analysis was constructed using data collected from universities that have a climate similar to Illinois. Future revenues were based on milk price projections for Illinois from FAPRI. Feed prices were also based on an average of future projected prices by FAPRI (2001a). After-tax net cash flows were projected for 20 years into the future.

Investment Outlay

Investment in facilities and equipment can vary greatly from each system. Publications on rotational grazing (Hamilton, Young and Hurley) often mention using used materials and modifying existing dairy facilities rather than building all new facilities to obtain labor efficiencies in milking. For purposes of this analysis all investments in facilities and equipment are considered new. Table 2 presents the investment outlay for each system. Total investment outlay for buildings and equipment were $1,657,919 for concentrated system, $256,000 for the intensive grazing, and $436,206 for the conventional system. Table 3 presents the total investment in land (for dairy facilities only), livestock, buildings and equipment.

Receipts

Receipts for the dairy budgets included milk, cull cows, bull calves, and heifers, and government revenue. Milk sales included the price per pound and the pounds sold per cow. Prices were an average of the projected future prices for 2003-2007 (FAPRI).

Receipts included revenue from cull cows. In the same manner, a value was determined for the sale of bull calves and heifers. The death loss of 2% was assumed in all cases. The cull rate was assumed to be one-third. The expected number of calves per cow in the herd is 0.6. The government revenue was from the Milk Income Loss Contract Program (MILC). According to the Farm Service Agency, MILC payments are made on a monthly basis when the Boston Class I milk price falls below $16.94 per hundredweight. Payment rates will be determined by multiplying 45 percent of the difference between 16.94 and the Boston Class I milk price for that month (USDA-FSA). Payments are issued up to a maximum of 2.4 million pounds of milk produced and marketed by the operation per fiscal year (USDA-FSA). A spreadsheet developed by the University of Wisconsin was used to calculate the annual revenue for the three different dairy systems. Milk price projections for Massachusetts by FAPRI were used as an estimate of the Boston Class I milk price.

Variable Costs

Variable costs for the budget included purchase of replacements along with feed costs and other variable costs. Feed costs were established according to the type of system and the requirements needed. Corn or corn equivalent, corn silage, hay or hay equivalent, protein, and salt and minerals were included in the feed costs. Prices for corn, hay, and soybean oil meal were calculated using the FAPRI outlook prices averaged from 2003 to 2007. Whether feeds were purchased or raised they were valued at those average prices. Pasture was valued at the hay equivalent value less a charge for harvesting and storage. Pasture accounted for 50% of the forage requirements for the grazing system.

Other variable costs included marketing. Most of marketing costs were for hauling and transport charges, but also included promotional charges.

Bedding costs were assumed to be sand based at $40 per ton.

Veterinary cost estimates were from the University of Illinois budgets. These costs included the on-farm hiring of a veterinarian and the medications supplied to the herd. Veterinarian costs were not lowered for the grazing system despite anecdotal evidence that less is needed.

The fuel costs are the costs of operating the machinery and equipment needed on the dairy enterprise. These costs did not include the fuel costs associated with growing feed in the 120 cow system. Those costs are accounted for by the cost of feeds.

Building and equipment repairs were a percentage of the total original investment. Building repairs were 1.7% of original investment. Equipment was 2.1% of original investment.

Accounting and testing expenses were from the University of Illinois budget estimates.

Breeding costs were based on the use of artificial insemination at $35 per cow. Water and Sewage costs for the conventional and concentrated system were $20 per cow higher than grazing system.

Cash Fixed Costs

Fixed costs included family and hired labor, building insurance and taxes, and equipment insurance and taxes. Family and hired labor were charged at $8.00 dollars per hour. All labor requirements used in the budgets were found in the Michigan State University budgets (Dartt and Schwab). They estimated a grazing dairy requiring 49 hours per cow as compared to 69 hours of labor for the conventional and concentrated.

Building taxes and insurance was 1% on the annual average investment. Equipment insurance was 3.6% of average investment. A management charge of 5% of the total receipts was also charged.

Salvage Values

Land for the dairy site was assumed to increase in value at 2.5% a year. Buildings and equipment had a zero salvage value. The dairy herd maintained its value through purchase of replacements.

Depreciation

Investment assets were divided into 5, 7, 10 and 20 year recovery periods to calculate depreciation for tax purposes. Equipment and machinery were considered 5 or 7 year recovery property. The milking parlor was 10 year recovery property and the barn and feed facilities were 20 year recovery periods. For this analysis, section 179 expensing and additional first year depreciation bonus was not used.

Results

The results presented address the previously stated research questions.

(1) How much capital investment is required to implement each of the three dairy systems? Intensive grazing has the lowest investment per cow at $3,661, followed by the concentrated system at $4,139 per cow investment, and finally the conventional dairy had an investment of $5,163 (table 3).

(2) How does the type of system and investment affect the revenues and cost structure of the dairy operation? The budgets created for each type of system show the breakdown of the revenue and cost structures of the dairy systems. These budgets provided insight as to the expected cost and returns. Table 4 summarizes the costs and returns for each dairy system on a per cow basis. The receipts for the intensive grazing system were noticeably less than the conventional and confinement systems due to the difference in milk production. The intensive grazing system produced 4,000 lbs per cow less than the conventional and concentrated feeding operations which had production yields equivalent to the top one-third of Illinois milk producers. The conventional system had the largest amount of government revenue per cow due to the fact that the conventional system was able to produce close to the maximum amount of milk production qualifying for MILC payments.

Feed costs in the intensive grazing system were found to be $821 per cow compared to $985 per cow for the other two systems. The intensive grazing system had lower feed costs because of the ability to allow the cows to receive some of their nutritional intake from pasture-though this resulted in lower milk production. The conventional system had higher total costs than the concentrated feeding operation due to the higher initial investment per cow.

The conventional system had the highest before tax net cash flow when compared to the other two systems, but without the government revenue the concentrated feeding system would have the highest net before tax cash flow due to its milk yield and lower costs than the conventional system.

(3) How profitable is the investment in terms of net present value and rate of return on investment? The intensive grazing system had a 7.87% rate of return on investment higher than the conventional (6.62%) and confinement (5.84%) systems (table 5). Without government revenue, the 600-cow concentrated feeding system had the higher rate of return on investment. The before-tax rate of return was also examined because the assumed tax rate of 33% might be higher than expected. The intensive grazing system had a rate of return of 11.91% compared to the conventional (10.02%) and the concentrated (8.85%) systems. Again, the intensive grazing system had the highest rate of return on investment.

(4) How will the type of dairy system affect the ability to finance the investment under alternative assumptions about the amount of debt financing? Table 6 shows the investment per cow required by each system. This is followed by the annual after-tax net cash flow from the fourth year. This year was chosen because it is not as high as the previous years due to the faster cost recovery in the first three years. The after-tax net cash flow of $367 for the intensive grazing system would finance a loan for $2,476 for 10 years at an interest rate of 7.85 percent.

This accounts for 66% of the required investment per cow. Alternatively, this annual net cash flow could finance a loan for $3,639 for 20 years at 7.85 percent, which is 97% of the investment. The intensive grazing system had the least amount of initial investment and the ability to finance the greatest proportion of the investment despite having a lowest after-tax net cash flow, thus, allowing this system to be the most likely to be financially feasible.

(5) How sensitive are the results to changes in milk yields? Although, the initial investment for the intensive grazing system was less than the other systems, lending institution could be worried how stable the annual cash receipts may be in reference to milk production receipts. With conditions no manager can control such as weather and nutritional intake playing a greater role in the intensive grazing system, the milk production levels may fall dramatically from one year to the next. With drops in milk production levels, the amount of debt repayment capacity could vary greatly from year to year as could the return on investment. Conversely, conventional and concentrated feeding systems appear to be making gains in increasing milk production per cow. Table 7 and 8 show the results of alternative milk yield assumptions. Increasing milk yields to 24,000 lbs per cow for the conventional and concentrated system, and reducing grazing to 16,000 lbs per cow now shifts the advantage to the 600-cow concentrated system with or without MILC. Without MILC payments, the grazing system has a negative rate of return.

Conclusions

Although this type of analysis is limited by the assumptions used in budgeting for the three systems, it does illustrate how the MILC program impacts investment decisions of milk producers. The analysis especially illustrates why smaller milk producers are likely to support the renewal of MILC. If our cost and return assumptions are basically correct, it also supports the structural changes that we observe in the industry to larger dairy units. Smaller dairies having difficulty in obtaining higher milk yields may also want to consider intensive grazing as a means of obtaining higher returns.

References

Bailey, K., M. Bennett, J. Garrett, D. Hardin, J. Hoehne, R. Randle, J. Spain, B. Steevens, J. Zulovich. “Missouri Dairy Plan-The Missouri System of Dairy Production 500, 300, and 150-Cow Model.” Commercial Agriculture Program University of Missouri-Columbia. CD-ROM. 10 October 2002.

Bhandary, R., G. Frank, R. Klemme, L. Tranel. "Grazing's potential: predicting expansion's cost, profit," University of Wisconsin-Madison, Center for Integrated Agricultural Systems. Internet site: <http://www.wisc.edu/cias/pubs/briefs/030.html> 18 March 2003.

Center for Integrated Agriculture Systems (CIAS). “Grazing project combines strength of on-farm research station studies.” Res. Brief 12, Univ. of Wisconsin. 2001. Internet site: http://www.wisc.edu/cias/pubs/brief/012.html (Accessed July 31, 2002).

Dartt, B.A. and G.D. Schwab. "2001 Crops and Livestock Budgets Estimates for Michigan," Michigan State University, Department of Agricultural Economics. Internet site: <http://www.aec.msu.edu/agecon/aecreports/budgets0l.htm> 27 January 2003.

Doane’s Agricultural Report. “The Milk Income Contract program (MILC) faces an uncertain future,” 68(January 7, 2005):1.

FAPRI. 2001. Agricultural Outlook. "U.S. Livestock and Dairy," Internet site: <http://www.fapri.org >12 February 2003.

FAPRI. 2001a. Agricultural Outlook. "U.S. Crops," Internet site: t http://www.fapri.iastate.edu/Outlook2001/PageMker/outlk2001US Crops.pdf 12 February 2003.

Federal Reserve Bank of Chicago. "AgLetter," Internet site: http://www.chicagofed.org/publications/agletter/2003/agfeb2003.pdf 28 March 2003.

Groover, G. "Dairy Budgets," Virginia Cooperative Extension Farm Management, Virginia Tech University. Internet site: <http://www.ext.vtu.edu/departments/agecon/spreadsheets/livestock/dairy. html> 15 January 2003.

Hamilton, S., R. Young, and G.B. Hurley.. "Economics of Pasture-based Dairy Production," University of Missouri Extension, 2000. Internet Site: <http://agebb.missouri.edu/mgt/dairy.htm. > 22 August 2002.

Hanson, G.D., L.C. Cunningham, M.J. Morehart, and R.L. Parsons. "Profitability of Moderate Intensive Grazing of Dairy Cows in the Northeast." *Journal of Dairy Science* 81(1998):821-828.

Jones, R. and J.P. Murphy. "Livestock Building and Equipment Requirements," Kansas State University. Internet site: <http://www.oznet.ksu/library/agec2/mf940.pdf> 22 October 2002.

Kriegl, T. "Wisconsin Grazing Dairy Profitability Analysis-A Preliminary five Year Comparison of the Cost of Production of Selected Conventional and Grazing Wisconsin Dairy Farms." University of Wisconsin Center for Dairy Profitability. Internet site: < http://cdp.wisc.edu/pdf/costofprod5yrb.pdf>28 August 2002.

Moore, R. Dairy Enterprise Budgets. The Ohio State University. Internet site: < http://www-agecon.ag.ohiostate.edu/people/moore301/size/dairy-size.htm > 24 October 2002

Ohio Dairy Enterprise Budgets. "Feed requirement for a dairy cow and replacements (21,000 lb. Production)," Ohio State University Extension, p. 14, footnote 6. Internet site: <http://ohioline.osu.edu/b864/b864_22html> 12 November 2002.

Short, S. D. "Characteristics and Production Costs of U.S. Dairy Operations," USDA-ERS. Statistical Bulletin No. (SB974-6) 20 pp, February 2004.

Tauer, L.W. "Short-run and Long-run Efficiencies of New York Dairy Farms." Agricultural and Resource Economics Review 22(1993)1-9.

University of Illinois Urbana Champaign Farm Lab. "Enterprise budgets for Illinois Farms." Internet site: <http://www.ace.uiuc.edu/farmlab/farmmgt.html>22 October 2002

University of Wisconsin-Madison. "Spreadsheet Model for Undertaking Farm-Level Analysis of MILC Program: Multiple Herd Size Evaluation," Available online at <http://www.aae.wisc.edu/future/default.htm> 15 March 2003.

United States Department of Agriculture-Farm Service Agency. "Milk Income Loss Contract Program, 2002" Internet Site: <http://www.fsa.usda.gov/pas/publications/facts/html/milcO2.htm> 29 March 2003.

United States Department of Agriculture-National Agricultural Statistical Service. "USDA Published Estimate Date Base—U.S. and State Level data: for dairy. Internet Site: http://www.nass.usda.gov:81/ipedb/ (Accessed November 20, 2004).

Table 1. Dairy Structure Comparison for Illinois, Wisconsin, California and U.S. for 2000

	Illinois	Wisconsin	California	U.S.
Dairy Farms (no.)	2,100	21,000	2,500	105,170
Share of U.S. Milk Production (%)	1	14	19	100
Average Herd Size (cows)	57	64	624	87
Dairy Farms with 500+ Cows (%)	0.2	0.7	44	3
Milk Production by 500+ Cows (%)	3	9	78	36
Milk Production per Cow (lbs)	17,450	17,306	21,169	18,201
Cost of Production ($/cwt)*	18.38	16.90	12.48	16.53

Source: USDA-NASS

* USDA-ERS 1999 Regional estimates North Central, Upper Midwest, Pacific and U.S.

Table 2. Investment in Facilities and Equipment by System

Building and Equipment Costs for 600 cow confinement system*	
Free stall barn	$630,0000
Feed storage:	
Hay barn	$31,680
Silage bunker	$184,748
Commodity shed	$35,258
Protein bin	$6,233
Milking parlor (20 stalls)	$302,000
Manure storage system	$228,000
Rolling equipment	$200,000
Miscellaneous	$40,000
Total	$1,657,919

*Based on Kansas State University Estimates Available online at
http://www.oznet.ksu.edu/library/agec2/mf2441.pdf

Building and Equipment Costs for 120 cow intensive grazing system*	
Buildings	$62,000
Bulk Tank (new)	$20,000
Skid Steer	$10,000
Milking parlor	$144,000
Lagoon	$15,000
Miscellaneous	$5,000
Total	$256,000

*Based on University of Wisconsin estimates
Available online at http://www.wisc.edu/cias/pubs/briefs/030.html

Building and Equipment Costs for 120 cow conventional system*	
Free stall barn	$120,000
Hay barn	$5,147
Silage bunker	$36,111
Commodity shed	$4,888
Protein bin	$1,060
Milking parlor (12 stalls)	$144,000
Manure Storage system	$40,000
Rolling Equipment	$75,000
Miscellaneous	$10,000
Total	$436,206

*Based on Kansas State University Estimates Available online at
http://www.oznet.ksu.edu/library/agec2/mf272.pdf

Table 3. Capital Outlay Comparison

	Intensive grazing	Conventional	Concentrated
Capital Outlay			
Land	$27,360	$27,360	$45,600
Livestock	$156,000	$156,000	$780,000
Milking parlor	$144,000	$144,000	$302,000
Barn and Feed Facilities	$62,000	$167,206	$887,919
Equipment and Machinery	$50,000	$125,000	$468,000
Total	$439,360	$619,566	$2,483,519
Total Investment per Cow	$3,661	$5,163	$4,139

Table 4. Cost and Return Comparison

Costs and Receipts/ Cow	Intensive Grazing	Conventional	Concentrated
Milk Pounds	17000	21000	21000
Milk Sales	$2,030	$2,508	$2,508
Government Revenue	$190	$228	$59
Total Receipts	$2,492	$3,008	$2,839
Feed Cost	$821	$985	$985
Total Cost	$2,041	$2,426	$2,395
Before-Tax Net Cash Flow (BTNCF)	$451	$582	$444
BTNCF without government revenue	$261	$353	$385

Table 5. IRR of Three Alternative Dairy Production Systems

	Intensive grazing 17,000 lb milk	Conventional 21,000 lb milk	Concentrated 21,000 lb milk
Rate of return	7.87%	6.62%	5.84%
Rate of return without MILC revenue	1.79%	1.21%	4.13%
Rate of return before tax net cash flow	11.91%	10.02%	8.85%
Rate of return before tax net cash flow without MILC Revenue	5.83%	4.61%	7.14%

Table 6. Financing debt comparison on a per cow basis

	Intensive grazing	Conventional	Concentrated
Investment per cow	$3,661	$5,163	$4,139
4th year After Tax Annual Net Cash Flow	$367	$498	$374
Debt servicing per cow 10 year loan at 7.85 %[1]	$2,476	$3,360	$2,525
Percent of Investment Financed	66%	64%	61%
Debt servicing per cow 20 year loan at 7.85% interest	$3,639	$4,938	$3,710
Percent of Investment Financed	97%	94%	90%

[1]Average Interest Rate from fourth quarter (1998-2002), Federal Reserve Bank of Chicago

Table 7. Cost and Return Comparison Alternative Milk Yields

Costs and Receipts/ Cow	Intensive Grazing	Conventional	Concentrated
Milk Pounds	16000	24000	24000
Milk Sales	$1,911	$2,867	$2,867
Government Revenue	$176	$201	$35
Total Receipts	$2,359	$3,339	$3173
Feed Cost	$722	$1,084	$1,084
Total Cost	$1,941	$2,526	$2,495
Before-Tax Net Cash Flow (BTNCF)	$418	$813	$678
BTNCF without government revenue	$242	$602	$643

Table 8. IRR of Three Alternative Dairy Production Systems Alternative Milk Yields

	Intensive grazing 16,000 lb milk	Conventional 24,000 lb milk	Concentrated 24,000 lb milk
Rate of return	6.86%	11.68%	12.12%
Rate of return without MILC revenue	-3.18%	7.42%	11.22%
Rate of return before tax net cash flow	10.39%	17.70%	18.37%
Rate of return before tax net cash flow without MILC Revenue	0.35%	13.44%	17.47%