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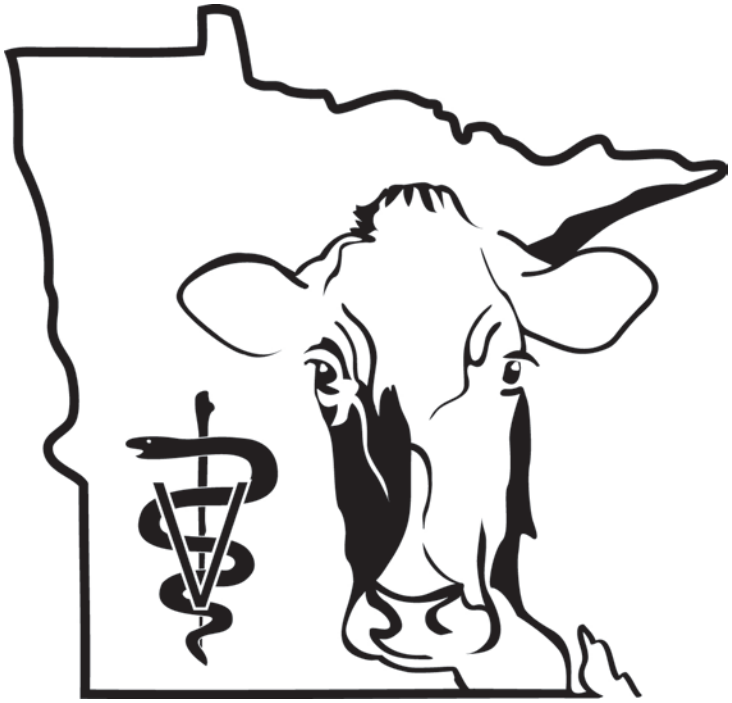

ST. PAUL, MINNESOTA
UNITED STATES OF MINNESOTA

Profitability for the Dairyman and Veterinarian

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Chair, Clinical and Population Sciences
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Minnesota derives a great deal of benefit from its dairy industry. Currently, Minnesota is the fifth ranking dairy state in the U.S. It ranks second in cheese production and third in butter production. Minnesota's 14,000 dairy farmers sell about 10 billion pounds of milk worth approximately 1.2 billion dollars at the farm gate each year. In Minnesota milk was responsible for more than 40,000 dairy industry jobs, both on farm and in the dairy processing and marketing sector. This is an employment impact much greater than many other much more visible industries. In addition, another 45,000 Minnesota jobs are directly related to or dependent on the State's dairy industry. Minnesota's dairy industry contributes a total of 3.5 billion to Minnesota's economy, including 170 million in State and local tax revenues. Minnesota's dairy industry is the largest sector in Minnesota's agricultural industries, accounting for more than 20% of the total agricultural productivity of the State. Agriculture is the State's largest industry, and dairying is the largest sector of that agricultural industry.

Despite the significance and positive benefit derived from the dairy industry in Minnesota, those benefits are shrinking. Minnesota's dairy industry is in need of revitalization. Over all, milk production, in the United States is increasing (Exhibit 1), with Wisconsin and particularly California notably increasing their total milk output over the past decade. During that same time, Minnesota's dairy industry has suffered some significant setbacks. The dairy industry in Minnesota is concentrated in a belt of counties running from the northwest to the southeast in the State (Exhibit 2). The dairy production facilities and equipment in Minnesota are, on average, more than 30 years old and are not being replaced rapidly enough to sustain our market share of production of U.S. milk supplies. The average dairyman in Minnesota is more than 54 years old and may be looking more toward retirement than toward expansion. If Minnesota's milk production continues its decline, we are at risk of losing significant parts of the supportive infrastructure that keeps the dairy industry vital in the State. Milk marketing organizations (processors and marketers) may find it no longer economical to operate in Minnesota. These manufacturing jobs may leave the State, and other industry related jobs would follow. In fact, more than 12,000 jobs that depend on the dairy industry have left the State in over the last six years; nearly 6,000 in on-farm, 800 in processing, and nearly 6,000 in other industries. If the current trend continues, and the dairy industry cannot regain the market share it had at the beginning of this decade, Minnesota will face the year 2,000 with the loss of more than 16,000 full-time jobs (an impact equal to the entire labor force of Red Wing and Hopkins), a loss of 67 million in gross revenues from the dairy industry, and 480 million in non-dairy industrial output for a total of more than 1 billion dollars lost. Losses will include more than 50 million dollars in State revenues (enough to pay for a quarter of the tuition books of every student at the University of

Minnesota), and more than 100 million in total value of Minnesota grown feed fed on farms. That potential decline between now and the year 2000 is equivalent to losing an entire Fortune 500 company from Minnesota. Obviously, much must be done to reverse this decline. To that end, on the initiative of the College of Agriculture lead by Dr. Ed Frederick and Dr. Dick Goodrich, the Dairy Initiatives program, with the support of the Agricultural Extension and the Veterinary College, has begun working in a variety of ways to help revitalize the dairy industry. Veterinarians have taken part in this dairy initiative process, particularly in their role as team members in the dairy demonstration farms.

As a profession, dairy veterinarians must not sit on the sidelines and watch the decline in Minnesota's dairy industry go on without playing a role to reverse it. Milk production has dropped 8% in the last five years in Minnesota (Exhibit 3), and cow numbers have dropped 22% in the years from 1985 to 1990 (Exhibit 4). The projections are, for the dairy industry in the year 2000, that several important trends will accelerate, and the structure of Minnesota dairy farms will alter significantly. In particular, the projection is that there will be many more larger herds in the State, with herds over 100 cows counting for one quarter of the State's production by the year 2000 (Exhibit 5, Ag-Nomics).

There are several trend lines that are possible for the Minnesota dairy industry. The Dairy Leaders Roundtable (a group of the major leaders of the dairy industry in Minnesota that has been formed in the last year to address this issue) has set the goal that the dairy industry should recover its 1985 market share by the end of the decade (Exhibit 6). If we do that as a State, the industry's output will increase by 570 million pounds of milk, employee payrolls will increase by 158 million dollars, 7,600 new jobs will be created, 430 million value added dollars will be created in the economy, and the State will earn roughly 50 million additional dollars in State tax revenue (Exhibit 7).

Dairy Farm Financial Status

So what are the economic forces that are driving these major shifts in the Minnesota dairy industry? How does Minnesota and the upper Midwest stack up compared to other dairy regions within the United States? Exhibit 8 presents the average in 1990, by dairy region, for farm financial flows. These numbers are taken from figures published by the USDA National Agricultural Statistics Service (Exhibit 8). Despite much concern about the Minnesota-Wisconsin milk price and the difficulty that it presents in holding our own in competition with other regions where the milk price is higher, in fact Minnesota, Wisconsin and Michigan have fared reasonably well in terms of average revenue from milk per cow (Exhibit 9).

If our difficulty does not rest on the revenue side, perhaps it might rest on the expense side. Minnesota and the upper Midwest have a major advantage in terms of feed costs. Our feed costs are cheaper than virtually anywhere else in the United States (Exhibit 10). In particular, feed costs in the Southeast and the Pacific regions (areas where the dairy industry is expanding rapidly) are substantially higher than the feed costs in the upper Midwest. Our labor costs (Exhibit 11) are substantially higher than those regions but not significantly different than labor costs in the Corn Belt, the Northeast or Appalachia. Overhead costs in the upper Midwest are higher than any other region, reflecting both the traditional style of construction for dairies (high cost per cow) and also

the tendency for each individual small dairy to maintain a full complement of equipment, raising total overhead per cow to high level in our region (Exhibit 12). This higher investment per cow is reflected in higher average interest costs per cow (Exhibit 13), even in the face of the fact that many facilities in Minnesota are old and essentially paid for. Balancing all of this together (Exhibit 14) on a per cow basis, the various regions come out not all that different when one looks at the major categories of expenses in total. Some regions have higher labor costs, some have higher feed costs, and some have higher overhead. There is certainly some variation between regions, but just as certainly the variation between farms within a region is much greater than the variation between regions. That being the case, it is probably a more productive exercise to look at why some farms in our region are more successful than others, rather than focusing our concern about competition from other regions.

All of the discussion thus far has been a discussion of efficiency; that is the efficiency of production, finances, and economics on a per cow basis. Dairy farm families, however, are less interested in the efficiencies on a per cow basis and much more interested in the overall profitability or return to labor and management available from the farm that they own. What is at stake here is an issue of family income and family lifestyle, not an issue of returns per cow. Despite the fact that returns per cow (Exhibit 15) are not significantly different between regions. "Family income" from the dairy (Exhibit 16) is dramatically different between regions. The upper Midwest, the Corn belt, and Northeast are areas where, because of herd size, adequate family income and family lifestyle has been difficult to sustain.

There is a caveat for the reader about Exhibit 16. It is derived by multiplying herd size times efficiency per cow. Both of those numbers are averages across the region, and they obviously don't translate exceedingly well to an individual farm. Although an individual farm might have an average size, it certainly will not, in general, have average efficiencies. Many Minnesota farms derive their family income from several sources, not just the dairy. Small farms in the upper Midwest can support quality lifestyles, but to do so they have to maintain more better than average profitabilities. The situation is fairly simple. Family income from a dairy enterprise will be returns to management and labor per cow (efficiency) times the number of cows (volume). If one begins with an assumption of desired family income ($30,000 per year), and one takes industry average efficiencies from in Minnesota (slightly more than $300 per cow in 1989) then it is fairly easy to calculate the necessary herd size (volume) that will be needed to sustain that lifestyle (100 cows, Exhibit 17). This is not a value judgment about large or small farms, it is merely the statement of a reality of what it is going to take if families are going to be able to continue to dairy farm at an acceptable lifestyle in Minnesota.

Obviously, a farm can improve its efficiency from $300 to $600 per cow, and the herd size that can sustain a $30,000 income can be reduced from 100 cows to 50 cows. Each individual farm will have to look at its own ability to be both efficient and its own desires for income and lifestyle.

The Veterinary Point of View

As veterinarians serving the dairy industry, our lives are inextricably tied with the industries

future. As veterinarians, what can we do and what should we do to help support revitalization of Minnesota's dairy industry? What to dairymen expect from their veterinarians? The veterinary profession has an opportunity to have an impact on both parts of the family income equation, i.e., on efficiency and on volume. Traditionally, we have worked hardest on efficiency. In fact, we have actually worked hardest on productivity (revenue), assuming that expenses would take care of themselves and that improved productivity would equate with increased profitability on a per cow basis. While there is some general truth to that, by no means is that relationship a fixed one. So much of our task and much of our activity in the future will be working on efficiency. This will include improving productivity, focussing on cost control, minimizing investments, reducing labor costs, and otherwise looking out for the financial as well as biological health of our client's dairies.

Veterinarians are also likely to be called upon for advice, counsel and guidance on the other part of the equation on the side relating to the volume or cow numbers. Many dairies are considering expansion in one form or another in Minnesota, and veterinarians are very likely to be asked for their opinions, their thoughts and their recommendations. We have a responsibility, working with others, to help dairymen plan for expansion in such a way that the overall economic efficiency of the farm is enhanced.

The question of expansion, particularly to larger dairies, raises some very deep emotions within Minnesota. At least part of that emotionality arises from the fear that if one's neighbor expands significantly, the total milk supplies will increase, milk prices will be driven down, and the future of the smaller farmer will be put in jeopardy by the expansion. We need to dispel the concept in Minnesota that one's neighbor is one's competitor. In fact, the competition for Minnesota is in California, upper New York State or New Zealand. The 200 cow dairy next to the 50 cow dairy in fact enhances the chance of the 50 cow dairy surviving in Minnesota, because the 200 cow dairy will help keep the cheese plant open and keep the price of Minnesota product competitive. The 200 cow dairy will sustain the need for the infrastructure that also supports the 50 cow dairy; the feed mills, the hauling companies, the foot trimmers, the veterinarians, the equipment dealers, the seed dealers. All of those are likely to be sustained and competition between them enhanced if there is a vibrant dairy enterprise in Minnesota. It is clearly in the best interest of all Minnesota dairy farmers for the Minnesota dairy industry, in general, to expand in terms of cow numbers and productivity.

Producer perceptions of Veterinarians:

How are veterinarians perceived by dairy farmers. What do farmers want from us? A recent study by Dr. Earl Bracewell and others from the University of Minnesota's division of agricultural education (Exhibit 18) has found that veterinarians, among all sources of information, are the most frequently used source of information and the most trusted source of information for dairymen when that information is actually going to be used to make a change in dairy farm practices. That means that if your client is going to make a change, you are the most likely person to be asked for advice, and your answers are going to be the most trusted. This provides the veterinary profession with a wonderful opportunity to serve the dairy industry, and it also confers upon us a significant professional responsibility that our advice is well grounded, supported to the

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best extent possible with fact, and that it is professionally given without an eye toward self aggrandizement. Increasingly, veterinarians are called upon for advice in areas where veterinary education has traditionally not been extensive. If we are to provide advice in areas beyond the bounds of the Practice Act, it is incumbent upon us as a profession both to retrain ourselves so that we are competent, and/or to establish networks of interaction with other agricultural professionals who can provide expertise and critical information in areas where we, as an individual practitioner, are weak. The opportunity for an expanded role for veterinarians, though, is clearly there.

Veterinarian's Life and Lifestyle

So, with this expanded professional responsibility and with the needs of the dairy industry and the opportunity for veterinarians, what does this mean to you as a practitioner on a day-to-day basis? The above discussion touches on the needs for income and lifestyle on the part of your dairy clients, but what about your needs for income and profitability and lifestyle? There are a variety of ways to look at the issue of professional incomes. Perhaps the simplest is to refer to the AVMA studies conducted by Dr. J.K. Wise in 1989. He found that the average income of veterinarians in large and mixed practice was $52,600 dollars for 58 hours of work per week or about $19/hour work. Of a practice's gross income, approximately 41% is derived from professional services, and 27% is derived from the sale of pharmaceuticals accounting for a total of 68% of all gross income in just those two categories. No other category (surgery, radiology, laboratory, etc.) came even close to the importance of those two categories for large animal practitioners. Veterinary practitioners obviously may sell many things, including pharmaceuticals, other products, laboratory services, etc., but for the purpose of the rest of this article I would like to focus on the fact that fundamentally practitioners, particularly in a consulting mode of practice, sell their time. What kind of gross income is needed to sustain a particular income (and therefore lifestyle) for a veterinary practitioner? Just as we started with a desired income of $30,000 for a dairy farmer and some measure of efficiency and used those two numbers to derive the volume (number of cows the farmer needs), let's start with a projected income for veterinarians and a volume (days or hours worked) and determine the efficiency of practice (income per hour). Exhibit 19 does the arithmetic.

If the veterinary practitioner wishes to earn $60,000 of take home, taxable income per year, he is willing to work 250 days a year, ten hours per day, and if 80% of those hours are real income generating hours, and if overhead costs are 60% of gross income, then the practitioner needs to gross $150,000 per year. The 60% overhead costs, in actuality, refers to total practice expenses as a proportion of gross. Again, a study done by Dr. Wise in 1989 showed that for large and mixed practices, the typical practice overhead costs were 62% of gross. If the practitioner's gross income per year is to be $150,000, then gross per day needs to be $600, gross per total working hours needs to be $60, and gross per effective working hours (i.e., those hours when one is doing something billable) needs to be $75 per hour. It is all just arithmetic.

The table in Exhibit 19 provides some more interesting information. Obviously, the gross needed per effective working hour varies as a function of several factors. The table presents the effect of what percent of one's time is effective billable time and the effect

of the percent of gross revenue that is cost overhead or practice expenses. Notice particularly what happens if one is 80% efficient in using one's time as a practitioner and practice expenses can be lowered to 50% of gross. Then, to earn $60,000 per year, one must gross $60 per hour of effective time, not $75. Exhibit 20 displays the same calculations for a desired income of $80,000. Again, notice that if one is 80% effective in using one's time and manages a 50% overhead, then to earn $80,000 per year one needs to gross $80 per hour of effective time.

How many clients or cows does one need to do this? Dr. Bill Hartmann of the Minnesota Board of Animal Health reports that there are 532 practitioners in Minnesota who Brucella vaccinate calves. If one assumes, for the moment, that all of them are dairy practitioners and they represent all of the dairy practitioners, then there are at least 500 practitioners in the State who spend at least part of their time in dairy practice. If one assumes that they spend roughly 50% of their time actually doing dairy work, on average, and that there are 700,000 cows in Minnesota, then there are approximately 2,600 cows per full-time dairy practitioners in Minnesota (Exhibit 21). Similarly, with 14,000 herds in Minnesota, there are approximately 53 dairy herds per full-time dairy practitioner equivalent in Minnesota.

Another way to go after this issue is to assume a certain income per cow and then to calculate the number of cows it takes to generate a particular desired income by the veterinarian. Again, let's make some assumptions. Assume a desired income of $80,000. Assume 60% overhead expenses from gross revenue. This translates to a needed gross of $200,000 per practitioner. If one earns $25 per cow in one's practice, then one would have to serve 8,000 cows. The top table in Exhibit 21 provides a breakdown of the number of cows needed to support a practice based on the percent overhead in the practice and the income per cow. Let's follow two numbers from those tables. The numbers for 60% overhead and $40 per cow (the current typical situation in upper Midwest dairies) or the situation if one could reduce one's practice overhead to 50% and if one could earn $60 rather than $40 per cow. Notice in the first case, 60% overhead and $40 per cow, one must serve 5,000 cows in order to generate the desired income of $80,000. If one can reduce one's overhead to 50% and increase revenue per cow by providing more services to the dairy to $60 per cow, then one need only serve 2,600 cows to generate the same $80,000. In the next table down in Exhibit 21, if one's average dairy has 50 cows in the first scenario (60% overhead, $40 per cow), one must serve 133 herds. With reduced overhead and increased revenue per cow (50% overhead, $60 per cow), one need only serve 53 dairy herds. If one assumes that the veterinarian is willing to work about 20 days per month, then at the 60%, $40 level, one must serve 4.8 herds per day. At the 50% overhead and $60 dollar level, one need only serve 2.6 herds per day (Exhibit 22). From the lifestyle point of view, it may be a much more sustainable veterinary lifestyle choice to serve fewer herds, spending more time with each one, than serving many herds on a more limited basis. If one assumes eight effective working hours per day (i.e., time on farm), then if one is working with a 60% overhead, one had better gross $100 per hour, and if one is working with a 50% overhead, one need only gross $80 per hour.

What does this increased income per cow mean in terms of your client's gross income? In a 50 cow herd with a 17,775 rolling herd average (Minnesota DHIA average) where 90% of their income is from milk sales at $12 per hundred weight, gross income will be about $118,500. At $40 per cow for veterinary services, the farmer would spend $2,000 on veterinary medical services, or 1.7% of their gross income (Exhibit 23). At $60 per cow, they would spend another $1,000 for a total of $3,000, or 2.5% of the dairy's income.

The question then is: what can you do for your client that justifies their spending an extra $1,000 per year on your services? Obviously, through most of this discussion we have been discussing the average Minnesota dairy farm, so it is perhaps instructive to look at the current productive status of the average Minnesota dairy farm (Exhibits 24 & 25) and to realize that the average Minnesota dairy farm has a lot of room for improvement. One need only look at the Minnesota DHIA score card for 1992 to recognize that average dairy farms have significant problems in a number of categories. Many of these categories are potential areas for improvement as a result of veterinary services, both clinical and consultative. An obvious place to start to make money for a dairy client is in the area of cost control (Exhibit 26), and certainly everyone knows clients who spend money in places where there is really no return for their investment. When controlling costs, it is generally most productive to look at the costs in categories where costs are large. The obvious dairy example of this is feed costs, which on the typical dairy farm accounts for 60% of the operating expenses of the farm. If one could simply reduce the average feed bill by 5%, one could potentially cut total expenses by as much as 3% of gross income. If it could be achieved, that reduction alone would pay for the dairyman's entire veterinary bill, not just the additional $1,000. Without considering improved production or health effects, one study has shown that routine nutritional consultation by veterinarians saved 14 percent of total feed costs on dairies (Ferguson 1987).

Potential Cost Savings for Average Minnesota Dairies

If veterinarians are going to justify increased services to dairies and increased expenses for those services, then veterinarians have to solve problems that will return more to the farmer than the costs of those services. Its perhaps instructive to look at the potential improvement in revenue or profit that might exist on average Minnesota dairies in four major operational categories: nutritional management, mastitis, reproduction, and the youngstock program. These examples use values that approximate the average numbers for Minnesota DHIA herds or reasonable estimates of numbers where actual data are not available.

Nutritional Management

If one makes the assumption that increased veterinary services to an average dairy might improve dry matter intake by 2 lbs. and save $.10 per cow in feed costs per day, significant savings to the farm could result (Exhibit 27). Assuming .75 megacalories per pound of dry matter intake per pound of dry matter, the increased 2 lbs of intake would translate into 1.5 megacalories. At .33 megacalories per pound of milk produced, that would translate into an increased milk production in the average cow of 4.5 pounds of milk per day. At $12.50 per hundred weight and assuming a marginal feed cost of 33%

of milk value, the increased profit from the dry matter intake improvement would net about $6,900 of extra income to the dairyman per year, with feed cost savings could net an addition of $1,800 for a total extra profit for improved nutritional management of as much as $8,700 or more.

Mastitis

Exhibits 28 & 29 model the potential savings from an improved mastitis control program over the status of an average Minnesota dairy farm. The average Minnesota dairy farm is run at a somatic cell count of 350,000. If increased veterinary services improved their mastitis status to 200,000 for cows and 150,000 for first calf heifers (with some estimated improvements in cull rate, deaths and treatment rates), the potential gains from achieving the goal status compared to the average status could be as much as $6,300 per year.

Reproduction

If one set as the goal for dairy that they have a 50 day voluntary waiting period, 1.8 services per conception in pregnant cows and a 70% accurate heat detection rate then days open could be reduced below 100 days. Using estimated numbers for the status of the average Minnesota dairy, then the potential savings if the reproductive goals were achieved are as much as $5,000 per year (Exhibit 30). Veterinarians can obviously play a major role in improved reproductive performance, often for little increased expense for the dairyman.

Youngstock

The average Minnesota dairy calves their heifers at 28 months. If heifers could be raised efficiently to calve at 24 months at a similar size and productive capacity, and making some reasonable assumptions about feed costs and overhead per heifer, the average 50 cow Minnesota dairy may expect to earn as much as $5,000 per year additional profit in calving their heifers 4 months earlier (Exhibit 31).

Summary

Obviously, in some of these examples, no accounting has been made of the additional costs necessary to move the herd from its average status to the goal status. This will vary from herd to herd and over time in an individual herd. A summarization of those potential profits/revenues (Exhibit 32) shows that there could be as much as $25,000 extra money available to the dairyman if the average herd moved from average status to reasonably achievable goals. If part of the expense of achieving that improvement is an extra $1,000 in veterinary service fees per year, then there certainly is quite a large potential return on that investments in veterinary services. It may not be reasonable to expect all of the benefits to be additive, but clearly there is enough potential in the system to make the effort worth considering. Investment in veterinary services still can pay off handsomely for dairy producers.

Conclusion

Minnesota's dairy industry is facing a time of significant change, turmoil and financial duress. The veterinary profession that serves that industry has a responsibility to help their clients through these difficult times and, in many cases, to provide valuable

services as producers make the transition from traditional small dairies to dairies of larger and economically sustainable scale. As a profession, we have always served dairy herds, preventing disease, feeding animals, improving the productivity of dairies. There is an opportunity for dairy veterinarians, if they choose as individuals to take advantage of it, to expand the array of services that are provided to dairy farms. If veterinarians will do so, they can improve both the dairy farm's financial picture, survivability, and the quality of life of the dairy farmer while at the same time improving the income and lifestyle of the practicing veterinarian. For me, at least, it seems an opportunity worth pursuing.

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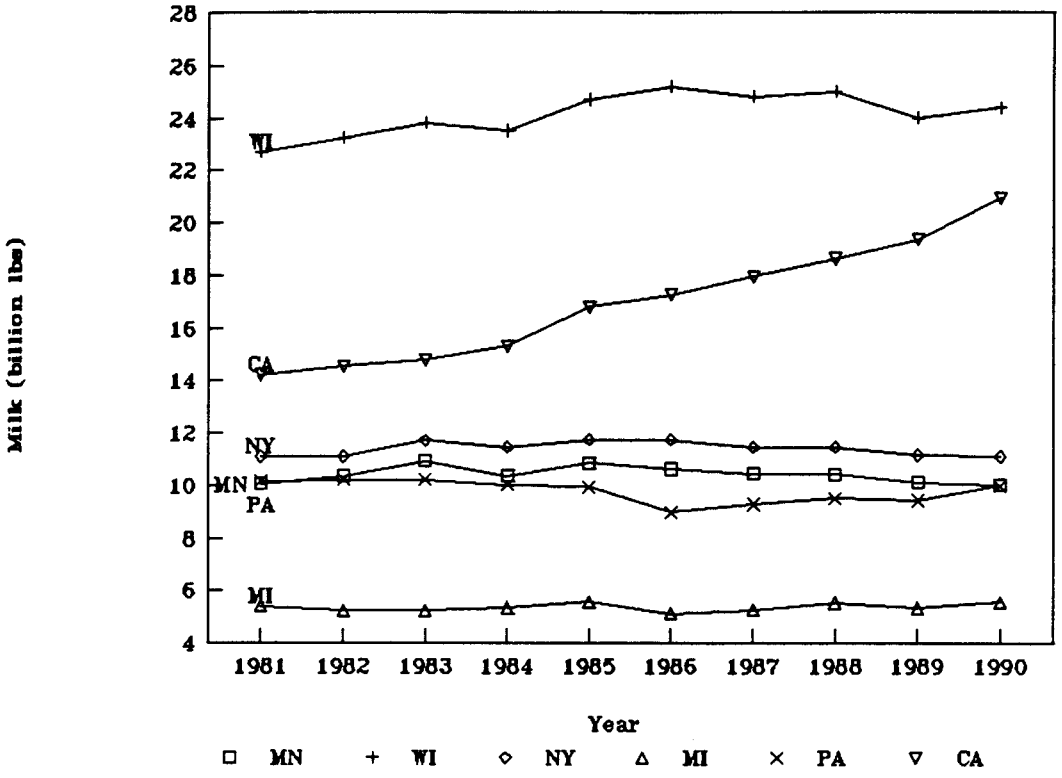
DAIRY INFORMATION SOURCES
USED TO MAKE CHANGES
MINNESOTA: 1992

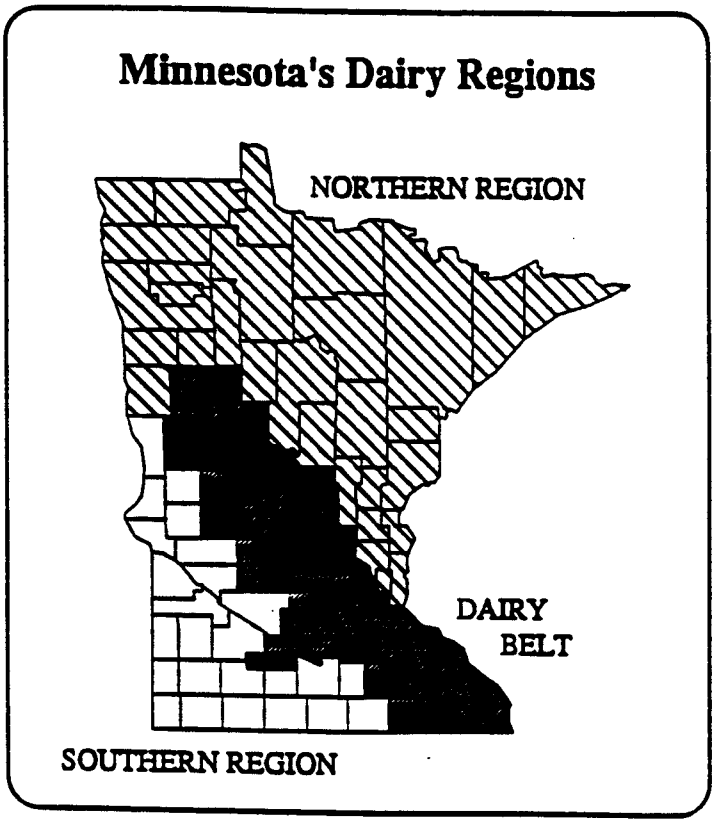
Source	Freq.	Rank	Trust	Rank
Veterinarian	3.31	1	3.50	1
Agricultural Supplier	3.11	2	2.89	3
Family Members	2.88	3	3.16	2
Neighbor or Friend	2.62	4	2.74	4
Advertising Circular, etc	2.46	5	2.12	12
Mass Media	2.41	6	2.22	8
County Extension Agent	2.23	7	2.72	5
Univ. Extension Specialist	2.06	8	2.61	6
Bank or Lender	1.88	9	2.20	9
Farm Business Mgt. Instructor	1.78	10	2.23	7
Professional Ag. Literature	1.73	11	2.14	10
Paid Agricultural Consultant	1.66	12	2.14	11
High School/Tech Ag Teacher	1.62	13	2.01	13
Electronic Informat. Service	1.38	14	1.60	14

(Bracewell et. al. Innovation Diffusion and Decision Making by Minnesota Dairy Farmers, U of MN, 1992)

MILK PRODUCTION BY STATE

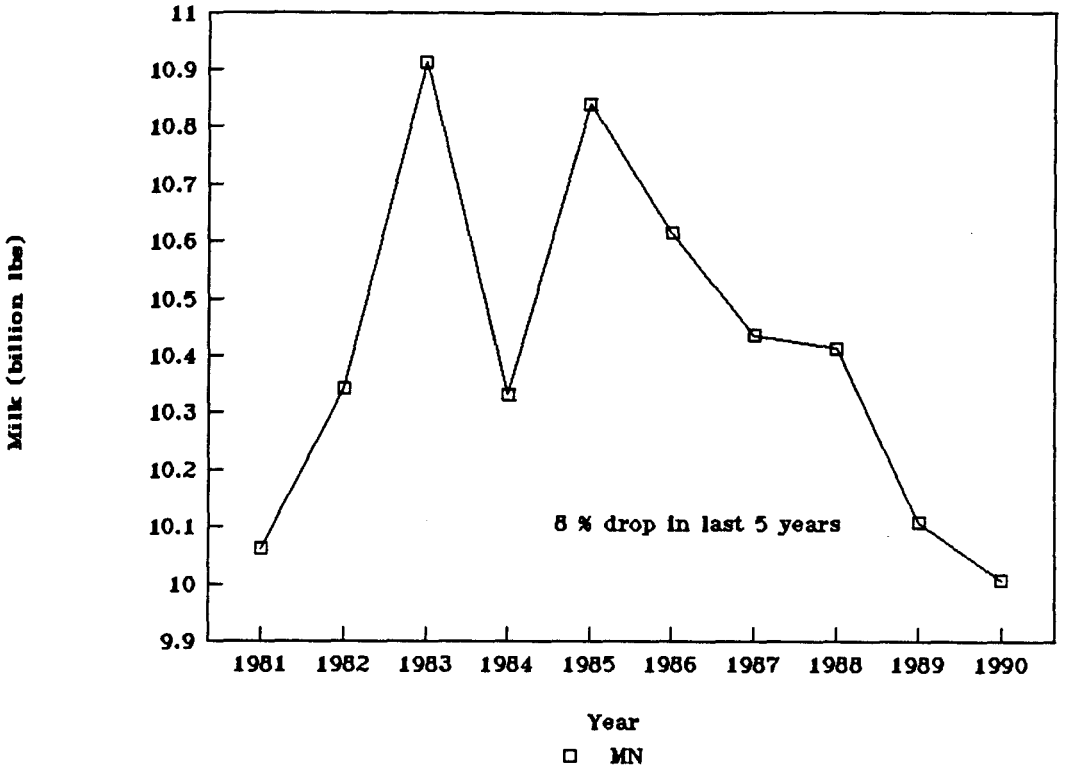
1981 - 1990




Minnesota's Dairy Regions
NORTHERN REGION
DAIRY
BELT
SOUTHERN REGION

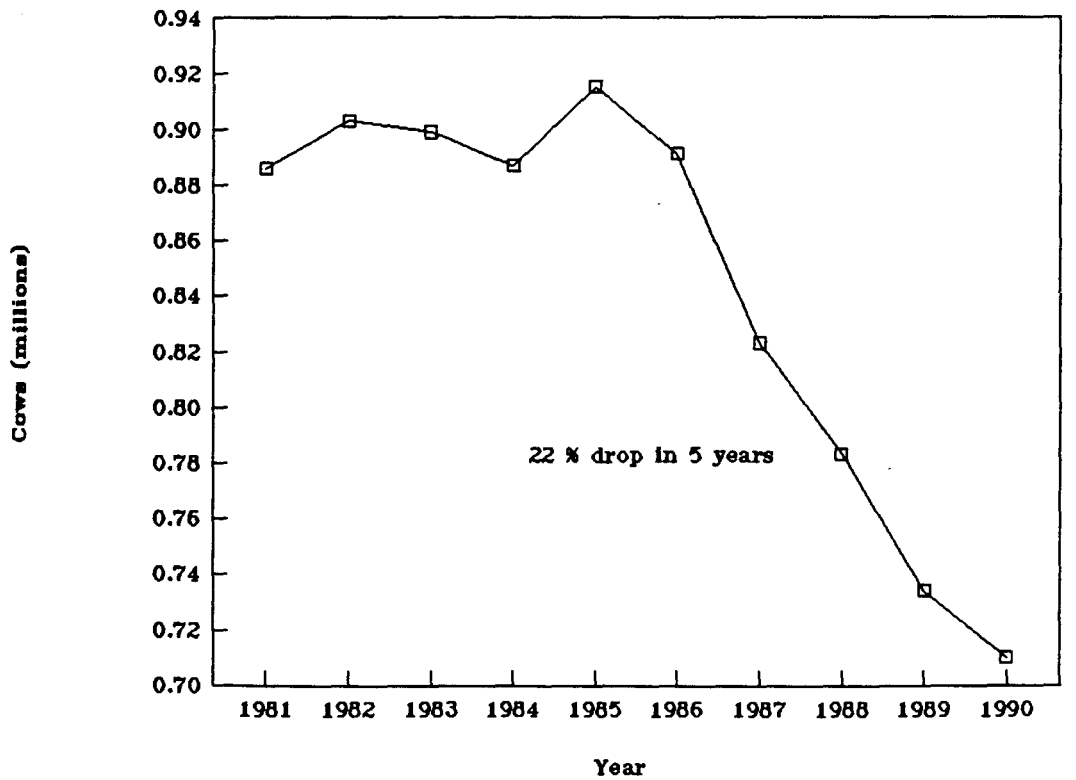
MILK PRODUCTION IN MINNESOTA

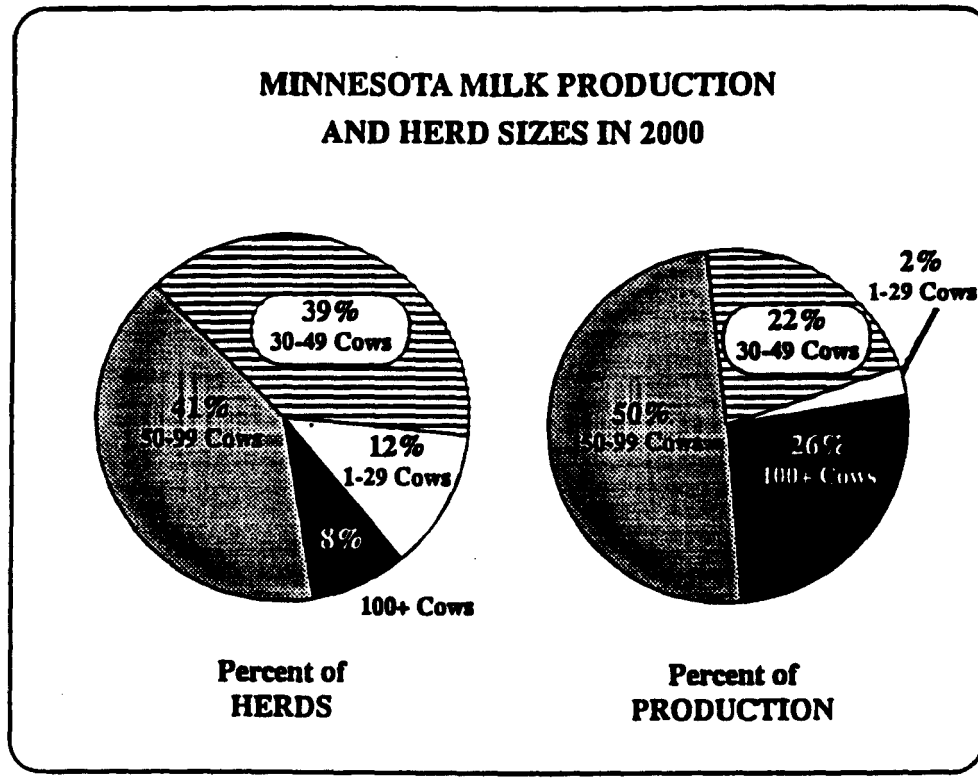
1981 - 1990

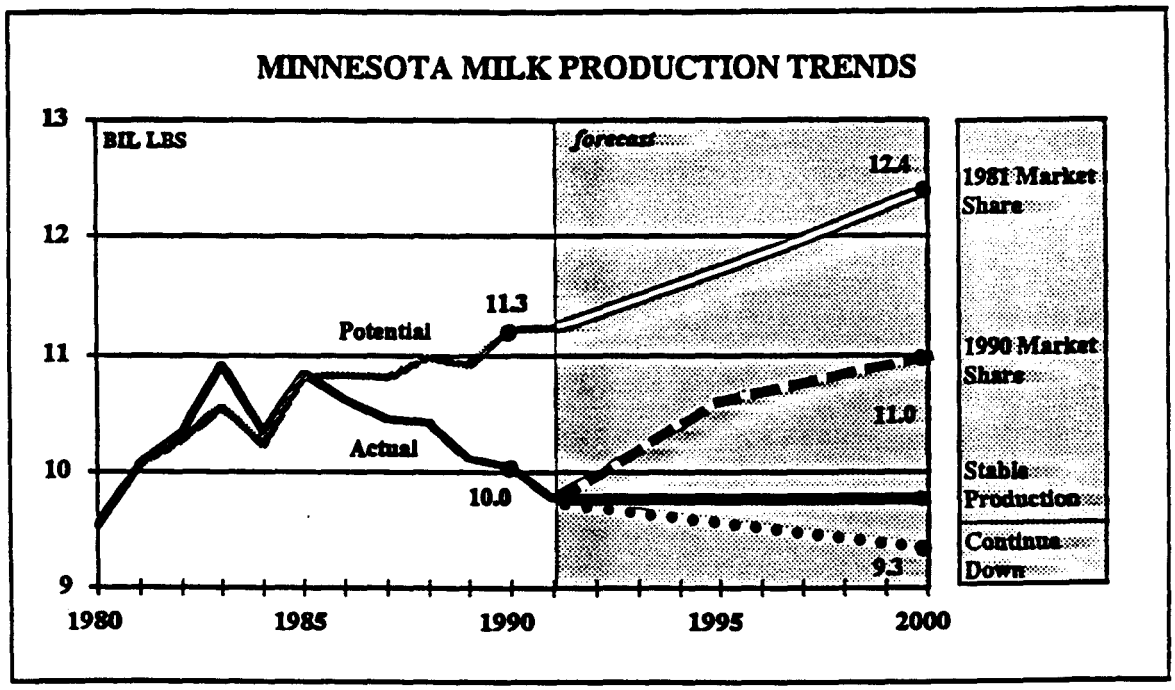


COW NUMBERS IN MINNESOTA

1981 - 1990




MINNESOTA MILK PRODUCTION
AND HERD SIZES IN 2000
39%
30-49 Cows
41%
50-99 Cows
12%
1-29 Cows
8%
100+ Cows
Percent of
HERDS
2%
1-29 Cows
22%
30-49 Cows
50%
50-99 Cows
26%
100+ Cows
Percent of
PRODUCTION


MINNESOTA MILK PRODUCTION TRENDS
BIL LBS
13
12
11
10
9
1980
1985
1990
1995
2000
forecast
12.4
11.3
Potential
Actual
11.0
10.0
9.3
1981 Market Share
1990 Market Share
Stable Production
Continue Down

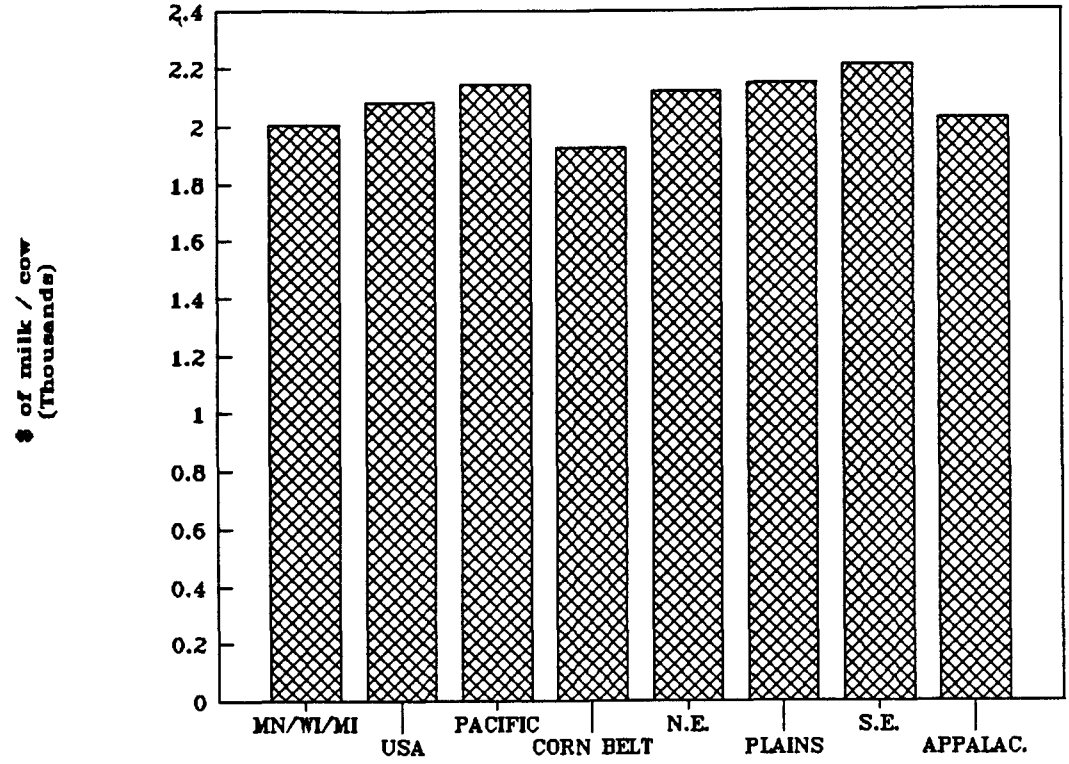
IMPACT OF REGAINING NATIONAL MARKET SHARE

- Dairy output up 570 million
- Employee payroll up 158 million
- 7,600 new jobs
- 430 million value added dollars
- Additional 47 million in state tax revenue

MILK PRODUCTION COSTS PER COW: 1990	UPPER MIDWEST	%	USA	%	PACIFIC	CORN BELT	NORTH EAST	SOUTH. PLAINS	SOUTH EAST	APPALAC.
Milk per cow (lbs)	14,854	INCOME	15,203	INCOME	17,580	14,365	14,546	14,634	13,393	13,685
Gross income from dairy:										
Milk	2,005	89%	2,083	91%	2,144	1,925	2,124	2,151	2,209	2,025
Cull cows	257	11%	216	9%	188	237	204	184	161	202
TOTAL INCOME	2,262	100%	2,299	100%	2,332	2,162	2,328	2,335	2,370	2,227
Cash expenses:										
Concentrates	556	25%	637	28%	575	626	689	816	1,021	673
Silage and haylage	162	7%	127	6%	137	63	131	50	55	122
Hay	158	7%	204	9%	376	156	147	198	145	124
Pasture and other forage	17	0.8%	21	0.9%	21	26	22	26	16	21
By-products	16	0.7%	46	2.0%	123	14	10	80	61	34
Total feed:	909	40%	1,035	45%	1,232	885	999	1,170	1,298	974
Other:										
Veterinary and medicine	37	1.6%	32	1.4%	24	42	33	25	29	30
Artificial insemination	21	0.9%	19	0.8%	19	16	22	5	14	17
DHIA fees	8	0.4%	8	0.3%	8	9	10	3	3	6
Dairy supplies	29	1.3%	32	1.4%	29	33	35	41	26	40
Hired labor	106	5%	124	5%	168	88	92	156	148	157
Milk hauling and marketing	71	3%	91	4%	91	94	92	115	143	114
Livestock hauling	6	0.3%	4	0.2%	4	3	3	2	2	3
Fuel, lube, and electricity	21	1%	25	1%	36	35	19	15	15	26
Machinery and building repairs	82	4%	70	3%	57	66	88	39	34	55
Dairy assessment & misc.	2	0.1%	2	0.1%	1	2	1	1	7	4
Total variable cash expenses:	1,292	57%	1,442	63%	1,669	1,273	1,394	1,572	1,719	1,426
Fixed cash expenses:										
General farm overhead	171	8%	138	6%	111	125	164	76	57	115
Taxes and insurance	43	2%	30	1%	22	28	37	10	12	14
Interest	135	6%	108	5%	96	127	116	58	49	72
Total fixed cash expenses:	349	15%	276	12%	229	280	317	144	118	201
TOTAL CASH EXPENSES:	1,641	73%	1,718	75%	1,898	1,553	1,711	1,716	1,837	1,627
Income - cash expenses:	621	27%	581	25%	434	609	617	619	533	600
Capital replacement	278	12%	254	11%	212	209	280	298	235	228
INCOME - CASH AND CAPITAL EXPENSES:	343	15%	327	14%	222	400	337	321	298	372
Economic (full ownership) costs:										
Variable cash expense	1,292	57%	1,442	63%	1,669	1,273	1,394	1,572	1,719	1,426
General farm overhead	171	8%	138	6%	111	125	164	76	57	115
Taxes and insurance	43	2%	30	1%	22	28	37	10	12	14
Capital replacement	278	12%	254	11%	212	209	280	298	235	228
Allocated returns to owned inputs:										
Return to operating capital	12	0.5%	13	1%	16	12	13	15	16	13
Return to other non-land capital	106	5%	89	4%	73	85	106	54	54	74
Land	35	1.5%	32	1%	12	72	36	14	15	45
Unpaid labor	352	16%	278	12%	93	429	360	164	77	316
Total economic costs:	2,289	101%	2,276	99%	2,208	2,233	2,390	2,203	2,185	2,231
Residual returns to management and risk	(27)	-1%	23	1%	124	(71)	(62)	132	185	(4)
Returns to management and labor	325		301		217	358	298	296	262	312
Average herd size	50		68		262	46	60	132	245	51
"Family income"	16,250		20,468		56,854	16,468	17,880	39,072	64,190	15,912

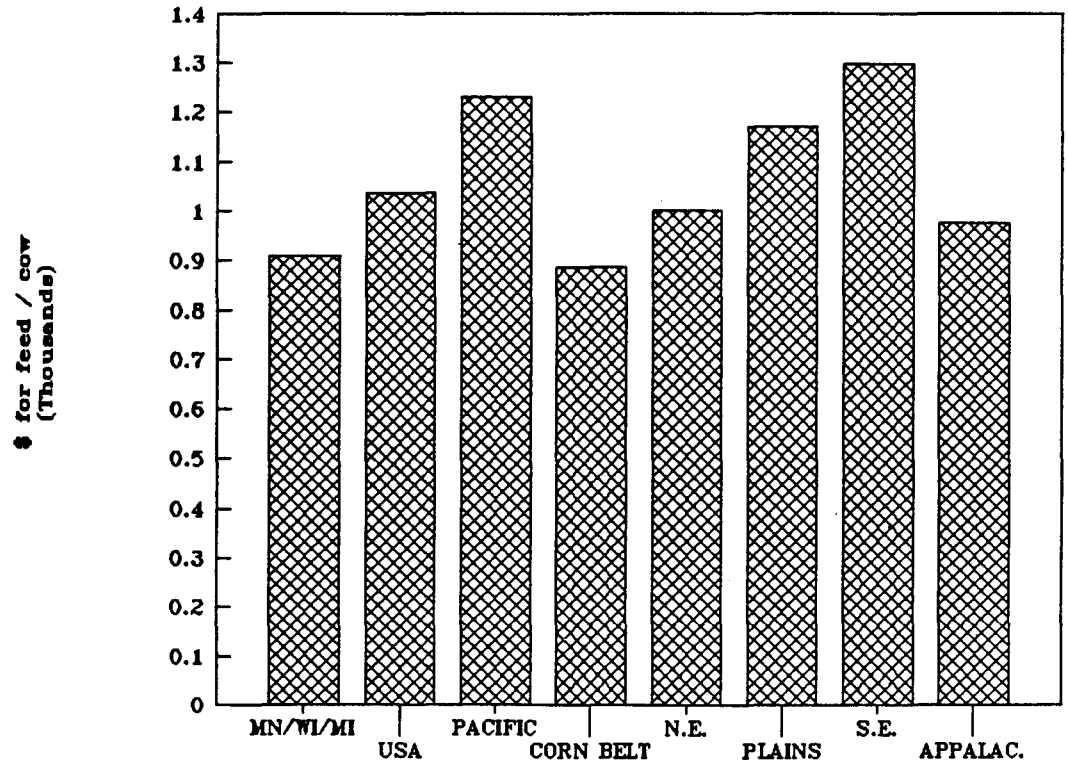
Milk Income by Region

1990



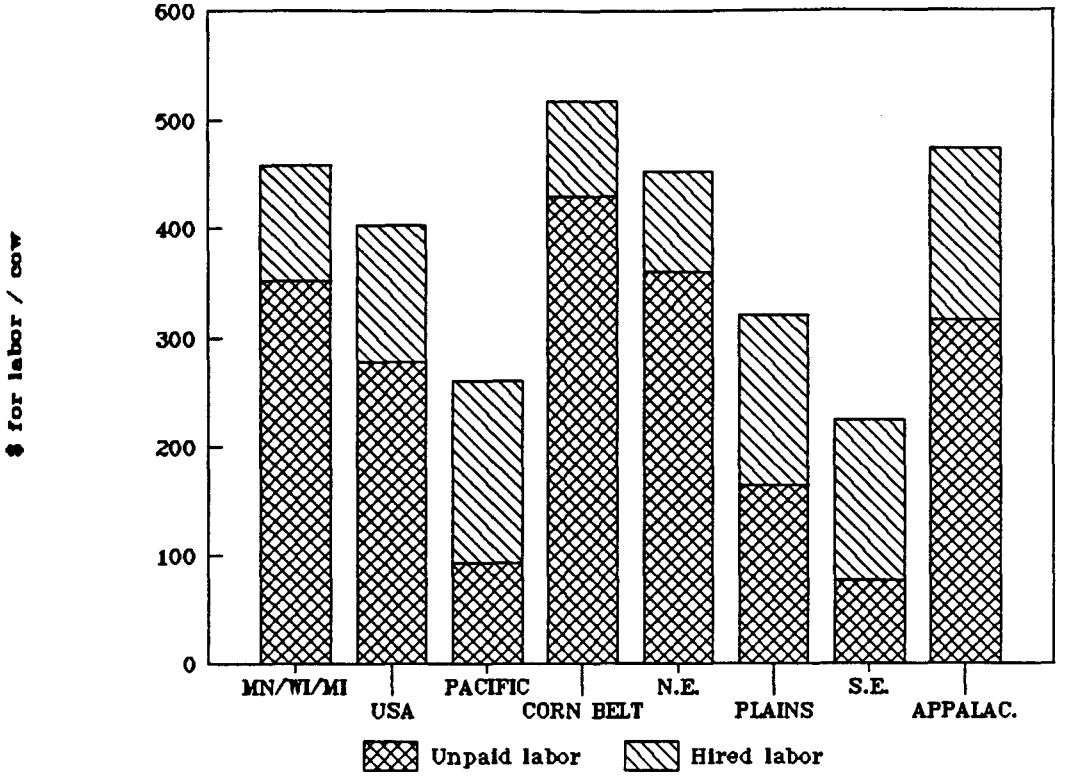
Feed Costs by Region

1990



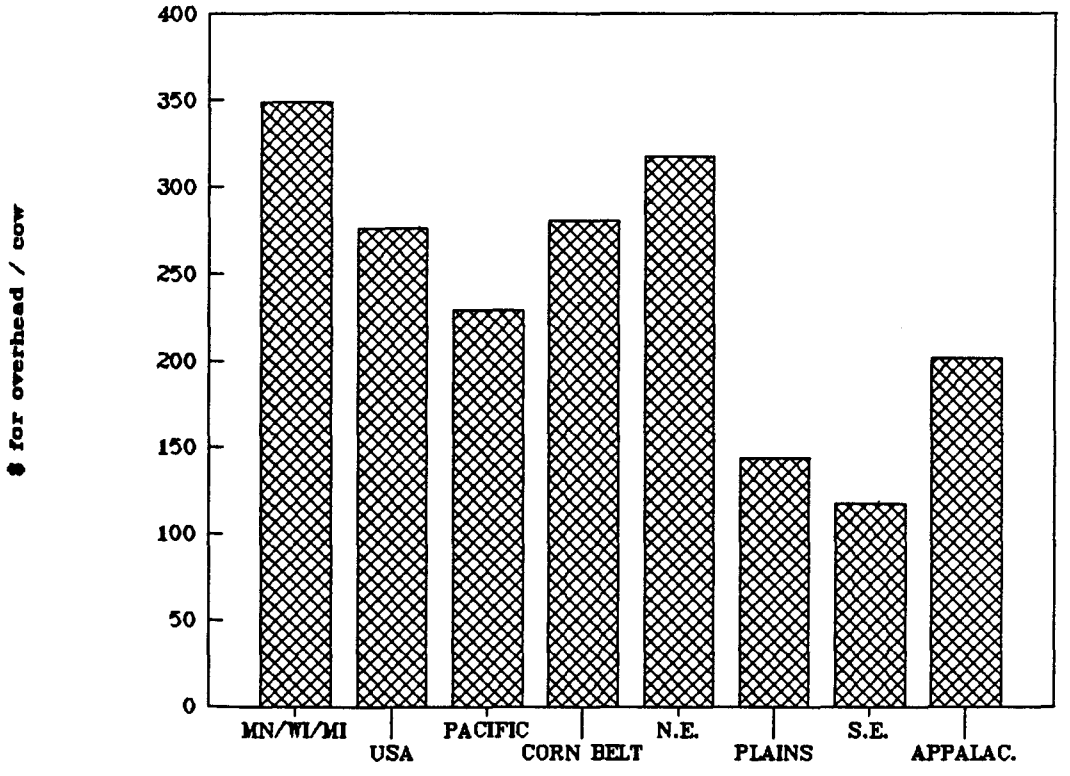
All Labor Costs by Region

1990



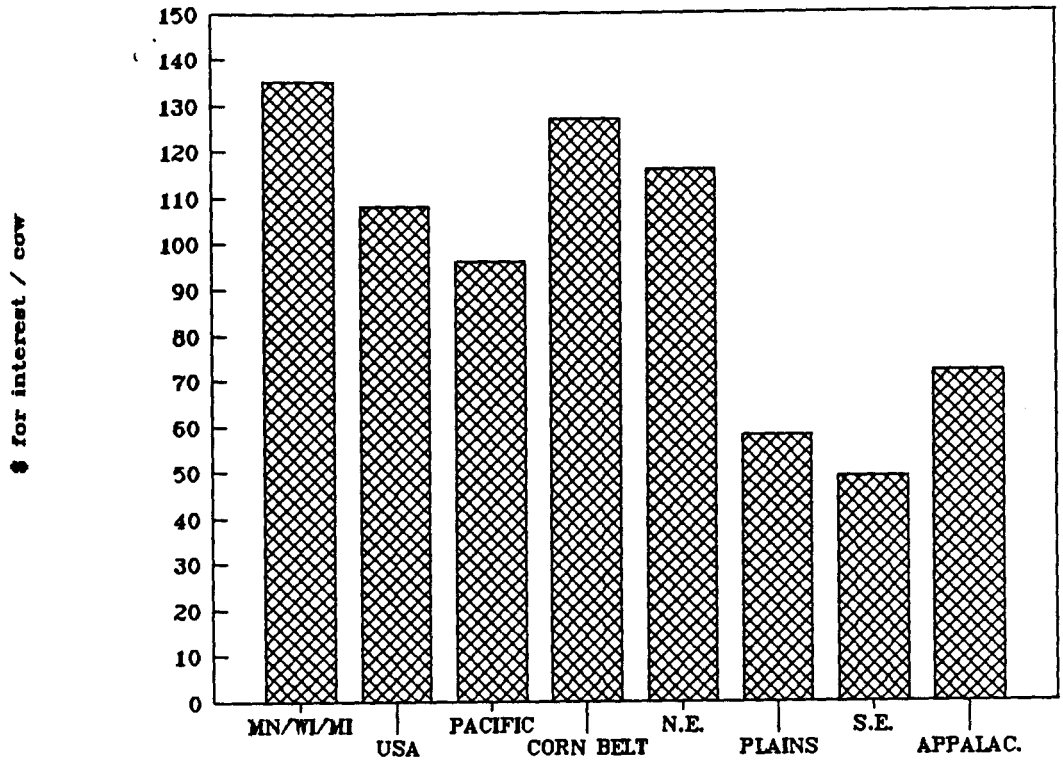
Overhead Costs by Region

1990



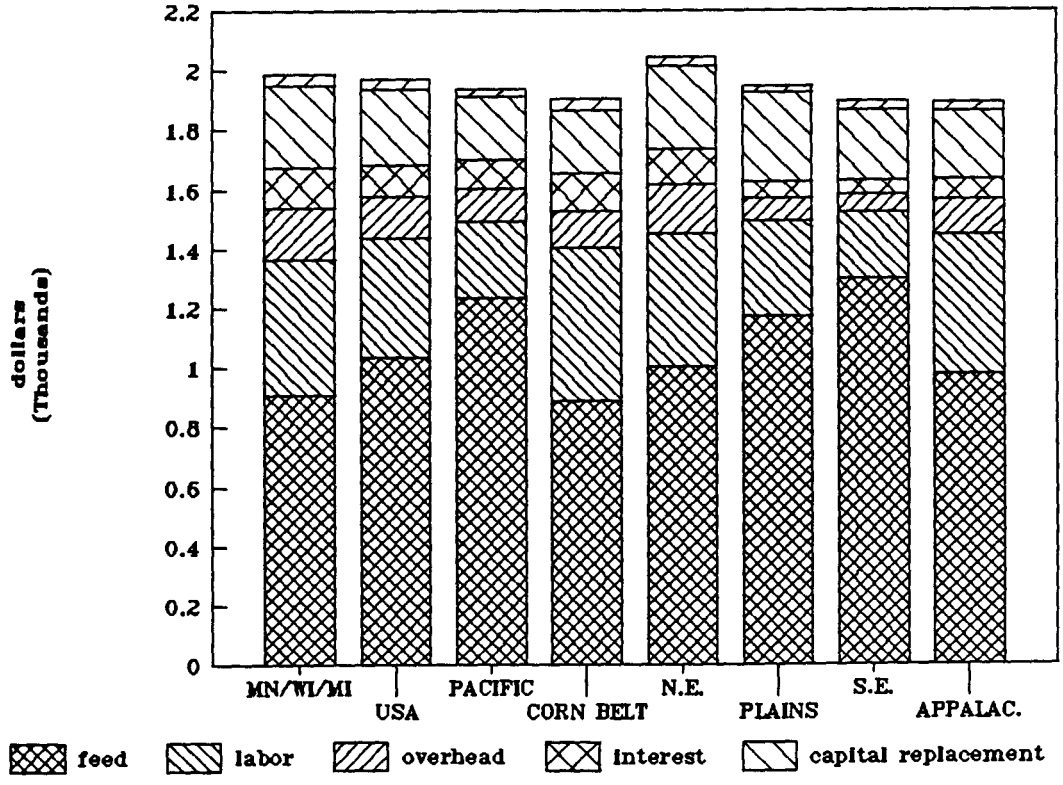
Interest Costs by Region

1990



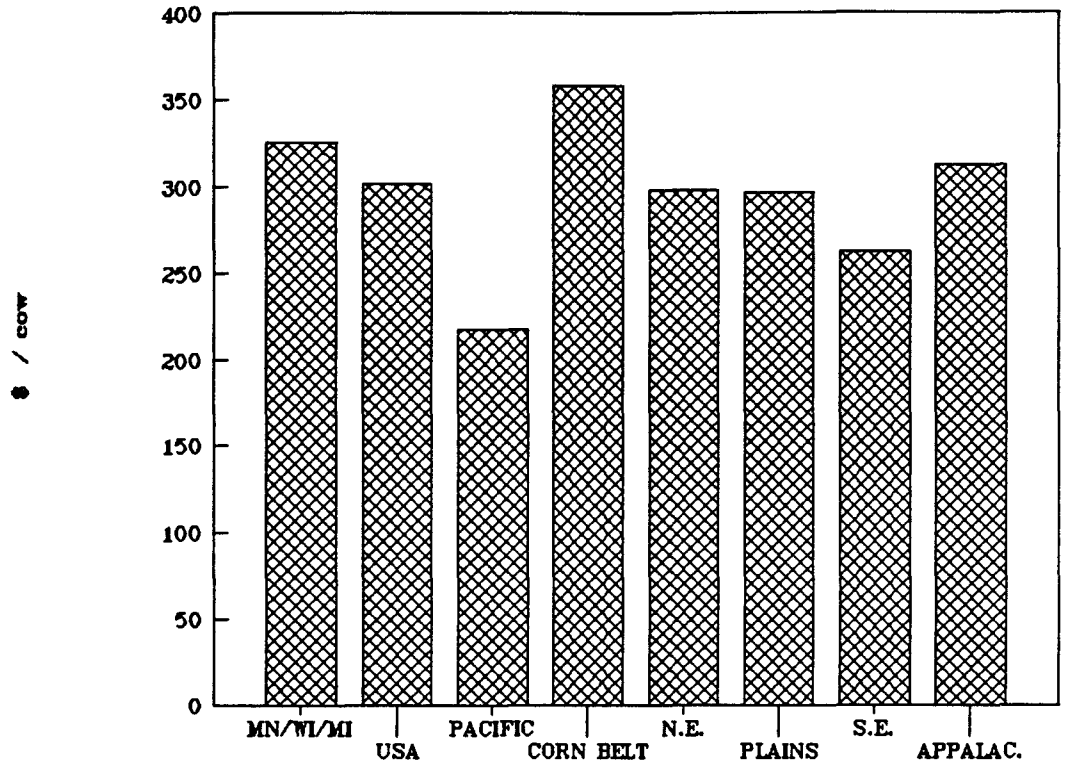
Major Costs Categories per Cow

1990



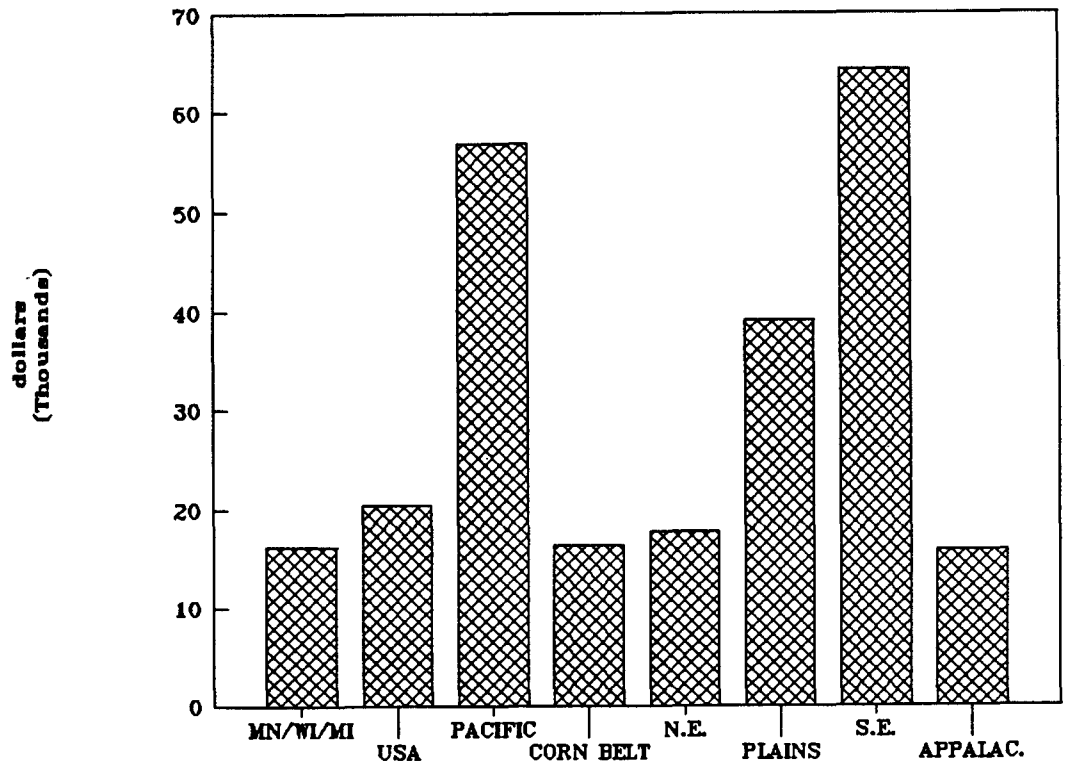
Returns to Management & Labor

1990



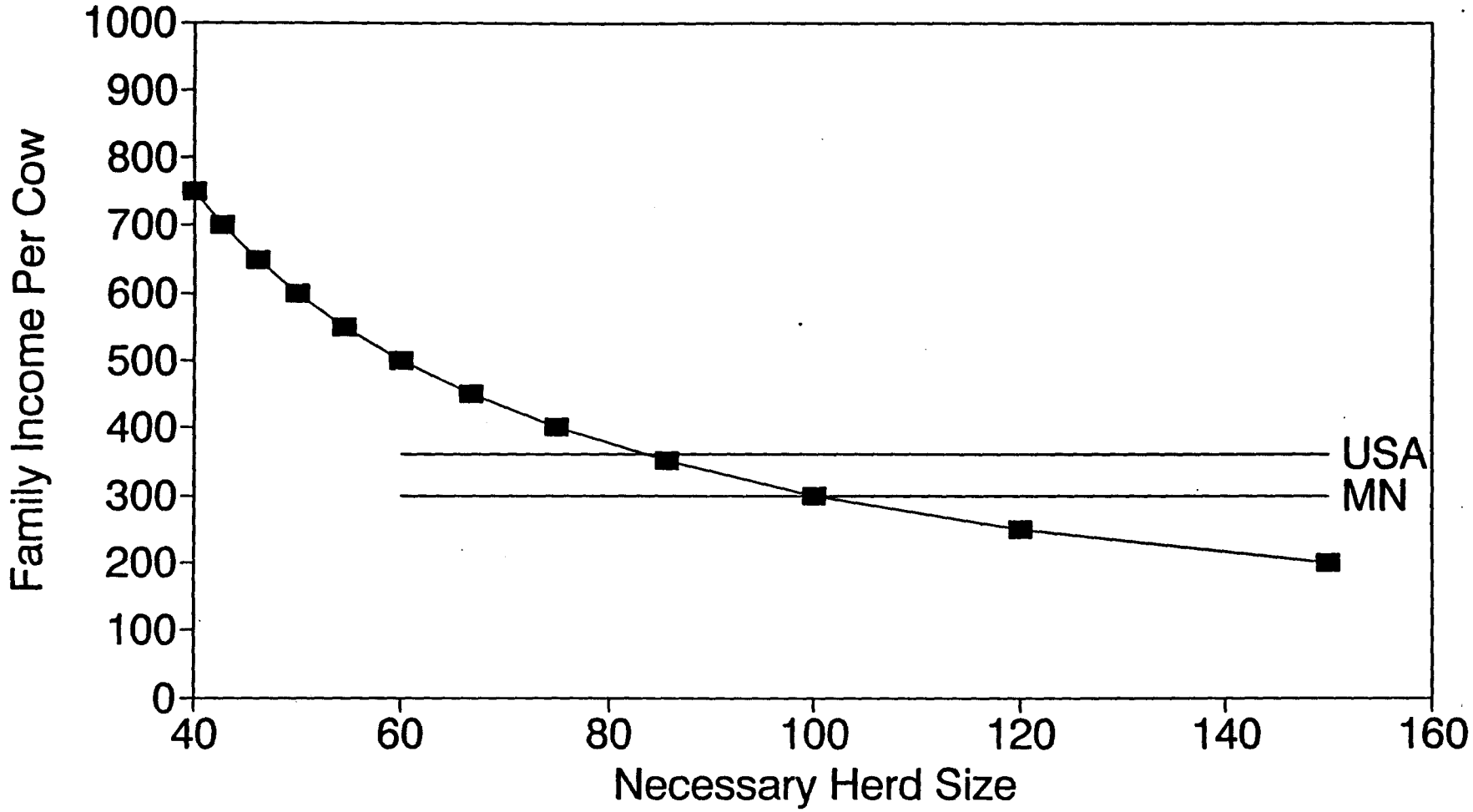
Family Income from the Dairy

1990



Family Income Needs Will Set Herd Size

$30,000 desired income



Minnesota ave:1989 — USA ave:1989

DAIRY INFORMATION SOURCES
USED TO MAKE CHANGES
MINNESOTA: 1992

Source	Freq.	Rank	Trust	Rank
Veterinarian	3.31	1	3.50	1
Agricultural Supplier	3.11	2	2.89	3
Family Members	2.88	3	3.16	2
Neighbor or Friend	2.62	4	2.74	4
Advertising Circular, etc	2.46	5	2.12	12
Mass Media	2.41	6	2.22	8
County Extension Agent	2.23	7	2.72	5
Univ. Extension Specialist	2.06	8	2.61	6
Bank or Lender	1.88	9	2.20	9
Farm Business Mgt. Instructor	1.78	10	2.23	7
Professional Ag. Literature	1.73	11	2.14	10
Paid Agricultural Consultant	1.66	12	2.14	11
High School/Tech Ag Teacher	1.62	13	2.01	13
Electronic Informat. Service	1.38	14	1.60	14

(Bracewell et. al. Innovation Diffusion and Decision Making by Minnesota Dairy Farmers, U of MN, 1992)

Veterinary Practitioner Income

$60,000	desired income
250	days worked per year
10	hours worked per day
80%	effective income generating hours (%)
60%	overhead costs (% gross income)
$150,000	gross income needed
$600	gross per day
$60	gross per working hour
$75	gross per effective working hour

Gross income per effective hour needed to achieve income goals

% Overhead	Effective % use of time 60%	70%	80%	90%
30%	57	49	43	38
35%	62	53	46	41
40%	67	57	50	44
45%	73	62	55	48
50%	80	69	60	53
55%	89	76	67	59
60%	100	86	75	67
65%	114	98	86	76
70%	133	114	100	89

$80,000	desired income
250	days worked per year
10	hours worked per day

Note: with 50% overhead and 80% effective use of time:
gross dollars per hour x 1000 = income.

Veterinary Practitioner Income

$80,000	desired income
250	days worked per year
10	hours worked per day
80%	effective income generating hours (%)
60%	overhead costs (% gross income)
$200,000	gross income needed
$800	gross per day
$80	gross per working hour
$100	gross per effective working hour

Gross income per effective hour needed to achieve income goals

% Overhead	Effective % use of time 60%	70%	80%	90%
30%	76	65	57	51
35%	82	70	62	55
40%	89	76	67	59
45%	97	83	73	65
50%	107	91	80	71
55%	119	102	89	79
60%	133	114	100	89
65%	152	131	114	102
70%	178	152	133	119

$80,000	desired income
250	days worked per year
10	hours worked per day

Note: with 50% overhead and 80% effective use of time:
gross dollars per hour x 1000 = income.

Cows per full time dairy veterinarian

$80,000	desired income	532	dairy practitioners in MN
60%	overhead (%)	50%	% time in dairy work
$200,000	gross needed	700,000	cows in Minnesota
$25	expenditures per cow	2,632	cows / full practitioner
8,000	# of cows needed	14,000	herds in Minnesota
		53	herds / full practitioner

Cows per practitioner

	Percent overhead					
	30%	40%	50%	60%	70%	80%
Income /	Gross income needed					
cow	114,286	133,333	160,000	200,000	266,667	400,000
25	4,571	5,333	6,400	8,000	10,667	16,000
30	3,810	4,444	5,333	6,667	8,889	13,333
35	3,265	3,810	4,571	5,714	7,619	11,429
40	2,857	3,333	4,000	5,000	6,667	10,000
45	2,540	2,963	3,556	4,444	5,926	8,889
50	2,286	2,667	3,200	4,000	5,333	8,000
55	2,078	2,424	2,909	3,636	4,848	7,273
60	1,905	2,222	2,667	3,333	4,444	6,667
65	1,758	2,051	2,462	3,077	4,103	6,154
70	1,633	1,905	2,286	2,857	3,810	5,714

Herds per practitioner

50 Cows per herd

*********	Percent overhead					
	30%	40%	50%	60%	70%	80%
Income /	Gross income needed					
cow	114,286	133,333	160,000	200,000	266,667	400,000
25	91	107	128	160	213	320
30	76	89	107	133	178	267
35	65	76	91	114	152	229
40	57	67	80	100	133	200
45	51	59	71	89	119	178
50	46	53	64	80	107	160
55	42	48	58	73	97	145
60	38	44	53	67	89	133
65	35	41	49	62	82	123
70	33	38	46	57	76	114

Herds per day

50	Cows per herd
20.8	Working days per month

*********	Percent overhead					
	30%	40%	50%	60%	70%	80%
Income /	Gross income needed					
cow	114,286	133,333	160,000	200,000	266,667	400,000
25	4.4	5.1	6.1	7.7	10.2	15.4
30	3.7	4.3	5.1	6.4	8.5	12.8
35	3.1	3.7	4.4	5.5	7.3	11.0
40	2.7	3.2	3.8	4.8	6.4	9.6
45	2.4	2.8	3.4	4.3	5.7	8.5
50	2.2	2.6	3.1	3.8	5.1	7.7
55	2.0	2.3	2.8	3.5	4.7	7.0
60	1.8	2.1	2.6	3.2	4.3	6.4
65	1.7	2.0	2.4	3.0	3.9	5.9
70	1.6	1.8	2.2	2.7	3.7	5.5

Dollars per hour: gross income

50	Cows per herd
20.8	Working days per month
8	Hours per day on farm (effective time)

*********	Percent overhead					
	30%	40%	50%	60%	70%	80%
Income /	Gross income needed					
cow	114,286	133,333	160,000	200,000	266,667	400,000
25	57	67	80	100	133	200
30	57	67	80	100	133	200
35	57	67	80	100	133	200
40	57	67	80	100	133	200
45	57	67	80	100	133	200
50	57	67	80	100	133	200
55	57	67	80	100	133	200
60	57	67	80	100	133	200
65	57	67	80	100	133	200
70	57	67	80	100	133	200

Percent of your farmer's gross income

50	Cows per herd
17,775	rolling herd average
90%	milk percent income
$12.00	milk price/cwt
$118,500	farm gross income

****

Income / cow	vet $ / year	percent of farm gross
25	1250	1.1%
30	1500	1.3%
35	1750	1.5%
40	2000	1.7%
45	2250	1.9%
50	2500	2.1%
55	2750	2.3%
60	3000	2.5%
65	3250	2.7%
70	3500	3.0%

MINNESOTA DHI SCORECARD FOR 1992

	MINNESOTA HOLSTEIN HERD AVERAGES, LB MILK						
MANAGEMENT FACTOR	<12,000	14-15,000	16-17,000	18-19,000	20-21,000	>22,000	YOUR HERD
PRODUCTION MEASURES							
Milk, lb	10969	14543	16550	18480	20434	23034	
MLM, lb	37	48	53	59	65	73	
Average Peak lb, 1st Lactation	45	55	61	66	71	78	
Average Peak lb, Other Cows	58	71	79	86	93	103	
Average Days in Milk	176	171	171	169	169	172	
MASTITIS							
% SCC Positive	60	53	47	42	38	36	
NUTRITION							
Total DM/cwt	3.1	3.1	3.2	3.3	3.3	3.5	
Energy Index	129	116	114	110	107	107	
Protein Index	151	132	129	125	122	121	
Milk/lb Grain DM	2.2	2.6	2.8	3.0	3.1	3.1	
RECORDS UTILIZATION							
Sire ID, 1st Lactation, %	51	59	74	85	93	93	
REPRODUCTION							
% Dry 40-70 Days	43	54	62	69	72	72	
Heat Detection Index	37	41	44	48	49	50	
Average Days, 1st Breeding	84	87	84	83	83	84	
Days Open	168	140	131	127	127	129	
GENETICS, PD$ (adjusted for genetic trend)							
Service Sire	230	229	230	235	238	242	
1st Lactation	154	158	168	175	183	185	
Other Cows	84	97	110	120	129	135	
CULLING							
% Cows Leaving Herd, 1st Lactation	9	10	11	12	14	14	
% Cows Leaving Herd, Other Cows	27	29	28	29	29	28	
	← Problem Area				Goal →		

DHI YARDSTICK FOR 1992 - HOLSTEIN ROLLING HERD AVERAGES, AUGUST 1991

	< 10000	12-12999	13-13999	14-14999	15-15999	16-16999	17-17999	18-18999	19-19999	20-20999	21-21999	22000 +
NUMBER OF HERDS	97	118	256	444	684	872	883	785	577	399	204	155
COWS PER HERD	42	47	48	52	53	53	56	56	58	61	60	62
% COWS IN MILK	83	85	85	86	87	87	87	88	87	88	88	88
AVERAGE DAYS IN MILK	176	175	173	171	170	171	169	169	168	169	170	172
MILK LB	10969	12561	13555	14543	15512	16550	17501	18480	19490	20434	21453	23034
% FAT	3.8	3.8	3.7	3.8	3.7	3.7	3.7	3.7	3.7	3.7	3.6	3.6
% PROTEIN	3.1	3.2	3.2	3.2	3.2	3.1	3.1	3.1	3.1	3.1	3.1	3.1
MLM LB	37	42	45	48	51	53	56	59	62	65	68	73
ALL FEEDS 100% DM												
* GRAIN LB	4915	5125	5138	5508	5745	5932	6191	6259	6617	6699	7086	7336
TOTAL DM/CWT BW	3.1	3.1	3.0	3.1	3.2	3.2	3.3	3.3	3.4	3.3	3.4	3.5
FORAGE DM/CWT BW	2.0	1.9	1.8	1.9	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9
ENERGY INDEX	129	122	114	116	116	114	113	110	111	107	107	107
PROTEIN INDEX	151	144	133	132	131	129	129	125	126	122	119	121
MILK/LB GRAIN DM	2.2	2.5	2.6	2.6	2.7	2.8	2.8	3.0	2.9	3.1	3.0	3.1
VALUE OF PRODUCT, $	1246	1455	1568	1693	1812	1935	2054	2169	2297	2411	2522	2715
TOTAL FEED COST, $	712	722	724	762	798	813	846	856	899	913	927	991
INCOME OVER FEED COST, $	534	733	842	931	1014	1122	1208	1313	1398	1498	1595	1724
FEED COST/CWT MILK, $	6.49	5.75	5.34	5.24	5.14	4.91	4.83	4.63	4.61	4.47	4.32	4.30
MILK PRICE/CWT, $	11.36	11.58	11.55	11.64	11.68	11.69	11.74	11.74	11.79	11.80	11.76	11.79
* % SCC POSITIVE	60	58	54	53	51	47	44	42	39	38	36	36
AVERAGE SIRE PD (adjusted for genetic trend)												
* AVERAGE PD$, SERVICE SIRE	230	230	229	229	229	230	234	235	235	238	239	242
AVERAGE PD$, 1ST LACTATION	154	141	158	158	163	168	172	175	181	183	185	185
AVERAGE PD$, OTHER COWS	84	77	85	97	103	110	116	120	128	129	132	135
1ST LACTATION VS OTHER COWS												
% OF HERD, 1ST LACTATION	29	31	33	33	34	35	36	36	36	37	37	37
AVERAGE PRODUCTION INDEX, 1ST LACTATION	102	103	102	103	103	103	103	103	103	103	102	102
AVERAGE PRODUCTION INDEX, OTHER COWS	103	103	103	103	103	103	103	103	103	103	103	103
AVERAGE AGE AT FRESHENING, 1ST LACTATION	29	28	28	28	28	27	27	27	27	27	27	27
AVERAGE AGE AT FRESHENING, OTHER COWS	62	60	59	59	58	58	57	57	56	56	57	56
* % SIRE ID, 1ST LACTATION	51	48	53	59	64	74	80	85	90	93	91	93
* % SIRE ID, OTHER COWS	44	43	45	52	59	69	76	82	87	90	90	94
* AVERAGE PEAK LB, 1ST LACTATION	45	49	53	55	58	61	63	66	69	71	74	78
* AVERAGE PEAK LB, OTHER COWS	58	64	68	71	74	79	82	86	90	93	98	103
* PEAK RATIO, 1ST + 2ND LACTATION	0.78	0.77	0.78	0.77	0.78	0.77	0.77	0.77	0.77	0.76	0.76	0.76
* % LEAVING HERD, 1ST LACTATION	9	8	10	10	10	11	12	12	13	14	14	14
* % LEAVING HERD, OTHER COWS	27	26	29	29	29	28	29	29	28	29	29	28
DAYS DRY BEFORE CALVING												
AVERAGE DAYS DRY	72	70	69	66	65	64	63	62	62	61	61	60
* % DRY LESS THAN 40 DAYS	16	17	14	14	13	10	8	8	7	7	8	9
* % DRY MORE THAN 70 DAYS	41	37	36	32	29	28	25	23	23	21	21	19
PREGNANT COWS												
* MINIMUM CALVING MONTHS INTERVAL	14.7	14.4	14.0	13.8	13.7	13.5	13.5	13.3	13.3	13.3	13.4	13.4
AVERAGE DAYS TO 1ST BREEDING	84	86	86	87	87	84	83	83	82	83	83	84
AVERAGE DAYS OPEN	168	160	148	140	137	131	131	127	125	127	129	129
CONCEPTION RATE	62	61	59	58	57	55	54	54	53	53	53	50
* HEAT DETECTION INDEX	37	35	40	41	42	44	46	48	50	49	50	50

* NOTE: Highlighted variables are those most closely related to production level. Individual herds may deviate drastically from averages on any variable indicating management differences.

The Need For Cost Control*

Dairy (Milking Herd) -- Average Per Cow --

Selected Items	Average For 34 Farms Quantity	Average For 34 Farms Value	Average For 7 Low Farms Quantity	Average For 7 Low Farms Value	Average For 7 High Farms Quantity	Average For 7 High Farms Value
Milk Sold (lbs.)	16,793.73		14,650.59		18,261.62	
Total Return		1,882.74		1,478.05		2,120.50
Corn Fed (bu.)	111.56		124.33		108.66	
Protein, Vitamins, Minerals (lb)	1,863.61	272.43	1,272.81	201.64	2,202.30	288.72
Breeding		30.65		31.68		29.18
Veterinarian & Medicine		61.82		76.79		58.85
Supplies		109.90		132.66		103.58
Marketing		51.34		66.97		53.31
Total Direct Costs		1,253.06		1,332.16		1,184.04
Return to Overhead		629.68		145.89		936.46
Avg. Number of Cows	69		52		102	
% of Barn Capacity Used	108		90		113	
Lbs. of Milk per lb. of Concentrate	2		1.8		2.1	
Avg. Milk Price ($ Per Cwt.)		12.09		11.43		12.30

* 1991 Livestock Enterprise Analysis, Southeast Minnesota Farm Business Management Association, 1991 Annual Report; (Farms sorted according to Return to Overhead per head)

Financial Impact of Improved Nutritional Management

$8,741 Extra profit from improved nutritional management
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Improved Dry Matter Intake

2.0	Increased dry matter intake (lbs)
0.75	Mcal / lb dry matter
1.50	Increased Mcal intake
0.33	Mcal / lb milk
4.5	Increased milk production
$12.50	Price of milk / cwt
$0.57	Value of extra milk
33%	Marginal feed cost (% of milk value)
$0.38	Profit per cow/day of increased dry matter intake
50	Herd size (milking cows)
$18.95	Extra income per day
$6,916	Extra income per year

Feed Cost Savings

$0.10	Savings per cow per day
$1,825	Savings per herd per year

MASTITIS ECONOMICS Average Minnesota Dairy	TOTAL LOSSES herd	 cow	LOSSES ABOVE GOAL herd	 cow	 %
Subclinical mastitis milk loss	$4,510	$85	$1,806	$34	28%
Loss of milk quality premiums	$5,747	$108	$1,790	$34	28%
Culling and death	$2,600	$49	$1,805	$34	28%
Clinical treatment	$1,694	$32	$976	$18	15%
herd SCC (1,000s) total	$14,551	$275	$6,377	$120	100%

17,775	rolling herd average		
53	total cows in the herd (lactating and dry) --- milking:		46
3	cows culled/year for mastitis	1	mastitis cows dead/yr
3%	goal for mastitis culling %/yr	0%	goal for deaths %/yr
30	mastitis cases treated in the last year		
2%	goal for clinical cases of mastitis (% of herd/mo)		
$1,100	average market price for a replacement animal		
$600	average sale price of a cull cow		
$15	ave. cost for treating a clinical case, incl. drugs & vet fee		
7	average days milk withdrawal, including treatment days		
20%	value of discard milk fed to calves: % of milk's market value		

Lost milk production from subclinical mastitis: 2nd and older lactation losses per day
Average Minnesota Dairy

lbs. loss/day	SCC code	milk price/CWT goal %	$12.50 actual %	# cows	lbs. lost	total $ loss	$ over goal
0	1	18%	13%	4	0	$0	$0.00
0	2	23%	16%	5	0	$0	$0.00
1.3	3	25%	19%	6	8	$1	($0.28)
2.6	4	12%	16%	5	13	$2	$0.42
3.9	5	9%	13%	4	16	$2	$0.59
5.2	6	7%	10%	3	16	$2	$0.54
6.6	7	3%	6%	2	13	$2	$0.88
7.9	8	2%	3%	1	8	$1	$0.38
9.2	9	1%	3%	1	9	$1	$0.79
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ave score	3.9	100%	totals:	31	82	$10.29	$3.31
goal ave	3.2						
goal SCC	200,000	for 2nd and older lactatn			total	over goal	
----------		herd losses per month:			$313	$101	
		herd losses per year:			$3,755	$1,209	

Lost milk production from subclinical mastitis: 1st lactation
%
losses per day

lbs. loss/day	SCC code	milk price/CWT goal %	$12.50 actual %	# cows	lbs. lost	total $ loss	$ over goal
0	1	25%	13%	2	0	$0	$0.00
0	2	25%	27%	4	0	$0	$0.00
0.6	3	25%	20%	3	2	$0	($0.12)
1.3	4	10%	13%	2	3	$0	$0.17
2	5	6%	7%	1	2	$0	$0.05
2.6	6	5%	7%	1	3	$0	$0.17
3.3	7	2%	7%	1	3	$0	$0.60
3.9	8	1%	3%	0.5	2	$0	$0.35
4.6	9	1%	3%	0.5	2	$0	$0.42
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ave score	3.6	100%	totals:	15	17	$2.07	$1.64
goal ave.	2.8						
goal SCC	150,000	for 1st lactation			total	over goal	
----------		herd losses per month:			$63	$50	
		herd losses per year:			$755	$597	

CALCULATOR FOR THE CAUSE AND COST OF REPRODUCTIVE INEFFICIENCY:
DHIA Dairies: average for 16,000 lb herds

53	total cows in herd	$2.00	cost of day open
12%	% repro culls (est.)	$12.00	cost of semen/breeding
7%	goal for repro culls	$1,100	cost of replacement
2.2	services/preg: all cows	$600	value of cull cow

days open added	GOALS		ACTUAL	days open added
50.0	50	days fresh when willing to breed	50	50.0
11.0	11	average days to wait for next estrus	11	11.0
16.8	1.8	services/pregnancy: pregnant cows	1.9	17.9
16.2	70%	percent of heats detected	43%	52.1
94		total days open		131
12.3		calving interval (months)		13.5

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$2.57 Dollars per day open including culling

LOSS PER COW ABOVE GOAL (per year):

		% of loss
$6	due to conception failure (including semen)	7%
$64	due to failure to detect heats	67%
$25	due to excess culling	26%
$95	Total	100%

LOSS PER YEAR FOR ENTIRE HERD

$5,034

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LOSSES DUE TO DELAYED FIRST CALVING DHIA Dairies: 16,000 lbs

	GOALS	ACTUAL		COSTS GOALS	COSTS ACTUAL
Age at calving	24	28			
Weight at weaning	150	150	Avg heifer feed $/month	31	31
Age at weaning	2	2	Overhead $/month	480	480
Weight at calving	1300	1300	Overhead/head/month	$19.2	$19.2
Rate of gain (lbs/day)	1.74	1.47	Total cost/heifer/day	$1.65	$1.65

Price of springing heifer $1,100
Number of heifers calving/year 25

ANALYSIS -

Loss avoidable per head			Total loss avoidable per year
	Feed:	$124	
	Overhead:	$77	$5,020
	Total per head:	$201	*********

Income available from transition to goal: $9,167
selling 8 extra heifers due to calve *********

1. Cost estimates taken from "Wisconsin Farm Enterprise Budgets" Luening, RA, Klemme, RM, and Howard, WT. 1987 A2731 Extension Publication, U fo WI, Madison WI.

This model calculates economic losses from delayed first parturition. The losses are broken down into 3 main categories:

a) Feed costs: Maintenance feed costs account for approximately 75% of the total feed cost in a 1100 lb Holstein heifer. The cost of wt. gain should be fairly constant over varying rates of gain. Reduced gains due to disease or parasitism of course would be an exception but these are difficult to quantify at this time.

b) Overhead costs: This cost includes the cost of the extra facilities, land and equipment needed for the larger heifer herd due to delayed first parturition. This estimate may be a "best guess" cost. Also included is cost of extra deworming and vaccination if applicable and includes other variable costs in addition to feed costs.

c) transition income from the sale of extra heifers as the interval to first calving is reduced. This same figure is a loss if the interval gets longer, i.e. the opportunity to sell heifers is lost.

Summarization of possible enhanced profits

$8,741	nutritional improvement
$6,377	mastitis improvement
$5,034	reproductive improvement
$5,020	youngstock improvement (+$9,167 one time)
$25,172	total

53	number of cows
$475	extra profit per cow
$12.50	milk price
3,800	lbs equivalent improvement in rolling herd average

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