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# Dairy Update



## MANAGING PROFITABILITY IN THE 90'S

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What is the profit margin on each 100 lbs of milk produced on your farm? What is your return for each dollar invested in dairying? Is your dairy farm business at risk in the event of more economic stress? Do you have contingency plans? Are you satisfied with your standard of living?

These are key questions concerning the financial future of any business entering the decade of the 90's. The ideas discussed in this paper are intended to stimulate thinking on the issues and opportunities for more profitable alternatives. Farms positioned to be competitive nationwide will have the brightest outlook for long term economic vitality.

### Past to the Present

The 1980's were a decade of dynamic change and adjustment. There were many forces that shaped the changes of the 1980's. Understanding them can help us think about what the future will be like. Many of these changes occurred as a chain reaction to other events such as a world recession, high government deficits, inflation, etc.

Our government adjusted policies to control inflation and curb government spending by increasing interest rates, and changing tax laws and agricultural policy. High interest rates had a major impact on cash flows and asset values of many dairy farms. Adjustments in federal income tax laws changed incentives for tax based decisions on many dairy farms. Local property taxes also increased in the face of declining support for education and other services in many communities. Lower price support levels, and the dairy diversion and buyout programs were part of the strategy to reduce surpluses. Product advertising, low or competitive consumer prices, new dairy food products, and consumer health diet concerns have aided the expanded demand. Today government surplus levels of dairy products are at a 20 year low while farm level prices are reaching new highs. Drastic reductions in export of U.S. feed grains resulted in lower purchased feed costs on most dairy farms but depressed farm income from the cash sales of these commodities.

Adoption of science and technology have helped enhance productivity, quality and efficiency in milk production on many farms. Increased use of several old proven practices such as

DHI, ration balancing, teat dipping, veterinary health programs, forage testing, financial analysis, and others have had a positive effect. Some new technologies introduced in the 1980's such as prostaglandins, heat detection aids, progesterone test kits, bypass protein, added fat, feeding systems, milking systems, somatic cell count testing, computer dairy management information systems and others have worked well and proved cost effective on many farms, but not all. Most of these technologies are in early stages of adoption in Midwest dairies. Successful use of many of these are related to herd size, production level, housing system, and skill of the manager to efficiently integrate them into the management system.

Farm families have been impacted by skyrocketing cost of health insurance and health care, multi-generational farming, reduced educational opportunities, fewer off-farm employment and recreational opportunities in rural areas.
Most of the forces of the 1980's are certain to continue into at least the early 1990's. Government policy will continue to try to control the national debt. Continuation of the market driven agricultural policy is probable. No major new directions in policy are expected in the 1990 Farm Bill, only fine tuning adjustments. Dairy production will likely surpass demand once again, and milk prices will weaken. Milk marketing experts suggest milk prices will range between $11.50 and $12.50 by mid-to-late 1990. Farms and agricultural firms will continue to consolidate through mergers and joint ventures to use fixed resources more efficiently. There will be greater diversity among dairy farm with more large and very small farms and fewer mid-sized farms. Off farm income will increase in importance to many farm families. Farmers will have new opportunities to replace capital intensive mechanical technology with biotechnology, information, and management expertise. Strategic and contingency planning will be necessary to cope with volatile price changes and emerging technologies. New ways of capitalizing agriculture such as contract farming, leasing arrangements, point of sale financing are already beginning to appear. Concerns about the environment, food safety, health and nutrition and animal rights are likely to increase in importance. Non-agricultural sectors are likely to become more active participants in forming agricultural policy. Recent events in Eastern Europe and Soviet Union have potential to change the demand picture of agricultural commodities dramatically in the 1990's. Agricultural products competitively priced in the world market will be in high demand.

## Factors Affecting Dairy Profitability

Dairy farm profitability is the same as net farm income; cash income minus cash expense with adjustments for depreciation and changes in inventory. Profitability is dependent on prices, cost of inputs and efficient conversion of labor, feed, and capital resources into marketable products.

Table 1 gives insight into the breakdown of milk production costs and returns per cwt of milk that are typical for three major milk producing regions of the U.S. The costs and returns are for only the dairy enterprise on these farms. The farms are considered typical for their region in size, investment level, debt, production and variable costs. There are wide differences between dairy farms within each of the regions in each of these factors. Note that Pacific region herds produce more milk per cow and have more cows per herd.

The sources of dairy farm income are from sale of milk and animals. Income per cwt of milk is highest in the Northeast region and lowest in the Pacific region. Feed costs are the largest single cost accounting for 45 to 65 percent of the total cash cost of production. Feed prices are lowest in the Midwest region because of the large plentiful supply available. The

other itemized variable costs of production do not vary greatly among regions except hired labor. Dairy labor in the Midwest is largely unpaid family labor. The combined labor cost, hired and unpaid labor, for the three regions are Midwest $1.25, Pacific $1.45, and Northeast $1.77 per cwt of milk.

Table 1. Production costs per cwt and returns for three major U.S. milk production regions.

| Item | Midwest | Pacific | Northeast |
|---|---|---|---|
| Milk per cow | 13475 | 16821 | 14321 |
| Cows per farm | 49 | 322 | 57 |
| Income: | | | |
| Milk | 12.10 | 11.56 | 12.90 |
| Cull cows and calves | 1.29 | 1.04 | 1.11 |
| **Total Income** | 13.39 | 12.60 | 14.01 |
| Production Costs: | | | |
| Total feed | 4.58 | 5.65 | 4.32 |
| Other Variable Costs: | | | |
| Milk hauling and marketing | .55 | .42 | .77 |
| Breeding | .12 | .08 | .17 |
| Veterinary expense | .19 | .16 | .23 |
| Livestock hauling | .04 | .01 | .01 |
| Fuel and electricity | .25 | .16 | .27 |
| Machinery and repairs | .43 | .34 | .38 |
| Hired labor | .65 | 1.28 | 1.02 |
| DHI fees | .19 | .18 | .20 |
| Dairy supplies | .19 | .19 | .20 |
| Dairy assessment | .19 | .19 | .19 |
| **Total other variable costs** | 2.67 | 2.88 | 3.31 |
| Total variable cash costs | 7.25 | 8.52 | 7.63 |
| Fixed Costs: | | | |
| Taxes and insurance | .39 | .16 | .41 |
| Loan interest | 1.55 | .83 | .91 |
| General farm overhead | .73 | .22 | .60 |
| **Total fixed cash** | 2.67 | 1.21 | 1.92 |
| **Total cash costs** | 9.92 | 9.73 | 9.55 |
| **Return above cash costs** | 3.47 | 2.87 | 4.46 |
| Capital replacement | 1.97 | .67 | 1.74 |
| Return to owned inputs | .89 | .48 | .88 |
| Unpaid labor | .60 | .17 | .75 |
| **Fixed non cash costs** | 3.46 | 1.32 | 3.37 |
| **Total economic costs** | 11.83 | 10.22 | 12.01 |
| **Return to mgmt. and risk** | 1.56 | 2.97 | 2.00 |
| **Total net return per farm** | $10,300 | $128,000 | $16,300 |
| **Return over economic costs** | | | |
| Plus unpaid labor | 3.05 | 3.03 | 3.57 |

Source: Economic Indicators of the Farm Sector, USDA, 1987.

Taxes insurance, interest, replacement of equipment and buildings, and general farm overhead are fixed costs that do not change with changes in production or cow numbers. Farm overhead expenses are largely associated with the farm unit and are lower in the Pacific region because of the larger herds and higher production per cow. Midwest farms tend to be more highly leveraged, therefore pay more interest spread over fewer pounds of milk marketed. Non-cash fixed expenses include costs associated with capital replacement or depreciation, unpaid labor and potential return that could have been earned on the owners equity in the business (6% interest). The Pacific region has much lower capital replacement costs because of lower investment costs per cow and higher productivity.

Returns above cash costs are available for making payments on debt principal, making capital improvements such as replacing equipment, and for family living expenses. The average total cash costs of producing 100 pounds of milk were slightly higher in the Midwest, $9.92 versus $9.73 in the Pacific and $9.55 in the Northeast.

Total economic costs include both cash and non-cash costs excluding interest paid and range from $10.22 in the Pacific region to $12.01 per cwt in the Northeast region. This value reflects the cost of production using a desired return on owner equity (6%) and a value for unpaid family labor ($6 hour) and depreciation. The return over economic costs is the reward for management and risk associated with the dairy investment.

These returns favor the Pacific region at current price, production and investment levels used. The total net returns per farm vary greatly due to the differences in herd size, productivity, and economic return per cwt. An additional return value was calculated by the author to more adequately reflect the annual cash available to service debt and support family living. This value reflects returns over economic costs plus unpaid family labor and return on invested equity. These values by region are Midwest $3.05, Pacific $3.03 and Northeast $3.37.

New York researchers identified the factors in Table 2 having the highest positive and negative correlation with labor and management return to the operator.

Table 2. Factors most closely correlated with labor and management income per operator (NY 1984).

| Positive | Negative |
|---|---|
| Pounds of milk sold per worker | Production cost per cwt/milk |
| Total pounds of milk sold | Total farm expenses per cow |
| Number of cows | Machinery cost per cow |
| Pounds of milk sold per cow | Land and building investment per cow |
| Number of cows per worker | Labor cost per cow |
| *Total farm inventory | Machinery investment per cow |
| Income over value of feed | Total capital investment per cow |
| *Yield of corn silage dry matter | Debt per cow |
| Percent equity | Days open |
| Number of cows milked 3X per day | Percent leaving |
| | Feed and crop expense per cwt/milk |
| | Projected minimum calving interval |

*These factors are probably less important under current Minnesota conditions.

The data were from 410 New York farms using DHI and farm business records from 1984. Six of the variables accounted for 71% of the variation in net cash income among the 410 dairy farms studied. They were feed and crop expense per cwt milk, percent equity, machinery cost per cow, labor cost per cow, number of cows, and pounds of milk sold per cow.

More recent Wisconsin and Minnesota studies agree with the New York studies. Production per cow, debt level, herd size, capital investment levels and labor efficiency were important factors.

## Productivity

Pounds of milk per cow has a two fold effect on profitability; more milk marketed and lower cost of production. Table 3 illustrates the differences in profitability between two identical 50 cow herds that differ only in the production per cow.

Table 3. Impact of production level on income and expense for 50 cow herd.

| | Per herd per year | | Per cwt milk | |
|---|---|---|---|---|
| Pounds milk per cow | 14,000 | 20,000 | 14,000 | 20,000 |
| Income | 95,250 | 131,250 | 13.61 | 13.13 |
| Feed cost | 48,046 | 51,160 | 6.86 | 5.42 |
| Other variable costs | 19,328 | 22,172 | 2.76 | 2.22 |
| Total variable cost | 67,374 | 76,420 | 9.62 | 7.64 |
| Total fixed cost | 24,920 | 24,920 | 3.56 | 2.49 |
| Cash costs | 69,974 | 79,020 | 10.00 | 7.90 |
| Return over cash costs | 25,275 | 52,229 | 3.61 | 5.22 |
| Total economic cost | 107,394 | 116,440 | 15.34 | 11.64 |
| Return over economic cost | -9,544 | 17,409 | -1.36 | 1.74 |

Source: Conlin et al., University of Minnesota, 1990.

Feedstuffs available are identical except quantities are adjusted to meet the NRC nutritional needs. Expenses for breeding, veterinary service and supplies are adjusted to reflect typical value for these production levels. The 20,000 pound herd marketed 300,000 pound more milk from the same number of cows, and produced the milk for $2.10 less per cwt. The combined effect is about $4,500 for a 50 cow herd or $90 per cow greater return over cash expenses for each additional 1,000 pounds of milk produced per cow.

Studies show typical returns to labor and management increased $.25 to $.40 per cwt of milk for each additional 1,000 lbs of milk produced per cow. Milk and feed prices will affect this value.

The key to maximum profit is that the cost of the last unit of input must result in output of equal or greater value. Productivity is essential to achieve high levels of profitability, but a closer review shows that high productivity does not in itself guarantee high returns over costs. Using a balanced mix of inputs that result in efficient conversion to outputs is important. Examples include balanced rations, feeding according to production, or avoiding overfeeding low genetic or mastitis infected cows. University of Minnesota studies of DHI records show

the following factors accounted for forty percent of the differences in DHI herd average milk among herds.

Table 4. Production related to number of dairy practice factors above average.

| | | Average level of dairy practice factors | | | | | |
|---|---|---|---|---|---|---|---|
| No. practices above average | Avg. prod. of herds | SCC positive | Grain fed | Sires ident. | Dry 70+ days | P.D. $ | Left herd |
| | | % cows | lbs | % | % cows | $ | % |
| 6 | 18,203 | 19 | 6,983 | 92 | 7 | 44 | 45 |
| 5 | 17,361 | 22 | 6,388 | 88 | 9 | 37 | 40 |
| 4 | 16,495 | 26 | 6,019 | 80 | 13 | 30 | 37 |
| 3 | 15,608 | 30 | 5,731 | 62 | 16 | 24 | 33 |
| 2 | 14,794 | 35 | 5,407 | 46 | 18 | 18 | 30 |
| 1 | 13,908 | 39 | 4,958 | 33 | 22 | 7 | 26 |
| 0 | 13,339 | 44 | 4,629 | 26 | 27 | 2 | 25 |

Schutz et al., MN (5945 MN DHI herds).

These results identified important production management factors that require priority management attention to achieve high productivity. The herd averages were about 800 pounds higher for each of the top six factors the herd was above average. These results show the importance of balanced management, with the largest production response results from management excellence in all the important areas. Production per cow is related to the interdependence of these factors.

More recent Minnesota work shows how the herd milk response to a change in the feeding program differs depending on the genetics of the cows, the level of mastitis infection, and days open. This helps explain why an improved herd nutrition program often fails to result in the expected production response. Any one of management factors can limit the response to excellent management in a single area. Single focus herd problem solving often fails to correct the problem that needs to be corrected first.

Efforts are being made at Minnesota to estimate how some of these production management practices affect profitability. Table 5 shows comparative estimates of returns over cash expenses for a 50 cow herd producing 17,000 pounds milk for five factors. The first five factors in the table show single factor effects on economic efficiency independent of changes in production. Most of the gains in economic efficiency are due to more efficient use of feed. Production was adjusted only to reflect the expected changes due to longer calving intervals and mastitis infection levels. The mastitis infection level also represents a $.25 per cwt loss in milk quality premium. The single factor values can help establish the relative importance under the feed and milk prices used. The relationships will change with changing prices. The three bottom table values reflect the combined effect of the five factors and the impact productivity has on returns.

Table 5. Estimated economic effect of various herd management factors.

| Factor | Economic effect: Factor change From | Factor change To | Return over cash cost $/cost Farm/yr. | $/cwt |
|---|---|---|---|---|
| Mastitis infection level (SCC) | 400,000 | 250,000 | 4,062 | .45 |
| Calving interval | 14 mon. | 12 mon. | 4,684 | .42 |
| Herd replacement rate | 46% | 36% | 581 | .13 |
| Debt level | 40% | 0% | 9,375 | 1.10 |
| Age at first calving | 29 mon. | 24 mon. | 5,401 | .64 |
| Combined effect | 5 factors (+) | 5 Factors (-) | 24,103 | 2.68 |
| Production level | 17,000 | 14,000 | -13,464 | -.95 |

Prices: Milk $12.00 per cwt, corn 2.20 per bu., SBOM $180/ton, hay $100/ton, cull cows $500/head, investment $3,680 per cow.

The values in Table 5 show that profitability can be seriously reduced by inefficient production management in spite of high productivity. The combined effect of the five factors reduced returns over cash costs for a 20,000 pound milk herd to $12,000 below the returns for 17,000 pounds under efficient management.

Several management practices and some new technologies will be most cost effective when used to achieve higher levels of productivity from already high levels and be less cost effective for lower producing herds. Examples might include milking three times a day, bypass protein, added fat, feeding three or more times per day, and use of BST. Use of DHI records, forage testing, balanced rations, and mastitis control practices must precede the high production practices.

Increased productivity is a major profit enhancing opportunity on a majority of Upper Midwest dairy farms. Overcoming this profit constraint is a necessary first step to be positioned to make additional investments in the dairy farm business.

## Herd Size And Facilities

A review of farm management business records suggest that large low producing herds tend to have the poorest economic return and large high producing herds the highest economic returns. New York studies have shown the variable cost of producing 100 pounds of milk declines by $.50 per cwt as herds increased from 50 to 150 cows. Costs decreased more slowly at sizes above 150 cows. Larger herds tend to produce slightly more milk per cow (NY 1987).

Minnesota estimated minimum milk price needed to cover all costs for herds either building new facilities and expanding current facilities at various levels of expansion and production. The estimates discussed here are for herds producing 18,000 pounds per cow. Their estimates of break-even prices in new facilities ranged from $12.68 per cwt for 40 cows to $10.51 for 120 cows in tie stall barns. The break-even prices for new free stall barns were $11.07 for 50 cows to $9.03 per cwt for 200 cows.

These researchers also estimated the break-even price to cover all production costs through expansion of existing tie stall and free stall facilities at 18,000 pounds milk per cow. In the case of expanding a 40 cow tie stall barn to 90 and 120 cows; the respective break-even price were $9.87 for the original 40 cow herd, $9.92 at 90 cows, and $9.74 at 120 cows. Most of the gain from increased herd size was offset by the cost of expansion. The per cow cost of expanding tie stall facilities decreases only slightly as more stalls are added. The estimated break-even prices for expanded free stall facilities were $8.73 for an existing 50 cow free stall, $8.37 for 120 cows, and $8.44 for 200 cows. In this case, expansion did not require a new milking facility until herd size increased beyond 120 cows. The per cow cost of expanding free stall facilities decreased substantially as more cows were added until the increased size required a large investment in new milking facilities. This added investment cost again offset gains from increased herd size in the 200 cow example; thus increasing the break-even price slightly over 120 cows. Break-even prices were lower for free-stall barns than tie stall barns at comparable levels of production and size.

Growth of herd sizes in Minnesota DHI herds in the most recent period has occurred through minimal investments and more fully utilizing existing facilities. Some herds are over 150% of barn capacity by housing dry cows separately from the milking herd, using a combination of tie stall and free stall by milking in shifts, use of calf hutches, etc.

## Labor Efficiency

Milk marketed per cow or per hour of dairy labor are important measures of labor efficiencies. These values are greatly affected by the productivity of the herd and the amount of mechanization that is used to replace labor. Table 6 shows a summary of business records from specialized Michigan dairy farms.

Table 6. Summary of labor used on Michigan dairy farms.

| | Number of cows per herd | | | |
|---|---|---|---|---|
| | 50 | 50-75 | 75-100 | 100 |
| Number of farms | 45 | 65 | 52 | 102 |
| Avg number cows | 36 | 63 | 86 | 163 |
| Hours per cow per year | 69 | 66 | 59 | 50 |
| Avg lbs milk per cow | 15,992 | 16,438 | 16,399 | 17,461 |
| Avg milk per labor hour | 231 | 249 | 277 | 349 |
| Labor cost per cwt($5/hr) | 2.15 | 2.00 | 1.80 | 1.43 |
| Per hr milk value($12/cwt) | 27.72 | 29.88 | 33.24 | 41.88 |
| Net cst/cwt milk | 12.40 | 11.03 | 10.77 | 10.31 |

Ag. Econ. Report, 1988, Michigan.

Table 6 shows about 25% fewer hours per cow in larger herds. Some of this reduction in labor hours per cow is probably related to a predominance of parlor milking in larger herds. The higher production per cow with fewer labor hours favored larger herds by 35% more milk per hour of labor. These efficiencies convert to a range between $2.15 to $1.43 labor cost per cwt with a $5.00 per hour labor charge. The value of milk produced per hour of labor ranged from $28 to $42.

A recent study of 50 Idaho dairies ranging from 100 to over 500 cows per herd broke down labor time by category. The results show that more than 50% of the labor is used for milking. The average annual labor hours per cow break-down for these Holstein herds were: milking 27 hours, feeding 9 hours, facility management 6 hours, herd management 5 hours, manure management 2 hours, for a total of 48 hours per cow per year. Labor time for raising calves and replacements were not included. Herds in this study averaged 409 pounds of milk per hour.

There are wide differences in labor required to produce milk on farms. A full time equivalent (FTE) generally equates to 2,500 to 3,000 hours per year. These studies suggest that a 50 cow dairy herd is a full time job without cropping activities. High production per cow, level of mechanization, facilities and herd size are all key factors affecting labor efficiency.

## Investment Levels

Investment levels per cow and per 100 lbs milk produced are higher on Midwest diversified dairy farms compared to more specialized dairies in other parts of the U.S. Some over-investment occurred in the name of tax management during periods of investment tax credits and favorable profitability. Generally, diversified farms that raise their feed for small herds in stanchion barn systems have higher investments per cow. Many of the dairy facilities on Midwest farms are old and highly depreciated, have limited alternative use, are still functional and productive, but do not lend themselves to the use of some new technologies and limit the level of efficiency that can be attained. Table 7 shows the average year of construction and most recent improvements made on Minnesota and Wisconsin dairy facilities.

Table 7. Construction date and date of last improvement in facilities on Midwest dairy farms.

| | Average year built | | Average year remodeled | |
|---|---|---|---|---|
| | MN | WI | MN | WI |
| Housing | 1963 | 1943 | 1976 | 1975 |
| Milking | 1964 | 1957 | 1978 | 1979 |
| Feed storage | 1969 | 1964 | 1978 | 1979 |
| Feed handling | 1973 | 1972 | 1980 | 1981 |
| Waste disposal | 1974 | 1974 | 1977 | 1981 |

North U.S. Dairy Survey, 1990.

A key question is, "What is the current value of the facilities?" Accountants and economists don't have a ready answer except it is someplace between the depreciated value used for tax purposes and the new construction cost to replace them. The decision to upgrade and replace them is dependent on the cost/benefit to be gained.

As an example, let us consider an investment in a new feeding system in a stall barn that will allow more frequent feeding of grains and concentrates and more efficient distribution of feed by production level without changing the total amount of feed used or time it takes to feed.

Table 8. Example: Purchase of round the barn feeding system for 50 cow stall barn.

| | |
|---|---|
| Initial investment cost | $20,000 |
| Annual cost: | |
| Avg annual interest and principal (12% interest amortized for 5 years) | + 5,338 |
| Annual operating costs (electricity, repairs) | + 900 |
| Benefits: | |
| Tax saving from depreciation (4,000 * 28% tax rate) | - 1,120 |
| | $ 5,118 |
| Break-even milk per cow per day: | |
| *Pounds per day = (5,118/(.12*305*50) = 3.05 lbs per day for cows in milk. | |

*Milk price $.12 per pound, 305 days in milk, 50 cows.

The above example illustrates a way to calculate the increased milk production per day (3.05 lbs) needed to pay for the investment in a new feeding system over a 5 year period. The example does not account for any change in the cost of feed or labor needed to realize the increased milk. A question that always needs to be answered when making decisions that increase cost of inputs is, "Are there alternative investments that will yield a better return?"

Diversified dairy farms are typically oversized on field machinery to expedite crop production activities. The following indicators of prudent investment levels may help determine if your investments are reasonable.

Table 9. Investment level guidelines for diversified dairy farms.

| Investment/cow | Low | Reasonable limit | High |
|---|---|---|---|
| Land - 2.5 to 5.0 acres/cow | $1,700 | $2,850 | $3,000 |
| Building - livestock, feed storage waste | 1,000 | 1,250 | 1,500 |
| Livestock - cows and associated youngstock | 1,250 | 1,500 | 1,750 |
| Machinery and equipment - livestock and crop | 750 | 1,100 | 1,250 |
| Inventory and working capital | 300 | 300 | 300 |
| Total | $5,000 | $7,000 | $8,000 |

Leasing of equipment and/or cows are options for reducing investments on the dairy farm. Some farmers use custom hire for some or all cropping activity. In most cases, the cost of leasing cattle exceeds the cost of ownership, but may be advantageous when leased cows will add to the return over feed and other cash costs, particularly if land and labor resources won't otherwise be fully utilized, and especially when the barn won't otherwise be full.

## Debt Level

Debt levels on Upper Midwest dairy farms have been shown to be more highly leveraged than dairies in most other U.S. regions and most other farm enterprises in the Upper Midwest. Approximately 50% of the Midwest dairy farms are debt free while about 25% are at risk with debt asset ratios above 70. Farms with debt asset ratios above 70 (owe 70 cents on each $1.00 of assets) are considered at risk. Debt levels became a serious problem on many farms in the face of declining prices and asset values and increasing interest rates. Managing debt has been a major challenge on many Midwest dairy farms in the 1980's.

The debt a cow can carry depends on gross income per cow, number of cows, operating expenses excluding interest, family living requirements, capital replacement needs, interest rates, length of loan, etc.

## Diversification Versus Specialization

Diversification can be a risk avoiding strategy. The idea is to spread the risk over several enterprises; low prices of one commodity will be offset by high prices in the other.

The typical Midwest diversified dairy farm produces feed for the dairy herd and relies on milk sales for 80-90% of its income. In reality, these farms are highly dependent on the price of milk. The diversified cropping enterprises only protect the farm from high feed prices. However, the cost of producing a bushel of corn, oats, wheat or barley is frequently more than the price for which it can be purchased. Production costs of feeds on dairy farms are often higher than on crop farms because of more limited scale efficiencies of the cropping enterprises.

Most of these farms produce a major portion of the feed for the dairy herd and are diversified in their capital investment, labor activities and management expertise required. Investment capital is almost always a limited resource. The table below shows a typical investment for various levels of diversification for a 50 cow dairy farm.

Table 10. Per cow investment capital for diversified and specialized farms.

| | Produce all feed | Produce forage only | Purchase feed |
|---|---|---|---|
| Acres per cow | 4.5 | 3.0 | 1.0 |
| Dairy animals | 1,500 | 1,500 | 1,500 |
| Dairy building and equipment | 1,100 | 1,100 | 1,100 |
| Land ($800 acre) | 3,600 | 2,400 | 800 |
| Crop machinery | 1,260 | 640 | 340 |
| Inventory/working capital | 300 | 300 | 300 |
| Total investment/cow | 7,760 | 5,940 | 4,040 |

The cropping activities require substantial investments in land and field machinery. Renting land, custom hiring and/or machine rental for some of the cropping activities are options to reduce the investment levels.

Land ownership typically accounts for 35-45% of the total per cow investment when forages and grains are produced and the land is owned. Field machinery for tillage, planting and harvesting add 10 to 20% to the fully owned cropping investment. Dairy farms tend to oversize their machinery to minimize their crop labor so it can be accomplished between milkings and in a timely manner. Michigan and Minnesota studies identify the option of raising all feeds to be marginally profitable when compared to other options.

Raising only forages and purchasing grains is an option becoming more popular in the Midwest. The smaller land base per cow and lower field machinery investments needed with this option reduce the total investment costs by 20-30% below raising all feeds. Grain harvesting machines are not needed with this strategy. Studies show this option to be fairly low risk and usually more profitable than raising all feed.

Purchasing all feeds and producing milk on a minimal land base is typical of dairies in western and southern U.S. This option reduces the total investment costs by 45-55% relative to full ownership of producing both grains and forages. The option can be highly profitable at high production levels but also carries a higher exposure to fluctuating feed prices. Investment costs can be reduced by renting land and/or machinery. Other options include contracting with others to do all or part of the cropping activities, or sharing ownership of the machinery needed with other farms.

Dairying is labor intensive requiring daily consistency in timing and precision of feeding, milking, cleaning, and animal monitoring and care. The seasonal cropping labor demands often competes with the time available to perform these tasks at a high level of proficiency. Productivity and profitability frequently suffers from seasonal drops in proficiency. Use of more hired labor, contracting field work to be done by others, or having others raise the youngstock are some strategies being used on some farms to cope with the labor demand.

Agriculture is a high tech business requiring a large amount of specific knowledge and expertise to be competitive. Diversified farms are handicapped to know all they need to know in many different areas; controlling mastitis, feeding, producing alfalfa, corn, oats, fixing machinery, etc. This challenge requires a great amount of knowledge and skill in the face of rapidly changing technology and economics. Many farms are supporting these needs through greater use of consultants.

There are several trade-offs between diversification and specialization. The transition from one operating mode to another requires careful planning. There is not a best answer that fits all situations.

## Transition Strategies

Making major changes such as land base, housing systems, investment levels, herd expansion etc., can have a major effect on how you farm. Careful study of the options, financial planning, accounting for adjustments in labor and management, etc., is a necessity. The benefits and risks of the options will vary from farm to farm depending on the debt levels, land base, productivity, management adaptability, etc.

A recent Minnesota study evaluated the risk and profitability associated with several restructuring strategies relative to herd expansion, land base, and crop mix. The general economic scenario for this study was a small decline in milk prices, small increase in feed

prices and stable land values. The conclusions were that most Midwest dairy farms could improve their economic performance by making some changes. The most desirable options varied, depending on the starting point. Debt level, productivity and herd size affect the ability to change and/or can restrict the options.

Table 11. Dairy farm change strategies.

| | Risk | Economic success |
|---|---|---|
| Ideal option | Very low | High increase |
| Government crop program | Very low | Small increase |
| Rent land for cash crop | Low | Small increase |
| Purchase more land | Very high | Decrease |
| Raise forage/Purchase grains | Medium | Increase |
| Sell land | Very low | Mixed |
| 100% dairy expansion | Medium high | Increase |
| 200% dairy expansion | High | Large increase |
| Purchase all feed | High | Increase |

Note: These assessments are based on subjective analysis and represent trends.

Dairy expansion is feasible for most Upper Midwest dairy farms and usually improves financial performance at the expense of increased risk. More risk averse producers are likely to maintain some or all of their crop enterprises. Cash crop enterprises and participation in 1985-1990 government price support programs improve financial performance and reduce risk. This is the best option for less productive small farms. Larger herds exhibit superior performance and are better able to specialize (eliminate some or all cropping) and maintain or improve financial performance without expansion of the dairy herd than smaller herds.

## Summary

The forces of the 1980's brought dynamic changes to the business of producing milk. Many of the forces of change of the 1980's are likely to continue into the 1990's with a few new challenges. The Midwest has many opportunities to strengthen its competitive position with other milk producing regions of the U.S. A larger number of Midwest farms have already positioned themselves to be highly efficient and ready to adopt many of the high production technologies of the 90's. Skillful management control of the factors affecting profitability will continue to be of paramount importance. The human side of dairying: knowledge, expertise, creativity, and attitude will be the most important input resources to achieve success.

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