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A PROFILE OF THE MINNESOTA MILK PRODUCTION SECTOR

by

Jerome W. Hammond



Department of Agricultural and Applied Economics

University of Minnesota
Institute of Agriculture, Forestry and Home Economics
St. Paul, Minnesota 55108

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** Jerome W. Hammond is a Professor, Department of Agricultural Economics, University of Minnesota.

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A PROFILE OF THE MINNESOTA MILK PRODUCTION SECTOR

Introduction

Regional shifts in U.S. milk production and a lag in productivity gains in Minnesota's dairy industry have raised questions about its competitiveness and the future structure of the industry in Minnesota. Dairy farm numbers in the state decline by 4 to 5 percent per year, much larger than declines in several other regions of the U.S. We lag behind all other major milk producing states in production per cow. In 1988, state milk production declined by .2 percent while national production increased by 2 percent. Analysts for the Office of Science and Technology of the U.S. Congress concluded, in a 1986 report, that the Northeastern and Upper Midwest Regions of the U.S. are losing their comparative advantage in milk production to the Southwest and some of the Southern states.¹ The report stated that by the year 2000, milk production nationally will reach 24,000 lbs per cow per year and that the most common herd size will be 1,500 to 2,000 cows. Given the demand growth that can reasonably be expected, 30 percent fewer cows will be required nationally to meet production needs.

Though some of the predictions and trends are alarming, I believe there is strong evidence that much of the state's dairy industry is competitive, and there is potential for it to remain competitive. My objective is to examine, briefly, some of these trends and to present some data that have been collected in a special survey of Minnesota's dairy production sector. They illuminate some of the industry's problems but they also indicate potential.

¹U.S. Congress, Office of Technology Assessment, Technology Public Policy and the Changing Structure of American Agriculture, OTA-F-285, Washington, D.C. March 1986.

National Trends

National and regional data do show the Southern Plains and the Pacific Coast to be increasing their share of total U.S milk production, Table 1. The Pacific region increased its share from 9.2 percent in 1965 to 16.4 percent in 1987. The Upper Midwest and Northeast, traditional heavy milk producing regions, however, have essentially maintained their national shares. Minnesota's share has declined somewhat more and it may soon lose its rank as number 4 in milk production to Pennsylvania.

Although total U.S. milk production increased substantially in the 10-year period, 1977-87, it was produced with 6 percent fewer cows, Table 2. Cow number changes have differed substantially from region to region, the Pacific region increased by 18 percent. Concurrently, the Lake States and Minnesota declined by 3 percent and 5 percent, respectively, but these percentage declines were substantially less than for many other regions as shown in the table.

Increased total milk production was possible because of significant increases in production per cow, a 23.3 percent increase, Table 3. Again, we observe significant regional differences. The traditional milk producing regions, the Upper Midwest and the Northeast, increased less than the national average and Minnesota increased by only 15.8 percent. The Mountain and Pacific regions increased by 27.3 and 26 percent, respectively. As a consequence, Minnesota fell from 29th in production per dairy cow in 1977 to 33rd in 1987, Table 4. State average milk production per cow in 1987 was 12,680 compared to 18,000 in the state of Washington.

The Minnesota Milk Production Sector

Because of the concerns about regional milk production trends and predictions, agricultural economists from several of the Land Grant Universities in the north central and northeastern states undertook a survey of the dairy farm production sector in 1988 to obtain information on the level of technology, management practices, and farm resources that were considered to be important in explaining the efficiency of the industry and comparative advantage in milk production. A questionnaire was developed and sent to several thousand milk producers in 8 northern and north central states in the spring of 1988. I've directed the Minnesota component of this survey. The results of those surveys are being summarized, and a report for the region is planned for later this year. However, my remaining remarks will focus on the survey results for the state of Minnesota only. Some of the major findings from the survey and some of the implications of these findings for the viability of Minnesota's dairy industry will be considered. Industry characteristics that will be examined are: (1) owner-operator characteristics, (2) farm size and productivity, (3) equipment and facilities, (4) labor use, (5) management practices, (6) income and financial characteristics, and (7) producer attitudes and policy preferences.

The questionnaire was sent to 4000 Minnesota milk producers in February and March 1988. Responses were returned by 868 milk producers. They represented, respectively, 4.6 percent of the state's dairy farms, 5.3 percent of milk cows, and 5.3 percent of the milk production for Minnesota in 1987. The sample of producers was designed to be representative of the entire milk production sector in Minnesota.

Owner-Operator Characteristics

The individual owner (usually single-family owner) is the predominant form of ownership for Minnesota dairy farms, Table 5, 80.2 percent of all farms in our sample. Partnerships, including limited partnerships, accounted for only 15.5 percent of the farms, though a higher percentage of milk volume 20.5 percent. Incorporated family farms accounted for only 4.3 percent of the farms and none were reported as being operated by outside corporations. Multiple family farms accounted for 20.3 percent of the sample.

Average age of the dairy farmer was 50 years. About 84 percent of all dairy farms operators are 30 to 60 years of age, Table 6. Only 7.1 percent of the producers were less than 30 years of age. Its likely that many of the partnership dairy farms represent situations where the sons or daughters will eventually become the principal operators. The decline in share of farms with operators 60 years or older indicates that retirements from dairy farming occur very rapidly beginning at age 60.

The highest level of education of the principal farm operator is most commonly, completion of high school, 49 percent of all respondents, Table 7. Twenty percent of producers have less than 12 years of education. Only 6.8 percent are college graduates. An interesting comparison is that of education and productivity per dairy cow. Note the increase in annual production per cow with level of education, from 13,153 lbs. for producers with less than a high school education to 17,829 lbs. for producers with post-graduate college education.

Land ownership is high for milk producers, 93 percent of all respondents owned some land, Table 8, with an average of 277 acres owned

for each dairy farm. On the other hand, rental of some land is also common, 63 percent of the respondents rented some land with an average of 178 acres of rented land per farm. This use and land ownership pattern will be a major obstacle for a large transition to feedlot type dairies that have developed in the Southwest.

Size and Productivity

The average size of milking herd for the sample was 50.6 cows, Table 9, somewhat higher than calculated from USDA statistics for 1988 of 48.8 cows. Numbers of heifers for dairy cow replacements almost equals the number of cows. Forty percent of the respondents held bulls for breeding purposes with a average of 2.3 bulls for those farms. The number seems high in view of the widespread use of artificial insemination, but it may reflect situations of a mature bull for breeding and a young bull for replacement. About half the dairy farms retain dairy steers for feeding.

The distribution of dairy farms by herd size shows that 70 percent of the state's dairy herds range in size from 30 to 75 cows, Table 10. Only 5.4 percent of the herds exceeded 99 cows. This compares to 1.9 percent in 1980.² Less than 1 percent of the herds exceed 200 cows. There is certainly little evidence that herd size in Minnesota is approaching 500 cows, let alone the 1,500 to 2,000 projected in the OTA report. The data on herd size show no strong patterns of size according to age of operator except for the smallest herd sizes. Operators over 60 years of age have the largest percentage of herds of less than 30 cows, one-third of producers in this age group, Table 11.

² Harry Kaiser and Jerome Hammond, "Changing Structure of the Minnesota Dairy Industry," Economic Report 83-8, Department of Agricultural and Applied Economics, University of Minnesota, St. Paul, MN. June 1983, p. 17.

Plans by producers for changes in herd size during the next five years indicate continuing increases in average herd size, but not a rate to generate an average herd size projected by the OTA study, Table 12. Note that these responses indicated that about 4 percent of the operators plan to terminate dairying within the next 5 years. Eleven percent plan to reduce herd size and 25 percent plan to maintain the same size of herd. Almost half of the respondents plan to increase herd size. However, planned increases in herd size are usually 1 to 25 cows. Less than 1 percent of the respondents plan to expand herds by more than 100 cows.

The data also illustrate that Minnesota dairy farms produce most of the feed required for the dairy herd. The average number of acres of land for each dairy farm is 369 acres, Table 13. Tillable cropland accounted for more than two-thirds of the land on each farm. Much of the tilled land was used for hay production, silage or greenchop. Corn silage production and/or legume hay production was the most common use of cropland for all farms in the sample. Approximately 60 percent of the farms had land in the government set-aside program and in the government conservation reserve.

Because of the relatively large land base with a large amount of tillable land, many Minnesota dairymen produce all forage and grain requirements of their dairy herds, 74 percent of the farms require no forage purchases and 55 percent required no grain purchases, Table 14. Only 5.9 percent of the farms purchased more than 50 percent of forage needs and 21.9 percent of farms purchased more than 50 percent of grain needs. Forage and grain purchases are supplemental to home production for most farms that do purchase these dairy farm inputs. Only 1.3 percent

of the farms reported purchasing 100 percent of forage requirements and 9.4 percent of the farms reported purchasing 100 percent of grain requirements. Its obvious that Minnesota dairy farms are primarily integrated feed production and milking operations.

The average production per cow for the sample dairy farms was 14,027 lbs. per year for 1987, somewhat larger than the production for all herds in the state as reported by USDA's Agricultural Statistical Service of 12,680 lbs. There is a wide distribution of herds by production per cow, 28 percent of our herds produce in excess of 16,000 lbs. per cow per year and a small percentage of herds average from 22,000 to 25,000 lbs. per cow, Table 15. On the other hand, 11 percent of the herds produce less than 10,000 lbs. per cow. Productivity per milk cow has a very significant impact on per hundredweight costs of milk production. Generally, very low producing herds are very high cost operations on a per hundredweight basis, or, the operators are accepting a very low return for management and labor. These are the herds that are exiting the industry most rapidly. Consequently, Minnesota's industry can be expected to become more competitive and generate greater net income per farm with declines in farm numbers.

Equipment and Facilities

Stanchion type housing systems accounted for 79.4 percent of all housing systems in 1988, Table 16. They have declined in importance as 87.4 percent of all housing systems were of the stanchion type in 1982.³ It is interesting that this system was not reported for any of the herds in excess of 150 cows. Free stalls or loose housing systems are used for

³Kaiser, Harry and Jerome Hammond, o.p. cit. p. 28.

the very large herds. Stanchion housing is more labor intensive than other housing systems for large herds, consequently, we can expect a continuing decline in stanchion systems as our average herd size increases.

The selection of milking system by dairy farmers appears to be related to size of herd and type of housing system. For herds with less than 30 cows, the bucket system is used by 62 percent of producers, Table 17. For herds from 30 to 150 cows, the pipeline system predominates. As noted previously, most of these farms have stanchion housing which is quite compatible with the pipeline milking system. For herds in excess of 150 cows, parlor milking systems are most often used. This, of course, reflects the labor saving feature of those systems.

About one-half of the housing systems were built before 1951 with an average age of housing system of 37 years, Table 18. The average age of the milking system is 28 years. Feed handling, waste disposal, and feed storage systems are much newer, on average, with most systems being constructed between 1967 and 1982. One can conclude that labor saving systems have been added to existing housing systems to permit handling of the larger herd sizes. Additionally, many of the dairy facilities have been remodelled since construction. Sixty-two percent of the housing systems and 55 percent of the milking facilities have been remodelled within the last 20 years, Table 19.

Very few of the respondents plan to construct new dairy facilities within the next 5 years, Table 20. Only 2.8 percent plan to construct a new housing system. Seventeen percent of producers intend to modify or enlarge their existing systems. These responses imply that there is a shift to

loose or open housing systems with milking parlors will not occur rapidly in Minnesota.

Labor Use

The operator and family are the principal source of labor for almost all Minnesota dairy farms. Only 17.6 percent of the farms reported use of full-time hired labor, Table 21. The spouse provided labor for 65.1 percent of the farms. The principal operator provides labor for all three major activities (feeding, milking, and cropwork) for more than 88 percent of the farms, Table 22. Note also that the spouse and other family members frequently provide labor for all three of these functions. Seasonal hired labor, as expected, is most frequently used for cropwork.

Management Practices

Numerous farm management practices or techniques are used by Minnesota dairymen, Table 23. Forage quality testing, soil testing for fertilizer application, DHIA records, artificial insemination, feed ration formulation, teat dipping cows after milking, and dry cow treatment for mastitis prevention are each used by more than half of all producers. These data are striking in that they verify that large numbers of our producers are not using what are considered good management practices. That these practices pay off in terms of increased productivity per dairy cow is dramatically illustrated in Table 24. This table shows the percent of farms using the technique in each yield category. Note that the percentage of use of the practices increases with increases in per cow production, e.g. only 25 percent of herds with less than 10,000 lb/cow production use DHIA services, while 85 percent of those in the 19-22,000 lb/cow production use the service. Note that low herd culling appears to

be negatively associated with production. It seems obvious to me that productivity of Minnesota dairy herds can be substantially increased by increased use of available management practices.

Income and Financial Characteristics

Cash farm receipts for 1987 for the surveyed dairy farms ranged from less than \$10,000 to \$500,000 for 99 percent of the farms, Table 25. Sixty-two percent of the farms generated gross farm sales from \$40,000 to \$175,000 annually. For the average dairy farm, 72.1 percent of sales were generated by sales of milk and 11.4 percent by sales of dairy livestock, Table 26. For a few farms, sales of purebred dairy cattle are important, but they account for only .7 percent of all dairy farm income.

Net cash farm income in 1987 was quite low for a large share of dairy farmers, 57.6 percent of the dairy farms earned less than \$20,000 net cash farm income, Table 27. Almost 40 percent of the farms reported net farm income from \$20,000 to \$100,000. This would indicate that many dairy farms have the potential and do, in fact, generate middle income levels.

In addition to farm income, over half of the dairy farms reported income from non-farm sources, Table 28. This income usually totalled less than \$10,000.

The financial status of dairy farm sector, as measured by the debt asset ratio, indicates solvency for more than 90 percent of farms, Table 29. About 7 percent of the surveyed farms reported debts in excess of assets. Twenty percent of all dairy farms reported a debt free status. This financial situation increased with age of operator, but also characterized a large proportion of the very small, less than 30 cow,

dairy farms. Financial stress, if indicated by a debt to assets of 70 to 100 percent, characterized 21.5 percent of the farms.

Producers Attitudes

Producers in the survey were asked to provide opinions on adoption of BST (bovine somatotropin) and the federal price support program. Almost half of all respondents, 46.3 percent, reported that they will not adopt BST if it is approved for commercial use, Table 30. Only 9.1 percent of respondents report that they will adopt BST when it first becomes available. Others will adopt if it is recommended by the University, the industry, or if successfully adopted by neighbors. Essentially, dairy farmers are saying that they need much more conclusive evidence on this technology before they adopt it. These responses also indicate to me that widespread adoption of BST in Minnesota, if it proves to be economically viable, will take 5 to 6 years following its approval for use by the Food and Drug Administration.

My analysis of the data on attitudes toward BST show that it will be adopted more readily by young farmers. Only 35.4 of farmers under 30 years of age responded that they would not adopt BST as opposed to 64.2 percent for farmers 60 years and older, Table 31. Those farmers that are financially stressed also appear to be more likely to adopt use of BST, Table 32.

Producer attitudes toward federal dairy price support programs were very diverse, but somewhat predictable, Table 33. The data seem to indicate that there is strong support to continue price supports and at increased levels and strong opposition by producers to reduced support levels. Nevertheless, these attitudes are far from unanimously held by

producers. A majority of these Minnesota milk producers are opposed to re-institution of a whole-herd-buyout program. The USDA is authorized to implement another buyout program under the 1985 FSA if deemed necessary to more closely balance commercial milk supply and demand. Although a majority of producers oppose a buyout program, a large majority support implementation of some other form of supply control. Though we did not specify the type of supply management in the question, I believe that most producers interpreted it to mean some type of marketing quota program.

Conclusions

1. The Minnesota dairy industry is still characterized by relatively small herd sizes with most feed, forages, and grains being produced on the farm. Herds from 30 to 75 milk cows are the most common. There is no evidence that 500 cow, even less that 1,500 to 2,000 cow, specialized milking operations will become important in Minnesota in the foreseeable future. Many of the surveyed dairy farms reported plans to expand herd size in the next five years, but less than one percent planned expansion by more than 100 cows.

2. Stanchion housing systems, with upright silos, and pipeline milking systems predominate as the major dairy facility systems. There is a trend to loose housing systems with milking parlors, but the shift is not rapid. High investment costs in the existing systems prevent a rapid shift although they are more widely used with larger herd sizes.

3. Most of the labor and management inputs on Minnesota dairy farms are provided by the owner-operators and spouses. Children provide some

labor and hired labor is used, most often, for field work. Hired managers were reported for only 2.2 percent of the farms.

4. There is a strong relationship between use of numerous management practices and productivity of milk cows. Milk production per cow increases with use of: forage quality testing, herd performance records, artificial insemination, regular feed ration formulation, pregnancy checks following breeding, regularly scheduled veterinarian services, and annual culling of the herd by more than 30 percent, as well as numerous other management practices. Because a large number of Minnesota milk producers do not now use these management practices, substantial gains in productivity are possible through their adoption.

5. Net income figures for many of our dairy farms also indicate that they are providing middle level incomes for the family. I would judge these to be acceptable levels for many farm families and an indication of the long-run viability of these dairy farms. This doesn't imply, however, that all our dairy farms are viable units.

In summary, the survey results show that many of Minnesota's dairy farms are efficient and of a size to generate acceptable middle level incomes. Many of the smaller dairy farms and very inefficient operations will continue to exit the industry. The remaining producers will be sufficient in numbers and size to maintain Minnesota as a leading milk producing state. However, its rank in production and productivity will depend on how progressive its producers are in adopting new technology and management techniques relative to other states.

TABLE 1
Regional Shares of U.S. Milk Production for
Regions of the U.S. and for Minnesota
Selected Years, 1965-87

Region	Share of U.S. Production		
	1965	1977 Percentage	1987
Northeast	20.7	20.1	19.8
Lake States	28.3	28.7	28.4
Minnesota	8.6	7.7	7.3
Corn Belt	17.1	13.4	11.5
Northern Plains	5.3	4.4	3.8
Appalachian	6.9	6.8	5.9
Southeast	3.0	3.6	3.1
Delta	2.3	2.2	1.7
Southern Plains	3.5	3.6	3.8
Mountain	3.7	4.3	5.5
Pacific	9.2	12.7	16.4
Total U.S. Milk Production (mil. lbs.)	124.2	123.0	142.4

Source: "Dairy Situation and Outlook" DS416, ERS, USDA,
Aug 1988 and "Wisconsin Dairy Facts, 1979," 210-1-79,
Wisconsin Agricultural Reporting Service, Madison, WI.

TABLE 2
Number of Milk Cows by State and Region
for 1967-77-87

State/Region	1977	1987	Percent Change 1977-87
	Number		Percent
Northeast	2,202	2,059	-6.5
Lake States	3,071	2,979	-3.0
Minnesota	866	823	-5.0
Corn Belt	1,526	1,299	-14.9
Northern Plains	582	448	-23.0
Appalachian	842	708	-15.9
Southeast	467	360	-22.9
Delta	333	224	-32.7
Southern Plains	431	438	+1.6
Mountain	443	510	+15.1
Pacific	1,111	1,312	+18.1
Total U.S.	10,977	10,337	-5.8

Source: USDA Statistics

TABLE 3
Output Per Cow for 1967-77-87
for Minnesota and Selected Regions

State/Region	1977	1987	Percent Change 1977-87
	lbs./cow/year		Percent
Northeast	11,187	13,645	+22.0
Lake States	11,490	13,595	+18.3
Minnesota	10,950	12,680	+15.8
Corn Belt	10,608	12,702	+19.7
Northern Plains	9,328	12,150	+30.0
Appalachian	10,020	11,956	+19.3
Southeast	9,610	12,258	+27.6
Delta	8,024	10,763	+34.1
Southern Plains	10,422	12,557	+20.5
Mountain	12,061	15,349	+27.3
Pacific	14,160	17,835	+26.0
Total U.S.	11,181	13,786	+23.3

Source: USDA Statistics

TABLE 4
Milk Production and Productivity in Minnesota, 1977-87

Year	Production (millions of lbs.)	Production per cow (pounds)	State's National Rank in Productivity
1978	9,089	11,859	29
1980	9,535	11,061	30
1981	10,061	11,356	32
1982	10,341	11,452	33
1983	10,913	12,139	26
1984	10,331	11,647	30
1985	10,840	11,847	35
1986	10,614	11,912	38
1987	10,436	12,680	33

Source: USDA Statistics

TABLE 5
Distribution of Minnesota Dairy Farms by
Farm Ownership Type and Milk Volume
1988 U of M Dairy Farm Survey

Type of Ownership	Percent of Total Farms Reporting	Percent of Milk Volume ¹
Individual owner	80.2	73.6
Partnership (formal)	10.3	14.1
Limited partnership	5.2	6.4
Corporation - family	4.3	5.9
Total	100.0	100.0

¹ Calculated for farms reporting both ownership type and milk volume.

TABLE 6
Distribution of Minnesota Dairy Farms by
Age of Principal Operator and Milk Volume
1988 U of M Dairy Farm Survey

Age of the Farm's Principal Operator	Percent of Total Farms Reporting	Percent of Milk Volume ¹
Less than 30	8.0	7.1
30 - 39	28.0	29.1
40 - 49	22.9	24.5
50 - 59	29.0	30.3
60 and up	12.0	9.0
Total ²	100.0	100.0

¹ Calculated for farms reporting both age of operator and milk volume.

² Average age for all farmers was 50.

TABLE 7
Distribution of Minnesota Dairy Farms by
Principal Operator's Education Level
1988 U of M Dairy Farm Survey

Principal Operator's Education Level	Percent of Total Farms Reporting	Ave. Annual Prod/Cow lbs.
Less than 12 years	20.2	13,153
High school graduate	49.0	13,986
Technical training	15.0	13,982
Some college	9.0	14,464
College graduate	5.8	15,637
Post graduate work	1.0	17,829
Combination of above	0	0
Total	100.0	14,027

1Calculated for farms reporting both level
of education and milk volume.

TABLE 8
Distribution of Minnesota Dairy Farms by
Land Ownership and Renting or Leasing Arrangement
1988 U of M Dairy Farm Survey

Ownership and Renting or Leasing Arrangement	Number of Farms Reporting	Percent of Total Farms Reporting	Average Acreage for Farms Reporting
Owned Acres	806	92.9	276.9
Rented or leased from others	515	62.8	177.9
Rented or leased to others	15	1.7	102.7

TABLE 9
 Distribution of Minnesota Dairy Farms by
 Dairy Stock on Hand January 1, 1988
 1988 U of M Dairy Farm Survey

Type of Dairy Stock	Average Number of Animals per Farm Reporting	Percent of Dairy Farms
Total milk cows on hand (including dry cows)	50.6	100.0
Dairy heifer calves & replacement heifers	41.6	98.0
Bulls on hand	2.3	39.5
Bull calves on hand	11.5	49.0
Dairy steers on hand	18.6	51.5

TABLE 10
 Distribution of Minnesota Dairy Farms by
 Herd Size and Milk Volume
 1988 U of M Dairy Farm Survey

Herd Size	Number of Farms Reporting	Percent of Total Farms Reporting	Percent of Milk Cows ¹
Less than 30	145	16.8	5.5
30 - 49	346	40.0	29.5
50 - 74	261	30.2	35.9
75 - 99	66	7.6	14.0
100 - 149	34	3.9	9.2
150 - 199	6	.7	2.1
200 and up	7	.8	3.9
Total	865	100.0	100.0

¹ Calculated for farms reporting both herd size and milk volume.

TABLE 11
Distribution of Minnesota Dairy Farms by
Age of Principal Operator and Herd Size¹
1988 U of M Dairy Farm Survey

Herd Size Num. of Cows	Percent of Farms by Age of Principle Operator (years)				
	Less than 30	30-39	40-49	50-59	60 and up
Less than 30	10.6	12.2	12.7	18.1	33.7
30-49	51.5	44.8	38.6	35.7	32.7
50-74	28.8	34.4	34.4	29.0	22.4
75-99	6.1	4.4	9.0	10.0	6.1
100-149	3.0	3.9	4.2	4.6	2.0
150-199	0	0	0	1.7	1.0
200 and up	0	.4	1.0	.8	2.0
Average herd size	47.5	49.3	52.7	53.3	45.1

¹ Calculated for farms reporting both operator age and milk volume.

TABLE 12
 Distribution of Minnesota Dairy Farms
 by Plans for Herd Size Adjustment or Exit
 by 1993 (Total Milking and Dry Cows)
 1988 Minnesota Dairy Farm Survey

	<u>Percent of Herds</u>
Cease Dairying	19.2
Reduce Herd Size	11.0
by 1 - 25 cows	9.7
by 26 - 50 cows	1.0
by 51 - 100 cows	.1
by more than 100 cows	.1
No Change in Herd Size	25.0
Increase Herd Size	44.8
by 1 - 25 cows	36.5
by 26 - 50 cows	5.8
by 51 - 100 cows	1.7
by more than 100 cows	.8
	<hr/>
Total Herds	100.0

TABLE 13
Distribution of Minnesota Dairy Farms by
Total Land Operated in 1987
1988 U of M Dairy Farm Survey

Land Category	Percent of Total Farms Reporting	Average Acreage for Farms Reporting
Tillable cropland	98.7	252.0
Set aside government programs	62.9	45.8
Conservation reserve	6.2	67.1
Permanent pasture land	81.2	55.8
All other land	86.5	47.7
All land operated	98.2	369.2

TABLE 14
Distribution of Minnesota Dairy Farms
By Feed Purchasing Patterns
1988 Minnesota Dairy Farm Survey

Percent of Farm's Feed Purchased	Percent of Total Farms
<u>Forage</u>	
0	73.9
1 - 9	4.4
10 - 24	10.6
25 - 49	5.4
50 - 99	4.4
100	<u>1.3</u>
Total	100.0

<u>Grain</u>	
0	54.9
1 - 9	4.1
10 - 24	12.6
25 - 49	7.6
50 - 99	12.5
100	<u>9.4</u>
Total	100.0

TABLE 15
Distribution of Minnesota Dairy Farms by
Average Production per Cow and Milk Volume
1988 U of M Dairy Farm Survey

Average Production Per Cow per Year (lbs)	Percent of Total Farms Reporting
Less than 10,000	11.0
10,000-12,999	26.0
13,000-15,999	36.0
16,000-18,999	22.0
19,000-21,999	5.0
22,000-24,999	1.0
TOTAL	100.0
Average Production per Cow: 14,027 lbs.	

¹ Calculated for farms reporting both
production per cow and total production.

TABLE 16
Distribution of Minnesota Dairy Farms
By Herd Size and Type of Housing,
1988 Minnesota Dairy Farm Survey¹

Type of Housing	Herd Size (Number of Cows)							Percent of Herds	Total Number
	Less than 30	30-49	50-74	75-99	100-149	150-199	200 & up		
Stanchion	87.4	72.9	62.4	37.9	29.4	0	0	66.6	568
Stanchion with outside feeding	7.7	12.7	17.4	9.1	11.8	0	0	12.8	109
Free stall	0	2.9	9.7	30.3	32.4	83.3	42.9	8.7	74
Free stall with outside feeding	1.4	.6	4.3	6.1	8.8	16.7	14.3	2.8	24
Bedded pack	0	.3	0	0	0	0	0	.1	1
Bedded pack with outside feeding	.7	3.5	0	1.5	0	0	0	1.6	14
Dry lot outside feeding	0	.3	.4	1.5	0	0	0	.4	3
Other	0	.6	1.2	0	0	0	0	.6	5
Combination of above	<u>2.8</u>	<u>6.2</u>	<u>4.7</u>	<u>13.6</u>	<u>17.7</u>	<u>0</u>	<u>42.9</u>	<u>6.4</u>	<u>56</u>
Total percent	100.0	100.0	100.0	100.0	100.0	100.0	100.0		
Total number	143	339	258	66	28	6	6	100.0	853

¹ Calculated for farms reporting both herd size and housing system.

TABLE 17
Distribution of Minnesota Dairy Farms by
Milking Facility and Average Production Per Cow
1988 U of M Dairy Farm Survey¹

Type of Milking Facility	Percent of Herds By Average Production Per Cow Per Year (lbs)					
	Less than 10,000	10,000- 12,999	13,000- 15,999	16,000- 18,999	19,000- 21,999	22,000 & above
	----- Percent -----					
Bucket system	46.9	26.0	10.6	3.1	5.0	0
Pipeline system	43.2	63.0	74.7	85.2	87.5	100.0
Herringbone parlor	1.2	6.8	12.1	8.6	7.5	0
Other parlor	8.6	4.2	2.6	3.1	0	0
Total percent	100.0	100.0	100.0	100.0	100.0	100.0
Total	81	192	265	162	40	4

¹ Calculated for farms reporting both type of milking system and production.

TABLE 18
Distribution of Minnesota Dairy Farms
By Year Facilities Were Built
1988 Minnesota Dairy Farm Survey

Facility	<u>Percent of Farms Reporting By Year Built</u>					
	Before 1957	1957- 1966	1967- 1976	1977- 1982	1983- 1987	Average Age
Housing	49.1	12.7	20.3	14.3	3.4	37
Milking	29.7	16.1	28.4	20.1	5.7	28
Feed storage capacity	13.1	14.1	35.3	30.6	6.9	19
Feed handling system	6.1	12.2	33.6	36.1	11.9	16
Waste disposal system	6.0	10.4	22.7	44.2	16.7	15

TABLE 19
Distribution of Minnesota Dairy Farms
By Year Facilities Were Last Remodeled
1988 Minnesota Dairy Farm Survey

Facility	Percent of Farms By Date Remodeled					Percent of All Farms	Average Year Remodeled
	Before 1957	1957- 1966	1967- 1976	1977- 1982	1983- 1987		
- - - - - Percent - - - - -							
Housing	2.0	8.0	23.6	21.4	18.2	73.2	1976
Milking	.7	4.8	14.8	20.0	20.5	60.8	1978
Feed storage capacity	1.3	2.5	8.3	19.3	12.3	43.5	1978
Feed handling system	0	1.7	8.6	14.4	16.4	41.1	1979
Waste disposal system	.3	1.2	6.0	15.5	12.2	35.2	1979

TABLE 20
Distribution of Minnesota Dairy Farms
By Future Plans for Facility Changes
1988 Minnesota Dairy Farm Survey

Facility	Modify or Enlarge <u>Present System</u>	<u>Build New System</u>
	Percent of Total Farms In Survey ¹	Percent of Total Farms In Survey
Housing	17.4	2.8
Milking	11.4	3.1
Feed storage capacity	9.8	4.5
Feed handling system	7.6	4.7
Waste disposal system	4.1	6.5

¹ 868 dairy farms

TABLE 21
Distribution of Minnesota Dairy Farms by
Family Labor and Other Workers on the Farm
1988 U of M Dairy Farm Survey

Unpaid and Paid Labor	Percent of Total Farms Reporting	Average Number of Persons for Farms Reporting Labor Components
<u>Unpaid Labor</u>		
Spouse	65.1	1.0
Children over 12	35.0	1.8
Other non-salaried labor	15.2	1.4
<u>Paid Labor</u>		
Hired manager	2.2	1.0
Full-time labor	17.6	1.3
Part-time labor	26.8	1.6
Seasonal labor	23.9	1.9

TABLE 22
Distribution of Minnesota Dairy Farms
By Individuals Performing Specified Types of Work
1988 Minnesota Dairy Survey

Type of Work and Individual Performing Work	Percent of Total Farms Reporting ¹
<u>Milking</u>	
Operator	92.0
Spouse	34.7
Other family	32.7
Hired manager	3.0
Full-time labor	10.0
Part time/seasonal	11.5
<u>Feeding</u>	
Operator	88.2
Spouse	41.3
Other family	46.4
Hired manager	2.7
Full-time labor	11.2
Part time/seasonal	10.8
<u>Crop Work</u>	
Operator	94.1
Spouse	26.2
Other family	46.2
Hired manager	1.7
Full-time labor	10.7
Part time/seasonal	31.1

¹ Percentages for each activity total to more than 100 because more than one individual is frequently involved in each activity.

TABLE 23
Management Practices Utilized on Minnesota Dairy Farms
1988 Minnesota Dairy Farm Survey

Management Practice Used	Percent of Total Farm Reporting
Forage quality testing by cutting	52.8
Soil testing for crops for fert. appl.	74.3
Microcomputer for farm records	6.7
Mail-in service for farm records	8.6
DHIA performance testing	54.7
Performance testing other than DHIA	10.6
Subscribe to DHIA somatic cell count	44.9
A.I. in majority of cow matings	80.0
A.I. in majority of heifer matings	59.6
Feed ration formulation--regular basis	60.6
Group cows by milk prod. and feed accordingly	31.7
Pregnancy check within 40 days	58.1
Systematic postpartum exams	38.4
Heat synchronization check	10.0
Use regularly scheduled vet. services	49.6
Milk three times a day	.7
Predip all cows	15.8
Teat dip all cows after milking	67.9
Treat dry cows for mastitis prevention	76.1
First calf heifers age 24-25 months	71.9
Culling rate 15 percent or less	30.0
Culling rate 15-29 percent	48.8
Culling rate 30 percent or more	17.0
Purchase 16% plus concentrate dairy ration	52.5

TABLE 24
Distribution of Minnesota Dairy Farms
By Average Production Per Cow and Management Practices
1988 Minnesota Dairy Farm Survey

Management Practice Used	Percent of Farms Using Practice by Average Production Per Cow Per Year (pounds)					
	Less than 10,000	10,000- 12,999	13,000- 15,999	16,000- 18,999	19,000- 21,999	22,000- 24,999
Forage quality testing by cutting	29.6	41.6	61.4	71.4	65.0	75.0
DHIA performance testing	24.7	39.5	62.5	79.6	82.5	75.0
Performance testing other than DHIA	7.4	12.6	12.1	8.0	10.0	0
Subscribe to DHIA somatic cell count	19.8	37.4	49.2	69.1	67.5	50.0
A.I. in majority of cow matings	60.5	71.1	91.2	91.4	95.0	100.0
A.I. in majority of heifer matings	38.3	54.2	63.3	76.5	77.5	100.0
Feed ration formulation --regular basis	37.0	53.2	67.0	77.2	72.5	75.0
Use regularly scheduled vet. services	25.0	42.3	52.9	70.0	72.5	25.0
Teat dip all cows after milking	57.5	62.4	72.2	75.0	92.5	75.0
Treat dry cows for mastitis prevention	65.0	74.6	77.9	86.3	92.5	100.0
Culling rate 15 percent or less	52.5	36.0	22.8	15.0	30.0	25.0
Culling rate 30 percent or more	6.5	10.1	18.6	31.9	32.5	25.0

TABLE 25
Distribution of Minnesota Dairy Farms
By Total Value of All Cash Receipts in 1987
1988 Minnesota Dairy Farm Survey

Value of all Cash Receipts in 1987 ¹ (\$)	Percent of Total Farms Reporting
Less than 10,000	1.0
10,000 - 19,999	2.7
20,000 - 39,999	6.5
40,000 - 99,999	37.7
100,000 - 174,999	34.4
175,000 - 249,999	10.6
250,000 - 499,999	6.2
500,000 - and over	<u>1.0</u>
Total	100.0

¹ Including crops, animals, and animal products sold plus government payments.

TABLE 26
Distribution of Minnesota Dairy Farms
By Percent of Cash Receipts From Specified Source
1988 Minnesota Dairy Farm Survey

Source of 1987 Cash Receipts	Percent Reporting Sales	Average Percent of Total Cash Receipts for All Farms
Milk sales	100.0	72.1
Percent from purebred dairy animal sales	7.3	.7
Other dairy livestock sales	73.6	8.4
Crop sales and gov't program payments	64.1	11.2
Other livestock sales	44.0	5.7
Other farm income	15.5	1.9

TABLE 27
1987 Net Cash Farm Income for All Families
in the Dairy Unit
1988 Minnesota Dairy Farm Survey

1987 Net Cash Farm Income (\$)	Percent of Total Farms Reporting
Less than 10,000	27.7
10,000 - 19,999	31.4
20,000 - 39,999	25.2
40,000 - 99,999	11.9
100,000 - 174,999	2.4
175,000 - 249,999	.8
250,000 - and over	<u>.6</u>
Total	100.0

TABLE 28
Distribution of Minnesota Dairy Farms
By 1987 Household Income Obtained From Non-Farm Sources
for All Families in Dairy Unit
1988 Minnesota Dairy Farm Survey

Non-Farm Income (\$)	Percent of Total Farms Reporting
None	43.8
Under 5,000	25.7
5,000 - 9,999	13.2
10,000 - 14,999	6.8
15,000 - 19,999	4.1
20,000 - 39,999	4.8
40,000 - and over	<u>1.6</u>
Total	100.0

TABLE 29
Distribution of Minnesota Dairy Farms
By Debt/Asset Ratio and Milk Volume
1988 Minnesota Dairy Farm Survey

Debt/Asset Ratio	Percent of Total Farms Reporting
Percent	
0	20.1
1 - 19	13.3
20 - 39	15.3
40 - 69	22.4
70 - 100	21.5
greater than 100	<u>7.3</u>
Total	100.0

¹ Calculated for farms reporting both
debt/asset ratio and milk volume.

TABLE 30
Distribution of Minnesota Dairy Farms
By Farm Plans for Adoption of Bovine Somatotropin and Milk Volume
1988 Minnesota Dairy Farm Survey

Farms Will Adopt BST When:	Percent of Total Farms Reporting
First available	9.1
Successfully used by neighbors	10.1
Recommended by university	23.8
Recommended by industry	10.7
Will not adopt	<u>46.3</u>
Total	100.0

¹ Calculated for farms responding to both questions,
adoption of BST and milk volume.

TABLE 31
Distribution (percent) of Minnesota Dairy Farms
By Age of Principal Operator and Farm Plans
for Adoption of Bovine Somatotropin
1988 Minnesota Dairy Farm Survey¹

Farm Plans For Adoption of Bovine Somatotropin	Age of Principal Operator (years)				
	Less than 30	30-39	40-49	50-59	60 and up
	-----percent-----				
Adopt when available	13.8	11.1	10.4	7.3	2.5
Adopt if successfully used by neighbors	10.8	12.4	11.0	10.2	4.9
Adopt on basis of university recommendations	27.7	26.3	22.0	22.0	21.0
Adopt on basis of industry recommendations	12.3	12.4	8.7	9.3	7.4
Not adopt	<u>35.4</u>	<u>37.8</u>	<u>48.0</u>	<u>51.2</u>	<u>64.2</u>
Total	100.0	100.0	100.0	100.0	100.0

¹ Calculated for farms responding to both questions,
adoption of BST and age of operator.

TABLE 32
Distribution of Minnesota Dairy Farms
By Debt/Asset Ratio and Farm Plans for Adoption of Bovine Somatotropin
1988 Minnesota Dairy Farm Survey¹

Farm Plans for Adoption of Bovine Somatotropin	<u>Percentage of Farms with a Debt/Asset Ratio of:</u> (Percent)			
	0	1 - 69	70 - 100	Greater than 100
Adopt when available	3.4	9.4	13.3	10.9
Adopt if successfully used by neighbors	9.4	9.9	10.3	7.3
Adopt on basis of university recommendations	20.8	24.7	24.8	27.3
Adopt on basis of industry recommendations	8.7	12.3	10.3	9.1
Not adopt	<u>57.7</u>	<u>43.6</u>	<u>41.2</u>	<u>45.5</u>
Total	100.0	100.0	100.0	100.0

¹ Calculated for farms reporting both debt/asset ratio and response to availability of BST.

TABLE 33
Distribution of Minnesota Dairy Farms
By Reactions to Dairy Policy Options
1988 Minnesota Dairy Farm Survey

Dairy Policy Options		Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
Continue DPSP at 1988 price levels	%	9.5	23.8	20.6	25.3	20.8
Continue DPSP at reduced price levels	%	1.2	5.3	14.5	30.4	48.6
Continue DPSP at increased price levels	%	26.2	28.9	20.6	14.6	9.5
Eliminate DPSP	%	12.5	10.9	31.9	22.3	22.5
Reinstitute dairy whole herd buyout program if needed	%	14.9	18.6	20.9	19.7	26.0
Institute some form of supply management	%	31.8	33.8	17.9	8.4	8.1