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INCOME-IMPROVING ADJUSTMENTS IN LAKE STATES DAIRYING

W. B. Sundquist

Recently, great concern has been expressed about the future of dairying in the Lake States—particularly in Minnesota, Wisconsin, and Michigan. This article reports some highlights of a study on this topic conducted cooperatively by the U. S. Department of Agriculture and Agricultural Experiment Stations in Illinois, Iowa, Minnesota, Wisconsin, and Michigan.

Competing Regions

The Lake States produce more milk than does any other U. S. region. In 1961, milk production in the three-state area of Minnesota, Wisconsin, and Michigan was about 26.8 percent of total U. S. milk production. The second highest region is the Northeast with 20 percent of total U. S. milk production, followed by the Corn Belt with 18.1 percent.

Of all regions, only the Lake States, the Northeast, and the Pacific regions had any substantial increases in dairy production in 1961 as compared with 1950. For this study, the Lake States region was considered to include major dairy areas of northeastern Iowa and Illinois.

The Lake States region is located a substantial distance from major fluid milk markets on the eastern seaboard. So it is a region of "surplus" milk production. It does supply much of the fluid milk consumed in numerous markets within the region, including several Federal order markets. Urban areas of Chicago, Detroit, Minneapolis-St. Paul, and Milwaukee are largely supplied by Lake States dairymen.

Almost the entire area is dominated by the Chicago market. This market draws fluid milk from northeast Illinois, southwest Michigan, and all of Wisconsin (all included in the study), as well as from northwest Indiana (not included).

Much of the milk produced in the region, particularly in Minnesota, western Wisconsin, and northeastern Iowa, is not eligible for fluid use. Therefore, it is processed into manufactured milk products. Markets for this milk have been particularly depressed because of the per capita decline in consumption of butter and some other manufactured milk products. Government acquisition of manufactured dairy products stocks, coupled with a support price program, has provided part of the market and the effective price floor for these products.

In the post-World War II period, about 75 percent of the milk produced in the three-state region of Michigan, Minnesota, and Wisconsin found a non-fluid-consumption market outlet. A greater proportion of milk produced in the study area of Illinois and Michigan found a market for fluid consumption than did milk produced in Iowa, Minnesota, and Wisconsin. In contrast, during the same period, about 75 percent of the milk produced in the Northeast United States found a fluid-consumption market.

The Study Procedure

A sample was drawn from all commercial farmers in the portions of the five states studied. These farmers were interviewed to determine their current farm organizations and resources. Producers were divided into 80 groups on the basis of soil type, farm size, dairy facilities, and milk market. A representative resource (farm) situation was constructed for each group.

The most profitable organization was then computed for each representative farm. Recommended crop and livestock production practices were used and access to a "reasonable" amount of credit was allowed. Organizational alternatives included major adapted crops and dairy, beef, and hog enterprises. Several dairy and hog technologies and enterprise systems were studied. Farm organizations were determined for 36 different milk and hog price combinations.

As a result, an estimate of the supply of milk, both grade A (eligible for fluid use) and grade B (eligible for manufacturing uses only) was constructed. Estimates were made of the supply of milk which would result at different milk prices from implementation of the farm organizations producing maximum or near maximum farm incomes.

A concurrent study was made of the demand for milk in 1965. This study assumed that Lake States producers would continue to service the same proportion of the domestic market use of fluid and manufacturing milk that they supplied in 1959. However, similar conclusions could be indicated from the study even: (1) with a moderate increase or decrease in the proportion of consumers supplied by Lake States dairymen, or (2) with a later projection date—say 1967 or 1968.

The market for fluid-eligible milk was assumed to come largely from consumers in or near the producing region (the Lake States). Manufactured milk products were assumed to compete in a national market. Both supply and demand estimates were projected from a 1959 benchmark base.

A Summary of Results

Projection of the demand for all milk indicates a slight increase in total milk demand (as compared to 1959) at an equilibrium price about 8 percent below the current (1963 average) market price. This is true despite a slight per capita reduction in the demand for fluid milk and a greater decline in the demand for fluid cream and some manufactured milk products.

This equilibrium analysis assumes full utilization of milk produced (no government purchases). In the event of: (1) continued government acquisition of milk stocks, or (2) producers not producing up to capacity, equilibrium prices would be nearer those of 1963.

Projected population increases, about 10.3 percent nationally, more than off-

set the projected decline in per capita consumption of manufactured milk products between 1959 and 1965. The population increase, coupled with the lower equilibrium price for milk, would increase the quantity demanded for use in manufacturing by about 1.5 percent per year. However, quantity of milk demand for fluid uses would change little by 1965 as compared to 1959, even with the lower equilibrium price.

The demand potential is limited, and the free-market equilibrium price that would balance regional supplies and demand is slightly lower than current prices. Nevertheless, increases in milk production would be profitable on many dairy farms. But increases in some parts of the region would be offset by decreases in other areas.

The equilibrium analysis indicates that, in a situation of balanced supply and demand for milk in the Lake States region, three major considerations would be of prime importance in improving the income of Lake States dairymen:

- Grade A producers generally could provide an increased supply of milk as their competitive position in dairying is strong relative to grade B producers. This is true even with a reduction of about one-third or more in the historical (post-World War II) price premium of fluid-eligible milk over manufacturing quality milk.
- Many grade B dairy farmers will find it profitable to decrease milk production. Or they could eliminate the grade B dairy enterprise completely and specialize in grade A milk production or in beef and hog feeding. Since the analysis was based on more favorable beef prices than those currently existing, an important consideration is assessment of how long the currently depressed state of beef prices will continue. A shift to livestock feeding enterprises should also be considered on some small grade A dairy farms located on the region's Corn-Belt-type soils.
- An increase in the quality of cows and size of herds would be profitable on farms staying in dairy production. On many larger, better financed, grade A dairy farms a substantial increase in laborsaving loose housing milking parlor mechanization would also be profitable.

Two-man grade A dairy operations, milking from 40 to 60 cows or more, often would be the most profitable farm organizations in areas where dairying has an advantage. For this size operation a specialized labor-efficient parlor-loose housing dairy was found profitable over stanchion dairying. Below 40 cows, use of an existing stanchion barn usually would be more profitable.

The largest increase in milk production would be profitable in Michigan where livestock alternatives to dairy are limited. Also, higher land values and a better capital position would enable more Michigan farmers to invest in specialized dairy facilities ($15,300 for a 40-cow herd) than is the case for farmers in northeastern Iowa, western Wisconsin, and eastern Minnesota.

This increase in Michigan milk production also partly results from a historically "higher priced fluid market" than is the case for other regional markets. Since this "higher priced fluid market" is obviously limited, it cannot absorb a major increase in the milk supply. However, a substantial increase in milk production in Michigan will probably be profitable even with: (1) less favorable milk prices than those discussed here, and (2) a much lower than 1959 class I utilization rate for fluid-eligible milk.

Any reduction in price differentials between states in the region (from those existing historically) would enhance the competitive position of Wisconsin and Minnesota producers. Producers in these two states have not realized as high a price for milk historically as have producers in other Lake States.

Profitable reductions in milk production on farms on the Corn-Belt-type soils of the region (particularly Illinois, Iowa, and south-central Minnesota) are indicative of the strong competitive position of cash crops and nondairy livestock enterprises. Such adjustments are also consistent with more favorable demand projections for red meat than for dairy products.

Some smaller farms in east-central Minnesota and west-central Wisconsin cannot be organized to provide adequate incomes. Their resources do not provide an adequate base from which to make profitable adjustments. Many of these farms will probably be consolidated into larger units.

Nonprofit considerations such as: (1) unwillingness to incur the large debts required for some farm adjustments, (2) risks associated with some feeding enterprises, and (3) uncertainty about the profitability of some farm practices will likely prevent income-improving adjustments considered here from occurring 100 percent. However, the extent of adjustment which actually occurs will greatly determine the future competitive position of Lake States farmers.

How Productive Is Your Farm?

H. R. Jensen and P. Ram

Through the years a common goal of farm families has been to have a productive farm. Some attain this goal. Others do not. Even those who attain it at some point in time discover that what is a productive farm in one period may become not so productive in a later period. Why? Because methods of farming change continuously, as do economic conditions surrounding farming.

Just what is meant by a productive farm? The measure of productivity we used was that a farm is considered productive if the dollar value of its annual output equals or is greater than the dollar value of the annual input of resources used to produce it. This study is based on samples of farms in south-central Minnesota and the Red River Valley.

We calculated total value of annual output by summing: income from sales of farm products, value of farm products held for sale, income from government payments, income from custom work done for others, and dollar value of farm products consumed by the household.

We estimated total value of annual inputs by summing: total man hours of labor times wage; dollar outlay for farm operating expenses; depreciation on machinery, equipment, and service buildings; and interest on investment in land, service buildings, machinery, equipment, and breeding stock. Total man hours of labor included man hours of labor hired and those the farm operator said that he and his family were able and willing to devote to farmwork. All labor was valued at $1.13 an hour in south-central Minnesota and at $1.09 in the Red River Valley.

We calculated farm operating expenses by multiplying physical quantities of these inputs by their prices. Depreciation on machinery and equipment was figured at 12 percent, and on service buildings at 4 percent. Interest on investments in land and service buildings was figured at 5 percent; on machinery, equipment, and breeding stock, at 7 percent.

We obtained information for our calculations for individual farms through

personal interviews with 213 farmers in south-central Minnesota and 126 Red River Valley farmers. These random samples of farms were stratified by size and type in order to determine whether size and type influenced productivity in each area. Moreover, the information was for 1960, so productivity measurements and comparisons reflect yields and prices of that year.

By dividing the total value of annual output by the total value of annual input, we obtained ratios that provide a measure of the productivity of various size and type groups of farms. A 1.0 ratio means that, as an average, a farm group had an annual output whose value just equaled the value of annual inputs. So the value of what the farms produced was just sufficient to pay: annual farm operating expenses; farm operators and their hired workers a wage of $1.13 per hour ($1.09 in the Red River Valley area); an annual depreciation cost of 12 percent on machinery and equipment and of 4 percent on service buildings (the cost of capital assets is thus distributed over the estimated useful life of these assets); and a 5-percent interest cost on investments in land and service buildings and 7 percent on machinery, equipment, and breeding stock.

So a 1.0 ratio means that, on the average, a farm family in this group is as well off farming as it would be if it sold the land, buildings, machinery, equipment, and breeding stock; invested the money received at 5- and 7-percent interest, and went to work at the wage indicated.

A ratio of less than 1.0 does not mean that a group of farms is going broke. But it suggests that, as a group, the farms failed to make operating expenses together with the conservative labor wage and the investment costs charged against capital.

South-Central Minnesota

The analysis (table 1) shows that in the Clarion-Nicollet-Webster soils area of south-central Minnesota, size and type of farm influenced the farm's productivity. Small farms had a productivity ratio of 0.91 while medium and large farms as a group had a ratio of 1.03.

At the same time, hog and/or beef (livestock) farms had a productivity ratio of 1.09. Cash grain, general, and dairy (other) farms as a group had a ratio of 0.92. Note that medium and large farms as a group, when compared with small farms as a group, had over twice the number of crop acres and cash operating expenses, 1.8 times the capital inputs, but only 1.2 times the labor.

Not only were relatively large quantities of resources necessary for a productive farm in this area, the kind of products produced and their market value were also important. Livestock farms that emphasized production and sale of hogs and/or beef were more productive than the "other" farms that emphasized production and sale of products other than hog and/or beef or placed relatively less emphasis on feeder livestock. Livestock farms as a group had the same amounts of investment capital and crop acres as the "other" farms and somewhat less labor. But they had more than three times the operating expenses, which partly reflected the purchase of feeder livestock.

Red River Valley

Whereas both size and type of farm influenced the productiveness of farms in south-central Minnesota, only size influenced the productivity of farms on the Fargo-Bearden soils in the Red River Valley of Minnesota (table 2).

Sample farms in this area were also grouped by type to determine whether type influenced productivity. Farms were classified as:

1. Pure cash grain farms if they produced grains only for sale.
2. Cash crop farms if they produced grains as well as sugar beets for sale.
3. Cash crop with livestock farms if they had some livestock enterprise(s) together with cash crops, including cash grains and sugar beets.

But the analysis showed that the productivity ratios for each group of farms by type did not differ significantly from each other.

The productivity ratio increased as size of farm increased (table 2). The large farm, when compared with the small, had about seven times the crop acres, the investment capital, and the current operating expenses but only about three times the labor.

Summary

This study shows that size of farm influences the productivity of a farm. A productive farm requires relatively large quantities of resources, especially investment and operating capital. Only in this way does labor become productive. The productivity of any one resource depends on the quality and quantity of other resources with which it is combined. Type of farm may also be important in determining productivity—in areas such as south-central Minnesota where a relatively large number of crops and livestock are feasible alternatives.

But size and type are not the only factors determining productivity. An operator's ability is also an important determinant.

Table 1. Resource inputs on south-central Minnesota farms and the overall productivity of these resources, 1960

Class of farm	Crop acres	Cash expenses	Labor supply (man hours)	Capital investment	Productivity (ratio of total value output over total value input)*
Small	147	$ 4,243	4,070	$46,661	0.91
Medium and large	300	9,224	4,989	83,949	1.03
Livestock	243	12,572	4,570	70,103	1.09
Other	243	3,927	4,701	70,130	0.92

* Statistical tests showed that the average productivity ratios for the medium and large farms did not differ significantly so these two groups were combined. Similarly, the tests showed that the average productivity ratios for cash grain, general, and dairy farms did not differ significantly. So they were combined into one group termed "other" farms. The type classification used here was similar to that used by the U. S. Census. Units were classified as livestock farms if 50 percent or more of the 1960 gross sales were from hogs and/or beef cattle. The same percent of income criterion was used for classifying cash grain and dairy farms. Farms having several enterprises with none providing over 50 percent of gross sales were classified as general.

Table 2. Resource inputs on Red River Valley farms and the overall productivity of these resources, 1960

Class of farm	Crop acres	Cash expenses	Labor supply (man hours)	Capital investment	Productivity (ratio of total value output over total value input)*
Small	135	$ 1,454	2,125	$ 22,644	0.77
Medium	371	5,252	3,912	60,454	1.06
Large	985	11,452	7,194	156,747	1.21

* Statistical tests showed that the average productivity ratios differed significantly between sizes of farms but not between types.

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High Protein Feeds

Ju Chun Chai and Harold C. Pederson

As producers, farmers are interested in the prices of byproducts made from their grains, oilseeds, meat animals, and poultry. As buyers, they are also interested in the prices they pay, especially for high protein feeds. These feeds are essential ingredients in rations for all classes of livestock and poultry.

High protein byproduct feeds may be substituted for one another in varying proportions in feed rations. For this reason, price is an important factor in determining least-cost feed mixes. So let us review trends in recent years as to the: (1) volume produced of major high protein byproduct feeds, (2) variations in yearly average prices of different high protein feeds, and (3) factors likely to affect future trends.

Concerning the volume produced of high protein byproduct feeds, the trend is up (see table 1). The quantity of high protein feed fed per animal unit has increased rather steadily for several years. The average increase has been about 2 or 3 percent a year since 1950.

Minnesota farmers will be interested to see that a large proportion of high protein feeds are made from soybeans, grains which are milled, and meat byproducts. A bushel of soybeans normally yields 48 pounds of meal. This represents three-fifths of a bushel of beans.

The yearly average price relationships among each of the eight selected high protein feeds are shown in table 2. Of course, protein feeds vary in composition—in the percentage of protein contained and in nutritional characteristics which are of special value in certain feeds.

When the yearly average price of each high protein feed is compared with the other seven since 1957, these trends are observed for the 1957-63 period:

1. The yearly average price of soybean meal shows an almost uninterrupted upward trend. This trend is quite similar for cottonseed meal. However, in the earlier part of this period cottonseed meal was higher priced than soybean meal. Processing improvements have made soybean meal a very competitive high protein feed.

2. Linseed meal prices have fluctuated more from year to year than either soybean or cottonseed meal prices. At times it was higher priced than either of these two high protein feeds; at other times it was lower in price. However, the trend has also been slightly upward.

3. Fish meal and meat meal in this group of feeds show the highest average prices. Neither shows an upward trend; yearly average prices for fish meal actually have been downward.

4. Prices for the mill feeds, gluten feeds, and alfalfa meal have remained the most stable for this period.

Table 1. Selected byproduct feeds: estimated use for feed, year beginning October, average 1957-61, annual 1962-63*

Feed	Average 1957-61	1962	1963
	million of tons		
Soybean meal	8.68	9.58	10.00
Cottonseed cake	2.34	2.56	2.63
Linseed meal	0.38	0.32	0.35
Tankage	1.60	1.85	1.90
Fish meal	0.51	0.65	0.65
Wheat mill feeds	4.81	4.90	4.90
Alfalfa meal	1.40	1.58	1.58
Gluten feeds	1.11	1.28	1.30
Total	20.83	22.72	23.31

* Source: FDS—201, November 1963.

Table 2. Prices of specified byproduct feeds, year beginning October, average 1957-61, annual 1962-63*

Feed†	Average 1957-61	1962	1963
	dollars per ton		
Soybean meal	57.80	63.60	71.30
Cottonseed meal	57.50	59.20	66.90
Linseed meal	59.40	66.00	67.30
Meat meal	85.50	86.30	93.70
Fish meal	122.00	123.20	126.50
Gluten feed	38.10	37.50	43.20
Wheat midlings	33.40	34.50	38.40
Wheat bran	38.00	39.20	43.50
Alfalfa meal	45.75	47.60	48.40

* Source, FDS—201, November 1963.

† Wholesale prices reported at these customary locations: for soybeans, Decatur; cottonseed, Memphis; linseed, Minneapolis; meat meal, Chicago; fish meal, Buffalo; wheat bran and midlings, Minneapolis; and alfalfa, Kansas City.

Future price trends in byproduct high protein feeds will be greatly influenced by:

- Prices received for other products processed from grains, oilseeds, livestock, poultry, and fish. At the present time, oilseed processors find that the income derived from the meal made from soybeans accounts for a larger portion of the value of processed soybean products than was true a few years ago. (See *Farm Business Notes*, April 1964, for a detailed discussion of soybean prices in relation to oil and meal.)
- The continued upward climb in the use of high protein feeds. This will depend upon prices received for livestock and livestock products.
- Export demand for oilseeds (especially soybeans) and meal.

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NOTES

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