Staff Paper Series

Staff Paper P75-10 June 1975

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Dairy products are one of the most protected commodities in international trade. Section 22 of the Agricultural Adjustment Act of 1933, as reenacted and amended, provides authority for dairy import quotas. These quotas restrict imports into the United States to about 1.5 percent of domestic milk production. Import controls are quite stringent in the European Economic Community (EEC), Canada, and Australia. In the EEC, import levies must be paid by the importer of any dairy product. These levies are set high to prevent even more competitive countries from shipping dairy products to the EEC without special agreements. In Canada, imports of the major dairy products require import licenses which normally are not granted. Dairy imports into Australia are subject to licensing and tariffs. Licenses are difficult to obtain unless a bilateral agreement has been made as in New Zealand. New Zealand licenses fresh milk, cream, and casein, but domestic prices are so low that essentially no imports are attracted to that market.

1/ Paper presented at the American Dairy Science Association meeting, Kansas State University, Manhattan, Kansas, June 25, 1975. Some of the results presented in this paper were first presented in "The Impact of Dairy Imports on the U.S. Dairy Industry", Boyd M. Buxton, project leader. Agricultural Economic Report No. 278. Economic Research Service. United States Department of Agriculture, January 1975.

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If most or all of these quotas, tariffs, levies, and other protection mechanisms were to be dismantled, the competitive position of the U.S. dairy industry in relation to other potential supply areas would become even more important. Can foreign exporting nations supply cheaper dairy products to the American consumer than our own farmers, processors, and retailers? If so, does this necessarily imply the dismantling of the U.S. dairy industry? This paper presents some analyses of these complex questions.

DAIRY IS PART OF A BROADER PICTURE

Dairy product trade is not determined in isolation from trade of other commodities. A country buys imports with revenue from exports. U.S. import of dairy products depends, to a large extent, on its export markets for other agricultural or nonagricultural products.

It has long been shown that specialization in production and trade of goods generally improves the standard of living for trading partners. However, moving toward free trade, after an industry in a particular country has been protected, can cause major short run adjustments as resources are displaced by imports. A country's dependence on imports also grows with trade, making it more susceptible to the uncertainties associated with the availability of imported supply. Many of these uncertainties depend upon the political policies of the trading countries.

Whether or not the gains are worth these costs is something to think about, but are beyond the scope of this paper. The central question of this paper concerns the position of the U.S. dairy industry under a more liberal import policy.

Two questions important in considering whether the United States dairy industry can compete with dairy exporting nations are:

(1) Can any exporting nation profitably (without subsidy) supply the U.S. consumer with cheaper dairy products than the U.S. dairy industry?

(2) If so, how much can those countries supply?

Most countries are not interested in providing a regular supply of dairy products to other countries at subsidized prices. In general, subsidized exports have been the result of short run surplus disposal and these exports cannot be counted on year after year. No country could compete with the 40 cents per kilogram butter that Europe sold Russia in 1973. But how often could Russia be assured of butter from the EEC at that highly subsidized price? In the long run the key issue, then, is the quantity of dairy products which countries with lower costs than the United States can ship to the United States. Those exporting nations which could sell dairy products to the U.S. consumer at lower prices than the U.S. industry are presented in the following section.

COMPETITIVE POSITION FOR THE U.S. MARKET

The quantity and quality of farm resources and their suitability for alternative uses largely determine the competitive differences between countries. The processing and manufacturing sectors, and the intra-country competition with other farm and nonfarm enterprises also affect competitive ability. Some of these realtionships are briefly summarized for a few important dairy regions of the world.

Farm efficiency - Herd size varies widely throughout the world. In the potential exporting areas of the world, the average herd size varied from 105 cows in New Zealand to 4.4 cows in Italy (Appendix Table 1). Government policy has had much to do with the size of dairy farms in many countries. For example, the German Government has intentionally located industry in rural areas, to make dairying a part-time possibility. Recent policy changes in Australia have eliminated a bounty subsidy program and initiated programs to help marginal dairymen discontinue milk production or attain better sized dairy herds. Most of the major supply regions of the world have placed emphasis on increasing herd size and efficiency.

Yields per cow are closely related to concentrates fed per cow. In New Zealand, for example, production per cow is low, but dairying is a pasture based industry. A typical New Zealand dairy farm has no buildings except an open shed milking parlor and the farm residence. The cows are pastured year round so there are no hay or concentrate storage structures, or handling equipment. Most of the machinery inventory is represented by a small tractor and trailer.

Farm income - Structural and financial data were collected for representative dairy farms in potential foreign supply areas for the 1972 production year (Appendix Table 2). These farms ranged in size from 22 to 108 milk cows and in production capabilities from 2,595 to 4,749 kilograms of milk per cow.

In addition, two U.S. dairy farms were constructed to represent the net income situation for dairy farm operators in New York and

Wisconsin. Both of the American farms had a substantially higher production per cow in 1972 than the European and Oceania dairy farms. Likewise, the net cash incomes of the U.S. farms were substantially above their foreign counterparts. However, relative to industrial wages, the farm incomes were comparable in all the countries. While milk prices and costs have risen substantially since 1972, Appendix Table 2 presents a good relative picture throughout the world.

Most of the economic and social forces operating in the United States are also very evident abroad. Rapidly rising production costs have created a concern about dairy farmers' ability to continue production. Dairy farming has also lost its appeal for many young people who have off-farm job opportunities in town that sometimes pay more and certainly have shorter working hours plus vacations.

Inflation of land values and increasing production costs have threatened the "sharemilker" system of farm transfer in New Zealand. Traditionally, young sharemilkers would work on established dairy farms for several years with the objective of saving enough money to start their own dairy farms. However, with the recent level of inflation, farm values have increased more than most sharemilkers can save.

Physical input-output measures - A gross estimate of the physical efficiency of labor and land in producing milk was made using farm account data from New Zealand, the Netherlands, and the United States (Figure 1). Results indicate that New Zealand farms can produce a metric ton of milk with less labor and land than can U.S. farms. This gives New Zealand an apparent absolute advantage in milk production

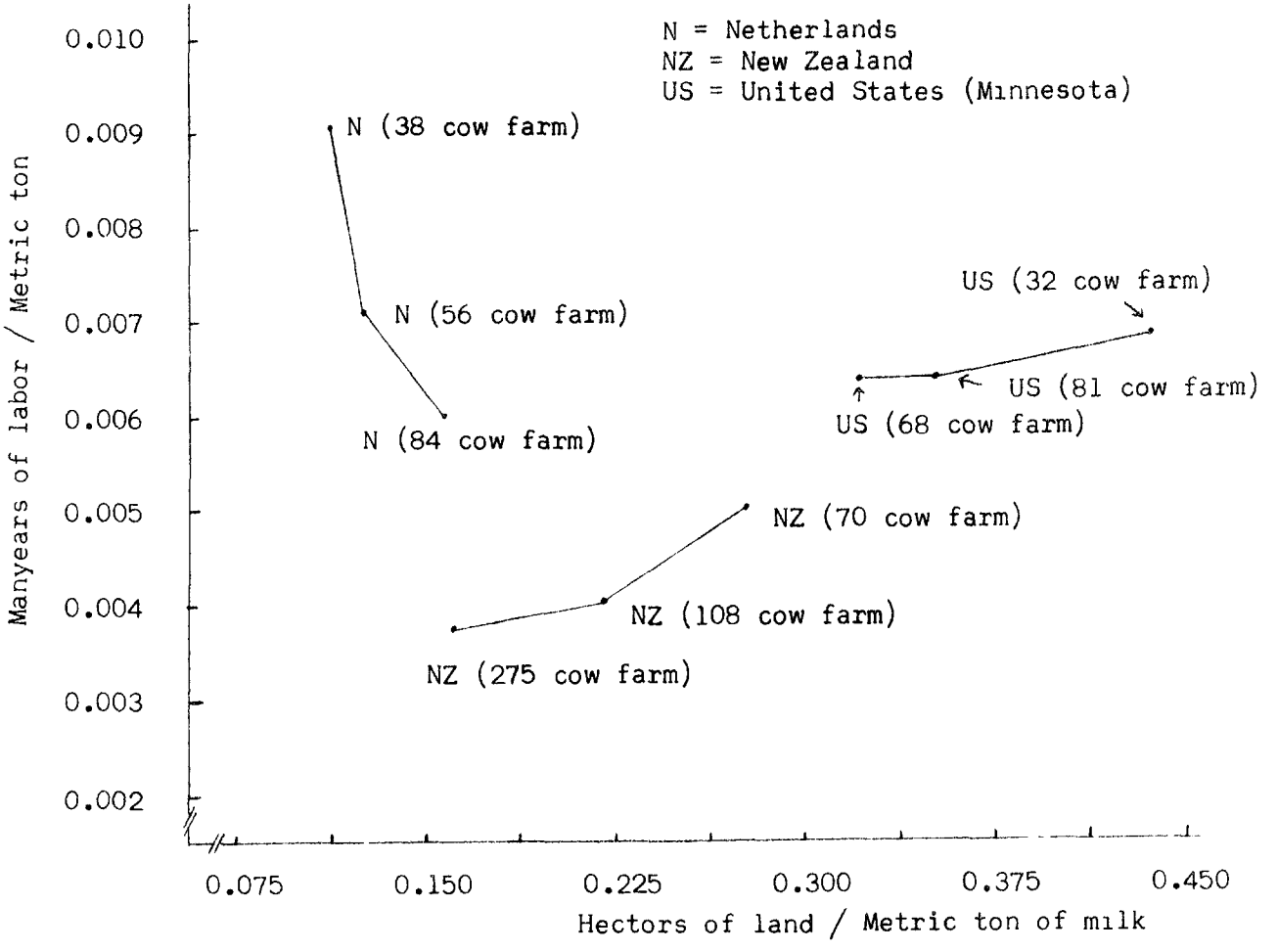

Figure 1. Land and labor used to produce one m.t. of milk on selected size farms in New Zealand, Netherlands, and the United States.

Sources:

Netherlands, Dr. A. Maris and ir. C.J. Cleveringa, "Outlook for Modern Family Farms in Dairying". (Data for 1971-72 accounting year); New Zealand, "A Survey of the Economic Structure of Factory Supply Dairy Farms in New Zealand", 1970-71, Volume VIII, New Zealand Dairy Board; United States, Nodland, Truman, "Data from Specialized Dairy Farms for 1973", unpublished data, University of Minnesota, St. Paul, Minnesota.

compared to all size farms in the United States.[2/]

Farms in the Netherlands use less land but more labor to produce a metric ton of milk than U.S. farms. The question of advantage in milk production between the United States and the Netherlands, then, is less clear than between the United States and New Zealand. New Zealand farms use about the same land but much less labor per metric ton of milk produced than do farms in the Netherlands.

These results are explained, to a large extent, by differences in dairy farming in the three countries. In the United States, more land and labor are required to dry-lot feed forage and relatively large quantities of concentrate. Most of the feed is carried to the cow rather than foraged by the cow. The opposite is true in New Zealand as cows are pastured year round; practically no feed is fed by the farmer. Apparently this not only reduced the labor, but also the land per unit of milk produced in New Zealand compared to the United States. With relatively cheaper sources of concentrates in the United States than in New Zealand, both types of dairy farming appear to be economically rational. It is economically rational for U.S. dairy farmers to feed concentrates given the historical price realtionships. Although the potential economic use of high concentrate feeding in New Zealand has not been fully explored, they seem quite content to continue a primarily pastured based feeding program.

2/ These data are for Minnesota farms and do not include labor represented by purchased feed, which is more important in the United States and the Netherlands than in New Zealand. All family and hired labor (full or part-time) was converted into manyears. The analysis also excludes direct consideration of capital requirements which would be higher per unit of milk produced in the United States than in New Zealand.

This data suggests that Dutch farms require as much labor per metric ton of milk produced but less land than their counterparts in the United States. Cows in the Netherlands are pastured during the full pasture season but, as in the United States, feed is carried to them during the winter when they are in the barn. The cows typically remain in the pasture during the pasture season and often cows are milked with portable milking units right in the pasture.

Assuming freer trade in dairy products, this comparison between New Zealand and U.S. dairy farms has several implications. If world prices declined in the long run, and the two countries had similar land values and labor wage rates, the United States would be the first to go out of milk production. This situation would prompt structural and locational adjustments in U.S. dairy farming. Intensive concentrate and dry-lot feeding would probably be forced out, and dairy would retreat to areas where pasture was the best land alternative. Cows would forage much of their feed from this pasture land but the most important dairy areas would still require winter feeding.

Information beyond the physical efficiency on farms is needed to analyze world trade in the long run under freer trade conditions. Whether New Zealand or any other country would specialize in dairy production also depends on the alternative uses of their resources, consumer demand throughout the world, transportation costs, etc. However, the efficiency information does provide insight into the competitive position of U.S. producers in relation to those in New Zealand.

The Marketing System - The cost of manufacturing milk into butter,

nonfat dry milk, and cheese is lower in the United States than in either Europe or Oceania (Table 1). Although processing technology is similar, the United States experiences lesser seasonal fluctuation in milk production. New Zealand and Australian factories are essentially closed in the winter months of June and July. Because of seasonal fluctuation in milk production, New Zealand and Australian dairy plants operate annually at about 60 percent of capacity while U.S. plants operate at about 90 percent.

Total cost delivered to the United States - Breakeven prices for foreign dairy products can be estimated using farm prices, and costs of assembly, manufacturing, export, and transportation (Table 1). In 1973, four of the EEC countries would have needed about $1.76 per kilogram of butter at U.S. East Coast ports to cover all transportation and processing costs, and pay for milk at the going farm price. New Zealand would have needed about $.84, and Australia about $1.04 to deliver butter to the East Coast. These contrast to a U.S. processing cost of about $1.41. Wholesaling and retailing costs are not included in these figures. Similar conclusions apply to cheese and nonfat dry milk.

The farm milk price in 1974 was similar in Europe and the United States but substantially lower in New Zealand and Australia. These differences in milk costs account for most of the variation in breakeven prices of the countries considered.

The main conclusion is that Oceania can and Europe cannot ship dairy products to the United States more cheaply than we can produce them here. The full implications of this situation, given freer trade, to the United States rests heavily on Oceania's supply. This question is discussed in the next section.

Table 1. Estimated Cost of Producing and Shipping Butter, Nonfat Dry Milk, and Cheese to the United States from Selected Countries, 1973.

(U S. cents per kg. of product)

Item	Milk cost 1/	Farm collection	Factory cost 2/	Export cost	Freight to U.S. east coast	Total break-even price to U.S. east coast	Total U.S. cost at plant
Butter·							
Australia	67	3/	20	2	15	104	
New Zealand	54	3	9	2	15	83	
Netherlands	114	4	31	9	19	177	
Germany	132	6	19	9	19	185	
Belgium	124	6	28	9	19	186	
France	116	6	29	9	19	179	
United States	129	5	7				147
Nonfat dry milk:							
Australia	65	3/	21	2	11	99	
New Zealand	56	3	12	2	11	84	
Netherlands	111	3	10	2	8	134	
Germany	117	5	21	2	8	153	
Belgium	110	5	24	2	8	149	
France	103	5	21	2	8	139	
United States	114	5	10	2			129
Cheese (cheddar):							
Australia	80	3/	26	2	15	123	
New Zealand	65	4	18	2	15	104	
Netherlands	149	4	26	4	12	195	
Germany	150	9	24	4	12	199	
Belgium	141	6	22	4	12	185	
United States	147	6	11				164

[1] Allocated 37.3 percent to fat, 62 7 percent to skim (1974-75 U S price support ratio.) [2] Includes bulk packaging [3] Included with milk cost

Sources: For specific countries as follows: Australia—W. D Scott survey, Sydney, Australia, New Zealand—New Zealand Dairy Board, Wellington, New Zealand; Netherlands—Product Board for dairy products the Hague, France —Processing costs from communications with dairy experts in Paris and Laval, Belgium—costs from personal interview with a dairy expert in Belgium, Germany—processing cost data from Federal Institute of Dairying in Kiel and Bavarian Dairying Institute at Weihenstephan, United States—Estimates are based on data from dairy processing firm records; assembly cost is based on Federal order market data and producer cooperative records Export costs and shipping from Europe to the United States for butter and nonfat dry milk were obtained from conversations with export brokerage firms in Europe

POTENTIAL SUPPLY FROM OCEANIA

Although New Zealand and Australia accounted for about 66 percent of world dairy exports in 1973, they produced only four percent of the world milk supply. Their 1973 combined milk production was only 30 percent of the United States production and 17 percent of EEC production. A large percentage increase in their milk production is quite small compared to the size of their potential markets. Production in Oceania is expected to increase about two percent per year for a total increase of only 1.58 million metric tons from 1975 to 1980. This is about three percent of 1974 U.S. production and less than one-half of one percent of 1974 world production. Consequently, potential supply from Oceania is not sufficient to drive world prices to their relatively low production costs. Given the two percent annual increase of Oceania production, their production would not supply a significant proportion of the United States' needs and a much smaller proportion of the world's needs.

If worldwide trade barriers for dairy products were reduced or eliminated, prices and, therefore, milk production would decline in Canada, the United States, and Europe. Consumption would rise. These decreases in production and increases in consumption would quickly absorb much, if not all, of the potential growth in milk production in Oceania. Thus, the U.S. would import a relatively small part of the expected increase of 1.58 million metric tons of additional milk from Oceania. This increase of import level into the United States probably would be less than one percent of our domestic production. Therefore, even though the United States cannot compete in its own market with Oceania, Oceania poses no serious threat to the U.S. dairy industry.

COMPETITIVE POSITION FOR THIRD COUNTRY MARKETS

Breakeven prices (f.o.b. point of origin) were computed for selected countries in Europe, New Zealand, Australia, and the United States (Table 2). These breakeven prices reflect all charges, including delivery of goods free on board ships at point of origin. Transportation charges must be added to obtain breakeven prices to any importing country. These prices approximate the competitive position of any two countries for a third country market as long as transportation costs to the third importing country are identical for both exporting countries.

Data in Table 2 indicate that the United States in 1973 was equally competitive with most European countries in markets having the same transportation cost from the United States and Europe. France and the United States had about the same breakeven prices for all three dairy products.

Milk prices since 1973 have risen more rapidly in Europe than in the United States. Recent price changes have improved the U.S. competitive position relative to European countries.

As indicated before, it is likely that both Europe and the United States would be net importers of dairy products under freer world trade conditions. Therefore, it is unlikely that the dairy industries in both areas would be concerned about their respective competitive positions for third country markets. Rather, they would be most concerned about the quantity of imports from more competitive countries.

Table 2. Breakeven f.o.b. Prices at Country of Origin for Selected Exporting Countries, 1973 Conditions.

Exporting Country	U.S. cents per kilogram of product		
	NFDM	Butter	Cheese (cheddar)
Australia	86	86	106
New Zealand	71	66	87
Netherlands	124	150	180
Germany	143	156	183
Belgium	139	157	169
France	130	150	163
United States 1/	132	147	169

1/ Includes the estimated cost of moving products from Little Falls, Minnesota, to east coast including total charge loaded on vessel· butter and cheese, 5.05 cents per kilogram; nonfat dry milk 3.95 cents per kilogram.

FREE TRADE IN DAIRY PRODUCTS

With free trade of dairy products, prices in relatively high-priced areas would fall and prices in relatively low-priced areas would rise toward a world equilibrium price determined by world supply and demand conditions. The price differences between countries would reflect only transportation and processing cost differences. Therefore, the relatively high milk prices in Europe, Canada, and the United States would be expected to fall while milk prices in New Zealand and Australia would be expected to rise under freer trade conditions.

Assuming all countries eliminated their trade barriers on dairy products, the United States, EEC, and Canada would be expected to be net importers of dairy products. Almost all these imports would be from New Zealand and Australia (Table 3). Imports into the United States would increase from 2.9 billion pounds of milk equivalents in 1975 to 5.3 billion pounds in 1980. Farm prices would be about five percent lower and, by 1980, there would be 4,200 fewer dairy herds than if import quotas were continued. Many of these 4,200 dairy herds would be owned by farm operators with marginal profits and/or high debt loads compared to the 200,000 U.S. dairy herds expected to remain under free trade conditions.

The social and economic adjustments of free trade for the dairy industries of the high priced countries, primarily Europe, would be so great that such a situation likely would be politically unacceptable. However, analyzing free trade conditions assists in identifying the implications for the United States.

Table 3. Projected Free Trade Levels of Exports and Farm Prices for Major Dairy Areas, 1975-1980. 1/

Area and farm prices	1975	1976	1977	1978	1979	1980
	----------millions of metric tons----------					
United States	-1325	-1252	-1732	-1959	-2187	-2423
EC-3	-6960	-6364	-5500	-4673	-3841	-3002
EC-6	1408	948	407	253	923	-1598
Total EC-9	-5552	5416	-5093	-4926	-4764	-4600
Canada	-1984	-2102	-2164	-2234	-2306	-2377
Australia	2576	2567	2682	2761	2844	2930
New Zealand	5644	5653	5771	5855	5943	6035
Other countries	641	550	537	504	470	435

1/ Milk equivalent, fat-solids basis. Negative numbers are imports; positive numbers are exports.

CONCLUSIONS

The U.S. dairy industry can compete price-wise with all countries except Australia and New Zealand. Free trade with total absence of export subsidies would encourage milk products to be imported from Australia and New Zealand with some specialty products from Europe. By 1980, farm numbers would be reduced by a net of 4,200 U.S. farms under a free trade policy: consumer prices would be somewhat lower than at present.

The American dairy farms would not vanish under conditions of free trade because the Oceania countries which can produce milk cheaper and more efficiently do not possess the resources to significantly increase their supply much beyond the additional 1.58 million metric tons by 1980. This is only about three percent of our total market utilization. In addition, expected technology and transportation costs are such that the large U.S. fluid milk market will remain the domain of the U.S. farmer.

Appendix - Table 1. Size of Dairy Herds, Yield Per Cow, and Concentrates Fed Per Cow in Selected Countries.

	Average herd size	---percent of total herds by size of herd--- 1-4 cows	5-9 cows	10-19 cows	20-29 cows	30-49 cows	50-74 cows	75-149 cows	150+ cows	Total	Yield per cow	Concentrates fed per cow (1971)
United States	29.6	45			16	24		15		100	4649	1846
New Zealand 1/	105			17			16	52	15	100	2829	7/
Australia 2/ 3/	66			22			19	45	14	100	2696	18
Canada 4/	22	28		38	27			7		100	3627	8/
EC-6												
West Germany	7.7	13	36	33	12	5		1		100	3949	414
France	10.2	7	21	43	17		12			100	2957	150
Italy 3/	4.4	..	..	..	..	..	..	..	..	100	6/	357
Belgium	9.7	16	30	36	17			1		100	3635	679
Netherlands	19.0	2	5	24	28	30		11		100	4556	1034
Luxembourg	12.9	4	16	39	23	15		3		100	3743	1012
EC-3												
United Kingdom	31.4	1	2	11	14	26		46		100	4187	657
Denmark	12.5	3	15	43	20	13		6		100	4252	625
Ireland	18.0	5	22	64	5		4			100	2528	60

1/ New Zealand Dairy Board, The New Zealand Dairy Industry: A Survey, Wellington, 1973.
2/ Australian Dairy Produce Board. Annual Report, Melbourne, 1973. Also Bureau of Agricultural Economics. The Australian Dairy FArming Industry. Report on an Economic Survey, Canberra, 1973.
3/ Exact time period not known.
4/ Department of Industry Trade and Commerce, the Canadian Dairy Industry, Ottawa, Canada, May 1971.
5/ Economics Division, Milk Marketing Board, EEC Dairy Facts and Figures, London, 1973.
6/ Not available.
7/ Insignificant quantity.

Appendix - Table 2. Major Structural and Financial Data for Representative Commercial Dairy Farms, 1972. 1/

Item	United States		New Zealand	Australia-Victoria	Netherlands-northern region	France-70. to 99.9. hectare farms	Belgium-Campine region
	New York	Wisconsin					
Structural data:							
Farm records(number)	66	225	254	112	38	98	179
Cows (number per farm)	75	77	108	71	45	58	22
Milk(pounds per cow)	12,715	12,540	5,900	8,240	10,350	5,720	10,470
Financial data(unit of exchange): 2/							
Cash farm receipts	$70,470	$74,475	$NZ16,430	$A16,060	G122,840	FF163,830	BF1,180,155
Cash farm expenses	50,250	46,985	9,260	8,410	87,590	107,305	753,870
Net cash income	20,220	27,490	7,170	7,650	35,250	56,525	426,285
Net cash income(U.S. dollars)	20,220	27,490	8,620	9,135	11,125	11,310	9,740
Milk price(price per 100 pounds)	$6.42	5.66	$NZ1.81	$A1.92	G19.42	FF30.13	BF272.65
Milk price(U.S.$/cwt)	6.42	5.66	2.18	2.29	6.13	6.03	6.23
Revenue proportion(%):							
Milk	86.9	73.3	70.3	69.8	73.6	61.0	53.2
Nonmilk	13.1	26.7	29.7	30.2	26.4	39.0	46.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Expenditure proportion(%):							
Purchased feed	33.5	21.3	12.0	14.4	33.7	28.5	53.9
Dairy livestock	7.2	6.8	12.5	8.9	9.6	8.4	2.5
Labor	15.1	17.2	18.3	25.4	7.5	6.2	3.8
Fertilizer and lime	5.4	6.9	11.5	7.7	1.8	13.8	6.4
Other	38.8	47.8	45.7	43.6	47.4	43.1	33.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

1/ Based on farm records available for 1972.
2/ In producers' own currency except where noted.