Proceedings of the Second
Canada/U.S. Agricultural and Food
Policy Systems Information Workshop

Understanding Canada/United States Dairy Disputes

Edited by

R.M.A. Loyns
Karl Meilke
Ronald D. Knutson

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December, 1996

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FOREWORD

This publication represents the second output of what the organizers hope will be a series of workshops and public information on Canada/U.S. policy and trade disputes. The first initiative was an analysis of the grains disputes; the second program and this publication deal with the issues of the dairy industries in both countries. The objective of the organizers of this initiative is to reduce the level and impact of policy differences, and stressed trading relations between Canada and the United States through dissemination of balanced economic information.

A great deal of effort and cooperation have gone into these programs to produce this output. The organizers are committed to a low budget operation with sometimes very tight deadlines; that means that the contributors do most of the work outside of the very nominal compensation we are able to make. That also means that a number of public and private institutions have indirectly contributed to the program and publication. We appreciate these contributions and wish to acknowledge the sharing by organizations, universities, private firms and branches of government on both sides of the border.

Direct funding for this program and publication came from three sources: the U.S.D.A., Agriculture and Agrifood Canada, and the Farm Foundation. We acknowledge these contributions and thank you for your continued support. We have been unencumbered in our planning efforts by this support and the program represents our own best shot at relevant and timely analysis.

The first named editor wishes to acknowledge the contribution of the authors, and his fellow editors; this is a significant undertaking, and most papers and the support of the other editors expedited the process. Alex Pursaga has worked on editing both years, and Bonnie Warkentine has done all the production work. Their contributions have been beyond compensation as well. Having said this, the senior editor also acknowledges and takes responsibility for failure to meet our time lines. The next publication will be on time.

The next program will occur in early March and has been fixed at the time of writing. We take the policy/trades dispute framework to the next logical level of policy consistency, compatibility, and harmonization, and this time in a tri-national context including Mexico. That publication is targeted for release in June 1997.

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December, 1996

WORKSHOP AUTHORS AND ORGANIZERS

Richard Barichello is Professor and former Head, Department of Agricultural Economics, University of British Columbia. Rick is recognized as one of a very few academic economists in Canada with intensive knowledge of the dairy industry.

Jack Bamford in Policy Directorate, Agriculture and Agri-Food Canada (AAFC), Ottawa. He assisted in planning this workshop and was the primary source of information and writer of the Canadian Background paper.

Bill Blakeslee is the Vice-President in charge of planning for Mid-America Dairymen Inc., located in Springfield, Missouri. Mid-America is one of the largest U.S. dairy cooperatives with operations stretching across the country.

Tom Cox is Assistant Professor at the University of Wisconsin. He has developed one of the few equilibrium models for dairy policy analysis, as such he was a key analyst for the dairy process of the 1996 farm list.

Terry Crawford is the head of the Animal Products Branch of Economic Research Service of the United States Department of Agriculture (U.S.D.A.). In this position he serves as the leader of dairy marketing research in U.S.D.A.

Bob Cropp is Professor at the University of Wisconsin with primary interest in cooperational marketing. He is one of the foremost U.S. authorities on dairy marketing and policy.

Jack Gellner is Director of the Industry and Policy Analysis Division, Policy Branch, AAFC, Ottawa and one of the members of the coordinating committee for the workshops. His responsibilities include research, analysis and development on most aspects of federal policy, including providing analysis and advice related to the dairy industry.

Marcia Glenn is Vice-President, Production and Planning, Kraft Foods, Glenview, Illinois. Marcia has held positions in Agriculture and Agri-Food Canada in Ottawa, the Canadian Embassy in Washington, and Kraft Foods in Chicago.

Hal Harris is Professor in the Department of Agricultural Economics and Applied Economics at Clemson University. His research and extension interests include public policy, trade policy, dairy policy and agricultural marketing.

Ron Knutson is Director, Agriculture and Food Policy Center at Texas A & M University. Ron serves in many extension, teaching and research capacities in the policy arena; he is a member of the Board of the the Farm Foundation; and he is a member of the workshop coordinating committee.

Al Loyns is Professor of Agricultural Economics, University of Manitoba and a member of the workshop coordinating committee.

Don McClatchy is with Agriculture and Agri-Food Canada and has been involved in policy development and analysis of agricultural marketing systems.

Kempton Matte is with the National Dairy Council of Canada and is extensively involved with national dairy policy development and analysis.

Karl Meilke is Professor of Agricultural Economics and Business, University of Guelph. Karl is active in the International Agricultural Trade Consortium and he is a member of the coordinating committee for these workshops.

Don Nicholson is the Federal Milk Marketing Administrator in Tulsa, Oklahoma with responsibilities for the maintenance and management of the milk distribution system in several states.

Andy Novakovic is Professor and Chair of the Department of Agricultural, Resource, and Managerial Economics at Cornell University. He heads up the largest dairy policy research and extension program in the United States.

Rick Philips is with the Dairy Farmers of Canada and is actively involved in policy analysis and development.

Yvon Proulx is economist, union des producteurs agricoles du québec and a dairy farmer. Yvon was a professor in economie rurale, université laval for a number of years and has been involved in aspects of research inside and beyond the dairy industry.

Alex Pursaga is a Ph.D. candidate in agricultural economics at the University of Manitoba. He has contributed editorial and organizational support to both workshops.

Robert Romain is professor, economie rurale, université laval. He has conducted studies and published in the area of commodity marketing, including dairy and poultry regulation.

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John Schildroth is the Director of the Trade Competition Branch for the British Columbia Ministry of Agriculture, Fisheries and Food.

Mark Stephenson is Professor of dairy economics in the Department of Agricultural Economics at Cornell University.

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Richard Tudor Price is a trade policy advisor with Agriculture and Agri-Food Canada, AAFC.

Michele Veeman is Professor and Chair, Department of Rural Economics and Sociology, University of Alberta, Edmonton. Michele is one of those very few long time academic analysts of dairy policy and programs in Canada.

Peter Vitaliano is Chief Economist for the National Milk Producers Federation in Arlington, Virginia. He works with dairy farmers, cooperatives, the congress and U.S.D.A. in the analysis and development of U.S. dairy policy.

Alfons Weersink is Associate Professor, Agricultural Economics and Business, University of Guelph presently on research leave at the Food Research Institute, Stanford University.

Bonnie Warkentine is Assistant to Head, Department of Agricultural Economics, University of Manitoba. Bonnie has done the production work on two manuscripts for the workshops.

Fred Woods is the coordinator for extension public policy education in the Cooperative State Research Education and Extension Service of U.S.D.A.

Robert Young III is co-director of the Food and Agricultural Economics Research Institute (FAPRI) at the University of Missouri. FAPRI conducts quantitative policy and impact analysis using a large scale econometric modelling system.

CONTENTS

BACKGROUND PAPERS

OBJECTIVE

To provide relevant background information on the United States and Canadian dairy sectors as well as a general description of the policies of both countries.

UNDERSTANDING CANADIAN/UNITED STATES DAIRY DISPUTES

Ronald D. Knutson and R.M.A. Loyns

The root cause of many, if not most, agriculture trade disputes lies in differences in domestic farm policy. This is certainly the case for dairy where the United States and Canada have pursued different policies designed to achieve the same objective—raise farm income and stabilize prices. Dairy disputes between the United States and Canada have their origins in the limitations that both countries place on imports to achieve these basic policy objectives.

Tension in the dairy sector between these two trading neighbours was the subject of the second in the series of trade dispute workshops. This workshop was ideally timed. It coincided with the U.S. Congress finalizing the provisions of the 1996 Farm Bill which included major changes in dairy policy. In a seven-year bill designed to reduce government costs and provide transition to a much freer market, the fragmented U.S. dairy lobby suffered some organizing defeats; price supports will be removed in five instead of seven years. During the debate in the U.S. Congress leading up to passage of the Farm Bill, many alternative dairy policy approaches were considered. These proposals are evaluated in the papers by Cox and Sumner, and Cropp and Harris. North of the border, policy and program change have proceeded relatively quietly and unnoticed, but change has occurred as documented by all of the Canadian contributors in the workshop. Still, many changes need to be made on both sides of the border to achieve the level of free trade envisioned by the NAFTA.

As policy and program change is occurring on both sides of the border, structural adjustment is occurring on farms and in dairy processing. Yet structural change in Canada bears little resemblance to the 1000-2000 plus cow dairies that characterize parts of the U.S. industry, often only a relatively short driving time from the Canadian border. The comparative efficiency of the U.S. and Canadian dairy production and processing sectors was a contentious workshop issue that sparked discussion and certainly was not resolved.

But the purpose of the workshop was not to resolve these issues—that will be done at the negotiating table, through the interaction of market forces, and perhaps with the aid of research and education programs like this one. Rather, as in the previous workshop, the objective was one of fostering improved mutual understanding by participants and decision makers of policies, programs, institutions and economic forces of change. Our overall objective is to foster more harmonious trading relations by improving the information base on the industry and its policy framework.

THE WORKSHOP PROGRAM

The workshop was built around three researchable questions (called Themes in this publication) that bear directly on policy and the nature of adjustments that might be anticipated as we move toward freer trade:

- What impacts have past U.S./Canadian dairy programs had on structure, efficiency and trading relationships?
- What impacts will contemporary policy changes have on structure, efficiency and trading relationships?
- What is the potential for increased trade?

The first workshop on Grains Disputes resulted in discussions that were considered rather academic due to the absence of industry participants. As a result, in this workshop we utilized several industry discussants to react to the papers prepared by university and government economists. Government and industry perspectives on all issues were encouraged throughout the workshop. The presence of industry interests changed the entire rapport of the discussions, made the workshop discussion more relevant and lively, and improved the overall value of the program.

Each of the themes was addressed by U.S. and Canadian analysts. Likewise, discussants from each country provided their perspective on the papers. This publication maintains that format. Authors were selected to give geographic and perspective diversity. For example, in analysing the impacts of past policies, the perspectives of the Upper Midwest (Cropp) and the Southeast (Harris) dairy industries are quite different. Likewise, in Canada, Veeman from Alberta was paired with St. Louis from Quebec. Discussants included a U.S. marketing order regulatory perspective (Nicholson) and a Canadian dairy farmer perspective (Proulx).

Assessment of the impacts of contemporary policy changes is a difficult task because policy is a moving target in both the United States and Canada. U.S. analysts Cox and Sumner were put in an unenviable position of analysing a yet undefined dairy program. The Cox and Sumner paper presented in this publication has been revised to reflect Farm Bill information available only during the workshop. Barichello and Romain's job of analysing the impacts of the evolving Canadian policies was equally difficult. For these papers Blakeslee, a cooperative manager, spoke on behalf of U.S. dairy farmers, and Schildroth provided a Canadian regulatory perspective.

The testy topic of the potential for increased trade was provided by Novakovic and Stephenson, both from the Northeast U.S., and by Meilke from Ontario. The discussants of this sensitive issue were provided by Young and Weersink, both from academia. The results of these analyses indicate that the opportunity for trade will be conditioned to some extent by how the ice cream/yogurt dispute is settled, but freer trade in dairy products is unlikely to mean the Canadian industry will be subsumed by its U.S. neighbour. This latter conclusion was typical of most discussion in the workshop and it is significant because it is contrary to much apparent belief.

The last half day of the dairy workshop provided an opportunity for government, producer and processor representatives to react and develop their thoughts on the policy process and program assessment needs. Government economists Crawford (USDA) and Tudor Price (Agriculture Canada) provided the perspective of policy analysts. The producer perspectives were presented by advocates Vitaliano (United States) and Phillips (Canada). Processors were represented by Glenn (United States) and Matte (Canada). Discussion in this session covered a wide range of policy, political, economic and analytical issues—a fitting wrap-up to a productive and provocative workshop.

In preparing for the workshop, the coordinating committee believed that it would be useful to the workshop itself and to the general function of distributing information to prepared detailed background papers on the industry in both countries. The papers were intended to be strictly descriptive in content but reasonably exhaustive in providing the kind of background data that analysts, policy makers and industry participants could use to better understand the structure of dairy production and the policy framework in Canada and the United States. The USDA and Agriculture and Agri-Food Canada agreed to prepare and circulate these documents in advance of the preparation of papers, and all participants had access to these papers before the workshop. We believe that these two background papers are valuable sources of basic information that is not readily available elsewhere.

Consequently we have included the two papers at the beginning of this publication to set the stage for the papers that follow.

The coordinating committee for the workshops is composed of two U.S. economists: Ronald D. Knutson from Texas A and M University, and Dan Sumner from the University of California at Davis; and three Canadians: Karl Meilke from the University of Guelph, Jack Gellner from Agriculture and Agri-Food Canada, and R.M.A. Loyns from the University of Manitoba.

CANADA/UNITED STATES DATA CONVERSION TABLES

Agriculture and Agri-Food Canada

The following table has been prepared to assist readers in dealing with the sometimes complex and confusing issues surrounding the different units of measurement and the varying rates of exchange between Canada and the United States. These data were largely derived from the annual publication: "Dairy Facts and Figures At A Glance" [1994] produced by the Dairy Farmers of Canada.

	United States Measures		**Canadian Measures**	
Fluid Milk (3.5 % b.f.)	1 cwt	is equal to	0.441 hl	Fluid Milk (3.6 % b.f.)
Fluid Milk (3.5 % b.f.)	2.26761 cwt	is equal to	1 hectolitre	Fluid Milk (3.6 % b.f.)
	1 pound	is equal to	0.4536 kilogram	
	2.2046 pounds	is equal to	1 kilogram	
	1 ton (2000 lbs)	is equal to	907.18 kilograms	
	2.204.6 pounds	is equal to	1 metric tonne	
	1 U.S. quart	is equal to	0.946 litres	
	1.0571 U.S. quart	is equal to	1 litre	
	1 U.S. gallon	is equal to	3.785 litres	
	0.2642 U.S. gallon	is equal to	1 litre	
	26.42 U.S. gallon	is equal to	1 hectolitre (100 litres)	

To convert $US/cwt to $C/hl at the prevailing exchange rate for each year, multiply $US/cwt by the following factors.

To convert $C/hl to $US/cwt at the prevailing exchange rate for each year, divide the $C/hl by the following factors.

Year	**$US/cwt > $C/hl**
1982	2.80
1983	2.79
1984	2.94
1985	3.10
1986	3.17
1987	3.01
1988	2.79
1989	2.69
1990	2.65
1991	2.60
1992	2.74
1993	2.98
1994	3.10
1995	3.12

Theoretical Exchange Rate $C in $US	**Factor** $US/cwt > $C/hl
0.90	2.52
0.89	2.55
0.88	2.58
0.87	2.61
0.86	2.64
0.85	2.67
0.84	2.70
0.83	2.73
0.82	2.77
0.81	2.80
0.80	2.83
0.79	2.87
0.78	2.91
0.77	2.94
0.76	2.98
0.75	3.02
0.74	3.06
0.73	3.11
0.72	3.15
0.71	3.19
0.70	3.24

THE CANADIAN DAIRY SECTOR: STRUCTURE, PERFORMANCE AND POLICIES

Agriculture and Agri-Food Canada

The objective of this paper is to provide a description of the segments of the Canadian dairy sector, its structure and performance, and of the major policies which affect it.

THE MILK AND DAIRY PRODUCTS INDUSTRY[1]

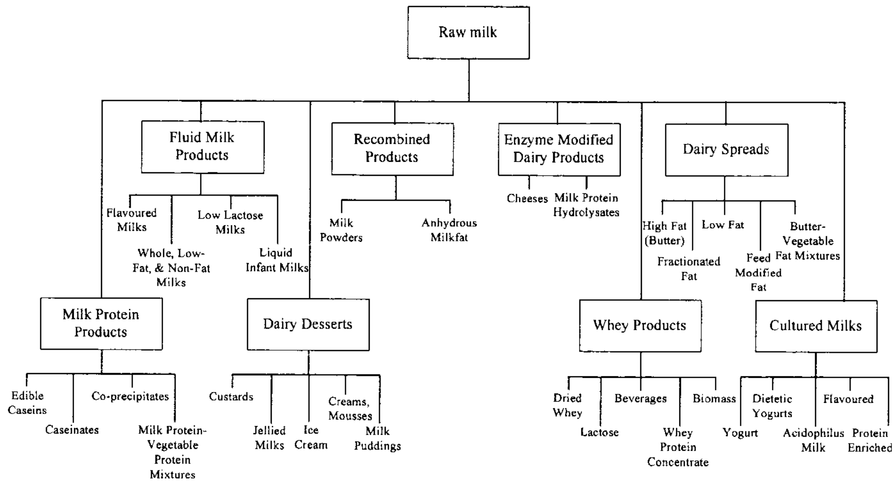
Raw milk is a combination of water, fat, proteins, lactose, and minerals. Production of manufactured products from raw milk involves the disaggregation and transformation of its constituent parts. The broad range of products derived from basic raw milk includes processed dairy products themselves, functional and nutritional food ingredients for use in other food and beverage processing industries, and industrial inputs for a variety of non-food manufacturing (Figure 1).

Demands for dairy products range from lower value, relatively undifferentiated, standardized products, to higher-value, differentiated, specialized, and premium priced products (Figure 2).

Industry has traditionally produced a wide range of consumer dairy products, such as fluid milk, butter, cheese, ice cream and yogurt. In the relatively undifferentiated and standardized market segments, competition can be more on the basis of price. Factors such as the larger volumes required to capture economies of scale and lower production costs can be important elements in competitive position. In the more differentiated, specialized and higher-value market segments, competition is more on the basis of attributes of the products for which premium prices are paid. In these product market segments, factors such as specialized ingredients and production processes used, research and development outlays, branding and marketing investments are critical competitive factors.

[1] Based on Jelliss (1995).

Figure 1. Dairy Products Production Possibilities

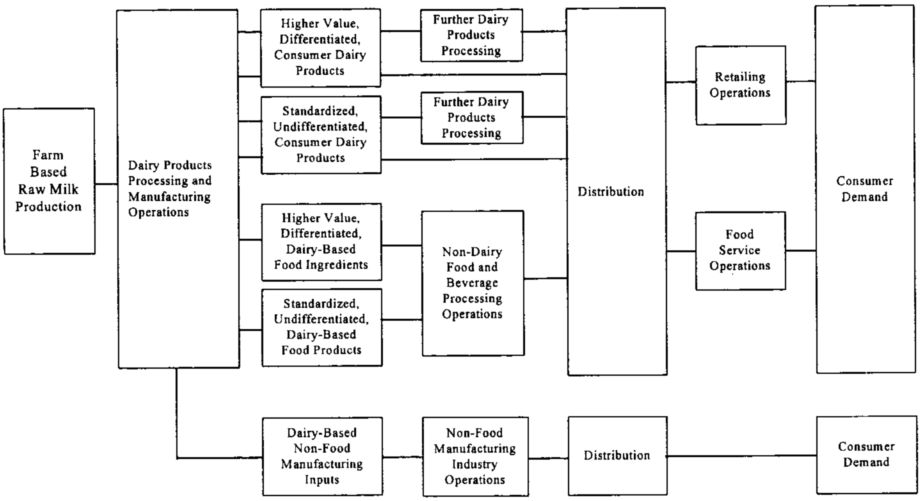


Source: Jelliss (1995) Adapted from Briant (1991).

Similar distinctions occur in dairy-based food ingredients markets. Competition in undifferentiated commodity market segments, such as that for standardized nonfat milk powders, may be more related to price considerations, whether in domestic or international markets. In specialized, more differentiated, dairy-based food ingredient markets, such as custom-designed milkfat mixes, special composition casein and whey based milk protein products, competition is more on the basis of the critical investments and competencies in product, process, market, and customer development.

Industrial demands for dairy-based manufacturing inputs derive from the use of particular milk constituents in the manufacture of products such as pharmaceuticals, virus combatants, beauty aids, glues, or knitting needles, as well as from their functional properties in such areas as immunology and the combating of tooth decay. Various industrial uses for milk-based constituent inputs are located in more technically advanced, higher-value market segments, where the special properties of the milk fractions involved are reflected in premium prices. Establishment and maintenance of a competitive position in these higher value market segments is frequently related to investments in research and development, product and process technologies, and customer relationships.

Figure 2. The Milk and Dairy Products Value System



Source: Jelliss(1995).

The relatively large investments in product, process, market and customer development required in the higher-value, more specialized consumer products and dairy ingredient markets are rewarded by higher margins and lower price sensitivities (Table 1).

Table 1. Margins and Price Sensitivities in Different Dairy Product Markets

Product Market Segment	Margins	Price Sensitivity
Dairy Commodities	Low	High
Dairy Ingredients	Medium-High	Medium
Consumer Dairy Products:		
- Standard	Low-Medium	Low
- Specialty	High	Low

Source: Jelliss (1995) based on Crocombe, Enright, and Porter (1991).

PRESSURES FOR POLICY CHANGE

This section examines five factors which are expected to affect the future structure and performance of the dairy industry.

Global Trends in Supply and Demand.[2] The world dairy market experienced a particularly difficult period in the early 1980s. World recession reduced demand for dairy imports in third world and oil producing countries, while milk production in the EC and the United States rose significantly. The result was an increase in surpluses. Since then, there have been determined efforts to curb overproduction. However, the overall picture remains one of imbalance between supply and demand, with substantial sums of public money tied up in storing surplus stocks and underpinning markets. The danger persists that the dairy industry will remain caught between rapid technological progress, highly flexible production and the slow growth of import demand and consumption.

Technological Change. Embryo transplants, improved methods of genetic evaluation and selection, and improved management practices have contributed to a global increase in cow productivity. These genetic improvements are enhanced by developments in biotechnology such as the recent introduction of recombinant bovine Somatotropin (rbST). This synthetic version of a naturally occurring hormone has been found to increase milk production in average yielding cows. Recent estimates suggest that national production increases in the order of 4 percent are realistically attainable, although for individual cows the increase may be as high as 10-15 percent.

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[2] Based on Grant (1991)

Improvements in filtration technology are enhancing the ability to extract specific ingredients and to develop niche market products. These same technologies are also changing the transportation economics for products by allowing the extraction of water, for example, which reduces the volume and the weight of the product and allows for transportation over greater distances. Such technological breakthroughs will provide a basis for another round of plant consolidation and relocation consistent with these changed transportation economics.

Low-fat / Value-Added Market Shifts. The market for "traditional" dairy products, (i.e., milk, cheese, butter) is in decline. Specialty cheeses, yogurt, ice cream, and fast-food products, such as pizzas and cheese burgers, are a growing segment of the market. The use of dairy ingredients in further processed foods is a growing market.

The former market control rules and the new rules agreed in various trade negotiations do not allow the same degree of market protection for value-added products as for "traditional" dairy products. As this market segment expands, internationally competitive ingredient pricing will be increasingly necessary to support domestic processing and further processing industries.

Consumption trends affect the structure of the dairy industry and dairy policy. Butterfat, once considered the most important component of milk, is becoming a surplus component. Policies that encouraged farmers to produce milk with higher levels of butterfat have become obsolete because butterfat consumption is declining.

As the relative economics of production and processing shift, over the longer term, with changes in component values for milk and the dairy products produced from these components, there will be a need for structural adjustment at both the farm and processing levels.

Freer Trade. Improvements in communications, financial transactions, transportation, packaging, processing, marketing and distribution have encouraged a global approach to the production, processing and marketing for most products, including agriculture and agri-food products. In response to "globalization", governments are negotiating new bilateral and multilateral trading rules which include the reduction of trade barriers. The dairy industry, one of the world's most protected industries, is affected by this policy shift more than other industries.

The Uruguay Round of the GATT resulted in tariffication of import quotas previously permitted under Article XI.2(c)(I). Domestic supply control is no longer a prerequisite for border controls. Under the CUSTA, both Canada and the United States retained their GATT rights with respect to agricultural goods. Under NAFTA, these rights were also protected and restrictions consistent with GATT Article XI or an "equivalent provision of a successor agreement" were specifically allowed.

Neither the CUSTA, NAFTA nor UR GATT have significantly affected the import protection afforded the Canadian and U.S. dairy industries. The changes resulting from these negotiations are a clear indication that governments intend to further reduce trade barriers in the future.

Fiscal Pressures. Budget pressures have stimulated major changes in the dairy market management systems of the European Union and the United States, and are a significant factor in overall Canadian policy reform.

THE CANADIAN MILK AND DAIRY PRODUCTS SECTOR[3]

The milk and dairy products industry in Canada has operated within a heavily regulated policy environment. Domestic industry operations under a national supply management system have been largely insulated from international markets by a combination of quotas, tariffs, and other import control, industry support, and price stabilization arrangements.

Milk production in Canada is split into two commodity markets: the "fluid milk" market and the "industrial milk" market. Fluid milk products consist of standard milk (3.25 percent butterfat), lower fat milk (2 percent, 1 percent, skim), buttermilk, chocolate milk, and fresh creams. Industrial milk products are divided into two categories: 1) hard products, such as hard cheese, butter, and skim milk powder, and 2) soft products, such as ice cream, yogurt, and cottage cheese. Both the fluid and industrial milk markets use the same dairy input – raw milk. However, different regulations govern each market.

Price discrimination is extensively applied in the Canadian milk market. For example, in dairy year 1992/93 there were more than 50 different prices for milk according to end-use and province of production. Prices paid for milk differ between provinces, between milk markets (fluid versus industrial) and between industrial milk classes.

Individual dairy producers produced milk for one or both of these markets. Historically, there was a difference in milk quality between these two markets; today, virtually all milk is fluid quality.

Most industrial milk is processed into cheese in Canada, mainly cheddar and various specialty cheeses. Although cheese is a major dairy product from a production point of view, there is a large variety of dairy products on the market. As in the rest of the food industry, there has been a shift away from commodity markets to increasingly segmented niche markets. This shift has occurred mainly through extensions to existing product lines (e.g., low fat, flavours, packaging format). Examples of such highly segmented markets include cheese, yogurt and ice cream.

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3 Based on Jelliss (1995)

Economic Importance of the Canadian Dairy Sector

The milk and dairy products industry ranks among the major industries in the Canadian agri-food sector in terms of farm cash receipts, processed product shipments, employment, value-added and contribution to gross domestic product (Table 2).

Altogether, dairy farming and processing industries generated sales of more than $10 billion in 1992. Over the last three decades, the dairy industry has shown moderate growth (dairy farming 1.1 percent, dairy processing 1.9 percent), but slower growth than the rest of the agriculture and agri-food industries. Thus, dairy industry contribution to total agriculture and agri-food sector sales has declined slightly.

Dairy farming, ranked second of all Canadian agricultural commodities in value of sales, has maintained its importance for the last 30 years. From 1991-93 dairy products generated average annual farm sales of $3.13 billion; 15 percent of market receipts for all agricultural products.

Dairy processing is the second ranked sector of the Canadian food and beverage processing industry (Figure 3). In 1992, dairy processing manufacturing shipments were $7.46 billion; 16 percent of the value of manufacturing shipments of the food and beverage industry.

While employment data are not readily available, the number of commercial dairy farms reflects the minimum number of producers or families that make a living from dairy farming, as most dairy farms are family farms. According to the Canadian Dairy Commission (CDC), there were 29,350 farms selling milk or cream in Canada in 1993. Dairy farms accounted for 11 percent of all farms in 1991[4].

The dairy processing industry, ranking second to meat and poultry in value of shipments, employed 24,600 people in 1992; about 11 percent of total food and beverage industry employees. This proportion has remained stable over the last decade. Of total dairy processing employees, 53 percent are in fluid milk, 47 percent in industrial milk processing.

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[4] Among all the farms with sales of $2 500 or more in 1991, 28,910 out of 256,182 farms were classified as dairy farms. (Statistics Canada, Census of Agriculture).

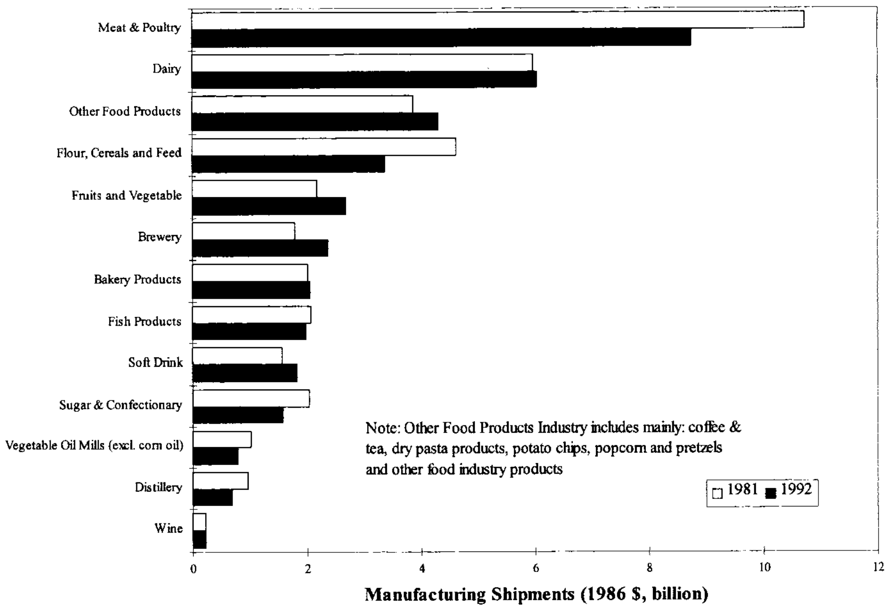
Table 2. Importance of the Dairy Products Industry 1980 - 1991

Farm Cash Receipts ($ millions)												
	1980	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**
Dairy Farm Cash Receipts	2,763	3,079	3,348	3,141	3,410	3,444	3,509	3,617	3,833	3,828	3,878	3,853
% of Total Farm Cash Receipts	17.7%	16.5%	17.6%	16.8%	16.9%	17.3%	17.1%	17.3%	17.7%	17.0%	18.0%	18.1%
Dairy Farming Industry Rank	3	3	2	2	2	2	2	2	2	2	2	2
Processed Product Shipments ($ millions)												
	1980	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**
Dairy Processing Industries	4,315	4,883	5,345	5,615	6,096	6,410	6,668	6,884	7,195	7,349	7,530	7,576
% of Food and Beverage Sector	15.3%	15.4%	16.2%	16.6%	16.9%	17.0%	17.0%	16.6%	16.7%	16.8%	17.0%	17.2%
Dairy Products Industry Rank	2	2	2	2	2	2	2	2	2	2	2	2
Employment												
	1980	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**
Dairy Processing Industries	26,028	26,196	25,734	25,306	25,368	25,445	26,201	25,582	25,870	25,920	25,238	25,781
% of Food and Beverage Sector	11.1%	11.2%	11.3%	11.6%	11.6%	11.4%	11.6%	11.2%	11.1%	11.3%	11.4%	12.0%
Dairy Products Industry Rank	4	4	4	3	3	4	4	4	4	4	4	3
Value Added ($ millions)												
	1980	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**
Dairy Processing Industries	949	1,106	1,180	1,310	1,412	1,661	1,759	1,946	2,074	2,156	2,474	2,497
% of Food and Beverage Sector	11.4%	11.6%	11.5%	11.8%	12.0%	13.3%	13.2%	13.3%	13.5%	14.0%	15.0%	14.5%
Dairy Products Industry Rank	2	2	2	2	2	2	2	2	2	2	1	2
Gross Domestic Product at Factor Cost (Current $ millions)												
	1980	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**
Dairy Processing Industries	801	951	1,048	1,172	1,285	1,533	1,581	1,755	1,824	1,970	n.a.	n.a.
% of Food and Beverage Sector	11.6%	11.9%	11.9%	12.2%	12.5%	13.7%	13.3%	13.7%	13.8%	14.6%	n.a.	n.a.
Dairy Products Industry Rank	2	2	1	1	1	1	1	1	1	1	n.a	n.a
Gross Domestic Product at Factor Cost (Constant 1986 $ millions)												
	1980	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**
Dairy Processing Industries	1,490	1,523	1,398	1,273	1,381	1,586	1,581	1,636	1,582	1,548	1,567	1,545
% of Food and Beverage Sales	13.1%	13.4%	12.5%	11.7%	12.1%	13.2%	13.3%	13.7%	13.2%	13.2%	13.3%	13.6%
Dairy Products Industry Rank	1	2	1	2	1	1	1	1	1	1	1	1

Note: Dairy products industry ranking is based on a comparison of all 3-digit food and beverage product industries excluding that of miscellaneous food products.

Source: Dairy Farmers of Canada, 1992 and various issues; Statistics Canada, various sources (as cited in Jelliss, 1995).

Figure 3. Real Manufacturing Shipments by Major Food and Beverage Sector Canada, 1981 and 1992



STRUCTURE AND PERFORMANCE OF THE CANADIAN DAIRY SECTOR

This section reviews structural changes in the dairy sector at both farm and processing levels over the past several decades. These include changes in number and size of farms and firms, and regional distribution of farms, firms, production and consumption. It also reviews dairy sector financial structure including, assets, liabilities, income, profitability, investment and return on investment.

Performance measures reviewed include production growth; trends in prices, margins, market share, and multifactor, labour and capital productivity; output measures per cow, per farm, per firm, per labour hour; cost of production estimates for farms and firms; and some indication of size or scale economies.

Physical Structure

In 1992, 29,358 dairy farms, with slightly less than 1.9 million milk cows and dairy heifers, shipped about 68.7 million hectolitres of milk and cream to Canadian dairy processing plants, generating a total value of almost $3.3 billion in farm cash receipts.

Approximately 27.3 million hectolitres (39.7 percent), were sold for fluid purposes, and 41.5 million hectolitres (60.3 percent), for industrial purposes, including 1.2 million hectolitres shipped as cream.

Processing occurred at 308 plants across Canada, employing a total workforce of 24,614 persons, and producing some $7.4 billion of processed dairy products shipments. Just under $3.5 billion (47 percent), shipped as fluid milk products, and slightly less than $4 billion (53 percent), as industrial milk products.

An estimated $185.2 million of these shipments were exported, $17.1 million (9.2 percent), as fluid milk products, and $168.1 million (90.8 percent), as industrial milk products. Offsetting this were an estimated $189.4 million of dairy product imports, $2 million (1.1 percent), of which were classified as fluid milk products, and $187.4 million (98.9 percent), as industrial milk products.

Distribution to consumers, primarily in the form of dairy products or as ingredient inputs in other processed food and beverage products, occurred through a network of just over 30,000 retail food stores and more than 114,000 food service industry outlets. These food service industry outlets included the activities of licensed and unlicensed restaurants, accommodation, leisure industry, and institutional food service operations, as well as distribution channels provided by vending, department store, and other retail food service industry outlets.

Table 3 provides an overview of Canadian milk and dairy products industry operations in 1992.

Table 3. Overview of Canadian Dairy Industry Operations - 1992

MILK PRODUCTION OPERATIONS	
Number of Farms Shipping Milk or Cream 1992/93	29,358.0
Number of Milk Cows (thousand head)	1,290.5
Number of Dairy Heifers (thousand head)	592.5
Total Farm Sales of Milk and Cream (millions of hectolitres)	68.7
Farm Cash Receipts from Dairying (millions of $)	3,271
PROCESSING AND MANUFACTURING OPERATIONS	
Number of Dairy Processing Plants	308.0
Production Workers	14,523.0
Total Employment	24,614.0
Shipments (millions of $)	7,449
Exports (millions of $)	185.2
Imports (millions of $)	189.4
RETAIL AND FOOD SERVICE OPERATIONS	
Retail Food Stores	30,163.0
Food Service Industry Outlets	114,196.0

Note: Food service industry outlets include licensed and unlicensed restaurants, take-out and delivery and social/contract caterer operations, pubs/taverns/ lounges, accommodation, leisure industry and institutional food service operations, as well as vending, department store, and other retail food service activities.

Sources: Jelliss (1995). Based on information provided in Dairy Farmers of Canada (1993); Statistics Canada (1992a, 1994); ISTC (1993); Canadian Grocer (1993); Canada Restaurant and Food Services Association (1993).

Number and Size of Dairy Farms

The family farm orientation of the Canadian dairy industry is not unlike that of the United States or other major milk producing countries in Europe or Oceania. However, the average size of dairy farms in the main Canadian milk producing regions, and in Canada as a whole, is noticeably smaller than in the United States and a number of other competitor countries (Table 4).

About 29 thousand farms sold milk or cream (quota holders)[5] in 1993, compared with 174 thousand in 1968, a reduction of 145 thousand farms. Over the last 25 years, about one farm out of six has remained in the dairy sector. Compared with other farm types in Canada,

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5 As defined by the Canadian Dairy Commission.

the number of dairy farms has dropped the most, with small dairy farms showing the greatest decline.

Table 4. Average Size of Dairy Farms in Canada, the United States, and Other Countries 1989

COUNTRY/REGIONS		NUMBER OF DAIRY FARMS	NUMBER OF COWS PER FARM
CANADA	Quebec	14,969	38.5
	Ontario	12,000	40.6
	Alberta	2,340	52.6
	B.C.	1,050	71.4
	Canada	36,445	42.5
U.S.	North-East	32,300	66
	South-East	1,200	245
	Pacific	4,500	339
	Midwest	54,850	54
	U.S.	128,000	79
OTHER COUNTRIES	Netherlands	35,000	55
	New Zealand	14,000	164

Source: Janelle (1992)

Average dairy farm size was 45 cows[6] in 1993. Canada's dairy farms are still characterized as small and medium size enterprises, mainly family operations, but there is a trend toward larger dairy farms.

Number and Size of Dairy Processing Firms

Canadian dairy processing plant numbers decreased from 880 in 1970 to 308 in 1992, and plants increased in size. (Figure 4) Small plant numbers decreased the most. The pace of rationalization was faster in dairy processed products than in the fluid milk industry. From 1982 to 1992, the number of fluid milk plants decreased from 168 to 140 (-17 percent), while the number of other (non-fluid) dairy products plants decreased from 232 to 168 (-28 percent).[7]

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6 Average for farms being classified as dairy farms, Farm Financial Survey (1994).

7 Statistics Canada, Census of Manufacturers.

In 1992, dairy plants employed 80 persons per plant, on average, up from 35 in 1970. Employees per plant averages higher in the dairy industry than the food industry (excl. beverages) as a whole.

Regional Distribution of the Dairy Industry

Dairy farm numbers have been declining in all provinces; more rapidly on the Prairies. Quebec is the only province to significantly increase its relative share of dairy farms in Canada. Quebec and Ontario, collectively account for over 70 percent of Canadian dairy industry operations (Table 5).

Figure 4. Number of Dairy Processing Plants by Employment Size Group Canada, 1972 and 1989

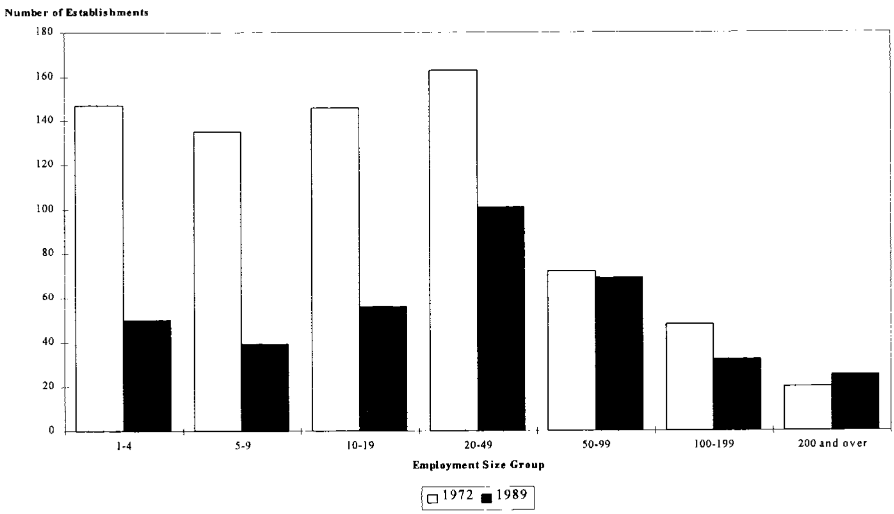


Table 5. Regional Distribution of the Dairy Industry in Canada

	Atlantic	Quebec	Ontario	West
		percentage share of Canada		
Dairy Farming				
Dairy Farms (1993)	5%	43%	33%	18%
Dairy Cows (1994)	6%	39%	34%	22%
Production[1] (1993)	6%	38%	34%	22%
Dairy Cash Receipts (1991-93)	6%	36%	34%	23%
Dairy Processing[2]				
Establishments (1989)	12%	26%	35%	27%
Total Employees (1989)	10%	34%	33%	24%
Manuf. Value Added (1989)	7%	46%	30%	18%
Population (1993)	8%	25%	37%	29%

Source: Based on Statistics Canada.

[1] Production (shipments) in milk equivalents, butterfat basis.

[2] Note: regional data related to processing are not available for a more recent period.

Fluid milk production and processing industries are distributed across provinces consistent with their population base (Tables 5 and 6). Industrial milk industries are more concentrated in central Canada, with Quebec accounting for almost half and Ontario for approximately 30 percent, of Canadian industrial milk production.

Production

Canadian milk production has been stable over the last 40 years. Other major commodities increased substantially, and both U.S. and world milk production increased significantly (Figure 5). Dairy products production is almost exclusively oriented toward the domestic market.

Table 6. Regional Distribution of Dairy Production and Population

	Maritimes[1]	Quebec	Ontario	Prairies	B.C.	Canada
Butterfat Production ('000 kg)						
three-year average 1991-92-93						
Fluid Milk	7,372	27,850	43,151	18,405	12,643	109,422
as a percent of Canada	7%	25%	39%	17%	12%	100%
Industrial Milk and Cream	7,190	73,399	49,160	20,321	6,812	156,880
as a percent of Canada	5%	47%	31%	13%	4%	100%
Total Dairy (butterfat)	14,562	101,249	92,311	38,726	19,455	266,302
as a percent of Canada	5%	38%	35%	15%	7%	100%
Population in 1993						
millions	1.8	7.2	10.7	4.8	3.5	28.8
as a percent of Canada	6%	25%	37%	17%	12%	100%

[1] Excludes Nfld.
Source: Statistics Canada

Consumption

Aggregate per capita disappearance of all milk and dairy products (in milk equivalents, milkfat basis) has decreased in Canada (Figure 6). This overall decline in dairy products consumption derives mainly from a declining overall trend in the consumption of fats. There are, however, some divergent trends between individual dairy products. For example, the demand for certain higher butterfat content products (such as whole milk, butter) has been reduced, while the demand for certain high-value products (such as specialty cheeses) and those perceived as more healthy (such as yogurt) has increased.

Figure 5. Milk Production Index 1961-1993: World, United States, Canada

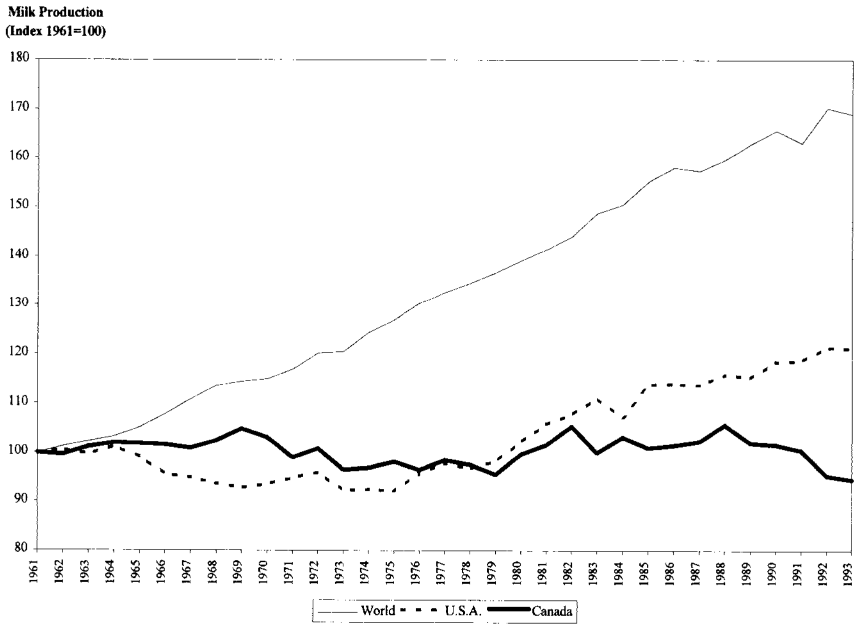
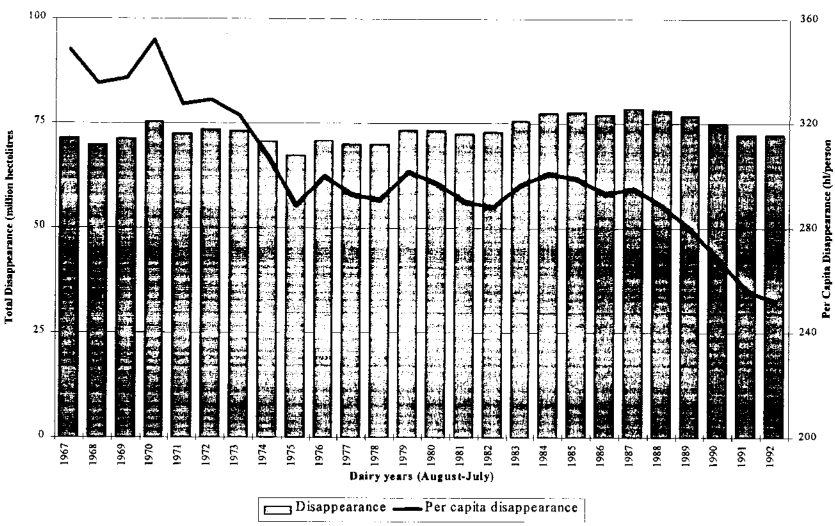


Figure 6. Total and Per Capita Disappearance of Dairy Products: Canada 1967-1992 (milk equivalents, butterfat basis)



The shift in consumption patterns of milk and dairy products has been attributed to three major factors (Nagengast, 1994). First, consumer awareness of the relation between health and diet has stimulated the demand for reduced-fat, reduced-calories food products. Second, some decades ago, milk was popular with children at meals and snack time, and the large numbers of children born in the 1950s affected the volume of milk consumed. In more recent decades, soft drinks and juices came to dominate consumption patterns, and the baby-boom was followed by a slow population growth. Third, although milk and dairy products are mainly consumed at home, products such as cheese have benefited substantially from the quick service restaurant with the popularity of products such as pizza, tacos, and cheeseburgers. In addition, frozen dairy products in specialized retail outlets (e.g., ice cream and frozen yogurt) have become a popular segment. These factors appear to be consistent with Canadian experience.

Trade

Imports and exports of dairy products represent a small portion of Canadian production, as expressed in milk equivalents, butterfat basis. Dairy products account for a very small portion of Canadian agri-food exports (1 to 2 percent) and these exports decreased moderately in the early 1990s (Table 7).

Table 7. Trade Balance for Dairy Products in Canada 1989-1993 (Million Dollars)

	1989	1990	1991	1992	1993	1989-1993 annual change
Imports	152	158	153	181	200	+8%
Exports	188	194	186	187	152	-5%
Balance	36	35	33	6	-49	

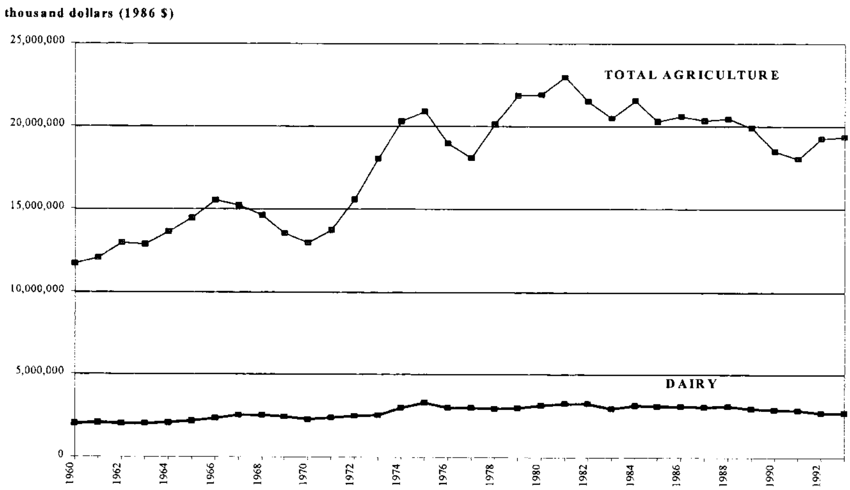
Source: Statistics Canada Trade Data.
Note: total may not add up due to rounding.

FINANCIAL STRUCTURE

Farm Cash Receipts

Real dairy farm cash receipts have grown very moderately, at a more stable, but much slower, pace than the aggregate agricultural sector. This has resulted in a decline in the dairy industry share of total farm cash receipts (Figure 7).

Figure 7. Farm Cash Receipts, Total Agriculture and Dairy 1960-1993 (constant 1986 dollars)



Net Farm Cash Income

As farm numbers declined and dairy receipts increased, average net farm cash income for dairy farms has increased substantially. It is now well above average for the agricultural sector and the second highest average net farm cash income in Canadian agriculture by farm type (Figure 8).

Figure 8. Net Farm Income by Major Farm Type, Canada Average 1989-93

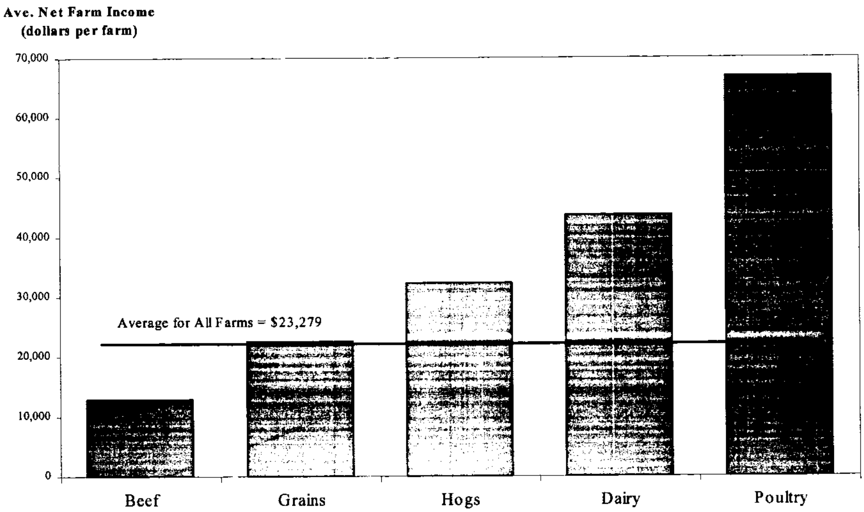


Table 8. Returns on Assets and Equity in Canadian Agriculture 1989-93

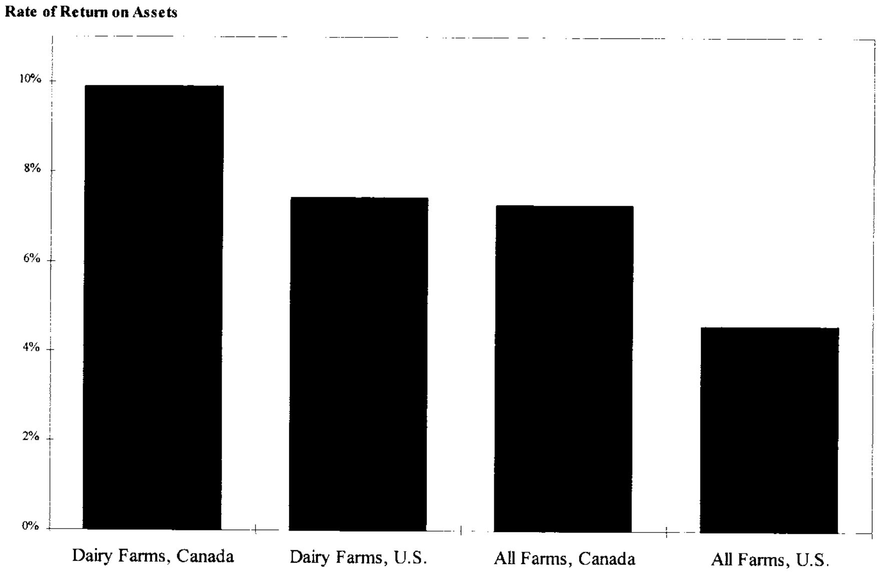
	Dairy Farms	All Farms
Returns on Assets		
1989	9.6%	7.1%
1991	9.9%	7.2%
1993	8.0%	6.2%
Returns on Equity		
1989	9.6%	6.7%
1991	9.9%	6.9%
1993	8.0%	6.0%

Source: Calculations based on Farm Financial Survey Data

Return on Assets

Return on assets for dairy farms in Canada was 9.9 percent in 1991 (Table 8). This is above the rate of return for all farms in Canada (7.3 percent) and also above the same rate for U.S. dairy farms (7.4 percent) shown in Figure 9.

Figure 9. Return on Assets for Dairy and All Farms, Canada and United States: 1991



Production Costs: Farm Level

Table 9[8] shows that average Canadian raw milk production costs are generally above those in the United States and countries such as the Netherlands, and significantly above those in very low-cost countries such as Ireland and New Zealand. The only exception to this relative ranking is a Price Waterhouse cost comparison between Canada and the United States done for the National Dairy Task Force. This study suggested that Quebec costs could be approximately equivalent to the average of those in the United States as a whole and slightly lower than those in twenty Northeastern U.S. states. Estimated Ontario costs remained higher than both. Wages paid, paid and unpaid family labour and return to equity were excluded from cost comparisons in this study. There is also considerable variation between average production costs in different Canadian provinces and U.S. states. In general, Alberta appears to have the lowest raw milk production costs among Canadian provinces, and California the lowest among reviewed U.S. states.

There also can be wide variations in production costs between the high-cost and low-cost raw milk producers within individual Canadian provinces.

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[8] Given the diversity of estimating procedures, data sources, and time periods, Table 9 summarizes various raw milk cost-of-production estimates in index form.

Table 9. Indices of Recent Canadian, U.S., and International Raw Milk Production Cost Estimates

	Jeffrey	Baker, Hallberg, Tanjuakio, Elterich Beck, and Liebrand	Phillips, White and Stonehouse	ISTC	Price Waterhouse	Nicholson and Knoblauch	Hamm and Nott
Canada		100					
Alberta	100			100			
Manitoba	109						
N.B.			100				
Quebec	113		102	120	100		
Ontario	121		112	118	105	100	100
B.C.	127						
Sask.	130						
U.S.		71	93		100		
California	78			79			
Minnesota	85						
Washington	94						
Wisconsin	99			89			
New York				90		74-77	
Michigan							96
Northeast					104		
Netherlands		72	83				
Ireland		45					
New Zealand		30	25				

Source: Jelliss (1995) calculated from data in Jeffrey (1992); Baker, Hallberg, Tanjuakio, Elterich, Beck and Liebrand (1990); Phillips, White, and Stonehouse (1989); ISTC (1991b); Price Waterhouse (1991a); Nicholson and Knoblauch (1993); Hamm and Nott (1986). Each index is based on the lowest Canadian cost in each study.

Within province raw milk production costs for Ontario and Quebec are estimated to have ranged from slightly above to generally below the Canadian target price for industrial milk in 1990 (Figure 10). They also ranged from noticeably above to somewhat below the 1990 support price for U.S. raw milk.

Production Costs: Processing Level

With regard to cost competitiveness in the Canadian dairy processing industry, subject to the influence of exchange rate fluctuations, the input price of Canadian raw milk supplies is generally higher than in the United States and a number of other competitor countries. (Table 10) However, once this is accounted for, there remains a noticeable variation in estimates concerning the competitiveness with which dairy processing industry operations themselves are conducted.

Canadian dairy processing costs are generally above those in the United States, with the extent of the Canadian cost disadvantage being more noticeable in certain product lines than in others.

Figure 10. Ontario and Quebec Industrial Raw Milk Production Costs by Producer Deciles - 1990

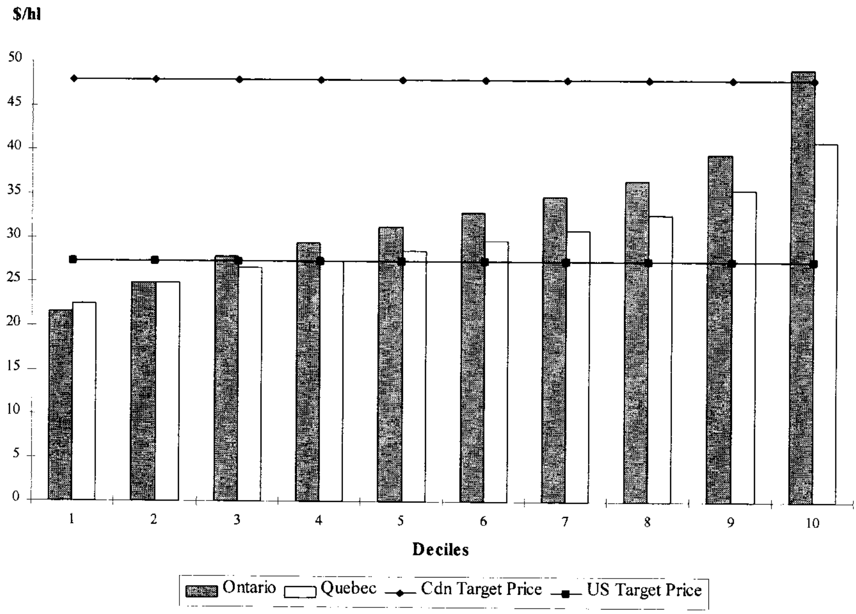


Table 10. Indices of Recent Canadian and U.S. Dairy Processing Cost Estimates

	Fluid Milk		Cheddar Cheese		Butter		Skim Milk Powder		Ice Cream		Yogurt	
	Can.	U.S.	Can.	U.S.	Can.	U.S.	Can.	U.S.	Can.	U.S.	Can.	U.S.
ISTC			100	100					100	100	100	100
Price Waterhouse (Manufacturing only)	100	98	100	77	100	88	100	83	100	76	100	88
McClain (Manufacturing only)	100	87							100	94		
Price Waterhouse (Total Processing)	100	87							100	54	100	89
McClain (Total Processing)	100	88							100	96		
Official Processor Margins					100	44	100	44				

Source: Jelliss (1995). Calculated from data in ISTC (1991b); Price Waterhouse (1991a, 1991b, 1991c); Canadian Dairy Commission (1993c); Commodity Credit Corporation (1993). Canada =100.

The one exception to this relative ranking involves an ISTC study which suggested that potential Canadian cost competitiveness could be equivalent to that of the United States for commodity cheddar cheese, ice cream, and yogurt. This analysis, based on an engineering cost study methodology, measured potential cost competitiveness on the basis of hypothesized investments in newly constructed, state-of-the-art processing plants, operating at full capacity utilization and optimal internal plant operating efficiencies. The study was not designed to assess cost competitiveness of actual Canadian and U.S. dairy processing plants under the conditions which these plants would in fact be conducting their operations at any given time (Jelliss, 1992).

As in the case of milk production, the higher costs in Canada could be due to higher input prices and the efficiency or productivity of processing operations. With respect to productivity, multifactor productivity in the Canadian dairy processing industry between 1961 and 1989 on a gross output basis is estimated to have increased approximately 6.1 percent. However, most of this improvement occurred before 1980. Between 1980 and 1989, multifactor productivity growth in Canadian dairy processing is negative, declining approximately 1.9 percent over this period (Statistics Canada, 1993e).

In summary, subject to the influence of exchange rate fluctuations, Canadian production costs are generally above those of the United States in both raw milk production and dairy products processing. Lower-cost Canadian milk producers may be cost competitive with certain of their higher-cost U.S. counterparts, and individual Canadian processing plants may also be cost competitive with certain of those in the U.S. Canadian raw milk production cost is considerably above that of extremely low-cost producers such as New Zealand. Cost competitiveness of Canadian dairy processors vis-a-vis competitors in countries other than the United States remains subject to further verification.

Organizational and Market Structure

Dairy farming is one of the least concentrated major agricultural sectors in Canada, with only 28 percent of production realized by the largest 10 percent of dairy farms.

Institutional arrangements can influence the way firms compete with each other and, thereby, industry performance in both cost and product competitiveness terms. For example, the supply management system has tended to constrain the degree of processing industry rivalry through such factors as restrictions on the movement of fluid milk beyond the province of origin, barriers to entry associated with quota systems (including plant supply quotas in some provinces), domestic industry protection from import competition, and difficulties incurred by processors in obtaining raw milk supplies for particular manufacturing purposes (Brinkman, et al, 1993, pp. 50-53).

The regulation of prices by provincial authorities for both fluid and industrial milk in all provinces except Prince Edward Island (where only fluid milk price is regulated), constrains rivalry within the industry on the basis of price (Deloitte & Touche, 1992). Within this context, however, Canadian dairy processing firms have tended to compete over time for increased market shares in particular industry market segments, for increased shares of industrial raw milk supplies, and through profitability improvements from increased plant operating efficiencies (ISTC, 1992a).

The degree of rivalry may also have been influenced over time by continuing merger and acquisition activity and increase in industry concentration at both the national and provincial levels. Recent consolidation activities involving cooperatives such as Agropur in Quebec and Dairyworld Foods in British Columbia, have been designed in part to combat perceived threats to competitive positions from investor-owned multinationals such as Beatrice and Kraft-General Foods, and to better position the companies concerned for possible changes in provincial government regulations and altered international trading rules (Co-operatives Secretariat, 1992).

The 4-firm concentration ratios for the Canadian fluid milk products industry increased from 1983 to 1992, while concentration changed little in the industrial milk products industry (Table 11). These are national data and do not necessarily reflect the degree of concentration for particular product segments nor geographic areas.

Notwithstanding involvement of individual dairy products companies (Ault Foods in Ontario, Agropur coopérative agro-alimentaire in Quebec, and Dairyworld Foods in British Columbia) in foreign market activities, Canadian-owned companies have comparatively little experience in dairy industry operations and differentiated customer requirements outside the domestic market. The largely domestic and regional focus of the Canadian dairy products industry limits participation in more dynamic markets elsewhere. It also limits development of expertise in international production, marketing, sales and distribution characteristic of more internationally oriented competitors in Europe, New Zealand, and the United States. However, a number of large Canadian subsidiaries of multinational firms may have access to such expertise in serving foreign markets.

Table 11. 4-firm Concentration Ratios in the Canadian Dairy Products Processing Industry: 1983-1992

	Fluid Milk Industry	Industrial Milk Products Industry
1983	41.9%	48.1%
1984	48.3%	47.1%
1985	48.5%	47.7%
1992	50%+	

Source: 1983-1985: Statistics Canada (1986); 1992: ISTC (1992a), cited by Jelliss (1995)

Ownership Structure

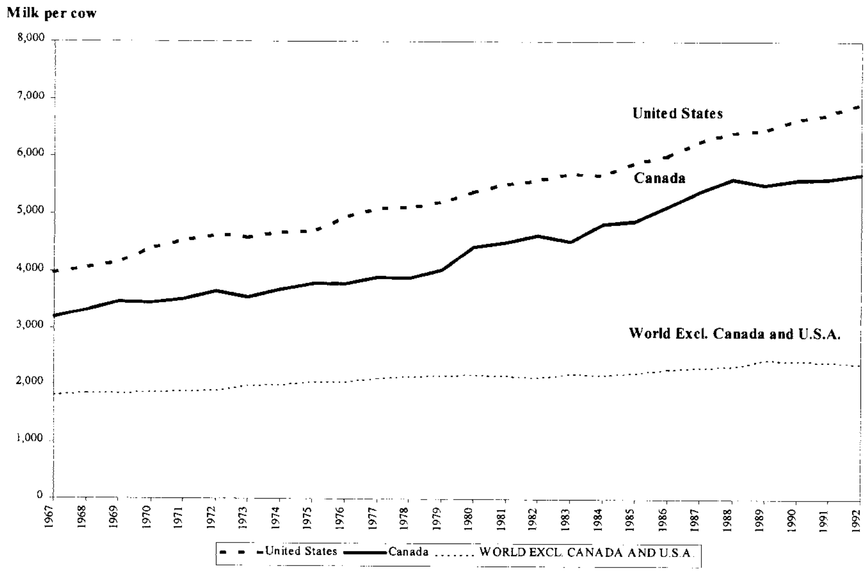
A structural characteristic of the dairy industry in Canada and other countries is the prominent role of cooperatives. About one-half of Canadian dairy processing firms are cooperatives, owned by the dairy farmers who provide their raw milk supplies. Approximately 35 percent are publicly traded investor-owned companies. The remaining 15 percent are generally smaller, privately held, investor-owned operations. Investor-owned firms are relatively more prominent in fluid milk operations. Cooperatives are relatively more prevalent in industrial milk processing activities (ISTC, 1992a). Cooperatives hold leading positions in milk marketing and dairy products processing in all provinces, except Ontario, where their market share is estimated at 20 percent (Sullivan, 1992).

The relationship between form of ownership and industry competitiveness is not clear. Lambert and Romain (1992) reported that from 1977-1986 labour productivity in the strongly cooperative Quebec processing industry was consistently above that in Ontario and the rest of Canada combined. However, they also reported that the trend of labour productivity in Quebec from 1977-1986 showed a relative decrease compared to that in Ontario and the rest of Canada. While these results could be due to factors unrelated to ownership, Lambert and Romain found that the decrease in labour productivity in Quebec was concentrated in the cooperatives segment of the industry while labour productivity in the investor-owned segment increased. Investor-owned firms appear to hold a relatively greater market share in growing segments of the market, processing an estimated 78 percent of milk used for specialty cheeses, 49 percent of that for yogurt, ice cream, and cottage cheese, and 37 percent of that consumed in fluid form in 1989 (GREPA, 1990). A question to be addressed, therefore, is the role that differences in the organizational, management, and goal structures of cooperatives and investor-owned firms may play in such divergent competitiveness trends.

PERFORMANCE INDICATORS

Productivity Per Cow. Although average yield per cow is below that for the United States (Figure 11), productivity per cow has increased continually over the past several decades.

Figure 11. Average Yield Per Cow: Canada, United States, Rest of World: 1967-1992



Production Stability. Milk supply has evolved toward more stable production throughout the year (Figure 12).

Financial Performance Indicators by Farm Size. Performance indicators vary by farm size (Table 12). For instance, dairy sales per cow increase with the size of the enterprise (number of cows or value of sales), suggesting that larger farms are more productive.

Growth in GDP. For the period 1961 to 1993, the Canadian dairy processing industry has grown more slowly, in terms of gross domestic product (GDP), than the rest of the food and beverage industry. Dairy processing GDP (constant dollars) increased by 1 percent annually, compared with 3 percent, 7 percent and 7 percent, respectively, for the rest of the food and beverage industry, for the rest of the manufacturing industry and for the entire economy. As a result, the dairy processing share of food and beverage GDP declined from 16 percent to 12 percent.

Real growth in GDP declined from the 1960s to the 1970s for both the dairy processing industry and the food industry as a whole. In the 1980s, both have shown increases, but at a slow pace, with dairy processing growing slower than the food industry.

Figure 12. Monthly Milk Deliveries, Canada: January 1976-June 1994

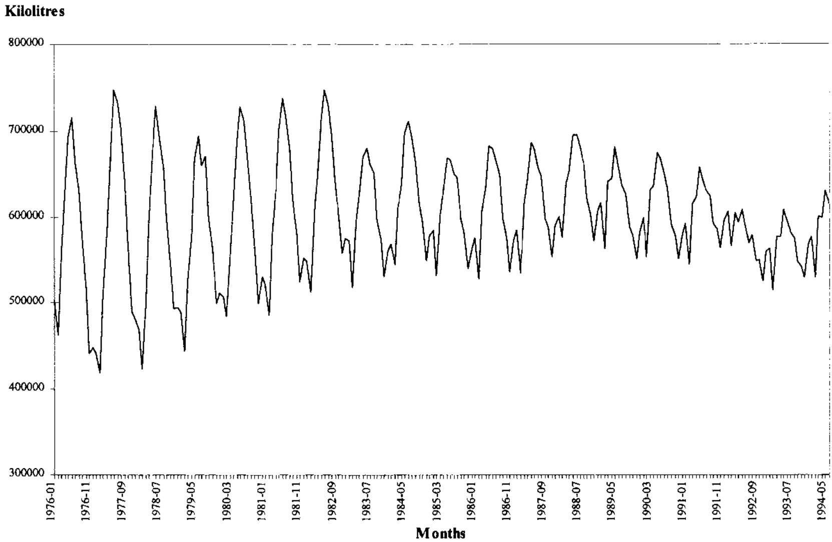


Table 12. Selected Characteristics of Canadian Farms by Sales Class: 1993 (1)

	less than $25,000	$25,000 $49,999	$50,000 $99,999	$100,000 $249,999	$250,000+	all classes
Dairy Farms as a % of all dairy farms						
Number of Dairy Farms	2.3%	5.2%	25.8%	52.9%	13.9%	100%
Quota	0.5%	1.6%	13.7%	54.1%	30.2%	100%
Total Assets	0.8%	2.2%	15.2%	53.6%	28.2%	100%
Farm Revenue	0.3%	1.3%	13.4%	53.8%	31.3%	100%
Dairy Sales	0.2%	1.2%	12.9%	53.8%	31.8%	100%
Average per farm						
Net Farm Income $	479	13,860	22,425	45,082	100,213	44,245
Total Govt. payments $(2	2,503	4,468	10,507	15,690	23,663	14,575
Average number of cows	17	22	30	45	81	45
Financial Indicators						
Margin before int.& sal.	9.8%	41.7%	39.0%	41.9%	43.1%	41.8%
Returns on Equity (3)	0.47%	4.35%	6.33%	8.01%	9.44%	7.99%
Returns on Assets (3)	0.62%	4.66%	6.56%	8.03%	9.09%	7.98%
Average per cow						
Dairy sales/cow ($)	**762**	**1,370**	**2,155**	**2,912**	**3,681**	**2,915**
All Farms excluding Dairy as a % of all farms excl. dairy						
Number of Farms	42.5%	18.0%	16.9%	15.6%	7.0%	100%
Quota	0.8%	1.1%	4.6%	19.9%	73.6%	100%
Total Assets	22.5%	13.0%	17.5%	23.3%	23.7%	100%
Farm Revenue	5.5%	7.5%	13.7%	25.6%	47.7%	100%
Average per farm						
Net Farm Income $	-1,113	8,361	20,218	39,089	151,613	21,125
Total Govt. payments $	2,858	7,888	13,628	20,242	35,867	10,594
Financial Indicators						
Margin before int.& sal.	2.9%	28.3%	34.2%	33.9%	30.0%	29.9%
Returns on Equity (3)	-0.28%	2.83%	4.94%	7.03%	12.76%	5.69%
Returns on Assets (3)	0.15%	3.21%	5.23%	7.14%	11.66%	5.88%

Source: Based on Farm Financial Survey 1994.

Notes: (1) Adjustments made to data in order to exclude non-farm operations.
(2) Government payments for dairy farms include non-dairy payments.
(3) Returns include wages and salaries paid to family members.

Labour and Capital Productivity

Canadian dairy processing labour and capital productivity is higher than that of the overall food and beverage industry (Table 13). While Canadian dairy processing labour productivity has increased at a faster rate than in the United States (Table 14), it is still below the U.S. productivity level.

Table 13. Labour and Capital Productivity: Dairy Vs Food and Beverage in Canada

	Food and Beverage	Dairy	Fluid Milk	Other Dairy
Labour productivity				
(manuf. v.a. $K1986/person hrs), 1992	46.39	59.96	58.47	61.20
Growth (annual % change), 1983-1992	1.7%	2.7%	1.5%	3.7%
Capital productivity				
(manuf. v.a. $'000k 1986 plant), 1992	4,514	5,948	5,827	6,048
Growth (annual % change), 1983-1992	3.2%	7.2%	4.9%	9.2%

Source: Based on Statistics Canada.

Table 14. Labour Productivity in the Dairy Industries, Canada and United States

	Canada	United States
	(annual % change)	
Labour productivity - growth 1982/3-1992		
(manuf.v.a.$ current/person hours)	7.3%	5.7%
Labour productivity - value in 1992		
(manuf.v.a. $Can./person hours)	72.73	90.20

Source: Based on Statistics Canada, U.S. Bureau of Census.

Compared with the United States, the gap in labour productivity is higher in the fluid milk than in the other dairy products industry, as shown below for 1992:[9]

- fluid milk industry:
  - 93.25 $Can/person hour in the United States
  - 70.93 $Can/person hour in Canada
- other dairy products industry:
  - 88.29 $Can/person hour in the United States
  - 74.24 $Can/person hour in Canada.

Economies of Scale and Capacity Utilization. Scale of operations and plant capacity utilization rates can affect costs. Various studies have identified potential economies of scale across a number of processed fluid and industrial dairy product categories (ISTC, 1991b; Rude, 1992).

While Canada has a number of world scale capable dairy processing plants under existing technology (ISTC, 1991b), most plants tend to be smaller than those in the United States. The United States has 6 times the number of dairy processing plants as Canada, but processes 9 times the dairy products on a milk equivalent basis (Price Waterhouse, 1991a).

Canadian dairy processing plant capacity utilization rates are lower than those in the United States across all industry segments, except ice cream and frozen desserts (Table 15). Additional costs associated with such excess capacity problems impact adversely the overall cost competitiveness of Canadian dairy processing firms in the various industry segments concerned.

Profitability. Dairy processing industry profitability is generally higher than that of the food processing industry as a whole (Table 16).

Table 15. Profitability Indicators in the Dairy and Food Industries in Canada

Profitability Indicators	Dairy Industry	Food Industry
Return on Capital Employed (1987)	19.3%	13.3%
Return on Equity (1987)	14.9%	14.6%
Profits (after tax) as % of Income (1990)	2.7%	3.3%

Source: Jelliss (1995)

[9] It should be noted that these productivity comparisons are affected by the exchange rate between the two countries.

In 1987, the dairy processing industry earned the highest return on capital employed among all the food processing industries. It also ranked fourth among the food sectors, both in terms of return on equity and in terms of profits as a percent of income.

Price Trends. Prices paid to milk producers have grown at a faster pace than prices for aggregate agricultural products. This has been reflected in the prices that processors charged for their products. However, the extensive price differentiation for milk at the producer level, has not led to a faster increase of prices at the consumer level, compared to the price index for all foods (Table 16).

Table 16. Prices and Trends in the Canadian Dairy and Food Systems, 1981-1993

Index 1986=100	Farm Product Price Index		Industrial Product Price Index		Consumer Price Index	
	All Agriculture	Dairy Products	All Food	Dairy Products	All Food	Dairy Products
1981	107.1	85.4	84.2	75.1	78.9	76.5
1986	100.0	100.0	100.0	100.0	100.0	100.0
1993	106.4	117.1	116	123	122.8	116.9

Source: Statistics Canada.

Prices in the dairy processing industry have increased at a faster pace than in the food industry since 1981. Fluid milk product prices have increased at a faster pace than prices for industrial milk products.

Relative to other major producing countries, prices for dairy products in Canada are generally higher (Figure 13). Compared with the United States, Canadian dairy prices are higher at all levels from farmers to consumers, and have increased at a faster rate (Figure 14).

CANADIAN DAIRY POLICIES

This section first examines the evolution of dairy policy, and then describes the background behind the development of the current supply management system and related sectoral polices.

Figure 13. Farm Gate Milk Price for Canada and Selected Countries, 1979-1993

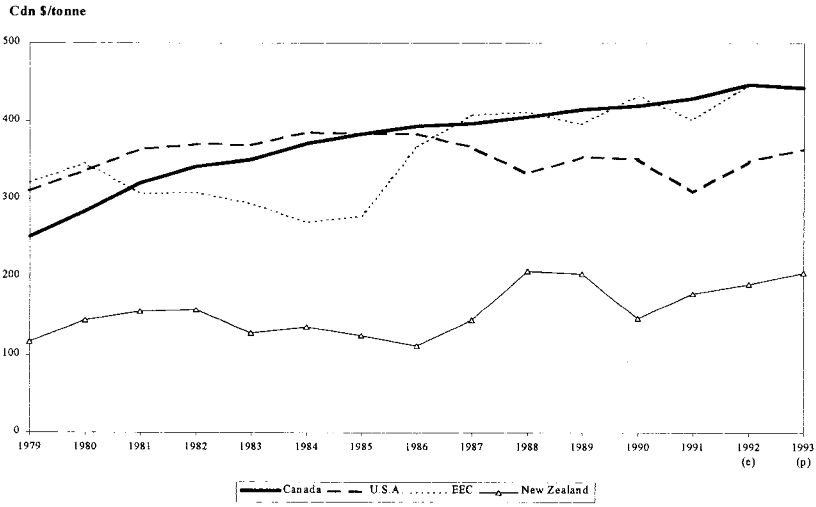
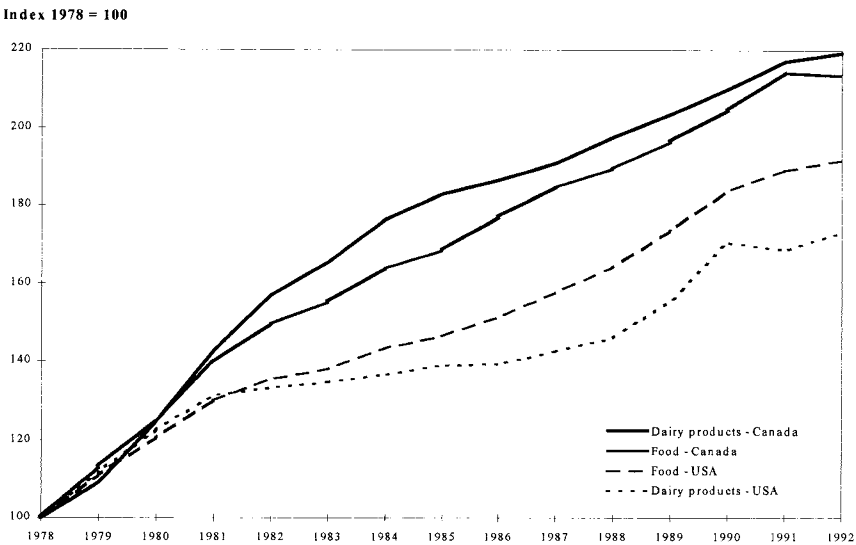


Figure 14. Consumer Price Indices for All Food and All Dairy Products Canada and United States, 1978-1992



Evolution of Canadian Dairy Policies

Many agricultural programs and institutions introduced in reaction to major economic disruptions, such as depression and war, have become entrenched as features of long-standing agricultural policy. These tendencies are evident in Canadian dairy policy and institutions (Veeman, 1987).

In Canada, the federal government appointed the first Dominion Dairy Commissioner in 1890. Prior to World War I, Canada was a major exporter of cheese and butter to the United Kingdom. In 1935, a temporary subsidy on butter and cheese was introduced. During World War II, federal subsidies were paid to dairy farmers to maintain production levels under a system of wartime price controls. Postwar assistance for industrial milk products, initially intended to be transitional, included programs to support prices, to export surplus products and to restrict imports. These programs, administered by the Agricultural Prices Support Board, subsequently were extended and administered by the Agricultural Stabilization Board established in 1958. In 1963, the lack of coordination between federal and provincial policies and the absence of effective mechanisms to control milk production led to a Canadian Dairy Conference. In 1965, a milk marketing board was established in the key Ontario market. In 1967, establishment of the Canadian Dairy Commission (CDC) under the Canadian Dairy Commission Act provided a federal body to develop initiatives in management of milk supply in cooperation with the provinces and provided the legislative basis for the implementation of supply management of industrial milk and cream. Supply management for fluid milk was enabled under the existing Agricultural Products Marketing Act (1957) which allowed provinces to control the fluid milk market. The National Milk Marketing Plan approach to managing the dairy market was adopted at the end of 1970. Dairy programs formerly under the Agricultural Stabilization Board are currently administered by the CDC (Grant, 1991 and Veeman, 1987).

Most marketing boards date from the 1930s when they were established under provincial legislation. The use of marketing boards in Canada as an effective means of major income transfers to farmers mainly dates from the 1960s and 1970s, in particular, the supply restricting boards. The evolution of marketing boards in Canada reflects the dual jurisdiction (federal and provincial) over agriculture and marketing. The general lack of jurisdictional conflict over the establishment of the various provincial fluid milk boards reflected the perishable nature of fluid milk and the localized nature of regulated markets for this product (Veeman, 1987).

Dairy policy in Canada uses import limitations to support the sector, and combines the long-standing feature of direct subsidy payments on specified marketed quantities of milk, along with quota restraints on marketings by producers. The milk market sharing program, basic to this policy since the early 1970s, is embodied in an agreement between the federal and provincial governments and is administered by a committee composed of the Canadian Dairy Commission, the provincial milk boards, and government agencies (Veeman, 1987).

Structures to manage the dairy industry were put in place in Canada rather later than in other advanced industrial countries. This was partly due to the need to negotiate a national policy between the federal government and the provinces, but the Canadian policy can also be seen as a response to changed world market conditions created by the existence of dairy management systems elsewhere. The structures that exist to regulate milk marketing under provincial jurisdiction and under supply management are described in the Veeman and St. Louis and Barichello and Romaine papers which follow.

Sectoral Policies Affecting the Dairy Industry[10]

Technical Regulations. A variety of provincial and federal government health and safety, labelling, and compositional standards, and grading and environmental rules and regulations apply to the Canadian dairy products industry at both the farm and processing plant levels.

Provincial governments undertake milk testing on the farm, and monitor products for quality and safety in provincially registered milk processing plants. The federal government carries out similar inspection activities in the federally registered processing plants that process industrial milk into manufactured dairy products entering interprovincial and international trade.

The Federal government and some provincial governments also test and monitor dairy products at the retail level to ensure consumer safety through a variety of packaging, labelling, composition, weight, and sanitation controls.

Research and Development. The research component of combined federal, provincial and industry expenditures approached $130 million in 1991-1992, representing approximately 1.7 percent of the value of dairy products industry shipments in 1991. If cost-of-production studies and milk recording programs are added, the total approaches $164 million; or slightly less than 2.2 percent of shipments value. Technology transfer activities entail just over $17 million in outlays; or less than one-quarter of one percent of shipments value. Of the total outlays identified, the combined federal and provincial government share amounted to an estimated $55.4 million, 31 percent of the total, and the private sector share to approximately $126 million, 69 percent of the total.

Government contributions to dairy industry research and development involve both the conduct and support of basic and applied research in government, university, and private institutions. Agriculture and Agri-Food Canada operates a network of research stations addressing various aspects of dairy cattle production. These include genetics, embryo manipulation, animal welfare, and food safety. Federal and provincial governments also contribute to the funding of university-based dairy research at the eight universities having dairy programs within their faculties of Agriculture.

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[10] Based on Jelliss (1995).

Recent Policy Changes[11]

Reduction In Direct Subsidy. Up until 1988, the federal government paid dairy farmers a direct subsidy for industrial milk produced within domestic requirements. From 1988 to 1989, the direct subsidy was paid on actual domestic requirements plus the export sleeve. Since 1989, the direct subsidy has been paid only on actual domestic requirements.

In 1992, this direct subsidy was $6.03/hl. Beginning August 1993, the federal government lowered the subsidy by 60 cents to $5.43/hl. On August 1,1993, the CDC announced that they would fully support the target price by raising the support price for skim milk powder. In effect, consumers would be charged a higher price to offset the drop in the dairy subsidy.

The effect of these changes has been to reduce the total amount of subsidy paid from approximately $270 million (pre-1988) to $225 million in 1994. It has been estimated that, as a result of this reduction as implemented by the CDC, there is no great effect on production or consumption. The skim milk powder support price increases, the butter support price remains constant, and cheese and other dairy product prices rise slightly due to the increase in industrial milk price to processors. Due to these higher product prices, there is a slight reduction in consumption of skim milk powder, cheese and other dairy products, a small increase in butter consumption due to substitution effects, and a net small reduction in domestic requirement for industrial milk leading to a small decrease in MSQ.

The 1995 federal budget announced a 30 percent reduction in the direct subsidy over the next two years (i.e., to $4.62/hl in 1995 and to $3.80/hl in 1996). As a result, the value of the subsidy will fall to $160 million by 1996. The future of this remaining subsidy amount will be further considered over the next year, with the intent of identifying alternative uses for, and/or additional reduction in, these funds. The 1996 federal budget announced that the dairy subsidy will be phased out entirely over the next several years.

Crossloading Butter And Skim Milk Powder Prices. Historically, target price increases were shared evenly by butter and skim milk powder support prices. On August 1, 1991, the CDC started to shift the relative weights so that skim milk powder support prices increased more than butter. This was extended and expanded on August 1, 1993 when the CDC announced that it would reduce the butter support price and maintain the target price by increasing skim milk powder support prices. The effect of this crossloading is an increase in butter demand and a reduction in skim milk powder demand. Overall, MSQ (in butterfat equivalents) is still dropping with declining domestic demand, but the rate of decline is less under this scenario. This move seems appropriate given that demand for butterfat is declining relative to solids non-fat.

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[11] Based on Ewing (1994).

Multiple Component Pricing. Multiple Component Pricing (MCP) is an approach that permits all components of milk to be measured and valued to reflect market demands. Since 1992, four provinces have introduced multiple component pricing for industrial milk (Ontario, Quebec, Manitoba and New Brunswick). Initial component prices for butterfat, protein and other solids were selected such that overall returns for milk of average composition was unchanged. Multiple component pricing is not expected to have a large immediate impact on returns or milk supplies. Depending on the relative prices set, MCP could have a long-run impact on the composition of milk produced in Canada. If component prices are set with market demands in mind then pricing and resulting milk allocation and processed product mix will move toward a more market responsive pattern. If component prices are set with an eye to maintaining producer revenues then such allocative efficiencies may not be achieved.

Change In The Basis For Applying Levies. Levies are collected by provincial boards or agencies and forwarded to the CDC. Three types of levies have been charged to dairy producers in recent years: the in-quota levy, a fluid skim-off levy, and the over-quota levy. The CDC uses levy revenue to finance exports of dairy products not required for domestic purposes. The levies are also used to finance special programs designed to increase domestic utilization of butterfat and skim milk powder.

The in-quota levy ($3.40/hl in 1990) has traditionally been charged on all industrial milk produced within MSQ. The fluid skim-off levy has been charged on the volume of skim-off transferred from the fluid sector to the industrial sector. The over-quota levy ($32.64/hl in 1990) is charged on all production over MSQ, and is set very high to discourage producers from delivering milk above their quota level.

The in-quota levy is now applied to both fluid and industrial milk production and the skim-off levy is dropped. A three year phase-in period began in 1991-92 when 55 percent of each province's in-quota levy requirements were from traditional MSQ in-quota levy plus fluid skim-off levy and 45 percent from a levy applied to all milk production. This ratio between the new and old methods increased to 75-25 percent in 1992-93 and to 100-0 percent in 1993-94.

This policy change moves the regulation of the fluid and industrial markets closer together. The fluid market is now a large contributor of skim-off cream to the industrial sector, as a result of the demand shift towards low-fat fluid products. This levy change equalizes the contribution of each sector in financing demand enhancing programs.

The net effect seems likely to be a move towards a more integrated and more market responsive sector.

Butterfat Utilization And Rebate Programs. Two programs were introduced recently to address the declining demand for butterfat — the Butterfat Utilization Program (1991) and the Rebate Program for Further Processors (1992). Both programs are entirely industry funded.

The Butterfat Utilization Program pays a flat rate of $2.00 per kilogram to processors such as bakeries and popcorn manufacturers who buy butter. It also compensates manufacturers of clarified butter ($1.00/kg), ghee ($1.50/kg) and fractionated butter ($2.75/kg). In total, the program expended approximately $6.4 million from June 1992 to May 1993. The support price of butter was about $5.33/kg at the time and the world price was about $1.90/kg.

The Rebate Program for Further Processors offered a rebate equivalent to 60 percent of the Canada-U.S. ingredient cost difference to processors who demonstrate actual or potential loss of market share to an imported product, due to higher ingredient costs. Spending on the program was $3.2 million in 1991-92 and $7.3 million in 1992-93. The program has been extended for three years and the rebate expanded to 85 percent of the cost differential.

The CDC credits these two programs with stimulating butterfat demand such that MSQ increased by 2 percent at the beginning of the 1993-94 dairy year, the first increase since 1988. This increase in demand was also aided by the lack of increases in butter support prices over the past two years.

Single Quota For Fluid And Industrial Milk. Manitoba, Saskatchewan, New Brunswick and Ontario are currently using a single quota for fluid and industrial milk. Many other provinces are considering changing to a single quota system. The implications of such changes include:

- simpler administration.
- all producers receive the same price for their milk -- essentially a means of sharing access to all market uses equally among all producers.
- skim-off is no longer a fluid vs. industrial issue but one that all milk producers must face. This presumably will enhance intra-industry cooperation and coordination.
- easier movement towards a national system of supply control in Canada. (The next stage would be a single national market for quota.).
- no major effects on aggregate quantities and prices but there could be significant individual impacts on producers who did not have a 50/50 split between fluid and industrial quota, which includes most producers. The impact could be positive or negative depending on whether industrial or fluid quota was the bigger share of an individual's production. How the change is implemented and compensated for in each province will affect the magnitude of these effects.

SUMMARY

The milk and dairy products industry ranks among the major industries in the Canadian agri-food sector in terms of farm cash receipts, processed product shipments, employment, value-added and industry contribution to gross domestic product. It has operated within an extensively regulated policy environment. The federal government supports the target price through two programs: a direct subsidy to industrial milk producers, and intervention purchasing of surplus butter and skim milk powder. Fluid milk pricing is under provincial jurisdiction and is based on provincial cost-of-production formulas, the national industrial milk target price, and end-use. Government policies in areas such as dairy food safety and quality regulations, as well as research and technology development activities contribute positively to both cost and product competitiveness.

Supply management is the key policy affecting the Canadian dairy industry. It uses a combination of production and marketing controls (production quotas), import controls (tariff rate quotas) and administered pricing (based on cost-of production) to stabilize and support farm income in the dairy sector. The supply management system for dairy has successfully achieved most of its initial objectives; for instance, regional production capacity has been maintained, the vast majority of dairy farms are family owned and operated, farm family incomes in the dairy industry exceed the average family income of all other farm types (except poultry) and are higher than the average Canadian family income. However, certain elements of the supply management system, while upholding the objectives of the system, have imposed a number of inflexibilities tending to constrain adjustments to more competitive forms of industry organization.

While supply management contributed stability to the industry and has resulted in high returns to producers and processors, it reduced incentives for growth, prevented efficient reallocation of production and processing among regions, and added to the cost of rationalization within regions. It restricted the size and raised the costs of dairy farms and processing plants. Canadian milk production costs are noticeably above those of the United States and the Netherlands, more than double those of Ireland, and more than three times those of low cost producers such as New Zealand.

The overall Canadian market is relatively small and, to a degree, fragmented by interprovincial trade barriers, which can affect the ability of the industry to achieve economies of scale and improved levels of capacity utilization.

Sector structure, linkages and strategies also exhibit a number of positive and negative characteristics. The potential for additional economies of scale and enhanced levels of both technical and allocative efficiency appear to exist in raw milk production.

In dairy products processing, similar opportunities for economies of scale and technical efficiency improvements are in evidence, while reported plant capacity utilization rates in Canada are below those in the United States. Some larger firms and plants may be competitive with certain of their U.S. counterparts, and some firms have had success in developing export markets for higher valued products. However, the largely domestic and regional focus of the industry has provided relatively limited opportunities for participation in more dynamic markets elsewhere, and the development of expertise in the international production, marketing, sales, and distribution skills characteristic of more internationally oriented competitors.

Various factors, including dairy policies and institutions, have contributed to the domestic orientation of the industry, constrained structural adjustment, and influenced the way firms compete.

While the dairy industry clearly faces competitive challenges, a number of strengths appear to exist and a number of opportunities for improvements can be identified. In particular, there exist strengths in the areas of genetics and dairy stock breeding, as well as in many of the regulations governing product safety and quality. Opportunities exist to improve management practices and technical efficiency at both the dairy farm and dairy products processing levels. Modifications to the operation of the supply management system, along with appropriate investments in the process, product, and marketing developments are required to facilitate movement into higher-value dairy product market segments. Raw milk cost disadvantages are likely to be relatively less important and offer areas of potential improvement. It will be important to ensure that current industry stakeholder initiatives in these areas are continued, and that policies at other levels and in other areas of the economy play a supportive role.

Neither the CUSTA, the NAFTA nor the Uruguay Round GATT agreements have significantly affected the import protection afforded the Canadian dairy industry. Recent policy discussions have focused on relatively modest adjustments to existing policies to make them compatible with the GATT/WTO rules.

The major pressures for change are the consumer preference for low-fat products and the global trend toward more liberal trading environments. Gradual adjustment to the new trading regime is the preferred course of action in Canada. Sudden and complete deregulation of the dairy sector is not desirable politically, socially or economically.

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THE U.S. DAIRY INDUSTRY

Richard Stillman, Don Blayney, James Miller and Terry Crawford

INTRODUCTION

The dairy industry is comprised of milk producers, dairy cooperatives, proprietary processors and manufacturers, and the firms that market milk and dairy products. In 1993, cash receipts (including government payments) from dairy products totaled $19.6 billion, ranking third behind meat animals ($51.4 billion) and poultry and eggs ($19.7 billion). Milk's production and marketing characteristics shape the industry with prices coordinating the actions of producers, processors and manufacturers, marketers, and consumers.

Key features of milk production are its location, quantity (both aggregate and per cow), the size and distribution of herds, farm numbers and ownership, producers' financial conditions, and the ability of producers to respond to changing economic conditions. Milk is produced and processed or manufactured in every State but over half of total production in 1993 came from five states: Wisconsin, California, New York, Pennsylvania, and Minnesota. The growth of milk production in areas outside of the traditional dairy areas (the Northeast and the Upper Midwest) continues. Farm numbers and cow numbers have continued to decline while output per cow continues to rise. Various measures suggest that dairy farmers' financial positions have improved in recent years. Decisions affecting production response are essentially based on long-term expectations.

A wide array of firms and businesses are engaged in transforming and distributing milk and its products. The dairy cooperative is an important link in the transformation and marketing process. Highly developed commercial fluid and manufactured dairy products industries have arisen over time, each characterized by fewer numbers of plants serving larger markets than previously. The role of cooperatives in each industry has been different.

There are active wholesale and retail markets for milk and dairy products in the United States. Both the Federal government and international dairy markets offer outlets for what is mainly a domestic industry. Commercial disappearance, which measures the demands of all commercial buyers, has grown by about 1.5 percent per year since 1980. Trends in the commercial use of individual products vary widely. Commercial trade in the international dairy markets has not, as a rule, been a major industry activity. Average imports during the 1988-92 period were about 1.8 percent of domestic disappearance. Exports averaged about 2 percent of production during the same period. This situation may change as the world moves toward more open agricultural trade.

Public policies and programs play major roles in the pricing and the marketing of milk and dairy products in the United States. Federal regulations are most important in most areas--California being a major exception. The major Federal dairy policies date from the 1930s and 1940s when the dairy industry looked much different than today. The policies have been modified since then by periodic reauthorization. The two major Federal policies are the dairy price support program and the milk marketing orders. Import quotas on dairy products have been used in conjunction with the price support program. The two major policies have been under increasing pressures to change in recent years. There has also recently been a revival of State-level regulations designed to improve dairy farmers' income.

The dairy industry is shaped by the production and market characteristics of milk. Raw milk is a bulky (about 87 percent water), extremely perishable product with a high potential for disease transmittal. Sanitary production and handling conditions, rapid movement, refrigeration, and heat treatment are a must. Joint assembly and hauling is required for most dairy farmers. Production (supply) and demand are seasonally unsynchronized and supply and demand responses to price changes are highly inelastic—small changes in supply and/or demand will cause large price changes.

Price differences in U.S. dairy markets are much smaller today than formerly. Improved farm milk quality, bulk handling, better refrigeration, and transportation advances have sharply reduced the costs of moving milk across both space and time. As a share of milk price, the late 1920s costs of hauling milk from the farm to the cheese plant (an average of 3 miles) would not only cover today's much longer farm-to-plant hauling—but would also pay to ship the cheese anywhere in the country. Similarly, the costs then required to move milk to New York, Chicago, or Philadelphia from supply stations 200 miles away would now pay to move milk to Miami from supply plants in New York or Wisconsin. About 95 percent of the milk produced in the United States is Grade A.

MILK PRODUCTION

Key features of milk production are: location, quantities (both aggregate and per cow), herd size and distribution, farm numbers and ownership, producers' financial conditions (including revenues, costs, and returns), and the ability of producers to respond to changing economic conditions. Divergent beliefs as to what are sound farming practices and differing viewpoints about the changes taking place in farming and rural areas underlie these issues in the dairy industry. The major factors affecting milk supply are shown in Appendix Table 1.

Location and Quantities

Regional issues quickly surface in discussions of milk production and dairy policies. These issues relate to the geographic location of milk production and the character of dairy farms in different parts of the country. Milk production has grown in areas outside the heavy producing tier of northern States stretching from New England around the Great Lakes to Minnesota (Appendix Table 1). Wisconsin is still considered "America's Dairyland" but California surpassed it in milk production in August 1993 and has maintained this monthly production advantage through the most current data available. In 1993, Wisconsin produced just over 23 billion pounds of milk, 15.3 percent of total U.S. production, while California's production totaled about 22.9 billion pounds or 15.2 percent of the U.S. total. In 1960, Wisconsin outproduced California by more than two to one (14.4 percent versus 6.6 percent).

Past regional population shifts help, in part, to explain the current location of milk production in States such as Arizona, California, Texas, and Florida. The current growth of production in those states, and others, is likely more related to other factors such as land and facilities costs, climate, the supply and quality of hay and forage, the availability of a labor supply compatible with dairy operations, and opportunities to specialize strictly in managing and milking cows. Large drylot facilities of 1,000 cows or more, which are common in western areas, apparently show economies of both specialization and scale which lead to reduced production costs.

Over half of 1993's total milk production (51.2 percent) came from five States: Wisconsin, California, New York, Pennsylvania, and Minnesota and over two-thirds of was produced in 10 States. Production per cow varied widely among States, ranging from 19,425 pounds in California (24.9 percent above the U.S. average of 15,423 pounds) to 11,492 pounds (26.1 percent below the U.S. average) in Tennessee.

One recent attempt to develop an aggregate measure of the changes in location of milk production in the United States is the "propensity to produce milk" index (PTPM), Appendix Table 2. The PTPM in a particular State reflects the State's changing relative share of U.S. production adjusted by the changing level of relative milk prices.

The top 10 states based on PTPM indices in 1992 were New Mexico, Arizona, Nevada, California, Florida, Washington, Texas, Colorado, Utah and Idaho. The PTPM index in each of these states was much greater in 1992 when compared to both 1985 and 1975 indices. The 10 states with the lowest PTPM's—ranked in reverse order—were Rhode Island, New Jersey, West Virginia, Illinois, North Dakota, Wyoming, Mississippi, Kansas, Iowa and Alabama. In contrast to the top 10 states, these PTPM's were much lower in 1992 when compared to both 1985 and 1975.

A careful evaluation of the PTPM indices and a cursory look at the underlying forces of change indicates that the growth of milk production in the West and Southwest will likely will continue. Some location-related advantages or disadvantages, such as climate, are essentially fixed. However, many of the other forces affecting the location and structure of the dairy industry—size and enterprise specialization, good management practices, business and sociological philosophies, dairy and business support systems and economic development strategies—are open to change (Fallert, Weimar and Crawford).

Farm Numbers

The number of operations with at least one milk cow in 1993 was estimated to be 162,450, down from almost 2.8 million in 1955. Included in this number are operations that do not sell milk. Milk cow numbers (excluding heifers not yet fresh) have also declined—from 1955's 21 million head to 9.7 million head in 1993. The changing average herd size on all farms with milk cows—from 8 in 1955 to 52 in 1990 to 60 in 1993, is one indication of structural changes taking place in milk production.

Herd Size and Distribution

The National Agricultural Statistical Service of the U.S. Department of Agriculture (NASS) reported operations with 1 to 49 head accounted for just under 60 percent of all operations in 1993. About 20 percent of the cow inventory was in the 1-49 herd size category. Farms with 100 or more cows represented almost 14 percent of the operations in 1994 and accounted for just over 50 percent of the cows.

Dairy Farm Ownership

Since 1969, individual or family ownership organizations have accounted for 80 percent or more of the reporting farms with milk cows, reaching almost 89 percent in 1974. Corporate organizations ranged from .5 to 3 percent of farms over the 1969-1987 period. Most corporate organizations are family-held with small numbers, 10 or less, of stockholders. Ownership and operational decision-making in milk production are firmly in the hands of individuals and families, even for very large farms.

Financial Conditions of Milk Producers

The financial position of milk producers is a key element to understanding structural changes in the dairy industry (particularly on the farm supply side).

1994 Conditions. The average net cash farm income of dairy farms in the 1994 FCRS survey was $38,646, lower than 1992 and 1993. Regional average net cash incomes ranged from $20,723 per farm in the Corn Belt to $108,830 in the Southeast region.

From a balance sheet perspective, the financial position of dairy farms did not change significantly from 1993 to 1994. Debts in 1994 were 21 percent of assets compared with 20 percent in 1993. Liabilities, particularly non-current liabilities, rose in 1994 which combined with increases in assets left the debt/asset ratios effectively unchanged. Regional debt/asset ratios varied from 0.11 in Appalachia to 0.38 in the Mountain States in 1994.

Revenues. Dairy cash receipts come from three sources: 1) milk sales, 2) sales of replacement cows, calves, and cull cows, and 3) other sources (including, for example, leasing cattle, sale of manure, and dairy cooperative patronage dividends). Milk sales have, on average, accounted for just over 91 percent of U.S. dairy enterprise revenues during the 1982-1994 period. Steady gains in production per cow and more volatile milk prices during the late 1980s and early 1990s led to a cyclic pattern of total cash receipts from 1988 to 1994.

Costs. Variable and fixed cash production expenses are influenced by several factors, including Government policies and programs. Feed and forage costs can be affected by changes in feed grain programs, conservation policies, disaster relief programs and, in some regions, policies related to irrigation water. Environmental, wage, and budget policies and decisions directly effect other variable expenses such as energy costs, labor costs, and assessments. Fixed cash expenses such as taxes, insurance, and interest payments are affected by Federal, State, and local actions. Tax policies and agricultural and non-agricultural credit and interest rate policies play roles in the entry, exit, and expansion decisions of the individual dairy farmer and in the well-being of the entire industry.

The quantity data for calculating dairy cost of production (COP) are not collected every year. Estimates for the years between surveys are based on price indices. From 1982 to 1994, variable cash expenses for the United States ranged from $7.39 to $9.00 per cwt, averaging just under 80 percent of total cash expenses. Feed and forage costs, the largest component of cash expenses, either variable or fixed, averaged almost 64 percent of total variable cash expenses. Fixed cash expenses, from a low of $1.60 to a high of $2.57 per cwt, accounted for 20 percent of total cash expenses.

The introduction of recombinant bovine somatotropin technology (rbST) on the supply of milk will depend on the extent that it lowers the milk production costs and the degree that producers are willing to use the technology. Studies have show that rbST will lower the cost of producing milk by increasing milk per cow and allowing the fixed costs to be distributed over greater output.

In a study done by the Administration, using the 1989 FCRS dairy COP data and assuming an increase of about 1,800 lbs of milk and additional costs of using rbST cost changes were estimated by regions and by size. The 1,800 pound increase in milk per cow, per year, is the level that would be expected from the existing research and trials using rbST.

There appears to be little difference in the actual levels of increased revenues between herd sizes; however, there is some variation if the increases are expressed in the percentage changes. The regional impacts of rbST show a little more variation but are not that large. rbST technology appears to be size neutral, which is contrary to many people's beliefs. Good management skills are required in the use of rbST; therefore, the use of rbST is not management neutral.

Returns. Cash returns (gross value of production less cash expenses) for dairy enterprises ranged from $1.60 to $4.76 per cwt during the 1982-94 period. Milk prices ranged from $12.20 to $13.70 per cwt over the same period. We observe both year-to-year increases and decreases in returns during the period. Cash returns peaked in 1982 at $4.76 and generally declined until 1986. Since 1987 there have been more numerous ups and downs and the magnitudes of the changes have been greater.

TRANSFORMING AND MARKETING MILK AND DAIRY PRODUCTS

Raw milk from the farm is usually jointly assembled and transported to firms where it is either processed into fluid (beverage) or perishable products or manufactured into storable products such as butter, cheeses, or dry milk products. The dairy cooperative is an important link in the movement of milk from the farm to final dairy product markets. In 1992, about 82 percent of the milk sold to plants and dealers in the United States was marketed through 265 dairy cooperatives.

Demands for Milk and Dairy Products—Consumers and Commercial Trade

There are active wholesale and retail markets for milk and dairy products in the United States. The U.S. Government participates in dairy markets as both a buyer and, in some cases, a seller of manufactured dairy products. International dairy markets offer another outlet for both commercial and Government dairy product sales.

Commercial Disappearance. Commercial disappearance measures the quantity of a particular product or all dairy products as a group demanded by all commercial buyers. It includes the generally small exports that are made without subsidy, such as recently have occurred with butter. Changes in commercial use reflect consumer responses to price changes and underlying demand shifts, Appendix Table 3.

Fluid Milk and Cream Products. Per capita consumption of fluid milk and cream has declined at a fairly steady rate over time. However, major consumption shifts among the fluid milk and cream products were steady until the late eighties. Whole milk sales have dropped steadily, lowfat milk use grew steadily, and skim milk sales were fairly stable. These trends appear to be changing. Skim milk sales have risen sharply since the late eighties. Since 1991, growth in lowfat milk sales and declines in whole milk use have slowed and become more irregular. Fluid cream use rose steadily, in part because of better shelf life and lower prices.

Perishable Manufactured Products. Use of perishable manufactured products such as cottage cheese, ice cream, and yogurt, has been variable. In general, the importance of these products in aggregate measures of milk and dairy product consumption has declined. Ice cream use was steady during the late seventies and early eighties, grew in the mid-eighties, dropped by 1990, and has recovered partially. Sales of other frozen desserts were steady until significant growth started in the mid-eighties. Cottage cheese use dropped steadily. Yogurt sales grew steadily into the 1980s but have been relatively stable since 1986.

Storable Manufactured Products. Strong, steady growth in cheese sales has been the dominant factor in demand for storable manufactured dairy products and the overall aggregate demand for milk. Per capita sales of Mozzarella more than tripled between 1975 and 1992, mostly because of the growing pizza market. Other varieties of cheese have also grown strongly, including Cheddar and the other American varieties.

Butter sales were generally flat between the early seventies and 1991. Low prices relative to margarine have triggered large increases since then. Commercial consumption of nonfat dry milk declined until the late eighties, in part because of substitution of whey products. Sales have been higher in recent years, but some of the increase has been to produce other manufactured products. Canned milk use generally decreased.

Demand Responses to Changing Prices and Incomes. Aggregate milk demand is relatively unresponsive to both price and income changes (inelastic demand). Consumer responses to individual product prices and the effects of income changes on individual product demands have been widely studied. While product demand elasticities do vary, they are still generally in the inelastic range. Income effects on dairy product demands are also small. Most estimates of own price demand elasticities range from -0.15 for fluid milk to about -0.75 for nonfat dry milk.

Commercial Trade. There is a tendency to envision trade of dairy products as a large market, similar to some of the grains. It is important to realize that international dairy product trade, primarily of butter, butteroil, nonfat dry milk, dry whole milk, cheeses, and casein, is a relatively small proportion of total milk production (approximately 7 percent of the 1988-1992 annual average world cows milk production of 430 million tons). The European Union (EU), New Zealand, and Australia together account for about three quarters of the exports, followed by Canada, the United States, and a handful of non-EU European countries. Major dairy product importing countries include Mexico, Russia and Japan.

The equilibrium pricing conditions described previously apply also to the international dairy markets. Butter and nonfat dry milk play the key roles in international trade and their prices would, if allowed, bring the world's dairy markets into alignment. However, the international dairy market has been plagued by distortions associated with export subsidies and import restrictions that reflect the domestic policies of the major dairy trading countries.

The United States was the largest individual milk producing country in the world in 1992 but traditionally has not played a major role in international dairy markets. Average imports from 1988 to 1992 were 2.5 billion pounds, milk equivalent, about 1.8 percent of domestic disappearance. Cheeses accounted for nearly 90 percent of the dairy products imported. Exports during the same period averaged 3.0 billion pounds, milk equivalent, about 2.0 percent of U.S. milk production.

As the world moves toward more open agricultural trade, as embodied in the Uruguay Round of the General Agreement on Tariffs and Trade (GATT), it is simultaneously embracing regional trading blocs such as the North American Free Trade Agreement (NAFTA). The GATT Uruguay Round concluded on December 15, 1993, to be implemented over the 1995-2000 period, addresses four agricultural areas: export subsidies, market access, internal support measures, and sanitary and phytosanitary rules. The GATT agreement is potentially significant for the U.S. dairy industry in two of the areas—export subsidy programs and market access. The Dairy Export Incentive Program (DEIP) is in fact an export subsidy and U.S. market access has long been curtailed by Section 22 quota rules. Long term effects on the industry are expected to be minor (USDA, March 1994).

The NAFTA, which is effective as of January 1, 1994, sets out separate bilateral agreements on cross-border agricultural trade between the United States and Mexico and between Mexico and Canada. U.S.-Canada trade is still covered by the U.S.-Canada Free Trade Agreement. The major agricultural issues addressed by the NAFTA are: nontariff barriers, tariffs, producer safeguards, rules of origin, and sanitary and phytosanitary rules. Market access under the NAFTA is a primary concern for the U.S. dairy industry, as are rules of origin. The U.S. dairy industry is expected to benefit from the NAFTA in that Mexican demand for milk and dairy products will likely continue to out pace domestic production (USDA, 1993).

HISTORY OF U.S. DAIRY POLICIES AND PROGRAMS

The U.S. dairy industry is affected by a set of regulations including Federal dairy price supports and milk marketing orders (which embody classified pricing), import restrictions, export subsidies, domestic and international food aid programs, and State milk market regulations. The major Federal dairy policies (and some State regulations) date from the 1930s and 1940s, a time when the dairy industry looked much different than today. The current program of dairy price support was established by the Agricultural Act of 1949; Federal milk marketing orders date to the Agricultural Marketing Agreement Act of 1937; and Section 22 dairy import quotas derive from the Agricultural Adjustment Acts of 1933 and 1935, as amended. Federal dairy policies have been modified to meet changing industry and economic conditions by periodic reauthorization.

State regulations operate separately or are superseded by Federal statutes. There are some shared State/Federal regulatory activities--milk safety, sanitary conditions, and environmental regulations for example. State regulations are less prevalent today than previously but State lawmakers have recently shown they are ready and willing to establish rules to aid their dairy farmers. Dairy farmers, analysts, policy makers, and other interested parties need to appreciate the multi-jurisdictional nature of dairy industry regulation.

Price Support Activities

The Agricultural Act of 1949 established the ongoing dairy price support program. The USDA, through the Commodity Credit Corporation (CCC), supports the price dairy farmers receive for their milk by purchasing butter, nonfat dry milk, and cheese meeting announced specifications at announced purchase prices. Purchase prices are calculated using a formula that combines the support price for milk, quoted for manufacturing grade (Grade B) milk, with margins, or "make allowances," to cover costs of processing milk into the products purchased. The purchase prices are such that dairy farmers receive an average of at least the support price.

On January 1, 1990, the support price for manufacturing grade milk was lowered 50 cents to $10.10 per cwt. The cut was made because CCC purchases during calendar 1990 were projected to exceed 5 billion pounds milk equivalent. The authorizing legislation, as amended by the budget Reconciliation Act of 1989, permitted the support price to remain unchanged or to be lowered by up to 50 cents under these conditions.

The dairy provisions of Title I of the Food, Agriculture, Conservation, and Trade Act of 1990 (1990 Act) made minor adjustments to previous policy. Although price support adjustments are still triggered by CCC purchase levels, combined purchases of cheese, butter, and nonfat dry milk are measured on a milk equivalent, total milk solids basis, instead of a milkfat basis. The 1990 Act also provides that the price of milk be supported at not less than $10.10 per cwt through 1995. Also continued by the 1990 Act was the search for new methods of supporting and stabilizing milk prices without increasing Government expenditures. The budget pressures that shaped the 1990 Act have not lessened as the 1995 farm legislation debate approaches.

The 1990 Act authorizes the Secretary of Agriculture, for calendar years 1991-1995, to: increase the support price at least 25 cents if USDA's estimate of purchases in the coming year does not exceed 3.5 billion pounds milk equivalent, total milk solids basis; not decrease the support price if USDA's estimate of purchases in each of calendar years 1991-95 exceeds 3.5 billion pounds but not 5 billion pounds milk equivalent, total milk solids basis; and decrease the support price by 25 to 50 cents if USDA's estimate of purchases in each of the calendar years 1991-95 exceeds 5 billion pounds milk equivalent, total milk solids basis. In estimating the level of CCC purchases, the Secretary is instructed to deduct from this figure any increase in the most recent calendar year's dairy product imports from the average imports during 1986-90.

The 1990 Act contained provisions requiring producers to help finance CCC program purchases during calendar years 1992-95 under certain conditions. Any expected purchases above 7 billion pounds, total solids basis, would be financed through a producer assessment on milk marketings. Producers who did not expand production would receive a rebate of their assessment. Excess production assessments have not as of yet been implemented. The Secretary was given discretionary authority to adjust support purchase prices for butter and nonfat dry milk in a way that would result in the lowest cost to the CCC or would achieve other objectives considered appropriate.

The Agricultural Reconciliation Act of 1990 implemented the 1990 deficit reduction agreement, which prescribed spending cuts of more than $13 billion for agriculture over fiscal years 1991-95. This Act modified the 1990 farm bill in order to reduce outlays as required by the deficit reduction agreement. For the dairy industry, this meant a producer assessment of 5 cents per cwt of milk marketed during calendar 1991. For calendar years 1992-95, the assessment increased to 11.25 cents per cwt.

Producers who do not increase marketings from the previous year are eligible for an annual refund of the assessment. The assessments in a specific year must be raised to recapture refunds made on the previous year's marketings. Eligible producers claimed refunds totaling $23.2 million in 1991. The 11.25 cent assessment was increased by 2.4 cents per cwt for May-December 1992. For calendar year 1992, producers claimed refunds totalling $50.7 million. The assessment was increased to 16.35 cents per cwt beginning May 1, 1993.

The Omnibus Budget Reconciliation Act of 1993 contained several dairy price support program-related provisions. Most of the 1990 dairy price support provisions were extended to 1996. The butter purchase price was restricted to be no more than $0.65 cents per pound while nonfat dry milk's purchase price can be no less than $1.034 per pound. Instead of the 11.25 cents, the reconciliation assessment was set at 10 cents per cwt for 1996 and 1997. Finally, a 90-day moratorium on the sale of rbST for commercial milk production from the date of FDA approval was written into the legislation. During the moratorium, the deficit reduction assessments were to be lowered by 10 percent.

Priorities for purchases under price support programs

Products acquired under the price support program are committed to specific uses or are put into storage for future use or sale back to the commercial dairy industry. Uses can be categorized as; 1) domestic donations (food aid) such as The Emergency Food Assistance Program (TEFAP) which donates surplus stocks directly to needy persons and child feeding programs, including the School Lunch Program and the Child Care Food Program; 2) international food aid though Section 416(b) of the Agricultural Act of 1949, as amended, and the Food for Peace Program (PL 480) passed in 1954; and 3) export sales. Priorities are based on perceived social value by use and increasingly on budgetary impacts.

Trade and other programs

U.S. dairy products are traded internationally using the Dairy Export Incentive Program (DEIP) and export credits. Imports of dairy products into the United States have been subject to import quotas since the 1950s. Recently completed trade negotiations will require conversion of the quotas to quota tariffs with reduction in those tariffs to follow. The demand for dairy products is affected by several domestic food assistance programs which are either targeted at the products specifically or designed to raise consumption of all foods.

DEIP and CCC Export Credits. The Dairy Export Incentive Program (DEIP) is an export subsidy program similar to but independent of the Export Enhancement Program (EEP) for other U.S. agricultural commodities. The program is used to assist U.S. dairy products to meet competition from subsidizing countries, especially the European Union, in targeted markets. Products currently eligible for the DEIP are milk powder, butterfat, and several cheese varieties. USDA, members of the agricultural community, foreign government official and others may recommend countries for targeting. The DEIP is currently authorized through December 31, 1995.

DEIP sales are made by private firms. Upon contacting a potential buyer, the prospective exporter submits a bid to USDA requesting a cash DEIP bonus that would allow the sale to take place. The bonus is calculated by USDA and paid after the exporter furnishes evidence that the specified commodity has been exported to the target country under the terms of the sales agreement. The DEIP was relatively dormant until March 1991, the first time bonuses exceeded $10 million. The highest level of DEIP activity thus far was during FY92 when $76 million was paid in bonuses.

In addition to promoting U.S. trade policy and market expansion, an active DEIP program can also enhance domestic U.S. milk prices under many market conditions. The exception would be when the surplus is heavy enough that DEIP export quantities cannot move prices off support. It is widely accepted that the DEIP enhanced milk prices in 1992 with estimates of the effect ranging from $0.30 to $0.50 per cwt.

Export credit programs to assist commercial exports of U.S. dairy products can also be used. Only GSM-102 is used for dairy product exports (only 5 percent of the total commodities exported under the program). Export credits and the DEIP can be used in combination if the destination country is eligible for both programs.

Import controls. Dairy product import restrictions under Section 22 were designed to prevent imports from undermining the dairy price support program. U.S. purchases of dairy products would support international product prices if there were no binding import quotas. Imports of ingredient products are severely restricted under the quota authority while more liberal treatment is given to products that are noncompetitive or partially so—some specialty cheeses for example.

The negotiation of the GATT agreement on multilateral trade and the NAFTA agreement among the United Sates, Canada, and Mexico will have important ramifications for the dairy industry. When implemented, all quotas are to be converted to quota tariffs and reduced over time. Also included in the GATT and NAFTA agreements are minimum access requirements which will allow more dairy products to enter the United States than currently. The yearly minimum access increases are clearly defined in the agreements.

Other domestic programs. Domestic food assistance programs have operated in the U.S. since the 1930s. Program goals in the early years were to help feed the poor and unemployed and to help stabilize farm prices by disposing of growing stocks of surplus agricultural commodities. Over time, another goal has been added and emphasized—improving the nutritional well-being of low-income persons and other target groups, such as children and the elderly.

Food assistance programs take a variety of forms and have varying effects on dairy markets and the dairy price support program. Market purchases of all foods are subsidized by the Food Stamp and school feeding programs. Some programs specifically target the purchase or consumption of milk and dairy products--the Women, Infants, and Children (WIC) program and the Special Milk Program.

Federal Milk Marketing Orders

Federal milk marketing orders were authorized by the Agricultural Marketing Agreement Act of 1937. The 1937 Act included many provisions of previous agricultural legislation and established procedures for formulating marketing agreements or orders covering agricultural commodities regarding price, availability, and quality in specified geographical areas. The general administration and oversight of the Federal milk marketing orders are the responsibilities of the Dairy Division of the USDA's Agricultural Marketing Service (AMS).

The intent of the 1937 Act was to secure fair exchange value for farm products by establishing orderly marketing conditions and achieve parity for farmers. These goals were to be met while accounting for consumer interests by only gradually making adjustments in the public interest and feasible in view of consumptive demand.

Only Grade A milk is regulated under Federal milk marketing orders. Some 93,000 producers delivered just under 104 billion pounds of milk to handlers regulated under the 38 Federal orders in effect as of January 1, 1994. The Federal order deliveries represented 70 percent of total U.S. milk marketings during the year (73 percent of the grade A milk produced). California is not part of the Federal order system; it has it's own State milk marketing program. Milk marketings in California represented about 16 percent of the 1993 U.S. total Grade A milk.

If the Secretary of Agriculture finds that an order is necessary to achieve the declared intent of the 1937 Act, a notice of a public hearing on the order is issued. All interested parties—including producers, cooperatives, processors, handlers, and consumer groups—may present evidence at the hearing. If the hearing record supports it, the Secretary must issue an order. Milk producers in the geographical area to be covered must approve of the order before it becomes effective. Procedures for terminating orders if producers indicate a desire to do so are specified. The Secretary can also terminate or suspend, without notice or a hearing, orders or particular order provisions if it is determined that they "obstruct or do not tend to effectuate the purpose of the Act."

The legal scope of milk marketing orders is defined by the provisions of the 1937 Act. Each order includes authority for:

1. classified pricing;
2. establishing the minimum class prices that handlers must pay for milk used in each class;
3. pooling (averaging proceeds of sales by class and apportioning the payments to producers);
4. verifying weights and tests of milk shipped by producers;
5. auditing handler reports to verify milk utilization and payments to producers; and
6. providing market information.

Federal milk marketing orders do not contain provisions that:

1. control production or restrict individual producers' marketings;
2. guarantee producers a market with any buyer;
3. regulate handlers decisions--from whom to buy, to whom to sell, quantity purchased, or what selling price is charged;
4. set maximum prices handlers may pay for milk;
5. guarantee a fixed price to producers;
6. establish sanitary or quality standards; or
7. set wholesale or retail milk and dairy product prices.

Classified pricing, pooling, uniform payments to producers, and no restrictions on marketing are key elements of milk marketing orders. Classified pricing is a pricing system based on the use (utilization) of milk purchased by regulated handlers. All Federal milk marketing orders now provide for at least three classes of milk. Twenty-seven (27) orders, of the 38 in effect at the end of 1993, have been granted the authority for an additional class called III-A. When this fourth class is permitted, the order classifications are:

- Class I - milk used for fluid milk products;
- Class II - milk used for fluid cream or in perishable products such as ice cream, cottage cheese, and yogurt;
- Class III - milk used in American cheese, butter, and condensed milk, and;
- Class III-A - milk used in nonfat dry milk.

When there are only three classes in an order, Classes I and II are as above with Class III and III-A combined as the single Class III.

Each order specifies the minimum price that must be paid by handlers for milk used in each class, which is to be uniform to all handlers, with enumerated provisos. Class I milk receives the highest price, Class III (or Class III-A) milk the lowest. Class II prices are generally determined by formula but in no case are they below Class III prices. Producers and/or their cooperatives are free to negotiate for prices above the minimums with the handlers buying their milk. In most marketing orders, effective class prices (at least for Class I) are above the established minimums--the result of these "over-order" payment negotiations.

The basis of the class prices in the Federal milk marketing orders currently is the Minnesota-Wisconsin (M-W) price, the average price paid for manufacturing grade milk in the two-State area. The minimum Class III price is set equal to the M-W price and is the same in all orders. The minimum Class I price in each order is the minimum Class III two months previous price plus a fixed Class I differential, which is different in each order and generally increase with distance from the Minnesota-Wisconsin production area. Class I differentials are meant to reflect other costs associated with producing and marketing milk for the fluid markets, such as increased sanitary requirements, balancing, and transportation costs.

Pooling provisions provide the mechanism for payment of uniform or "blend" prices to the producers whose milk is purchased by regulated handlers under the orders. Two types of pools are permitted, marketwide and individual handler. The marketwide pool is currently in use in all but one order. Under a marketwide pool, the dollar value of all milk delivered by producers to regulated handlers is calculated by summing the minimum class price multiplied by the quantity of milk from producers used in each class. The total value is divided by the total producer milk delivered to arrive at the minimum blend or uniform price to be paid to pooled producers, subject to some adjustments if authorized.

Federal Program Linkage

The price support and Federal milk marketing order programs are connected, a fact implying that changes in one will effect both. The link between the two programs is a price--currently the M-W milk price. The classified pricing under Federal milk marketing orders is directly tied to the value of milk for manufacturing which is a market price influenced by the support price for milk. As the mover of class prices in all Federal milk marketing orders, the M-W price coordinates price signals to producers under the orders. For example, a lower M-W (due to a support price reduction) assures that minimum class prices would not continue rising (providing a production incentive) when the support price reduction is required.

The Federal order system similarly affects manufacturing milk markets and the price support program. Production responses to any price distortions or to any stability benefits of the orders will alter the overall market balance, all milk prices, the size of the surplus, and (ultimately) the milk support price.

State Regulations

Several states enforced their own milk pricing and marketing regulations prior to implementation of Federal laws, particularly the marketing orders, and some still do. The California state milk marketing program is an important example. Many States have laws still in place but they are not being enforced. Regulation of milk markets by States and how that regulation effects Federal policies has been the subject of many debates.

Prices paid to producers for fluid-grade milk are regulated by Federal orders and by ten States. The share regulated by the States has declined from nearly 25 percent at one time. California is the largest producing state with state-only pricing regulations. In a number of cases, Federal orders were introduced after State legislation had been repealed or declared unconstitutional. Improvements in transporting milk have diminished the ability of States to effectively regulate markets. Less than 1 percent of the fluid-grade milk sold in the United States is unregulated.

1996 DAIRY LEGISLATION

The 1996 Act presents a departure from past dairy policies. The previous method of supporting milk price through government purchases is extended for 4 years, at reduced support levels, and then eliminated. Replacing the old support method starting in the year 2000 is a recourse loan program aimed at providing seasonal price stabilization. The provision for a minimum support level for milk of $10.10/cwt is immediately repealed, along with provisions for assessments and for increasing and decreasing support levels over time based on the estimated level of government purchases. The farm bill has no effect on current provisions for import restrictions on dairy products allowed under the Uruguay Round of GATT—provisions that insulate the domestic market from foreign competition.

The farm bill for the first time requires a major restructuring of Federal Milk Marketing Orders (FMMO), a regional system of pricing established pursuant to the Agricultural Marketing Act of the 1937.

The Milk Price Support Program

The 1996 Act states that the Secretary shall support the price of milk through the purchase of cheese, butter, and nonfat dry milk at the following rates per hundredweight for milk containing 3.67 percent butterfat (calendar year basis):

Year	Dol./cwt.
1996	10.35
1997	10.20
1998	10.05
1999	9.90
2000 and beyond	Not Applicable

There are no provisions in the 1996 Act to adjust these support levels over time. And there are no provisions at all for government purchases to support milk prices after 1999. The prior program, as extended by the 1990 Act, required support prices to be increased or decreased if the estimated level of government purchases of dairy products ("total solids basis") reached certain trigger levels.

Assessments. Assessments are eliminated under the 1996 Act (related refunds for 1995 and 1996 will be made). The 1990 and 1993 Budget Reconciliation Acts mandated milk marketing assessments to help pay the cost of the price support program. The budget reconciliation assessment for 1996 had been established at 10 cents per hundredweight. Producers who did not increase production over the previous-year level would receive a refund of the assessment, and an additional assessment would be used by the CCC to recapture the cost of the refunds.

Butter and Nonfat Dry Milk and Cheese Provisions. The 1996 Act gives the Secretary flexibility to set butter and nonfat dry milk support prices at levels that will minimize the level of expenditures by the CCC or achieve other appropriate objectives. The support price for these products are set such that a weighted average of these product prices (based on the yield from 100 lbs. of milk), less processing costs ("make allowance") will equal the milk support price. The previous law was more restrictive than the 1996 Act about the support levels for dairy products. The level of butter price, under the prior law, could be no higher than \$.65 per pound and the level of powder prices could be no lower than \$1.034.

Recourse Loan Program for Commercial Processors of Dairy Products. Recourse loans will be available to commercial processors of dairy products to promote within-year price stability. The 1996 Act states that beginning January 1, 2000, the Secretary shall make recourse loans available to commercial processors to assist them in the management of inventories through temporary storage of eligible dairy products. Funds and authorities of the Commodity Credit Corporation shall be used to carry out the program. The rate of interest charged participants under this program shall not be less than the rate of interest charged the Commodity Credit Corporation (CCC) by the United States Treasury. (This interest rate could, therefore, be 1 percent lower than the CCC rate charged crop producers for nonrecourse loans in the 1996 Act.)

The loan rate for dairy products will be established at a milk equivalent value of $9.90 per hundredweight (3.67 percent butterfat milk). The eligible products are cheddar cheese, butter, and nonfat dry milk, the same as for the price support program. The length of the loan contracts may not extend beyond the end of the fiscal year. However, the Secretary has the discretion to extend the loan for a period not to exceed the end of the next fiscal year.

Consolidation and Reform of the Federal Milk Marketing Orders

The 1996 Act modifies the Federal Milk Marketing Order (FMMO) system that is used to set regional prices of milk used for fluid milk. The FMMO system, started by the Agricultural Marketing Act of 1937 and modified by the 1985 Farm Bill, provides provisions for the pricing of milk in different regions by establishing geographically determined order areas. Milk is classified according to use. The order determines the minimum prices that handlers in the orders must pay for different classes of milk. Producers in an order then receive an average (pooled) price for all the milk marketed in the order. All prices are keyed off the price for manufactured dairy products. Predetermined FMMO class I (fluid grade milk) price differentials for each order are added to the class III (manufacturing grade milk) price to determine the class I price. (This is classified pricing.)

The 1996 Act mandates that the Agricultural Marketing Service (AMS) is to: 1) consolidate the number of orders from the present 33 orders to not less than 10 nor more than 14 orders; 2) allow the California state order to enter the FMMO system as a separate order if the producers in California choose to enter the Federal system; 3) use the informal notice and comment procedures for rulemaking to implement the changes in the FMMO system; 4) announce the specific proposed amendments to the FMMO system within 2 years of the date of the Act, 5) implement final amendments to the FMMO system within 3 years of the passage of the Act; and 6) submit a report to Congress by April 1, 1997 on the progress being made in making the changes to the system, along with recommendations for further changes.

As part of the consolidation of the FMMO system , the Secretary is also authorized to implement: 1) the use of utilization rates and the use of multiple basing points for the pricing of fluid milk, and 2) the use of uniform multiple component pricing in the basic formula price of manufacturing milk. (See glossary for definitions.)

Multiple basing points. Under the 1996 Act, the Secretary may establish multiple basing points using more than one surplus area as the basis for calculating class I prices in different areas. The Upper Midwest order, which has been used as the one surplus area-basing point, has the smallest Class I differential of all orders. Class I differentials in all other orders have been loosely based on the the Upper Midwest order differential, plus the cost of transporting milk from Upper Midwest. However, over time, other areas besides Upper Midwest have expanded production and could now be classified as surplus area-basing points to implement the new FMMO system. The 1996 Act specifically forbids the Secretary from using the class I differentials mandated in the 1985 Farm Bill.

Rule making process/timing. Unlike previous changes in orders where the AMS has reacted to proposals from the industry, AMS can use informal rule making. This approach allows the agency to put forth its proposal and then respond to subsequent comments. AMS has 2 years from the date of the enactment to put forth a proposal and another year to enact the changes. If the changes are challenged in court and a court order stops the reform, additional time is allowed before the AMS is penalized. If the AMS does not complete the reforms in the specified period, the authority of this agency to collect assessment used to pay for the order operations is suspended.

Effect on Fluid Milk Standards in State of California. The 1996 Act allows California to maintain their different standards for fluid milk in terms of fat and nonfat components. At present, California requires that milk sold in California (fortified milk) have more nonfat solids in fluid milk than is required in other parts of the country. Milk directly from a cow in the United States averages about 3.67 percent fat. Whole fluid milk as sold in the stores contains about 3.2 percent fat. Two-percent milk and 1-percent milk are aptly named, and skim milk is effectively fat free. California effectively forces fluid processors to increase the amount of nonfat solids in milk.

Milk Manufacturing Marketing Adjustment. This provision sets the manufacturer, or "make" allowance for butter and nonfat dry milk and cheese at not more than $1.65 per hundredweight for butter and nonfat dry milk and not more than $1.80 per hundredweight for cheese, for any state or Federal order participating in the Federal support program. California, under its order system has been allowing a higher make allowance to processors than specified by the CCC. The effect was to widen the processor margin and give a lower price to milk producers. The 1990 Farm bill (Section 102) prohibits states from using a higher make allowance than designated by the CCC. However, this prohibition was never enforced, and it was repealed by the 1996 Act.

Promotion. This section authorizes the continued collection of the fluid and manufacturing milk promotion assessment. This program pays for generic advertising for milk and milk products. The program will continue as long the referendum of participants passes.

Northeast Interstate Dairy Compact. In this section of the law, Congress consents to the Northeast Interstate Dairy Compact. This compact is an agreement between the states of Maine, New Hampshire, Vermont, Massachusetts, Connecticut, and Rhode Island, that allows these states to place an additional over order charge on Class I milk. This additional charge on the Class I price is set at a maximum of $1.50 a gallon increased by the rate of inflation since 1990. In 1996 the level of the Class I price maximum under the order is around $20.00 a hundredweight or about $5.00 over the present Class I price.

The compact is in place until the completion of the FMMO reform. In addition the states of New York, New Jersey, Delaware, Pennsylvania, Maryland, and Virginia may join if they are contiguous to a participating state. The compact must compensate the CCC for any additional costs CCC incurs as a result of the compact. The compact can not limit any movement of milk into the compact area. Further, any fluid milk that is sold in the compact area from noncampact areas will receive the same price, as if it had been produced in one of the compact states.

Dairy Export Incentive Program. The Dairy Export Incentive Program (DEIP) is extended to 2002 in the new Farm Bill. This section of the law also requires the Secretary to maximize the amount of DEIP allowable under the WTO agreement.

Authority to Assist in Establishment and Maintenance of One or More Export Trading Companies. This section allows the Secretary to assist in the establishment of one or more export trading companies under the Export Trading Company Act of 1982. The organization or organizations are to be designed to develop export markets for the US dairy products.

Standby Authority to Indicate Entity Best Suited to Provide International Market Development and Export Services. The Secretary has the authority to indicate the best entity suited to assist the U.S. dairy industry in the development of international markets. The Secretary may make this designation provided that 1) the industry has not established a trading company under the Export Trading Company Act of 1982 on or before June 30, 1997 and 2) U.S. exports during the 12 month period preceding July 1, 1998 do not exceed the dairy product exports in the 12 months ending July 1, 1997 by 1.5 million pounds total solids basis. The Secretary is also required to identify sources of funding. The life of this section is from July 1, 1997 to September 30, 2000.

Study and Report Regarding Potential Impact of Uruguay Round on Prices, Income, and Government Purchases. The Secretary of Agriculture shall conduct a study, on the impact of the increased access of cheese from the WTO agreement on the U.S. milk prices, dairy producer income, and U.S. dairy program costs. This study is to be done by variety of cheese. The study is to be completed by July 1, 1997. The limitation of the number of studies imposed on the Department by Congress does not apply to this study.

Promotion of United States Dairy Products in International Markets Through Dairy Promotion Program. This section allows the Dairy Board to expend funds in the promotion of dairy products overseas. The life of this program is for each fiscal years 1997 through 2001.

GLOSSARY

Agricultural Marketing Service (AMS): A USDA agency responsible for administering the marketing of several agricultural commodities, including providing market news and stock reports. AMS oversees the operation of the Federal milk marketing order system.

Agricultural Stabilization and Conservation Service (ASCS): A USDA agency responsible for administering farm price support and income support programs and some conservation and forestry cost-sharing programs.

Balancing: The market services of moving milk between various uses and among processors to meet fluctuating needs of individual processors from various supplies and of maintaining a reserve of milk to meet fluctuations in aggregate market needs.

Blend price: A weighted average price based on the proportion of Grade A milk in a pool allocated to each of the use classes. Producers participating in a pool receive its blend price with adjustments for butterfat content and farm location if so specified.

Class I differential: The amount added to the M-W price to obtain a given order's Class I price. Two components usually make up the effective or total Class I differential: a minimum Federal order differential and an over-order payment.

Class I use: Grade A milk used in Class I milk products as defined under a milk marketing order. Class I products generally include all beverage milks and may include other fluid products.

Class II use: Grade A milk used in fluid cream products or perishable manufactured products (ice cream, cottage cheese, and yogurt) under Federal marketing orders with three classes. The designation also refers to Grade A milk used to produce any manufactured product under a Federal marketing order with only two classes.

Class III use: Grade A milk used to produce storable manufactured products (cheese, butter, canned milk, and dry milk) under a Federal marketing order with three classes.

Class III-A use: Grade A milk used to produce nonfat dry milk under Federal milk marketing orders where the class has been delimited.

Classified pricing: A structure of prices that differ according to category of use. In particular, the Federal order pricing system under which regulated processors pay into the pool for Grade A milk according to the class in which it is used.

Commodity Credit Corporation (CCC): A federally owned and operated corporation within the U.S.Department of Agriculture created to stabilize, support, and protect farm income and prices through loans, purchases, payments, and other operations.

Cooperative: A firm that is owned by its farmer-members, is operated for their benefit, and distributes earnings on the basis of patronage (volume of milk).

Cost of production: An amount, measured in dollars, of all purchased inputs, allowances for operator labor and management, and rent, that is necessary to produce farm products.

Economies of size: Increasing returns as use of factors is expanded in least-cost combinations. Once the size of an operation reaches a certain size, the marginal cost of producing additional output begins to decline.

European Union: Formerly known as the European Community, an attempt originating under the Treaty of Rome in 1957 to unify and integrate member economies by establishing a customs union and common economic policies, including the Common Agricultural Policy. The EU currently has 12 members.

Farm act: The omnibus agricultural legislation that expires every 4 or 5 years. The act's titles include program commodities, trade, conservation, credit, agricultural research, food stamps, and marketing.

Federal milk marketing order: A regulation issued by the Secretary of Agriculture specifying minimum prices and conditions under which regulated milk handlers must operate within a specified geographic area.

Fluid grade (Grade A) milk: Milk produced under sanitary conditions that qualify it for fluid consumption. Only Grade A milk is regulated under Federal marketing orders.

Fluid product: Packaged dairy products traditionally including beverage milks, milk and cream mixtures, cream, eggnog, and yogurt.

Fluid utilization: The proportion of Grade A milk pooled in a market and used to produce fluid (Class I) products.

Food, Agriculture, Conservation, and Trade Act of 1990 (PL 101-624): The omnibus food and agricultural legislation signed into law on November 28, 1990, that provides a 5-year framework for the Secretary of Agriculture to administer various agriculture and food programs.

General Agreement on Tariffs and Trade (GATT): An agreement originally negotiated in 1947 by 23 countries, including the United States, to increase international trade by reducing tariffs and other trade barriers. The agreement provides a code of conduct and a framework for periodic multilateral negotiations on trade issues.

Handlers: Generally refers to fluid milk processors but can include manufacturing plants that also supply fluid markets.

Make allowance: The difference between the Government support price for milk and the value of its products at the CCC announced purchase prices for butter, nonfat dry milk, and cheese. The allowance is administratively set to attain the desired level of prices for milk in manufacturing uses.

Manufacturing grade (Grade B) milk: Milk not meeting the fluid grade standards. Less stringent standards generally apply.

Manufacturing milk: Grade B milk or the Grade A milk assigned to Class II and Class III or otherwise used in the production of a manufactured product.

Manufacturers: Generally refers to the producers of cheese, butter, nonfat dry milk, and other storable dairy products.

Milk equivalent: The amount of farm milk represented by a quantity of dairy products. Most often used to aggregate stocks, trade, or removals of various dairy products on a common basis, either milkfat or skim solids. Milkfat basis refers to the quantity of milk needed to provide the milkfat contained in the dairy products. Similarly, skim solids basis refers to the milk needed to provide the skim solids used in production. Total solids basis is an arbitrary weighting of net removals on the two bases used for adjusting the support price for milk. The weights currently are 40 percent milkfat basis and 60 percent skim solids basis.

Minnesota-Wisconsin (M-W) price: The average price per cwt paid to farmers for manufacturing grade milk in Minnesota and Wisconsin as estimated by USDA.

North American Free Trade Agreement (NAFTA): A region-wide (the United States, Canada, and Mexico) agreement effective January 1 which: 1) progressively eliminates tariffs and nontariff barriers to trade in goods; 2) establishes principles of and improves access for services trade; 3) establishes rules for investment; 4) strengthens protection of intellectual property rights; and 5) creates an effective dispute settlement mechanism. Other countries have expressed interest in joining in the agreement.

Over-order payment: A payment negotiated between buyers and sellers to cover the cost of providing market services or attracting milk away from manufacturing plants. Over-order payments could also result from market power.

Parity price: Originally defined as the price which gives a unit of a commodity the same purchasing power today as it had in a base period, traditionally 1910-14. In 1948, parity procedures were modified to adjust for changes in relative farm prices between the base period and the most recent 10 years.

Perishable manufactured dairy products: Manufactured dairy products with limited storage life, including ice cream, cottage cheese, yogurt, and sour cream.

Processors: Generally refers to firms that process raw Grade A milk into fluid dairy products.

Public Law 480 (PL 480): Common name for the Agricultural Trade Development and Assistance Act of 1954 which seeks to expand foreign markets for U.S. agricultural products, combat hunger, and encourage economic development in developing countries.

rbST (Recombinant bovine somatotropin): A synthesized copy of a protein hormone, bovine somatotropin (bST), which naturally occurs in cattle. The hormone is secreted by the cow's pituitary gland and directs how energy and nutrients from feeds are used for growth, milk production, and other body functions. Initial studies of the hormone emphasized its relation to growth and led to it being called bovine growth hormone (bGH), a name that is still sometimes used.

Reconstituted milk: Fluid milk recombined from ingredients (nonfat dry milk, condensed milk, cream, butter, and butter oil) or concentrated milk.

Revenue pool: With a classified pricing system such as that used in Federal and State orders, processors pay for milk at different prices for each use category. Producers are paid a weighted average, or "blend" price for all uses of milk in a particular order or market. Processors pay into the pool on the basis of their uses of milk; these are the pool revenues. Producers participating in the pool receive identical uniform blend prices, with adjustments for butterfat content and location of the farm.

Section 22: A section of the Agricultural Adjustment Act of 1933 (PL 73-10) that authorizes the President to restrict imports by imposing quotas or fees if the imports interfere with Federal price support programs or substantially reduce U.S. production of products processed from farm commodities.

Storable manufactured dairy products: Manufactured dairy products, including butter, nonfat dry milk, and cheese, which can be stored for relatively long periods of time.

Surplus: The difference between commercial milk supplies and the amount demanded by the market at a given price. CCC net removals (price-support purchases plus DEIP shipments minus domestic sales for unrestricted use) approximate the surplus during a particular period.

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Appendix Table 1. Milk Production and Factors Affecting Supply, Selected Years, 1970-93

Year	Milk cattle on farms, January 1				Milk production		Average prices received by farmers per cwt		
	Milk cows and heifers that have calved	Milk cow replacements; heifers 500 pounds and over		Milk cows on farms, average during year	Per cow	Total	All milk, wholesale	Milk eligible for fluid market	Milk manufacturing grade
	Thousand		Number per 100 cows	Thousand	Pounds	Million pounds	---------- Dollars ---------		
1970	12,091	3,880	32.1	12,000	9,751	117,007	5.71	6.05	4.70
1971	11,909	3,843	32.3	11,839	10,015	118,566	5.87	6.19	4.86
1972	11,776	3,828	32.5	11,700	10,259	120,025	6.07	6.38	5.08
1973	11,622	3,872	33.3	11,413	10,119	115,491	7.14	7.42	6.20
1974	11,297	3,941	34.9	11,230	10,293	115,586	8.33	8.66	7.13
1975	11,220	4,087	36.4	11,139	10,360	115,398	8.75	9.02	7.63
1976	11,071	3,956	35.7	11,032	10,894	120,180	9.66	9.93	8.56
1977	10,998	3,887	35.3	10,945	11,206	122,654	9.72	9.96	8.70
1978	10,896	3,886	35.7	10,803	11,243	121,461	10.60	10.80	9.65
1979	10,790	3,932	36.4	10,734	11,492	123,350	12.02	12.20	11.06
1980	10,758	4,159	38.6	10,799	11,891	128,406	13.05	13.23	12.01
1981	10,849	4,342	40.0	10,898	12,183	132,770	13.77	13.95	12.72
1982	10,986	4,547	41.4	11,011	12,306	135,505	13.61	13.80	12.60
1983	11,047	4,545	41.1	11,059	12,622	139,588	13.58	13.75	12.61
1984	11,059	4,533	41.0	10,793	12,541	135,351	13.46	13.61	12.49
1985	10,777	4,770	44.3	10,981	13,024	143,012	12.76	12.90	11.72

(Appendix Table 1 continued)

Year	Milk cattle on farms, January 1				Milk production		Average prices received by farmers per cwt		
	Milk cows and heifers that have calved		Milk cow replacements; heifers 500 pounds and over	Milk cows on farms, average during year	Per cow	Total	All milk, wholesale	Milk eligible for fluid market	Milk manufacturing grade
	Thousand		Number per 100 cows	Thousand	Pounds	Million pounds	---------- Dollars ---------		
1986	11,116	4,709	42.4	10,773	13,285	143,124	12.51	12.62	11.46
1987	10,466	4,305	41.1	10,327	13,819	142,709	12.54	12.66	11.37
1988	10,311	4,122	40.0	10,262	14,145	145,152	12.26	12.36	11.15
1989	10,212	4,161	40.7	10,126	14,244	144,239	13.56	13.66	12.38
1990	10,153	4,227	41.6	10,127	14,646	148,314	13.74	13.89	12.34
1991	10,156	4,220	41.6	9,992	14,860	148,477	12.27	12.30	11.05
1992	9,913	4,202	42.4	9,835	15,419	151,647	13.15	13.19	11.91
1993	9,838	4,224	42.9	9,705	15,554	150,954	12.86	12.88	11.80

(Appendix Table 1 continued)

	Dairy ration value per cwt	Milk/feed price ratio /2	Milk cow cost		Grain and other concentrates fed to milk cows			Dairy pasture feed conditions, as percent of normal	Alfalfa hay prices received by farmers per ton	Slaughter cow prices per cwt 3/
			Price received per head	Milk required to buy a cow	Total fed	Per cow	Per cwt of milk produced			
Year	Dollars	Pounds	Dollars	Cwt	Thousand Tons	---- Pounds ---		Percent	---- Dollars ----	
1970	3.28	1.74	332	58	24,870	3,979	42.4	81	24.70	21.32
1971	3.44	1.71	358	61	25,107	4,070	42.4	79	27.10	21.62
1972	3.52	1.72	397	65	25,162	4,298	41.9	80	31.45	25.21
1973	4.88	1.46	496	69	25,042	4,389	43.4	83	41.55	32.82
1974	6.23	1.34	500	60	24,586	4,384	42.6	75	52.58	25.56
1975	6.25	1.40	412	47	24,274	4,357	42.1	79	54.38	21.09
1976	6.30	1.53	477	49	25,083	4,545	41.7	70	60.81	25.31
1977	6.20	1.57	504	52	25,518	4,709	42.1	72	60.57	25.32
1978	6.08	1.74	675	64	26,018	4,803	42.8	76	52.25	36.79
1979	6.68	1.80	1,040	87	27,207	5,070	44.1	82	60.37	50.10
1980	7.42	1.76	1,190	91	28,433	5,260	44.2	70	72.00	45.73
1981	8.02	1.72	1,200	87	28,513	5,220	42.9	79	70.90	41.93
1982	7.45	1.83	1,110	82	29,661	5,380	43.7	83	72.73	39.96
1983	7.88	1.72	1,030	76	30,162	5,438	43.2	77	78.70	39.35
1984	8.16	1.65	895	66	28,449	5,253	42.0	74	79.48	39.81
1985	7.35	1.73	860	67	8,891	5,427	41.8	77	73.67	38.31
1986	7.00	1.79	820	66	29,913	5,534	41.8	80	64.85	37.18

(Appendix Table 1 continued)

			Milk cow cost		Grain and other concentrates fed to milk cows					
	Dairy ration value per cwt	Milk/feed price ratio /2	Price received per head	Milk required to buy a cow	Total fed	Per cow	Per cwt of milk produced	Dairy pasture feed conditions, as percent of normal	Alfalfa hay prices received by farmers per ton	Slaughter cow prices per cwt 3/
Year	Dollars	Pounds	Dollars	Cwt	Thousand Tons	---- Pounds ---		Percent	---- Dollars ----	
1987	6.81	1.84	920	73	29,607	5,736	41.6	79	65.97	44.80
1988	7.74	1.58	990	81	29,853	5,820	41.2	59	82.51	47.91
1989	8.20	1.65	1,030	76	29,602	5,845	41.0	73	95.98	50.11
1990	7.98	1.71	1,160	84	32,402	6,397	43.7	74	92.56	53.32
1991	7.73	1.58	1,100	90	30,934	6,192	41.7	78	78.96	51.50
1992	7.68	1.69	1,130	86	31,572	6,417	41.6	82	75.45	49.69
1993	7.73	1.64	1,160	90	32,185	6,637	42.7	84	85.73	50.14

1/ Preliminary.
2/ Pounds of average concentrate ration equal in value to 1 pound of milk.
3/ Utility grade, Omaha 1965-87, Wisconsin auctions 1988 and after.

Appendix Table 2. Propensity to produce milk index, relative production index, and relative price index, by State, 1992, 1985 and 1975

State		Propensity to produce milk index[a]			Relative production index[b]			Relative price index[c]		
	1992	1992	1985	1975	1992	1985	1975	1992	1985	1975
	Rank									
New Mexico	1	1070	474	198	749	394	166	70	83	84
Arizona	2	421	324	257	341	268	211	81	83	82
Nevada	3	378	282	222	291	231	182	77	82	82
California	4	278	206	155	231	185	150	83	90	97
Florida	5	254	193	233	183	152	182	72	79	78
Washington	6	236	154	147	212	137	134	90	89	91
Texas	7	189	137	137	151	114	114	80	83	83
Colorado	8	153	113	115	136	110	105	89	97	91
Utah	9	152	124	131	146	129	131	96	104	100
Idaho	10	150	117	96	164	134	107	109	114	111
Pennsylvania	11	141	151	130	130	132	177	92	87	90
Georgia	12	140	132	152	113	103	120	81	78	79
Oregon	13	138	121	101	124	110	94	90	91	93
Vermont	14	124	126	127	110	111	116	89	88	91
Louisiana	15	115	115	155	94	95	136	82	82	88
New York	16	103	104	120	96	94	109	93	91	91
North Carolina	17	93	110	111	76	93	99	82	84	89
Virginia	18	91	103	102	83	90	93	91	87	91
Wisconsin	19	87	99	97	110	121	114	127	122	118
Maine	20	86	96	109	74	81	94	86	84	86
New Hampshire	21	86	102	113	70	81	94	81	80	83
Maryland	22	84	108	117	77	95	109	92	88	93
South Dakota	23	83	92	108	94	107	116	113	116	107
Connecticut	24	81	95	113	60	72	88	74	76	78
Michigan	25	79	87	88	84	92	91	106	105	104
Ohio	26	72	80	86	73	80	87	101	100	101
Tennessee	27	71	78	92	77	83	94	109	107	102
Oklahoma	28	70	71	79	66	66	74	94	94	94
Deleware	29	67	73	76	60	64	70	90	87	92
South Carolina	30	67	100	106	55	86	94	82	86	89
Minnesota	31	63	75	82	82	95	98	130	126	119
Kentucky	32	61	68	92	69	75	97	113	110	105
Massachusetts	33	61	86	106	51	66	84	83	76	79
Arkansas	34	59	66	71	61	69	72	104	105	108
Montana	35	58	65	65	55	63	62	95	96	96
Missouri	36	57	59	76	63	64	79	110	109	104
Indiana	37	51	57	66	55	61	69	108	107	105
Nebraska	38	49	55	77	47	54	72	96	98	93
Alabama	39	48	52	78	39	44	69	82	85	89
Iowa	40	46	48	58	56	56	67	122	118	115
Kansas	41	46	48	68	48	54	73	103	111	108
Mississippi	42	46	56	70	45	55	69	98	98	99
Wyoming	43	44	58	58	43	58	59	98	100	102
North Dakota	44	43	52	57	46	53	56	106	102	98
Illinois	45	41	45	51	47	51	56	116	113	109
West Virginia	46	35	52	57	31	46	52	89	88	92
New Jersey	47	32	47	62	26	37	50	80	78	80
Rhode Island	48	29	39	71	21	28	52	72	72	73

[a] The "propensity to produce milk index" is the relative production index divided by the relative price index. Figures may not divide exactly because of rounding.

[b] The Relative Production Index is: (State's milk prod. in year t) / (Tot. U.S. milk prod. in year t)   (State's avg. milk prod. in 1957-59) / (U.S. avg. milk prod. in 1957-59)   X   100

[c] The Relative Price Index is: (State's all milk price in year t) / (U.S. all milk price in year t)   (State's avg. all milk price, 1957-59) / (U.S. avg. all milk price, 1957-59)

Appendix Table 3. Per capita consumption of milk and dairy products, United States, 1975-94[a]

			Evaporated and condensed milk					
			Cheese			Whole		
Year	Fluid milk and cream	Butter	American	Other	Cottage	Canned	Bulk	Skim
			Pounds					
1970	277	5.3	7.1	4.4	5.2	5.9	1.2	5.0
1971	275	5.1	7.4	4.7	5.4	5.7	1.1	5.1
1972	276	4.9	7.8	5.3	5.5	5.1	1.2	4.7
1973	272	4.8	7.9	5.7	5.3	4.8	1.1	4.3
1974	262	4.5	8.6	6.0	4.7	4.4	1.2	3.5
1975	261	4.7	8.4	6.1	4.7	3.9	1.4	3.6
1976	260	4.3	9.0	6.7	4.7	3.7	1.3	3.6
1977	258	4.3	9.3	6.8	4.7	3.2	1.1	3.9
1978	254	4.4	9.6	7.4	4.7	3.1	1.0	3.5
1979	251	4.5	9.6	7.6	4.5	3.0	1.1	3.3
1980	246	4.5	9.6	7.9	4.5	2.8	1.0	3.3
1981	242	4.2	10.2	8.0	4.3	2.9	1.2	3.2
1982	236	4.4	11.3	8.6	4.2	2.7	1.3	3.0
1983	236	4.9	11.6	8.9	4.1	2.7	1.1	3.2
1984	238	4.9	11.9	9.6	4.1	2.4	1.3	3.7
1985	241	4.9	12.2	10.4	4.1	2.2	1.4	3.8
1986	240	4.6	12.1	11.0	4.1		2.2	1.4
1987	239	4.7	12.4	11.7	3.9	2.2	1.5	4.2
1988	235	4.5	11.5	12.2	3.9	2.1	1.4	4.2
1989	236	4.4	11.0	12.8	3.6	2.0	1.1	4.7
1990	234	4.4	11.1	13.5	3.4	2.2	1.0	4.8
1991	233	4.4	11.1	13.9	3.3	2.1	1.1	5.0
1992	231	4.4	11.3	14.7	3.1	2.1	1.1	5.2
1993	227	4.7	11.4	14.8	2.9	1.9	1.1	5.2
1994	226	4.8	11.6	15.3	2.8	1.8	1.4	4.8

Appendix Table 3. (continued)

Year	Frozen products				Dry products			
	Ice cream	Ice milk	Sherbet	Other products[c]	Whole milk	Nonfat dry milk	Butter Milk	Whey[d]
	Pounds							
1970	17.6	7.8	1.6	1.4	0.2	5.3	0.2	0.9
1971	17.5	7.7	1.6	1.3	0.2	5.3	0.3	1.0
1972	17.3	7.7	1.6	1.4	0.1	4.6	0.2	1.7
1973	17.3	7.6	1.5	1.2	0.1	5.3	0.2	1.8
1974	17.4	7.7	1.5	1.1	0.1	4.2	0.2	2.0
1975	18.5	7.7	1.5	1.0	0.1	3.3	0.2	2.2
1976	17.9	7.3	1.5	0.8	0.2	3.5	0.2	2.4
1977	17.5	7.7	1.5	0.7	0.2	3.3	0.3	2.4
1978	17.4	7.7	1.4	0.8	0.3	3.1	0.2	2.4
1979	17.1	7.3	1.3	0.6	0.3	3.3	0.2	2.7
1980	17.5	7.1	1.3	0.3	0.3	3.0	0.2	2.7
1981	17.4	7.0	1.3	0.6	0.4	2.1	0.2	2.7
1982	17.6	6.6	1.3	0.6	0.4	2.1	0.2	2.9
1983	18.1	6.9	1.3	0.6	0.4	2.2	0.2	3.1
1984	18.2	7.0	1.0	0.6	0.4	2.5	0.2	3.2
1985	18.1	6.9	1.3	1.3	0.4	2.3	0.2	3.5
1986	18.4	7.2	1.3	0.9	0.5	2.4	0.2	3.7
1987	18.4	7.4	1.3	1.0	0.5	2.5	0.2	3.6
1988	17.3	8.0	1.3	1.0	0.6	2.6	0.2	3.5
1989	16.1	8.4	1.3	2.8	0.5	2.1	0.2	3.5
1990	15.8	7.7	1.2	3.6	0.6	2.9	0.2	3.7
1991	16.3	7.4	1.1	4.3	0.4	2.6	0.2	3.6
1992	16.3	7.1	1.2	4.4	0.5	2.8	0.2	3.8
1993	16.1	6.9	1.3	5.0	0.5	2.4	0.2	3.8
1994[e]	16.1	7.6	1.4	4.9	0.5	3.5	0.2	3.6

[a] Domestic disappearance divided by total population including military overseas (resident population for fluid products.

[b] Product weight of beverage milks, fluid creams, egg nog, and yogurt sold or consumed on farms.

[c] Includes mellorine. May not be comparable across time.

[d] Includes modified whey products.

[e] Preliminary or estimated.

THEME: WHAT IMPACTS HAVE PAST U.S./CANADIAN DAIRY POLICIES HAD ON STRUCTURE, EFFICIENCY, AND TRADING RELATIONSHIPS?

OBJECTIVE

To describe the economic effects resulting from past policies in the United States and Canadian dairy sectors with emphasis on prices, supply, demand, trade, structure and efficiency.

WHAT IMPACTS HAVE PAST U.S./CANADIAN DAIRY PROGRAMS HAD ON STRUCTURE, EFFICIENCY, AND TRADING RELATIONSHIPS? U.S. ANALYSIS

Bob Cropp and Hal Harris

The U.S. dairy industry currently is experiencing major structural changes. Milk production has shifted from the more traditional regions of the Upper Midwest and the Northeast to the South, Southwest and Northwest. Dairy farm numbers have declined steadily, while the size of individual dairy herds have increased substantially. Productivity of these dairy herds has been steadily increasing. Milk processors and marketers, both dairy cooperatives and investor-owned firms are declining in number, but are becoming larger in size and geographic scope of operation.

It is hard to ascertain whether historic structural changes are in response to major changes in U.S. dairy policy, or simply the result of changing economic conditions and new technology at the farm, processing and marketing levels. We believe that policy shifts have at times been major factors in influencing changes in the U.S. dairy sector, but that more often the flow of causality is the reverse. That is, changing economic conditions, industry structure, technology, and productivity have tended to dictate policy decisions. U.S. dairy policy has become increasingly market oriented since 1981 and as a result, farm level milk prices and dairy product prices have been determined by market forces and not by government programs during the past eight years.

In this paper we discuss the changes in U.S. dairy policy, related farm programs, the structural changes that are occurring in the dairy industry and implications for U.S. competitiveness in international dairy trade.

U.S. DAIRY PRICE SUPPORT PROGRAM

The Agricultural Act of 1949 established the dairy price support program. USDA, through the Commodity Credit Corporation (CCC), supports the price dairy farmers receive for milk by offering to purchase unlimited quantities of butter, nonfat dry milk, and cheddar cheese at announced prices. These purchase prices are set at levels that enable manufacturing plants to pay dairy producers, on the average, the support price for manufacturing grade milk.

1950-1972

The level of support for manufacturing grade milk was based upon a parity formula from 1950 to 1981. Parity attempted to keep the same relationship between farm level prices and farm costs as existed in the period 1910-14. The 1949 Act required a support price for manufacturing grade milk between 75 and 90 percent of parity taking into consideration supply and demand conditions. The stated goal was to maintain an adequate future supply of milk. During this period, the support price was never set at the maximum, and most often was set at the minimum.

From 1950 to 1972, with relatively low inflation, the support price did not change much from year to year. The support price increased from $3.14 per hundredweight in 1951, average milk fat test, to $4.93 per in 1972 (Table 1). For most of this period surpluses were more seasonal than annual. The program served a useful function of providing price stability by propping up prices in the spring. CCC stocks were sold back into the commercial market during seasons of tighter milk supplies. Exceptions were 1953-54 and 1961-65 when CCC net purchases of surplus dairy products totalled 8 to 11 billion pounds of milk (milk fat equivalent). Farm level milk prices were stable. Neither dairy producers nor manufacturing milk plants faced much price or market risk.

During this period the support price kept dairy product prices above world market levels. Commercial dairy exports were minimal. Most exports were under government assistance. Total dairy exports on a milk fat equivalent basis ranged from 350 million pounds to 600 million pounds, most years, less than .5 percent of production (Table 2). In a few years, international food assistance programs expanded exports to levels of 1 billion to 2.5 billion pounds. Dairy imports were kept in check through quotas on most dairy products with the exception of casein and lactose. Section 22 of the 1933 Agricultural Act required the Secretary of Agriculture to impose import quotas if such imports undermine the support programs. Dairy imports ranged from 400 million to 1.4 billion pounds.

During this 22 year period, the number of U.S. dairy farms having milk cows decreased from 3,648,253 to an estimated 475,000 in 1972 (Table 3). The number of milk cows on these farms decreased by 51 percent, 23.85 million head to 11.70 million head. But average milk production per cow almost doubled, going from 5,314 pounds to 10,250 pounds, for an annual average rate of increase of more than 4 percent[1]. Total milk production increased just 2.8 percent, 116.6 billion pounds to 119.9 billion pounds.

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[1]Throughout the paper, changes in production per cow are used as a proxy for productivity gains. Better measures of productivity growth might include production per unit of feed input, production per worker, or production per dollar of investment. Data are unavailable for such measures. However, the authors believe that such indexes have moved in close correlation with production per cow.

Table 1. U.S. Federal Dairy Price Support Program

Year	Support Price $/Cwt	CCC Purchases Billion Lbs.	Net Gov't Expenditures Million $'s
1950-51	$ 3.14	$ 2.5	188.1
1955-56	3.15	5.1	284.1
1961-62	3.40	11.2	612.0
1971-72	4.93	6.6	369.9
1978-79 (April)	10.76	1.1	250.6
1979-80 (April)	12.36	8.2	1,279.8
1980-81	13.10	12.7	1,974.8
1982	13.10	14.5	2,425.7
1983	13.10	16.8	2,600.4
1988 (January)	10.60	9.6	1,657.9
1989	10.60	8.4	712.0
1990	10.10	10.4	671.0
1995	10.10	3.0	4.0

Source: USDA, ASCS reports

Table 2. U.S. Dairy Exports and Imports, 1950-95

Years	Exports, Mil. Lbs. (milkfat equivalent)	Imports, Mil. Lbs. (milkfat equivalent)
1950 - 1972	350 to 600/year	400 to 1,400/year
1973 - 1980	380 to 650/year	1,700 to 2,300/year
1981	3,343	2,300
1982 - 1991	1,580 to 5,320/year	2,400 to 2,800/year
1992 - 1995	8,500	2,500 to 2,800/year

Source: USDA, ERS reports

Table 3. U.S. Dairy Farms, Number of Milk Cows, Average Herd Size, Average Pounds of Milk Per Cow, Total Milk Production

Year	Dairy Farms	No. Cows (Million Head)	Average Herd Size	Average Milk Per Cow, Lbs.	Total Milk, Bil.Lbs.
1950	3,648,250	23.85	7	5,314	116.6
1972	475,000	11.70	25	10,250	119.9
1973	420,000	11.41	27	10,114	115.4
1981	280,000	10.90	39	12,183	132.8
1982	278,000	11.01	40	12,306	135.5
1983	n/a	11.06	n/a	12,622	139.6
1984	n/a	10.79	n/a	12,541	135.4
1985	n/a	10.98	n/a	13,024	143.0
1987	202,000	10.33	51	13,819	142.7
1995	148,690	9.50	64	16,451	155.6

Source: USDA, ERS sources with author's estimates for some farm numbers.

1973-1981

Beginning in 1973, higher inflation rates increased parity milk prices and thus the support level fairly rapidly. In just eight years the support price more than doubled. The Agriculture and Consumer Protection Act of 1973 removed parity from the price support formula for feed grains and wheat, but the strong dairy lobby managed to retain the parity concept for milk. The mid-1970s were favourable years for American farmers. Export demand propelled prices for wheat, feed grains, rice, and cotton to record highs. But greater dependence on export markets made commodity prices subject to violent swings due to economic and political events in other parts of the world. In 1975, President Ford instituted a brief grain embargo against the Soviet Union and Poland. By 1976 grain prices were declining because of substantially higher grain production and falling exports. Corn prices fell from \$3.02 a bushel in 1974 to \$2.02 a bushel in 1977. Wheat prices fell from \$4.09 a bushel to \$2.33.

In response to the price-cost squeeze caused by the mid-1970s export surge, milk producers lobbied for higher price supports, and were successful in winning a campaign pledge from Jimmy Carter in 1976 to raise them. Congress subsequently passed, and President Carter signed a measure raising the minimum support price level from 75 to 80 percent of parity, and requiring semi-annual rather than annual adjustments. Thus, milk prices rose rapidly, even as feed prices declined. The program had been transformed from a price stability program to an income enhancement program, a goal for which the program was ill-suited.

Dairy farm structure changed considerably during this period. Expanding grain markets and good grain prices in the early to mid 1970s provided alternatives to dairying. The number of farms reporting milk cows declined by a third, from an estimated 420,000 farms to 280,000 farms. The Corn Belt, in particular, lost many dairies. Then, cheaper grain but higher milk prices from the mid to late 1970s attracted unneeded and less efficient resources into dairying and spurred milk production. Dairy farmers were able to obtain credit to modernize facilities, construct new silos etc. Capital investment per cow increased dramatically. Milk surpluses developed on a scale unseen during the first 30 years of the dairy price support program.

Number of milk cows during this 8 year period declined just 4.3 percent, 11.41 million head to 10.90 million head and the average milk per cow increased from 10,114 pounds to 12,183 pounds or 20 percent. This was an average annual productivity increase of 2.5 percent. This productivity and the relative stable number of milk cows pushed total milk production up 15 percent from 115.4 billion pounds to 132.8 billion pounds. CCC purchases of surplus dairy products grew from just 1.1 billion pounds of milk equivalent in 1978-79, to 8.2 billion pounds in 1979-80 and 12.7 billion pounds for 1980-81. Net government expenditures for the dairy price support program increased from $250.6 million in 1978-79 to $1.975 billion in 1980-81.

With the price of dairy products support well above world prices, CCC surpluses could only be moved internationally with government subsidies. Exports were at relatively low levels most years, between 380 and 650 million pounds of milk equivalent. An exception was 1981 when increased international food assistance pushed exports to 3.1 billion pounds. In 1977, the United States exported surplus stocks of butter to New Zealand, but refused to export to the Soviet Union or any other communist party. New Zealand, in turn, moved butter into the Soviet Union. In order to get rid of burdensome and growing stocks of surplus dairy products, the government increased domestic distribution programs. Dairy imports were kept at between 1.7 billion and 2.3 billion pounds of milk equivalent.

1982-1995

Milk production continued to outstrip commercial sales, and dairy surpluses continued to grow. CCC purchases of surplus dairy products reached 14.5 billion pounds in 1982, 10.9 percent of milk marketings, and a cost of about $2.4 billion. In response, Congress finally removed the support level from parity under the Agriculture and Food Act of 1981. Instead, the level of the support price was determined by Congress based upon the level of milk surpluses and associated government costs. The following year, Congress imposed producer assessments of $0.50 per hundredweight, first collected in April 1983, and an additional $0.50 implemented on September 1, 1983 that was refundable to producers who reduced marketings by a specified amount. The support price was frozen at $13.10 per hundredweight. Surpluses continued to expand in 1983, reaching almost 17 billion pounds of milk equivalent, 11 percent of milk marketings at a cost of $2.6 billion. On December 1, 1983, the support price was reduced to $12.60. Triggers based on expected CCC purchases further reduced the support to $11.60 by July 1985.

In 1983, Congress authorized a national program for dairy product promotion, research, and nutrition education as a part of a comprehensive strategy to reduce milk surpluses by increasing consumption. The program was funded by a mandatory 15-cent per hundredweight assessment on all milk marketed. The funds are administered by a producer board appointed by the Secretary of Agriculture.

For the first time in U.S. history, a voluntary supply management program, "The Milk Diversion Program" (MDP) was implemented for 15 months from January 1,1984, to March 31, 1985. The MDP paid dairy farmers $10.00 per hundredweight if they voluntarily contracted to reduce their milk marketing below base marketing. The program was financed by a $.50 per hundredweight assessment against all milk marketed. The 15 month program did reduce milk production, which fell from 139.6 billion pounds in 1983 to 135.4 billion in 1984. But once the program ended, milk production once again expanded, reaching 143.0 billion pounds in 1985. The program also created regional disputes. The largest participation occurred in the Southeast where a relatively larger portion of milk production costs are explicit variable costs, purchased feed and hired labor. As a result, the Southeast experienced major fluid milk deficits in the summer and early fall of 1984 and 1985.

The Food Security Act of 1985 authorized a voluntary dairy termination program. Producers submitted bids to cease milk production for at least 5 years by slaughter or export of all dairy cattle. Almost 14,000 bids were accepted, amounting to 12.3 million pounds of milk, equivalent to 8.7 percent of total marketings. Again, participation was greater in regions where a larger portion of milk production costs are variable costs, the South and Southeast. The Act also further reduced the support price for milk and retained producer assessments. The support price was reduced from $13.10 per hundredweight in 1982 to $10.60 by January 1,1988.

A major drought occurred in 1988. The combination of voluntary supply management programs, reduced price support levels, producer assessments, and the drought, at last alleviated the burdensome milk surplus problem. CCC purchases dropped to about 9 billion pounds for 1989, most all of which was butter. Net government costs dropped to about $700 million. The support price ratcheted down to $10.10 on January 1,1990, where it remained through 1995.

Under the Food, Agriculture, Conservation, and Trade Act of 1990, annual adjustments to the support price through 1995 were based on CCC purchases measured on a milk equivalent, total solids basis instead of a milkfat basis. However, the support price could not be less than $10.10. CCC financed purchases were limited to 7 billion pounds. Purchases above this amount were to be financed through additional producer assessments. If purchases were estimated to be less than 3.5 billion pounds of milk, the Secretary of Agriculture was required to increase the support price at least $.25 cents per hundredweight.

Since CCC purchases were between 3.5 billion pounds and 7 billion pounds each year between 1990 and 1995, the support price remained at $10.10 and no additional assessments were imposed.

The Agricultural Reconciliation Act of 1990 implemented deficit reduction producer assessments. For 1991, the assessment on all milk marketings was 5 cents per hundredweight. For calendar years 1992-95, they increased to 11.25 cents. Refunds were made to producers not increasing marketings from the previous year. Assessments were increased each May 1 to cover refunds. Few producers seem to have intentionally restricted milk production to qualify for refunds. Indeed, the present assessments were not intended to be a supply management tool.

During the 1990s, dairy imports held between 2.3 and 2.9 billion pounds. Even at a support level of $10.10US, product prices remained above world prices. Exports were less than 2 billion pounds of milk equivalent. In 1991, the Dairy Export Incentive Program (DEIP), which had been authorized, but little used, was activated as a tool to expand exports. DEIP sales are made by private firms, but most are foreign owned exporting firms. Upon contacting a potential buyer, the prospective exporter submited a bid to USDA requesting a cash DEIP bonus that would allow the sale to take place. DEIP bonuses were $10 million in (fiscal) 1991, grew to $143 million in (fiscal) 1993 and near $150 million in (fiscal) 1995. Exports exceeded 8.5 billion pounds milk equivalent each year since 1992. Although DEIP will need to be phased down under GATT provisions, it is authorized through December 31,2000. DEIP has been credited with enhancing farm level milk prices, at times, as much as $.50 per hundredweight during 1991 to 1995.

Because surpluses have been mostly butter, USDA lowered the purchase price of butter from $1.0925 per pound January 1,1990 to $.65 per pound on July 7, 1993 where it remains. Conversely, the purchase price of NFDM has gone from $.79 to $1.034 per pound. World butter prices strengthened in late 1994 and all of 1995, surpassing U.S. domestic butter prices. For the first time butter was exported without subsidies. On the other hand, the higher purchase price for NFDM has made it less competitive internationally. However, even with the increased support price for NFDM, prices were fairly close to world prices in 1995.

The $10.10 support price in effect since 1990, has made U.S. dairy policy very market oriented. The price of manufacturing milk has been above support since 1989. The government program no longer determines farm level milk prices. As a result, milk prices have become uncertain and highly volatile. Price risk and financial risk have now become a reality for U.S. dairy farmers, processors and marketers.

During the 1982-1995 period, the number of farms with dairy cows declined 47 percent, to 148,690. Lower and more volatile prices placed financial stress on the less efficient dairy producers, especially those with high debt loads. Smaller "family" dairy farms have felt the most pressure from declining real milk prices. Producers who did not adjust to reduced costs experienced lower net returns and many exited the dairy industry either voluntarily or un-voluntarily. Costs of production have been reduced through improved management, economies of scale, reduced input costs, and through new technology.

As the number of dairy farms declined so did the number of milk cows. The size of the U.S. dairy herd declined from 11 million in 1982 to 9.5 million head in 1995. The size of the average dairy herd increased from 40 cows to 64 cows.

This structural change was not uniform for all regions. In the Upper Midwest where the average size dairy farm is 55 cows and a large share of the dairy facilities are obsolete, dairy farm numbers declined faster than the U.S. average. New investments and expansions are just beginning in this area. But dairy expansion has been rapid in the Southwest, West and Northwest. Even the structural change to larger and more modern facilities in the Northeast has been ahead of the Upper Midwest.

Average milk per cow increased from 12,306 pounds in 1982 to 16,451 pounds in 1995 or 34 percent. This was an average annual increase in productivity of 2.5 percent. The result of this productivity increased total milk production from 135.5 billion pounds in 1982 to 155.8 billion pounds in 1995, a 15 percent increase. Commercial disappearance of dairy products during this period increased 27 percent, 121.9 billion pounds to an estimated 154.7 billion pounds, or 1.7 percent annually. The promotion program, and chiefly lower real product prices were major factors in increasing consumption. Consequently, CCC purchases of surplus dairy products have virtually disappeared for the past two years. CCC purchased about 6 billion pounds of milk during 1994 and less than 3 billion pounds during 1995, the lowest level of purchases since 1973. Government costs for the dairy price support program were insignificant in (fiscal) 1995, only about $4 million.

1996 and beyond

The future of U.S. dairy price support program is uncertain at the time of this writing. The Omnibus Budget Reconciliation Act of 1993 extended the dairy price support provisions through 1996. The Act contained a provision that the USDA in estimating the CCC purchases for the upcoming year must deduct from this figure any increase in the most recent calendar year's dairy product imports from the average imports during 1986-90. CCC purchases were projected at less than 3.5 billion pounds for 1996. This required the Secretary to increase the support price $.25 per hundredweight on January 1,1996 to $10.35, which will have little impact on market prices.

Debate continues on a new Farm Bill. Major regional differences between the Southeast, West and Northeast and the Upper Midwest exist. Federal milk marketing order provisions, discussed below, have been most contentious. Most proposals have been to reduce or eliminate the support price over time. The support on butter and NFDM could be eliminated and allowed to seek world price levels. There definitely appears to be a consensus that the support program will be eliminated over time and that the industry must consider international markets for dairy products more seriously. Through the efforts of the National Dairy Promotion and Research Board, a Dairy Export Council has been organized to assist U.S. dairy companies.

Regardless of the outcome dairy farmers cannot expect government support for higher prices nor price stability. Thus, the pressure on dairy producers to be efficient and reduce production costs will continue. This will hasten the trend to fewer and larger dairy herds.

FEDERAL MILK MARKETING ORDERS

As early as 1910, dairy producers in some markets had banded together into cooperative associations to gain bargaining power over prices for their milk. Around 1920, cooperatives developed a classified price system in an effort to promote stability in milk markets. The Capper Volstead Act of 1922, which established the legal right for producers to market jointly with limited exemption from the antitrust laws benefited this cooperative activity. But the success of cooperatives in negotiating for and holding milk handlers to higher pay prices met with limited success.

Dairy producers and cooperatives turned to legislation for help. The Agricultural Adjustment Act of 1933 required all milk dealers in a given market to pay producers on a classified price basis, and to pool the returns to producers either on a handler or market wide basis. The Agricultural Adjustment Act of 1935 set forth more specifically the terms and provisions that could be used under the program and termed the instruments marketing orders. The Agricultural Marketing Agreement Act of 1937 provided the framework for the current system of federal milk marketing orders. The act was enabling legislation only. Federal orders based on the record of a detailed public hearing, must be approved by two-thirds of the affected producers.

It should be noted that milk dealers, called "handlers" under orders, were also in support of federal orders. Milk marketing orders equalize paying prices among competing dealers. Federal milk marketing orders are legal instruments designed to promote orderly marketing conditions by applying a uniform system of classified pricing and pooling. Handlers are regulated and are required to pay at least minimum prices to producers for the different use classes of milk. Producers receive a weighted average price based upon these minimum prices and utilization for each class.

1937-1950

Federal milk marketing orders gained acceptance. By 1950 there were 39 federal orders that priced 41 percent of all grade A milk and 25 percent of all milk. Dairy producers experienced greater price stability and less financial risk.

1950-1970

The importance of federal orders continued to increase in the 1950s and 1960s. Number of orders reached 80 by 1960 and priced 64 percent of all grade A milk and 43 percent of all milk. Substantially higher Class I prices (grade A milk for beverage purposes) than manufacturing milk prices encouraged more and more grade B producers to convert to grade A milk production and to be affiliated with a handler regulated by an order. This conversion to grade A was also hastened during the late 1950s and early 1960s by the adoption of the bulk tank at the farm. Because of the price spread between grade A and grade B milk (about $1.45 per hundredweight in 1960), when a grade B producer decided to purchase a bulk tank, the necessary changes were made to convert to Grade A.

In the early 1960s major adjustments were made in the federal order system. A single basing point pricing system was established. Eau Clare, Wisconsin was selected as that basing point. A major purpose of federal orders is to assure consumers have an adequate supply of wholesome milk to drink, either produced locally or transported from a reserve area. Much of the Southern part of the United States experienced seasonal shortages of fluid milk. Wisconsin, a major manufacturing use state, had reserves of grade A milk which could be shipped to deficit markets. Hence, using Eau Clare, Wisconsin as the basing point for grade A milk for Class I (beverage) use, and increasing the class I price (class I differential) with distance from Eau Clare to move milk when needed, made sound economic sense.[2]

Second, modern transportation allowed manufactured dairy products, butter, milk powder and cheese to be marketed nationally. Up until this time individual markets used different methods for establishing minimum prices for milk used for manufacturing purposes. This resulted in different producer paying prices for grade A milk used for manufacturing purposes and placed manufacturers on unequal footing. To alleviate this problem, the Minnesota-Wisconsin Price Series (M-W) was established in 1961 as the minimum price for grade A milk under federal orders used for manufacturing, Class III use, and as the base price and mover of other minimum class prices. The M-W price was the weighted average price paid for grade B milk by butter, milk powder and cheese plants in Minnesota and Wisconsin. Thus, manufacturing and fluid prices were linked, and the entire industry responded to the same economic signs.

As modern transportation and milk packaging technology improved, milk could economically be marketed in greater geographical areas. Hence the market area of competing milk handlers expanded. This brought about mergers and geographic expansion of federal orders. By 1970, the number of orders was reduced to 62, but now 79 percent of all grade A milk and 59 percent of all milk was priced under a federal order. This merger activity led to increased incentives to produce and process milk in most economically advantageous locations.

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[2]Our earlier comment indicated that economics dictated policy rather than vise versa. This decision only institutionalized the general pattern of fluid prices that prevailed across the country at the time.

1970-1990

Additional order consolidations occurred. By 1990, the number of federal orders were down to 42, but 77 percent of all grade A milk and 70 percent of all milk was priced under an order. The share of milk that was grade A had increased from 74 percent in 1970 to 92 percent by 1990. With substantially more milk associated with federal milk marketing orders, the average class I utilization declined from 61.5 percent in 1970 to 42.8 percent in 1990. While the relative difference between average producer blend prices for all orders and the manufacturing price[3] was 41 percent in 1960 ($4.47 vs $3.16), 28 percent in 1970 ($5.95 vs $4.66) the difference was just 13 percent ($13.78 vs $12.21) in 1990. Most producers who were going to convert to grade A had done so.

Perhaps the most significant federal order action during this period was the 1985 increase in the class I differentials in 37 of the 44 existing federal orders. The largest increase in class differentials occurred in federal order markets distant from the Upper Midwest. For example, increases were $.79 per hundredweight for the Southwest Plains order and $1.03 for Southeast Florida compared to $.14 for the Chicago Regional order and $.08 for the Upper Midwest order. These increases were mandated by the Food Security Act of 1985, the same Act that authorized the voluntary termination program.

Because producers in the South and Southeast had shown the greatest participation in the previous voluntary milk diversion program that reduced milk production and caused shortages of grade A milk for class I needs, the South and Southeast would only support another voluntary supply management program if there were some additional incentive for producers to maintain milk production in their area. The Upper Midwest agreed to these higher differentials because the alternative was further reduction in the support price for manufacturing milk. Since the Upper Midwest is primarily a manufacturing milk use region and milk surpluses held milk used for manufacturing close to support, the Upper Midwest producers would suffer from any reduction in the support price. But this 1985 decision was the main factor in major regionalism that has drastically weakened the once strong unity among regions for federal dairy policy.

While milk surpluses continued to be a problem in the mid to late 1980s, triggering additional price support cuts, milk production expansion was occurring in the South, Southwest, West and Northwest. The Upper Midwest put part of the blame on the 1985 increases in class I differentials. The Upper Midwest claimed that the single basing point pricing of Eau Clare, Wisconsin was no longer justified because other sources of reserve grade A milk supplies existed and that the Upper Midwest was no longer the lowest cost producer of milk.

Regional shifts in milk production did intensify during the mid-1980s to 1990. From 1985 to 1990, the traditional areas of milk production lost market share: the Lake States, 28.7 percent to 26.7 percent; the Northeast, 20.0 percent to 18.3 percent. The following regions increased market share: the Southern Plains, 3.6 percent to 4.6 percent, the Mountain

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[3]The Minnesota-Wisconsin Price

region, 5.5 percent to 6.4 percent and the Pacific region, 15.5 percent to 18.3 percent (Table 4).

Table 4. Regional Shifts in U.S. Milk Production

Region	Percent of U.S. (1985)	Percent of U.S. (1990)	Percent of U.S. (1993)
Northeast	20.0	18.3	18.6
Lake States	28.7	26.7	25.3
Corn Belt	11.8	11.5	10.9
Northern Plains	3.9	3.6	3.2
Appalachian	6.1	5.6	5.3
Southeast	3.1	3.3	3.3
Delta	1.8	1.7	1.6
Southern Plains	3.6	4.6	4.7
Mountain	5.5	6.4	7.5
Pacific	15.5	18.3	19.7

Source: USDA, ERS

1990 to present

The Secretary of Agriculture held a 43 day public hearing in the fall of 1990 to consider proposals for changing class I differentials and related issues. The Secretary's final decision based upon the hearing indicated that there was not sufficient justification for changes in class I differentials. One result has been a lawsuit filed by the Minnesota Milk Producers Association (MMPA) against the Secretary of Agriculture claiming that the Secretary had violated his responsibilities under the 1937 Act by not appropriately amending federal milk orders. The case which made its way to the U.S. Appellate Court has been remanded to the United States District Court of Minnesota. The judge's decision is yet to be heard.

As milk now moves even greater distance with modern transportation and packaging technology, additional order mergers have occurred and more have been proposed. There are now 34 federal orders that price 74 percent of all grade A milk and 70 percent of all milk. The majority of grade A milk not priced under the federal system is priced under the California state order.

Production continues to shift from the Upper Midwest and Northeast to the Southwest, West and Northwest. Milk production in these regions has outstripped the growth in class I sales. As a result, class I utilizations have declined, reducing producer blend prices. At the same time, a decline in milk production in the Upper Midwest has resulted in excess manufacturing plant capacity in the area. Competition for manufacturing milk plants for milk supplies has intensified. Competitive premiums and subsidized farm to plant milk hauling have made average producer paying prices in Wisconsin and Minnesota higher than U.S. average milk prices, and higher than producer paying prices in the rapidly expanding regions. The Upper Midwest continues to argue that the single basing point pricing is no longer justified and that class I prices should be levelled among regions. This position has carried into the debate on the new Farm Bill, which will likely further reduce the number of orders.

Another issue has been the use of the Minnesota-Wisconsin (M-W) pricing rule as the reference price for national manufacturing. Since most milk in Wisconsin and Minnesota is now grade A (88 percent in Wisconsin and 80 percent in Minnesota), it is argued that the M-W no longer represents a fair market value for milk used for manufacturing purposes and that it should be replaced. The Upper Midwest argues that most products in the region are manufactured from grade A milk, which is priced $0.75 to $0.90 per hundredweight higher than grade B milk. Since the M-W is used to set the minimum price for class III use, grade A milk used for cheese and butter, this puts Upper Midwest manufacturing plants in a competitive disadvantage with other regions. They further claim that milk plants in other regions can use revenue from higher class I prices under the orders to subsidize the lower paying prices for grade A milk used for class III purposes.

A public hearing was held in June 1992 to consider proposals for replacing the M-W. The Secretary's final decision was to amend the procedure for determining the M-W. A temporary replacement to the M-W was implemented effective May, 1995, the Basic Formula Price (BFP), which updates paying prices based on product price changes from the prior month.

California's pricing provisions in its state order has resulted in a lower price than the M-W being paid for grade A milk used to make NFDM. This made it difficult for dairy cooperatives making nonfat dry milk to profitably compete with California powder producers. Based on federal order hearings the Secretary issued a final decision to amend federal orders by establishing a class III-A price. Skim milk used to make NFDM would no longer be priced at the M-W (now BFP) price, but rather a value established by a product price formula. This became effective in December 1993. The result has been a lower price for grade A milk used for NFDM than that used for cheese. Producers in the Northwest, a major producer of NFDM, have as a result, experienced lower producer blend prices. Class III-A pricing has also resulted using more powder in making cheese in a seemingly inefficient intermediate step.

FEED GRAIN POLICIES

The Agricultural Adjustment Act of 1933 provided payments to farmers who agreed to reduce their production of surplus feed grains. Non-recourse loans based on parity prices were implemented with the Agricultural Adjustment Act of 1938. The Agricultural Act of 1961 offered non-recourse loans and acreage diversion payments to producers who agreed to participate. The Agriculture and Consumer Protection Act of 1973 substituted target prices and deficiency payments for support prices based on parity, but the programs were ineffective for much of the decade because of high grain prices.

Table 5. Number of U.S. Dairy Cooperatives and Their Share Of Farm Milk, 1950 to 1994

Years	No. of Dairy Co-ops	Co-op's Share of Farm Milk
1950 - 51	2,072	53%
1960 - 61	1,609	61%
1969 - 70	971	73%
1974 - 75	631	75%
1985 - 86	394	78%
1990 - 91	264	82%
1994	247	83%

Source: USDA/Rural Economic and Community Development/Cooperative Service

In the early 1980s high CCC loan rates drove U.S. grain and feed prices well above world levels, probably slowing down structural adjustments and productivity gains in the dairy industry. But in the late 1980s, the course was reversed by the 1985 Farm Bill. Corn loan rates, and thus market prices, were dropped sharply, with income support provided by direct deficiency payments. Annual acreage set-aside programs also have tended to raise grain and feed prices, but these "ARP"s have seldom been applied in the 1990s, and when used have been small. Of course, dairy producers who grow grain are also eligible to participate. Attractiveness of feed grain policies contributed to the decline of dairying in the Corn Belt.

The impact of these feed grain policies on the dairy industry has been to keep feed grain prices and feed costs higher than what they would have been without support prices and production controls. However, dairy producers having grain acreage did participate in the feed grain program. The deficiency payment received was additional revenue that benefited these participating dairy producers.

DAIRY COOPERATIVES

As previously indicated producers in the early 1900s organized dairy cooperatives to enhance their bargaining power. In 1950 about 53 percent of producer milk was marketed by a cooperative (Table 5). This percentage is now about 82 percent. About 84 percent of all milk marketed under federal milk marketing orders is marketed by a cooperative. Since federal orders allow for bloc voting by cooperatives, cooperatives are the key to the approval and amendment of federal orders.

Dairy cooperatives have attempted to add value to producer-member's milk through further processing. Currently, cooperatives have the following market shares of dairy products: butter, 65 percent; dry milk products, 81 percent; cheese, 43 percent; and fluid milk, 13 percent. It is anticipated that these market shares are likely to increase.

The number of dairy cooperatives totalled 2,072 in 1950, declined through mergers to 1,609 in 1960. Merger activity intensified in the 1960s as a means to grow geographically and to increase market power. By 1970 the number of dairy cooperatives decreased to 971. Merger and consolidation activity slowed in the 1970s and 1980s as antitrust action was imposed against the major regional dairy cooperatives. But the need to reduce costs, be more efficient, and obtain more market clout has once again initiated mergers, acquisitions and consolidations as well as various forms of strategic alliances with other dairy cooperatives and investor owned firms. The number of dairy cooperatives declined to 247 in 1994.

The question is, as the U.S. dairy industry deregulates, will dairy cooperatives play a greater or lesser role in milk pricing and marketing? Will dairy producers turn to cooperatives to provide the price enhancement and stability now provided by federal milk orders? Has or will the cooperative structure change to enable them to be effective in this role? There are differences of opinions in these regards. It definitely appears that dairy cooperatives will become more active in dairy exports.

SUMMARY

The evolution of U.S. dairy policy and related government programs has in some cases retarded, but in most instances encouraged structural shifts to fewer, larger dairy farms capturing available scale economies. Dairy programs have fostered technical efficiency and economic efficiency, although they most surely have created distortions. At times the programs, both the dairy price support program and federal milk marketing orders, have been slow to change in response to new economic conditions. But changes, once adopted have generally been those that have fostered improved performance in the industry.

Real declines in the support price since 1981 have resulted in a broad sense a free functioning market economy in the manufacturing dairy sector. Although some CCC purchases have occurred, they have been mostly butter. Market prices have been $1.00 to $3.00 per hundredweight above support since 1991. The current support price represents below break-even prices for the average U.S. dairyman. The program costs little, $4 million estimated for 1995. The question is whether to simply let the support program wither away or just end it. Clearly U.S. dairy policy will continue to be highly market oriented. Dairy producers will continue to respond by striving to adopt technologies and management changes that will reduce the costs per hundredweight of milk. This action will make the U.S. dairy industry more competitive internationally.

Federal milk marketing orders are under threat of major changes or if not, the possibility of total elimination. The Northeast and Southeast may be the regions most negatively impacted if federal orders are eliminated. Short run, producer prices could decline the greatest in these areas and accelerate the trend to fewer and larger dairies. Dairy cooperatives will attempt to provide for dairy producers market protection now offered with federal orders. Cooperatives will also attempt to add value to producer-member milk via processing, packaging and marketing. Cooperatives will pursue more aggressively international markets. These activities will hasten additional mergers, consolidations, acquisitions among cooperatives and the formation of various strategic alliances with other dairy cooperatives and investor owned firms.

U.S.-CANADIAN DAIRY TRADE TENSIONS: THE NATURE AND EFFECTS OF CANADIAN DAIRY POLICY

Michele Veeman and Robert Saint Louis

The task assigned for this paper is to identify the nature of the economic effects that have arisen from Canada's current dairy policy as one of the necessary steps to understand and assess the nature of trade policy tensions between Canada and the United States. As is the case for other farm products, dairy policy in Canada has arisen from and evolved in a complex interplay of political, economic and social pressures that also reflects the joint nature of federal and provincial jurisdictional powers over agriculture and the power that each of these levels of government holds over regulation of markets and trade. Both in Canada and the United States, as in many other countries with a developed dairy industry, the sector is relatively highly protected from the pressures of external markets. The extent of this protection and support is indicated by the high levels of producer subsidy equivalents (PSE) and consumer subsidy equivalents (CSE) or implicit consumer taxes calculated by the OECD for both countries (Table 1). Such measures are necessarily based on comparison with reference prices that are affected by distorted world markets for dairy products; thus their precise levels may be viewed with caution. The measures do, however, provide an indication of the relative levels of protection associated with dairy policy in the two countries. This has been higher for Canada than for the United States, at least since the 1980s.

THE ECONOMICS OF DAIRY SUPPLY MANAGEMENT

A basic component of Canadian supply-management programs can be depicted simply, as for the fluid (beverage) milk sector in Figure 1, which demonstrates that administered wholesale-level milk prices in time t, P_f, are maintained by the limitation of delivery to level Q_f. Fluid milk pricing and quota administration occurs under provincial jurisdiction, reflecting provincial authority over regulation of intra-provincial trade and the historic tendency for milk consumed in fluid form to be produced relatively close to consumption centers. In practice, fluid milk quota levels exceed Q_f by some margin; milk surplus to fluid marketings is diverted to the industrial milk market and producers have traditionally been paid according to the monthly percentage utilization of their fluid quota shipments. Precise procedures vary by province. These are currently changing, for example, as some provinces integrate fluid and industrial milk quota and payment procedures by "single-pooling".

Table 1. Relative Levels of Support and Protection for Dairy Producers: PSE and CSE Estimates for Canada and the United States

Dates	1979-81	1986-88	1989-91	1992	1993[e]	1994[p]
	OECD Estimates of Producer Subsidy Equivalents, Percentages					
Canada	53	77	78	75	73	68
United States	55	64	57	54	55	54
Ratio	0.96	1.20	1.37	1.39	1.33	1.26
	OECD Estimates of Consumer Subsidy Equivalents, Percentages					
Canada	-42	-63	-61	-60	-60	-55
United States	-48	-52	-50	-48	-48	-47
Ratio	0.88	1.21	1.22	1.25	1.25	1.17

Source: OECD *Agricultural Policies, Markets and Trade in OECD Countries: Monitoring and Outlook 1995*. Paris: OECD, 1995.

A second element that is important to the analysis of supply management for the Canadian dairy sector, pricing by the category of milk end use or milk class, is by no means unique to the Canadian supply-management system but is prevalent in countries with developed dairy sectors. Essentially this reflects differences in elasticities of demand for the different consumer-level dairy products. These demand schedules are depicted in relatively simple form in Figure 2 as D_{ic} and D_{fc} for consumer-level industrial and fluid products respectively. The associated wholesale-level derived demand schedule for fluid milk is depicted as D_{fg} while D_{ig} relates to industrial milk. Administered price levels apply in both markets, with direct specification by provincial boards of wholesale fluid milk prices at P_{fg}, and provision for underpinning of the structure of dairy prices by federally-specified industrial product price support activities, discussed in further detail below, directed at P_{ip} and the associated wholesale price for industrial milk, P_{ig}.

Historically, with extremely inelastic demand for fluid milk and relatively more elastic demand for the traditional storable "industrial milk" products of butter/skim milk powder or cheese, the producer and wholesale level price gaps between fluid and industrial milk were relatively large. (This price gap is depicted as P_{fg} - P_{ig}, in Figure 2). Over time, however, the difference between fluid and industrial milk prices has narrowed. A variety of factors seem to have contributed to this narrowing. This has occurred as the earlier sectoral distinction between fluid and industrial dairy producers and production processes has become blurred or largely nonexistent and as the range of processed dairy products has broadened to include a variety of "soft" or relatively perishable higher-valued dairy products, such as yogurt and specialty cheeses, for which demand has tended to grow (Table 2). Concurrent with these shifts in demand has been the continuing tendency for declining consumption of particular high-fat dairy products, specifically butter and standard-fat milk, and the tendency for increasing consumption of lower-fat milks. There is a consequent necessary diversion of "skim-off" milk-fat toward butter production; this is currently calculated to account for some 40 percent of Canadian butter production (Ewing, 1994); butter-fat disposition is shown in Table 3. A final contributor to narrowing of the producer-level price gap between industrial and fluid milk has been the apparent tendency for an aggressive pricing policy to be pursued for industrial milk.[1] Elimination of this price gap is an objective of some producers; this would considerably facilitate more widespread adoption of producer-level single price pooling for milk.[2] Producer-level single pool pricing, and associated multiple component pricing, was adopted in Ontario in 1994, now applies in some four provinces, and is proposed for wider regional adoption or even, at some future date, national adoption.

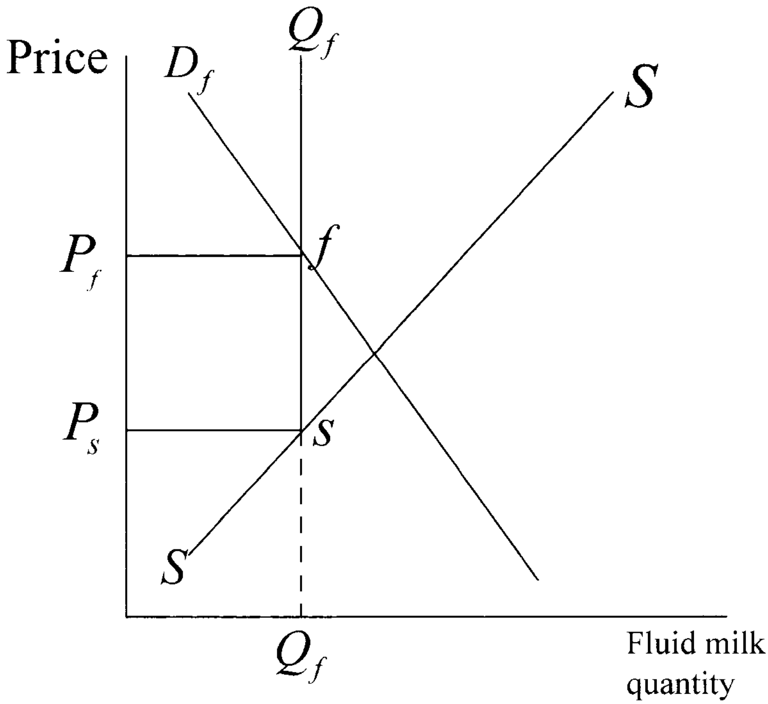
The third component of the Canadian dairy supply-management system relates to the specification of producer-level "target returns" i.e., target price, for industrial milk, which can be interpreted as P_{ig} in Figure 2, and the associated administered "offer to purchase" or "guaranteed" prices for specified processed dairy products that are in turn related to a guaranteed processing margin. The processor margin is depicted in Figure 2 as P_{ip}-P_{ig}. The guaranteed prices apply for the products of the lowest-valued industrial milk class, namely butter and skim milk powder. If necessary, these are maintained by purchase operations of the Canadian Dairy Commission; in recent years this has required relatively minor purchases of skim milk powder and butter.[3] The regulatory system for dairy products has long been oriented to self-sufficiency in butterfat, converted to milk equivalence (with an added margin or "sleeve" to accommodate exports, less negotiated imports, and possible demand variations); consequently a "structural imbalance" i.e.. a surplus in skim milk powder

[1] This also reflects the gradual reduction in direct subsidy payments to producers of milk used for industrial processing.

[2] This would, for example, considerably reduce opposition to single pooling over regional areas within which there is variation in the proportion of fluid and industrial milk utilization; the extent of these differences is shown clearly in the background document on the Canadian dairy industry (Economic and Policy Analysis Directorate, 1995).

[3] Offer to purchase prices have also been specified but not applied in practice for cheddar cheese. Price support operations for cheese are based on import restrictions and export assistance. In addition to purchases and sales of butter and skim milk powder, the CDC also buys and sells evaporated milk (CDC, 1995).

Figure 1. Supply Management for Fluid Milk



supplies, is associated with the Canadian supply-management system.[4] The system of target returns and associated offer to purchase prices in effect, provides a price "floor" for the entire structure of Canadian dairy product prices. Hand in hand with these pricing procedures is the provision for national market-sharing dairy quota to limit total milk sales to levels that are consistent with the administered structure of prices, both for industrial milk usage and for milk that is sold for fluid consumption purposes, i.e., at $Q_i + Q_f$ in Figure 2. Various approaches have been taken to clear the market relative to "surplus" of production of industrial milk in excess of Q_i. These have included export subsidization financed by producers' levies and programs to encourage domestic use of skim milk powder and butterfat.

[4] With declining demand for butterfat relative to non-fat milk components, the structural surplus in skim milk powder supplies has declined over time; with continuation of current demand tendencies it is anticipated that the butterfat-skim milk powder imbalance will eventually be reversed to generate a structural surplus of butterfat. That is, the presumed continuation of a self-sufficiency policy then would be directed at non-fat milk components giving a butterfat surplus. Discussion of this anticipated "cross-over" is in Ewing (1994).

Figure 2. Supply Management for Fluid Milk and Industrial Milk

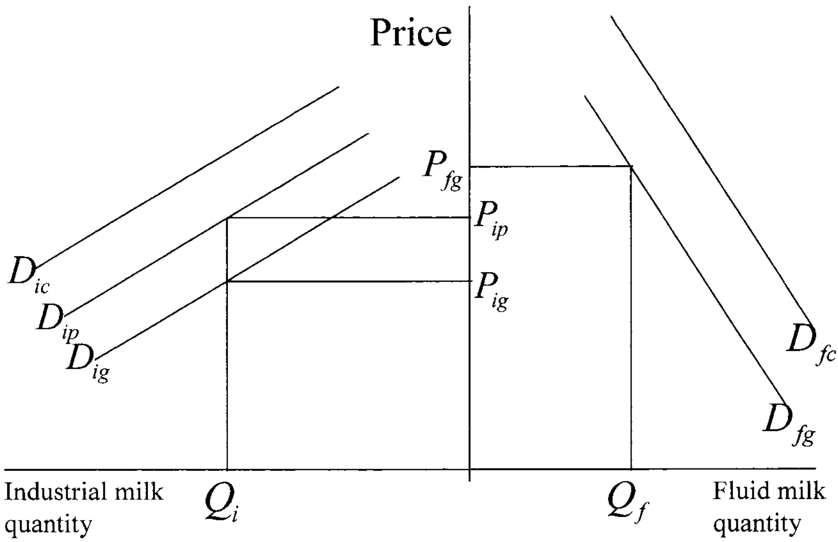


Table 2. Domestic Disappearance Per Capita of Selected Dairy Products in Canada

	Fluid Milk and Cream	Ice Cream	Yogurt	Butter	Cheddar Cheese	Fonduc Cheese	Specialty Cheese	Total Cheese	Skim Milk Powder	Cottage Cheese
		Litres					Kilograms			
1983	107.83	12.51	1.89	4.36	1.47	2.21	3.91	7.59	1.75	1.22
1984	107.66	11.98	2.12	4.27	1.72	2.08	4.29	8.09	2.51	1.22
1985	106.31	12.22	2.41	4.10	2.14	2.03	4.65	8.82	1.81	1.84
1986	107.86	12.43	2.77	3.92	2.36	1.96	5.23	9.55	1.79	1.29
1987	109.22	12.13	3.20	3.92	2.34	2.06	5.51	9.91	2.25	1.22
1988	107.93	12.37	3.29	3.83	2.04	2.25	5.52	9.81	2.02	1.20
1989	103.10	11.40	3.44	3.47	2.07	2.13	5.52	9.72	2.26	1.10
1990	102.51	11.45	3.27	3.27	1.68	2.22	5.46	9.36	1.51	1.11
1991	100.70	10.86	3.17	2.98	1.86	2.01	5.53	9.41	1.11	1.03
1992	99.52	10.36	3.09	2.82	1.73	2.03	5.72	9.47	1.02	0.92
1993	96.99	10.77	3.24	2.93	1.81	1.98	5.87	9.65	1.20	0.88

Source: Statist

Table 3. Industrial Milk and Cream Use in Canada, Butterfat Basis, 1992

Amount of Industrial Milk Used to Produce Various Products:	Million Hectolitres	Percentage
Butter*	11.3	27
Cheese	21.4	51
Ice Cream	5.1	12
Yogurt	0.7	2
Other	3.4	8
Total industrial milk and farm separated cream (in milk equivalent)	41.9	100

* About 40 percent of butter is currently made from skim-off from the fluid sector.

Source: Rebecca Ewing. *The Canadian Dairy Industry: Institutional Structure and Demand Trends in the 1990s*. Working Paper 1/94. Ottawa: Economic Policy Analysis and Innovation Division, Policy Branch, Agriculture Canada, February 1994.

The considerable coverage of fluid milk production by market share quota, traditionally viewed as industrial milk quota, reflects the extensive integration, at the primary production level, of fluid and industrial milk production. These categories of milk are now distinguished primarily by usage rather than, as historically, by production process and usage. Also reflective of this integration is the considerable reduction in seasonality of Canadian milk production relative to much earlier years, as common production processes and procedures have become widespread at the primary production level and as changes in demand have occurred for major dairy products. Overall, the component of supply management for dairy that is uniquely Canadian has been its focus on restraint of aggregate production or marketings of fluid and industrial milk to levels that, after accounting for the relatively small amounts of traditional or negotiated trade in dairy products, are generally consistent with administered price levels.

The final major component of the system has been the dependence that has been placed on import controls, in order to maintain the system of pricing, outlined above, at levels that have been consistently higher and markedly more stable than in the adjacent United States market, a relationship that is shown, for example, by the industrial milk price series in Table 4. Restriction of imports was initially applied through explicit import licensing and import quota programs. Unlike the Canadian import quotas for the supply-managed egg sector which were explicitly sanctioned under the previous framework of GATT Article XI 2(c) provisions, the import quotas applied by Canada to maintain the system of dairy supply management were not explicitly assessed in terms of the requirements of Article XI 2(c) until the then relatively recently-instituted Canadian import quotas for ice cream and yogurt were challenged, resulting in the 1989 GATT panel finding that these were inconsistent with the requirements for Article XI 2(c). Since implementation of the GATT/WTO procedures in 1995, restriction of dairy imports to the levels provided for under the access provisions of the most recent GATT agreement has been effected through the mechanism of the tariff-rate quotas that were tabled and adopted in the context of that agreement.

Table 4. U.S.-Canadian Wholesale Industrial Milk Prices

Year:	Ontario Class V c$/hL	Minnesota-Wisconsin US $/cwt	Minnesota-Wisconsin C $/hL	Ontario: United States Price Ratio
1978	21.61	--	--	--
1979	24.00	--	--	--
1980	27.35	11.88	31.53	0.87
1981	30.66	12.57	34.22	0.90
1982	33.87	12.49	34.97	0.97
1983	35.74	12.49	34.95	1.02
1984	37.68	12.29	36.12	1.04
1985	38.74	11.48	35.58	1.09
1986	39.78	11.30	35.64	1.12
1987	40.23	11.23	33.80	1.19
1988	40.71	11.03	30.81	1.32
1989	40.80	12.37	33.24	1.23
1990	41.61	12.21	32.31	1.29
1991	42.84	11.06	28.78	1.49
1992	43.36*	11.88	32.59	1.33
1993	44.24*	11.80	34.50	1.28
1994	45.59*	12.00	37.22	1.22
1995	NA	11.73	34.37	NA

* Based on multiple price components.

Source: Agriculture and Agri-Food Canada compilation, based on data reported in Agriculture and Agri-Food Canada, *Dairy Market Review* and USDA, *Dairy Market News*.

MAJOR EFFECTS OF CURRENT POLICIES

The current supply-management system has been the basis of the relatively high levels of protection and support for the sector seen in Table 1. However, as trade data in Table 5 reflect, in contrast to the systems of protection and support for dairying in the United States, amongst other countries, Canadian supply management has contributed relatively little to the subsidized disposal of export surpluses and to consequent export price pressures and disruptions of world dairy markets. In contrast, more extensive export subsidization of dairy products has been pursued by both the United States and the European Union, particularly for the traditionally lower-valued surplus disposal products of butter and skim milk powder.

The major farm-level impact of the higher structure of supply-managed prices in Canada has been the comparatively high returns to the farmers in this sector, relative to non supply-managed farming, as shown in data on sectoral returns to equity and the evident tendency for these higher returns to become capitalized into quota values. In the simple static framework depicted in Figure 1, the present value of the rent represented in period t by (P_f-P_s) Q_f accrues as the capitalized value of quota. Data on transaction values for fluid milk and market share quotas are available, providing a means by which aggregate supply price, e.g. P_s in Figure 1, or an associated marginal cost estimate, may be inferred. A considerable Canadian literature has developed on this issue; much of it is directed toward refinements of the simple analytic framework outlined above. This literature considers such issues as the impact of changes in price uncertainty on quota values (Moschini, 1984) Considerable attention has been directed at whether a risk premium representing possible future changes in policy may be inferred from or should be included in the calculation of annualized quota benefits or the estimation of supply price P_s (Barichello, 1993; Beck, Hoskins and Mumey, 1994; Lermer and Stanbury, 1985). Recently, the effect of adoption of technical change on quota values has been assessed (Veeman and Dong, 1995).

Failure to recognize that marginal costs of producing milk are appreciably less than current levels of prices for much Canadian milk production can lead to considerable over-estimates of the likely adverse impact of lower-price regimes, such as in a very recent paper by Bromfield *et al* (1995). The feature that marginal costs may vary appreciably between producers and the lack of reliable information on aggregate industry supply elasticities for the dairy producing and processing sectors, a byproduct of the longstanding regulatory regime, point to the need for sensitivity analysis in any quantitative assessments of policy changes.

Quota values represent an appreciable component of total capital assets of the Canadian dairy sector. Consequently, debt levels and associated financing costs for Canadian dairy producers exceed those for United States dairy farmers. The major obvious impacts of Canadian policy for the dairy processing sector are the relatively high structure of wholesale prices for milk that face primary processors, the higher dairy ingredient prices that face further processors, and the tendency for profitability in this industry to be somewhat greater than in most other Canadian food industries (Economic and Policy Analysis Directorate, AAFC, 1995).

Table 5. Average Exports and Market Shares for Selected Countries of Butter, Cheese, and Nonfat Dry Milk, 1990-1993

	Butter				Cheese				Nonfat Dry Milk			
Item	1990	1991	1992	1993[1]	1990	1991	1992	1993[1]	1990	1991	1992	1993[1]
					Thousand metric tons							
Annual exports[2]	740	794	719	698	755	769	783	873	817	787	982	799
					Percentage Shares[2]							
European Union[3]	36	51	32	27	58	59	58	58	42	32	39	31
United States	4	8	22	23	2	1	2	2	1	9	13	18
Canada	1	2	2	1	1	1	2	1	5	5	3	2
New Zealand	31	22	31	33	12	13	14	14	22	22	17	14
Australia	7	7	8	10	7	8	9	10	12	16	12	16
Total	79	90	95	94	80	82	85	85	82	84	84	81

[1] Preliminary.
[2] Excludes intra-EU trade.
[3] Formerly the European Community (EC).

Source: Dairy: World Markets and Trade Circular, U.S. Department of Agriculture, Foreign Agricultural Service as reported in USDA, ERS - Economic Report Number 705, April 1995.

Other impacts of dairy policy on the structure and efficiency of the Canadian dairy producing and processing sectors are not easily quantified, since it is not easy to disentangle the expected effects of a system of protection and support, such as achieved in the United States through other mechanisms, from the regulatory mechanisms of the Canadian supply-management system. For example, economists expect, other things being equal, that the higher the levels of support and protection, the less will be the incentive to adopt available cost reducing processes or practices. However, since the sector is considerably regulated and protected in both nations, such x-inefficiency impacts may not differ greatly between Canada and the United States. And it is not clear that differences in the structure and efficiency of dairy production and processing between Canada and the United States should necessarily be attributed to the differences in market intervention and regulation for dairying in these two countries.

Differences in industry structure are also necessarily affected by differences in economic pressures that arise from differences in population size, its geographic dispersion and location, and other dimensions of the economic structure of the two nations. For example, other things being equal, the regional dispersion of a smaller Canadian population base can be expected to contribute to somewhat smaller sizes of milk treatment and dairy processing plants in Canada than in the United States, reflecting higher levels of transportation costs, relative to processing costs. Even so, the Canadian milk producing and processing sectors have undergone considerable structural changes over time as the numbers of dairy farms and processing plants have decreased, the sizes of those remaining have increased, and new production and processing technologies have been adopted. These changes are outlined in more detail in a background document to this conference (Economic and Policy Analysis Directorate, AAFC, 1995). Details on institutional structure are also given by Ewing (1994). Some performance indicators that reflect some of these and other features are listed in Figure 3 and Table 6.

There are some general expectations of the nature, though not necessarily the magnitudes, of other effects of Canadian dairy policy on industry structure and efficiency. Specifically, the division of power between federal and provincial legislative authorities and the distinct interest of provincial governments in maintaining within their regional borders the income and employment generated by farm production and agricultural processing activities has contributed to a relatively static pattern of distribution of dairy production and processing among provinces. For example, the regional distribution of industrial milk production shown in Table 7 has changed very little over time. To date, provincial boards and governments have had little or no interest in fostering changes in policy that might lead to potential shifts to other regions of dairy production, such as the proposed introduction of a quota exchange to provide for cross-provincial quota transactions. Further, there is relatively little, if any, movement of unprocessed milk across provincial boundaries and there is an associated pronounced tendency for provincial self-sufficiency in production and consumption of fluid milk.

In general, it is expected that such features will increase production and processing costs, particularly if there are significant economies of size in production or processing or appreciable regional differences in production and processing costs (relative to associated transportation costs). However, the extent of these potential impacts on production and processing costs is not clear.

Some earlier restrictions on intra-provincial quota movement have largely been removed. Currently restrictions on geographic transfer of milk production and processing typically do not apply within provincial boundaries; active quota exchanges facilitate intra-provincial quota allocation in most provinces. However, restrictions on individual farm sizes that place a limit on individual producers' production organization in some provinces may also be expected to place some upward pressure on farm-level production costs.

CURRENT POLICY CHANGES, POSSIBLE FUTURE POLICY DIRECTIONS AND ASSOCIATED TRADE ISSUES

Canadian dairy policy is undergoing a number of changes. Some of these are being pursued in response to changes in consumer demand. Examples are the moves to multiple component pricing introduced at the producer level by several provincial milk boards. Response to changes in consumers' preferences is also the factor underlying recent adjustments by the federal dairy regulatory body, the Canadian Dairy Commission (CDC), to increase the relative levels of guaranteed prices of skim milk powder, relative to butter, by "cross-loading" increases in the support prices for these products on to skim milk powder, rather than butter prices. This move is intended to encourage consumption of butterfat relative to solids-not-fat dairy components. A similar objective of stimulating butterfat utilization by decreased pricing underlies the butter utilization rebate program introduced by CDC in 1991.[5]

Some policy adjustments for dairy and other farm sectors have been instituted by government in order to reduce budgetary outlays. For dairy, this encompasses the federal decision to reduce dairy subsidy payments to industrial milk producers. These "direct support payments" to milk producers represented, in 1994-95, some 10.4 percent of the target prices, compared to 24 percent in 1975. Further decreases in direct subsidy payments to producers will occur over the next two years (CDC, 1995).

[5] Another CDC program, the long-standing "Animal feed assistance policy" is intended to encourage use of skim milk solids in animal feeds by providing these at prices that are competitive to world market price levels.

Figure 3. Performance Indicators in the Canadian Dairy Industry: Recent Evidence, Issues and Questions

Levels and Types of Indicators	Observable Results	Issues at Stake/Questions
A. Milk production level: some partial productivity indicators		
Herd size	Average herd size in Canada increased from 36.3 in 1985 to 48.4 (1994), a figure that masks both local and regional variation (see, for e.g. the relatively small average size of herds in PEI relative to larger herds in Alberta and B.C. shown in Table 6; a measure of the regional distribution of production is in Table 7).	Are there disincentives to adoption of labor saving technology that will continue to reinforce the trend toward fewer and larger dairy farms? What is the "sustainable" potential for adjustment of farm costs of dairy production in Canada to United States levels? Will structural and technological adjustments that enhance resource productivity be sufficient to fill this gap?
Production / year / cow	In Canada, annual average milk production/cow is somewhat less than in the United States.	
Other measures	The volume of milk produced per unit of labour (an individual's year of work) continues to be significantly lower in Canada than in the United States.	
Costs of production per farm	Dairy farmers (and processors) in Canada face slightly higher input costs than in the United States and a rather higher structure of costs than in Australia and New Zealand. Cost-of-production studies from the late 1980s and early 1990s indicate that, depending upon the size of farms, mechanization levels, and use of modern technology, costs of milk production/hectolitre in Canada, after exchange rate adjustment, are about 10 percent higher than in the United States.	There is evidence of considerable variability in costs, within different farm size categories, that apparently reflects differences in management capabilities and farm situations. Alternate employment and non-farm opportunities limit the exodus from dairy farming, however, the opportunity cost of labour in the general economy is adjusting downward. In dairy production and processing, as in all other industries, such indications of absolute advantage do not necessarily translate to indicators of comparative advantage.
B. Milk Processing Level		

Levels and Types of Indicators	Observable Results	Issues at Stake/Questions
Size of plants	In Canada, sizes of both primary and further dairy processing plants are increasing over time with amalgamations, particularly in the cooperative processing subsector that dominates in this industry (as in many other nations). However, processing plants do tend to be smaller than in the United States.	In Canada (likely more so than in the United States) geographic and structural mismatches between milk supplies in local milksheds and existing manufacturing capacity may have contributed to regional market imbalances which may reduce the existing competitiveness of the entire sector.
Plant utilization rates	In the early 1990s, Canadian processing plants for each group of dairy commodities operated at or under 70 percent utilization rates.	
Processing costs	Once the fact that both primary and further processors must pay relatively high dairy input prices in Canada is neutralized, no major differences in potential competitiveness have been concluded for Canadian ice cream, yogurt and cheese processing. However, sectoral competitiveness may be weakest for cheddar cheese and ice cream processing plants.	Are milk treatment and dairy processing relatively "footloose" industries? Are technological changes that might affect the market (or supply) orientation of these industries available or are these constrained by current regulations?

Other policy changes have been pursued by industry and facilitated by government or undertaken by government following industry consensus, in response to recent changes in international trade agreements and pressures. For example, this includes the introduction noted above, by Canada, in the mid-1980s of import quotas for ice cream and yogurt in anticipation of the phased-in decrease in United States-Canadian tariff schedules for processed foods, amongst other items, under the provisions of the Canada-United States Trade Agreement (CUSTA). As noted above, these import restrictions were determined by the GATT panel in question to be inconsistent with the provisions of Article XI. The GATT panel found, for these processed dairy products, that "... ice cream and yogurt do not meet the requirements of Article XI: 2(c)i) for "like products" "in any form" to Canadian raw milk nor would their free importation be likely to render ineffective the Canadian measures on raw milk production" (GATT, 1989). This ruling potentially placed in question all Canadian import restrictions on processed dairy products under the previous Article XI provisions. Subsequently, these import quotas, and the other import licensing and quota provisions for supply-managed products, were converted by Canada into bound tariffs, in the form of tariff rate quotas, under the auspices of the recent GATT/WTO agreement.

Table 6. Average Number of Cows Per Farm in Each Province and in Canada, 1985 to 1994

Province	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Prince Edward Island	25.8	26.5	25.6	24.7	26.5	28.3	28.5	29.5	32.2	36.7
Nova Scotia	41.4	43.0	40.5	39.8	40.7	42.4	42.7	43.9	48.2	53.7
New Brunswick	35.1	37.4	37.5	39.0	40.1	42.3	44.5	46.8	48.2	53.8
Quebec	35.0	34.3	33.0	34.4	35.3	36.5	37.4	37.9	39.5	42.7
Ontario	39.2	39.8	38.6	39.2	40.1	41.4	42.3	42.8	42.9	47.8
Manitoba	25.2	25.3	25.0	25.5	27.6	28.9	27.6	29.6	31.6	46.8
Saskatchewan	23.9	23.3	23.9	27.9	30.2	33.4	34.3	38.3	42.0	58.1
Alberta	39.2	43.1	46.0	49.4	50.0	51.4	54.1	56.3	56.7	74.7
British Columbia	79.0	77.9	70.5	71.4	72.4	73.7	74.9	76.0	78.5	83.8
Canada	36.3	36.6	35.8	37.1	38.2	39.7	48.6	41.6	43.0	48.4

Source: Berger, Annie, Line Côté and Diane Gilbert. 1995. "Les Faits Saillants Laitiers Québécois, 1995", 9e editíon. Universite Laval: Groupe de recherche en économie et politique agricole.

Table 7. Some Regional Features of Canadian Dairy Production and Markets

Province	Provincial Share of National Marketing Sharing Quota (msq) July 1995, Percentages
Prince Edward Island	1.9
Nova Scotia	1.3
New Brunswick	1.2
Quebec	47.6
Ontario	30.9
Manitoba	3.8
Saskatchewan	2.5
Alberta	6.5
British Columbia	4.3
Canada	100.0

Source: Computed by GREPA (Groupe de recherche en économie et politique agricole) from unpublished data supplied by the Canadian Dairy Commission.

The Canadian "tariffication" rates for dairy imports that exceed the import commitment levels are shown in Table 8. These, in effect, prohibit importation beyond the committed import access provisions, a feature that is expected to continue through the current WTO agreement period. The current challenge to these tariff provisions by the United States, based on the contention that CUSTA/NAFTA should prevail over the GATT/WTO provisions,[6] is viewed in Canada to be primarily an expression of political action to force negotiation of more favourable terms of import access to the higher-priced Canadian market. The import access provisions of the GATT/WTO agreement were intended to provide for minimum import levels equivalent to some 3 percent of consumption, rising to 5 percent over the agreement period. Canada followed the lead of the United States in adopting somewhat lower percentage import access levels than this for some dairy products, notably for butter and ice cream. The low Canadian import commitments are comparable (in percentage terms) to the relatively low import access commitments of the United States.

The need for policy changes arising from the pressures of changes in trading regimes has both fostered and been facilitated in the past four years by a strategic linkage, for purposes of policy adjustment, of the major industry associations of dairy producers and processors. The joint interests of both groups in this process became particularly evident as

[6] A discussion of this NAFTA panel process is given by Meilke (1995).

provisions of the Canada-U.S. Trade Agreement came into force. This agreement and the subsequent North American Free Trade Agreement have considerably lowered tariffs on trade between the United States and Canada. By the late 1980s, Canadian food processors were expressing concerns about increasing cost-price pressures that affected them from the simultaneous pressure of high priced domestic dairy ingredients and increasing competition from processed food imports, particularly for food imports in which dairy ingredients are appreciable inputs, as is the case for frozen pizza and chocolate products.

These pressures were a major feature in the introduction, in 1992, of a system of rebates on dairy ingredient inputs to food processors. This program, and the butterfat utilization program noted above, have been credited by the Canadian Dairy Commission with increasing the domestic utilization of butterfat. In order to adjust to the requirements of the GATT/WTO multilateral trade agreement, this system of rebates, and the long-standing arrangements whereby producer levies or drawbacks have been used to subsidize exports of butter and skim milk powder, as well as the exportation of cheese[7], will change. These procedures will be replaced by extensions of the system of price discrimination by end use of milk. Associated with this is the development of a milk class permit system intended to provide competitively priced supplies of milk/dairy products that are required ingredients by domestic food processors who must compete with tariff-free food imports, for example, frozen pizza. This mechanism of allowing processors to access milk components at competitive prices may also be oriented to current exportation and future export development of dairy products. Levies will be used to subsidize exports of skim milk powder only, in order to overcome the limitations on export subsidization that are now provided by the GATT/WTO agreement (CDC, 1995).

[7] Subsidies on cheese exports have been provided through the "Dairy Product Export Assistance Program."

Table 8. Canadian Tariff Equivalents for Dairy Imports. 1995 and 2001[1]

Product	1995 Tariff		2001 Tariff	
	Percent	Minimum	Percent	Minimum
Milk	283.8	$40.6/hl	241.2	$34.5/hl
Cheddar Cheese	289.0	$4.15/kg	245.7	$3.53/kg
Butter	351.4	$4.71/kg	298.7	$4.00/kg
Yogurt	279.5	$0.55/kg	237.5	$0.47/kg
Ice Cream	326.0	$1.36/kg	277.1	$1.16/kg
Skim Milk Powder	237.2	$2.36/kg	201.6	$2.01/kg

[1] The specified over-quota tariffs will be reduced by 15 percent over the 6 years subsequent to 1995; the much lower within-quota tariffs will fall by 57 percent, satisfying the GATT agreement requirement for tariffs to fall by 36 percent during implementation.

Source: Agriculture and Agri-Food Canada.

CONCLUSION

The industry-motivated policy changes that arise from trade pressures noted above have been introduced as "revenue-neutral" programs from the perspective of Canadian dairy producers. These include the considerable extension of price discrimination by use class of milk, direct subsidy reduction, coordination of levies on fluid and industrial milk, multiple component pricing, single price pooling, price "cross loading", and the introduction and use of price rebate programs. Thus policy changes affecting the Canadian dairy sector have, to date, avoided the issue that the levels of dairy prices for producers, processors and consumers in Canada are considerably higher than are price levels in the adjacent United States market. The failure to come to grips with this problem, which involves considerable political sensitivities, appears to constitute one of the most compelling future policy challenges for the Canadian dairy sector. It is certainly a major source of current dairy trade tensions between the two nations. With adoption of the principle of tariffication, the issue of relatively higher Canadian price levels can be expected to be reduced in the longer-term, in the context of successive multilateral negotiations. It remains an open question as to whether other external pressures, as from the current United States trade action, or internal political decisions, will change this situation in the shorter-term.

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— DISCUSSION —
IMPACTS OF PAST U.S./CANADIAN DAIRY PROGRAMS ON STRUCTURE, EFFICIENCY, AND TRADING RELATIONSHIPS

Donald R. Nicholson

The Federal milk order program is a marketing plan with the basic objective of increasing returns to dairy farmers by segregating the disposition or usages of raw Grade A milk so as to prevent the last one hundred pounds of milk from setting the price for the entire market, i.e., price discrimination.

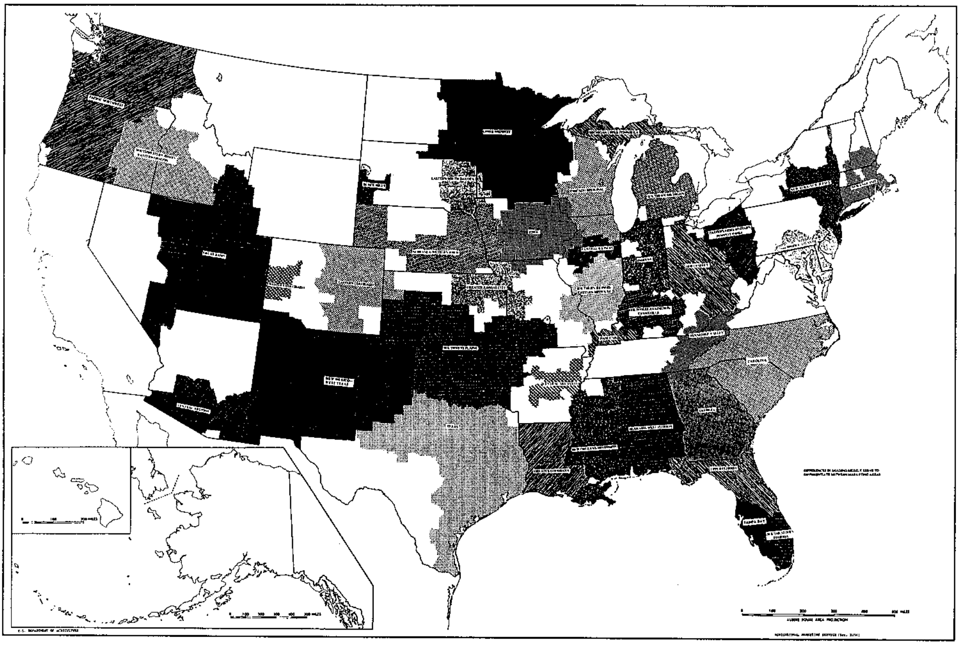
The majority of the milk supply was manufacturing grade in the early days of orders. The Grade A supply was centred around metropolitan areas and eventually a surplus of Grade A milk developed around the population centres. Most of the milk was processed by proprietary firms and most of the cooperatives were bargaining organizations.

Implementation of classified pricing spread rapidly across the country. Class prices were determined by private negotiation. The utilization was proclaimed by the processor in the form of an individual handler pool, and bargaining cooperatives would question the utilization of their member's milk. The honour system on accountability soon became one of dishonour. The cooperatives insisted upon an audit of their class utilizations and processors reluctantly agreed. Proprietary firms were not interested in cooperative personnel auditing their plant records. Public accounting firms were engaged in some markets. High standards of ethical business conduct were lacking in many cases. Suffering also, was the integrity of the producer butterfat testing program.

Farmer unrest and consumer dissatisfaction were quite common. Disorderly marketing conditions were paramount. During the early 1930s efforts were made by the federal and state governments to correct the situation brought about by unprecedented economic conditions in rural America. The federal effort commenced with the Agricultural Adjustment Act of 1933, the origin of our current enabling legislation. The Agricultural Act of 1949 provides the foundation for the dairy support program.

The Federal order program regulated 73 percent (108.6 billion pounds) of the fluid grade milk marketed in the United Stated during 1995 and 70 percent of the total milk marketed (Figure 1). There were 88,727 producers delivering an average of 3,352 pounds of milk per day to 599 regulated handlers. Payments to producers averaged $12.78 per hundredweight in 1995, which amounted to a gross value of $14.0 billion on all producer milk marketed under the program. Currently, about 58 percent of the milk marketed is under a multiple component pricing structure, and 43 percent of the milk is priced based on multiple components and somatic cell counts.

Figure 1. Marketing Areas under Federal Milk Orders as of January 1, 1994



Stability and orderly marketing, intrinsic to the Federal milk programs, have contributed to the production of 155 billion pounds of milk for $20 billion. Consumers on the other hand, pay approximately $67 billion for milk and milk products produced in this country. Milk production during 1995 totalled 592 pounds per capita with 1995 per capita consumption of 577 pounds. The top five producing states are California, Wisconsin, Pennsylvania, New York and Minnesota. They accounted for over 51 percent or 80 billion pounds of the total milk produced during 1995.

A regulated classified pricing program has been essential in our dairy economy for reasons other than to maximize total revenue to dairy farmers. Historically, it has been necessary to integrate manufacturing grade milk into the dairy marketing channel. Class III and III-A prices reflect the value of manufacturing grade milk in Federal milk orders. Fluid milk utilization within Federal milk orders was approximately 41 percent during 1995. Milk utilized in fluid products accounted for approximately 36 percent of the total U.S. 1995 milk supply.

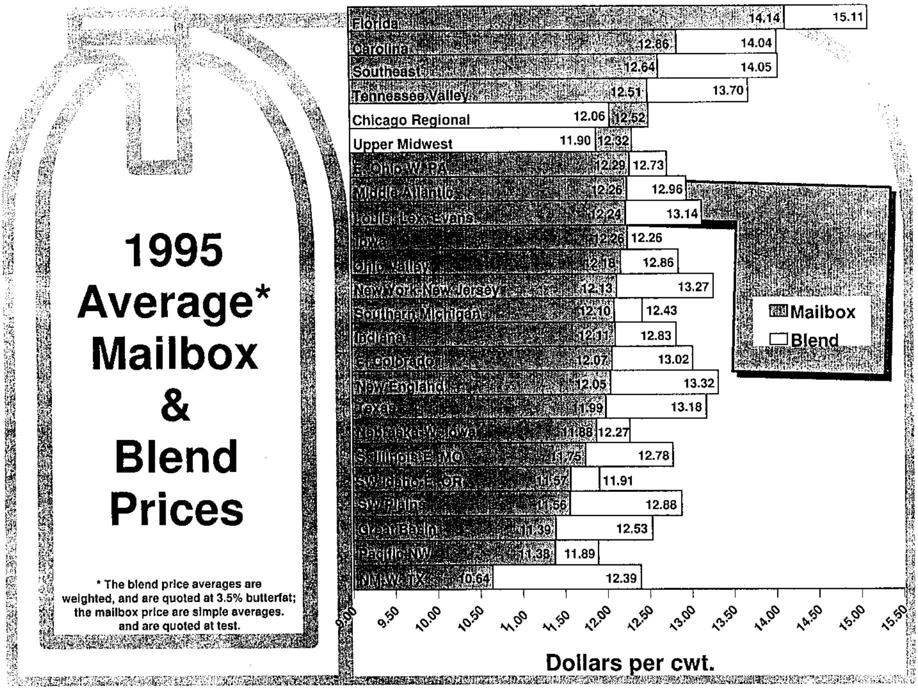
Through the milk price support program the Commodity Credit Corporation (CCC) removes dairy products from the commercial marketplace. The percent of the total milkfat and solids non fat which is removed via CCC purchases was about one percent in 1995. Approximately 1.5 billion pounds of milk was collectively removed during 1995. The support price has decreased since 1982 from \$12.80 to the current level of \$10.25. Mandatory government assessments imposed on dairy farmers began in April 1983 and continue today. Since 1983, dairy farmers have paid between \$2.5 and \$3.0 billion into the federal treasury.

The 1995 (CPI) All Milk Price Index of 93.9 reflects the fact that U.S. dairy farmers have not kept pace with the price consumers pay for all dairy products nor have they kept pace with all retail items. The spread between the prices that dairy farmers receive and the prices that consumers pay for dairy products has continued to grow. Class I price differentials between retail and farm prices vary widely from \$1.20 in the upper midwest to over \$4.00 in the southern extremes. The present Class I differentials were mandated by the U.S. Congress in the 1985 farm bill and have remained a controversial issue since then. Retail prices do not necessarily follow this pattern nor do fluid milk product sales react in direct relationship to changes in Class I prices.

A record high Class I price in the Federal milk order program occurred in February 1990. The Class I prices were indexed to indicate monthly fluctuations. Class I price changes have a minimal effect on Class I sales. The trend toward lower milkfat content in Federal order Class I sales continues. The decrease in the butterfat content of Class I milk from 1978 to 1994 has resulted in the necessity to utilize some 200 million pounds of milkfat per year in other products. The 1994 per capita milkfat consumption is at a record high of 21.2 pounds despite the decreases in the utilization of butterfat in fluid milk products.

Comparing the Federal order Class I price differentials with per capita milk production by states can give an indication of how Federal order blend (uniform) prices are related geographically. The difference between the 1995 average blend price and average Class III price in the Upper Midwest Federal order is 7 cents. In the Texas Federal Order, the difference between the average blend and average Class III is \$1.35. These are minimum prices as announced for each of the Federal orders. However, when examining mailbox prices (prices that best represent what dairy producers are actually paid) one becomes aware of a different perspective in terms of the geographical variations. In fact in the Chicago Regional and Upper Midwest the mailbox price exceeds the blend price (Figure 2).

Figure 2. 1995 Average* Mailbox and Blend Prices



*** The blend price averages are weighted; the mailbox price averages are not.**

The value of skim and butterfat in 100 pounds of Class III milk has shifted over the past seven years. During 1989, the value of skim and butterfat were roughly equal. With the exception of some aberrations in 1995, the first part of 1996 is back to "normal" with about 79 percent of value on skim and the balance on butterfat.

Presently 58 percent of producer milk under Federal milk order system is being valued on a Multiple Component Pricing program while the balance is still priced on the traditional skim/butterfat method. Quality differentials are now being applied to 43 percent of the Federal order producer receipts in the form of somatic cell adjustments in prices paid. Quality differentials will become a bigger factor in the industry. Future consideration might value the freshness aspect of milk. Quality payments reflecting the "freshness" factor in terms of time from farm to the plant may become important.

The present classified pricing program in Federal orders has categorized products along traditional product lines. For various reasons, some being outdated, fluid products

The present classified pricing program in Federal orders has categorized products along traditional product lines. For various reasons, some being outdated, fluid products have been assigned values greater than manufactured products. The need to integrate manufacturing grade milk into Federal order dairy programs was one reason for Class III prices which provided an outlet for moving these products into the commercial market. Based on changing elasticities of demand for these manufactured products, one might envision a price structure where selected manufactured items might be valued higher than some fluid products, a situation brought about by deregulation proponents where processing plants would purchase milk from dairy farmers and make products without recognition of any classified pricing program. Present industry participants know what kind of an economic umbrella they need to survive with the current programs. However, those who advocate privatization may or may not be equipped with the proper economic sun screen to survive the heat.

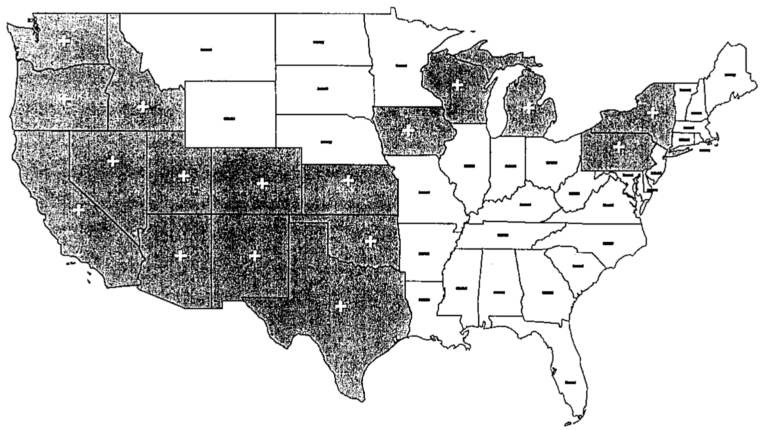
Some of the changes we can anticipate include:

1. The dairy industry is moving in the direction of one grade of milk. Today 96 percent of milk supply is Grade A.
2. Under the Federal milk order program, 43 percent of producer milk is eligible for a quality differential.
3. One class is likely in a deregulated environment.
4. 58 percent of the producer milk in the Federal order program is priced under a Multiple Component Pricing plan. That will continue to expand.
5. "Detailed/Accurate" compositional labelling will become prevalent because of the compositional differences among "like" milk products.

With the compositional labelling we have today, the labels on milk cartons may read the same even though the actual contents could be different. This situation occurs in many markets today. Consumers of tomorrow will be dissatisfied with the generic labelling on fluid milk products. They will insist on more detailed nutritional labelling than was available in the past. The "baby boomers" children and grandchildren will be more aware of food composition and will want a specific level of nutrient intake.

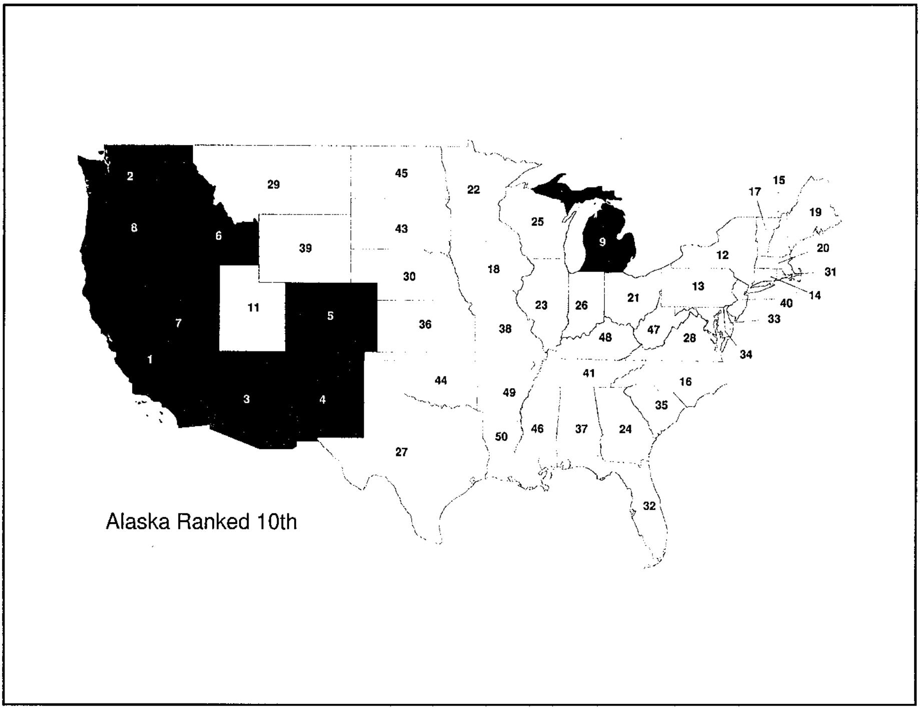
Changes in state milk production trends during the next few years are indicated in Figure 3. Production will continue to expand in the west and southwest reflecting in part the technological advantage of a late start.

Figure 3. Changes in Milk Production by Year 2000



States are ranked by milk production per cow in Figure 4. The top ten states are comparable to the states with predicted growth in milk production. This highlights the geographic regions where milk production will most likely continue to increase. In view of milk production increases occurring in areas that are not major population centres there will be a need to move milk from these regions to deficit areas. Reverse osmosis and ultra-filtration may be used to economically move the modified milk. Value based marketings will occur through contractual integration between producers and their marketing agents. This will become a major factor in the pricing of an individual producer's milk with or without deregulation.

Figure 4. 1995 Milk Production Per Cow Rankings by State with the Top Ten States Highlighted



Many view dairy exports to Mexico as a boom for the U.S. dairy industry. The last three years have shown that this environment is highly sensitive to political moves and exchange rate adjustments. Today few would raise trade with Mexico in the same light.

— DISCUSSION —

IMPACTS OF PAST U.S./CANADIAN DAIRY PROGRAMS ON STRUCTURE, EFFICIENCY AND TRADING RELATIONSHIPS

Rick Phillips

Comments made on behalf of the Dairy Farmers of Canada follow by topic.

Supply Management Economists Versus Free Market Economists

At the core of differences in policy formulation is the fact that supply management economists do not believe that "free" markets are necessarily "perfectly competitive" markets.

Free market economists appear to be mainly concerned with where the long run "perfectly competitive" equilibrium lies. Supply management economists on the other hand are more concerned with whether a "perfectly competitive" equilibrium is attainable and, if so, what adjustments are necessary to attain that equilibrium, and who pays the adjustment costs associated with the move to equilibrium.

Supply Management As An Evolving Concept Which Considers The Objectives Of Various Stakeholders

The supply management system that was established in Canada has evolved significantly since its inception in the 1970s and continues to evolve. A basic objective is to allow all producers to share equally in all milk markets and the system is well on its way to solving producer equity concerns.

Policy development is now focused on processor equity issues and processors are deeply involved in the negotiation process. Processor "equity" has been defined to mean that all processors have the "same competitive access to milk".

Supply management economists would argue that consumers would find themselves in a similar situation with or without supply management. The Dairy Price Index (DPI) has tended to rise at a slower rate than the Consumer Price Index. This would suggest that dairy products have become relatively less expensive. Where consumption has declined this was likely more a function of changing consumer preferences than price.

There is some evidence to suggest that the relative price stability associated with supply management (market equilibrium in a supply management system is achieved mainly through quantity adjustment) is of significant benefit to consumers. Recent experience in the United States would tend to support this conclusion. The DPI in the United States has risen at a faster rate than in Canada even though there were price increases at the producer level in Canada. The U.S. producer price has been trending downward. This is a consequence of higher variability in the producer price in the United States, combined with the exercise of unfettered market power at the retail level as evidenced by the observation that price movements in the United States appear to be asymmetric.

The Canadian industry evolves through negotiation and the establishment of consensus. Market forces may drive the discussion, but the market does not necessarily dictate the speed of the adjustment process nor the distribution of adjustment costs. In Canada the industry tends to buy out, rather than push out, those exiting the business.

Barriers to Trade

The tariff equivalents established as a consequence of the GATT Uruguay Round agreement were *conversions* of import quotas into tariffs. During the negotiations Canada established the level of these tariffs using a methodology utilized by the European Community and accepted by the United States. Canada used the U.S. methodology to establish its access levels. Whatever the differences, the tariff equivalents imposed by the United States and Canada are meant to accomplish the same thing. They are meant to act like import quotas.

Technically there are no barriers to Canadian access to U.S. fluid milk markets. In reality the United States keeps Canadian milk of the same or higher quality out of its market through the use of non-tariff barriers and in particular the combination of the Pasteurized Milk Ordinance (PMO) and the National Conference of Interstate Milk Shippers (NCIMS) which operate to set restrictive standards, Canada has already been exposed to the trade inhibiting potential of these non-tariff barriers in its ultra high temperature (UHT) milk market to Puerto Rico.

The greatest barrier to future trade liberalization is the harassment potential of U.S. trade actions.

Imperfect Competition

The economic analysis presented at the conference tended to be from the analytical framework of the "perfectly competitive market". Much of the analysis considered where long term market equilibrium might lie. Implicit in these models was the assumption that adjustment costs are zero, and are ignored. Since "perfect competition" is assumed, distribution effects are also ignored. From a policy analyst's perspective, however, the "politics" of policy making is in the adjustment to equilibrium and the distribution of market revenue between producers and others in the marketing chain. If markets are "imperfectly competitive" this policy focus is entirely justifiable.

Economists have to recognize the possibility that food markets at the retail level are not perfectly competitive, nor do they "behave" as though they are perfectly competitive. There is *prima facia* evidence for this market structure in high levels of industry concentration and the asymmetric pricing behaviour observed at that level.

The major implications are that:

- If pricing is asymmetric at the retail level, price stability is an important policy objective at the producer level.
- The benefits of deregulation for consumers tend to be overstated and the costs to producers understated. (i.e., The retail "pie" in the end is the same size. It is the producer share of this pie relative to others in the marketing chain that changes and perhaps this is a function of relative market power as opposed to perfectly competitive behaviour.)
- Border measures are necessary to protect Canadian institutions that correct what producers believe are domestic market distortions (U.S. retailers seem to have the same relative market power). Tariff equivalents should not be reduced until the alternative arrangements required to resolve this issue are developed.

U.S. Negotiating Techniques

There is some peculiar logic in the papers that are presented here. To move surplus milk from a federal milk marketing order (FMMO) in surplus to a FMMO in deficit requires the FMMO price plus transportation plus a "give up" charge. Movement of surplus fluid milk to Canada on the other hand will be at "marginal cost". Something does not quite add up but this is typical of the type of argumentatation we often hear from the United States.

The biggest impediment to the expansion of trade between the United States and Canada is the apparent inability of the United States to accept the results of a negotiation. U.S. negotiators may bargain in good faith but the American "system" inherently bargains in "bad faith". The alternative is to believe that Canadian negotiators are totally inept. Our belief is that Canadian negotiators are not inept.

The Level Playing Field

From a producer perspective, the end of high tariffs is not a "sufficient" condition to ensure a level playing field with the United States. The Canadian dairy industry has its own history of the U.S. exercise of non-tariff barriers to limit imports. UHT milk is a good example. We believe that given the PMO and NCIMS, U.S. specific compositional and labelling standards, and the demonstrated difficulty in determining "equivalency" of health, safety and inspection standards, our fears about the U.S. ability to impede imports are well founded.

It seems that if we wish to access the U.S. market unimpeded, we have to give up our ability to produce "Canadian" policy solutions. We must conform to the U.S. perception about the "right" way to do things. Ultimately it seems that the only way to do this is to give up our sovereignty and "adopt" the "U.S." solution.

Inevitability

There was a time when the United States "had" to convert to metric and Canada would "have to" beat them to it. There is no apparent trade imperative to reduce border measures for supply managed products within the NAFTA context. The WTO context is a more appropriate context to deal with dairy. Access to the European Union, which is critical for the Canadian industry in the longer term, can only be dealt with in this context.

Research Directions

There are several areas on which this structural process can and should be focussed.

Expand the Analytical framework. Economic researchers who wish to develop viable policy proposals must recognize that economics is not divorced from politics. In Canada, no national government would willingly adopt a policy that would require Quebec producers to do their work in Alberta.

The economics of "perfect competition" is nothing more than religion if it does not recognize the political and sociological context in which markets operate. A general criticism of the economic research community is that researchers tend to take the research path of least resistance. They tend to concentrate on areas where there are good data availability and stick to a theoretical framework that a Masters candidate can deal with.

Don't ignore imperfect competition. How have stakeholder shares of market benefits changed over time in markets characterized by increasing size of players, especially concentration at the retail level, when 1) marketing systems at the producer/processor level have not resulted in effective supply/price control at the producer level, 2) marketing systems at the producer/processor level have resulted in effective supply/price control at the producer level?

Don't ignore adjustment costs. Increase emphasis on analysis of the dynamics and costs of adjustment to market equilibrium as opposed to simply determining where market equilibrium lies.

THEME: WHAT IMPACTS WILL CONTEMPORARY POLICY CHANGES HAVE ON STRUCTURE, EFFICIENCY AND TRADING RELATIONSHIPS?

OBJECTIVE

To discuss the nature and extent of the impacts of current policy changes and likely changes on the prices, supply, demand, trade, structure and efficiency on both sides of the border.

ANALYSIS OF RECENT OPTIONS FOR CHANGES IN U.S. DAIRY POLICY

Tom Cox and Daniel A. Sumner

The policy instruments that control dairy output and distribution in 1996 are basically the same as those that have ruled the industry for half a century. Three distinct, but interrelated, policy types comprise the major components of government interventions in the U.S. dairy market: (1) a price support program under which the federal government stands ready to buy selected storable dairy products at minimum prices; (2) trade policies, including both import barriers and export subsidies that insulate the U.S. domestic market from competition and shift out the demand for certain manufactured dairy products; and (3) a marketing order system that regulates both regional milk prices paid by users and how these prices are translated into farm level prices. These three sets of policies combine to create a complex web of interrelationships that govern all aspects of the market for milk and milk products in the United States. (See Blaney, Miller and Stillman, 1995 for a extended discussion of the U.S. dairy industry and policy.)

This paper considers the effects of alternative modifications of U.S. dairy policy. For the formal quantitative analysis we draw on the University of Wisconsin-Madison Dairy Interregional Competition Model (IRCM) that has been used extensively over the last several years to consider a wide variety of policy options. We use the model to consider several specific proposals that were prominent in the dairy policy debate leading to the 1996 *Federal Agricultural Improvement and Reform* (FAIR) Act. In each case we consider the effects of a specific option relative to a scenario that replicates the dairy market and policy situation in 1993 (referred to as *BASE*). The options we consider include: (1) deregulation of marketing orders coupled with elimination of price supports (referred to as the *Freedom to Milk* scenario); (2) a complex mix that includes modification of marketing orders to change some regional effects while eliminating the price support on certain products and reducing the price support on other products (referred to as the *House Compromise* scenario); and, (3) the actual Dairy Title of the FAIR Act of 1996 (referred to as the *1996 FAIR Act Dairy Title* scenario). We also evaluate two additional variants on the *1996 FAIR Act Dairy Title* scenario. These scenarios measure the impacts of the provision to eliminate the price support program by the year 2000 under two alternative assumptions about world prices for butter, nonfat dry milk (NDM) and American cheese. These scenarios are referred to as *NO CCC: Low World Prices* and *NO CCC: High World Prices*.

Each of the policy options analysed includes a number of specific features and is described in some detail below. None of the options includes changes in trade barriers or export subsidies and, in fact, no serious trade policy reform was contemplated in the policy discussions leading to the FAIR Act. This is despite the fact that trade barriers are, perhaps, the most significant feature of U.S. dairy policy.

This paper does not review the legislative history or future political feasibility of the options considered. Our purpose is more academic in that we consider these specific options in order to learn what such analysis can teach us about the operation of the U.S. dairy industry and the underlying economics of alternative policies. We do not suggest that the alternatives we consider are the modifications most likely to be included in future legislation, however, they were each serious proposals for the 1996 Act. This paper also does not review the large academic literature that considers the implications of various stylized dairy policies. The research papers and USDA reports we cite include many of the key references and reviews of that literature.

The final section of the paper examines potential implications of alternative U.S. program options for dairy trade and trade relations with Canada. In light of the analysis of each program option developed in the paper we consider if the alternative chosen for U.S. reform has significant implications with respect to dairy trade issues with Canada.

U.S. DAIRY POLICY INSTRUMENTS: A BROAD BRUSH DESCRIPTION

Before considering the specific options and their effects it is useful to provide a brief description of the major U.S. dairy policy instruments.

Price Supports

The USDA agrees to purchase butter, non-fat dry milk (NDM), and American Cheese from processors at prices calculated to ensure that the farm price of milk used for the manufacture of those products will generally remain above the legislated support price ($10.10 per hundredweight in 1995 and $10.35 in 1996). In 1990, a tax on milk production was included in the price support program to limit milk output while directly offsetting dairy program budget costs. Farmers pay a specific per-unit assessment that has averaged a little under one percent of the market price. An added wrinkle to the program has been a refund of assessments to farms whose milk output did not grow from one year to the next and an upward adjustment in the assessment rate on other farms to make up for the lost government revenue.

Trade Policies

Trade barriers are a fundamental feature of U.S. dairy policy. In general, imports of dairy products in the United States have been limited to a small percentage of domestic consumption of manufactured dairy products. The import barriers allow the domestic price of milk and milk products to remain well above the price for traded products in world markets; thus making price discrimination policies feasible. The system of absolute quotas gave way to a system of tariff-rate quotas (TRQs) as a part of the Uruguay Round trade agreement which took force on July 1, 1995. However, the second-tier tariffs that limit over-quota imports remain prohibitively high; therefore, the effects of the TRQs remain the same as the absolute quotas that were replaced. The Uruguay Round agreement also provides for a gradual increase in the quantity of dairy product imports into the United States under the TRQs. This provision will allow for a gradual increase in import access into the U.S. dairy market over the next 5 years.

Subsidized exports have long been used, along with donations to domestic food programs and international food aid, to dispose of stocks of dairy products acquired under the price support program. Subsidized exports have been considered a market for U.S. dairy products that would not disrupt commercial sales. In addition to disposal of government stocks, the Dairy Export Incentive Program (DEIP) has provided explicit price subsidies for commercial dairy product exports since 1989.

Marketing Orders

Unlike the price support and international trade programs, marketing orders, even when applied under federal legislation, are regional in their implementation. Some regions have state marketing orders for milk, and some have no marketing orders. All federal milk marketing orders and the major state milk marketing orders establish specific minimum prices that must be paid for milk according to its end-use class (classified pricing). They also provide for pool pricing such that individual farmers receive a weighted average price of milk sold in their marketing order. Federal milk marketing orders calculate a separate pool price for all milk under each of the 34 regional orders (Neff and Plato, 1995).

Federal marketing orders operate with at least three classes of milk by end use. These classes provide separate markets and pricing for milk used in fluid, and for manufactured products such as yogurt, cheese, butter or NDM. California, which accounts for about 15 percent of U.S. milk supply and operates its own marketing order, has two pool prices that based on two separate weighted averages of prices for five end-use classes. Further, unlike farmers under federal orders, individual farmers in California receive a weighted average of the two pool prices, with these weights determined by individual ownership of milk quota (Sumner and Wolf, 1995).

Each marketing order regulates milk within a geographically limited market. The relationship of prices among orders is determined, in part, by the formula used to set minimum prices in the orders themselves. The price of unregulated Grade B milk produced in the Minnesota-Wisconsin region is the basis for the minimum price for Class I milk in the lowest-price federal order. The Class I differential (and, therefore the minimum Class I price) is generally higher the further the region is from the Wisconsin.

With different minimum prices in each region, regulations are needed to prevent milk from being transported across regions so as to undermine the maintenance of separate fluid milk markets in different orders. The regulations insure that there is generally little economic advantage to arbitrage across prices in different orders.

DAIRY TRADE AND "DOMESTIC" POLICY

U.S. dairy policy has several elements that generally keep the domestic prices of dairy products above those in most potential export markets. First, import barriers in the form of TRQs (and, for some products relatively high transport costs) are sufficient to insulate the domestic U.S. market from world supply and demand. This is a necessary condition for U.S. prices to remain above the prices that prevail in world markets. Second, the price support program requires government purchases of dairy products at minimum prices that are well above the prices at which these products typically trade in international markets. This means that rather than being exported by commercial firms these products are sold to the government. Third, the marketing order system assures relatively high prices for fluid milk and stimulates milk production in relatively high cost regions. Fourth, subsidized exports under the DEIP contribute to higher domestic U.S. prices for milk by drawing product out of the domestic market.

Under classified pricing, (and with import barriers in place) buyers are required to pay different prices for identical milk depending on the intended end use of the commodity. Classified pricing has had its most dramatic effects creating higher prices for fluid products while lowering prices for manufactured products. However, price discrimination among manufactured products is becoming more evident in the current system and in some of the options for policy changes. (For example, the *House Compromise* option provides for wide price differentials between milk used for cheese and milk used for butter and NDM.)

This price discrimination can take many forms and could be tailored to stimulate exports without including an explicit subsidy tied to the export of a particular product. For example, some dairy products are more likely to be destined for export markets and others are much more likely destined for domestic use. Given this tendency, classified pricing could be used to set high prices for those products likely to be consumed by domestic buyers and lower prices for products likely to be exported, even though the products were manufactured from identical milk. Classifications by end-use category may be defined such that export-bound products are grouped together and assigned relatively low milk prices. Products destined for domestic consumption may be grouped into classes that are assigned higher milk prices. Finally, the end-use prices and classifications can be adjusted such that producer revenue is insulated from any drop in the price of those products destined for export. One result is that the price paid by export buyers may be below both the price paid by domestic consumers and the price received by producers. (Sumner, 1996, analyses several such options and discusses their export implications.)

OVERVIEW OF THE UW-MADISON DAIRY IRCM AND THE BASE SCENARIO

The UW-Madison Dairy IRCM is a multi-region, multi-product interregional competition model that balances regional supplies and demands (See Cox; Cox and Jesse; Cox, Chavas and Jesse; and Chavas, Cox and Jesse for more details on the model, its development and the empirical specification of the underlying equations and parameters). The Dairy IRCM has 13 regions (see Table 1), nine wholesale dairy products (see Table 2) and farm-level milk priced on three components: fat, protein, and lactose. The Dairy IRCM was designed to consider potential reform of the federal and state milk marketing orders and other policies. It therefore includes substantial regional detail. Important production areas such as California and the Upper Midwest (which includes Wisconsin, Minnesota, North Dakota and South Dakota) are each modelled as separate regions. Each of the 13 regions is allowed to have different supply functions, farm level prices, and different aggregate wholesale demands determined by population.

The Dairy IRCM generates a spatial equilibrium across regions by adjusting regional prices, production, and trade. In the model, dairy product price differences between regions cannot be greater than transportation costs or additional interregional trade would occur. Mileage between regions, three different transportation cost rates (raw milk, refrigerated and non-refrigerated), and federal and California milk marketing order regulations are explicitly modelled.[1] The model uses regional component pricing, so the farm level value of fat, protein, and lactose are generated regionally as are production of farm milk and production and consumption wholesale products. The model does not examine the evolution of policy changes or reactions to them over time; rather, it presents annual results under the assumption that a policy has be fully implemented and adjustments have taken place. All adjustments are assumed to occur over an intermediate-run time horizon of 3 to 5 years.

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[1]The model incorporates a single blend price under the California marketing order and thus does not reflect the supply effects of the two pool price system as analysed by Sumner and Wolf. This likely means that the model over estimates the supply effects of the scenarios that change the price of manufacturing milk. However, it also means that the effective supply price in California is less affected by changes in Class I prices.

Table 1. Producing and Consuming Regions of Fluid and Manufactured Dairy Products in the U.S. Dairy Sector IRCM.

1.	**California**
2.	**Central:** Kentucky, Tennessee
3.	**East North Central:** Illinois, Indiana, Michigan, Ohio
4.	**East South Central:** Alabama, Arkansas, Louisiana, Mississippi
5.	**Middle-Atlantic:** New York, New Jersey, Pennsylvania
6.	**Mountain:** Arizona, Colorado, Montana, Nevada, Utah, Wyoming
7.	**North East:** Connecticut, Massachusetts, Maine, New Hampshire, Rhode Island, Vermont
8.	**North West:** Idaho, Oregon, Washington
9.	**South Atlantic:** District of Columbia, Delaware, Maryland, Virginia, West Virginia
10.	**South East:** Florida, Georgia, North Carolina, South Carolina
11.	**West South Central:** New Mexico, Oklahoma, Texas
12.	**West Central:** Iowa, Kansas, Missouri, Nebraska
13.	**Upper Midwest:** Wisconsin, Minnesota, North Dakota, South Dakota

In order to consider the effects of policy change we compare each alternative to the BASE scenario. The BASE scenario simulates conditions in the 1993 U.S. dairy sector. The BASE scenario is characterized by: (1) budget assessments of $0.1125/cwt, (2) a farm level price support of $10.10/cwt (operationalized as purchase prices of $1.12/pound for American cheese, $0.65/pound for butter, and $1.034/pound for NDM), (3) federal milk marketing orders (classified pricing, Eau Claire based Class I differentials, Minnesota-Wisconsin (MW) minimum price for Class III products and Class I "mover", etc.) and, (4) California pricing rules for California (including California fluid standards in California). In addition, this scenario assumes that the DEIP operates at the 5 year average of its maximum allowable export subsidies on cheese, butter, and NDM (as provided under the Uruguay Round GATT agreement) and that government domestic donations are continued at the 5 year average rates (roughly 2.4 billion pounds of milk equivalent total solids (METS)).

Table 2. Nine Categories of Fluid and Manufactured Dairy Products in the U.S. Dairy Sector

Fluid:	Beverage fluid milk including regular and flavored milk (whole, 2%, 1%, skim) and buttermilk.
Soft Products:	Cream (Half and Half, heavy and light), sour cream, yogurt, eggnog, cottage cheese.
Frozen Products:	Ice-cream, ice-milk, sherbet, frozen dairy mix and mellorine.
Butter:	Butter.
American Cheese:	American, Cheddar, Colby, Monterey and processed American cheese.
Italian Cheese:	Mozzarella, Provolone, Parmesan, Romano and Ricotta.
Other Cheese:	Swiss, Edam, Gouda, Brick, Muenster, Gruyere, cream cheese and all other cheeses.
Nonfat Dry Milk (NDM):	Nonfat dry milk.
All Other Mfg (Resid MFG):	Canned and bulk whole milk and skim milk, dry whole milk and buttermilk, and dry whey products.

In each alternative scenario except the final *NO CCC: High World Prices* scenario, relatively low exogenous world market prices are assumed for butter ($0.69/pound), NDM ($0.70/pound), and American cheese ($0.83/pound).[2] These low world price assumptions yield a butter/NDM milk equivalent world price of around $6.20/cwt.

The ability of mathematical simulations to precisely mimic market behaviour is limited (see Cox and Jesse). In this context, comparing the changes induced by the alternative scenarios relative to the BASE is preferred to comparing the absolute changes

[2]Most scenarios presented here were also evaluated at considerably higher world market prices: butter ($0.82/pound), NDM ($0.90/pound), and American cheese ($0.97/pound). These high world price assumptions yield a butter/NDM (Class IIIa or Class IV) milk equivalent price around $8.50/cwt and tend to lower the losses (increase the gains) generated by dropping price supports in the alternative scenarios. Hence, use of the lower world prices generates a somewhat less optimistic assessment of the likely impacts of these scenarios.

Below we explicitly examine the differential impact of these alternative world price assumptions when the U.S. price support program is ended.

(say from current reality) generated by the alternative scenarios. The results below summarize the aggregate wholesale and regional farm level impacts of the alternative scenarios as percentage changes from the BASE results. Other results are also presented relative to the projections under the BASE scenario.

ALTERNATIVE POLICY OPTIONS: DESCRIPTIONS AND IMPLICATIONS

We believe it is instructive to present the results from the two major alternative proposals that were rejected in the 1995/96 dairy policy debate, along with a more detailed look at the actual policy that was adopted in the Dairy Title of the FAIR Act. The policy scenarios will each be described in just enough detail to allow the reader to understand the major features that were modelled. Following the description the projections for milk market aggregates from the policy alternative are discussed. We begin with the so called *Freedom to Milk* proposal that was easily the most radical reform seriously considered for the 1996.

Freedom to Milk

This is basically a deregulation scenario with transition payments made to producers based on the average of the best three of the past five year milk sales. A 5 year average of these payments (roughly 10 cents per cwt) is incorporated in the modelling of this scenario. Two key components of the *Freedom to Milk* deregulation are the removal of price supports on all products and the elimination of both the federal and California milk marketing orders. In addition, the producer assessments ($0.1125/cwt) and the government donations (2.4 billion METS) of the BASE scenario are removed. Import barriers remain and imports are fixed at 1993 quantities. Export subsidies may remain available, but they are irrelevant given that prices for butter and NDM fall to world market levels.

Eliminating milk marketing orders reduces fluid milk prices by 17 percent ($2.45/cwt), increases fluid production/consumption by 3 percent (1.6 billion pounds), and reduces fluid revenues by almost 15 percent ($1.1 billion) (see Table 3). As shown in Table 4, the aggregate farm milk price and farm production each drop by roughly 2.5 percent ($0.33/cwt and 3.7 billion pounds). With less total milk production and increased fluid milk consumption, manufacturing milk markets tighten considerably. As a result, production of each cheese type falls (From Table 3: American cheese, -6 percent; Italian cheese, -3 percent; and other cheese, -8 percent) and total cheese production falls by 349 million pounds. Also in Table 3, cheese prices rise (American cheese, 2 percent; Italian cheese, 12 percent; and other cheese, 13 percent). Butter/NDM prices fall to near world market levels because they are no longer supported by government purchases. NDM production falls by 18 percent (173 million pounds). Finally, soft and frozen product outputs fall by 5 percent and 7 percent, while prices rise by 14 percent and 24 percent. These aggregate wholesale sector results are national in scope. There are significant regional variations in the farm level impacts that are discussed next.

Table 3. Aggregate and Regional Wholesale Sector Summary: Percentage Changes from BASE

	BASE	Freedom to Milk (%)	House Compromise (%)	1996 Fair Act Dairy Title (%)	No CCC: Low World Prices (%)	No CCC: High World Prices (%)
WHOLESALE PRICES ($/cwt)						
Fluid	14.08	-17.4	10.3	-1.7	-6.6	-3.3
Soft	24.23	13.9	-0.4	-1.3	9.2	-2.1
American Cheese	105.40	2.4	-0.2	-2.7	-10.4	-4.9
Italian Cheese	84.36	11.5	11.1	-3.6	-8.3	-11.7
Other Cheese	81.43	13.3	2.2	-2.3	4.6	-0.2
Butter	60.67	-6.4	-11.0	0.6	-8.9	14.1
Frozen	18.85	24.4	-4.0	-0.9	19.1	0.8
Residual Mfg	36.16	-5.6	4.4	-0.0	2.2	2.2
NFDM	99.34	-33.5	-43.2	-2.8	-42.3	-22.7
WHOLESALE PRODUCTION (million pounds)						
Fluid	54,049	3.1	-1.8	0.3	1.2	0.6
Soft	4,027	-5.2	0.2	0.5	-3.5	0.8
American Cheese	3,130	-6.1	-2.0	-4.4	-4.2	-5.1
Italian Cheese	2,467	-2.9	-2.8	0.9	2.1	2.9
Other Cheese	1,066	-8.0	-1.3	1.4	-2.8	0.1
Butter	1,284	1.5	10.0	-0.2	-3.8	-4.0
Frozen	7,639	-7.2	1.2	0.3	-5.6	-0.2
Residual Mfg	4,219	1.5	-10.0	0.0	-0.6	-0.6
NFDM	963	-18.1	10.0	-1.6	-22.7	-13.1
WHOLESALE CONSUMPTION EXPENDITURES (million $)						
Fluid	7,561	-14.8	8.2	-1.4	-5.5	-2.7
Soft	972	7.9	-0.2	-0.8	5.4	-1.3
American Cheese	3,025	2.0	-0.2	-2.3	-8.9	-4.1
Italian Cheese	2,070	8.3	8.0	-2.8	-6.4	-9.1
Other Cheese	1,076	6.0	1.1	-1.2	2.3	-0.1
Butter	616	-4.9	-8.6	0.5	-6.9	10.2
Frozen	1,431	15.4	-2.8	-0.7	12.4	0.5
Residual Mfg	1,388	-4.0	3.1	-0.0	1.6	1.6
NFDM	540	-23.3	-32.0	-1.5	-31.2	-14.7
TOTAL U.S.	18,679	-4.0	3.0	-1.4	-4.0	-2.8

Table 4. Aggregate and Regional Summary of Farm Level Impacts: Percentage Changes from BASE Scenario

	BASE	Freedom to Milk (%)	House Compromise (%)	1996 Fair Act Dairy Title (%)	No CCC: Low World Prices (%)	No CCC: High World Prices (%)
FARM LEVEL PRICES ($/cwt)						
North East	14.08	-9.0	-0.1	-0.8	-2.7	-2.2
Mid-Atlantic	13.30	-4.7	1.7	-0.9	-2.8	-2.3
South Atlantic	13.78	-9.4	-1.1	-0.6	-2.3	-3.2
South East	15.14	-10.6	-1.5	-0.6	-5.2	-3.1
Central	13.89	-7.9	-0.5	-0.8	-5.7	-4.4
E. South Central	14.22	-11.1	-0.7	-0.7	-2.9	-3.3
W. South Central	13.20	-7.0	1.1	-0.6	-0.6	-0.7
E. North Central	13.71	-9.1	0.5	-0.9	-5.1	-2.5
Upper Midwest	11.84	4.2	4.1	-1.1	-4.9	-3.2
West Central	12.79	-4.3	1.3	-1.0	-4.2	-2.6
North West	11.68	2.0	2.4	-1.9	-6.4	-3.5
Mountain	12.29	0.0	1.8	-1.1	-1.1	-1.2
California	11.40	3.1	2.5	-2.1	-6.4	-0.4
TOTAL U.S.	12.68	-2.6	1.7	-1.1	-4.3	-2.4
FARM LEVEL PRODUCTION (million pounds)						
North East	4,500	-2.6	-0.0	-0.2	-0.8	-0.6
Mid-Atlantic	21,617	-2.9	1.0	-0.5	-1.7	-1.4
South Atlantic	3,789	-1.0	-0.1	-0.1	-0.3	-0.4
South East	5,998	-6.9	-1.0	-0.4	-3.4	-2.0
Central	4,220	-11.2	-0.7	-1.2	-8.1	-6.3
E. South Central	2,952	-6.4	-0.4	-0.4	-1.7	-1.9
W. South Central	9,713	-4.7	0.8	-0.4	-0.4	-0.4
E. North Central	15,582	-9.0	0.5	-0.9	-5.1	-2.5
Upper Midwest	34,767	0.7	0.7	-0.2	-0.9	-0.5
West Central	8,923	-6.2	1.9	-1.5	-6.0	-3.8
North West	9,527	1.0	1.2	-1.0	-3.2	-1.8
Mountain	5,212	0.0	0.8	-0.5	-0.5	-0.5
California	22,857	1.1	0.8	-0.7	-2.2	-0.1
TOTAL U.S.	149,657	-2.5	0.7	-0.6	-2.3	-1.3
FARM LEVEL TOTAL REVENUES (million $)						
North East	633	-11.4	-0.2	-1.1	-3.5	-2.8
Mid-Atlantic	2,875	-7.5	2.7	-1.4	-4.5	-3.7
South Atlantic	522	-10.3	-1.2	-0.7	-2.5	-3.6
South East	908	-16.8	-2.5	-1.0	-8.5	-5.1
Central	586	-18.2	-1.1	-2.0	-13.3	-10.4
E. South Central	420	-16.8	-1.0	-1.1	-4.5	-5.1
W. South Central	1,282	-11.4	1.9	-1.1	-1.0	-1.1
E. North Central	2,136	-17.3	0.9	-1.8	-10.0	-4.9
Upper Midwest	4,116	4.9	4.8	-1.3	-5.7	-3.7
West Central	1,141	-10.3	3.2	-2.5	-10.0	-6.3
North West	1,112	3.0	3.6	-2.9	-9.4	-5.2
Mountain	640	0.1	2.6	-1.6	-1.7	-1.8
California	2,605	4.3	3.3	-2.8	-8.5	-0.5
TOTAL U.S.	18,976	-5.0	2.4	-1.7	-6.6	-3.7

Table 5. Aggregate Welfare and Revenue Impacts: Percentage Changes from BASE Scenario

	BASE	Freedom to Milk (%)	House Compromise (%)	1996 Fair Act Diry Title (%)	No CCC: Low World Prices (%)	No CCC: High World Prices (%)
AGGREGATE WELFARE SUMMARY (million $)						
Producer	2,706	-1.7	1.2	-0.8	-3.0	-1.6
Consumer	4,358	1.7	-1.6	0.8	2.0	1.5
TOTAL	7,064	0.4	0.5	0.2	0.1	0.3
AGGREGATE REVENUE/COST SUMMARY (million $)						
Farm	18,976	-5.0	2.4	-1.7	-6.6	-3.7
Consumer	18,679	-4.0	3.0	-1.4	-4.0	-2.8
Government	441	-66.9	-71.1	18.3	-100.0	-100.0

As a result of increased cheese prices and more access to fluid markets, regions that now produce milk used primarily for manufactured products (Upper Midwest, Northwest, California, and Mountain: these regions accounted for 48 percent of 1993 milk production) are projected to have increases in farm price, production and total revenue while regions that now have high Class I utilization suffer sizable losses. In these regions that produce milk for manufacturing uses, the losses from allowing product prices to fall to world market levels are offset by gains from eliminating milk marketing orders. These simulations suggest, therefore, that, under current regulations, producers in markets with high Class I utilization gain more from the price discrimination maintained by the milk marketing orders than do regions with low Class I utilization.

As noted above and shown in Table 4, U.S. aggregate farm production and price each decline by about 2.5 percent ($0.33/cwt) and total revenue falls by 5 percent ($949 million).[3] Consumer outlays are projected to decline by 4 percent, ($0.7 billion) (Table 5). The direct government budget costs under this option are $146 million annually, due solely to the transition payments ($0.10/cwt on 145,970 million pounds of milk production). Government costs are $295 million less than BASE outlays (Table 6).

Table 6 also provides an indication of likely exports under a deregulation scenario. Exports of butter fall by 8 percent to 293 million pounds and exports of NDM falls by 90 percent to 42 million pounds. Exports of the solids rich residual manufacturing aggregate remain unchanged (372 million pounds). In contrast, exports of American cheese fall to zero as domestic U.S. prices remain well above world market prices.

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[3]At the higher world market prices these aggregate declines are smaller: -1 percent on price and -3 percent on revenues.

Table 6. Endogenous Sector Summary: Price Support Purchases (If Products are Supported) and/or Commercial Exports (If Products are Not Supported)

	BASE	Freedom to Milk (%)	House Compromise (%)	1996 Fair Act Dairy Title (%)	No CCC: Low World Prices (%)	No CCC: High World Prices (%)
QUANTITIES (MILLION POUNDS)						
American Cheese	161	0	116	31	0	0
Butter	318	293	575	473	403	70
Nonfat Dry Milk	383	42	365	353	52	192
Residual Manufacturing	372	372	0	372	372	382
MINIMUM DOMESTIC PRICES ($/CWT) / a						
American Cheese	112.00	114.78	112.50	109.80	101.17	107.64
Butter	65.00	58.99	58.99	65.00	58.99	72.00
Nonfat Dry Milk	103.40	59.62	59.62	100.30	59.62	79.62
Residual Manufacturing	33.60	33.60	34.01	33.60	33.60	33.60
WORLD PRICES ($/CWT) / b						
American Cheese	82.72	82.72	82.72	82.72	82.72	97.20
Butter	68.99	68.99	68.99	68.99	68.99	82.00
Nonfat Dry Milk	69.62	69.62	69.62	69.62	69.62	89.60
Transport Cost / c	10.00	10.00	10.00	10.00	10.00	10.00
Government/DEIP Cost / d	101	(0)	2	94	0	0
Other Government Costs / e,f	340	146	126	428	0	0
Total Government Costs / g	441	146	128	522	0	0
Change from BASE		(295)	(314)	81	(441)	(441)
% Change from BASE		-67%	-71%	18%	-100%	-100%

Notes:

a) Minimum domestic prices are either Price Floors (at $10.10 CCC levels or World Market Prices + transportation to North European Ports) or the lowest regional price in the current solution (usually California).

b) World market prices are 5 year averages (1994-98) from FAPRI's 4/95 BASELINE, except for NO CCC: High World Prices which are from FAPRI's 10/95 BASELINE.

c) Approximate transport costs to move products to North European ports or Pacific Rim.

d) DEIP costs computed as Domestic Price - World Market Price + Transport Costs, using 5 year average DEIP Maximums (1994-98): American cheese, 4 million pounds; butter, 70 million pounds; NDM, 217 million pounds.

e) BASE Other Government Costs are computed as (Exports - DEIP Maximum) * Domestic Price - 1993 Assessments ($0.1125/cwt). Note that this includes the 1993 Government release of 14 million pounds of American Cheese and 201 million pounds of butter (i.e., around $146 million at $10.10 CCC prices). Excludes Residual Manufacturing Costs. Freedom to Farm costs are the transition payment ($0.10/cwt) times total milk production (145,970 million pounds).

f) Note that the House Compromise and Dairy Title do not have budget assessments to offset the cost of the government price support and DEIP programs. The lack of assessments explain why the projected Dairy Title government costs are higher than BASE despite lower CCC purchase prices.

g) Total Government Endogenous Costs does not include the costs of Government purchases to meet the 5 year average Domestic Donations of butter, NDM, and American Cheese (71.3, 27.5, and 102.8 million pounds respectively) assumed to be exogenous ONLY in the BASE scenario. At 1993 support prices, the cost of these donations would be around $200 million.

The House Compromise (1/25/96)

The *House Compromise* proposed a package of complex significant policy changes affecting fluid and manufacturing milk markets. Each of the major policy provisions is listed here separately, but, it must be stressed, the impacts of the proposal depends on their simultaneous implementation.

- Existing federal and state milk marketing orders are retained but *minimum* fluid prices are kept 2 years at $12.87 plus BASE Class I differentials. These relatively high minimum prices reflect the tight milk supply (due to unusually hot weather and high grain prices) that characterized the U.S. dairy sector in the fall of 1995.

- A national pool is created for $0.80/cwt of fluid revenues at the average U.S. Class I utilization (about 40 percent).
- California fluid milk protein standards are imposed nationwide; this raises the nonfat solids in fluid milk (as well as fluid prices) and raises the demand for nonfat solids.
- The California marketing order is retained, but California participates in the national Class I pool.
- The price support on butter and NDM is eliminated.
- The producer assessments are eliminated.
- Price support on American cheese is raised from $10.10 (in the BASE) to $10.35. The cheese support is phased down $0.10/year for 5 years generating a 5 year average support level of $10.15/cwt ($1.125/pound versus $1.12/pound in the BASE) which we use in our simulations.
- The most complex change is the creation of a 50 percent Class IV pool to replace the government purchase program for butter and NDM. This program is similar to a farmer financed, target price-deficiency payment scheme where 50 percent of the difference between the cheese support price and the price of milk used in butter and NDM evaluated at world market prices (roughly $6.20/cwt under our low world price scenario) is recovered from a national pool that is assessed on all dairy farmers on the basis of their production. An assessment of about $0.16/cwt on all milk in required to cover 50 percent of the losses from dropping the price support. By maintaining a price differential, this program provides considerable incentives for manufacturers to make cheese rather than butter and NDM. Offsetting these incentives are a generous "make allowance" on butter/NDM production ($1.60/cwt) and the nationwide California fluid standards which raises demand for nonfat solids and shifts milk away from cheese. Due to these factors, in the simulations we assume exogenously that NDM production expands a minimum of 10 percent over BASE quantities.
- The domestic donations of about 2.4 billion pounds (METS) that are included in the BASE scenario are dropped.

Two additional elements contained in the *House Compromise* proposal are not modelled. Neither the stand-by pool nor the unspecified reform of federal marketing orders that is to occur after 2 years have specific or quantifiable elements that lend themselves to explicit modelling. Therefore, rather than speculate on their form, these policy elements are not included in the simulation of this option.

Under the *House Compromise*, butter and NDM prices fall to near world market levels, hence facilitating exports. To the extent that the Class IV pool successfully shifts milk into export markets and tightens domestic markets for other products (cheese, fluid, soft, and frozen products, etc.), the U.S. dairy industry would gain revenue by reducing supplies along inelastic product demand functions.

Due to the very high minimum fluid prices and the additional solids fortification induced by nationwide California fluid standards, this scenario is projected to increase fluid prices by about 10 percent ($1.45/cwt, 12.5 cents/gallon), decrease fluid production and consumption by about 2 percent (1.0 billion pounds), and increase fluid revenues by about 8 percent ($621 million, Table 3). Given that aggregate milk production rises by 0.7 percent (roughly 1 billion pounds, Table 4), there is considerable additional milk available for manufacturing usage which tends to lower prices and revenues for milk used to produce manufactured dairy products.

The simulations suggest that the combination of California fluid standards nationwide and Class IV pooling as modelled here, successfully raise domestic prices. By construction, NDM production expands 10 percent above BASE levels (as does butter) (Table 3). Butter prices fall by 11 percent (7 cents/pound) and NDM prices fall by about 43 percent (in both cases the resulting prices are equal to prices prevailing in world export markets). Production of residual manufactured products, a key source of milk solids used in fortification (whey solids, evaporated/condensed milk, whole milk powders) fall by 10 percent (422 million pounds). Total cheese production falls by about 2 percent (147 million pounds) while American cheese declines by 2 percent (67 million pounds). American cheese prices fall slightly relative to BASE, while prices of Italian cheese and other cheese rise (11 percent and 2 percent), hence generating added revenue from these cheese markets (Table 3). The CCC purchases 116 million pounds of American cheese at 1.125/pound ($128 million), generating a 70 percent decrease in total government outlays relative to BASE (Table 6).

Farm level results, summarized on a regional basis in Table 4, indicate that producers in several markets with high Class I utilization (e.g., North East, South Atlantic, South East, Central, East South Central) tend to have lower prices, production and revenue relative to the BASE scenario. These losses, however, are generally quite small (less than 1 percent). Further, the precision of the model means that regional changes of this magnitude cannot be distinguished confidently from no change. The higher fluid prices and more Class I revenue induced by this policy are offset by losses due to national Class I pooling. It should also be noted that the losses in the high Class I utilization markets are considerably less than under the *Freedom to Milk* deregulation scenario.

Regions with low Class I utilization have modest price and revenue gains relative to the BASE scenario, generally in the range of 1 percent to 2 percent for price, and slightly higher for revenue (2 percent to 4 percent). Regions such as California, the Upper Midwest, and the North West have slightly higher gains—3 percent to 5 percent on price and about 3 percent to 5 percent on revenues (Table 4).

Average farm prices are projected to rise by 1.7 percent (22 cents/cwt) and production increases by 0.7 percent (1 billion pounds). Aggregate farm revenue increases by 2.4 percent ($458 million, Table 4). Wholesale costs to consumers are projected to rise by 3 percent

($567 million) over the BASE (of this the costs rise by 8 percent, or $621 million, for fluid milk consumers and decline for consumers of other products). Government purchases of American cheese decline slightly from the BASE scenario and total government outlays decline by 71 percent ($314 million, Table 5).

Due to the Class IV pool and elimination of price supports, butter exports increase by 80 percent to 575 million pounds while NDM exports dip by only 5 percent to 365 million pounds (Table 6). These results indicate that the Class IV pool, as modelled in this scenario, successfully increases commercial exports of butter and NDM.

The 1996 FAIR Act Dairy Title

The dairy policy reform that became law in April 1996 calls for much more modest changes from the BASE than the two scenarios just discussed. While a number of detailed provisions are included in the law, the reforms that have quantifiable implications for milk markets are few. (See Jesse and Cropp for a detailed discussion of the dairy provisions of the FAIR Act.)

The 1996 FAIR Act Dairy Title provides marginal changes from current policy over the next 3 to 5 years. The dairy price support program is phased down 15 cents/cwt per year from $10.35/cwt, and completely eliminated by the year 2000 (at which time it is replaced with a recourse loan program). Given the recent strength of dairy product markets (which is likely to continue for several years due to high grain and other feed prices), the impacts of phasing out federal price supports will likely be minimal. However, assessments on dairy producers are eliminated immediately, which does have a direct impact on producers. Section 102 of the 1990 Food Agriculture Conservation and Trade Act (which mandated that no state could use manufactured product to make allowances higher than used under the federal dairy price support program) is repealed. This provision was never implemented and it's repeal will have minor (if any) impacts.

The 1996 Dairy Title does not provide for any specific changes in federal or California milk marketing orders—BASE classified pricing and Class I differentials, and current California pricing (with California fluid standards in California) are all maintained in the simulation. USDA is required to consolidate current orders to between 10 and 14 within three years. USDA is authorized to consider using both multiple basing points and fluid milk utilization rates in setting Class I prices in the consolidated orders, and to consider uniform multiple component pricing in designing a new basic Formula Price. Under this legislation, California may become one of the 10-14 federal orders (if California producers petition and approve a federal order). None of these provisions provide any directly quantifiable impacts on milk markets.

The 1996 FAIR Act Dairy Title extends and fully funds DEIP through 2002, authorizes USDA to assist in forming export trading companies, and authorizes the National Dairy Board to use funds for export market development. Other major provisions include the exemption of California from federal standards of identity for fluid milk (that is, it explicitly allows California fluid standards in California) and allows the Secretary of Agriculture to authorize the Northeast Dairy Compact (which allows northeast states to collectively set higher minimum fluid prices than mandated under the federal order structure) for a limited time and under fairly stringent conditions.

In terms of modelling, the Dairy Title of the FAIR Act of 1996 is almost identical to the BASE, but without budget assessments, and with a $9.90 milk price support that implies a reduction by 3 percent in the NDM price floor ($1.003/pound versus $1.034/pound at a $10.10/cwt milk price support) and a reduction by 3 percent in the American cheese price floor (to $1.098/pound). Butter supports are kept unchanged from the BASE at $0.65/pound. This scenario as modelled, does not incorporate any market order reform nor any Northeast Dairy Compact effects. Lastly, this scenario drops the government domestic donations (of 2.4 billion pounds METS).

The 1996 *FAIR Act Dairy Title* scenario has minimal impacts on wholesale fluid markets: average fluid prices fall by 1.7 percent ($0.24/cwt) and production increases by 0.3 percent (166 million pounds) compared to BASE. Lower American cheese and NDM incentives (due to the lower $9.90 versus $10.10 price supports) result in a decline in American cheese production by 4.4 percent (137 million pounds) and a decline in NDM production by 1.6 percent (16 million pounds). Other wholesale level changes are minimal (see Table 3).

Farm prices and revenues are projected to decline slightly relative to BASE in all regions (see Table 4). Across the regions listed in Table 4, milk prices fall 1 percent to 2 percent while milk revenues fall by 1 percent to 3 percent. The National average milk price falls by about 1 percent (14 cents/cwt) while aggregate milk revenues decline by 1.7 percent ($322 million). Aggregate producer surplus falls by 0.8 percent ($21 million) (Table 5).

Aggregate consumer expenditures (at wholesale) fall by 1.4 percent ($269 million) while consumer welfare increases by 0.8 percent ($35 million) (Table 5). Annual government expenditures due to the price support program are projected to be $522 million after a 3 to 5 year adjustment period. This is an 18 percent ($81 million) increase over BASE. Under this scenario the government purchases 31 million pounds of American cheese, 473 million pounds of butter, and 353 million pounds of NDM (Table 6). In contrast to the BASE scenario, however, there are no budget assessments to offset the cost of these purchases. Therefore net government expenditures increase despite the considerably smaller purchases of American cheese compared to BASE. DEIP expenditures are about $94 million. If these projections do prevail, there will likely be pressure to manage these levels of butter and NDM removals, (beyond the DEIP limits) to avoid the build up of government stocks.

No CCC: With Alternative Assumptions on World Prices

Under the FAIR Act the federal dairy price support program is scheduled to end by the year 2000. It is therefore of particular interest to consider the impacts of alternative world market prices for butter, NDM and cheese at the end of a 3 to 5 year adjustment period. Two scenarios were examined that are identical to the 1996 FAIR Act Dairy Title except that they drop butter, NDM, and American cheese price supports and allow domestic prices for these products to fall to world market levels. Given our uncertainty over future world market prices, both low and high world market price assumptions are used to provide bounds on the likely impacts of elimination of the federal dairy price support program by the year 2000. As mentioned earlier, the low world price assumptions yield butter and NDM milk equivalent prices around \$6.20/cwt; whereas the high price scenario yields milk equivalent prices of about \$8.50/cwt (see footnote 2 for more detail).

The impacts on the wholesale fluid sector are considerably larger when product prices are allowed to fall to the world prices rather than being supported at the U.S. government purchase prices as was assumed under the *FAIR Act Dairy Title* scenario. Average fluid prices decline by 6.6 percent (\$0.92./cwt) with low world prices and by 3.3 percent (\$0.46/cwt) under the high world price assumptions (Table 3). Given these lower prices, fluid milk production and consumption is projected to expand by 1.2 percent (633 million pounds) under low world prices and by 0.6 percent under low high world price assumptions. Domestic prices for American cheese fall sharply (10.4 percent) under low world prices, (5.1 percent) under high world prices, but do not fall to world market levels in either scenario. American cheese production falls by 4 percent to 5 percent, while total cheese production falls by 1.7 percent under low world price assumptions.

Butter and NDM prices adjust to world market levels under both of these scenarios. As shown in Table 3, aggregate butter price declines by 8.9 percent (5.4 cent/pound) under low world prices, but increases by 14 percent (9 cents/pound) under high world prices. Butter production falls by roughly 4 percent (50 million pounds) under both scenarios. Commercial exports remain strong (403 million pounds) under low world prices, but decline sharply to 70 million pounds under high world prices (Table 6). The impacts of world market prices on wholesale NDM markets are even larger: NDM prices decline by 42 percent under the low world price conditions and by about 23 percent under high world prices. Similarly, NDM production also declines by about 23 percent under low prices but by 13 percent with the high world price assumptions (Table 3). Note that commercial exports of NDM drop sharply under both of these scenarios: exports decline by 83 percent to 52 million pounds under low world price assumptions and by 50 percent to 192 million pounds under the high price assumptions (Table 6). Aggregate consumer expenditures (at wholesale) decline by 4 percent (\$750 million) while consumer surplus increases by 2 percent (\$86 million) under low world prices. With high world prices consumer costs fall by 2.8 percent and consumer surplus rises by 1.5 percent (Table 5).

Given these wholesale market impacts, it is not surprising that farm prices and revenues in all regions are projected to decline relative to BASE under both of these scenarios: the ranges are 1 percent to 6 percent under low world prices and 0.4 percent to 4.4 percent under high world prices. Average U.S. milk prices are projected to decline 4.3 percent or 55 cents/cwt relative to BASE under low world prices (the effect is roughly half as large under high world prices) (Table 3). Across the regions shown in Table 4, milk revenues decline by 1 percent to about 13 percent under low worlds prices, and decline by

0.5 percent to 10.4 percent under high world prices. Table 5 provides aggregate producer effects. Aggregate milk revenue declines by 6.6 percent ($1.251 billion) and producer surplus declines by 3 percent ($81 million) under low world prices. Under high world prices, milk revenues fall by 3.7 percent ($0.694 billion) while aggregate producer surplus declines by 1.6 percent ($44 million). Under both of these scenarios, there are no government expenditures because there are no price supports.

CAVEATS AND MODELLING LIMITATIONS

The Dairy IRCM used to assess the likely impacts of these alternative policy scenarios has several limitations that should be mentioned again before proceeding to the concluding section. First, the model measures the impacts expected to occur over a 3 to 5 year adjustment period and assumed that all dairy products have equilibrium prices based on the prices of the milk components used in their production. However, the BASE model results suggest that the U.S. dairy sector does not yet price fully on a component basis. Further, the model does not incorporate shipment of intermediate products (skim milk and cream) and does not allow for reconstitution. Additional research is underway to address these limitations.

Also, the model specifies relatively elastic regional supplies of manufactured products. That is, the model does not incorporate "brick and mortar" with respect to regional processing capacity, hence likely allows for more change in regional processing profiles than might be expected to occur over a 3 to 5 year period. Thus, the results provide an indication of what regional processing would look like if the U.S. dairy sector maximized returns to farm level milk components.

The model also does not incorporate the impacts of additional factors such as changes in and impacts of NAFTA and GATT, emerging markets (both on the supply and demand side), trade disputes, world supply demand balance, etc. Given the nature of U.S. trade policy for dairy, we do not see these omissions as crucial.

The Dairy IRCM demonstrates the kinds of changes in production, prices, and interregional trade that would likely occur if federal dairy programs were modified. The model emphasizes that prices are interrelated among regions and products. It also shows how, as a result of these interrelationships, changes that have primary effects in one region or on one product spill over into all other regions and products. This is particularly true for the impacts on regions with high Class I utilization and fluid production versus regions specializing in production of manufactured dairy products.

The Dairy IRCM does a reasonably good job of representing the complex U.S. milk marketing and pricing system, but it is only a mathematical simulation model. Its projections must be interpreted carefully and tempered by market experience and intuition. Any model must be used as only one tool among many that should be used together in the process of gaining an understanding of the potential impacts of changes in agricultural policy.

SUMMARY AND IMPLICATIONS OF THE ANALYSIS

The simulations discussed above have emphasized a variety of national and regional impacts of several policy options (and two additional variants) on prices, production, and industry revenues within the U.S. dairy sector. It may be useful to summarize the underlying economics that drives the implications of each policy before going on to consider implications for Canada-U.S. dairy trade and trade relations of the dairy policy changes in FAIR Act of 1996.

The proposals considered in the dairy policy debate that lead to the FAIR Act had several common elements. None of these proposals included lower import barriers and all include full funding of export subsidies under the DEIP. Further, all proposals, provided for elimination of the dairy farmer assessments instituted in 1990 and reduced price support activities by the USDA. Before passage of the relatively modest changes included in the FAIR Act, the U.S. Congress seriously considered the much more dramatic changes in milk market regulations that were analysed in detail above.

The *Freedom to Milk* policy would have eliminated the price support program and the dairy marketing orders. Such a policy would reduce transfers to the dairy industry from both consumers and taxpayers. It would also allow changes in regional production patterns. The simulations indicate that the regional distortions created by marketing orders are so large that producers in major dairy regions that have relatively low milk prices, would gain from eliminating the whole system of support and regulations. Such a system would allow more milk to be produced in lower cost regions, but because the price of fluid milk falls and less milk is produced in high cost regions, the system also implies that more of that milk from California and the Upper Midwest would be used in fluid products. Therefore, given import barriers, U.S. dairy product prices remain above world prices and exports are minimal.

Another failed proposal, the *House Compromise* favoured by significant parts of the dairy industry, would have eliminated the government purchase program for butter and NDM, but raised the price support for cheese. It also included a whole set of complex rearrangements of subsidies and pricing regulations that would have left dairy markets at least as heavily regulated as before. The *House Compromise* policy is such a complex mix of program changes that it defies simple summary. It is clearly not deregulation and increases, rather than reduces, many of the distortions of the current system. As may be observed from Tables 5 and 6, this proposal shifts an even higher proportion of the dairy program subsidy from tax payers to consumers of dairy products. It also shifts some of the consumer cost to domestic consumers of cheese relative to consumers of butter.

The increased use of non-fat solids in fluid milk also increases the transfers from fluid consumers to producers of NDM. By eliminating the price support on butter and NDM, the proposal could facilitate export of these commodities, but little increase in exports is projected under our analysis. Export expansion is limited primarily because regional and product realignments predominate and because increased use of NDM to fortify fluid milk reduces the availability of NDM for export. The two new national pooling schemes together with the different treatment of NDM and butter relative to cheese seem to keep the mix of manufactured products similar to what is produced now. There does, however, seem to be an incentive for reduced production of butter and NDM relative to cheese in the period over which the price support would have been binding.

The FAIR Act gradually reduces the support price over 4 years from $10.35 in 1996 to $9.90 in 1999 and eliminates the price support program for subsequent years. The FAIR Act includes some language encouraging modifications of the marketing order system, but provides little guidance as to the form of the new price or marketing regulations. The simulations reported as *FAIR ACT DAIRY TITLE* in Table 3 through 6 include the effects of the price support reduction to $9.90 and the elimination of the producer assessment The elimination of the price support program that is a part of the FAIR Act is considered in the two final simulations. These simulations indicate the FAIR Act implications (relevant for the year 2000 and beyond) under two alternative projections of world dairy market conditions. Thus, to understand the likely effects of the dairy policy changes that the United States adopted in 1996, we should consider each of the final three simulations.

The three simulations used to represent the FAIR Act all show lower milk prices, lower farm incomes, and lower consumer costs in the United States. Because there is no marketing order reform, there is little regional variation in the losses to producers except that producers in regions that rely most on production of manufactured dairy products lose slightly more than producers in other regions.

Each of the simulations presented respond to the question: under market conditions that prevailed in the base period (roughly 1993), what would have been the outcome if, instead of the policies that prevailed at that time (BASE), the United States would have had specific alternative policy? For the FAIR Act program we examine this question, under the assumption of relatively low world dairy prices, first for the period for which the price support of $9.90/cwt applies (scheduled for 1999 under the FAIR Act). We then examine the question again, under the case of no price support program (which is terminated after 1999 under the FAIR Act). Because of the potential importance of world market conditions when the U.S. price support has been eliminated we examine this last case again with a higher set of world dairy prices.

Note that these simulations are not designed to provide predictions of the most likely implications of the FAIR Act for the 1996-2002 period. The underlying market conditions expected over the life of the FAIR Act have important implications for its effects, and these market conditions are likely to differ from those that prevailed in the 1993 base period. However, comparing the simulations to the base, and to each other, helps us better understand the alternative polices.

During 1995 and 1996, high grain prices and other factors have caused the price of milk and dairy products to be relatively high—well above the USDA purchase prices for cheese, butter and NDM. The result has been very low USDA acquisition of stocks and very low government costs. If these high price conditions were to continue, say because grain prices continue to be high, then a gradual elimination of the price support program would have little effect. If simulations were prepared under the conditions of high underlying milk prices, then we would find quite minor consequences of the FAIR Act, under either the $9.90 support price or under elimination of the price support program. With high market prices the price support program becomes almost irrelevant and major impact of the FAIR Act would be the elimination of the producer assessment.

The FAIR Act was prepared when many projections were that high grain prices and relatively high prices for milk would continue. This allowed analysts to conclude that the price support program provided limited gains to producers which were easily offset by the elimination of producer assessments. Further, by allowing market forces to have more influence over the relative prices of manufactured dairy products, the FAIR Act might facilitate exports of some dairy products during periods when U.S. prices are low or world prices are high.

Our simulations show that the provision for a lower support price does affect farm prices and incomes directly when market conditions are such that relatively low U.S. prices and low world prices prevail. No one really knows what market conditions will be over the next 7 years and, properly interpreted, the simulations provide useful guidance to potential consequences of the FAIR Act over this period.

CONCLUSION: IMPLICATIONS FOR RELATIONS WITH CANADA

What are the implications of these policy options for dairy trade and trade relations with Canada? First, it should be stressed that, with present barriers in place, there are few if any direct effects of U.S. policy on exports to Canada, Nor, with U.S. barriers and the current Canadian policies, are there direct implications for imports from Canada. No proposed U.S. dairy program could lower the Canadian tariff wall or reduce U.S. prices enough that product would flow over that wall. That said, each of the policies considered may change trade incentives or otherwise affect the political pressures on trade policy.

Policies such as *Freedom to Milk* would allow a more market oriented domestic industry with declining product prices. A new orientation, plus reduced total revenue and lower prices might increase pressure for more access to Canadian markets. Offsetting this effect, however, is reduced price discrimination in the U.S. This means that low-cost production regions that had produced mainly manufactured dairy products, shift more milk to fluid uses. As a result, average milk prices in these low cost regions are projected to rise.

The key question for this option is: what sort of political pressures on trade would emerge in a much less regulated dairy industry?

The House Compromise proposal would have reshuffled, but not dismantled the array of dairy policy tools. It would have modified intra-industry revenue flows from the existing price discrimination pattern and creates new price discrimination instruments. None of this affects trade with Canada directly, but lower prices of potentially exportable butter and NDM might have increased pressure for exports to Canada. If such pressure on Canadian policy were to occur, Canadians would be sure to point out the export subsidy characteristics of the House Compromise Class IV pooling program. This policy, by transferring revenues within the industry, while simultaneously raising U.S. consumer prices and lowering potential export prices, could be seen as an indirect export subsidy under the Uruguay Round agreement (Sumner).

Let us conclude with a discussion of the most likely effects of the FAIR Act for dairy trade and trade relations with Canada. Consider the case of a gradual or partial opening of the U.S. - Canadian border, as discussed, for example, in the Barichello and Romain chapter in this volume. Their analysis of Canadian milk quota programs suggests that, with lower border barriers, the potential for imports from the United States would most likely be met by a reduction in the regulated high prices in Canada and lower quota rents rather than by an attempt to maintain high prices in the face of imports. Further, the lower the effective potential import price from the United States, the more Canadian prices must decline in order to avoid imports. Barichello and Romain, among others, argue that U.S. prices have been high enough, and Canadian quotas tight enough, so that the effect of much lower tariffs would be much lower prices in Canada, and that no trade need actually occur. Clearly, information about the effective export prices of dairy products from the United States is vital in determining the effect of lower tariffs on milk prices and quota values in Canada. The FAIR Act has direct implications for those potential export prices.

The direct impact of the FAIR Act is to reduce the support prices for manufactured dairy products that are most heavily traded on world markets. The simulations show that the FAIR Act allows the prices of NDM and cheese, in particular, to decline relative to the BASE. Further, the FAIR Act continues the marketing order system which, through price discrimination, lowers the price of manufactured dairy products. Marketing orders also restrict trade of milk within the United States and create many regional markets. Our simulations show that the FAIR Act lowers farm milk prices most in several regions, such as the North West, California and the Upper Midwest, which may be most suited to export to Canada. We do not include simulations to project exports to Canada under alternative Canadian policies, but the factors just discussed indicate that the FAIR Act would place additional pressure on Canadian milk prices and quota rents, and increase the potential for exports to Canada from the United States.

The additional trade pressure may raise some additional trade tensions. By scheduling the elimination of the price support program, the FAIR Act makes the price discrimination aspects of U.S. dairy policy more transparent and important. As noted above, U.S. policies may cause the price of milk used in potential export products (such as NDM and butter) to be below the price of milk received by U.S. producers (which is a blend price) and below the average prices paid by buyers who make products directed towards the domestic market. (This average is more likely to include products required by marketing orders to be made with higher priced milk.) If lower tariffs between the United States and Canada eventually open the border to potential trade, this stimulation to exports implied by U.S. policy may well raise concerns or objections within Canada.

Finally, it should be noted again that, in 1995 and 1996, dairy product prices in the United States have been well above the support prices. If these market conditions were to continue, the FAIR Act would have relatively little effect on potential export prices except that producer assessment that raised cost of production most for the most efficient producers have been eliminated.

Even though none of the policy options we have considered has direct consequences for trade flows under present import barriers, each does have implications that may affect pressure for changes in trade relations, and they do have export implications if trade barriers are reduced. We do not speculate here on the likelihood of major reductions in border barriers. U.S. import barriers may not be as high or as distorting as those in Canada, but they do create a major subsidy for the U.S. dairy industry, and seem to be politically secure. This could make it difficult for the United States to advocate open markets for dairy trade. But, of course, nations seldom find it troubling to condemn another country's policies, even when they have similar distortions at home.

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PROSPECTS FOR THE CANADIAN DAIRY SECTOR FOLLOWING THE UPCOMING NAFTA PANEL RULING

Richard Barichello and Robert Romain

On October 3, 1987, Canada and the United States signed a Trade Agreement (CUSTA) which came into force on January 1, 1989. Included in this agreement, all tariffs on dairy products which were not on the Import Control List (ICL) subject to GATT rules were to be eliminated over ten years. Products not included on the list at the time of signing the agreement included ice cream and yogurt. Canada added these products to the ICL early in 1988. A GATT Panel ruled that such action was illegal basically because these processed products were not considered to be "like products" to raw or liquid milk to which the Article XI provisions of the GATT applied, provisions that allowed import quotas if certain restrictive conditions were met. Canada refused to withdraw these products from the ICL, deferring action on this issue until GATT negotiations were completed. Canada argued that GATT Article XI would be made more restrictive, thus legitimizing its action.

In 1992, Canada signed the North American Free Trade Agreement (NAFTA) which involved three bilateral agreements among the three partners. The CUSTA was folded into the NAFTA as the bilateral agreement governing trade between Canada and the United States.

As a result of the Uruguay Round Agreement (URA) of the World Trade Organization (WTO, formerly the GATT) signed at the end of 1993, all quota and non-tariff barriers have to be translated into tariff-equivalents. In addition, export subsidies and subsidized volumes have to be gradually reduced over a period of 6 years starting August 1, 1995. Minimum access commitments are also established. Tariffs for specific supply managed products and processed products manufactured with the raw commodities were proposed by Canada and were accepted by all parties, including the United States. It is clear that the tariffs under the URA are very high and as a consequence, imports of dairy products and other supply managed products will be practically impossible until the next round of negotiations. However, there has arisen a difference in opinion between Canada and the United States regarding the application of NAFTA provisions to the tariffs created in the URA. The United States seems to argue that Article XI is no longer in the multilateral Agreement, that Canada has signed NAFTA which extended CUSTA for agriculture, and therefore Canada should eliminate all tariffs on agricultural products by January 1, 1998 as stipulated by Article 402:2 C in CUSTA. The underlying question is whether Uruguay Round Agreement (URA) tariffs that arose from the tariffication of previous non-tariff barriers fall under the disciplines of the NAFTA, or whether they are unaffected by that Agreement. A NAFTA dispute settlement panel, the first dispute heard under Chapter 20 of the NAFTA, has been convened to resolve this conflict to determine which trade agreement takes precedence.

Since the outcome of the dispute will not be known until the end of June at the earliest, the objective of this paper is to investigate the medium term implications, say over the next five years, of possible outcomes for the Canadian dairy sector. We will first discuss the case where the NAFTA Dispute Panel rules for the Canadian position. The alternative scenario assumes the U.S. position, that NAFTA dominates over URA, is upheld. In this second scenario, we will assume a series of smaller changes, however likely or unlikely they may be. First, however, the next section summarizes the role of the Canadian Dairy Commission (CDC) while the following section presents the recent modifications that have been made to the Canadian dairy policy and programs. These recent changes were not presented in the introductory paper by Agriculture and Agri-Food Canada, but they are important in analyzing the short-medium term evolution of the Canadian dairy sector.

THE CANADIAN DAIRY COMMISSION

Role of the Canadian Dairy Commission

The Canadian Dairy Commission (CDC) was established in 1966 by virtue of the Canadian Dairy Commission Act. The CDC is a crown corporation which administers the National dairy policy and its two objectives outlined in the Act are *"to provide efficient producers of milk and cream with the opportunity of obtaining a fair return for their labour and investment capital; and to provide consumers of dairy products with a continuous and adequate supply of dairy products of high quality."* (CDC Annual Report, p.16).

The Canadian dairy sector has been under supply management for over twenty five years.[1] The national plan which established the aggregate national quota (market sharing quota MSQ) for industrial milk was signed in December 1970 by the CDC, the provincial governments of Ontario and Quebec, as well as by producers representatives of these provinces. The other provinces gradually joined the national plan and all provinces had

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[1]See Coffin et al (1994) and Gouin (1987) for excellent descriptions of the origin and evolution of the Canadian supply management system.

signed the plan for the dairy year starting April 1st, 1974[2]. National quota is allocated to provinces according to historical market shares. The provincial quota is distributed among producers according to provincial legislation or regulations. In most provinces, a public quota exchange market exists and quotas are traded among producers.

To administer the National Dairy Policy, the CDC is responsible for setting the national MSQ which reflects estimated domestic requirements at the going price, as well as a small percentage of domestic production which is exported to the United Kingdom. To assure a "fair" return to producers, the CDC sets a target price for milk, which is partly based on calculated average costs of production using survey data from Quebec, Ontario, Manitoba and New-Brunswick, and it establishes support prices for butter and skim milk powder which, in conjunction with a direct federal subsidy, meets the target price. The CDC stores butter and skim milk powder in periods of overproduction relative to domestic needs and it also exports what is not needed domestically. Up to August 1995, the CDC was funding its operations through producers levies which were of two main types: "within-quota" and "over-quota" levies. These levies were paid by provincial marketing Boards and they were collected from producers through different means and levels specific to each province.

Recent Modifications to the National Dairy Policy

During the dairy year 1994-1995, sub-committees formed by the CDC worked heavily to adjust the national dairy policy and programs so they would be acceptable under the URA. This included substituting export levies collected from producers with another mechanism which would allow surplus production to be exported at world prices, and which would allow processors and manufacturers who use dairy constituents in products that are traded freely (or almost freely) on the world market to remain competitive.

A second major adjustment to the dairy policy is the elaboration of new Plans in the Offer To Purchase Program (OTPP), which should contribute to a more efficient allocation of milk among processors within a province and across provinces. This modification to the OTPP is coupled with the implementation of a national quota exchange market which will start its operations August 1, 1996.

The third significant modification is the implementation of an Optional Export Program (OEP) in order to take advantage of potential export markets. Each of the previous policy changes are further discussed in the next sub-sections.

From Levies to Special Milk Classes. Prior to August 1, 1995, the small export program as well as a few other programs administered by the CDC, programs which contributed to supply dairy constituents to processors who were operating in an internationally competitive environment, were financed with levies imposed on all milk produced within quota (within-

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[2]Newfoundland has never signed the National Plan because dairy production is almost non-existent in this province.

quota levies). Exports of dairy products manufactured with over-quota production were financed with over-quota levies. These levies were collected on a per hectoliter basis. Therefore, the "costs" associated with the national export program and a few other "legitimate" programs were shared among all producers, while individual producers who exceeded their quota were responsible for exporting the surplus of dairy products[3] (mainly butter and/or skim milk powder).

In order to comply to the WTO Agreement, a new mechanism had to be developed since levies can no longer be collected from producers, and milk used for export or in rebate programs has to be paid the world price to producers. As of August 1, 1995, provinces agreed to share a common classification for milk into five classes. The first four classes are for milk used to process domestic products and the pricing of milk in these classes reflects domestic requirements at the going prices. Milk used into exported products or in rebate programs, as well as milk produced over-quota fall into class 5 and is priced according to world price.

Since the distribution of industrial milk production is quite unequal across provinces,[4] it was determined not to be equitable that only producers in provinces with a large share of industrial milk quota bear the "cost" of the system, which also covers fluid milk production, for the whole country. In order to share the cost among all producers, provinces have agreed to pool all milk revenues, including fluid milk revenues, at the national level and then redistribute revenues according to the provincial share of all milk production.[5] Therefore, after a breaking in period, all producers will receive the same price for milk and adjustments will be made for processors to pay similar prices also.

As will be discussed further in a later section, the pooling of revenues from all milk at the national level created the opportunity to implement a national quota market. As of August 1, 1996, three provinces have agreed to participate in a national quota market where up to one percent of the provincial share of total milk production quota could be exchanged.

The Offer to Purchase Program (OTPP). Until August 1, 1995, two Plans were used in the OTPP. Under Plan A, the CDC purchased, at the support price, all butter or skim milk powder that a processor would produce but could not sell on the market at a higher price.

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[3]The final part of this statement is needs qualification. Provinces were responsible for collecting levies from individual producers and some provinces would collect levies higher than those assessed by the CDC to dispose of the products on the world market. This was done to discourage over quota production.

[4]Quebec and Ontario produce close to 80 % of all industrial milk in Canada.

[5]Presently, only six provinces have agreed to pool revenues from all milk. A parallel agreement has however been signed by all provinces, excluding Newfoundland since this province is not part of the National Plan, and this agreement is on pooling only a fraction of total revenue from all milk. It is expected that the three provinces which have not signed yet the agreement will eventually do so after further negotiations.

Plan A acted as a surplus removal mechanism. Plan B was used by processors to regulate their sales during the year. Under Plan B, processors sold butter (or a few other specific products) to the CDC but had to repurchase the product within one year at the same price. This program was self-regulating and processors used it to avoid carrying charges associated with holding the stock. Consumers paid the carrying costs.

The CDC was purchasing butter or skim milk powder when a processor could not find a market for milk that had been processed. However, it was possible that another processor in the same province, or in another province, could have marketed this milk at a higher price.[6] Since August 1, 1995, purchases by the CDC under Plan A will be made only to ensure adequate supply to the domestic market during seasonally deficient periods. When an adequate level of stock is reached, purchases under this Plan will be closed, as it is the case at the present time. The effective surplus removal program will henceforth be administered through two new Plans : Plan C and Plan D. When Plan A is closed, processors have to sell butter to the CDC under Plan C. For the CDC to purchase butter under Plan C, a processor has to declare its "surplus milk" before transforming it into butter, and the milk is offered to other processors in the same province, as well as to processors in the neighboring provinces. If the milk is not required by the other processors, then the CDC buys it at the world price and assures its disposal. Plan C has been put in place to insure that as much milk as possible could be sold in the domestic market at a higher value (Paquette, 1995). As of today, this Plan is not fully operational.

Purchases under D are used exclusively for conducting the small export program. Levels of export are determined by the Canadian Milk Supply Management Committee and milk is paid at the world price.

Optional Export Program. In the summer of 1995, provinces agreed to establish an optional export program (OEP). The administration of the program is the responsibility of each province. A processor who finds a market for a product has to approach its provincial Board to secure milk supply, and he has to be supported by the Board in its request to the CDC. The provincial Board evaluates if it could supply the requested amount of milk at a negotiated price with the processor. The OEP is not yet operational: only Alberta has submitted a proposal for export to the OEP Supervisory Committee.

The three major modifications to the national dairy policy have been implemented in order to comply with the WTO Agreement and they are likely to affect the evolution and the structure of the Canadian dairy sector in the next few years. This will be the case even if the NAFTA Panel decision favors Canada's position. The anticipated impacts as well as the probable modifications to the Canadian policy and programs in that case within the next five

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[6]Such a situation within a province was not possible in all provinces. In Quebec for example, the marketing agreement between processors and the Federation des producteurs de lait du Quebec was such that processors could be supplied with as much milk as they required if they were not manufacturing butter or skim milk powder. Milk was sent to butter plants only as a last resort. Of course, butter plants were not always pleased with this agreeement, especially in situations of cuts in the provincial MSQ. A similar policy was also in effect in Ontario.

years are treated in the following section under Scenario one. Scenario two discusses the situation where the Panel decision is less favorable to the Canadian position.

IMPACTS OF CURRENT AND ANTICIPATED CHANGES IN THE CANADIAN DOMESTIC POLICYON THE STRUCTURE AND EFFICIENCY OF THE DAIRY SECTOR

Before discussing different scenarios, one has to realize that a common factor will affect all scenarios: a decrease in direct government support. Since the mid-seventies, the federal government contributed \$6.03/hl to the target price. This support level was reduced by 10 percent in August 1993. In 1995, the federal government announced a further reduction of 30 over two years.

Scenario One: Panel Decision Favours the Canadian Position

A panel ruling in Canada's favour does not mean that pressures on adjusting the supply management system will end. All stakeholders in the industry are well aware that the next round of multilateral negotiation, which will start sometime in 1998, will certainly focus on a phase out scheme of the high tariff rates imposed by several countries on different commodities. However, due to the rigidity of the system, the impacts on the structure of the industry and on gains in efficiency at both the production and the processing levels are not expected to be large. Nonetheless, the recent modifications in the national dairy programs will allow economic forces to begin indicating where milk production and processing would concentrate in Canada in a freer trade environment. Moreover, the recent adjustments in the dairy programs will likely generate more pressure from producers themselves in order to further liberalize the industry in Canada within the next five years. The reasons underlying the above statements are presented in the following sub-sections.

Evolution of the Structure and Efficiency of the Production Sector. The background paper by Agriculture and Agri-Food Canada summarized the structure of the dairy sector. The major characteristics of the production sector are threefold. First, total milk production has remained at about the same level over the last thirty years, but the number of dairy farms has decreased significantly (Figure 1). Actually, the decrease in the number of farms during this period has been similar to that observed in the United States (ISTC 1991). Over the last twenty years, the average herd size in the two major producing provinces, Quebec and Ontario, has shown minimal increase, while the average herd size has grown slightly in the other provinces (Figure 2).

The second structural change that occurred over the last two decades is the significant increase in average yield per cow, which has kept pace with that observed in the United States as shown in Figure 3. However, average yield per cow in Canada has always been lower than that in the United States. Some could argue that this may be due in part to supply management, especially when one notes that the gap between yields in Canada and in the United States has increased since 1989 when significant cuts in the national MSQ occurred. When farmers increase their productivity per cow, they have to purchase the equivalent amount of quota in order to market the milk, or they have to accept a much lower price for over-quota production. Farmers realize they will overproduce their allocation towards the end of the dairy year and, of course, quota prices increase at that time due to increased demand. Since over-quota production levies are high, it may be a rational economic decision to cut variable costs for the remainder of the dairy year and reduce production to comply with the current quota level. The incentive for increased efficiency is therefore reduced.

Figure 1. Number of Dairy Farms per Province

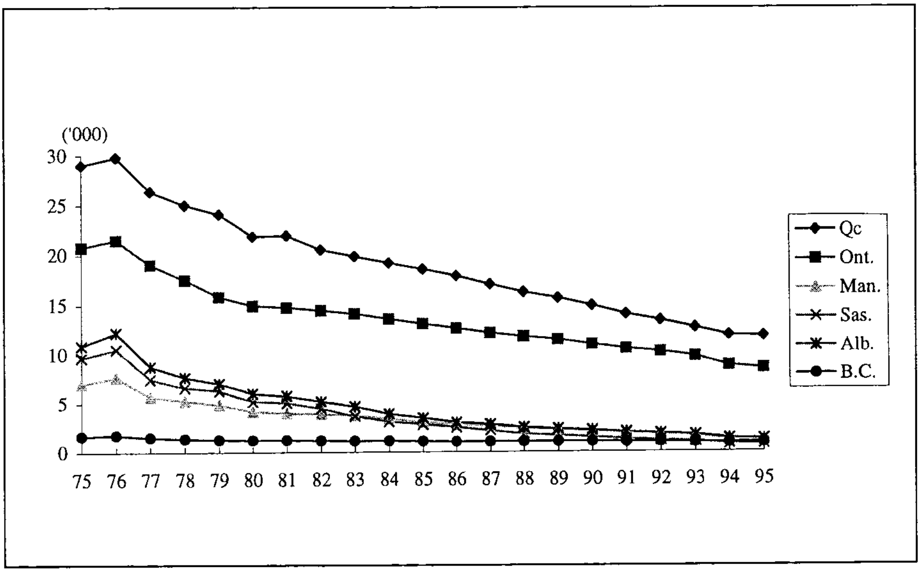


Figure 2. Average Herd Size per Province (Cows/Farm)

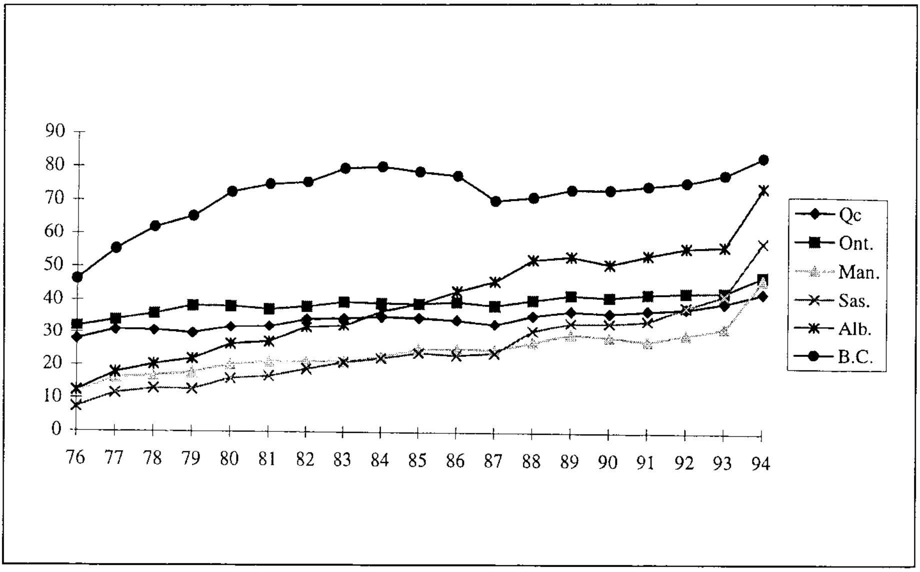
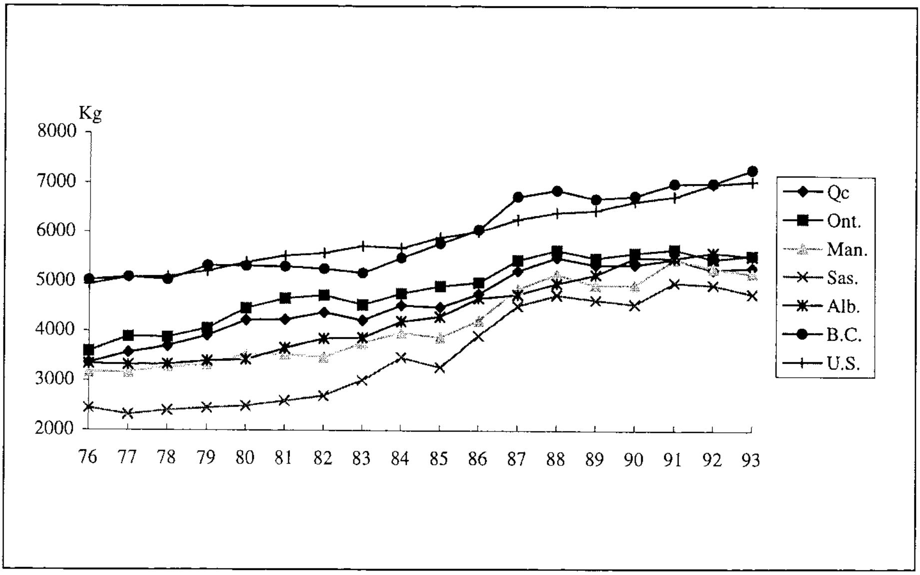


Figure 3. Average Yield per Cow, Canadian Provinces Vs United States



Another structural characteristic of the sector is the stability over time of the provincial allocations of the national MSQ. Provincial allocations of the national MSQ are mainly based on historical market shares. Pressures have been growing over the last several years to implement a national quota exchange market. However, since quota regulations and the milk pricing structures are specific to each province, and because they vary significantly across provinces, an agreement on implementing a national quota exchange market was never reached. Harmonization of provincial disparities were first required to insure a level playing field for all producers across provinces.

Moreover, the relative share of fluid milk quota to industrial milk quota varies across provinces. Therefore, producers located in a province with a relatively high ratio of fluid to industrial milk quota would have had a relative advantage to bid in a national quota exchange market. Indeed, their average revenues would have been higher: fluid milk price is higher than industrial milk price and producers usually own both types of production quota.

The agreement on pooling revenues from all milk that was reached by provinces in order to keep supply management operational within the country, and equitable across producers while complying with the rules under URA, created the opportunity to implement a national quota exchange market. Even though the harmonization process is not complete yet, this market should be operational soon. Once the harmonization process is complete, revenues on a per hectoliter basis will be similar across provinces, and the competitive and comparative advantages of each region for milk production will be reflected in the price producers are willing to pay for quota. The initial provision of the agreement on a common quota market is that a province can withdraw from the exchange market when its net loss to other provinces reaches 1 percent of its provincial share of milk production, including both fluid and industrial milk.

The expected implications on the structure of the dairy sector of the previously mentioned modifications to the national policy over the next five years are small. However, the direction is clear: less efficient producers will have greater encouragement to sell quota, leading to more consolidation of farms at lower production costs. Due to pressures to comply with the URA, all provinces will likely reach an agreement to pool milk revenues from all milk[7] and a truly national quota exchange market will become operational. The interprovincial movement of quota is difficult to predict and this is why the agreement among the provinces includes the possibility for a province to withdraw from the common exchange market when it has lost 1 percent of its provincial share.

Very few studies have investigated the potential impact on production allocation within the country of removing interprovincial barriers. Ewasechko and Horbulyk (1995) analyzed the interprovincial reallocation of MSQ for industrial milk using a linear programming model where the objective function minimizes the cost of producing and transporting milk in Canada. Their results suggest that there would be significant

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[7]See footnote 5.

modification to the present allocation, and all provinces west of Quebec would increase their production level; Quebec and the Atlantic provinces would be net losers. However, the authors mention several limitations to their analysis, including the lack of standardized production cost data as well as the fact that they have not accounted for the costs of processing and manufacturing dairy products. Another limitation to their study is that they have not accounted for the relative levels of economic efficiencies across provinces and they have not included quota prices in their analysis. This seriously limits the benefits of their results in policy analysis.

Another study by Lambert *et al* suggests that the implementation of a quota market between Ontario and Quebec would shift milk production from Ontario to Quebec. This result is contrary to that of Ewasechko and Horbulyk. However, Lambert et *al*'s approach accounts, indirectly, for the relative levels of economic efficiencies between the two provinces by reflecting the willingness to pay for quota. Their model is based on estimated demand for and supply of quota equations for both used and unused quota markets, and the equations include several variables to account for different administrative policies between the provinces. Results show that as much as 5 percent of Ontario's industrial milk quota would be purchased by Quebec producers within one year. Results also suggest that the price of other agricultural commodities would significantly affect interprovincial quota transfers. However, the time frame of their analysis did not reflect similar milk pricing structures nor similar quota regulations across provinces, and this would likely affect quota movements.

Lambert *et al* did not analyze the implementation of a national quota exchange market, but the data presented in Tables 1 to 3 suggest that a likely result of such a modeling exercise would be the concentration of industrial milk production in Quebec, Ontario and British Columbia. Indeed, quota prices in the other provinces are lower and the quantities transacted are relatively small. Using a similar econometric modeling approach, one would have to invoke the Lucas critique (1976),[8] and expect significant changes in the would be estimated parameters, in order to argue that milk would continue to be produced in all provinces. For this reason, it is likely that there will be pressures from producers in provinces with comparative advantages in dairy production to increase the 1 percent limit on interprovincial transfers, and this would contribute to increase the economic efficiency of the supply management system.

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[8]Lucas argued that people adapt their expectations, and therefore their behaviour, to the new environment when a significant policy change occurs, and estimated parameters using conventional econometric techniques are no longer reliable.

Table 1. Prices and Quantities Traded of Unused Quota of Industrial Milk per Region*

Year	PEI		NS		NB		Quebec		Ontario		Man.	Sask.		Alberta		BC
	P	Q	P	Q	P	Q	P	Q	P	Q	P	P	Q	P	Q	P
85-86	10.18	50.18			14.85		25.11	1188	25.26	1034				7.94	194	
86-87	10.94	27.19			18.38		25.79	1576	20.47	997				13.04	68	
87-88	10.82	50.30			14.51		26.21	1316	21.39	1013				19.37	147	
88-89	7.88	42.70			15.88		25.75	1548	21.94	1235				14.95	195	
89-90	8.19	38.57			18.87		24.55	1877	15.45	1457	16.40			12.41	223	
90-91	12.16	22.99			24.99		29.46	1598	21.36	1055	17.28			19.31	157	18.07
91-92	13.75	30.30			31.16		36.29	1046	28.71	834	18.71			20.94	111	20.82
92-93	20.50	11.87	35.18	52	33.54		37.17	1251	35.07	909	20.76			29.30	87	24.25
93-94	23.25	113.34	37.61	32	27.03	0.83	36.49	803	31.81	1581	21.12			23.86	117	29.33
94-95	24.24	89.11	37.88	128	27.48	1.02	40.04	950	37.44	1299	23.57	17.16	39.6	28.92	80	3350

* Data on quantities traded were not always readily available.

P = weighted price in \$/kg of b.f. Q = quantities traded in thousand kg of b.f./year

NS: single quota in kg of b.f./day starting Oct. 94. (Used and Unused markets). Expressed here in kg of b.f./year.

Manitoba: single quota including fluid and industrial milk in kg of b.f./day. (Unused market only). Data on quantities traded were not readily available.

Saskatchewan: single quota including fluid and industrial milk in litres/day. Expressed here in kg of b.f/year. (Unused market only)

Alberta: 1994-95 is incomplete. Until March only.

NB: Quota in \$/litres/day until Nov. 1990. Expressed here in \$/kg of b.f. Since Aug. 1993, single quota including fluid and industrial milk in kg of b.f./day. Expressed here in \$/kg of b.f./year. Data on quantities traded were not readily available prior to 1992.

BC: Prior to 1990, only fluid quotas were transacted and they included industrial milk allocation.

PEI: There is no fluid milk quota exchange and farmers receive their fluid milk quota according to their industrial quota basis.

Table 2. Prices and Quantities Traded of Used Quota of Industrial Milk per Region

Year	PEI		NS		NB	Quebec		Ontario		Alberta		BC
	P	Q	P	Q	P	P	Q	P	Q	P	Q	P
85-86	7.85	28.05			9.31	18.43	743.87	18.11	458.93	5.99	2795	
86-87	10.81	37.26			12.84	19.79	523.17	15.47	327.44	9.20	9.06	
87-88	10.58	44.20			12.70	20.48	560.29	16.32	367.54	13.45	31.61	
88-89	7.87	35.80			12.49	19.23	780.87	13.96	580.65	9.05	60.81	
89-90	8.03	18.89			12.29	18.45	699.60	11.81	560.60	9.13	48.32	
90-91	13.13	33.88			17.28	23.20	724.42	15.31	530.89	10.76	37.50	10.90
91-92	13.75	50.58			19.41	26.04	1255.22	20.15	791.14	9.36	17.70	12.75
92-93	19.70	10.04	27.55	28.72	25.14	31.00	653.12	26.18	665.55	19.23	27.33	15.31
93-94	18.06	72.82	31.66	31.20		30.25	388.49	26.36	619.09	19.80	61.29	23.00
94-95	21.46	44.83				33.81	379.58	28.79	985.74	20.11	39.64	24.00

See Notes of Table 1.

Table 3. Prices and Quantities Traded of Fluid Milk per Region

	NB	Quebec		Ontario		Alberta		BC
	P	P	Q	P	Q	P	Q	P
85-86	210.58	363.06	61219	281,92	89478			573,62
86-87	267.88	376.32	41439	275,68	76353			631,79
87-88	267.18	373.17	45511	263,42	81053			598,82
88-89	243.17	347.65	57023	266,59	110249			563,69
89-90	257.42	350.53	60636	241,85	119855			501,48
90-91	314.18	380.39	58122	286,44	104961	266,50	1545	409,66
91-92	303.17	35.27	519523	347,52	126709	281,72	8260	418,47
92-93	264.91	36.21	314160	370,78	98179	322,40	6905	483,25
93-94						299,53	10270	553,36
94-95						297,24	9295	598,14

P = weighted price in $/litres/day. Q = quantities traded in litres/day

See Table 1 for other notes.

The most important policy modification with respect to a potential increase in efficiency of the dairy sector is the implementation of the optional export program (OEP). Producers have always resisted the implementation of voluntary export programs for several reasons. An obvious reason is that producing milk at a lower price for foreign customers would not be seen favourably by Canadian consumers. Another important reason is that producers wanted to ensure compliance with the GATT Agreement and not put themselves in a position where they could be accused of dumping dairy products on the world market.

The impact of the OEP will depend upon the way it is administered by Provincial Boards in each province. Not all provinces have yet determined their administrative policies. Producers in Ontario have decided that the decision to participate or not in this program has to be taken collectively. Therefore, if processors find a market for a particular product and if the Ontario Milk Marketing Board accepts that they will supply milk to this market, it is a collective agreement and all producers are responsible to supply the agreed amount of milk. Operating the OEP in this manner has the advantage of sharing the risk and the marginal revenues among all producers but this will not fully use the potential benefit of the program for increased efficiency of the sector. Indeed, increased efficiency could be reached by allowing producers who can produce at lower costs to do so if market opportunities can be found, even if product prices may not be sufficient to satisfy high cost producers. Moreover, the potential for this policy to identify comparative and competitive advantages of both the production and the processing sector will be deferred.

There is a significant potential increase in Canadian production due to increased economic efficiency (Weersink et al, 1990, Romain and Lambert, 1995). Therefore, administrative policies which would allow different producers to supply milk for export at different prices could contribute to decrease pressure on quota prices as well as allow producers to increase their size of operation at a lower cost, and hence increase their competitive position. This, however, may diminish the overall power of the provincial milk marketing Boards due to a possible hole in the supply management system : producers will have more latitude in their production decision. Nevertheless, if the other provinces follow the lead of Ontario in their administrative policies of the OEP, the impact of this modification to the Canadian dairy policy on the structure and efficiency of the sector will be positive and small.

Another factor that will affect the performance of the OEP is the evolution of the target price for milk, which is set by the CDC twice a year (August 1st and February 1st). The Minister of Agriculture has announced a cut in dairy subsidy but producers want this cut to be picked up by consumers. Producers' argue that the target price is already well below their calculated cost of production and they cannot accept a lower price for milk. The previous cut in 1993 did not result in lower producers prices nor did the cut in 1995. Increases in the domestic demand, perhaps due to increased advertising of dairy products, increased consumption of industrial milk (dairy products) steadily since 1992[9]. However, the latest cuts in subsidy, which will account for increased milk price to processors of about a 3 to 4 percent in 1996, may have an effect on domestic demand for dairy products. If there is a decrease in domestic consumption, producers will face cuts in MSQ and this may put pressures to develop the OEP. Pressures will come from producers themselves because they will not want to invest large amounts of capital in quota purchases only to keep the same level of production, as they had to do in the 1988 - 1992 period when national MSQ was reduced by 13 percent.

On the other hand, if the pressure to decrease the quantity demanded of dairy products due to higher milk prices is counter-balanced by an outward shift in the demand function, so the national MSQ is not decreased, the impact of the OEP may be small, and the participation in the OEP could remain marginal. It is unlikely that the CDC will increase its support price enough to compensate both the reduction in federal subsidy and the increase in the cost of production. However, producers in Quebec in particular, argue that if they are not assured of a target price that will follow the evolution of their cost of production, they will not participate in the OEP. This position may change depending upon the response in the other provinces, but the impact on the structure and performance of the dairy sector will remain marginal.

Effects on the Structure and Efficiency of the Processing Sector. A possible rationalization at the production level has direct implications at the processors level. If milk production can move from one province to another, processors in the selling province would become less competitive due to a shortage of milk. Processors therefore argued for a level playing field and requested that raw milk could also move from one province to another. The modification of the surplus removal program with the implementation of Plan C will allow interprovincial movements of raw milk before surplus milk is processed into butter and skim milk powder. This should compensate partly the potential loss in competitiveness of processors located in a production shrinking province, as well as maximize producers revenues from the domestic market. This plan is presently suspended because it could have created perverse effects in its original form. Discussions are presently underway to insure an acceptable working form of the Plan and it should be operational shortly.

With freer movement of milk across provinces due to the implementation of Plan C, more aggressive market development behaviour will develop. Small butter plants will likely have more difficulties to operate continuously as they will have to make milk available to other processors before manufacturing butter for which they do not have markets. Larger and more diversified processors with more elaborate marketing strategies will have an advantage to expand operation and enjoy economies of size.

The evolution of the industry over the last twenty years suggests that processors in Quebec have a competitive advantage over processors in Ontario, while processors in the rest

[9]Note, however, that 1992 was the end of a four year period of significant cuts in the national MSQ.

of Canada are in the worst position. Figure 4 shows that the share of butter production has been gradually increasing in the rest of Canada while it has decreased in Quebec and remained at the same level in Ontario. This reflects the fact that processors in Quebec have gradually increased their share of higher value-added dairy products. They have developed an expertise in manufacturing and marketing high value added dairy products which will benefit them in a more competitive environment.

Better performance by processors in Quebec over that of processors in Ontario, and especially over that of processors in the rest of the country is also evident when one analyses labour productivity in manufacturing plants. Figure 5 shows that the value added per person employed is higher in Quebec than in other provinces. Moreover, the annual increase in the value added by employed worker over the 1976-92 period has been $2,680 in Quebec, $1,390 in Ontario and only $580 in the rest of Canada (Romain and Lambert, 1994). These results suggest that the processing sector in Central Canada is better equipped to face further domestic competition.

The implementation of a national quota exchange market and the provision under Plan C for milk to move across provinces should therefore give an indication of where the comparative advantage of the dairy industry lies within Canada. However, an important factor which will contribute to the competitiveness of a province is the degree and the quality of the interaction between producers and processors. The recent policy changes favour the concentration of decision making in the hands of producers as compared to the other stakeholders in the dairy sector, and it transfers provincial autonomy in decision-making to the national level. Processors, in Quebec in particular, feel they are being left out by the National Policy reform while they believe they could contribute in a more active way to increasing the competitiveness of the sector. Some processors argue that the system will become more rigid because the major decisions will have to be agreed upon at the national level where there are nine possibly divergent positions. The superstructure created to administer the National Policy may constrain the decision making process and defer decisions that used to be taken more rapidly at the provincial level. This is one of the reasons why no major changes in the structure and efficiency of the dairy sector are expected over the next five years.

Summary. In summary, the impacts of the recent modifications to the National Dairy Policy are not expected to be major on the structure and efficiency of the dairy sector over the next five years if the NAFTA Panel rules in favour of the Canadian position. The extent of the impacts are closely linked to the final agreements that will be reached on the actual working terms of Plan C, on the performance of the national quota exchange market, as well as on the provincial administrative policies of the OEP. However, the modifications to the National Dairy Policy, which follow from hard and difficult discussions across provinces, may be very useful to face alternative decisions of the NAFTA Panel as it is discussed in the following scenarios.

Figure 4. Index of Provincial Shares in Butter Production

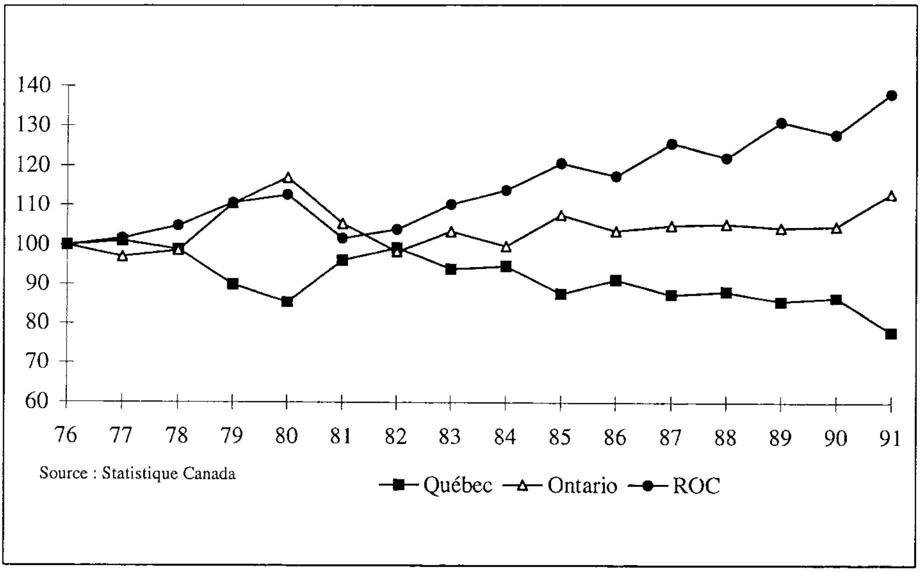
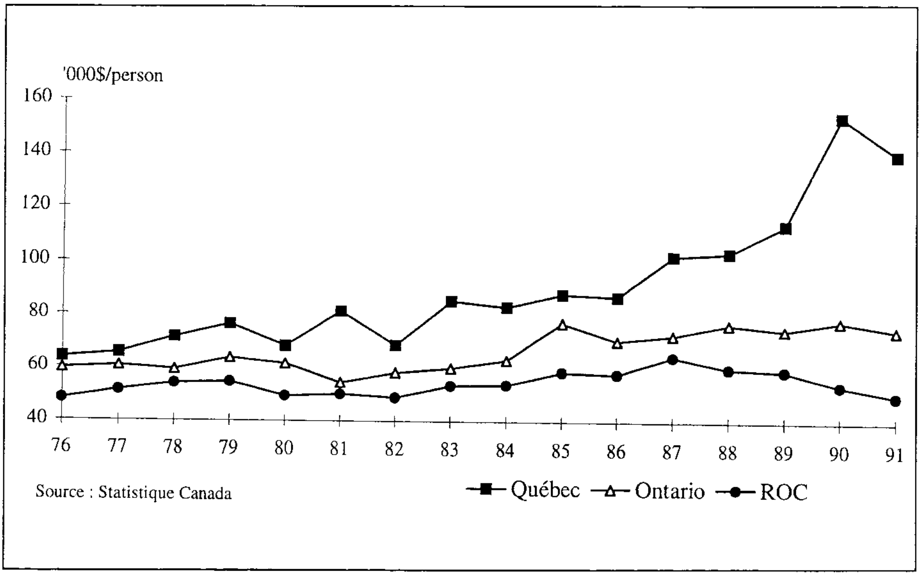


Figure 5. Value-Added per Person Employed in the Manufacturing Dairy Sector



Scenario Two: A Panel's Decision in Favour of the United States' Position

This discussion considers the alternative situation, where the United States position that NAFTA dominates is upheld. We will do this through a series of changes, which can be interpreted as decomposing a decision favouring the United States into steps or as possible intermediate decisions made by the Panel, however likely or unlikely such decisions may be. We also focus on the plausible empirical magnitudes that are involved, which are interesting in their own right but also provide some justification for the assumptions used in the Meilke et al paper. The numbers that are used should be interpreted as indicative, not precise.

We consider three steps in this "scenario two": (a) tariff removal on ice cream and yogurt only, (b) tariffs off all industrial milk products, and (c) the removal of fluid milk tariffs. Our two foci are on (1) determining the intermediate effects of these policy alternatives, say within 5 years, and (2) looking at the effects of these changes on the domestic industry. The broader range of consumption and trade effects, and related issues are left to other papers in this publication. To understand the magnitudes involved, Table 4 gives the tariff levels in effect beginning July 1, 1995 after the tariffication process of the Uruguay Round Agreement of 1994, the final URA tariff (15 percent total decline), and the annual decline in tariffs in percentage points under NAFTA where tariffs would become zero percent in the time period negotiated (assumed to be 10 years for illustration).

Table 4: Initial and Final Tariff Levels under the URA and Possible NAFTA Tariff Declines

Product	URA 1995 Tariff (%)	URA Final Tariff in 2001 (%)	NAFTA Annual Tariff Decline over 10 yrs to 0%
Butter	351.4	298.7	35 percentage points
Cheese	289	245.7	29
Ice Cream	326	277.1	33
Milk	283.8	241.2	28
Yogurt	279.5	237.6	28

Source: Uruguay Round Agreement documentation

Ice Cream and Yogurt. First we will analyze the case of two industrial milk products, ice cream and yogurt. Although accounting for only 11 percent of the value of industrial milk products, they have been given relatively more trade policy attention among dairy products because, they were the subject of an earlier (1988-89) GATT investigation into the legality of import quotas imposed on those products by Canada in 1988 after the Canada-U.S. Free Trade Agreement was signed. That investigation, brought forward by the United States, concluded that these import quotas were not legal under the GATT. Singling out these two items in the current panel decision is unlikely, given that the previous problem was caused by the imposition of import quotas that now have been removed. However, it still may be useful to consider their importance in comparison to a larger decision that applies to all industrial milk products.

A decision in favour of the United States, focused on ice cream and yogurt, would be to lower the current Canadian tariffs on U.S. imports of 326 percent and 279.5 percent, respectively, to zero over a time period to be negotiated. This would mean that, after that time period, ice cream and yogurt prices in Canada will mirror those in the United States, differing only by transport and brokering costs. Immediately following that period, Canada would plausibly be on an import basis in those products if no action is taken, so that wholesale prices in Canada would be c.i.f. prices, equal to U.S. wholesale prices plus transport and related importing costs (and a zero tariff).

This situation could be met by a variety of policy responses within Canada. Basically, Canada would have two options—to reduce its industrial milk quota level, or to lower the average farm price for industrial milk in Canada (or some combination of the two).

In the first option, Canada would abandon the ice cream and yogurt markets to the lower-priced U.S. imports. This would mean a reduction in the national industrial milk quota (MSQ) equivalent to the milk supplies previously required to produce the ice cream and yogurt. These two products account for 11 percent of industrial milk sales. In volume terms, the decline would be a lesser proportion, because unit values of ice cream and yogurt are higher than other industrial milk products.[10] With a decline in MSQ levels, there would be no need to reduce farm gate industrial milk prices in Canada from their current levels. This option is, however, unlikely.

In the second case, these two products could be priced lower at the point of trade (wholesale level) to meet the U.S. import competition. However, Canadian processors could not continue paying higher prices for their raw milk than their U.S. counterparts, and be competitive with the lower prices of the imported product. Therefore, this case would further require lowering Canadian farm gate prices on raw milk to U.S. levels, assuming that Canadian ice cream and yogurt makers are as efficient as their U.S. counterparts.[11] However, with border protection being lowered only for ice cream and yogurt in this scenario, farm milk prices would need to be lowered only enough to cover the equivalent of

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[10]Recent estimates for Ontario and Quebec are that yogurt and ice cream account for 10 percent and 5 percent of their respective allocations of industrial milk (ISTC, 1991). The shares in the other provinces are likely within this range.

[11]This assumption is supported by detailed engineering cost studies for plants built in Canada and the United States for long run marginal costs (ISTC, 1991) and is discussed below. If Canadian plants are higher cost operations than their U.S. counterparts during the intermediate run before adjustments to tariff declines are completed, farm milk prices in Canada would have to be lower than those in the United States in order for the Canadian industry to be competitive, and conversely if Canadian plants are lower cost.

the milk supply going into ice cream and yogurt, roughly one-tenth of the industrial milk supply. The recent modifications to the national dairy policy could accommodate this option. Milk used in the production of ice cream and yogurt would be sold as "special milk class 5". In fact, this is presently done for some products that use dairy constituents and that are traded between Canada and the United States.

We can give some rough magnitudes to the numbers that are involved under these options. In the first case, the Canadian industrial milk quota will fall by the amount of milk previously needed to produce the ice cream and yogurt, say 10 percent of industrial milk sales. With industrial milk production of 42.5 million hl (1994) priced at current average levels of $47.41/hl, this would represent a loss in terms of gross revenues to the industry of some $200 million. In fact, the loss is likely to be somewhat higher because milk used for ice cream and yogurt is priced higher than that used in other dairy products. Although the loss in net returns to producers would be considerably less than the loss in gross returns (say no more than 1/3), this option is unrealistic in that it assumes no response by the Canadian industry.

The second option, reducing milk prices, is more attractive. At the present time (using 1994 data) U.S. farm gate milk prices are equivalent to CDN$41/hectolitre landed in Canada, assuming a one dollar per hectolitre (hl) cost of transportation. This can be compared to a 1994 net farm gate milk price of $48.65 in Canada (market returns plus subsidy). Therefore, the effect of lowering milk prices to the U.S. level would be a fall in Canadian prices of $7.65/hl (16 percent decline). When that is multiplied by the share of total industrial milk production that goes into ice cream and yogurt (10 percent), the loss in total gross returns (net of levies) on industrial milk would be (0.16)(0.10) or 1.6 percent. In dollar terms, this loss would then be equivalent to about $30 million.[12]

What can we conclude about the loss of tariff protection on ice cream and yogurt? First, if this situation were to arise, a price response to the loss of tariffs on ice cream and yogurt is considerably more attractive than simply walking away from that market and letting it be served by imports, assuming a very elastic (excess) supply of U.S. product. Second, the possible loss to Canada from lowering farm milk prices to U.S. levels for only the ice cream

[12]The above discussion on this second case is still pessimistic because it also assumes a minimal reaction (only a matching price) from Canadian processors. In such a case, losses to the farm sector would be less than 2 percent. However, recent discussions with processors show that several large processors would welcome such an opportunity to have access to the U.S. market. They strongly believe that the quality of their products compares favourably to that of U.S. products. Also, their experiences in visiting plants in the United States convinced them that they would be competitive with their U.S. counterparts if they could have access to the raw product at comparable prices. Considering the excess capacity of the production sector mentioned previously, the net effect on producers' gross revenues is unclear. The impact of this Panel outcome on the structure of the sector would, however, be negligible due to the small percentage of total production that is at stake.

and yogurt classes is relatively small (less than two percent)[13]. The small size of this effect is mainly the result of the small share of the industrial milk market accounted for by these two products. It also reflects the relative similarity of farm milk prices in the two countries. Looking only at possible losses to ice cream and yogurt imports, however, may be excessively pessimistic. As noted in footnote 12, Canadian processors may be quite competitive in their costs and product quality and may be able to export to the United States once U.S. border protection is reduced.

Industrial Milk. In 1994, the industrial milk sector accounted for 42.5 million hectolitres, roughly 60 percent of the quantity of all milk produced in Canada. The net average price (net of levies and charges) received by farmers for industrial milk (94/95 dairy year) was \$48.57/hl, the sum of the net market return (\$43.14/hl) and the direct subsidy (\$5.43/hl). Therefore, this sector accounted for market revenues to farmers net of levies of about \$1.83 billion, and was supplemented by the total direct subsidy payment of \$223 million. In terms of market revenues at the farm gate, the industrial milk sector accounted for 53 percent of total farm dairy revenues in 1992 (the remainder being accounted for by fluid milk sales).

A Panel decision favouring the United States would lower the milk product tariffs listed in Table 4 to zero over a negotiated time period. This would have a significant effect on the Canadian industrial milk market by changing the process of price determination in Canada as well as lowering the price level. However, these lower price effects are not likely to be imminent. Current tariffs are so high that they prohibit imports like the previous import quotas, and Canada remains insulated from price effects in other markets. Further, this situation will not change over the course of the URA because even after the 15 percent URA tariff reductions, tariff levels will still be prohibitive. However, even with the NAFTA-imposed tariff declines of this scenario 2, the current tariffs are sufficiently high that without major exchange rate changes, imports would likely become seriously competitive with domestic industrial milk production only in the last year of the phase-in period of tariff cuts. This means that Canada would have an adjustment period where tariffs will be falling, yet the industrial milk sector could function much like it does today, with few direct signs of import competition until the last year of the adjustment period. At that point there would be a major drop in price to U.S. landed import price levels, assuming a perfectly elastic U.S. export supply curve.

However, this situation alone is unlikely to prevail politically if the United States "wins" the Panel decision. Rather than wait five, ten, or more years for any benefit from a Panel decision, the U.S. is likely to insist upon interim compensation. The most likely form of compensation would be an increase in the tariff rate quota (TRQ) allocated to the United States. This could take the form of some immediate "down-payment" TRQ increase, some incremental increase over the tariff phase-out period, or some combination of the two. This would give the United States an immediate benefit in terms of sales to Canada, possibly an

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[13]There is a regional effect here too, given that ice cream and yogurt are produced mostly in four to five provinces, but the effect on average or blended farm level milk prices is still relatively small.

unsustainable increase after full trade liberalization, as is suggested below. Its effect within Canada would be to reduce aggregate MSQ by the amount of the TRQ increase to the United States in each year.

To examine the possible changes to Canadian producers in more detail, we start with the U.S. farm gate milk price, particularly its value landed in Canada. Using the 1994 U.S. manufacturing milk price, the then-prevailing exchange rate (much the same as today's exchange rate), and an assumed cost of transportation (US$1.00/cwt), the landed cost of U.S. milk in Canada would be $41/hl (Meilke et al, 1996). This should be compared to the 1994 cost of raw milk to Canadian processors of $47, the difference being $6/hl or almost 12 percent. The point to note is that with current milk prices and exchange rates, and using aggregate date, the U.S. landed import value is within 12 percent of the current processor cost of raw milk in Canada.

If we were to fine tune these numbers, the changes would tend to widen the Canada-U.S. price difference by several dollars. First, the cost of raw milk to Canadian milk processors is based upon target return, obtained by selling the milk as butter and skim milk powder. In fact, a majority of Canadian industrial milk is sold into higher valued uses such as cheese, ice cream, and yogurt. The average price paid would then be somewhat above the $47 level. Similarly, it is possible that U.S. milk exported to Canada could be procured at prices lower than the average U.S. manufacturing milk price. Together, these two factors could increase the Canada-U.S. price difference to as much as $8 - $9 per hectolitre, or about 17-19 percent. This could be particularly important in some regions.

Leaving aside for the moment the possible increases in TRQ to the United States, this illustrates why the Canadian industrial milk sector would still be well-protected right to the last year of a phase-in of tariff cuts under a Panel decision favouring the dominance of NAFTA rules. The lowest tariff level in the last year of a ten year (linear) phase-in is 28 percent, and that would still leave the average U.S. product uncompetitive against Canadian products made with current Canadian raw milk prices.[14] This would still be true for a 15 year phase-in (where the last year's tariff then would be at least 19 percent) and possibly for a 20 year phase-in (the last year's tariff would be at least 14 percent).[15]

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[14]U.S. products could be competitive in that last year if Canadian processors were much less efficient that their U.S. counterparts, but, from evidence discussed later, this appears not to be the case.

[15]It should also be noted that when the protective tariff is imposed on an intermediate or finished product like any of the manufactured milk products, the effective protection on the raw material is greater than what appears to be the case from the nominal or apparent tariff. If the raw milk accounts for half the costs of making the more processed product, its *effective* protection could be as high as twice the apparent tariff as would be the case if the other costs of processing (other raw material costs, labour costs, capital and machinery costs, etc.) are comparable to those of the U.S. competitor.

What this reveals is that under current conditions, especially the exchange rate,[16] the difference in raw milk costs between Canadian and U.S. farm sources facing a Canadian processor may not be exceedingly large—farm gate milk prices calculated on an import (c.i.f.) basis in Canada are between 10 and 19 percent under current policies and circumstances. Where within this range the difference lies depends upon assumed transport costs, whether procurement costs in the United States are at or below the average price of manufacturing milk, and whether Canadian milk supplies are prices at or above the target price. Secondly, the combination of similar raw milk costs, high current tariffs and phase-in periods of 10 years will leave Canadian raw milk prices largely unaffected for almost all of the phase-in period. However difficult the adjustment to lower milk prices and MSQ levels, Canadian dairy farmers will have most of the full phase-out period before any serious price changes from the NAFTA Panel decision will be seen.

Farm Prices. The next question concerns the implications of these changes at the farm level. First, what will happen to farm gate returns and second, what will this mean for milk supplies within Canada? On the first, the 1994/95 net farm return for industrial milk (using Ontario data), from market returns and the direct subsidy, net of levies and fees, was $48.57/hl, made up of the market return component of $43.14/hl and the direct subsidy, $5.43/hl As these numbers are based on target returns, actual farm market returns may be slightly higher.

Zero tariffs on manufactured milk products will place strong pressures on milk processors to cut costs to be competitive with imports that are made with cheaper milk raw materials. This can be avoided only if, in other areas of the milk processing activity, Canadian milk processors have a strong cost advantage. Our reading of the available evidence (mostly from studies in 1991, reported by Agriculture and Agri-Food Canada, 1995, and discussed in more detail later in this paper) suggests overall similarity in non-raw milk processing costs, although this would be exchange rate sensitive. The current exchange rate may give Canadian processors some advantage, but we lack enough information on current comparative costs to quantify it. Therefore, we will make the possibly conservative assumption that processor costs are now similar in the two countries, resulting in strong pressures to lower raw milk prices in Canada to U.S. levels to make manufactured milk products competitive.

Using 1994 data (above), market returns paid to farmers by processors dropping to U.S. levels would mean a decline from CDN$46.85/hl to levels in the vicinity of $41, a drop of almost $6/hl at the prevailing (and current) exchange rate. However, part of this price

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[16]The importance of the exchange rates in competitiveness calculations is illustrated by the rate changes within only the last five years. In 1990 the average exchange rate was 1.15 (Canadian dollars per U.S. dollar) and in 1994 the value was 1.39, a decline in value of the Canadian dollar of 21 percent. Farms or processors that were uncompetitive with imports in 1991 could be exporting profitably by 1994. For a longer term perspective on these price comparisons, it may be preferable to use an average value of the Canadian dollar over a number of years, probably near US$0.80. If such a value were used for current price comparisons, the landed price of U.S. milk in Canada would fall from CDN$41.02 at the 1994 actual exchange rate, to CDN$36.89.

drop should be offset by a reduction in levies. With an open market there will be no need to finance export losses or special domestic programs. Consequently, producer returns will increase by the removal of the within-quota levy ($2.18/hl) and possibly other charges (e.g., domestic butter program costs, some marketing board fees).[17] Considering only the in-quota levy, the result will be a *net* price drop to producers from the tariff removals and levy removal of $3.65. Ignoring the direct subsidy, farmers' net *market* returns can then be expected to decline from $43.14/hl (1994/95) to $39.49/hl after the tariff removal is complete, a *reduction of 8 percent*. In addition, there is the likely drop in production (MSQ) levels that will be needed when U.S. TRQ levels are increased.

The final variable affecting net producer returns is the direct subsidy. It is primarily a domestic policy variable and is not centrally affected by the change in tariffs, but it could be increased to offset a tariff-induced fall in market prices in order to maintain domestic production. In fact, it has been cut in recent years as a budgetary measure and is slated to decline to zero over the next five years. This could be a second source of decline in producer net returns (after possible tariff cuts) unless support prices are raised to compensate for reductions in the subsidy.[18] By 1996/97 the subsidy will have fallen to $3.80/hl (from $5.43 in 1994/95) and will be phased out entirely by the year 2 001 as planned with ongoing budget cutbacks. To look only at the trade policy issues, we treat the direct subsidy as continuing at $3.80/hl and add it to the new (post-tariff removal) market returns of $39.49, leaving producer net returns from all sources at $43.29 after tariff removal is complete.

Implications for farm milk supplies in Canada. With the industrial milk sector facing the prospect of a decline in milk prices under this scenario due to the removal of milk product tariffs, albeit some years into the future, what will be the likely supply response? Will the industry be competitive enough to maintain its domestic market? A quick response might be that domestic production would decline in the face of price falls on the order of 10 percent, and lose some or most of its domestic market. Such a response may be based on the assumption that since prices would be equalized to costs, and given higher milk prices in Canada, costs of the Canadian firms in this market also would be higher. Therefore, with a decline in tariffs, domestic production and market share would also decline.

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[17] As mentioned previously, since August 1995 the within-quota levy is no longer in effect, but the new pricing policy is equivalent, for producers, to having the former within-quota levy imposed.

[18] In fact, this did occur for the 1993 reduction in the direct subsidy when it fell from $6.03/hl to $5.43/hl and it may have occurred in August 1995. If so, net farm returns per hectolitre will be unaffected as long as tariff protection is prohibitive. Once tariffs have fallen to zero, then market returns for milk products will be determined by U.S. milk prices and there will be no opportunity to raise these prices to compensate for any direct subsidy reductions. In any case, passing declines in the subsidy onto consumers through increased support prices is not costless. It will lead to reductions in consumption and resulting declines in MSQ.

Such an analysis can be erroneous due to the presence of binding marketing quotas on industrial production. The critical question, given these quotas, is the level of milk supply prices within this quota-regulated market. Once one acknowledges that with binding quotas the supply price will be below the market price, then the supply response to a lowering of nominal prices, in conjunction with the removal of the quota restriction, could be positive or negative.

Farm Level Supply Price of Industrial Production. The question here is, what is the supply price of industrial production in Canada at the farm level. To be competitive in the final industrial milk products there is also the question of the competitiveness of processors, apart from their milk raw material costs. These questions are not easily answered for several reasons. First, on the farm side, the supply curve cannot be observed using traditional econometric methods when quotas are imposed because changes in prices will induce no changes in output. Second, with a small number of processors in some markets possessing market power, there is the usual difficulty in determining actual costs under such conditions. Third, for both farmers and processors, when there are relatively high returns and little competition, costs may not be kept as low as they would be under more competitive conditions. Alternatively, with added competition and narrower margins, productivity usually rises and costs or margins are pushed down. The question is what is the scope for cutting costs when faced with lower prices.

For farm costs, we have several observations. First, we know that with marginal prices between $48/hl and $49/hl and with relatively high values of traded industrial milk quota, farmers are competitive at prices below this level. Exactly how much below is not clear, but the very high MSQ prices in some markets suggests that marginal costs may be considerably below current milk prices. To make more definitive statements about cost levels on the basis of quota values requires detailed analysis on that topic specifically.

Second, Barichello and Stennes (1994) analyzed traditional farm cost data for three U.S. states and three Canadian provinces, using the same methodology and similar data sets, for 1989. The results show that average costs for the three Canadian provinces were in the range of $37/hl to $45/hl in 1989 prices. Translating these costs into 1994 dollars would require an adjustment for inflation and for increased productivity such as in milk yields per cow. Given low inflation levels over this period, this adjustment would likely be no more than a five percent increase. Taking the mean of the cost range as $41/hl (1989 dollars), a 5 percent increase would place average costs at $43/hl (1994 dollars).

However, a second observation from this study was that unit costs fell significantly when herd size increased from 40-50 cows into the range of 60-70 cows and above.[19] In the latter group, average costs averaged about $35/hl. If adjusted upward by 5 percent to put this in 1994 terms, average costs would be in the range of $37-38/hl. Since 1989 there has been

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[19]This observation is also made by Desbiens and Negrave (1993) for Ontario and Quebec dairy farms, where the highest deciles of dairy farms have higher costs, particularly the 10th decile. Romain and Lambert (1995) also report similar conclusions.

considerable exit among dairy farms and this has been most pronounced among smaller farms. Therefore, a more recent review of farm cost data would likely reveal this changing industry structure by showing a larger average herd size and lower average costs.

Third, similar results for raw milk costs of production between the two countries have been reported by other authors for the same period (Jeffrey, 1992, Phillips, White and Stonehouse, 1989, and Price Waterhouse, 1991), where U.S. farm level costs are lower but within about 10 percent using exchange rates that value the Canadian dollar at high levels compared to current rates. It is also worth noting that U.S. studies of comparative milk costs between the two countries typically find U.S. farms at a large (25-30 percent) cost advantage (e.g., Baker, Hallberg, Tanjuakio, Elterich, Beck and Liebrand, 1990, and Nicholson and Knoblauch, 1993), a result that we suggest is considerably in error.

The conclusion that even taking average costs across all (1989) farms, a "high cost" scenario, and using them to indicate long run marginal costs, those costs in 1994 would be around $43/hl. When compared with a landed cost of U.S. milk of $41, the industry in Canada would be close to being competitive today. With such costs and no structural change occurring, Canada would likely lose marginally in terms of market share to U.S. product. However, an extension of recent trends, in terms of structural change to larger farms, would be likely to lower these costs more in Canada relative to those in the United States.

An alternative scenario would recognize more explicitly the current trend in structural change to larger farms that is now occurring in Canada and that will push average herd sizes above 50-60 cows. Judging by the data referred to above, such farms have 1989 average costs in the $35/hl range (slightly less in the United States). An adjustment to 1994 prices would still leave their costs below $40/hl. This would leave Canada very competitive at the farm level, given current landed U.S. prices around $40/hl. For those farms below such sizes, the phase-in period gives them valuable time to increase their size (and make other changes) to achieve the lower costs described. The longer term implication is that under this scenario, with net farm prices for industrial milk in the vicinity of $40/hl, farms with fewer than about 60 cows will be increasingly uneconomic for farmers with any reasonable alternative value for their labour.

Processing margins. On the processing side, there are three studies on comparative costs between the two countries for several milk products, and two of the three were done in 1991 (ISTC, 1991, Price Waterhouse, 1991, and McClain (referenced in 1992)). The latter two studies that examined existing plant costs showed that U.S. plants have lower margins (i.e., manufacturing costs only), but the United States advantage varies by product line. For example, the Price-Waterhouse study finds only a 2 percent advantage in fluid milk while it finds a 24 percent advantage for ice cream. The third study was interesting in that it looked at long run marginal costs for plants newly built in both countries at a size that was judged to be the minimum economic scale. These sizes were consistent with the production base and market size in Ontario and Quebec, but may not have been feasible or economically viable in some of the other provinces. It found that costs were virtually equal between Canada and the United States for cheese and yogurt, while there was a slight U.S. cost advantage for ice cream. The study concluded that in all three products the processing cost differences were not significant and that such Canadian plants would be competitive with their U.S. counterparts if they could buy raw milk at comparable prices.

These studies suggest that existing plants may suffer from some cost disadvantages when we consider their current scale and the high value of the Canadian dollar that existed at the time. However, Canadian processors could build new, larger processing plants and operate them competitively, even at relatively high exchange rates. Using more current exchange rates would ensure this competitiveness. There are some indications that mergers are taking place among milk product processors across Canada which could be interpreted to support the study findings just noted. That is, such firms are positioning themselves with larger scale operations to be competitive with the United States when the border becomes more open. This says that once these adjustments in the processing sector take place, processing margins will be roughly the same as (or lower than) those in the United States. With similarly priced raw milk, as would be likely to occur when tariffs are removed, the Canadian milk product industry will be competitive with the United States.

Overall prospects for the industrial milk sector under U.S. free trade. We conclude the following from the above review of the evidence. First, the Canadian industrial milk industry is, or is in the process of, becoming competitive with the United States at both the farm and processing levels and at current exchange rates. On the farm side, price falls to about $40/hl coupled with a removal of quota costs and constraints, can be accommodated by the industry. However, farms at the bottom of the size distribution, those with fewer than 50-60 cows, will be pressured by the prospect of these lower prices to increase herd sizes to exploit size economies, or exit the industry. This process has been occurring for decades but will likely intensify in the next few years as lower trade barriers with the United States are experienced. The same general observations apply to the processing sub-sector as well. If there is a major change in exchange rates, such as a Canadian dollar climbing to U.S.$0.85-0.90, then greater adjustments will be needed to maintain competitiveness, mostly at the farm level. This structural change will increase the competitiveness of the Canadian industry, perhaps enough to be profitable at higher exchange rates. There is even the possibility of generating exports of some milk products to the United States.

Finally, there is no evidence to support the prediction of a collapse of the Canadian milk sector as was recently predicted within Canada (Informetrica, 1995) if tariffs on U.S. product imports are removed. There are likely to be challenging adjustments to larger sized operations at both farm and processing levels, but as just noted, this has been a continuous process for decades. Similarly, there is not likely to be any large industrial milk market available for the taking by U.S. dairy exports. The milk market is likely to be quite competitive between the two countries, as one would expect with largely the same inputs, technology and know-how being used, open borders for purchased inputs, and similar costs of capital and labour once the exchange rate is taken into account.

Fluid Milk. This final section involves the fluid milk sector, specifically a reduction in fluid milk tariffs (with the United States) to zero over some negotiated adjustment period. Tariff changes here are almost as important as those in the industrial milk sector as the fluid milk sector across Canada is slightly more than 2/3 the size (in output weight) of the industrial sector. In some provinces (the Maritimes (aggregated), Ontario, and British Columbia) , the fluid sector is larger than the industrial sector. Fluid milk production in 1992 was 27.2 million hectolitres, or 39 percent of Canadian milk produced. As in the United States, fluid milk regulations and pricing is determined at a provincial (state) level, although there is presently little trade in fluid milk across provincial boundaries. Milk destined for fluid uses is priced at a premium above industrial milk levels in both countries, but that premium is larger in Canada than in most U.S. states. The situation in 1994, drawn from Meilke et al (1996), is that the landed price in Canada of U.S. fluid milk would be CDN$44.27/hl, while the net of levy producer return for fluid milk in Ontario was $56.20/hl. The difference between the two countries is $11.93/hl so Canadian prices would fall by 21 percent if they were lowered to U.S. levels.

The trade issues resulting from a negative Panel decision are similar to those noted above for ice cream and yogurt. First, the current tariff on fluid milk is 283.8 percent, and it would be lowered to zero over some negotiated time period such as 10 or more years. Using 1994 data, the result would be a fall in fluid milk prices of some $12/hl from current levels (e.g., $56/hl for Ontario) to the landed U.S. price of $44, or a decline of about $1.20/hl per year if there is a ten year adjustment period. In aggregate terms, given current fluid milk output of 27.2 M hl, this tariff reduction would mean a decline in industry revenues of $326 million, or 21 percent of total current fluid revenues. In fact, the decline would be somewhat less than this if we considered the increase in fluid milk consumption that would accompany the 21 percent price fall. The significance of this change in profitability can be compared with the situation for ice cream and yogurt; the fall in fluid revenues would be about ten times the decline experienced in the ice cream and yogurt markets. As in the case of industrial milk, there is also the likelihood of an expanded fluid milk import quota (TRQ) for the United States. This will not directly change the unit returns for fluid milk producers but it will lower individual farm fluid quota holdings, and hence also lower fluid milk sales.

With a price decline as large as it is in this case, the question of the competitiveness of this part of the milk industry is raised. Already there have been claims in the Canadian media of massive farm and job losses if the United States wins this NAFTA panel decision (e.g., Informetrica, 1995). The competitiveness of the fluid milk subsector, after tariff reductions are phased in, will depend upon whether the fluid milk processors can match the landed cost of imported fluid milk with no tariff. This depends, as for industrial milk earlier, upon the two component issues, whether farm fluid milk production in Canada is profitable at the U.S. farm gate milk price, and whether the processing sector's margins in Canada can match those in the United States.

At the farm level in those cases where fluid production is accounted for separately at farm levels (i.e., before fluid and industrial milk are pooled, or in those regions (if any) where pooling does not occur) one question is whether Canadian fluid operations can be profitable at a price of CDN$44/hl, assuming that Canada would be on an import basis vis-à-vis the United States. In this case the price with which Canadian farms must compete is the U.S. fluid milk price in the nearby would-be exporting state, plus the cost of transporting and importing that milk into Canada. This U.S. price will vary by state and the transport costs will do likewise, so for a realistic answer to this question, a detailed analysis would be needed for each milkshed or province. In fact, it may be possible that milk coming into Canada from the United States could have been purchased at the U.S. industrial milk price fo Grade A milk. In this case, the landed import price of milk from the United States would be \$41/hl, compared with the current Ontario fluid milk price of \$56/hl. The question is whether Canadian fluid milk operations would be competitive at the \$41/hl price.

The evidence on this matter was evaluated in more detail in the previous section, where farm cost data were reviewed with reference to a landed import price of \$41 for U.S. industrial milk. The finding was that this would represent a fall in producer net market returns of some \$5/hl or a net market return 8% lower than current levels. Even with no structural change in the milk industry since 1989 (e.g., no change in average herd size), average farmers would be close to meeting their average costs. Since there has already been considerable structural change since that time, and the process will almost certainly continue, it is likely that most farms could cover their costs at the landed import price of \$41/hl. Therefore, it remains clear that Canadian dairy farms would be covering their costs for fluid milk based on imported U.S. product at \$41/hl, although they would be receiving lower revenues than presently. Even if this were not so for the smallest farms, farms in the 60+ herd size range would be competitive.

On the processing side, the evidence is also similar to that discussed above for industrial milk, only fluid costs are even closer to U.S. levels. Price Waterhouse (1991) found U.S. costs only 2 percent lower than Canada's, and McClain found the U.S. advantage to be 13 percent. Revising such data to embody current exchange rates would almost certainly show Canada to be at a cost advantage. Further, we see merger and acquisition activity in fluid milk processing that is leading to larger firms with greater concentration, making it even more likely that Canadian plants will operate at higher capacity levels and with lower margins. The conclusion is that both farms and processors are most likely to be competitive with U.S. fluid milk imports if tariffs were removed, particularly if trends in consolidation and firm size in Canada continue.

However, if pooling of milk revenues becomes more widespread, the farm sector will be responding not to a separate industrial price and fluid price but a pooled price or weighted average of the two.[20] This will not affect processors but will primarily alter prices at the farm level. Pooling will preserve the results already noted above, except that the pooled price will exceed the industrial milk price. For a Canada-wide pool and landed import prices of \$41/hl for industrial milk and \$44 (or \$41) for fluid milk, the weighted average price will be about \$42.30/hl (or \$41/hl). If pools are set up for smaller regions, the weighted price will depend upon the relative size of the fluid and industrial sectors, with prices closer to previous industrial milk levels in a province like Quebec with a larger proportion of industrial milk, and higher prices in a province like B.C. with a larger proportion of fluid milk. Therefore,

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[20]Editors note: It is interesting that a detailed discussion of impacts of freer trade retains the notion of administered prices. The U.S. and Canadian papers presented here all have vestiges of this economic anomaly.

pooling may make Canadian dairy farms more likely to be competitive than was discussed in section b) above for industrial milk, even if the Canadian industry's total revenues will remain the same as prior to pooling.

To conclude, fluid milk tariff removal will have a significant effect on the milk industry in Canada by lowering fluid milk revenues by about one-fifth. However, at current exchange rates and milk costs, the Canadian industry still will be competitive, possibly more so than in the case of industrial milk because landed import prices of fluid milk could be \$3/hl higher than comparable industrial milk prices. From available evidence, this is just as true at the processor level as at the farm level. The situation is slightly modified when we take into account the pooling of industrial and fluid milk that is occurring across the country. Farmers then will have to face a marginal price on their total milk supply that is somewhat higher than on their industrial milk if that market was kept separate at the farm level. Instead of having to meet an industrial price of about \$41/hl under no tariffs, with fluid milk included and pooled they would have to meet an overall milk price of \$41-\$42/hl with which more farmers would find themselves competitive. Again, there appears to be no basis for a prediction of dramatic decline in dairy farm numbers and processing plants following a Panel decision favouring the United States as reported in Informetrica (1995).

SUMMARY OF THE TWO SCENARIOS

Regional Distribution of production. The economic forces to redistribute milk production across regions of Canada are already present as outlined in Scenario 1, arising from the national pooling of milk and the imminent national quota exchange. They will benefit producers wishing to sell in the higher cost regions by raising their quota values, and will benefit producers wishing to expand in the lower cost regions by lowering quota values to them. Scenario 2 will add to these pressures to redistribute milk supplies, particularly in the adjustment period. Increased trade with the United States would occur first with lower milk prices, prompting farm consolidation and average herd expansion within Canada. This process of growth would occur during the adjustment period where tariffs would be declining, and would occur via quota transfers from high cost farms to lower cost farms. This would mean that higher cost regions also would see more of their quota moving to other regions, resulting in greater regional specialization in production. As noted in scenario 1, it is difficult with available information to predict exactly which provinces would expand and which ones would contract. Again, this process of increased regional specialization would occur in scenario 1 but would occurr more quickly under scenario 2.

Farm Structure. The size distribution of dairy farms has been changing over at least the last 30 years and under both scenarios 1 and 2 this process would continue and speed up. In fact, the data on average herd size shows that the process has already started. After years of slow increases in herd sizes, virtually all provinces now show that average herd sizes are increasing quickly in the last two years. This is exactly what one would expect as milk prices are expected to decline, as farms can cut unit labour costs at larger herd sizes. If the U.S. size structure is any indication, this does not mean that Canadian dairy farms would be at the 1000+ herd sizes found in California. Rather, the likely result would be that economic farm sizes will begin around 50-70 cows. So there would be a substantial shrinking in the left hand tail of the current Canadian size distribution so that farms with fewer than 50 cows would become a rarity rather than the mean level as it is now in Ontario and Quebec. A good indication of future farm sizes probably can be found in the adjacent U.S. states. Ontario and Quebec farms would look like New York farms in average size (about 70 cows), while B.C. farms would be more like Washington State with somewhat higher average herd sizes.

Quota Markets and Values. The existence of quotas and quota markets would be different under scenarios 1 and 2. Under the first scenario, with URA provisions defining the extent and pace of tariff reductions, there would still be active quota markets at least to 2001. Following that, the pace of tariff reductions would be governed by the provisions of the next WTO round of trade negotiations. Quotas would be binding until world market prices plus applicable tariffs get close to Canada's domestic milk prices, and that may be some years after the end of URA tariff reductions (2001). Under scenario 2, the existence of quotas would be to the last year of the negotiated adjustment period.

Within this period of active quota markets, there would likely be increased quota demands and trade under either scenario. The mere existence of a national quota exchange would encourage more trading between regions to rationalize production and move toward greater equality in costs across regions and farms. There would also be more quota trading from the pressures that are mounting for farms to cut their costs by increasing herd sizes. This would be so particularly under scenario 2, under which there would be lower milk prices following the adjustment period. During this period the demand for quota would be expected to increase more than the supply, raising quota prices initially. This would be sustained into the adjustment period as quota demanders would likely be enjoying lower unit milk costs from their expansion, presumably until the last few years of quota trading when quota values become constrained by their limited future life. The late importance of this factor arises from the high discount rates that are associated with these quotas, typically in the range of 25 to 35 percent. When one factors in the likely increase in TRQs to the United States, it is even more likely to see quota values increase, because marginal returns will increase with a reduction in both MSQ and fluid quota.

Another interesting aspect of quota trading under scenario 2, is that there would be increased quota values for a number of years in several provinces, especially during the first half or more of the adjustment period. This would be relevant to those farms which exit the industry during that period because of the greater financial benefits from the higher values on the quota.

SUMMARY AND CONCLUSIONS

Dairy policy in Canada is a period of significant change, caused by the Uruguay Round Agreement (URA), possibly the NAFTA, and by federal government budget cuts. There are two main elements to this change, the modification of domestic policy to make it congruent with the disciplines of the URA, and the reduction in currently high tariff levels. The first class of changes is in the process of design and adoption. The second class of changes will ultimately occur as part the next Round of WTO trade negotiations, with agreement and implementation sometime after the year 2000. It is also possible that changes will occur more quickly if a NAFTA Panel hearing, brought on by the United States, decides in favour of the United States. In this case, policy change will occur quickly at the end of a tariff cut phase-in period. That would have to be negotiated.

Any price declines in Canada associated with freer trade will challenge the competitiveness of the Canadian industry. From available evidence, at current exchange rates and an open border with the United States, both farmers and processors will be competitive with U.S. milk and milk product supplies after a period of adjustment. This likely would require the increase in farm size that is occurring already as noted above. The main effect on the size distribution of Canadian dairy farms would be to reduce significantly the number of farms with fewer than 50 cows. Therefore, average herd size can be expected to increase from the current 40-50 cow range into the range of 70-100 cows. This would clearly result in an exit from the industry of a number of these small farms (although some will also be able to increase their size), but aggregate production levels could remain the same or even increase. If there were a large increase in the value of the Canadian dollar, the necessary adjustments would be greater and more difficult.

There will also be regional changes in the distribution of production across provinces, from higher cost provinces to those with lower costs, but we do not have evidence to predict which provinces are most likely to increase their share of national production. The last main point is that there is no evidence that the domestic industry will collapse from more open trade with the United States as has been predicted in some quarters. With an adjustment period, both farmers and processors are most likely to be competitive with the U.S. industry.

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— DISCUSSION —
IMPACTS OF CONTEMPORARY POLICY CHANGES ON STRUCTURE, EFFICIENCY, AND TRADING RELATIONSHIPS

Bill Blakeslee[1]

The process of policy analysis can be aided by model building and testing , but the ultimate testing remains with how the models are used, their objectives and purposes. In the United States dairy industry, and perhaps equally in the Canadian dairy industry, the implicit objective of the policy regime has always been to support farm incomes. It is our belief that this will remain the major objective and will in fact be improved as a result of the current round of trade negotiations and agreements, the exact details of which largely remain to be broadcast and responded to by the industry.

There are many ways in which the industry will respond on a local, statewide, regional, national and international scale. These responses will all be conditioned by the nature of technology that is perfected within the industry itself. It makes little sense to talk about opening up an international market for milk when parts of our own country are deficit in reasonably priced milk. In all of the models that have been developed, technology is assumed to be held constant and currently that technology insists on moving heavy products long distances before they can be marketed. Part of a technical answer may be in research that allows milk to be dehydrated and then reconstituted at the marketing source. Under this approach there would be a potentially enhanced domestic and international market that could be easily serviced by the current United States industrial structure and even met jointly with the Canadian industry under a coordinated marketing approach.

While these models hold technology constant they also miss out on a few very important questions as well. The models provide market clearing flexibility through price adjustments only. This theoretically could mean that prices would rise in deficit areas until demand was satisfied and this could mean $20.00 per gallon milk in some parts of the country. It is unlikely that this would ever be satisfactory to consumers or to producers. If the situation were ever to be immanent that milk would rise to these levels of price, it is quite likely that technical research would be heavily emphasized. The key question that all

[1] Editors Note: This comment and discussion is derived from a taped record of the presentation and discussion which followed.

of the modellers have to address in order that their models will become more directly applicable is the level at which technical change becomes more imperative than marketing change. To date this has not been modelled.

Another area where change is likely to occur is in the structural interrelationships within the industry. In the discussions surrounding this last Farm Bill many adjustments were made such as adding in the California standards for many computations and the raising of prices to placate different regional interests. These marketing adjustments will have structural impacts that are in their formative stages as we speak. It appears that there will be significant support for Federal Milk Orders even after subsidy programs are removed. The potential for united action will appeal to many in the dairy sector and these organizational adjustments will come about with government help or without it.

In particular it is quite likely that national organizations of dairy producers will seek to develop technologies in various product sectors specializing in dehydrated milk and its transportation, but also possibly pursuing other processed dairy sectors such as cheese, yogurt, and ice cream. If the international marketplace is truly opened then the interests of United States dairymen will clearly be in distribution technologies.

These models appear to be flawed in some very important areas. The production of nonfat dry milk increases which results in a decrease in domestic price simultaneously with the operation of the proposed Class IV pool which is designed to move product into information markets thereby increasing domestic prices.

In view of historic, current and projected increases in domestic consumption of cheese, the decrease in cheese production defies market logic. The same applies to the purchase of 116 million pounds of cheese by the Commodity Credit Corporation (Price Support Program purchases).

It is not clear how raising the support price when market prices are considerably above the support level stimulates additional domestic milk production. Furthermore, no consideration is given to the impact on production resulting from changes in feed, forage and other milk production costs.

These flaws result in questionable conclusions of the models and demonstrate models should not be expected or portrayed to result in absolutes, but should be used only as indicators of change.

A final element that is missing from the models is the reaction of other market sectors and other countries in the overall mix. While it is likely that processors will seek to counter the uncertainties attached to a non subsidized industry that is subject to massive reorganization at the whim of Congress, it is not clear as to what direction this will take. If it is in the interests of dairymen to pursue technical improvements in the processing industry, it may well be in the processor's interest to pursue technical improvement in the farming operation. The net balance will be critical and is not addressed in these models. A similar situation is likely to happen as other potentially export oriented dairy countries attempt to develop market niches and face the possibility of cooperation with the United States or competition head to head in various markets. Again the models are weak in this area as well.

The models that we have are useful because they indicate the direction that change is likely to take. There are many side issues that can alter the course of this change and these must be remembered before any drastic assumptions are made about how dairymen in this country, or any country, will react.

—DISCUSSION—
CONTEMPORARY DAIRY POLICY CHANGES IN CANADA: A WESTERN CANADA PERSPECTIVE

John Schildroth

Changing dairy policy in either Canada or the United States is a difficult business. In this industry, we inherit numerous regulations and administrative practises that are very resistant to change. The existing policy nexus also favours sub-groups within the dairy industry. We need to keep these observations in mind as policy change is contemplated.

Canadian dairy policy changes over the past year have not received the public or analytical attention accorded U.S. dairy policy, through the Farm Bill. As a recent example, two February 28th editorials in USA TODAY were dedicated to U.S. dairy policy changes. Both sides of the debate were presented in terms understandable to the average reader. There has been no equivalent public debate in Canada.

Canadian dairy producers historically insisted that Canadian dairy policy be based upon three "pillars".

- Domestic supply management (production quotas by province).
- Import restrictions (import quotas, now tariff rate quotas).
- Cost-of-production (COP) pricing.

Cracks have appeared in these pillars recently. Some provinces are committed to an interprovincial quota exchange, to allow milk production to move to those provinces/regions with a comparative advantage. Export markets have been developed. In 1994, the dairy support price was severed from a formal COP formula, as "benchmarking" was introduced to the system. And further processors using dairy ingredients have negotiated lower prices for dairy ingredients in order to be competitive with imports.

With Canada signing onto the WTO, the Canadian dairy industry was faced with three realities.

- Domestic supply controls to meet GATT Article XI obligations were no longer necessary or required.
- Dairy export assistance, a structural surplus removal program, had to be reduced or, in some instances, eliminated.

- Canadian quantitative import quotas on dairy products were "tariffied", and minimum access commitments for butter and margarine were established.

Although domestic supply controls are no longer necessary, domestic production currently remains fixed in place, without any provincial reallocations of industrial milk quota (MSQ).

Fluid milk production quota is the responsibility of the provincial milk boards, while MSQ is set at the national level, through the Canadian Dairy Commission (CDC). Dairy products move interprovincially, as MSQ is currently not allocated according to market supply/demand. The interprovincial movement of fluid milk is now occurring, suggesting that provincial fluid milk price differentials are creating the opportunity for arbitrage. Even in the instance of industrial milk quota, genuine export market opportunities (as opposed to structural surplus removal) are starting to influence the system.

Dairy export assistance was producer-funded through over-quota levies, and under the new WTO, any such assistance was deemed to be an export subsidy. The FTA and the NAFTA required that Canada and the United States terminate all export subsidies on goods traded between the two countries. Consequently, in August 1995, the CDC eliminated all assistance on dairy exports to the United States, and implemented price pooling to maintain these markets with the same distributional impacts on Canadian dairy producers.

Canadian international trade policy (tariffs and border access commitments) is the purview of the federal government, and tariffication and minimum access commitments (MACs), were put into place as per Canada's WTO obligations.

Given the federal government's implementation of its WTO obligations, the Canadian dairy industry, in particular the provincial milk boards and the Canadian Dairy Commission (CDC), through the Canadian Milk Supply Management Committee (CMSMC), decided to undertake a series of policy changes to retain the existing Canadian dairy system.

Following is a brief review of these changes.

Harmonization of Milk Classes Nationally. All parties to the CMSMC agreed to establish 5 harmonized milk classes. This involved some provinces amending regulations and associated conversion costs.

Pooling Nationally - Special Classes. Nine provinces (P9) have agreed to pool special classes, which collectively fall into Class 5 in the new, harmonized system. Special classes include export classes and ingredient classes to provide competitive dairy inputs to domestic further processors. Returns are pooled nationally, with each province required to contribute a minimum amount of Class 5 milk to this pool, from higher classes if necessary. Pooling was done to ensure all provinces paid for structural surplus exports, whether or not a province was generating any such surplus, or benefiting from the export or import-replacement activities of the CDC.

Pooling Milk Nationally and Regionally. Central Canada, Manitoba, the Maritimes and the CDC have agreed to a national pooling of all milk, fluid, industrial and special classes. Extending this proposal to the West would have a substantive deleterious impact on growing regions such as BC and Alberta, where population growth means growth in the higher-priced fluid sector. The West is presently considering a separate "Western Pool", as a means to capture greater production and allocative efficiencies.

Domestic Structural Surplus Management Programs. The CDC has three domestic surplus management programs.

- Plan A - CDC takes ownership of product and sells it later;
- Plan B - CDC stores butter or powder for a particular processor;
- Plan C - CDC tries to get processors to "share" surplus milk, to reduce the surplus without exporting.

Plans A and B were designed to address seasonality of production and demand. Plan C, a new program, is fraught with problems. Processors are not horizontally integrated and continue to compete for market share. Small butter processors do not want to "sell" their surplus milk; and larger, efficient processors do not want to buy it on a haphazard basis. Plan C is an example of a CDC policy designed by producers which has not been fully implemented by processors.

Optional Export Program. This program allows provinces to produce milk for which there is a unique export market niche. It is not intended to compete in existing export markets serviced by the CDC. This program permits additional provincial milk production, administered centrally, without requiring industrial (MSQ) quota. Government at this time is allowing producers the right to control production for export. However, some provinces may take the opportunity to expand output for export, at the expense of those provinces where producers continue to dominate the policy agenda.

Multiple Component Pricing (MCP). MCP allows for the pricing of fat and protein separately. As indicated in one of the background papers, if component prices are set with market demands in mind, pricing and milk allocation will move the dairy product mix towards a market-sensitive pattern.

However, if component prices are set with an eye to maintaining producer revenues, allocative efficiencies will not be realized. To date, the latter path seems to be the preference.

Quota Policies. Some provinces have a single quota for industrial and fluid milk production. This is an attractive administrative concept - milk is milk is milk - but implementing it will have significant equity impacts on producers who are not at a 50/50 split in fluid/industrial production.

Interprovincial quota transfer/movement is another policy issue. There is resistance to this policy initiative in some provinces. Provinces are jealous of their existing milk production levels and a quota exchange under supply management creates winners and losers.

Levy Policy. Existing levies support CDC programs and activities. If CDC programs and policies are seen to support specific provinces, the levies may be at risk in those provinces not receiving any CDC program benefits.

Pricing Policy. Attempts by producer boards to retain maximum prices, without reference to market conditions or processor needs, will prove and have proven to be unsustainable.

Fluid milk is now moving interprovincially in response to price differentials. And processors are undertaking mergers, vertical integration, and vertical coordination to protect their interests. Dairyworld, for example, is now a regional cooperative of significant size in the Canadian market.

CONCLUSIONS

Dairy policy in Canada in 1996 continues largely to reflect a producer perspective. However, producers, at least in the West, now realize that they need to support processing and marketing interests, if their industry is to be sustainable and profitable. Indeed, vertical coordination between Canadian and U.S. dairy firms may become more attractive in the future.

Some observers believe that the U.S. dairy industry will walk all over the Canadian industry if high tariffs are removed. However, I believe that if tariffs are lowered substantially or removed, producers, processors and provincial governments will take action; policy will change; and the Canadian industry will be more competitive as a result. As a practical matter, no government will allow an industry to simply disappear, on either side of the border.

Consequently, I agree with the finding of Barichello and Romain, that the Canadian dairy industry will not cease to exist if the United States gains increased access to the Canadian market. There would be an adjustment period and the Canadian industry would use that time to make the necessary changes.

I am much less sanguine about the authors' support for the current set of national dairy policy initiatives: a single national milk pool; an interprovincial quota exchange (MSQ only?); new CDC surplus control programs; and a centralized export program. These are palliatives for the existing system. They are unlikely to provide the basis for a new dairy policy in Canada under conditions of freer trade.

THEME: ANALYSING THE POTENTIAL FOR INCREASED TRADE

OBJECTIVE

To establish the nature and extent of common ground in place, or needed to be put in place, in order to permit unbiased, consistent, and efficient analysis to be developed in both Canada and the United States.

POTENTIAL IMPLICATIONS OF FREER TRADE FOR THE UNITED STATES AND CANADIAN DAIRY SECTORS: A SPATIAL ANALYSIS

Andrew M. Novakovic, Maurice Doyon and Phillip Bishop

This paper presents key results from two studies recently completed by members of the Cornell Program on Dairy Markets and Policy. The study by Maurice Doyon compares the optimal trade flows of dairy products and marginal values of raw milk that are predicted by a spatial model of the United States and Canada under conditions of free trade or current trade restrictions (Doyon). The implications of free dairy trade in North America for the viability of U.S. Federal Milk Marketing Orders (US FMMO) is explored in a study by Phillip Bishop (Bishop).

Both studies employ highly disaggregated spatial optimization models that represent the production, assembly, processing, distribution, and consumption activities characteristic of dairy market operations. Although very similar in their basic design, the models used in the two studies have significant differences. The Doyon study focuses on the adjoining regions of the Northeastern United States and the central Canadian provinces of Ontario and Quebec, with a much more aggregated representation of the rest of the United States and Canada. The Bishop model covers all of North America in more evenly proportioned detail. There are also some differences in the level of product aggregation and other details. In any case, both studies can be thought of as drawing on the same conceptual and mathematical approach to representing milk and dairy product markets. Additionally, both studies begin with establishing a baseline that is predicated on current conditions of current highly restricted trade between the two countries and include a free trade scenario. The latter does not reflect any current policy, nor does it correspond to the requirements under GATT, but it does provide an estimate of the most unrestricted scenario.

The presentation begins with the Doyon study and concludes with the Bishop study. Summary conclusions are presented at the end.

FREE TRADE BETWEEN THE UNITED STATES AND CANADA WITHOUT DOMESTIC POLICY COMPLICATIONS

Observers of the dairy sectors in the United States and Canada are well aware that both countries employ an extensive set of domestic dairy policies and that these policies differ markedly. It goes without saying that any sudden liberalization of trade between the two countries would be grossly affected by and have effects on these domestic policies. Canada would find it immensely difficult to maintain its current regime of relatively high farm prices under its milk marketing quota system and the USFMMO system would find it difficult to enforce producer prices on Canadian shipments of packaged milk to U.S. locations. The latter will be discussed later in this paper. The issue of the Canadian quota system is not studied here. In fact, we take it as a given that free trade must involve either the elimination of the quota system or changes so significant as to render it irrelevant in a free trade analysis. The key issue is, of course, achieving price equilibria in markets for raw milk and dairy products. Unlike more conventional studies that might attempt to estimate changes in production and consumption due to new price equilibria, this study approaches the question of prices as the dual solution of an optimization problem wherein the primal deals with production and consumption based on existing levels. In a sense, the study looks at the shorter term implications for price and leaves the potential impact on production and consumption for another analysis. In so doing, the study obviates any need to find appropriate supply and demand response functions, which in many cases simply do not exist at a level corresponding to the spatial and product disaggregation used in the model. The fact that previous studies of supply and demand response, as well as conventional wisdom, suggest that both behaviours are highly price inelastic helps to support the robustness of this approach.

Design of Trade Liberalization Simulations

A **Base scenario** is used as a benchmark to evaluate the magnitude of the predicted changes. In the base scenario, all dairy products, except fluid (beverage) milk, could move freely among Canadian regions, while all dairy products are allowed to move freely within the Northeast United States. No dairy product trade is allowed between the United States and Canada.

The base simulation is a benchmark, a point of reference. The effects that policy changes had on trade patterns are evaluated in terms of changes relative to the base simulation. The base simulation represented the economic optimum for the period studied, notwithstanding all other factors.

In the **Free Trade scenario**, all dairy products, as well as raw milk, are permitted to move freely across the U.S.-Canada border. Free trade is not likely to occur in the short run. However, the scenario has two desirable qualities. One is that free trade is easy to model. The second is that it represents a normative upper limit of trade liberalization. For this simulation, all constraints on the movements of dairy products between the United States and Canada are removed. Thus, Quebec and Ontario could export or import any of seven dairy products, including raw milk, to and from the Northeast. This is also the case for a Canadian aggregated excess demand point and a U.S. aggregated excess supply point, which together represent the rest of the relevant components of the United States and Canada.

Results of the Base Scenario

The simulation results are expressed as changes in quantity trade flows and shadow prices. Trade flow maps provide a pictorial view of the results. To simplify the presentation of results, the many supply, processing, and demand points in the Northeast US is disaggregated into five smaller multi-state regions. Northern New England (NNE) is comprised of Vermont, Maine and New Hampshire. Southern New England (SNE) is made up of New Jersey, Rhode Island, Connecticut, and Massachusetts. Maryland, Washington D.C. and Delaware formed the Middle Atlantic (MAT) region. New York (NY) and Pennsylvania (PA) are the two other regions. Similarly, Ontario and Quebec points are aggregated into regions defined by the two provinces—ON and PQ, respectively. The excess demand point for the rest of Canada (CAED) and the excess supply point for the rest of the United States (USES) make up the remainder of the model.

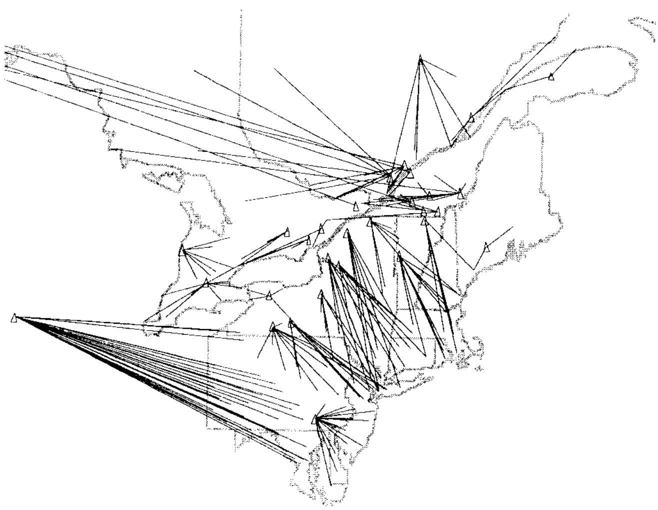
Shadow Prices. Shadow prices indicate the amount by which the objective function would be reduced if an additional unit of a milk component is made available. Two types of shadow prices are generated by the model-a supply shadow price and a processing shadow price. The supply shadow price corresponded to raw milk at the farm with a fixed ratio of butterfat to skim nonfat (SNF). Although the ratio is fixed within each region, the ratio varied from one region to the next. In contrast, the processing shadow price, reflecting values at the plant is comprised of two prices, one for butterfat and one for skim non-fat (SNF). Thus, for a particular product in a region, the shadow price for butterfat may increase while the shadow price for SNF may have decreased under trade liberalizing policies.

If a shadow price increased from one simulation to another, then the relative incentive to market milk increased and vice versa. Thus, the magnitude or the direction of a shadow price change is not relevant. Only the magnitude of a shadow price relative to those of other regions for the same product have relevance in assessing the impacts of different trade policies.

Trade Flow Maps. Trade flow maps are useful for finding cross-border movements and can be used to illustrate differences in trade flows between simulations. **Triangles** represent processing plants, and **lines** from the triangles represent product movements from plants to consumption points. The lines that represent flows are not proportional to quantities. Therefore, an insignificant flow and a large flow of a particular dairy product would be represented by lines with identical appearance.

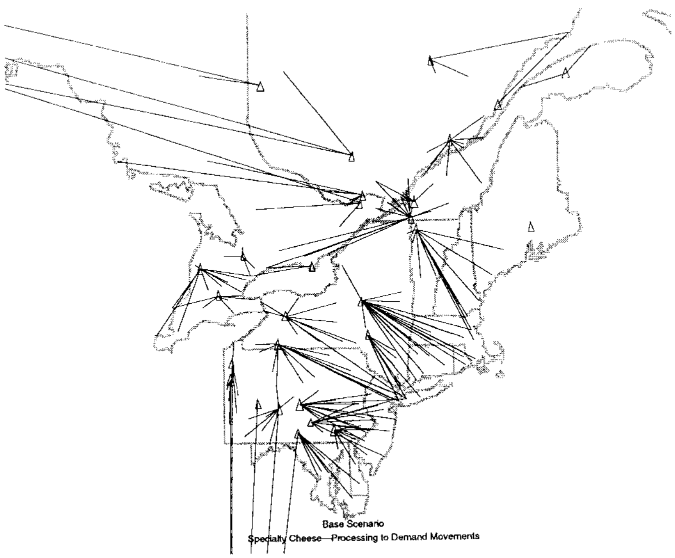
Raw Milk Movements. Because fewer raw milk movements exist relative to finished product movements and because their variability across simulations is not significant, raw milk flows will be discussed only briefly. Milk destined for fluid milk plants travelled moderate to long distances, but few milk supplies used in the production of dry and condensed milk are located far from the processing plants. Furthermore, butter plants had such short raw milk movements associated with them that no supply to processing movements are discernable. The explanation is found in the costs associated with transportation, i.e. the higher the product's distribution cost, the closer the processing plants are to the consumption points. The number of plants is also dependent on transportation costs. If a product is relatively inexpensive to transport, it is more efficient to have a few large plants located near supply points than many smaller plants located near consumption points.

Processing to Demand Movements. In the base simulation, Quebec shipped butter, cheddar cheese and dry and condensed milk to Ontario and the CAED. Results are illustrated for cheddar cheese in Map 1.



Map 1. Cheddar Cheese: Processing to Demand Movements

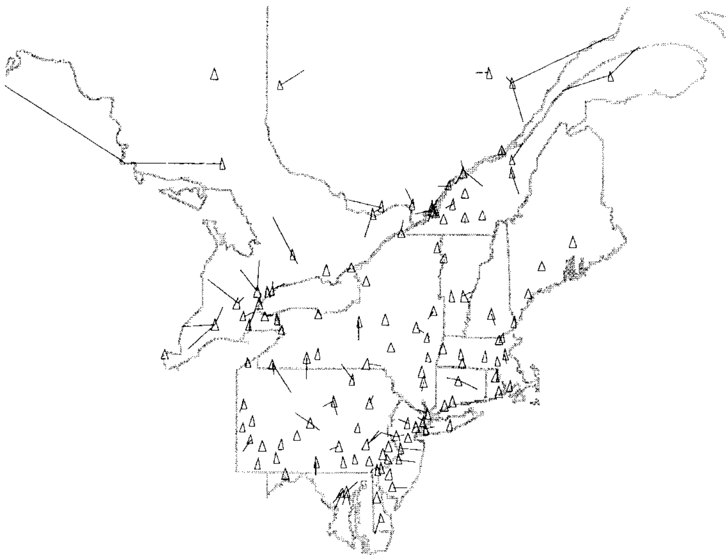
Quebec also shipped specialty cheese to the CAED, and imported yogurt and frozen dessert from Ontario. Ontario shipped frozen dessert and yogurt to the CAED and Quebec, and exported cheddar and specialty cheese to the CAED. Specialty cheese results are illustrated in Map 2.



Map 2. Specialty Cheese: Processing to Demand Movements

New York imported butter from Vermont, Pennsylvania, and Maryland in the base simulation. However, New York exported frozen dessert and yogurt to Pennsylvania, Maryland, and Vermont, and imported frozen dessert from Vermont as well. New York also exported cheddar cheese, dry and condensed milk, and specialty cheese to SNE. Pennsylvania exported butter to Maryland, New York, and New Jersey, while it imported yogurt from New York. Pennsylvania exported yogurt to the US aggregated excess demand (USED), Maryland, District of Columbia, Delaware, and New Jersey. Pennsylvania also exported cheddar cheese, dry and condensed milk and specialty cheese to New York City, SNE and MAT. Vermont exported butter and frozen dessert to New York, and frozen dessert to Maine. Vermont also exported cheddar cheese, specialty cheese and dry and condensed milk to New York, SNE, and the other NNE regions. The USES exported cheddar cheese to Western New York, Pennsylvania and SNE, while it exported dry and condensed milk to New York, Pennsylvania, SNE, and MAT.

Map 3 shows that fluid milk is a local business with short movements from plants to the consumers. The map also reveals that the optimal market structure consists of numerous plants, with plant density highest near large metropolitan areas. In contrast, butter plants are less numerous and have longer processing to consumer movements. The market structure of butter processing plants is nearly opposite that of fluid milk plants, and the results imply that there exists an economic incentive for butter plants to locate near supply points.



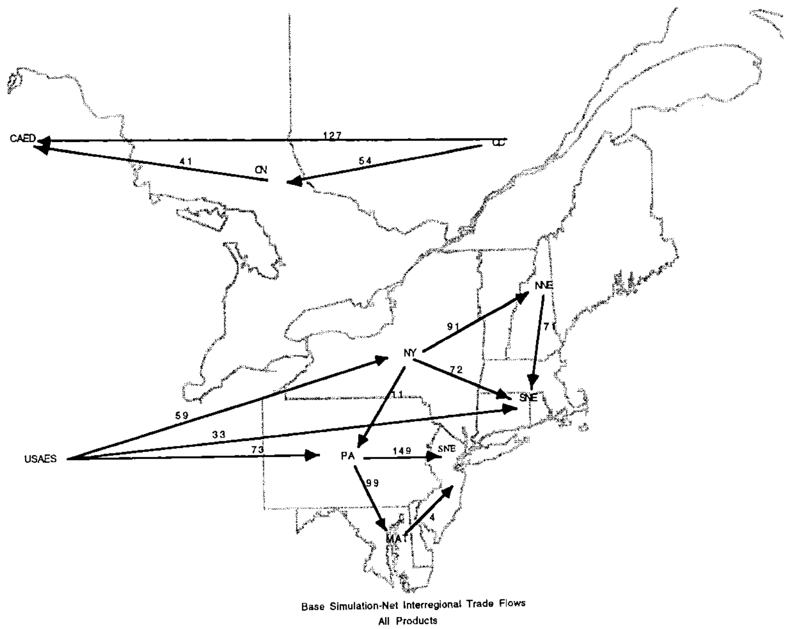
Map 3. Fluid Milk: Processing to Demand Movements

In general, lower transportation costs for a product imply fewer plants to process that product and longer movements of that product from processing to demand . For example, fluid milk is rather expensive to transport, but dry and condensed milk are relatively inexpensive to ship. The base simulation resulted in 121 plants processing fluid milk but only 9 plants processing dry and condensed milk.

The plant density shown in the preceding maps may be misleading because differences in plant size are not addressed. The size of processing plants differs significantly across regions in the base. For example, New York and SNE fluid plants are twice as big as those in the other regions. For yogurt, the plants with the highest average size are found in

Quebec, Ontario and Pennsylvania, while the smallest plants are in NNE and New York. New York and MAT ice cream plants are twice the size of the Quebec and Ontario ice cream plants. Regarding cheddar and specialty cheese plants, Pennsylvania and New York have the largest plants. On average the largest dry and condensed milk plants are in Quebec, Ontario and NNE, while the largest butter plants are in Ontario, Pennsylvania and SNE.

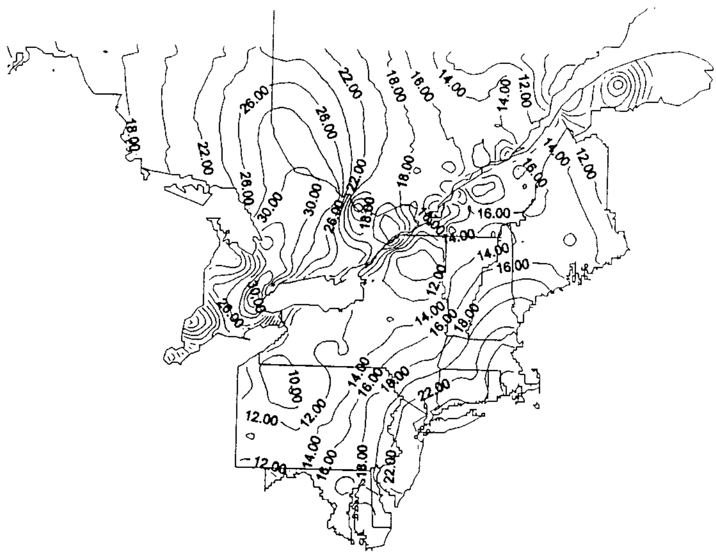
A summary of the net interregional trade flows for all products combined can be observed in Map 4.



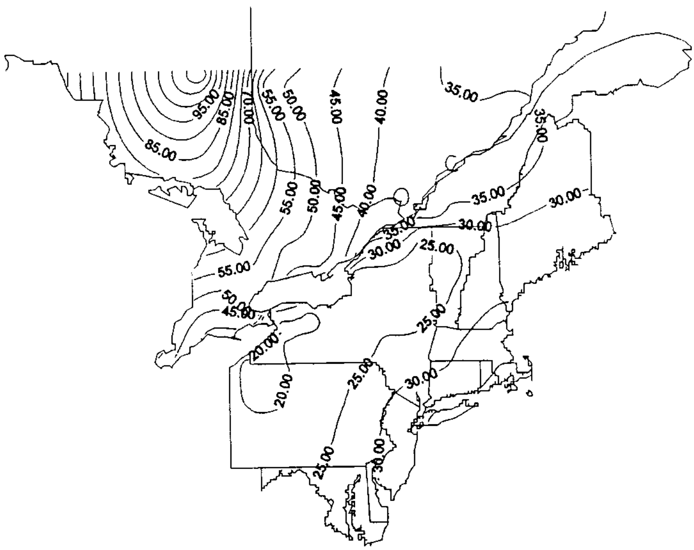
Map 4. Net Interregional Trade Flows: All Dairy Products in Million of Kilograms of Products

Map 5 presents the supply shadow prices for the base simulation. The supply shadow prices increased from the northwest to the southeast in the Northeast United States, from east to west in Quebec, and from west to east in Ontario. In general, supply shadow prices are higher in Canada than they are in the Northeast United States.

A fluid milk shadow price is calculated using the butterfat and SNF processing shadow price generated by the model. Fluid milk is chosen for the processing shadow price contour maps, because it is the most consistent product across regions and is present in significant quantities in all regions. Map 6 presents the processing (fluid milk) shadow price for the base simulation. In the Canadian regions, shadow prices increased from east to west, while in Northeast United States they increased from northwest to southeast. Processing shadow prices are much higher in Canada than in the United States regions, the highest values occurring in Northeastern Ontario.



Map 5. Supply Shadow Prices: Canadian Dollars per Hectoliter



Map 6. Processing Shadow Prices: Canadian Dollars per Hectoliter

Free Trade Simulation

Raw Milk Movements. In the Free Trade simulation, all dairy products and raw milk could move freely between the Canadian and U.S. regions. The results indicate that no movements of fluid milk between the United States and Canada occurred in the Free Trade simulation. This result is a consequence of the transportation cost structure of fluid milk and raw milk. Raw milk is less expensive to transport than fluid milk. Thus, it is not surprising to observe cross-border movements of raw milk to fluid milk plants but no cross-border movements of fluid milk.

Based on relative marketing costs, some cross-border movements of raw milk are evident in the Free Trade simulation. Raw milk moved from New York to Ontario and Quebec fluid milk plants, and raw milk from Quebec went to Vermont specialty cheese plants. Although a limited amount of raw milk moved from Canada to the U.S. and vice versa, in the short run more U.S. milk would be pulled North due to lower U.S. raw milk price. Factor price equalization would put that down toward the levels suggested by the model in the longer run.

Quebec increased net exports of raw milk for cheddar and specialty cheeses and for ice cream by 7, 13, and 7 points, respectively. At the same time, Quebec increased its net imports of raw milk for fluid milk processing by 8 percentage points. Similarly, Ontario increased its net raw milk imports for fluid milk, ice cream and cheddar cheese by 34, 7, and 3 percentage points, respectively. New York shifted from being a net importer of raw milk for fluid processing in the base simulation to being a net exporter in the Free Trade simulation.

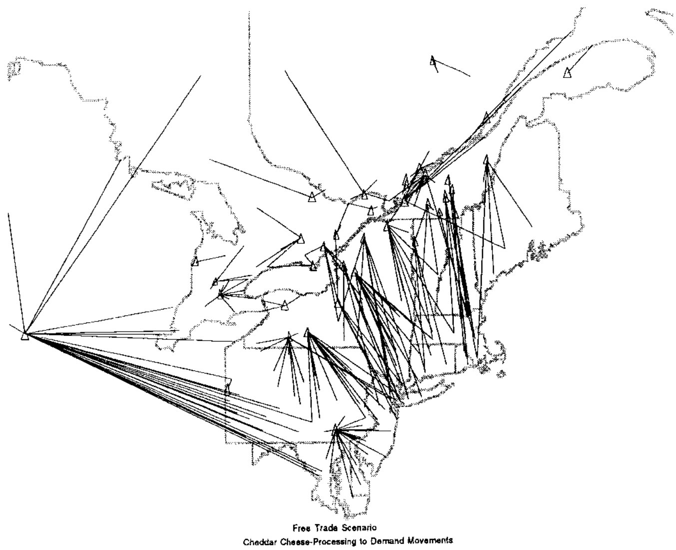
The decrease in net imports of raw milk for dry and condensed milk of 2,650 points in NNE resulted from the combined effect of eliminating raw milk imports from New York and diverting local supply to a dry and condensed milk plant.

Processing to Demand. The number of plants that received raw milk for a particular product as shown in supply to processing movements maps does not necessarily correspond to the number of plants that effectively processed that product, shown in processing to demand movements maps. This apparent discrepancy resulted from interplant movements. Some plants received raw milk and redirected butterfat and SNF to other plants without performing any processing activities.

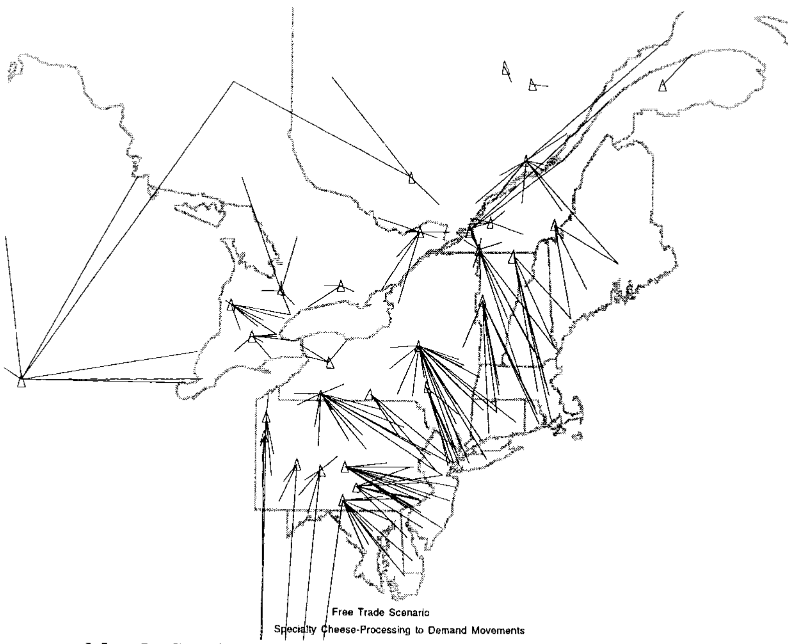
Under the conditions imposed by the Free Trade simulation, Quebec lost market share for all dairy products except cheddar cheese and ice cream. Quebec significantly increased its net exports of cheddar and shifted from a net importer of ice cream to a net exporter (Table 1). Small losses for fluid milk and specialty cheese are also predicted. The loss of the CAED butter market and part of the Ontario butter market to USES resulted in a 33 point decrease in Quebec's net butter exports. The effect of the lost market share is somewhat mitigated by Quebec's butter exports to Maine, Vermont, and New York.

Predicted exports of dry and condensed milk to Maine did not compensate for the loss of the CAED and Ontario dry and condensed markets to USES. Moreover, Ontario, and to a lesser extent USES, penetrated part of Quebec's domestic market for nonfat dry and condensed milk. As a result, Quebec is expected to lose 4 dry and condensed milk plants and shift from being a net exporter to being a net importer of dry and condensed milk. Quebec also shifted from being a net exporter to being a net importer of yogurt. This is partially due to new exports to Maine and Northern New York. Quebec became a net exporter of ice cream and exported to Vermont and New York. Quebec significantly increased exports of cheddar cheese under the Free Trade simulation trade conditions.

A comparison of Maps 1 and 2 with Maps 7 and 8 shows new trade dynamics for cheese. **Traditional East to West movements in Canada are replaced by North to South movements**. Quebec lost its CAED and Ontario cheese market to USES and New York, but exports to New England more than compensated for the lost market. However, Quebec's farm and plant values for milk components declined greatly in the Free Trade simulation (Maps 5, 6, 9, and 10).

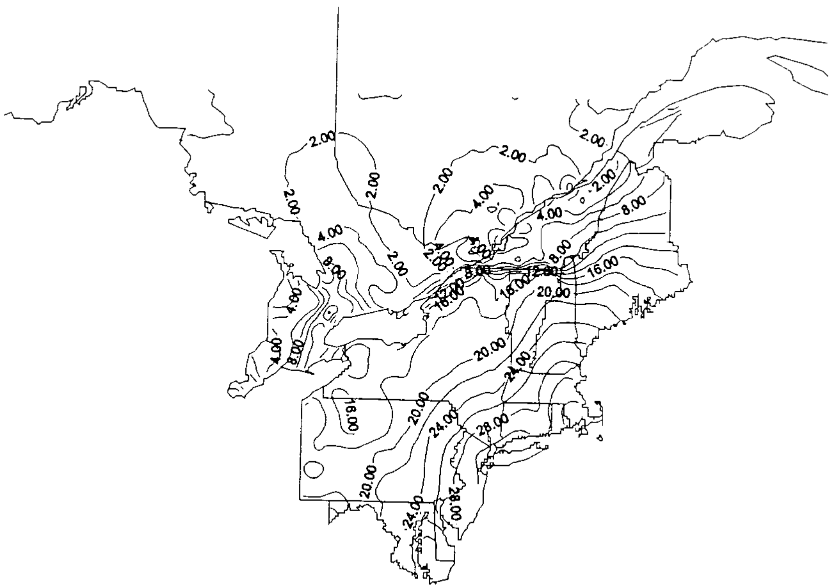


Map 7. Cheddar Cheese: Processing to Demand Movements

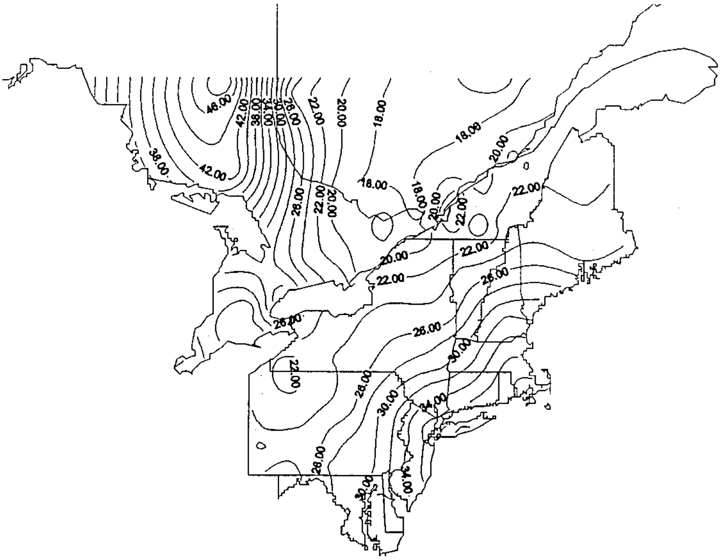


Map 8. Specialty Cheese: Processing to Demand Movements

Ontario increased its net exports for all dairy products except yogurt and specialty cheese. Net imports of specialty cheese slightly increased. Ontario shifted from being a net exporter of yogurt to being a net importer, and from being a net importer of cheddar cheese to being a net exporter. Ontario's loss of the CAED cheddar cheese market to USES is more than compensated by cheddar cheese exports to New York. Ontario also reduced net imports of butter and dry and condensed milk by 17 points and 117 points, respectively. The reduction in dry and condensed milk net imports is explained by new exports to Quebec, New York and SNE. As a result, the Western Ontario dry and condensed plant is replaced by a larger plant in Eastern Ontario. Significant decreases in the value of Ontario farm milk and plant milk components also occurred in the Free Trade simulation. Maps 9 and 10 and Table 1 illustrated the implications for calculated milk values.



Map 9. Supply Shadow Prices: Canadian Dollars per Hectoliter



Map 10. Processing Shadow Prices: Canadian Dollars per Hectoliter

Table 1. Changes in Shadow Prices for Supply, Butterfat and SNF for Various Dairy Products Relative to the Base Scenario, Free Trade Simulation.

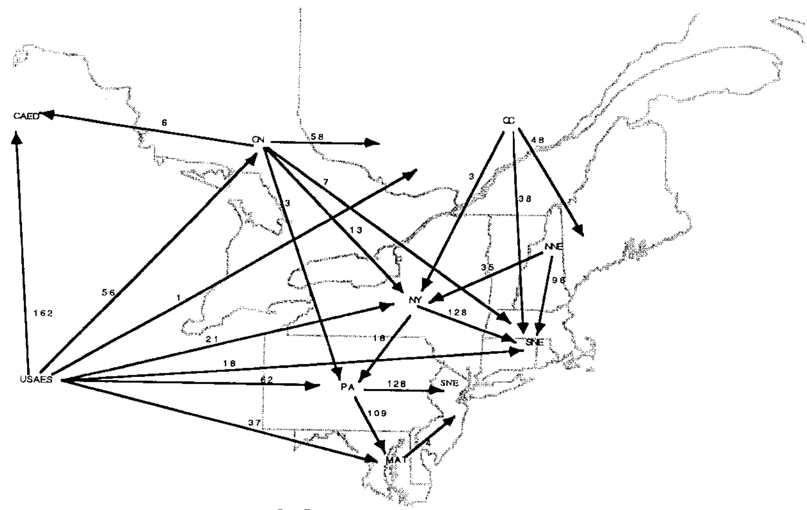
	SNE			NNE			NY			ON		
	Supply	Fat	SNF	Supply	Fat	SNF	Supply	Fat	SNF	Supply	Fat	SNF
Fluid	25%	36%	-6%	31%	32%	-18%	37%	40%	-6%	-73%	-57%	-24%
Butter	0%	64%	-10%	0%	0%	0%	0%	68%	-32%	0%	-51%	-95%
Ice cream	0%	33%	-1%	45%	28%	-12%	47%	41%	-2%	-82%	-55%	-18%
Yogurt	46%	13%	-6%	15%	-5%	-8%	28%	-10%	-18%	-87%	-58%	-47%
Cheddar cheese	0%	0%	0%	25%	0%	0%	51%	31%	1%	-78%	-43%	-66%
Specialty cheese	0%	0%	0%	28%	2%	-16%	48%	22%	-3%	-80%	-48%	-66%
Dry & Condensed	0%	0%	0%	25%	41%	-28%	30%	0%	0%	-85%	-56%	-48%
Total Effect	26%	36%	-5%	30%	29%	-20%	45%	38%	-5%	-78%	-55%	-30%

	PA			QC			MAT		
	Supply	Fat	SNF	Supply	Fat	SNF	Supply	Fat	SNF
Fluid	39%	36%	-5%	-74%	-51%	0%	36%	37%	-6%
Butter	0%	72%	-19%	0%	-46%	-99%	0%	71%	-10%
Ice cream	48%	39%	-7%	-78%	-49%	63%	42%	44%	-7%
Yogurt	57%	20%	-3%	-79%	-54%	-2%	0%	0%	0%
Cheddar cheese	34%	25%	-1%	-70%	-41%	-23%	0%	0%	0%
Specialty cheese	46%	20%	-3%	-77%	-52%	-32%	0%	0%	0%
Dry & Condensed	56%	41%	-7%	-75%	-51%	-28%	0%	0%	0%
Total Effect	42%	35%	-5%	-74%	-50%	-4%	37%	39%	-6%

For New York, imports of yogurt and nonfat dry and condensed milk decreased by 50 and 343 percentage points, respectively. Cheddar cheese exports decreased by 2 percentage points, and specialty cheese exports are reduced by 8 percentage points. In the Free Trade simulation New York lost its only dry and condensed plant. However, values of plant milk components and farm milk values improved greatly relative to the base.

By decreasing net imports of butter and increasing net exports of specialty cheese and dry and condensed milk, NNE gained exports in hard products. The gain in butter resulted from exports to Quebec. Exports of specialty cheese and dry and condensed milk to New York and SNE accounted for the export gains. However, NNE significantly increased its net imports of yogurt, and shifted from being a net exporter of ice cream and cheddar cheese to being a net importer of these two products. Although NNE farm milk values and plant component values did not increase as much as those in other Northeast states, they nonetheless increased significantly.

The trading patterns of the other regions is relatively unaffected. All Northeast U.S. supply and processing shadow prices increased in the Free Trade simulation. International flows are summarized in Map 11. For each of the Canadian and U.S. regions, butter supply shadow prices are zero (Table 1). This is explained by a non-binding supply of raw milk for butter, and the placement of butter plants at supply point locations.



Free Trade Simulation-Net Interregional Trade Flows
All Products

Map 11. **Net Interregional Trade Flows: All Dairy Products in Million of Kilograms of Products**

Summary of U.S.-Canada Free Trade

Although free trade may place downward pressure on prices, it has the advantage of opening alternative markets over time for both countries. It also would result in significant gains in transportation efficiency. Free trade creates possibilities for growth and spreads the negative price effects for Canadians across the industry, instead of concentrating the hardships in a few sectors, as would be the case with liberalizing trade on a product sub-sector by sub-sector basis as some have proposed.

Physical trade in New York and NNE are impacted somewhat by free trade; the trade levels of the other Northeast U.S. regions are not notably affected. The USES gained the majority of new exports to Canada in the Free Trade simulation. Most of the USES exports are, however, directed to the CAED point. That is, the western US tends to serve western Canada. Nevertheless, all regions in the Northeast United States, especially New York and Pennsylvania, registered a significant increase in shadow prices in the Free Trade simulation.

One interesting finding is that fluid milk processing and distribution are minimally affected by either trade scenario. It appears that marketing costs alone are enough to essentially insulate fluid milk from free trade. The Dairy Farmers of Canada have estimated that approximately 3 percent of the Canadian fluid milk consumption in 1991 could be attributed to U.S. cross-border shipments. This occurs now because fluid milk supply and demand are equilibrated independently in the two countries. Since that time, this estimate has been lowered due to a weaker Canadian dollar. From the model results and cross-border purchase estimates, 3 percent to 5 percent is probably the upper limit on Canadian importation of fluid milk. This bound should remain effective despite variations in the exchange rate. Therefore, a Canadian trade policy negotiator would be advised to drop significantly the tariff level on fluid milk in exchange for concessions on the level of tariff placed on other dairy products.

Another implication of the study is that the Canadian regions consistently do well with regards to cheese when trade is allowed between United States and Canada. Quebec cheese processors have a competitive advantage which enables them to ship cheddar and specialty cheese to New England. Ontario cheese processors also have a competitive advantage and ship cheese to New York. These competitive advantages are robust and resistant to changes in marketing costs. On the other hand, the USES has a clear competitive advantage for the delivery of cheese in Western Canada. In spite of the loss of the Canadian market, Quebec and Ontario more than compensate with cheese exports to the Northeast United States.

The Canadian competitive advantage for cheddar and specialty cheese should not be underestimated or ignored by Canadian policy negotiators. The results suggest that the current tariff level of more than 300 percent is not necessary to protect the Canadian cheese industry. Papillon (1995) found that a tariff level of 30 percent to 40 percent would be as effective as a 300 percent tariff level. Thus, it would be to Canada's advantage to lower Canadian tariffs on cheese in exchange for greater access to U.S. markets.

The results suggest that geographic proximity is an important factor in determining trade impact on regions. Thus, Pennsylvania and the MAT states are not active players in the model, while New York and NNE are the most active players. Similarly, the USES and the CAED points, which are relatively close to each other, have a significant amount of interaction.

Through shadow prices, the model confirmed that any degree of trade liberalization will change the intrinsic value of raw milk, especially in Canada. Although the price effects on raw milk were not directly estimated, the supply shadow prices, which represent the value of an extra unit of raw milk at a supply point, still allow one to make conclusions. Using the average net milk price at the farm for Quebec and New York in May 1995 and the changes in supply shadow price from the base simulation to the two trade scenarios, a price effect could be estimated. In Quebec, dairy farmers received an average of $51.00 per hectoliter in May 1995. That amount is reduced to $39.00 per hectoliter with the implementation of free trade conditions. New York dairy farmers received an average of $40.50 (Canadian) per hectoliter in May 1995. Under free trade conditions, the average price in New York for raw milk at the farm rose to $46.00 per hectoliter. These price effects should be seen as the first step in a price adjustment process following a shock to the market structure. The final equilibrium should imply a smaller price decrease for Quebec, and a smaller price increase for New York.

The model also suggested that consumers will be affected by trade liberalization in the dairy sector through consumer price variations. A look at the processing shadow price provides some instruction as to how the simulation might affect consumer prices of dairy products. Thus, Canadian consumers should experience significant price decreases under free trade. In contrast, Northeast U.S. consumers should realize price increases in the Free Trade simulation.

THE IMPLICATIONS OF TRADE LIBERALIZATION WITH U.S. FEDERAL MILK MARKETING ORDERS

Background

For almost sixty years, Federal Milk Marketing Orders (FMMOs) have regulated the terms and conditions under which grade A milk is purchased from U.S. farmers. At the heart of the program is a complementary system of classified pricing, which values milk according to its end use, and the pooling of revenues arising from the sale of milk products. An immediate problem raised by the spectre of trade liberalization concerns the ability of FMMOs to maintain the integrity and performance of classified pricing and pooling when barriers to trade are either removed or relaxed. Federal regulation replaced state regulation in the early days of marketing orders because the prevalence of interstate commerce in milk rendered state authority ineffective. At issue now is whether international commerce will similarly reduce the effectiveness of federal orders. Marketing orders regulate milk processors, not farmers nor processor's customers, and do so through the use of minimum price regulation. Because it is fluid handlers who are required to pay a higher price, it is they for whom trade liberalization provides an incentive to avoid regulation. For example, it is easy to imagine a fluid milk processor located just across the U.S. border processing milk purchased either locally or from nearby U.S. farmers, and then selling class I products in regulated U.S. markets. Such a handler, by virtue of being located in another country and regardless of whether it is U.S. or foreign owned, would avoid the class I pool obligations to the order in which it makes its sales. Quite simply, the potential to profitably engage in this type of arbitrage, within the scope of any particular order, depends on the extent to which the increased milk assembly and distribution costs are outweighed by the difference between the class I price and the prevailing blend price.

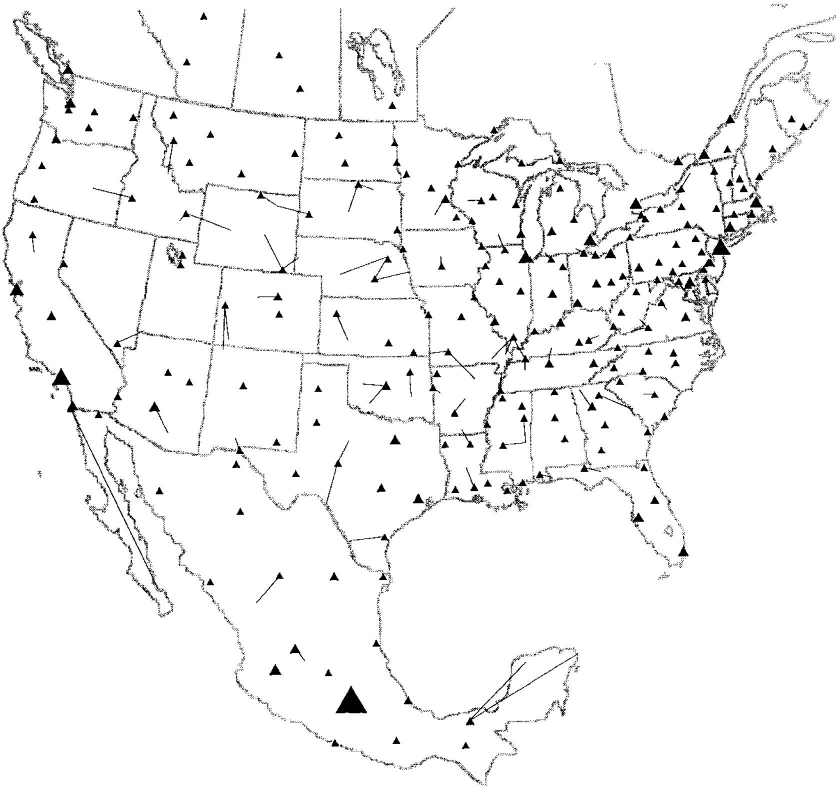
This study is restricted to factors directly impacting the integrity or performance of FMMOs as an agent for achieving economic performance objectives in the U.S. dairy sector. The implications of freer trade for price levels, export opportunities, or other factors that are of importance to the dairy sector but which do not have particular and direct implications for FMMOs are not addressed. Although this study is primarily concerned with federal milk marketing orders, the impact of trade liberalization on similar state marketing programs is also analysed.

The Base Solution

In order to perform any analysis of a new policy or market environment, it is necessary to first establish a base from which to make comparisons. This section describes the base solution used for such comparisons in this study. The base solution is designed to simulate the economic activity and policy settings in the U.S. dairy sector, particularly as it relates to marketing orders. Therefore, some imports, primarily of cheese, occurs subject to quotas; some exporting, particularly NDM to Mexico, takes place; and grade A milk is priced under federal or state regulations.

An overall impression of the base solution can be gained from viewing the thematic maps in Maps 12 and 13. These maps represent, respectively, the flows of raw milk from farms, or supply points, to fluid milk processing plants, and flows of fluid milk from plants to demand areas. The **solid triangles** represent plants and their size gives a relative indication of the level of activity. Thus, in Map 12, the triangles denote the destination end of the flows which are depicted by the lines, while in Map 13, the triangles denote the origin of the flows. A **triangle without a line** radiating from it implies that the supply or demand activity is located in the same area as the processing activity. These conventions will apply to all subsequent thematic maps presented throughout this report.

Map 12. Raw Milk Flows from Supply Points to Fluid Milk Processing Plants, Base Solution



Map 13. Fluid Milk Distribution Flows from Processing Plants to Consumption Areas, Base Solution

Immediately noticeable from these maps is that fluid processing plants tend to be located near the demand areas and further away from the raw milk supply areas. Indeed, the simple average length of raw milk shipments to fluid plants, originating in the United States, is 76.3 miles while for packaged milk distribution movements terminating in the United States it is 25.3 miles. This phenomenon is consistent with both economic theory and other studies (Bressler, 1958; Francis, 1992), and general observation. There are 190 U.S. fluid plants receiving a total of almost 60.2 billion pounds of farm milk in the base solution. 55.9 billion pounds of packaged milk are distributed from these plants to U.S. demand areas. In addition, these fluid plants also shipped out significant quantities of cream for use by other types of plants.

Based upon actual North American interregional trade, the only permissible base case cross-border movements are between the United States and Mexico. While the model found an optimal solution without making any flows from the United States to Mexico of either raw milk or packaged milk, there are U.S. shipments of manufactured products to Mexico in the base solution.

Although this model has been constructed with structural simplicity in mind, there remains ample opportunity for misspecification that can lead to results which do not conform to expectations. The base solution, however, is entirely consistent with expectations. Based on the model's output, we estimate there to be about 140 billion pounds of regulated grade A milk received at plants; roughly 113 by federal orders and about 27 under state programs. Adding to this another billion or so pounds of unregulated grade A sales, approximately 2 billion pounds of direct sales by suppliers, and about 6 or 7 billion pounds of grade B milk, yields the 149.1 billion pounds of milk actually marketed in 1993.

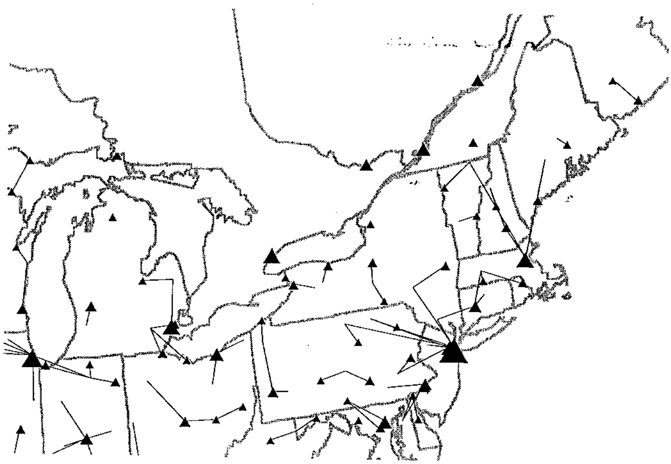
Trade Liberalization Without Regulation of Foreign Plants

This simulation examines the impact on FMMOs when trade policies are liberalized and fluid milk processors located outside the United States are not legally able to be regulated under the terms and provisions of federal orders. This is not to say that the products such processors might ship to the United States do not have to meet the necessary sanitary and phytosanitary standards or conform to the identity standards of the particular product being shipped. It simply assumes that the administrators of federal orders have no jurisdiction to require plants located outside of the United States to abide by the rules of the order in the marketing area to which they plan to sell class I products. In particular, such plants do not have to pay producers the blend price, nor do they have to contribute to the order's producer settlement fund. To the extent that class I differentials more than cover the extra cost of transporting raw milk and/or final fluid milk additional distances, plants in Canada and Mexico will thus have an incentive to ship fluid milk to the United States, using as an input either local raw milk or raw milk procured in the United States.

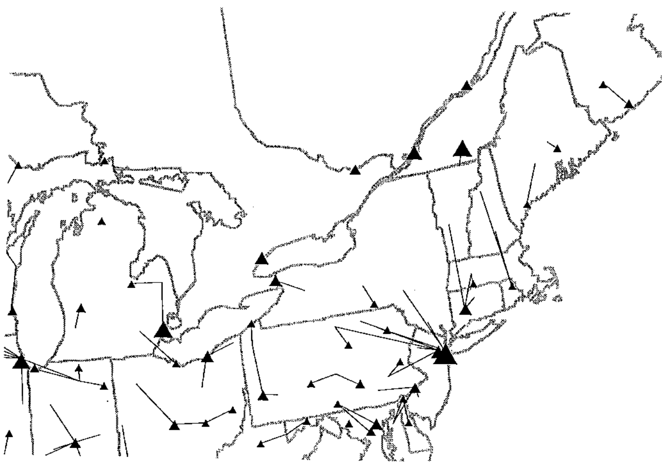
The degree of trade liberalization included in this particular scenario is quite extensive. In fact, complete free trade among the NAFTA countries in raw milk, intermediate products, and final products, both fluid and manufactured, is permitted. The quantity of imports able to enter any of the NAFTA countries from the rest of the world is left at the base case levels. It has already been argued that such trade would not involve fluid products and would therefore have no bearing on the performance of FMMOs. The supply of raw milk displaced by increased imports of manufactured products would, over time, diminish or continue to be utilized as a class III use. Either way, while there could well be competitive implications for the U.S. dairy sector, they are unrelated to the operation and performance of FMMOs so are of no concern to this study. The blend price in any particular order might well decrease as a result of increased imports of manufactured products but this does not in and of itself imply a problem with the functioning of federal orders.

Before proceeding, it is helpful to briefly review some of the underlying factors upon which this and subsequent solutions are predicated. First, the focus of the analysis is on the potential first round impacts and what they suggest about the incentive to circumvent marketing orders' regulations under liberalized trade. Indeed, because the model features no price response on either the supply or the demand side so it would be incorrect to interpret the results as being the long run equilibrium outcome. If the consequences of trade liberalization for marketing orders are severe, one would logically expect some kind of policy response to mitigate these affects. Secondly, although free trade with Canada is assumed, this of course is not the current policy. Nor is there any agreement as yet to even begin phasing in such a policy. However, many analysts believe that it is just a matter of time before dairy trade with Canada dramatically increases so analysing this scenario is beneficial. Along the Mexican border, the restrictions on dairy trade are already being relaxed under the terms of the NAFTA agreement, and will continue to do so at an accelerating pace. Finally, all uses of milk other than class I are assumed to be priced at the class III price. The implications of such an approximation are minimal because such prices are similar to class III prices anyway and the quantity of milk they utilize is relatively small.

Because for much of the North American region the outcome of this simulation looks much like the base case, there is little to be gained by viewing maps of the entire region. Rather, Maps 14 and 15 contrast the present trade liberalization scenario with the base case for those areas where substantial differences exist. Specifically, these figures compare raw milk assembly and fluid milk distribution movements in the vicinity of the northern U.S. border east of Michigan and along the border with Mexico. The former is our focus for this paper, but results are also presented for the Mexican results, in part to contrast the differences.

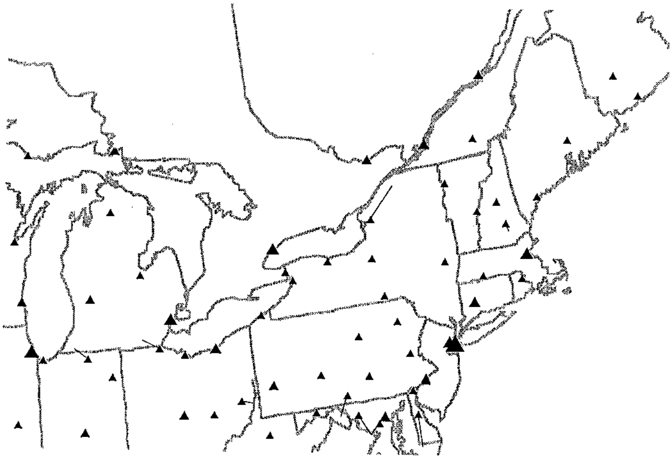


Base



Trade Liberalization

Map 14. Raw Milk Flows from Supply Points to Fluid Milk Processing Plants in the Northeast, Base and Trade Liberalization Solutions



Base

Trade Liberalization

Map 15. Fluid Milk Distribution Flows from Processing Plants to Consumption Areas in the Northeast, Base and Trade Liberalization Solutions

Consistent with expectations, class I differentials provide a substantial arbitrage opportunity, the exploitation of which requires that both raw and packaged milk be hauled longer distances. An indication of this is the average distance that raw milk from U.S. supply points must be hauled which increases by 3 miles over the base case. More significant is the increase of almost 14 miles to 39.2 for the average distance that packaged milk destined for U.S. markets must be transported. This suggests two things; first, supplies of U.S. farm milk are being shipped across the border only if they are located close to the border, and second, Canada and Mexico are diverting significant quantities of their own raw milk supplies to fluid plants for use in the production of packaged milk destined for U.S. markets. Moreover, these shipments of packaged milk are moving a considerable distance into the interior of the United States. There are 169 plants processing fluid milk in the United States, down from 190 in the base solution.

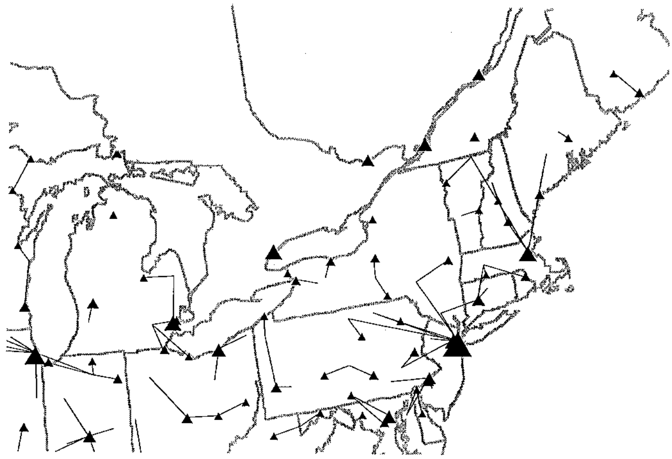
Interestingly there are no cross-border movements aimed at circumventing price regulation taking place in the Northwest. Several explanations can be offered for this. First, the fat-adjusted class I differential in the Pacific Northwest order at $1.25/cwt. is considerably lower than in the marketing areas located in the Northeast and Southwest. Hence, there is an insufficient incentive created by the class I differential to warrant shipping raw milk from the United States to Canadian fluid plants and back again as packaged milk. Second, the western part of Canada is a milk deficient area so there is simply no Canadian milk available for the production of packaged milk for U.S. markets. Moreover, the supplies of raw milk that do exist are a considerable distance from the major northwestern US markets. Finally, class I utilization in the Pacific Northwest order, at around 32 percent, together with the relatively low class I differential would imply a lower blend price than in areas such as the Northeast or Southwest. Thus, the incentive to avoid regulation under the order would necessarily be lower.

Class I Credit

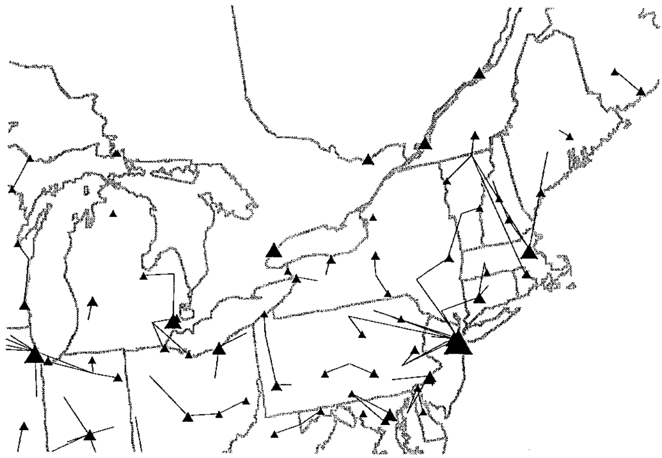
The final of the three principal simulations is referred to as the class I credit scenario. The motivation for this experiment stems from the concerns of regulators in markets near the Mexican border who, already, are proposing policy responses to the difficulties faced by marketing orders when trade is liberalized. In a nutshell, this simulation allows fluid plants in a predefined zone along the border to procure milk at less than the class I price. In fact, such plants would be able to purchase farm milk at the blend price and thereby remain competitive with unregulated plants located across the border. The mechanism by which a scheme such as this allows eligible plants to purchase grade A milk for class I use at less than the class I price would be to award a monthly credit equal to the difference between that month's class I and blend prices. The benefit is that the processing activity remains based in the United States and the portion of the revenue over and above the basic formula price is pooled, but the cost manifests itself as a lower price for producers. There is clearly some flexibility available in defining the class I credit zone. While a more inclusive zone is better able to prevent arbitraging of the class I differentials, this must be weighed against the resulting diminution of the blend price.

It is envisioned by advocates of this type of arrangement that the zone of plants eligible to receive the class I credit would be defined geographically. For example, all counties contiguous to the border, or a 50 mile wide district along the border, would encompass all eligible plants. While the model used in this study is very disaggregated, it does not include every single plant location in the country. Thus, the class I credit simulation is implemented as follows. First, all marketing areas receiving shipments of class I products from outside the United States under the previous free trade simulation are identified. They are then assigned a class I differential of zero and the free trade simulation is run again. In other words, any U.S. fluid plant can serve those markets and can procure the necessary raw milk to do so on an equal footing with foreign plants. The consumption area represented in the model by the city of Portland, ME is also assigned a zero class I differential even though that market was not served by Canadian-based processors in the free trade case.

As expected, the solution to this scenario looks much like the base case as far as the class I sector is concerned. In the north, only one shipment of raw milk from the United States to a fluid plant in Canada occurred; from Newport VT to Sherbrooke in Quebec. However, unlike in the free trade case, no shipments of packaged milk came into the United States from Canada. Along the Mexican border, there are small volumes of raw milk crossing the border in both directions, destined for plants of all types, while a small amount of packaged fluid milk is shipped from Mexico to the United States. All of these shipments are between points close to the border. Maps 15 and 16 illustrate the assembly and distribution pattern under this scenario in the same way as was presented for the free trade case.

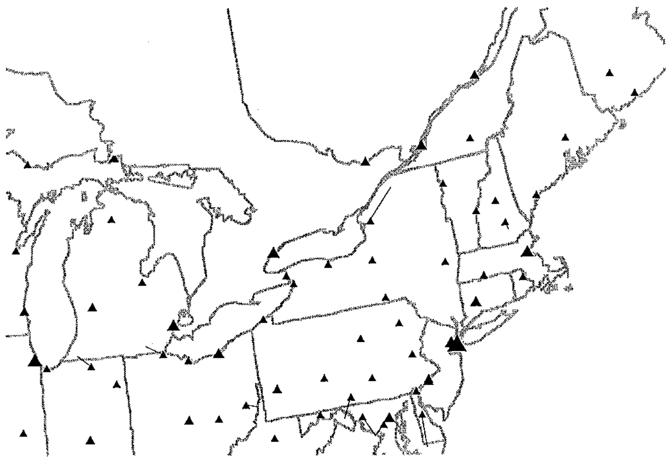


Base

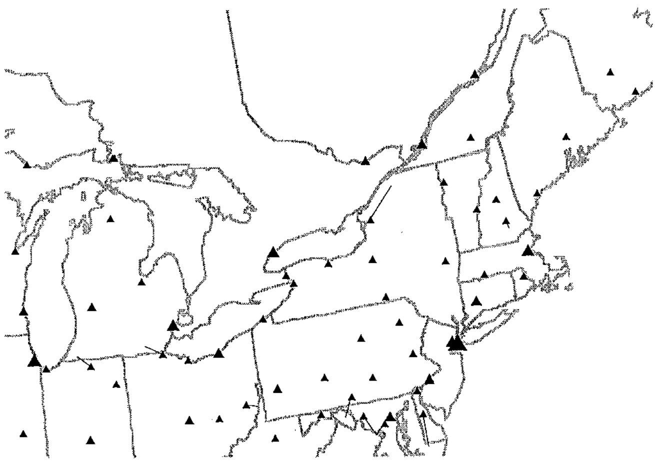


Class I Credit

Map 16. Raw Milk Flows from Supply Points to Fluid Milk Processing Plants in the Northeast, Base and Class I Credit Solutions



Base



Class I Credit

Map 17. Fluid Milk Distribution Flows from Processing Plants to Consumption Areas in the Northeast, Base and Class I Credit Solutions

Once again, the average distance that raw milk is assembled and packaged milk is distributed conforms with both expectations and theory when compared with the previous two simulations. Removing trade barriers and precluding the hauling of milk long distances solely to avoid class I differentials has the aggregate effect of allowing fluid processing plants to be located even closer to the markets they serve. Compared with the base case, the average distance that packaged milk is transported to U.S. markets falls slightly from 25.3 to 24.9 miles. Concomitant with this the average distance that U.S. farm milk gets hauled to fluid plants increases from 76.3 to 78.3 miles. Note that in the case of both assembly and distribution, these distances are less than for the previous free trade scenario where the incentive to avoid class I differentials existed.

Summary of Results

While the impression gained from the thematic maps is perhaps one of some change but nothing too drastic, this particular scenario causes a significant reallocation of milk among plant types, and across countries. In general, the United States ships less milk to fluid plants and more to manufacturing plants while in Canada and Mexico the reverse is true. In fact, the United States ships an incredible 17.8 percent less milk to its own fluid plants. This magnitude of change is surely significant and, moreover, as will be seen shortly, it is felt entirely in the Northeast and Southwest. There is no doubt that the reduction in the class I utilization that this implies for the affected orders will result in much lower blend prices for producers in those areas.

The raw milk diverted away from U.S. fluid plants is either sent to fluid plants in Canada and Mexico; or it gets shipped to manufacturing plants in either the United States, Canada, or Mexico. Fluid plants in Canada and Mexico draw in additional supplies of raw milk not only from the United States but from local areas as well. In fact, Canada increases deliveries of its own raw milk to fluid plants by a staggering 42.8 percent while Mexico does the same to the tune of 7.7 percent. The proportion of milk diverted from fluid plants in the United States to fluid plants in Canada equates to almost 3 percent of the quantity assembled at U.S. fluid plants in the base solution while for the Mexico, the same proportion is 8.2 percent. Finally, taking total deliveries to both fluid and manufacturing plants together, the United States suffers an overall loss of almost 5.2 percent in the level of activity at the processing sector. Of course, under such a scenario as this, those new or expanded plants in Mexico and Canada might well be U.S. owned but that would be of little comfort to U.S. producers receiving a much lower price for their milk.

The distribution side of the ledger is consistent with what has just been described with respect to raw milk assembly. Notably, fluid plants in the United States distribute 18 percent less packaged milk with the shortfall being made up of shipments arriving from Canada and Mexico. Canada now supplies 8.3 percent of U.S. fluid needs while Mexico supplies over 9.6 percent. Of the packaged milk that Canada now ships to the United States, a much lower proportion is produced from raw milk procured in the United States than is the case for Mexico. In fact, on a strictly volume basis, raw milk procured from the United States is 91.6

percent of the packaged milk that Mexico distributed to the United States whereas the same proportion in the case of Canada is only 38.5 percent. This disparity has implications for the way U.S. producer prices will be impacted and these will be discussed shortly.

The total cost of transporting milk and milk products after trade is liberalized increases by over 16 percent with only a modest increase in raw milk assembly costs but a staggering 220 percent increase in the cost of distributing packaged milk. These changes are consistent with the earlier finding of trade liberalization leading to milk being hauled a similar distance when assembled at plants but much further when distributed. It is apparent that the ability of foreign plants to avoid the higher class I price when procuring milk means that they have an incentive to both procure U.S. milk if it's near the border, and distribute to U.S. markets that are a considerable distance from the border.

The cost of assembling milk at manufacturing plants increases noticeably. This follows from foreign fluid plants, especially in Canada, drawing in much more local milk and thus depriving nearby manufacturing plants of their supplies. Consequently, those plants have to seek milk from further away, including from the United States.

Turning now to the specific orders impacted by trade liberalization, there are 11 such orders and the degree of impact is quite severe. These orders are those that border Mexico. The orders that border Quebec and Ontario and the Ohio Valley Order, which is close enough to Windsor, Ontario to be affected, even though it does not strictly border Ontario. Three of these are state rather than federal milk marketing orders. Although operating under different legal authority, the implication for state orders is no different from that for federal orders. In the case of Western New York and Southern California, the fluid processing industry is totally displaced. The State of California operates a statewide pool so the implication for the blend price will be muted somewhat. Nevertheless, these results portend significant price declines.

While three of these areas are not encompassed by federal orders, there exists something identical or akin to a class I differential in all cases. With lower quantities of class I milk being pooled in these areas under liberalized trade, the blend price will surely decline. However, competitive pressure for the supply of milk in the area may result in class III processors having to offer a higher price than they otherwise would simply to elicit an adequate supply so it is not really clear just how low the producer price would go. Even the least affected order, Ohio Valley with a 14.3 percent reduction in fluid milk distributed from U.S. plants, is materially impacted. With an actual class I utilization currently around 57 percent, this scenario would see that drop to 49.1 percent and at current prices, the result would be a 17 cents/cwt. reduction of the blend price. This amount would be sufficient to stress some producers.

An obvious question that follows from this outcome concerns the nature of the flow-on effect, if any, that occurs in nearby orders. Surprisingly, the answer appears to be that there is no such effect. For all affected orders, the nearby areas maintain the same pattern of assembly movements to fluid plants and distribution movements from those plants. All of the adjustment following trade liberalization appears to manifest itself through either the relocation of fluid processing, or through changes in the manufacturing sector at both the assembly and distribution levels. A further part of the explanation as to why the impact is limited to the border areas may have to do with the regional variation in the composition of raw milk. The problem of assembling milk at plants, processing it into final products, and distributing those products to demand areas is constrained not only by the cost of transportation but also by the availability of milk components in a given area. It simply may not be economical to substitute one supply area for another only slightly further away if the composition of the milk is such that a greater volume of milk must be acquired, and thus a higher cost incurred, just to obtain the same quantity of components.

Another question of interest in the face of trade liberalization relates to how the price surface changes. That is, how does the location value of milk to be used at fluid plants change under liberalized trading conditions. Very little change in the price surface is noticeable in areas far from the impacted regions. Hence, only the Northeast and Southwest sections for both the base case and the present scenario are displayed in Maps 8 and 9. Immediately obvious is that following trade liberalization, the price surface levels out as one moves across the border, especially in the Northeast. For example, southern Quebec and Ontario have a value in the range of 2 to 4 in the base case while just across the border in New York and New England the value is 12 to 14. The lower panel of Map 8 reveals that in these same areas, the value of milk at fluid plants increases in Canada and decreases in the United States. Similarly, the pronounced "U" shape to the contours along the Texas-Mexico border in the upper panel of Map 9 is opened up as trade is liberalized indicating a levelling out of the price surface. In general, these maps reveal that in the affected areas, the value of raw milk at fluid plants decreases as trade is liberalized and marketing orders are unable to regulate the purchase of as much of the grade A milk.

Finally, Table 1 reveals the extent to which the blend price is reduced in those orders impacted by trade liberalization. The procedure used to compute the blend price changes is an approximation and in some sense it represents a worst case scenario. That is, it assumes that the milk diverted from U.S. fluid plants as a result of trade liberalization will be priced at the class III price. This will indeed be the case if the milk gets used at a U.S. manufacturing plant. However, if the milk is procured by a plant, of any type, in either Canada or Mexico it would presumably be purchased at the blend price rather than the lower class III price. No supply would be forthcoming if foreign plants didn't offer producers the blend price. A number of other assumptions are also implicit in these computations; in particular, it is assumed that plants are regulated under only one order and that cross-hauling does not occur.

Actual class I utilization in each of the affected areas is noted for 1993, the year represented by the data. The change in the quantity of fluid milk distributed by U.S. plants into each of these areas is then used to calculate the class I utilization after trade is liberalized. With this information, and the assumptions just described, it is a straightforward calculation to arrive at the resulting blend price changes.

The range of price reductions varies from a low of 17 cents/cwt. in the New York-New Jersey and Ohio Valley orders to a high of over 90 cents in Western New York and

New England. The magnitude of these price changes is such that a good number of producers could reasonably be expected to go out of business or at least suffer severe financial stress. There is a greater variation in the severity of the price decreases in the Northeast compared with the Southwest although for producers in both regions, such an observation is of little consequence.

Federal Orders Under Liberalized Trade With Regulation of Foreign Plants

Under this scenario, the presumption is made that all the necessary legal mechanisms are in place to allow administrators of federal orders to regulate plants located outside the United States in cases where such plants ship class I products to U.S. markets. In essence, the simulation is set up to be identical to the previous trade liberalization scenario except that now, shipments of fluid milk from plants in Canada and Mexico incur the class I differential applicable at the demand markets that they serve. In other words, those plants are pooled under the orders in which they sell class I products.

Improbably, this simulation implies that raw milk procured from outside the United States, as well as that procured from within the United States, is subject to regulation if the plant in question ships any fluid milk products to regulated U.S. markets. There is no compelling reason to believe that federal orders would be at all concerned with the price at which foreign plants procure raw milk from local producers, even though such milk might be used to produce class I products for U.S. markets. However, there is no way in the model to discriminate between milk from different sources being assembled at an arbitrary plant when that plant is also able to ship to both foreign and U.S. markets. This point illustrates the difficulty that market administrators would face under this type of scenario. When a single facility comprising a multi-product plant located outside the United States is procuring milk from multiple sources, and that milk is commingled before being used to produce the variety of product types, it would be practically impossible for U.S. auditors to determine whether or not raw milk from the United States is used in the production of fluid milk destined for the United States, or if it is instead used to produce soft products, say, for the foreign market in which the plant operates. Recall too that the rules of origin clauses in the NAFTA treaty do not deem this to be illegal because those rules only require that raw materials be procured from a NAFTA country, as opposed to locally.

Despite this conceptual difficulty, the simulation is performed and results are obtained that differed only slightly from the base case. In other words, the ability to regulate foreign plants almost entirely mitigates the impact of trade liberalization that would be felt in the absence of such regulatory capability. In the Northeast, there are no shipments of fluid milk from Canadian plants to U.S. markets as there were in the previous trade liberalization scenario. In the Southwest there are 3 such shipments from Mexico to the United States; 354,000 cwt from Nogales to Tucson, AZ in the Central Arizona order, 567,400 cwt from Nuevo Laredo to Laredo, TX in the Texas order, and 538,700 cwt from Ciudad Juarez to Las Cruces, NM in the New Mexico-West Texas order. These quantities represent, respectively, 3.3, 1.7, and 8.5 percent of the total fluid milk distributed in these orders. Given the conceptual difficulty of formulating this simulation, such quantities would represent a very conservative lower bound under such a scenario. That is, if milk procured from outside the United States could be kept separate, for auditing purposes, from that procured within the United States, then one would expect that the amount of fluid milk entering the United States would, at the very least, be no less, and would in fact probably be greater than the amount suggested here.

Under this scenario, no U.S. raw milk is assembled at Canadian fluid plants while 1,854,092 cwt of U.S. raw milk is shipped to Mexican fluid plants. This amount is almost 400,000 cwt less than the amount of fluid milk that Mexico shipped to the United States implying that some of it is distributed as fluid milk within Mexico. There is also a single shipment of raw milk from Ciudad Juarez, Mexico to a fluid plant in Las Cruces, NM. A small amount of raw milk also crossed borders, both Mexican and Canadian, and in both directions, to be assembled at manufacturing plants.

CONCLUSIONS

In the short run, without or before prices equilibrate across countries:

- immediate free trade would be very hard on Canadian farmers; but
- not as hard on Mexican farmers;
- price pressures will force cost-reducing structural change.

Free trade, after prices re-equilibrate:

- will likely result in various combinations of commerce between the United States and Canada; but
- trade with Mexico is likely to be larger in total and more dominated by specific products.

Free Trade between United States and Canada tends to:

- turn domestic flows of west-to-east in United States and east-to-west in Canada into
- north-to-south flows in the East and south-to-north flows in the West.

U.S. Class I differentials:

- distort trade incentives along both borders; but
- the impacts are isolated to border areas.

Partial trade liberalization (e.g., specific products):

- may/will lead to further trade distortion; and
- is not a good strategy for transition to free trade.

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ANALYZING THE POTENTIAL FOR INCREASED TRADE IN DAIRY PRODUCTS: A CANADIAN PERSPECTIVE

Karl Meilke, Rakhal Sarker and Danny Le Roy

INTRODUCTION

The U.S. and Canadian dairy industries have been protected from foreign competition for decades. The Uruguay Round of multilateral trade liberalization forced Canada and the United States to replace their very restrictive import quotas with tariffs. However, the tariffs on dairy products are high enough to leave each countries complex milk marketing system largely intact (Meilke and van Duren 1995, IATRC). The recent challenge to Canada's tariffs, by the United States, on dairy and poultry products has the potential to upset the current trading arrangement. The outcome of the challenge will not be known for several months (Meilke; Martin).

Nonetheless, the warm winds of trade liberalization are gathering speed and the dairy industries in Canada and the United States will not be able to lean against this wind indefinitely. A first step towards increased market integration might be liberalized trade in milk and/or dairy products within the current, or an expanded NAFTA agreement (Meilke and van Duren 1996). Partial trade liberalization has several disadvantages from the perspective of Canada. Dairy product prices in Canada and the United States are well above world market levels and Canada's are significantly above those in the United States. Continental free trade would reduce Canada's prices to U.S. levels. Canadian prices would decrease because of the large size of the U.S. dairy industry compared to the North American market. Moreover, North American trade liberalization would not provide the general equilibrium price increases that would follow from multilateral trade liberalization (Graham, *et al.*; Meilke and Larue; Roningen; Roningen and Dixit). As a result, adjustment costs in Canada from free trade with the United States may be large. In fact, adjustment costs in Canada may be larger than they would be from free trade with all industrial market economies.

The purpose of this paper is to highlight the factors that determine the direction and the size of trade flows in milk and dairy products between Canada and the United States, with North American trade liberalization. By identifying the key economic factors, the importance of various assumptions necessary in modelling the Canadian milk market are exposed. Free trade is analyzed with a static, nonspatial, partial equilibrium model. The model employs parameter estimates derived from a literature survey. The literature survey is helpful in identifying several estimation problems and in providing a range of estimates for essential parameters. The results from the economic model and the literature survey provide a guide for future research.

BUILDING BLOCKS

Seven key building blocks are necessary for the construction of any economic model of the Canadian dairy sector (Agriculture Canada 1980; Stonehouse and Kizito; Cozzarin). These building blocks include: 1) the marginal cost of producing milk; 2) the supply elasticity of milk; 3) the shut-down price for milk production; 4) the demand elasticity for fluid milk; 5) the demand elasticity for industrial milk; 6) the difference between Canadian and U.S. processing margins; and 7) the landed price of U.S. milk and dairy products in Canada.

Marginal Cost of Producing Milk

Supply management involves setting a producer price, based on a cost of production formula, and restricting the level of production to the quantity that is demanded at this price. Since the 1970s a number of key agricultural sectors (dairy, poultry, eggs) have been regulated under Canada's supply management policies. The economic implications of supply management are well known (Barichello, 1981); Stonehouse; Barichello and Cunningham-Dunlop; Forbes, Hughes and Warley; and Schmitz and Schmitz). Supply control policies ensure a sizeable income transfer from consumers to producers of these commodities. The welfare gains to producers, however, are outweighed by the welfare losses to consumers.

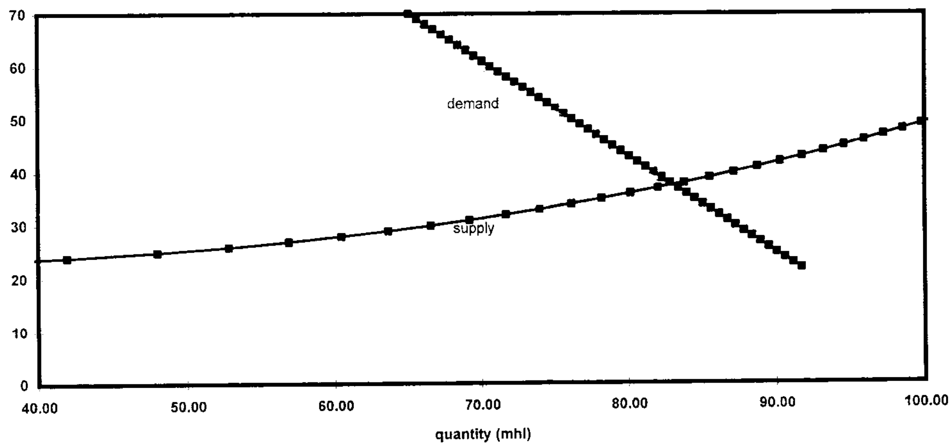
Figure 1 illustrates the net welfare loss due to Canadian dairy policy[1]. Without supply control, the equilibrium price is P_e and the quantity demanded and supplied at this price is Q_e. However, supply control restricts output to Q, resulting in a demand price of P_d and a supply price (marginal cost) of P_s. The difference between the two prices (P_d - P_s) is the annual rental rate for quota. The welfare loss is area ABC.

The departure from marginal cost pricing is a distinguishing feature of supply management. The size of the departure from marginal cost pricing is a key element in 1) determining the size of the efficiency losses, and 2) determining the size of the impact of trade liberalization. During the past 15 years many attempts have been made to measure the

[1] Figure 1 has been simplified by assuming there is only one type of milk that fetches only one price.

departure from marginal cost pricing in the Canadian dairy industry. Some of these efforts involve accounting procedures. Others involve the statistical estimation of cost relationships. Each approach has strengths and weaknesses.

Figure 1. Price Determination with Supply Control



The most direct approach, to obtain a value for marginal cost, is to use cost of production survey data. Cost of production data is used to compute the average cost of milk production. It is then assumed that an estimate of average variable cost provides a crude approximation to marginal cost (Barichello 1981; Barichello and Stennes). Although the cost of production approach is simple, it has several drawbacks. First, unit costs of production vary considerably between farms due to variations in size, technology, and location. Second, because average costs vary substantially by output level, it is important that sample farms be representative and that the sample includes the largest firms in the industry. Third, the opportunity costs of farm supplied inputs (family labour and returns to management and equity capital) are unknown and difficult to proxy. Fourth, if farm production is characterized by joint production of multiple outputs, using shared inputs, cost allocation becomes arbitrary. Finally, under supply management, there is an incentive for farmers to inflate input usage and reported costs, since these are used in determining their administered price.

If there was a rental market for production quota then milk production would move from inefficient producers to efficient producers, over time. The rental rate of quota also would be directly observable. If the rental rate is known, a well behaved supply function can be derived from the profit function (or restricted profit function in the short-run). Once the supply function is estimated the departure from marginal cost at any output level can be determined[2]. However, there is no rental market for Canadian milk quota and the rental rate is not observed. Instead, dairy quotas are exchanged as capital assets and confer the right to produce and market milk indefinitely. In this situation, two alternative strategies can be pursued to overcome the problem of estimating the milk supply function.

Another strategy to follow in determining marginal cost is to exploit the duality between profit and cost functions. By using farm-level data it is possible to estimate econometrically a joint cost function. The marginal and average cost of milk production can be derived from the cost function and then used to determine the departure from marginal cost pricing. This approach does not require any information on quota rental rates.

Moschini (1988a) used the joint cost function approach to analyze aggregate supply response with supply management. He also estimated a joint cost function for the Ontario dairy sector using farm-level cost data from 1980 to 1986 (Moschini 1988b). The departure from marginal cost was estimated as the difference between the farm level milk price and marginal cost (and average cost) at the optimum long-run scale of production. At the optimal output level (which was about 5,000 hl of milk per year), the minimum value of average cost was estimated to be \$26.10/hl. The average price of industrial and fluid milk during the study period were \$30.70/hl and \$36.90/hl, respectively. Thus, for industrial milk, the departure from marginal cost pricing was 15 percent. For fluid milk, the extent of departure was over 29 percent (Moschini and Meilke).

Milk quota confers the permanent right to produce milk and to sell it at privileged prices. The production rights provide a stream of annual returns to the producer. According to the capital asset pricing model, the capitalized quota value is equal to the sum of the discounted future returns. That is,

$$(1) \qquad V_o = R / i$$

where (V_0) is the current capital value of the asset, (R) is the average annual return on the investment and (i) is the average discount rate.[3] The return, R, can be interpreted as the difference between price and marginal cost.

If two of the three variables in equation (1) are known, the value of the third variable can be derived from the formula. Since the capitalized quota values (V_0's) are observable, it is possible to recover from equation (1) the departure from marginal cost pricing (R) if the discount rate is known. But what is the appropriate discount rate? In theory, the discount rate reflects the riskiness of the asset. In this case the major risk is that the right to produce milk at privileged prices might be lost (Lermer and Stanbury). Expected capital gains, expected nominal interest rates and the planning horizon will also affect the risk assessment. These factors are difficult to quantify and incorporate into the choice of a discount rate.

[2] Babcock and Foster used this approach to determine the marginal cost of flu-cured tobacco production in North Carolina.

[3] Note that this simple capitalization formula assumes an infinite planning horizon, no growth in asset value and zero covariance between the value of the asset and aggregate consumption (Varian:368-386).

Consequently, discount rates as diverse as 0.14 (Veeman) and 0.32 (Barichello 1984) have been considered appropriate to estimate the departure from marginal cost pricing. Even for assets as closely related as fluid milk quota and industrial milk quota, estimated rates of return vary considerably over time (Moschini and Meilke; Barichello 1995). A shortcoming of the capital asset pricing model is that of the three variables contained in formula (1), only one is known with certainty. The other two variables are equally difficult to estimate with precision.

Barichello (1984) has proposed another method to determine marginal cost using the capital asset pricing model. In Ontario, there are markets for two types of industrial milk quota, used and unused. Exactly the same set of policies regulate both markets, but the per unit values of the quotas are different. Note, that used quota bought in year (t) can be used to ship milk beginning in year,(t+1). However, milk can be shipped under unused quota immediately. The difference in value between used and unused quota can be considered a return on investment in current milk production. Note that unlike imputed returns on investment, the return on an investment in current quota (milk production) is market determined. The rate of return reflects the riskiness of the asset, nominal interest rates and the time horizon. The approach is analytically simple and empirically appealing. Obviously, the nominal discount rate retrieved in this way will vary over time. However, it is one of the few ways to avoid the arbitrary choice of a discount factor.

Hickling used the Barichello approach to retrieve the annual rental rate of milk quota and the marginal cost of milk production. He estimated the departure from marginal cost to be 43 percent. Some experts have argued that a departure of 43 percent is too high (Halpern *et al.*). Consequently, while this is an intuitively appealing approach to obtain the departure from marginal cost pricing, it seems to generate unrealistically high values for the discount rate. High discount rates produce implausibly low marginal cost estimates.

Chen and Meilke have proposed a dynamic variation on Barichello's approach. The authors estimate the marginal cost of Ontario milk production from 1980 to 1991. The estimated marginal costs are consistently higher than those obtained using Barichello's method (in 1985-86 marginal cost were \$22/hl vs. \$12/hl)[4]. Consequently, the estimated departures from marginal cost pricing are consistently lower in Chen and Meilke's study than similar estimates obtained using Barichello's approach.

The choice of any single marginal cost estimate is fraught with difficulties and is bound to be controversial. However, for empirical analysis a point estimate is needed and \$33/hl is assumed to be the margin cost of producing the current quantity of milk. The estimate of \$33/hl is consistent with cost of production surveys. Furthermore, a \$33/hl marginal cost implies a discount rate of 20 percent, based on 1993 Ontario used industrial milk quota values. A 20 percent discount rate is in the mid-range of discount rates estimated by other economists.

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[4] Unless otherwise noted all dollar values are in Canadian currency.

Supply Elasticities

Information on the departure from marginal cost pricing provides one point on the underlying supply function. It does not describe the shape of the supply function nor the responsiveness of milk supply to free market price changes. Most Canadian studies involving supply managed commodities borrow supply elasticity estimates from analysis conducted using U.S. data. Regulatory differences have introduced dissimilarities in the average size and capital structure of dairy farms in Canada and the United States (Agriculture Canada 1995a, USDA). Identical supply responses cannot be expected in the United States and Canada. Nonetheless, there are similarities in production practices and input prices in the two countries. As a result, supply elasticities estimated using U.S. data are indicative of the responsiveness of the underlying Canadian supply function.

Estimated long-run supply elasticities for milk derived from several U.S. studies are presented in Table 1. The estimated supply elasticities vary considerably across studies depending on the structural characteristics of the models, the data sets, the time period of analysis, and the expectations mechanism used. All of the estimated long-run supply elasticities are greater than 0.5, except for the estimate obtained by Howard and Shumway. In four of the studies the estimated long-run supply elasticity is greater than one. The American Agricultural Economics Associations Task Force on Dairy Marketing Orders in summarizing their survey of milk supply elasticities came to the conclusion that... "quite high long-run supply elasticity, say more than two, makes a good deal of economic sense given modern dairy production methods (p. 51)" which provides an argument against using a small supply elasticity in the Canadian context.

Table 1. Estimated Long-Run Supply Elasticities for Milk in the United States

Source	Study Period	Supply Elasticity[a]
Elterich and Masud	1966-78	2.8
Dahlgran	1953-83	1.0(6)-2.0(16)
Thraem and Hammond	1949-78	1.15
Chavas and Klemme	1960-82	0.89(5)-2.46(10)
LaFrance and de Gorter	1950-80	4.8-8.0
Kaiser et al.	1949-85	0.80 (5)
Howard and Shumway	1951-82	0.23
Helmberger and Chen	1966-90	0.58

[a] The numbers in the parentheses are the number of years allowed for the indicated supply response.

Shut-Down Price

Most economists pay little attention to the price at which the production of a commodity falls to zero[5]. Policy changes typically involve small price changes which seldom push prices near the shut-down point. However, MacGregor, *et al.* did consider the issue, in a mathematical programming context, when they analyzed changes to Canada's subsidized rail freight rates. Fox, Roberts and Brinkman discuss a non-linear functional form, for a supply curve, that allows for an explicit shut-down price without imposing an inelastic supply response. In some situations the shut-down price can be important, especially if price declines are expected to be large. Supply response must become very price elastic as prices fall close to the shut-down price.

The only source of information about possible shut-down prices for milk production, are the various cost-of-production surveys. Survey data suggest that for the more "efficient" farms to produce a hectolitre of milk in 1993-1994, the variable cost was around $23-24/hl (ODFAP; OMMB). The variable cost estimate included the variable cost of milk and crop production plus the cost of hired labour. Therefore, a value of $22/hl was selected in this study as the price at which Canadian milk production would go to zero, since some farms have lower costs than the "average" figure.

Demand Elasticities for Fluid and Industrial Milk

Milk is consumed either in fluid form or as processed products made from industrial milk (butter, cheese, yogurt, ice cream, and skim milk powder). The demand elasticity for each product is different. By using observed retail prices, the demand elasticities for Canadian dairy products can be estimated using standard econometric techniques.

Table 2 contains some direct price elasticities for fluid milk estimated for the most part with Canadian data. The estimates for the United States are included for the purpose of comparison. Table 2 shows that most of the elasticity estimates for Canada vary between -0.20 and -0.40.

About 70 percent of the raw milk produced in Canada is used in processed dairy products. Despite its large share of the raw milk market, few studies have estimated the price elasticity of demand for Canadian industrial milk products. Goddard and Amuah found the own-price elasticity of demand for butter during the 1973-86 period to be -0.78. Veeman and Peng estimated the following direct price elasticities for various processed dairy products: butter (-1.11), ice cream (-0.62), yogurt (-0.81), cottage cheese (-0.21), cheddar cheese (-0.66) and other cheese (-1.22). Moschini and Moro report a matrix of own-price and cross-price elasticities of demand for fluid milk, butter, cheese and other dairy products. The elasticities estimated by Moschini and Moro are listed in Table 3.

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[5] Studies using linear supply curves with an inelastic supply response imply there is positive output at a zero price.

Table 2. Estimates of the Own-Price Elasticity of Demand for Fluid Milk

Source	Study Area & Period	Price Elasticity
Kinnucan and Forker	U.S.	-0.04
Kinnucan	Buffalo, U.S.	-0.73
Thompson and Eiler	U.S.	-0.20
Goddard and Tielu	Ontario: 1971-84	-0.25
Venkateswaren and Kinnucan	Ontario: 1973-84	-0.19
Stonehouse and Kizito	Canada: 1971-88	-0.01 (Stnd.) -0.31 (L-Fat)
Curtin et al.	Canada: 1961-84	-0.24
Agriculture Canada 1980	Canada: 1970-80	-0.02 (Stnd.) -2.79 (L-Fat)
Goddard and McCutcheon	Ontario: 1981-89 Quebec: 1981-89	-0.24 -0.23
Goddard and Tielu	Canada: 1977-94	-0.38
Moschini and Moro	Canada: 1962-88	-0.34
Fang	Ontario	-0.11
Helmberger and Chen	U.S.: 1966-90	-0.08 (Fluid)
Veeman and Peng	Canada	-0.59 (Stnd.) -0.11 (L-Fat)

Table 3. Price Elasticity of Demand for Milk and Milk Products in Canada.

	Milk	Butter	Cheese	Other Dairy
Milk	-0.34	0.12	-0.14	0.10
Butter	0.35	-0.92	-0.19	0.46
Cheese	-0.24	-0.11	-0.40	0.39
Other Dairy	0.15	0.24	0.35	-1.02

Source: Moschini and Moro (1993, p. 89).

Trade liberalization will affect the prices of all dairy products through a change in raw milk price. The price of all dairy products will fall compared to prices of other goods. The relative prices of dairy products will change slightly or not at all. Therefore, total elasticities are required. An estimate of the "correct" elasticity can be obtained from Moschini and Moro's results by adding the elasticities across the rows in Table 3. Doing this, the total elasticity for fluid milk is -0.26 and for butter, cheese and other dairy products -0.30, -0.36 and -0.28 respectively.

Processing Margins

According to Industry Science and Technology Canada, Canadian processing costs are similar to those in the United States when the higher cost of raw milk is excluded. However, the guaranteed margin to dairy processors, in Canada, is considerably larger than the one used in the United States to set support prices for butter and skim milk powder(de Gorter). Therefore, with free trade, processor margins might get squeezed due to increased competition. Reduced processor margins would be shared between consumers and producers. Elasticities of supply and demand and arbitrage conditions would determine the extent of the margin squeeze and the shares allocated to consumers and processors. Little is known about the competitive conditions in the Canadian milk processing industry. Moreover, there is limited information on the supply and demand conditions for processed dairy products that would be traded under free market conditions (Rude). A careful analysis of dairy product trade is well beyond the scope of this paper. However, the effect of lowering the Canadian processing margin on dairy products is simulated.

U.S. Milk Prices

Table 4 shows that the nominal price of U.S. industrial milk has ranged between US$11.03/cwt and US$12.57/cwt. Transfer costs between the United States and Canada are assumed to equal US$1.00/cwt which is roughly consistent with the findings of de Gorter and Agriculture Canada (1995b). Table 4 reveals that most of the variation in the landed value of U.S. milk ($31.73/hl to $41.02/hl) has resulted from currency fluctuations. With the U.S. dollar trading at $1.35-$1.40 the landed price of industrial milk from the United States is about $40/hl.[6] The price gap between Canadian producer returns and U.S. industrial milk prices is $8-$10/hl, of which $5.43 is the direct federal subsidy. Consequently, Canada's market prices for industrial milk are not much different from the current landed price of U.S. milk. The price gap shown in Table 4 assumes that Canada would be in a net import

[6] The price relationships in Table 4 and Table 5 should only be considered as indicative of trading prices. Actual trade would take place between Canada and low cost producing points in the Northern United States. Especially for fluid milk, prices in the Northern United States are below those in the Southern Milk Marketing Orders.

position. If Canada is exporting milk and dairy products to the United States, industrial milk prices would have to fall to about $34/hl, ie. the U.S. price less transfer costs.

Table 4. A Comparison of Canadian and United States Prices for Industrial Milk, 1980-1994.

Year	US-Man. Price	Transfer Costs	Exchange Rate	US-Man Price	Can-Target Return	In-Quota Levy	Ontario Mkt. Fees	Producer Net Return	Prodcer Price Gap	Direct Subsidy	Plant Gate Price Gap excl. subsidy	Plant Gate Price Gap incl. subsidy
	us$/cwt	us$/cwt	c$/us$	c$/hl	c$/hl	c$/hl	c$/hl	c$/hl	c$/hl	c$/hl	subsidy	subsidy
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]
1980	$11.88	$1.00	1.19	$34.79	$35.55	$2.96	$0.48	$32.11	($2.68)	$6.03	$0.76	($5.27)
1981	$12.57	$1.00	1.22	$37.58	$38.92	$3.27	$0.64	$35.01	($2.57)	$6.03		($4.69)
1982	$12.49	$1.00	1.23	$37.67	$41.33	$4.68	$0.69	$35.96	($1.70)	$6.03	$3.66	($2.37)
1983	$12.49	$1.00	1.26	$38.58	$43.24	$5.14	$0.73	$37.37	($1.21)	$6.03	$4.66	($1.37)
1984	$12.29	$1.00	1.34	$40.43	$44.65	$6.17	$0.77	$37.71	($2.71)	$6.03	$4.22	($1.81)
1985	$11.48	$1.00	1.38	$39.09	$45.64	$6.07	$0.84	$38.73	($0.36)	$6.03	$6.55	$0.52
1986	$11.30	$1.00	1.36	$37.97	$46.48	$5.35	$0.92	$40.21	$2.24	$6.03	$8.51	$2.48
1987	$11.23	$1.00	1.27	$35.26	$46.77	$4.11	$0.99	$41.68	$6.42	$6.03	$11.51	$5.48
1988	$11.03	$1.00	1.20	$32.77	$47.06	$3.08	$1.06	$42.93	$10.16	$6.03	$14.29	$8.26
1989	$12.37	$1.00	1.17	$35.51	$47.45	$2.91	$1.06	$43.49	$7.98	$6.03	$11.94	$5.91
1990	$12.21	$1.00	1.15	$34.48	$48.69	$3.40	$1.10	$44.19	$9.71	$6.03	$14.21	$8.18
1991	$11.05	$1.00	1.16	$31.73	$49.92	$3.38	$1.23	$45.32	$13.58	$6.03	$18.19	$12.16
1992	$11.88	$1.00	1.26	$36.84	$50.11	$2.10	$1.38	$46.64	$9.80	$6.03	$13.27	$7.24
1993	$11.80	$1.00	1.35	$39.23	$50.84	$1.90	$1.45	$47.49	$8.26	$5.43	$11.61	$6.18
1994	$12.00	$1.00	1.39	$41.02	$52.28	$2.18	$1.45	$48.65	$7.63	$5.43	$11.26	$5.83

[1] M-W Manufacturing grade milk, 3.5% fat, calendar year. Dairy Outlook. USDA.

[2] Assumed average transfer costs.

[3] Canadian dollars per United States dollar, calendar year. Medium Term Outlook. Agriculture Canada.

[4] United States price of manufactured milk landed in Canada, Canadian dollars per hectoliter, calendar year. Calculated as (1 + 2)*(3)*2.27.

[5] Canada target return for industrial milk, dairy year. Medium Term Outlook. Agriculture Canada.

[6] In-Quota levy on all milk, dairy year. Medium Term Outlook. Agriculture Canada.

[7] Ontario Milk Marketing Board marketing levy, dairy year. Dairy Statistical Handbook. OMMB.

[8] Canada net producer return for milk, dairy year, including direct federal subsidy. Calculated as (5-6-7).

[9] Gap between Canadian industrial milk producer returns, including the direct federal subsidy, and the M-W average manufactured milk price.

Calculated as (8-4).

[10] Canada industrial milk direct federal subsidy, dairy year. Medium Term Outlook. Agriculture Canada.

[11] Gap between Canadian industrial milk price, plant gate, excluding the federal subsidy, and the M-W average manufactured milk price. Calculated as (5-4).

[12] Gap between Can. industrial milk price, plant gate, including the federal subsidy, and the M-W average manufactured milk price. Calculated as (5-10-4).

Table 5 lists the nominal prices of fluid milk in the United States. In this case, the producer price gap is much larger, ranging from \$12-\$17/hl, in recent years. A reasonable fluid milk import price is about \$43/hl.

Table 5. A Comparison of Canadian and United States Prices for Fluid Milk, 1980-1994

Year	US-Fluid Price us\$/cwt [1]	Transfer Costs us\$/cwt [2]	Exchange Rate c\$/us\$ [3]	US-Fluid Price c\$/hl [4]	Ontario Fluid Price c\$/hl [5]	In-Quota Levy c\$/hl [6]	Ontario Mkt. Fees c\$/hl [7]	Ontario Fluid Producer Return c\$/hl [8]	Producer Price Gap c\$/hl [9]	Plant Gate Price Gap c\$/hl [10]
1980	\$13.23	\$1.00	1.19	\$38.44	\$40.11		\$0.48	\$39.63	\$1.19	\$1.67
1981	\$13.95	\$1.00	1.22	\$41.40	\$43.36		\$0.64	\$42.72	\$1.32	\$1.96
1982	\$13.80	\$1.00	1.23	\$41.32	\$46.04		\$0.69	\$45.35	\$4.03	\$4.72
1983	\$13.75	\$1.00	1.26	\$42.19	\$48.23		\$0.73	\$47.50	\$5.32	\$6.04
1984	\$13.61	\$1.00	1.34	\$44.44	\$51.49		\$0.77	\$50.72	\$6.28	\$7.05
1985	\$12.90	\$1.00	1.38	\$43.54	\$52.51		\$0.84	\$51.67	\$8.13	\$8.97
1986	\$12.62	\$1.00	1.36	\$42.05	\$52.51		\$0.92	\$51.59	\$9.54	\$10.46
1987	\$12.66	\$1.00	1.27	\$39.38	\$52.51		\$0.99	\$51.53	\$12.14	\$13.13
1988	\$12.36	\$1.00	1.20	\$36.39	\$54.51		\$1.06	\$53.46	\$17.06	\$18.12
1989	\$13.66	\$1.00	1.17	\$38.94	\$54.45		\$1.06	\$53.40	\$14.46	\$15.51
1990	\$13.89	\$1.00	1.15	\$38.87	\$56.95		\$1.10	\$55.85	\$16.98	\$18.08
1991	\$12.30	\$1.00	1.16	\$35.02	\$56.95		\$1.23	\$55.73	\$20.70	\$21.93
1992	\$13.16	\$1.00	1.26	\$40.50	\$58.94		\$1.38	\$57.57	\$17.06	\$18.44
1993	\$12.86	\$1.00	1.35	\$42.47	\$59.08	\$1.90	\$1.45	\$55.73	\$13.26	\$16.61
1994	\$13.03	\$1.00	1.39	\$44.27	\$59.83	\$2.18	\$1.45	\$56.20	\$11.93	\$15.56

[1] Price of milk eligible for fluid market, calendar year, Dairy Outlook. USDA.

[2] Assumed average transfer costs.

[3] Canadian dollars per United States dollar, calendar year. Medium Term Outlook. Agriculture Canada.

[4} United States price of fluid milk landed in Canada, Canadian dollars per hectoliter, calendar year. Calculated as (1 + 2)*(3)*2.27.

[5] Ontario Class I price for milk, dairy year. Medium Term Outlook. Agriculture Canada.

[6] In-Quota levy on all milk, dairy year. Medium Term Outlook. Agriculture Canada.

[7] Ontario Milk Marketing Board marketing levy, dairy year. Dairy Statistical Handbook. OMMB.

[8] Return received by Ontario fluid milk producers, dairy year. Calculated as (5-6-7)

[9] Gap between average Ontario fluid milk producer returns and US average fluid milk prices. Calculated as (8-4).

[10] Gap between average Ontario fluid milk prices, plant gate, and US average fluid milk prices. Calculated as (5-4).

THE MODEL

To illustrate the importance of the economic variables mentioned above a simple two-good, synthetic economic model is constructed. The model depicts trade between Canada and the United States in milk and dairy products. It is assumed that Canada is a small-country price-taker.

The model consists of two consumption goods: industrial milk products and fluid milk, produced from a single raw milk input. While fluid milk would trade in its raw (fluid) form, industrial milk is more likely to be traded as processed dairy products (butter, skim milk powder, cheese, ice cream, etc.). The model is calibrated in terms of the milk equivalent of processed product consumption, and constructed to reproduce the 1993/94 Canadian dairy year.

Prices, quantities, and the assumed base values of parameters used for simulation, are listed in Table 6 and Table 7. All Canadian prices and quantities are based on data, for the dairy year, except for exports of Canadian dairy products (milk equivalents) where data for calender year 1993 is used. Similarly, the U.S. prices shown in Table 6 and Table 7 are for a calendar rather than a dairy year. The choice of the base parameter estimates has been guided primarily by the literature review. A reader may disagree with the choice of the base parameters. Therefore, a range of values are used in the sensitivity analysis to illustrate the importance of various parameter choices (Table 7).

Model Specification

The simulation model consists of two linear demand functions and a non-linear supply function calibrated to representative prices and quantities. The demand elasticities for fluid and industrial milk demand are set at -0.10 and -0.50. The industrial milk demand elasticity is slightly higher than the total elasticities estimated by Moschini and Moro but considerably lower than most Marshallian demand elasticities for individual processed dairy products. The elasticities should be calculated at the processing plant gate (wholesale) and not at retail, as are nearly all of the estimates in the literature. Under most conditions, demand elasticities will be lower at the wholesale rather than at the retail level. To capture all "reasonable" demand elasticities sensitivity analysis is conducted over the range -0.05 to -0.40 for fluid milk and from -0.20 to -0.90 for industrial milk (Table 7). These elasticities are imposed on a linear demand curve at the 1993/94 price-quantity point.

The farm level supply elasticity for milk has been set at 1.0. Selecting a supply elasticity also requires selecting a length of run to which it applies. A base period value of 1.0, should be appropriate for the medium run. A range of values from 0.5 to 2.0 should capture all expected supply responses beyond the very short run to the long run.

Table 6. 1993/1994 Dairy Year - Base Data

[1]	Industrial target return ($/hl)		$50.84
[2]		minus within quota levy ($/hl)	$1.90
[3]		minus marketing board fees	$1.45
[4]		minus domestic butter program costs	$0.08
	Producer Net Return for Industrial Milk ($/hl)		**$47.41**
[5]		minus direct subsidy	$5.43
	Producer Net Market Return for Industrial Milk ($/hl)		**$41.98**
	Industrial target return ($/hl)		$50.84
		minus direct subsidy ($/hl)	$5.43
	Price Paid by Processors for Industrial Milk ($/hl)		**$45.41**
[6]		plus processor margin	$7.60
	Price Guarantee to Processors		**$53.01**
[7]	Ontario Fluid Milk Price ($/hl)		$59.08
		less over quota levy	$1.90
		less marketing board fees	$1.45
	Producer Net Return for Fluid Milk		**$55.73**
	Ontario Fluid Milk Price ($/hl)		$59.08
[8]		plus weighted average processing margin	$0.63
	Price Received by Fluid Processors		**$59.71**
[9]	**Fluid Milk Deliveries (mhl)**		**30.73**
[10]		less skim off	8.16
[11]	**Fluid Milk Consumption**		**22.57**
[12]	Industrial Milk and Cream Deliveries (mhl)		43.27
		plus skim off cream from fluid sector (mhl)	8.16
	Industrial Milk Supply, butterfat basis (mhl)		**51.43**
[13]	**Exports of Industrial Products, butterfat basis (mhl)**		**3.00**
[14]	**Imports of Industrial Products, butterfat basis (mhl)**		**2.63**
	Net Exports of Industrial Products (mhl)		**0.37**
	Domestic Consumption of Industrial Milk and Cream Products, butterfat basis (mhl)		**51.06**
	United States Milk Price + Transfer Costs		
[15]		Fluid Milk Price + transfer costs	**$42.47**
[16]		Industrial Milk Price + transfer costs	**$39.23**
	United States Milk Price - Transfer Costs		
[17]		Fluid Milk Price - transfer costs	**$36.35**
[18]		Industrial Milk Price - transfer costs	**$33.10**

[1], [2], [5], [6], [7], [8], [9], [10], [11], [12] Medium Term Outlook. Agriculture Canada.
[3] Dairy Statistical Handbook. OMMB
[4] Dairy Facts and Figures. Dairy Farmer's of Canada.
[13], [14] Figures are for calendar year 1993. Dairy Facts and Figures. Dairy Farmer's of Canada.
[15], [17] See table 5.
[16], [18] See table 4.

Table 7. Base Parameter Values and Values Used in Sensitivity Analysis

PARAMETERS:	Base Value*	Range for Sensitivity Analysis
Demand Elasticity for Fluid Milk	-0.10	-0.05 to -0.40
Demand Elasticity for Industrial Milk	-0.50	-0.20 to -0.90
Supply Elasticity for all Milk	1.00	0.50 to 2.00
Marginal Cost of Production at Current Output	$33.00/hl	$30.00 to $45.00
Shut-Down Price	$22.00/hl	$20.00 to $28.00
US Fluid Milk Price, import basis	$43.00/hl	$33.00 to $48.00
US Industrial Milk Price, import basis	$40.00/hl	$30.00 to $45.00
US Industrial Milk Price, export basis	$34.00/hl	$30.00 to $45.00

* All values are expressed in Canadian dollars.

There are two other aspects of the model that need further elaboration: (1) the functional form for the supply curve and (2) the point on the curve to impose the supply elasticity. The functional form selected in this study is:

(2) $S = \alpha (P - \beta)^{\gamma}$

where S is the quantity supplied, P is price (marginal cost) and α, β and γ are parameters.

A supply curve of this form permits the specification of a shut-down point and the price where milk supply goes to zero. In equation (2), when $P=\beta$ supply goes to zero, the parameter (β) defines the shut-down price. The parameters α and γ determine the shape of the curve.

The supply elasticity is imposed at a marginal cost of $33/hl and a quantity of 74 mhl, conditional on the assumed shut-down price of $22/hl. To test the robustness of the results to these assumptions, a sensitivity analysis is conducted. Shut-down values are varied between $20/hl-$28/hl and marginal cost values are varied between $30/hl and $45/hl.

Processing Margin

The base model is constructed on the assumption that the processing margin in Canada is a competitive margin. Consequently, if Canadian processing plants pay the same price for raw milk as their U.S. counterparts, Canadian processed dairy products would be priced competitively with the processed product from the United States. To simulate the possibility that Canadian processing margins might be reduced with trade liberalization, the effect of reducing the Canadian processing margin from $7.60/hl to $3.80/hl is examined.

U.S. Milk Prices

Prices for fluid and industrial milk produced in the United States are needed to simulate the model. With the U.S. dollar trading at $1.35-$1.40, the landed price of milk produced in the United States is about $40/hl, the base value chosen for industrial milk. The value selected for fluid milk is $3/hl higher at $43/hl. A drop in the American milk price to $22.70/hl (US$10/cwt) plus a weaker U.S. dollar of $1.25, could push landed prices down to $30/hl. Hence, a range of landed values for U.S. milk from $30/hl to $45/hl are simulated. Values below $40/hl are the most probable. In all simulations it is assumed that Canada could price fluid milk at the import competitive price of $43/hl, even when it is a net exporter of dairy products.

THE RESULTS

Table 8 describes the consequences of freer trade under two alternative scenarios, and compares these results to the current policy situation. Base 1 assumes that producers react to the blend price in making their supply decisions. In Base 2, producers are assumed to react to the industrial milk price - which is the marginal output price. Under both assumptions Canadian milk output increases from the base level of 74 mhl. In Base 1 output increases to 81.3 mhl (blend price scenario) and In Base 2 output rises to 79.1 mhl (industrial milk price scenario). Output increases in both cases despite a producer price decline of 25-30 percent following the removal of supply restrictions. As a result of a reduced market price, the demand for fluid milk increases by 2.7 percent and the demand for industrial milk increases by about 10 percent.

In Base 1, Canada is a small net exporter of milk (1.53 mhl) and industrial milk prices are pushed down to the export floor of $34/hl. The blend price in Base 1 is reduced to $36.57/hl, compared to $49.95 under supply control. Under Base 2, Canada is self-sufficient in milk production and net trade in milk products is zero. Autarky industrial and blend prices rise from Base 1 levels to $35.41 and $37.64/hl.

Table 8. Current and Free Trade Policy Results: Base Period Variable and Parameter Values

VARIABLE	UNITS	CURRENT POLICY BASE value	FREE TRADE BASE 1 value	% change	FREE TRADE BASE 2 value	% change
Fluid Milk Demand	mhl	22.57	23.18	2.7	23.18	2.7
Industrial Milk Demand	mhl	51.06	56.56	10.8	55.88	9.4
Total Domestic Milk Demand	mhl	73.63	79.73	8.3	79.05	7.4
Total Milk Supply	mhl	74.00	81.26	9.8	79.05	6.8
Net Exports of Milk Products	mhl	0.37	1.53	313.5	0	-100.0
Fluid Milk Producer Price	$/hl	$55.73	$ 43.00	-22.8	$ 43.00	-22.8
Industrial Milk Producer Price	$/hl	$47.41	$ 34.00	-28.3	$ 35.41	-25.3
Producer Blend Milk Price	$/hl	$49.95	$ 36.57	-26.8	$ 37.64	-24.6
Price of Fluid Milk, plant gate	$/hl	$59.08	$ 43.00	-27.2	$ 43.00	-27.2
Price of Industrial Milk, plant gate	$/hl	$50.84	$ 34.00	-33.1	$ 35.41	-30.4
Wholesale Price of Fluid Milk, ex plant	$/hl	$59.71	$ 43.63	-26.9	$ 43.63	-26.9
Wholesale price of Industrial Milk Products, ex plant	$/hl	$53.01	$ 41.60	-21.5	$ 43.01	-18.9
US Fluid Milk Price, import basis	$/hl	$43.00	$ 43.00		$ 43.00	
US Industrial Milk Price, export basis	$/hl	$34.00	$ 34.00		$ 34.00	
Gross Revenue from Milk Sales	mil. dol.	$3,461.30	$ 2,971.68	-14.1	$ 2,975.44	-14.0
Rental Value of Production Quota	mil. dol.	$1,248.82	$ 0.00		$ 0.00	
Gross Revenue less Rental Value of Quota	mil. dol.	$2,212.48	$ 2,971.68	34.3	$ 2,975.44	34.5

Gross revenue from milk sales, excluding the direct federal subsidy, is $3,461 million under the current policy. Gross revenue is estimated to fall by about 14 percent under free trade to just under $3 billion. However, the annual rental value of production quota, under the base assumptions is $1,249 million. Deducting the $1,249 million from gross revenue leaves about $2.2 billion to cover production costs and to provide a return to non-quota assets. This "net" return is 34 percent less than under the free trade assumptions. The opportunity cost of quota is not an out-of-pocket expense for all producers, but for new entrants the cost of quota is a major expense.

Historically, quota holders have benefitted from the rising value of quota. Over the past 10 years, the value of Ontario's used industrial milk quota has increased at a compound rate of 5.3 percent per year. At 1993 quota values, this represents a capital gain of $370 million, or $5/hl. If capital gains are taken into account, the gross return to non-quota assets rises to $2,582 million - still less than under free trade assumptions.

The results presented in Table 8 are contingent on the assumptions made about the base parameters. In the remainder of this section, the sensitivity of the results to these assumptions are examined. The focus of the sensitivity analysis is on three variables. The first of the three variables is Canada's net exports of dairy products. Net exports captures both supply and demand changes in a single indicator. In both Base scenarios and under the current policy, net exports are close to zero. The other two variables reported are Canada's industrial and blend milk prices. Industrial and blend milk prices show how the base parameter assumptions influence the returns received by Canadian dairy producers. Under the Base assumptions Canada's industrial milk price is either at, or close to, the export floor price of $34/hl. Sensitivity analysis is conducted on six parameters: 1) the marginal cost of production; 2) the shut-down price; 3) the milk supply elasticity; 4) the milk demand elasticities; 5) the industrial milk processing margin; and 6) U.S. milk prices.

Sensitivity Analysis: Marginal Cost of Production

Figure 2 describes the effect of increasing marginal cost to $45/hl from $30/hl while holding the shut-down price at $22/hl. This corresponds to a situation where "average" production costs change, but the costs of the most efficient producers are held constant at a low level. In all cases, the assumed marginal cost is imposed on the milk supply curve at 74 mhl.

Figure 2 illustrates that at marginal costs below $32/hl, Canada is a small net exporter of dairy products. At marginal costs of production between $33/hl and $38/hl Canada is self sufficient. Marginal costs above $38/hl imply that Canada begins to import dairy products. If Canada's marginal cost, at 74 mhl, is as high as $45/hl then Canada would import 11.56 mhl of dairy products. An import level of 11.56 mhl of dairy products represents 15 percent of domestic consumption. As a consequence of higher marginal costs, milk production in Canada would drop to 65.3 mhl from 74 mhl (-11.8%).

Figure 2. Net Exports at Various Values for Canada's Marginal Cost: Holding Shut-Down Price at $22/hl

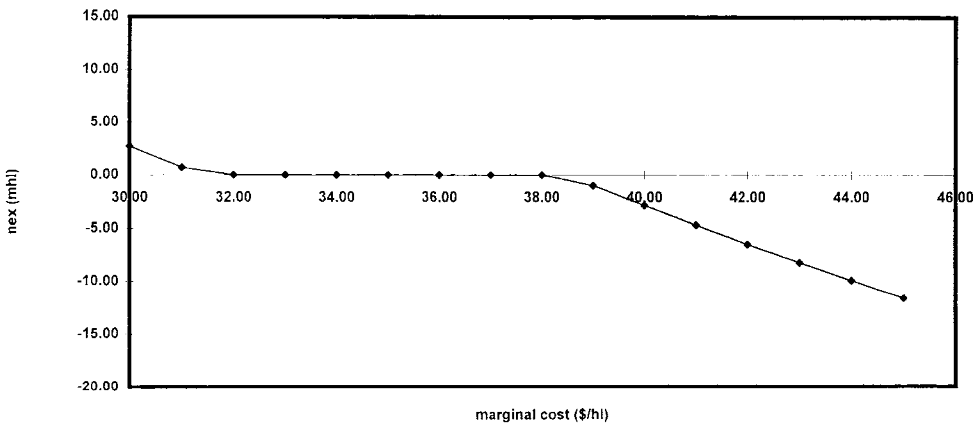
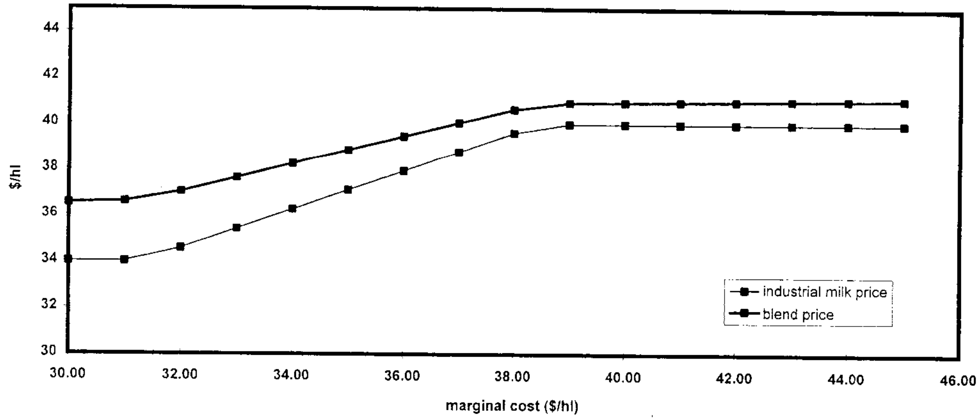


Figure 3 shows the evolution of the industrial milk and blend milk prices as marginal costs increase. The industrial milk price starts at the export floor price ($34/hl) and rises to the import ceiling price($40/hl) by the time marginal costs reach $39/hl. The blend milk price illustrates the effect of assuming that Canada always supplies the fluid milk market at the import ceiling price of $43/hl.

Figure 3. Industrial and Blend Milk Price as Canada's Marginal Cost Varies Between $30/hl and $45/hl



In the next scenario the $11/hl difference between the shut-down price and the marginal cost is maintained rather than holding the shut-down price at $22/hl, as in the previous scenario. As marginal costs are increased from $30 to $45/hl the shut-down price is increased to $34 from $19/hl. The outcome is illustrated in Figure 4 and Figure 5. In this situation, Canada begins to import dairy products at a marginal cost of $39/hl and by the time marginal costs reach $45/hl net imports equal 13 mhl, about 1.5 mhl more than in the previous scenario, which maintained a lower shut-down price.

Figure 4. Net Exports at Various Values for Canada's Marginal Cost: Shut-Down Price Eleven Dollars Less than Marginal Cost

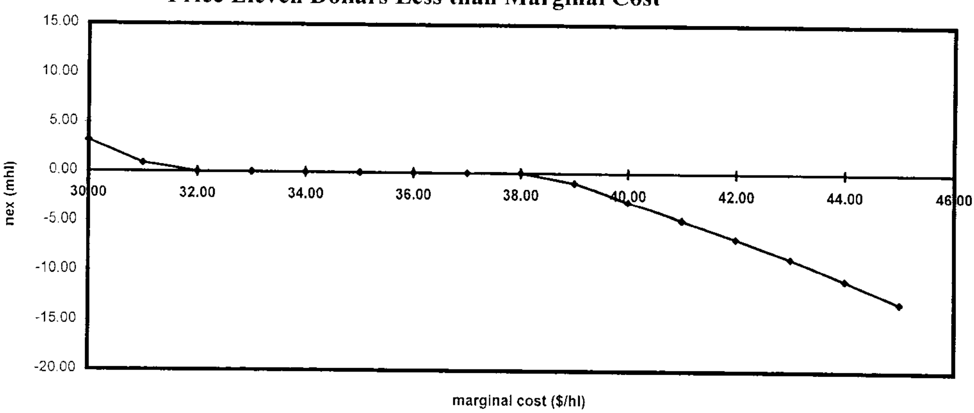
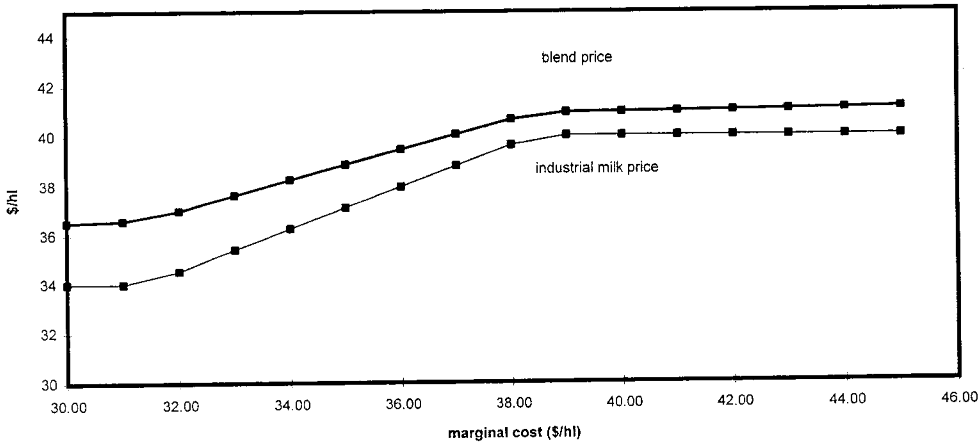


Figure 5. Industrial Milk and Blend Price as Canada's Marginal Cost Varies Between \$30/hl and \$45/hl and the Shut-Down Price from \$19-\$34/hl



In the final marginal cost scenario it is assumed the shut-down price is only six dollars below the marginal cost instead of eleven dollars. Again, the shut-down price is allowed to increase with the marginal cost, always remaining \$6/hl below the illustrated value of marginal cost in Figure 6 and Figure 7. By the time marginal cost reaches \$45/hl and the shut-down price \$39/hl, Canada becomes a net importer of 18.6 mhl of dairy products. Milk output declines to 58.3 mhl, a decline of 21.2 percent from current levels.

Figure 6. Net Exports at Various Values of Canada's Marginal Cost: Shut-Down Price Six Dollars Less than Marginal Cost

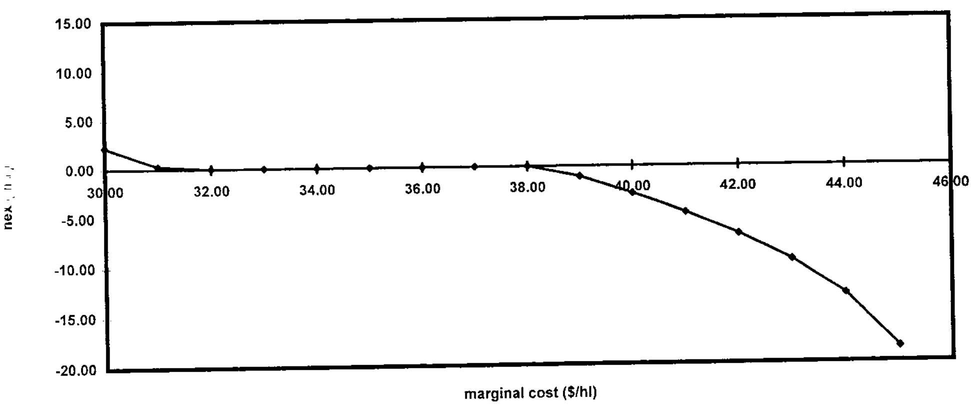
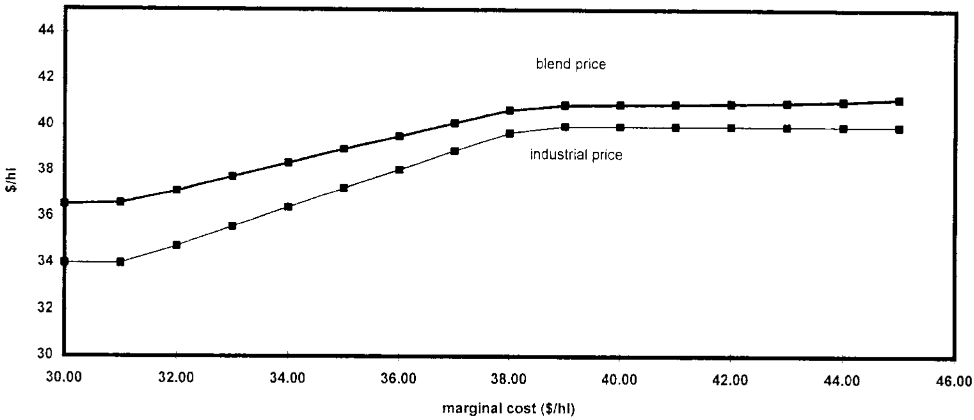


Figure 7. Industrial Milk and Blend Price as Canada's Marginal Cost Varies Between $30/hl and $45/hl and the Shut-Down Price from $24-$39/hl



Sensitivity Analysis: Shut-Down Price

In this scenario, the shut-down price is varied from $20/hl to $28/hl while holding the marginal cost at $33/hl. Variations over this range maintain Canada's no trade position. Moreover, variations in the shut-down price have little effect on the industrial or blend milk price. Total milk output varies from 79.1 mhl with a shut-down price of $20/hl, to 78.9 mhl with a shut-down price of $28/hl. The small response of supply to the shut-down price is not surprising since the supply inducing price is above the assumed marginal cost.

Sensitivity Analysis: Supply Elasticity

In Figure 8, the supply elasticity is varied from 0.5 to 2.0 holding the marginal cost and shut-down price constant at the base values. The variation in the supply elasticity does not change Canada's no trade position, but it does influence the autarky industrial milk price. As the supply elasticity is increased, output expands. Production is 78.2 mhl when the supply elasticity is 0.5, and increases to 79.6 mhl when the supply elasticity is 2.0. The additional output is enough to lower the equilibrium domestic price for industrial milk from $37.27/hl to $34.27/hl.

Sensitivity Analysis: Demand Elasticities

Figure 9 shows the effect on the equilibrium prices of industrial and blended milk as the demand elasticities for industrial milk and fluid milk are varied. The demand elasticity for industrial milk is varied from -0.20 to -0.90 (*shown*) while the elasticity of demand for fluid milk is increased simultaneously from -0.05 to -0.40 (*not shown*). Canada remains in a no trade situation as quantity demanded increases from 76.1 mhl at low demand elasticities, to 82.9 mhl with large price elasticities. Over the simulated range of demand elasticities, the equilibrium industrial milk price rises from $34.00/hl to $37.48/hl.

Figure 8. Industrial and Blend Milk Price at Various Domestic Supply Elasticities

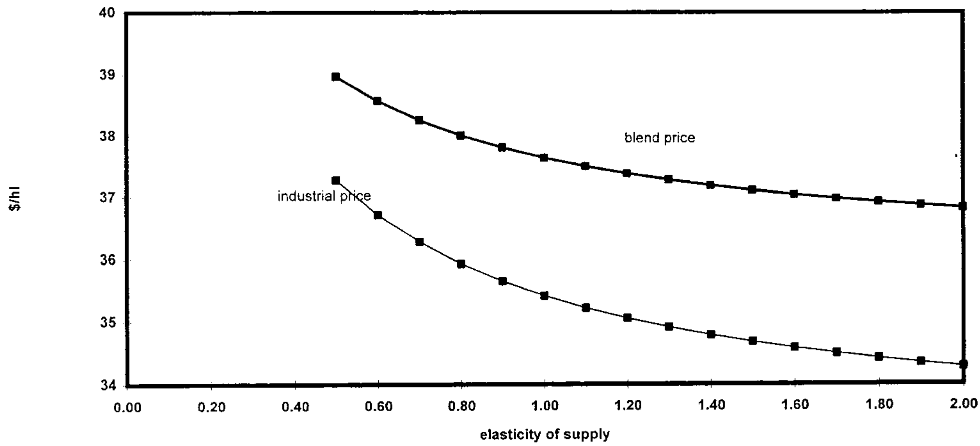
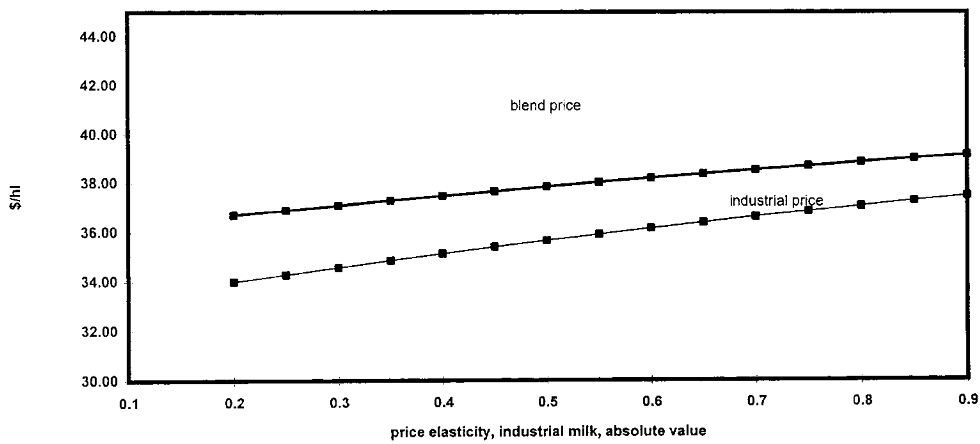


Figure 9. Industrial and Blend Milk Price with Various Domestic Demand Elasticities



Sensitivity Analysis: Processing Margin

The result of lowering Canada's assumed processing margin to $3.80 from $7.60 is shown in Table 9 where they are compared to the current policy base and to Base 2. The lower processing margin increases Canada's demand for processed dairy products. The lower processing margin also raises the industrial milk price received by producers to $36.17, from $35.41 in Base 2. Industrial milk demand and milk production both increase about 1.5 mhl in comparison with Base 2 and Canada remains in a no trade situation.

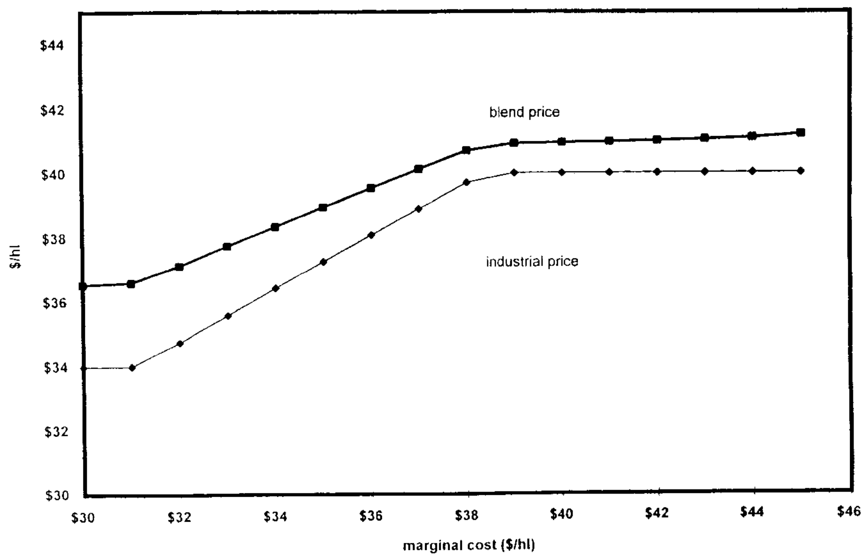
Table 9. Current, Free Trade Base 2 and Industrial Processing Margin Reduced to 50 Percent of Current Level

VARIABLE	UNITS		CURRENT POLICY BASE		FREE TRADE BASE 2			FREE TRADE 50 % Lower Processing Margin	
			value		value	% change		value	% change
Fluid Milk Demand	mhl		22.57		23.18	2.7		23.18	2.7
Industrial Milk Demand	mhl		51.06		55.88	9.4		57.34	12.3
Total Domestic Milk Demand	mhl		73.63		79.05	7.4		80.52	9.4
Total Milk Supply	mhl		74.00		79.05	6.8		80.52	8.8
Net Exports of Milk Products	mhl		0.37		0	-100.0		0	-100.0
Fluid Milk Producer Price	$/hl	$	55.73	$	43.00	-22.8	$	43.00	-22.8
Industrial Milk Producer Price	$/hl	$	47.41	$	35.41	-25.3	$	36.17	-23.7
Producer Blend Milk Price	$/hl	$	49.95	$	37.64	-24.6	$	38.14	-23.6
Price of Fluid Milk, plant gate	$/hl	$	59.08	$	43.00	-27.2	$	43.00	-27.2
Price of Industrial Milk, plant gate	$/hl	$	50.84	$	35.41	-30.4	$	36.17	-28.9
Wholesale Price of Fluid Milk, ex plant	$/hl	$	59.71	$	43.63	-26.9	$	43.63	-26.9
Wholesale price of Industrial Milk Products, ex plant	$/hl	$	53.01	$	43.01	-18.9	$	39.97	-24.6
US Fluid Milk Price, import basis	$/hl	$	43.00	$	43.00	0.0	$	43.00	0.0
US Industrial Milk Price, export basis	$/hl	$	34.00	$	34.00	0.0	$	34.00	0.0
Gross Revenue from Milk Sales	mil. dol.	$	3,461.30	$	2,975.44	-14.0	$	3,071.03	-11.3
Rental Value of Production Quota	mil. dol.	$	1,248.82	$	0.00	-100.0	$	0.00	
Gross Revenue less Rental Value of Quota	mil. dol.	$	2,212.48	$	2,975.44	34.5	$	3,071.03	38.8

Sensitivity Analysis: U.S. Milk Prices

Figure 10 illustrates the effect on Canada's net exports of dairy products as the U.S. industrial milk price increases from $30/hl (US$9.50/cwt) to $45/hl (US$14.25/cwt). The fluid milk price remains $3/hl higher. At U.S. prices below $38/hl (US$12.00/cwt) Canada is either self-sufficient or a small net exporter. If the U.S. price increases to $45/hl Canada would export 14.7 mhl of dairy products and produce 90.3 mhl, 22 percent more than current output. Over the range of U.S. industrial milk prices from $33/hl (US$10.45/cwt) to $38.00/hl (US$12.00/cwt) Canada would be self-sufficient in milk production. The effects on prices are shown in Figure 11.

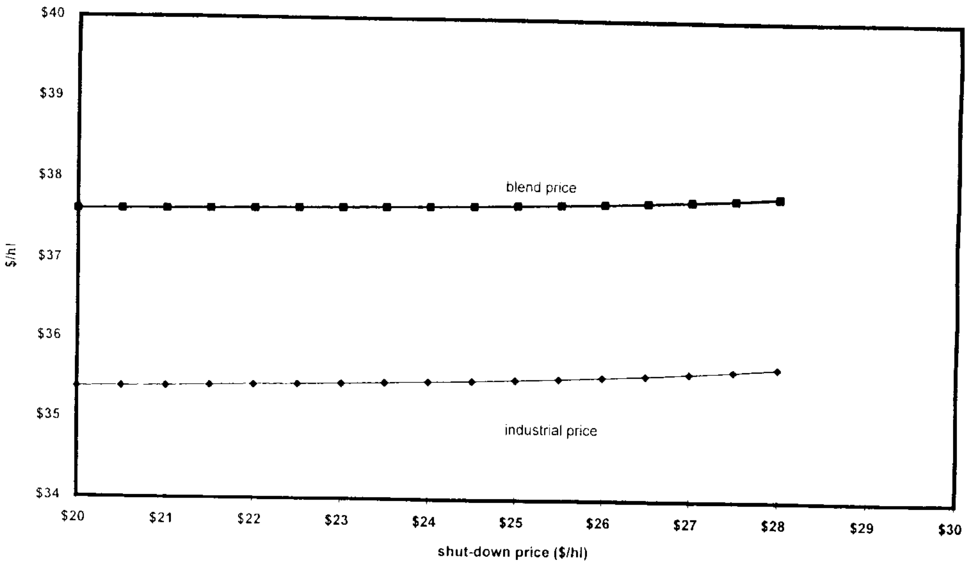
Figure 10. Industrial Milk and Blend Price as Canada's Marginal Cost Varies Between $30/hl and 45/hl and the Shut-Down Price from $24-$39/hl



Summary of Sensitivity Analysis

The most striking feature of the sensitivity analysis is the robustness of a small or no trade solution. Only when Canada's marginal cost of milk production is quite high relative to the U.S. market price, does Canada become a significant net importer of milk and dairy products. Likewise, Canada only becomes a significant exporter when U.S. prices rise sharply relative to Canada's marginal cost of production. The results also indicate the importance of taking into account Canada's output restrictions. Even though Canadian milk prices fall from current levels in nearly all of the simulations, Canada's milk production often expands, or contracts only modestly.

Figure 11. Industrial and Blend Price as the Shut-Down Price Varies from \$20-\$28/hl Holding Marginal Cost at \$33/hl



It is impossible to capture all of the subtleties of interregional trade in a non-spatial partial equilibrium model. In the next section three studies of the North American dairy market are reviewed. Two of these models are spatial equilibrium models that provide an indication of the potential sources and destinations of product. In addition, the importance of assumptions in reaching the conclusions taken from the papers are highlighted.

THE RESULTS FROM OTHER STUDIES OF TRADE LIBERALIZATION

Hallberg and Baker use a spatial equilibrium model of the U.S. and Canadian dairy markets to estimate the impact of freer trade[7]. The static analysis used by the authors is a standard approach to assess trade policy alternatives. Unfortunately, a fundamental error in the specification of the supply side of the Canadian market leads the authors to draw erroneous conclusions from their analysis. The problem lies in the specification of Canada's

[7] In preparing this review the authors have benefitted from unpublished comments on Hallberg and Baker and Bromfield *et al.* prepared by Don McClatchy, Agriculture Canada.

raw milk supply curve based on observed price and quantity data[8]. Production quotas have the effect of reducing the amount of milk produced at administered prices. The removal of tariff barriers would lower Canada's milk prices but, with the removal of output controls, milk production might increase. The possibility of lower prices and higher output is easily seen in Figure 1.

Hallberg and Baker's results also rely on the assumption that dairy processing must occur in the region where the milk is produced. The assumption that raw milk for manufacturing purposes cannot move between regions maybe be realistic under current U.S. regulations but it is less realistic under free trade assumptions. Processing costs can vary across regions and over time. As a result, it may be advantageous for processing to be located in some regions but not in others.

Bromfield, *et al.* estimate the impact on Canada's supply managed sectors of free trade with the United States[9]. The effects on farmers, input suppliers, processors and further processors are considered. The study predicts the economic impact of the elimination of import tariffs on milk, milk products, poultry and eggs as of January 1, 1996. The impacts are analyzed over the five-year period from 1996 to 2000 to allow for a separation between transitional and longer-run effects.

The authors make several important assumptions. For milk and dairy products, assumed price and production impacts are taken directly from the work of Hallberg and Baker. Based on these results, Bromfield, *et al.* argue that free trade in milk and dairy products would reduce Canada's producer prices by 25 percent, and milk output by at least 15 percent. While the estimated price decline seems reasonable, if the federal direct subsidy is eliminated, it takes very pessimistic assumptions about Canada's marginal cost of producing milk to generate significant output declines. Without significant declines in Canada's milk output there is no way for U.S. dairy imports to fill 20 percent of Canadian domestic consumption as argued by Bromfield, *et al.*

The results of Bromfield, *et al.* reinforce the notion that producers and processors in all provinces would be adversely affected by free trade in milk and dairy products. The annual average loss to the agricultural and food processing sectors, over the five years, was estimated to be $3.2 billion. The annual loss in government revenues over the same period was estimated at $3.6 billion. These loss estimates are based on the assumption that the resources (capital, labour and land) currently used to produce milk and dairy products would remain totally idle under trade liberalization. Roberts has revealed the unrealistic nature of this assumption in anything other than the very short run. In addition, the consumer gains which would offset the losses to producers and processors are not discussed fully. Hallberg and Baker, and Doyon, Pratt and Novakovic argue that with freer trade, milk and dairy

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[8] The high price of milk production quota indicates that the quota is binding and producers are not producing where marginal cost equals the market price of milk.

[9] A NAFTA panel ruling in favour of the United States would require that Canada move more quickly towards freer trade in dairy products but not necessarily to free trade. An adverse panel ruling would be followed by further negotiations (Meilke).

products may move in both directions across the border. However, Bromfield *et al.* assume unilateral trade in dairy products.

Doyon, Pratt, and Novakovic investigate the effects of two dairy trade scenarios between Québec, Ontario, and the Northeast United States. In the first scenario, trade conditions are changed to permit the United States to export yogurt and frozen desserts to Canada. The second scenario allows for an entirely free trade environment. A competitive, static, partial equilibrium, multicommodity, and multi-region linear programming model is used to determine the effects of the two trade liberalization policies. The model includes seven dairy products (fluid milk, frozen desserts, specialty cheese, dry and condensed milk, butter, yogurt, and cheddar cheese), 296 supply points, 184 consumption points, and 307 processing points. The solution to the model depends only on marketing costs (transportation and processing costs). Economic agents are not allowed to react to variations in output or consumption prices.

Two fundamental assumptions drive the results from this model. First, the quantities of raw milk consumed and produced in each region are fixed. Second, the costs associated with assembly, processing, and distribution, although different in each region, are fixed in the assessment of the two alternative trade scenarios.

The results of policy changes on trade patterns are evaluated by comparison to a base simulation. The base scenario reflects trade conditions that existed before the NAFTA and GATT'94 agreements. With only yogurt and frozen desserts exported to Canada in the first simulation, Québec was adversely affected in all categories of dairy products except fluid milk. Ontario's yogurt and ice cream sectors were also negatively affected. However, Ontario became a net exporter of specialty cheese.

The results of the second simulation (free trade) suggest there would be no significant movement of fluid milk across international borders. Québec relinquishes market share for all dairy products except cheddar cheese and ice cream. Ontario improves its trade position for all dairy products except yogurt and specialty cheese. The spatial equilibrium model documents the source-destination trade flows.

The authors conclude that if trade restrictions are lifted on only some dairy products, new distortions are created which may cause more adjustment problems than if all trade restrictions were lifted simultaneously.

These three papers illustrate how the initial assumptions made in analyzing a problem influence the conclusions. In Hallberg and Baker, the assumptions of: 1) a sharp drop in Canadian milk production, and 2) that processing must occur only in the producing region, drive the result that the U.S. exports significant quantities of dairy products to Canada. Bromfield *et al.*, relying largely on the price and output predictions of Hallberg and Baker conclude that free trade would significantly reduce the welfare of Canada's milk producers and processors. Finally, Doyon *et al.* conclusions rest on their two initial assumptions: 1) fixed quantities of raw milk demanded and supplied, and 2) that the costs associated with assembly, processing, and distribution of milk and dairy products are fixed. These assumptions sharply limit the extent of adjustments in milk and dairy product trade, but do illustrate how a fixed quantity of milk would be processed and transferred to minimize these costs.

CONCLUSIONS

Trade flows in milk and dairy products between Canada and United States, with trade liberalization, are likely to be small. In fact, no trade is a real possibility. For large ranges of the key parameters driving dairy product trade - no trade was the estimated outcome. The no trade finding is largely unaffected by changes in demand and supply elasticities for fluid and industrial milk, changes in milk producers shut-down price and Canadian processing margins for milk products. However, if the marginal cost of milk production in Canada is above the landed price of dairy products from the United States, then Canada could become a significant importer. Therefore, future research should focus on: 1) generating reliable farm-level information on marginal cost by farm size, and 2) the effects of regulation on average farm size and cost structures . It should be emphasized that while no net trade in milk and dairy products between Canada and the United States is a possibility, there could be significant intra-industry trade in differentiated milk and dairy products with trade liberalization.

The base line results indicate that Canada's gross revenues from milk sales, excluding the direct federal subsidy, decrease from $3,461 million to just under $3 billion with free trade. However, the gross revenue under the current policy includes the opportunity cost of milk quotas worth more than $0.8 million, even after allowing for the expected capital gains on quota purchases. Since the existing production quotas would disappear with trade liberalization, a pertinent policy question is: should dairy farmers be compensated for the loss in quota value? Compensation to Canadian dairy farmers is an equity issue which the Canadian government and taxpayers will have to confront.

Finally, several recent studies of trade liberalization in milk and dairy products between Canada and the United States paint a rather gloomy picture for the Canadian dairy industry in a free trade world. The gloom is, to a large extent, driven by unrealistic assumptions about the dairy industry in Canada. Predictions made on the basis of more reasonable assumptions suggest that net trade in dairy products between Canada and the United States is likely to be small following North American trade liberalization.

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— DISCUSSION —
ANALYSING THE POTENTIAL FOR INCREASED TRADE: MODELLER'S PERSPECTIVE

Robert Young[1]

The potential for increased trade between Canada and the United States in dairy products is a very tricky and evasive concept for modellers. The current state of the art does not keep track of, or account for quantity movements on a reportable basis and as a result movements that are simulated are induced from apparent shifts in marginal cost curves. The issue is whether the overall cost and demand structures are stable under trade or whether they actually shift. If they remain stable then the current round of modelling effort has a lot to recommend itself. If there are shifts, then we need to reassess the structure and focus of our modelling to determine if the results are meaningful within an industrial context before they can be used to address larger scale national issues.

A case in point is the Southeastern area milk surplus. The attached diagram shows the level of the surplus as we projected it for these states until the year 2010, overlaid across a map of the region. The downward pattern is unmistakable and profound. One might easily conclude that there is a "crisis" in this most significant of all dairy products. Yet our assumptions in this model do not address shifts in consumer preferences or the adjustments in trade that may come about. It may be conceivable that with changes in dairy policy and changes in technology that this locally prevalent " deficit" would vanish completely. On the other hand it may be that it would expand and generate considerable anguish both within the region and beyond its borders. We simply do not have confidence in the overall results , given these potential adjustments, in order to generate long term policy recommendations.

We need to establish better data sets that will allow us to make strides in our modelling efforts. At present we generally accept that quotas inhibit structural change and that the release of quotas would cause pent up pressures to drastically rearrange and industry. The converse is that price restrictions can be adjusted with less structural trauma. Yet we do not collect data that would allow us to analyse these effects and separate their implications. Our analysis often concentrates on solutions that seem to "pop" right out of our models. When we suggest that quotas be eliminated we often run directly to assessing

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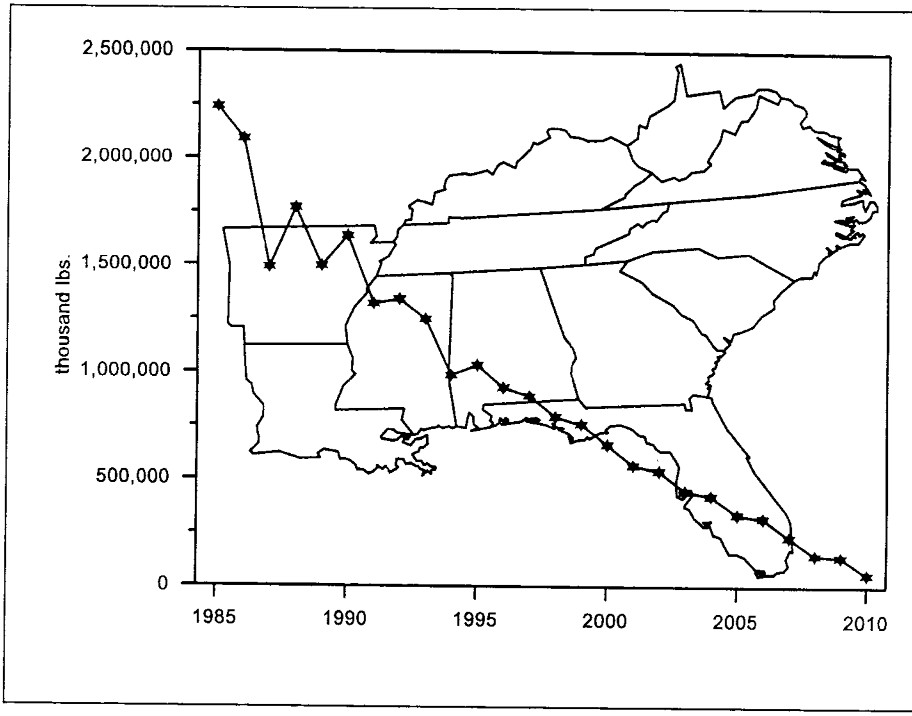
[1] This is an edited version of the comments made at the conference.

spend more money on compensation or adjust quotas. In effect we run the risk of "jumping over" the problem and missing other alternatives such as integration of facilities, product specialization at the processor level, and technological transfer and adjustment amongst others.

Figure 1.1 Southeastern Area Fluid Milk Production Surplus



Some of our models also lead us to spurious conclusions whereby our models predict movements between points that are related in terms of the "economic space" that we have designed into our models but which are not linked directly through "geographic space" or "infrastructural space". In other words we may be able to move products theoretically but not practically.

We must reconfigure much of our analysis to account for these changes and we must do so because we have spent the time to develop new sources of data. We can model quantity movements but these mean very little unless we can actually count the movements that are taking place. This shift may also mean that we move our focus of analysis along the distribution channel with more emphasis on the price transmission mechanisms that are involved or likely to be. The consumer may well be a more productive and worthwhile focal point than the farm in terms of these efforts after we have collected the data.

—DISCUSSION—
ANALYSING THE POTENTIAL FOR INCREASED TRADE

Alfons Weersink

International trade of dairy products has been approximately 7 percent of world production over the last decade (Stillman et al., 1996). Canada and the United States have not been major players in this small international dairy market with imports and exports of dairy products representing less than 3 percent of total milk production in both countries. However, domestic dairy policies in these countries and others which have curtailed past movement of dairy products are now under pressure to change externally from trade agreements such as NAFTA and internally from government fiscal constraints. The possibility of liberalized trade and subsequent change in the status quo creates excitement and anxiety over the new set of rules facing the dairy sector. American producers and processors view an open Canadian market as 'ripe for product infiltration' for manufactured and even fluid dairy products (Howard, 1995). Such optimism is buoyed by reports such as Bromfield *et al* who predict free trade would result in U.S. imports of dairy products meeting 20 percent of Canadian domestic consumption. The two papers in this session also examine how trade flows between Canada and the United States would change in the event of increased trade.

The purpose of this discussion is to compare the papers by Doyon, Pratt and Novakovic (DPN) and Meilke, Sarker and LeRoy (MSL). Similarities and differences between the two papers are examined for the purpose or scope of analysis, methods used, and results obtained along with suggestions for extension of the analysis. The discussion concludes with a brief synopsis of Victor Fuchs' tofu triangle and its relationship for the participants of the policy debate surrounding the dairy sector.

PAPER COMPARISON

Purpose

The purpose of the paper by Doyon, Pratt and Novakovic (DPN) is to determine the movement of milk and dairy products with existing supply and demand conditions under two scenarios. The first assumes the United States is able to unilaterally export yogurt and frozen desserts to Canada and the second assumes total free trade between the two countries. The paper by Meilke, Sarker and LeRoy (MSL) also examines trade flow but at a more aggregated level and with a focus on identifying the key economic forces which will determine the extent of such trade.

Methods

The two papers represent contrasting forms of analysis. DPN use a spatial equilibrium model that minimizes the cost of processing and transporting raw milk from its supply points to its final product form at given demand locations. Thus, the model is consistent with physical realities in the sense that the milk going into a plant must be balanced with the components of the products coming out. The strength of the model is its disaggregation and detail particularly at the processing sector which tends to be given less emphasis than the farm sector in most models of the dairy industry. Data on actual processing plant locations and costs and transport costs are incorporated into most models as marketing margins but have been labouriously obtained by DPN. However, since supply and demand relationships are not considered, the model is able to examine only market organization and not price equilibrium conditions.

In contrast, Meilke, Sarker and LeRoy (MSL) develop a simple synthetic trade model at an aggregate level for two dairy products where trade flows are the result of a price equilibrium. Products move on the basis of relative prices and costs along with the degree of responsiveness to those rather than on the basis of fixed processing cost differentials as in DPN. MSL have taken the raw data presented by Barichello and Romain the next step to allow for players in the sector to respond to those prices. While the model is admittedly simple, it does capture the basic elements of the system and the authors subject the model to a series of sensitivity tests to assess the importance of alternative factors.

Results

Despite the differences in approach, both models come up with two similar conclusions; (a) net trade flows between the two countries will be relatively small under deregulation; and (b) these flows are insensitive to processing costs. The results of DPN are intuitive given the type of model used. Under free trade, a large amount of cheddar cheese moves from Quebec to the northeastern United States due to the large amount of industrial milk supplied by this province. The model is able to identify specific products that move and to where. These movements tend to be local but DPN note the results are sensitive to distribution and assembly costs. Consequently, technology that lowers transportation rates could extend the degree and range of product movement.

The major finding of MSL is the importance of marginal cost of producing milk on possible trade flows. Actual marginal cost is difficult to determine and has not been adequately captured in most previous studies of Canadian dairy farmers. There is no relationship between price received and amount supplied under supply management. Consequently, a decrease in farm milk price as would occur under deregulation could very well result in an increase in Canadian milk supply if farmers were no longer subject to production controls. Highlighting this apparent paradox alone makes the paper a worthy one as the failure to differentiate between marginal cost and price at existing supplies can explain the large detrimental effects to Canadian dairy producers predicted by some previous studies.

Two other effects are not part of the sensitivity analysis by MSL but will also likely have major impacts on trade flow ; (a) transportation costs and (b) exchange rate. Lowering transportation costs would lower the U.S. landed price and thus shrink the band of Canadian prices for which there is no net trade between the two countries. Rather than changing the size of the price band with no net trade, exchange rate movements change the position of the band. A lowering of the Canadian dollar relative to the American dollar would enhance the competitive position of the Canadian industry by increasing the price at which U.S. imports would enter.

Extensions

An obvious extension to the work by DPN is to allow supply and demand to vary with prices rather than remain fixed. However, I think it more fruitful to extend the detailed analysis to other regions while acknowledging the model's inability to account for price response. The model is designed to determine the location of processing sites and how changes in assembly costs or quantitative restrictions will affect the movement of milk and its products within the sector. Allowing the levels of those variables to change with prices would require a great deal of effort which would best be spent building upon the model's strength. The important issues regarding price would then be left to be analysed with models such as the one presented earlier by Cox and Sumner. In conjunction, the approaches could provide much of the information required to make policy choices.

Incorporating the Canadian information of MSL into the model by Cox would be a means to extend the analysis provided by both parties. Their approaches are complimentary but there is little overlap in coverage at the present time as MSL focus on the Canadian dairy sector while Cox ignores that sector completely. A joint effort would result in a more complete analysis than if each was to proceed individually. Hopefully, such an extension will result and serve as a compliment to the efforts by DPN.

THE 'TOFU' TRIANGLE

MSL conclude that while net trade flows of dairy products between Canada and the United States are likely to be small under deregulation, the loss in quota value by Canadian farmers poses a significant policy question regarding compensation. The equity issues surrounding this policy choice and the role of economists in the debate around such choices are clarified in a recent article entitled "The 'Tofu' Triangle" by Victor Fuchs who is past president of the American Economic Association and an expert in health economics. The article is based on his new book *Individual and Social Responsibility: Child Care, Education, Medical Care, and Long Term Care in America.*

Fuchs begins by noting that all policy choices, including ones on the dairy sector which we are discussing in this conference, require knowledge about the consequences of alternative actions. Economists can play a fundamental role in the policy debate by identifying the trade-offs among different policies. The papers just presented provide results on price and quantity changes in response to deregulation. This is the type of objective information that can be generated by economists and are necessary for effective policy debate. However, Fuchs claims the role of economists in the debate is diminished when particular alternatives are promoted without making clear the values behind the recommendations. Public perception that economists can never agree is due to economists becoming involved in the political process without clarifying the influence of personal values in the policy choices they advocate. Since values differ, so will the conclusions advanced by economists.

The main value issues centre around government's role in income redistribution. To illustrate his assertion that differences in the positions of economists largely reflect differences in their values regarding the government's role in the economy rather than in how the economy works, Fuchs presents results of a survey of leading health economists. There was wide agreement among the group on value-free questions dealing with how health care markets work and the economic determinants of health. However, the economists' assessment of alternative health care polices varied significantly with their opinions highly correlated to their view of the choice between efficiency and justice. This choice of individual responsibility versus social responsibility has no right or wrong answer. Both are necessary for a good society with the ultimate weighting in a particular public policy depending upon society's values.

When economists enter into the political process of deciding upon policy choice without indicating the values behind their recommendations, they form part of Fuchs' 'tofu' triangle. The other elements are journalists and politicians or stake-holders. As with economists, journalists have an ideological bias that can be reflected in their reporting of issues surrounding the debate. Journalists can further hinder the ability to reach consensus by featuring extreme views that grab the spotlight rather than on areas of agreement. While economists and journalists provide information, final decisions rest with politicians. Since these choices involve values, a prerequisite for sound decisions is the need for politicians and stake-holders to indicate what values they stand for. However, changes in farm structure are making it more difficult for producers to agree on the values they wish their organizations to be based upon. The conflict between what is best for the individual versus the collective is at the heart of the tumultuous times for organizations such as the Canadian Wheat Board and the Ontario Pork Producers Marketing Board. If stake-holder groups are unable to reach agreement on the values that define the group, politicians have an even more difficult time selecting the right policy choice. The combination of compliant or exploited economists, jaded journalists and poll-directed politicians together form Fuchs' 'tofu' triangle; an intellectually soft and squishy foundation that generates shallow and inconclusive debates on policy choices.

Since policy choices involve values, differences between choices by members of society will never disappear. However, the 'tofu' triangle can be solidified and thereby aid in the reconciliation of differences when the triangle elements clarify how facts and values enter into their policy choices. Journalists should report on solid factual information on issues behind alternative choices. Politicians and stake-holders need to be candid about the values they seek to promote. Finally, economists must make their values explicit when recommending a particular policy and make their research accessible to a wide audience. It with the latter that I issue a concluding challenge to the authors. Deregulation in the dairy sector has generated heated controversy partly on the basis of predictions for large U.S. imports. The studies in this session both disagree with that forecast. The results of their analysis along with the assumptions behind it are necessary information for interested participants. With this information, the effectiveness of the debate on legislation for the dairy sectors in both countries will be improved and thus the chances of reaching a policy choice that best reflects the values of all society.

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THEME: POLICY DEVELOPMENT AND PROGRAM ASSESSMENT NEEDS, DAIRY POLICY RESEARCH NEEDS

OBJECTIVE

To provide industry and government perspective on the analytic, data and research needs for future policy development and program evaluation. Alfons Weersink received participant comments, synthesized them and reported them to the workshop.

POLICY DEVELOPMENT AND PROGRAM ASSESSMENT NEEDS: A POLICY ANALYST PERSPECTIVE

Terry Crawford and Richard Stillman

With the signing of the CUSFTA, the NAFTA and the GATT agreement there are three trade agreements between the United States, Canada, Mexico and the rest of the world. Each of these three agreements has slightly different limitations. As a result, the interpretation of the rules under which any, either or each agreement takes precedent is subject to question. The major present dispute is between the United States and Canada. Both the United States and Mexico, and Mexico and Canada trade relationships have the potential for a major dispute in dairy. This paper will focus on the relationship and analytic needs for the dispute between the United States and Canada, but some of the economic issues are transferable to trade issues between and among: the United States, Canada and Mexico.

The United States and Canada differ in their interpretations on access tariffs (second-tier tariffs) on dairy, poultry, and eggs (supply-managed commodities) under the World Trade Organization (WTO). The U.S. position is that the tariff rate quotas are inconsistent with the United States-Canada Free Trade Agreement which now is subsumed under the North American Free Trade Agreement (NAFTA). As a result, the two countries are in the preliminary stages of forming a Dispute Settlement Panel to examine the issue. Even so, Canada may not be able to eliminate the trade rules for these commodities in the short-run due to federal-provincial jurisdiction on marketing agreement.

Although the decision made by the panel is a legal interpretation of several treaties, economists have a place in the discussion. At this point it is important to be able to provide the best economic intelligence that is available on the impacts of a range of scenarios. Choosing the final outcome is difficult so, a best and worst case scenario from both view points is important. Within these reference points different levels of trade can be examined.

THE U.S. AND CANADIAN RELATIONSHIP

In 1988 the United States and Canada signed a trade agreement (CUSFTA) that provided a minimum access for the U.S. and Canadian dairy industries to each others market. Under this agreement quotas were established on dairy products along with tariffs. These tariffs were to be reduced over 10 years. The North American Free Trade Agreement (NAFTA) extended this relationship to Mexico, and set up general rules about tariffs and other border measures. NAFTA was effectively a set of bilateral agreements for agriculture, between the United States and Mexico, Mexico and Canada and incorporated the earlier United States and Canadian agreement. Under NAFTA all tariffs were reduced to zero over a given time frame. Finally, the General Agreement on Trade and Tariffs was signed in 1994. This agreement calls for countries to convert all quotas into tariffs, to provide for minimum or current access, and to adopt transparent sanitary standards..

Under the World Trade Organization (WTO), implementing on January 1, 1995, Canada has agreed to replace its import quotas on dairy, poultry, and eggs by tariff-rate quotas (TRQ). Under Canada's TRQ, within the access quantity the product is subject to a low tariff rate and imports over-the-minimum-access level would face significantly higher import duty (tariff rate quotas). The second-tier tariffs are scheduled to decrease annually over a six-year period (by 15 percent in total). In 1995, tariff equivalents are 351 percent for butter, 289 percent for cheese, and 283 percent for milk. By 2001, the end of the six-year period, the tariff equivalents for the three commodities would be 299, 246, and 241 percent, respectively. As a result, the supply-managed commodities would remain highly protected above the TRQ level. The high over-access tariff rates would allow the supply management program to continue to operate effectively (Canada Trade Policy Review, GATT, 1995). Under the WTO, Canada would allow minimum market access to increase to 5 percent by 2001. For dairy, poultry, and eggs, minimum access levels are not expected to result in an increase in imports from the current levels, except for butter and ice cream. Canada also announced that it will provide market access to the United States as defined by the NAFTA/CUSFTA.

This set of agreements has led to some confusion. Under the NAFTA, Article 302, neither country is allowed to increase any existing custom duty or introduce any customs duty on goods originating in the territory of the other country. In addition, the NAFTA/CUSFTA calls for complete elimination of all tariffs between the two countries by January 1, 1998. For example, under the NAFTA/CUSFTA Canada agreed to increase global import quotas for poultry, and eggs. Canadian global quotas for poultry were subsequently increased from 6.3 percent to 7.5 percent of previous year's production. Over-quota imports would have to be assessed a small tariff which would drop to zero under the NAFTA/CUSTA. The new rules under the WTO appear to change this by allowing a high tariff rated quota to be used by Canada. The introduction of a tariff-rate quota for dairy, poultry, and eggs on U.S. products is viewed by the United States as a violation of the NAFTA/CUSTA provision. The United States continues seeking increased market access. Canada, on the other hand, maintains that the WTO supersedes NAFTA. Imports above the

WTO minimum access would place significant pressure on Canadian dairy, poultry, and egg producers, particularly producers in Quebec and Ontario. In 1994, the dairy subsidy to the two provinces amounted to 78 percent of the total national dairy subsidy. This has the added dimension of complicating political tensions within Canada at the same time.

THE U.S./MEXICO RELATIONSHIP

Presently, Mexico has placed tariff rate quotas of 40,000 metric tons on nonfat dry milk that is imported from the United States. Under the NAFTA agreement, the TRQ quota on dairy product imports was to grow over the period from 1995 to 2005 as the tariff was reduced to zero. Mexico was also granted access to the United States but subject to sanitary restrictions. However, the domestic dairy industry in Mexico has a long way to go to meet domestic needs let alone have product to export to the United States.

The largest U.S. dairy export to Mexico is nonfat dry milk. These exports are shipped under Domestic Export Incentive Program (DEIP). Even with the advantage of lower tariffs faced by the United States, as opposed to other countries, the United States is still at a competitive disadvantage because of its high support price relative to the world market price for nonfat dry milk. Against the main subsidized EU dairy products, butter, NFDM, and bulk cheeses, the United States is not competitive in Mexico without subsidy. However, for unsubsidized products the United States made large gains in 1994. The devaluation of the peso made these products less competitive in 1995. The United States has been able to provide some higher value products such as ice cream. However, with the decline in the peso these exports have fallen dramatically, as well.

RESEARCH AND ECONOMIC ANALYSIS

The research and economic analysis of the dispute is in its preliminary stages. At the present time a framing of the debate is needed. Once the issues are framed, the research and economic analysis can be undertaken. It is fairly easy to define the two extreme cases in the U.S.-Canada dispute, free trade and the present trade situation. The difficulty is not in the definition of the scenarios but the resulting policy and structural changes that must occur under each of the open border arrangements. This is an important area of discussion for dairy industry economists in academia, industry and government. These issues also become regional in nature due to the natural trade flows that would occur. It is necessary to define tools which will examine the changing north-south as well as east-west trade flows.

Basic analysis requires information on:

- Structural/cost research both nationally and regionally;
- Economies of size at farm/ marketing/ processing;
- Change in market development.

Although Halberg at Pennsylvaina State University has done some preliminary work, much more is needed. This conference is a first attempt to set parameters on the analysis and provide some initial information on the effects of the settlement of the dispute on the dairy industries or forecast effects of future adjustments. This analysis needs to be national and regional in nature. However, we should not stop at looking at the farm level. The secondary and higher level effects on the macro or rural economy need to be examined.

In any solution that is presented there will be winners and losers. It is important to try to define the level of the loss. Inevitably, political ramifications will be involved in figuring out ways to compensate the losers. Loss of jobs in any rural area creates dislocation problems. In the dairy sector you not only have the farmers but also the processing and distribution industries. As we have seen in areas of Wisconsin and Vermont there are few alternatives for this labour.

WHAT IS NEEDED BY THE POLICY MAKERS

In general the academic community has been prone to longer term research studies. These are useful when they are timely. However, telling policy makers one year after the decision has been made, what the impact was is not very useful. Quick turnaround analysis that is consistent and timely is the most important thing that policy makers need. Ordinal rankings of the economic impact on the consumer, producer and the government costs of the policy or program at least provides policy makers a direction if not a precise road map.

In order to do these analyses it is important to have in place several flexible models that can be adapted to relate the impacts of policy decisions. Changes in policy in many cases implies change in industry structure. If a model is based on behaviour under past policies, it is up to the model builder to adjust the model to fit what he or she thinks will occur. In many cases the analyst must draw from some of the longer term research to alter the relationships for the short term analysis. A good example of this is some of the work done on risk. If some policy change increases the risk to producers, how will they react to these changes?

SHORT TERM POLICY WORK

Short term policy work involves the reaction to proposals that have been put on the table by negotiators. The time frame for these analyses are a few hours and usually not more than a week. The ability to answer these questions quickly and consistently usually involves the use of some type of model and existing data base.

The models or tools that are used in this type of analysis need to be flexible and readily available. There is little time to develop a model framework in the short time that is required. Model builders need to recognize that flexibility is very important in short term analysis and develop their models accordingly. Along with this adaptability, the models need to be transparent and easily used by other individuals. Dairy can be a complex topic, but for most policy makers we need to reduce the confusion to a minimum level. Hence, a policy maker will focus on how much it costs, who wins, production, prices, farm income, and little more. In many cases the ability to pull parts or all of some on-the-shelf model makes the policy analysts job much easier. A robust model that allows for a complete policy redesign is necessary.

Models used in short term analysis do not necessarily need to be point accurate. It is more important to present a relative ranking of policy options as apposed to the exact dollar amount of the impact. Therefore, the model builder needs to focus on the consistency of his model. Models need to flow logically from the economics. Good forecasting models may not work since policy changes alter the behaviour in the framework of the model. The proper sign and the expected relationships that underlie the economics of the industry need to be stressed. Some statistical accuracy may need to be traded to obtain economically consistent answers.

Timeliness is essential. Having the answer tomorrow when the decision is being made today does not do anyone any good. In most cases the answer was needed yesterday. This is particularly true in trade negotiations. Remember, policy makers don't appreciate your problems or care about them. Again, providing a broad outline of the relevant boundary solutions will help in the short term analysis. It is also helpful to provide the impact of various provisions that could be adopted. The impact of several different provisions may not be additive, but this type of analysis would provide some type of guidelines.

LONGER TERM RESEARCH

In the United States-Canada dairy trade dispute, the major issue or uncertainty is what would the Canadian or U.S. dairy industry look like if the borders were opened or domestic policies were dramatically changed . Price support for the Canadian dairy industry is based on marketing quotas. These quotas are allocated among the provinces. In effect there is no free trade in milk within Canada. Without import restrictions, the milk price in Canada would fall to a level no higher than the U.S. level plus transportation and no lower than the U.S. level minus transportation. What price would be necessary to hold a significant share of Canadian dairy resources in either production or processing, without restructuring? Alternatively what price would be likely with restructuring?

The United States and Canada share 3000 miles of common border and each part of this border shares common resources. The difference in the size and structure of the dairy industry in the two countries reflects more of a policy difference than a resource issue. In many cases the natural trading flow without political boundaries would be north south. The Pacific northwest is a perfect example of this type of flow. Vancouver, Seattle, and Portland form a micro economy because of the natural barriers of the mountains to the east with north-south valleys.

With the natural trade flows that exist, the impacts that we examine on a national level, should then be disaggregated into regional impacts. Adjustment in domestic policies in both countries would have to assess the resources directly across the border from them.

One of the most useful pieces of intelligence that the economist can provide is relating the regional differences into the alternative policy options that could occur. In the present environment, costing out these options is an important piece of information. As an example, if the over-quota tariff rates go to zero in between the United States and Canada, the Canadian dairy policy would be impossible to maintain via production quota if cheaper milk flows from the United States.

A secondary piece of information that can be provided by industry economists is the form that the U.S. domestic industry would take if free trade develops or domestic policy changes. Under the present U.S. policy, we have seen growth in the size of the dairy operation, in part because the margin in the production of milk is so small that the operators must expand to be able to support their families. Will this trend accelerate? In Canada, even with their quota system, there has been some expansion in operation size. However, the cost of the quota has slowed this transition. If the removal of the quota system is necessary, how does the Canadian dairy industry structure adjust to maintain farm income and what are the implications for price sensitivity for Canada?

One method that can be used to analyze the impacts of structural changes in the dairy industries in both the United States and Canada would be to examine the supply response among different sizes of operation for both farms and processing plants. If these responses differ dramatically, some type of adjustment to the industry response could be made dependent on the assumptions of the level of structural change. This type of information coming from the academic community would be extremely helpful to the policy analyst.

An even trickier question in Canada is how or if quota holders are compensated for their asset loss. If the transition of Canadian dairy policy is over a longer period, then these quotas could be discounted. Does the Canadian industry move towards more of a New York state type dairy structure in the east or a Washington state type dairy in the west? A potential future model in the Midwest is a 400-700 cow operation, which captures the economies of size and competes with the western dairies.

The processing industries will also be forced to change if the borders are opened. Questions about the competitive advantage of different segments of the dairy process industry in the United States, Canada and Mexico become important. Is it advantageous to set up joint processing facilities? Does one country focus on a specific type product that it can produce better. The big question is how will the processing industries look after the settlement. Will there be vertical and horizontal coordination across borders? These are areas that the universities can help us understand.

POLITICAL REALITY

One issue that the analysts within governments have to face is the political reality of the situation. Because of the constraints placed upon us by the elected officials, some of the analysis that we do may not become public, though highly prized and used by officials in their decision making. Also, some of the assumptions that we make may take in some of the political constraints or implication among the other alternatives. The academic community has some leeway in analysis, but also faces some constraints. Policy analysts may be prohibited from open and frank discussions during negotiations to avoid tipping off the other side of the negotiation. Therefore, academia can serve as public voices for some issues without being seen as signaling a government's position on an issue. State universities also suffer political constraints imposed via state legislatures and University budgets in terms of where money is available for research. In trade agreements there may be some type of side agreement that will be made, which limits, but may either increase market access or affect costs.

TIME FRAME FOR THE ANALYSIS

In the world of the government policy analyst, timing is very important. Analysis takes time to flow through the system. In many cases there may be less than a day to perform an analysis. The policy proposal may be incomplete and require clearly stated assumptions. This is why it is important to have flexible working models. These models may give up some detail, but it is important to give the decision makers quick and consistent analysis with the correct signs. Longer term research which takes several months must be done well ahead of the discussion to be of any use. Research success in policy is a case of issue identification and anticipation. Since many policy issues are generated by narrow interest group perspective, it is not easy to identify both the issues and which group is going to get the ear of the Secretary or the Hill, in time to provide meaningful original research.

CONCLUSION

The only way to conclude this paper is with this statement "Precautions should be taken for unforseen circumstances." We do not know what the political or legal outcome of the dispute panel will be. We can only speculate and try to provide the best analysis that we can as quickly as we can. The most important points in policy analysis is :

- Be consistent, (probably the most important point).
- Keep it simple, do not confuse people with minutia.
- Be timely, most answers were needed yesterday.

Longer term research needs to focus on structural change and on industry adjustments to the policy changes. Policy changes will alter both behaviour and market structure. It is our job as economists to provide the best information that we can on what this outcome will be. Taking a look beyond the farm level of the dairy industry, processor and consumer impacts should also be examined.

We must remember that economics does not always rule. Policy makers may well make uneconomic choices for other reasons. However, those choices are enhanced when the cost of the decision is known.

Finally has any one started to consider what effect the next WTO round is likely to have on the North American and world dairy industries?

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A CANADIAN POLICY ANALYST'S PERSPECTIVE

Richard Tudor Price

The opportunity to provide a Canadian policy analyst's perspective at this conference is a rare privilege as the agricultural economics community does not usually get together to discuss the art and practice of autarchy except in purely theoretical circumstances. In fact, there is a powerful argument to be made that, for this industry, the agricultural economists on both sides of the border have mainly been engaged for the last generation or two in making sure that there was no Canada-U.S. dairy trade. The art and practice of autarchy has been very successful, because the Uruguay Round notwithstanding, there is hardly any trade in milk or dairy products and there has not been much as far back as the 1930s. This is no accident—it is the result of concerted government action and industry desire in both Canada and the United States.

For example, Section 22 of the U.S. Agricultural Adjustment Act of 1933 was added in 1935 and was reinvented many times thereafter. Canada, on the other hand, operated a differential tariff scheme before the Second World War which applied lower tariffs to British Commonwealth supplies but was also a substantial exporter of dairy products.

Most of the U.S. Section 22 quota and import quantity limits that were tariffied in 1995 date from the 1950s and 1960s. By 1970, the United States had quotas in place which were consistent with the U.S. 1955 GATT (temporary) waiver and which limited the quantities of imports of almost all dairy products. The exceptions were fluid milk, casein and soft-ripened cheeses such as camembert and brie.

Canada proceeded more cautiously. Cheddar cheese was first put under import control in 1957. In 1969, the Export and Import Permits Act was amended to allow more dairy products to be subject to import controls consistent with Article XI 2(c) of the GATT. During the 1970s and 1980s, additions were made which brought Canada's import barriers close to the level of coverage which the United States had under Section 22 quotas.

It remains true today that dairy trade between Canada and the United States is extremely small. In aggregate, both countries import only about two percent of their dairy market requirements and almost all of that comes from third countries. Recently the largest seller of U.S. dairy products to Canada was most likely a gas station in Point Roberts, Washington where British Columbia consumers buy low priced gasoline and milk.

This history makes the point that dairy policies and programs in both countries have been developed in isolation for the last sixty years. Of course this phenomenon of isolation in domestic policy development is not unique to North America. Governments have been very sensitive to dairy sectors. It has been observed that Canada's first dairy policy involved providing a new settler with an axe, a cow and a spouse, in that order of importance. Milk markets have been held in isolation from world markets in most northern hemisphere developed countries. The European Community is one example of this process and also a model which other nations have felt bound to copy.

Of course the case of Canada-U.S. dairy trade is an agricultural economist's dream. Two countries with a three thousand plus mile common border succeed in keeping it closed for sixty years or more. They have put in place dairy programs intended to achieve domestic objectives based on the certainty that market penetration by imports will be fixed and very limited. There has been no need to have regard to Canada-U.S. dairy trade because there is none to speak of, by design, on both sides of our border.

The mythological analogy for this that comes to mind is Romulus and Remus, the founders of Rome; they are alleged to have been suckled and raised by a she-wolf, thereby providing a very early case study for students wishing to find out which human behaviour is innate and which is learned! The dairy policies and programs of our two countries have also grown up in isolation. Do not be surprised therefore that they are different, and do not underestimate how different they really are! It is not just the high profile programs and border controls that are different; differences are far deeper than that.

It should be noted that the Uruguay Round outcome made virtually no change to trade. The U.S. final offer on dairy access fell short of the 3 rising to 5 percent Dunkel guideline; Canada mirrored the U.S. offer in aggregate when formulating its own offer. In practice, the increased access in both cases has gone mainly to third countries. Even by the end of the Uruguay Round transition period in the year 2000, each country will have minimal access to the other's market under tariff rate quotas. Both countries will continue to have multilateral over-quota tariffs in place based on their Uruguay Round schedules which will still be prohibitive to trade.

The Crawford-Stillman paper has mentioned the high level of Canadian dairy product tariffs but U.S. dairy import tariffs will be equally effective in preventing Canadian dairy exports to the United States, even in year 2000.

Policy makers in both countries have, for many years, had the luxury of establishing their domestic dairy policies without having to consider trade aspects to any extent. Surplus removal policies which back-stop domestic markets are in place at the Commodity Credit Corporation (CCC) in the United States and at the Canadian Dairy Commission (CDC) in Canada. These programs underpin the industrial dairy products markets and indirectly the market price for industrial milk in each country. Programs such as federal and state milk orders in the states and provincial fluid milk regimes in Canada support regional fluid milk pricing at levels which are administered and exceed industrial milk prices. These government commodity-specific programs are similar in design and objectives. However a very important difference in approach has been the use of pricing in the United States to limit supply. Canada, on the other hand, has used production quotas to limit supply. Economists who are not working regularly with agricultural systems that include production constraints sometimes forget that the observed price is not necessarily on the supply curve, i.e., prices could probably be significantly lower before a supply response would be observed—in economic terms, the administered supply curve is vertical through a wide range of prices, above and below the current, administered prices.

The Canadian and U.S. markets are isolated from each other not only by tariffs on imports but also by a battery of technical, sanitary and phytosanitary barriers. For anyone who is not familiar with the history of Canadian U.H.T. milk exports to Puerto Rico, there are still plenty of non-tariff barriers in play. Those exports have just resumed after a hiatus of several years following Puerto Rico's adoption of the Pasteurized Milk Order. Our exports were halted while the conformity of the Canadian product with the U.S. Pasteurized Milk Order was verified. That process took several years.

As the trade situation changes, governments are going to need help from policy analysts. This will have to include practical advice on how policies and programs can change incrementally towards a more liberal trade scenario in both directions across the Canada-U.S. Border. Supply-managed systems are a real challenge to modellers, so step one is, as always, to have a firm understanding of what is in place and why.

With regard to the NAFTA Chapter 20 Panel, this Panel is currently dealing with a U.S. complaint about Canadian tariffication as negotiated in the Uruguay Round, included in Canada's schedules in Marrakesh in April 1994, and implemented in 1995 for imports of dairy products into Canada. The U.S. position is that these tariff equivalents should not apply to products originating in the U.S. The United States cites Articles 302(1) and 302(2) of the NAFTA as the basis of their position. These Articles require countries to progressively eliminate and not to increase custom duties except as otherwise provided for elsewhere in the NAFTA.

Canada has now replied in detail to the U.S. case. Given that the Panel deliberations are in progress, Canada's case must not be promoted in detail except to say that it explains that trade in agricultural goods was provided for in Chapter 7 of the NAFTA and that those provisions take precedence over the General Provisions in Chapter 3. Chapter 7 allows for the tariffication of agricultural non-tariff barriers as negotiated multilaterally in the Uruguay Round.

An interesting aspect of the U.S. position is that, if true, it would also apply in reverse and is not specific to dairy, i.e., if the United States were correct, tariffication of U.S. Section 22 regimes for dairy and some other sectors, such as sugar and peanuts, would also be inconsistent with the NAFTA. This might come as a rather unwelcome surprise in some quarters.

Trade access for dairy products has more support now in the United States than at any time in the last sixty years. How broadly based that support is and how far it embraces liberalization of U.S. border measures as well as those of potential importers of U.S. dairy products is not entirely clear. However, recent U.S. dairy and exporting activities both through the Dairy Export Incentive Program (DEIP) and through unsubsidized exports at world market competitive prices have clearly brought about a change in attitudes within the U.S. dairy industry. Analyses showing Canada as a large potential market for U.S. dairy exports may have played a part. "Access" may be a more important variable in driving opinion than "free trade" in dairy products.

In Canada, the dairy industry made a conscious decision in the 1960s to withdraw largely from export markets that Canada had been supplying. The dairy industry remains to be convinced that dairy exports on a larger scale than at present can contribute to adequate and reasonably stable revenues for the sector in the future. Similar attitudes probably exist in the United States too, judging from dairy industry responses to Congress' recent efforts at dairy program reform. Better the domestic market you know than the peril and uncertainties of international trade seems to be the underlying principle.

North American dairy trade liberalization is probably coming. Probably not soon and probably not fast, but the pressure for change is there. In Jakarta, Miami, Kyoto, and elsewhere, the directions seem to be quite clear. It is driven by export interests in the short term but in the medium term, it is driven by pressures to do multilaterally for agricultural trade what has already been achieved for industrial goods. The World Trade Organization is likely the main vehicle for this but there may be other vehicles too.

The implications of this for dairy trade and policy analysts is that there likely is an emerging market for our services which will continue for several years. Decision-makers in government and in the private sector are going to need our help to navigate a complex policy environment in which barriers to trade are first reduced and perhaps eventually eliminated.

CONCLUSION

A vital first step is to get our facts right. This seminar is an important step in that process. Both the United States and Canadian dairy programs are complex; we have seen examples in the past of analysis based on misconceptions of how the Canadian system works. I know that the mysteries of exactly how your marketing order system works have, at least until now, been unravelled by only a handful of cognoscenti; Canadian supply management in dairy may be a similar case.

If the transition towards freer dairy trade between our two countries will be gradual, then the method by which the transition is handled becomes critical. This transition is not only with respect to trade policies, but also with respect to the domestic policies each country can pursue. How do you best analyse that? Going to the end point and working backwards will not do. It appears that transitional arrangements will shape the eventual outcome.

—DISCUSSION—
POLICY DEVELOPMENT AND PROGRAM ASSESSMENT NEEDS: U.S. PRODUCER PERSPECTIVE

Peter Vitaliano

The perspective of U.S. dairy producers on the current U.S-Canada dairy trade dispute, and the associated policy development and program assessment needs, must be viewed in the context of an ongoing evolution in producer attitudes toward international trade.

BACKGROUND TO THE DISPUTE

The current bilateral trade dispute had its genesis virtually a decade ago, when the U.S.-Canada Free Trade Agreement (FTA) and the Uruguay Round negotiations under the GATT were beginning. At that time, world dairy markets were stagnant and highly distorted by the heavy use of export subsidies. Commercial dairy export expansion was, for all intents and purposes, a contradiction in terms; most international dairy trade flows occurred only with substantial government assistance.

The policy position of U.S. dairy farmers at the time was, not surprisingly, concentrated on maintenance of import protection. Guided by this policy, the National Milk Producers Federation (NMPF) concurred with the U.S. government's decision not to attempt to negotiate bilateral disciplines on the use of non-tariff dairy import restrictions in the FTA but nevertheless to agree to phase out all tariffs on dairy products over ten years.

Just a few years later, however, NMPF strongly supported the North American Free Trade Agreement. Several factors accounted for this apparent change in attitude. It had become clear that the NAFTA and the Uruguay Round GATT negotiations were just the beginning of a process that would achieve slow, but progressive liberalization of farm product trade. Further, the U.S. dairy industry was clearly demonstrating that it had the capacity to expand production faster than its traditional (domestic) market was likely to grow, elevating the importance of seeking potential new markets through exports. With the attractive Mexican market becoming clearly accessible through NAFTA disciplines, and other dairy importing nations likely to become more accessible through the Uruguay Round trade agreement, U.S. dairy producers began to recognize that trade agreements could produce benefits in the form of expanded access to potential export markets, and that these benefits needed to be weighed against the risks of increased access by imports to their own market. This decision calculus came out positive for Mexico, and the NAFTA became the first free trade agreement ever supported by NMPF.

During the NAFTA negotiations, the U.S. dairy industry also actively supported phasing out non-tariff restrictions on dairy trade between the United States and Canada. However, U.S. NAFTA negotiators were focussed on Mexico and showed no interest in negotiating with Canada on agricultural issues other than to incorporate the bilateral commitments already agreed to in the earlier FTA into the NAFTA.

The failure of the NAFTA to address the U.S.-Canada dairy trade was viewed as a significant problem, but one that did not stop NMPF from supporting the agreement because it gave the U.S. preferential access to one of the world's largest dairy-importing countries, namely Mexico. NMPF anticipated that the Canada issue would be addressed subsequent to the adoption of tariffication in the Uruguay Round agreement, which provided the opportunity to bring the current challenge under the dispute resolution provisions of the NAFTA.

THE CURRENT SITUATION

The issue of U.S. access to Canada's dairy markets is now, nearly ten years after it first arose in the FTA negotiations, in the hands of a formal international trade dispute settlement body. Despite the tensions and the rhetoric that, given the economic importance of this debate on both sides of the border, are inevitable in this dispute, the U.S. dairy industry sees the debate in very clear terms. The steep duties Canada imposed on U.S. dairy imports last year violate Canada's FTA and NAFTA commitments to phase out all tariffs and not to impose new ones, and there is no exception in the NAFTA on which they can be justified. Canada's argument hinges on negotiating history and intentions rather than on commitments. It attempts, but fails, to obscure the fundamental facts on which the United States has based its case.

THE BIGGER PICTURE

The U.S.-Canada dairy trade dispute is the most important, but by no means the only, trade policy issue confronting the U.S. dairy industry at this time. Its importance stems not just from the potential benefits, in terms of increased net U.S. exports, that would follow from the removal of bilateral restrictions on U.S.-Canada dairy trade. It also constitutes an important test of whether agricultural trade liberalization will proceed on a truly comprehensive basis in the future or whether instead individual countries will be allowed instead to pick and choose the farm sectors they will agree to liberalize, based on their particular sensitivities.

U.S. agriculture is facing a seemingly unending stream of trade consultations and negotiations with the potential to expand U.S. exports. These include NAFTA implementation, NAFTA expansion, the Free Trade Area of the Americas (FTAA), the Asia-Pacific Economic Cooperation (APEC) forum, WTO implementation and the WTO continuation negotiations, to begin by 1999. The U.S.-Canada dispute on dairy and poultry is one component of this process.

Given the importance of trade expansion to the U.S. dairy industry and the importance of striking tough and enforceable trade agreements to achieve it, the industry will benefit in the long run by having dairy trade fully included in each of these trade liberalization negotiations, however long it may take for them to produce results.

The challenge for the dairy policy economic research community is to expand its horizons beyond its traditional focus on domestic dairy policy analysis to include within its scope of work the ramifications of international trade policy on the economic performance of the U.S. and other dairy industries. This symposium is positive evidence that this process may be under way.

—DISCUSSION—
A PRODUCER PERSPECTIVE ON THE FUTURE OF DOMESTIC AND TRADE DAIRY POLICY IN CANADA

Yvon Proulx

In the context of market globalization and trade liberalization it is more and more common to read research documents and analytical papers that attempt to predict what would happen to the Canadian dairy sector if free trade in dairy products between Canada and the United States were allowed in the short run. Many of these studies predict a significant shrinkage of the dairy sector in Canada, a major decrease in producers and processors' income and some, but minor gains for consumers.

More open markets may well be the direction in which we are headed. However, free trade is not a realistic scenario for the immediate future. To allow this to happen suddenly and rapidly would not be a sound policy option for Canada. A number of prerequisites are required before we can even consider this option. If we can take the time to design a gradual and intelligent process of adjustment towards more open markets, the future of the industry may be much brighter than many studies predict.

FREE TRADE IS NOT A REALISTIC SHORT TERM SCENARIO

Free trade in dairy products is not a realistic short term scenario for a number of reasons. The first is that it would be in contradiction with what was agreed upon in all of the trade agreements that have been concluded over the last decade: the first Canada/U.S. free trade agreement, the North American Free Trade Agreement and the World Trade Organization (WTO) Agreement that came into effect at the beginning of last year. In the first two agreements it was agreed that the question of border protection and trade in dairy and poultry products would be solved in the WTO negotiation. In this last negotiation it was further agreed to proceed with a slow and gradual reduction of border protection and towards a modest market opening.

Canada has complied with these commitments and dairy producers in Canada expect that the Canadian government will live with them and only them. Canadian dairy producers expect that at the next round of the WTO negotiations, Canada will take a position similar to the one taken the last time: to fight for a much more disciplined trade environment and, if that can be achieved, to agree on the continuation of a gradual and limited process of market opening.

Second, dairy producers in Canada are not prepared to give up on the system of supply management that they have developed and are in the process of fine tuning. To accept free trade between Canada and the United States is equivalent to discarding that system.

It may be useful to recall that the essence of this system is to provide primary producers with market power to counterbalance the market power of other players in the system in order to stabilize and improve their income while providing the consumers with an adequate and stable supply of high quality dairy products at reasonable prices. There is no doubt that this system has met its objectives and producers feel that it remains well suited to the dairy sector, which is one of the most highly protected industries in the world.

Also, producers are not prepared to give up this system because they know that to do so is equivalent to shifting the power they have gained to other players in the system who will use them to their own advantage, and specifically to the disadvantage of producers. Producers hold the position that real gains to consumers and to the overall economy would be small.

PREREQUISITES ARE REQUIRED

There are a few important changes that have to be made outside Canada before we can consider moving more rapidly in the direction of free trade in dairy. The first one is a process of gradual reduction and elimination of other, more trade disruptive types of behaviour in world dairy production and trade. In the background document for this workshop, I noted a table in which the various forms of protection, support and export enhancement measures used by the major world dairy countries are described. Canada protects its producers but I noted that no other country has an effective supply management scheme to adjust production to market needs. The result is that the global market is characterized by overproduction, the piling up of stocks and disposal of stocks on the world market at whatever price may result. The result is an unstable, unpredictable and totally unattractive price structure for world dairy products.

Before we are prepared to give up the system of discipline that we have built, substantial moves towards greater discipline will have to be achieved elsewhere. One of these moves is the reduction and elimination of export enhancement programs that most other countries use. None of these are financed by producers, but they are in Canada.

The last WTO negotiation resulted in an agreement to reduce tariffs by 36 percent. The next negotiation should follow in this direction with an equal reduction. This is an absolute prerequisite to more open markets. Why would producers accept opening the markets if it is only to see these markets occupied by foreign producers with the assistance of their public treasury? That would be nonsense.

To consider moving towards a more open dairy market in Canada, substantial improvements have to be made so that the world dairy market becomes more stable, predictable and attractive.

A second prerequisite is that countries exhibit a greater willingness to comply with the rules agreed upon in trade negotiations. At the last WTO negotiation, it was almost agreed that countries would open their markets to a minimum level of 3 percent of consumption moving to 5 percent at the end of the implementation period (the Dunkel guideline). In the process of negotiation this obligation became less constraining and, finally, when the countries tabled their offers, it was much less than that. In fact the European Union and the United States offered next to nothing in terms of new access in the dairy sector. Canada had prepared a totally consistent position but followed the U.S. example and reduced it. Nevertheless Canada has a more open dairy sector than many other countries, especially the United States. Canadian imports represent 4.27 percent of consumption. They are approximately 1.8 percent in the United States. Why would Canada open its borders further if others do not?

A third prerequisite is that some behavioural change is required. U.S. producers and their lobbies will have to be more flexible and accept the reality that with free trade sometimes there are gainers and sometimes there are losers. That is a rule of the game.

Most if not all of the studies conducted which analyse free trade between Canada and the United States in dairy products predict that Canada would be a big loser in terms of producer prices, revenues and the size of the industry. There is little doubt in my mind that Canadian producers would have to live at least in the short run, with lower incomes. It may well happen that exports (without public subsidy) will develop from certain Canadian producing areas in certain U.S. markets. What will be the reaction of dairy producers of these areas and their lobbies, and U.S. senators, and even Mr. Kantor, if this happens? Their reaction is easy to predict if we base our expectation on past experience. There are a number of examples which indicate that U.S. producers may not like it very much:

- the hog and pork cases over the last a decade;
- the wheat case with Western Canada last year;
- the softwood and lumber case with British Columbia and Quebec, very recently;
- the potato cases with New Brunswick producers;
- the tomato case with Mexican producers this year.

If there are important exports of dairy products from Canada to the United States after free trade, will we be under heavy pressure to conclude an agreement to restrict these exports? If so, what is the purpose of this kind of free trade?

Before we can accept the acceleration of free trade talks with the United States, U.S. producers and lobbyists will have to exhibit more willingness to comply with the rules of the game. This may even require a change in that part of U.S. trade law which appears to require that the United States should always "win".

There is a fourth type of change in the environment that might facilitate a move towards more open markets. This one does not depend on a public policy decision in either of our countries. It is the question of the equilibrium between world food demand and supply.

According to a number of analysts we are entering a new era in which food demand may outpace the capacity to respond to it. Given population growth in the world (in China and some Latin American countries) and the growth in disposable income, we will face a major crisis. If the overcapacity era is over, then we may move faster. Supply management is an instrument to curb overcapacity. If this really disappears, the need for supply management may decrease. We will need to wait and see if that is a lasting trend.

THE FUTURE: A REASONABLY GRADUAL PROCESS OF CHANGE

Ten years ago the system of supply management was severely criticised for its unwillingness and inability to adapt or to adjust to changing circumstances. The history of this last decade has demonstrated that this is no longer the case. A number of important changes and adjustments have taken place. For most of these changes, total agreement was reached among the provinces. These include:

- the adjustment to the decline in the consumption of butterfat;
- the greater integration of fluid and industrial milk;
- the adjustment of the revenue pooling system;
- the multiple component pricing system;
- the butterfat utilization program;
- the rebate system for further processors;
- the changes from the system of levies and rebates to processors to the formula of differentiated prices to adjust to the new trade rules.

All these changes are significant. They have been made gradually, not always without difficulties and conflicts among the players, but they have taken place. This process continues. For example, it is likely that in the near future we will have a Canadian market for production quota allowing some, gradual interprovincial adjustments that will permit the sector to grow where it should and allow for economies of size and capacity utilization at both the farm and processing levels.

Another change which is about to be implemented is the optional export quota. Again this is likely to be introduced gradually beginning at a low level, but that may be increased over time, especially if the world market becomes more stable and predictable, or if the United States and European Union markets were to become more open.

This is an important move. It will offer those producers who want to expand their operation an option other than purchasing quota at a relatively high price. Those producers who want to expand are those who will supply the market in 10 and 15 years. This possibility to expand the size of their operation may be the only factor that separates them from their U.S. competitors on the cost side.

This move is going to have another important and necessary impact: inducement of a decline in the value of quota. This would be highly desirable. Another move which is going on and will continue is the research and extension work to improve the management skills and lower the cost structure of the larger producers.

CONCLUSION

Dairy producers in Canada do not favour sudden and drastic changes in policy directions. They do not oppose changes, they have exhibited their capacity to accept and induce changes in the system and this will continue and may be at a faster rate than many think they are capable of. This might be the case if the changes they hope to see happen elsewhere do in fact happen: elimination of export subsidies, a more disciplined and predictable world market, and reduction of trade harassment by competitors.

If that gradual adjustment process goes as expected, Canadian producers are going to be fully ready to face the competition, to maintain or increase the industry size and contribute to growth in revenue and income for the whole economy. This may also be an incommensurably larger benefit to the whole of Canadian society than the very marginal gain consumers might obtain from a sudden move towards free trade.

—DISCUSSION—
AN AMERICAN PROCESSOR'S PERSPECTIVE

Marcia Glenn

We now know the outcome of the vote in the House of Representatives in Spring of 1996. As I prepared these remarks for today's discussion, the outcome was far less certain. U.S. dairy policy was at a crossroads. One course continued the industry on a path similar to the recent past—gradual deregulation with movement towards a more market-oriented industry allowing the U.S. dairy industry to be truly competitive in world markets. The other course led the industry on a very different path—creating a class of export products designed to remove "surplus" product from domestic markets and regulate higher domestic prices. A complicated set of mandatory pooling mechanisms would be established to make this course work, including a series of rules and procedures (like compensatory payments and upcharges) preventing lower priced "export" product from leaking back into the domestic market.

These different options suggest fundamentally different directions for the U.S. dairy industry. I would like to share with you some of the questions and hypothesis that we faced over the prior 18 months regarding the impact of these alternate policies.

My specific objectives today are two-fold. First, to summarize some of the structural, efficiency and trade effects of alternate U.S. dairy policies, and second, to identify analytical and research areas to guide future work.

The "export class" course (House Compromise) described briefly above would have increased regulation of the dairy markets, while the Soloman-Dooley amendment and Freedom to Milk each represented a decrease in regulation of dairy markets. The Soloman-Dooley amendment passed by the House this Spring represents gradual deregulation of the kind we have seen in recent years. On an ordinal scale of more to less regulation, the figure below illustrates the ranking of the various alternatives vis-à-vis the status quo.

House Compromise	Status Quo	Soloman Dooley	Freedom to Milk
More Regulation			Less Regulation

If a policy such as the "export class" concept were adopted a number of significant changes in structure and efficiency would have occurred. Below we highlight some of the most potentially troublesome changes induced by policies designed to increase domestic dairy prices.

Higher fluid milk prices (Class I) would certainly have generated increased manufacturing milk supplies. From a manufacturing perspective, this raises a number of questions. Where will these supplies be generated, what is the production technology most likely to be adopted and at what cost, and where might plants need to be located in the future to deal with the new spatial equilibrium? Since the increased supply of manufacturing milk must be converted to storable product, will it be converted into butter/powder for export or cheese for domestic markets and at what prices? How should purchasing practices change to adapt to the new temporal equilibrium? These were some of the crucial structural and efficiency questions that we wrestled with earlier this year.

A significant increase in regulation contemplated by the "export class" concept was mandatory pooling for all milk. For the "export class" concept to work, all milk would have to be pooled. Presently, pooling is voluntary—manufacturers participate in milk pooling when and where there is an economic incentive to do so. Manufacturers can opt out of the pool or choose alternate locations where they do not have to participate. These options are eliminated with the mandatory pooling. Moreover, mandatory pooling further disadvantages proprietary manufacturing firms because cooperatives are exempt from pooling restrictions.

The adoption of mandatory pooling would force proprietary firms to examine alternate forms of milk sourcing and plant ownership to maintain a competitive position with cooperatives. One way to avoid the penalties of mandatory pooling would be vertical integration combining ownership of milk production and manufacturing facilities. Another alternative would be to completely eliminate plant ownership and manufacturing. In either alternative, the proprietary firm has avoided the increased minimum milk price provisions imposed by mandatory pooling. Again, the implications for milk production, dairy industry structure and global competitiveness are significant.

The trade effects of the adoption of an "export class" policy by the United States are enormous. Instead of gradually reducing export subsidies and rescuing world dairy markets from an historically low-price dumping ground, this policy exacerbates this situation. The creation of an "export class" to clear U.S. markets, keeps subsidized NFDM & butter flowing to world markets at low prices. Instead of continuing the transition of the U.S. dairy industry toward market reform and competitiveness, the United States would need to operate a 2-tier price system—a high domestic milk price and a low export price.

As discussion and legislation in the United States moved closer to an "export class" policy, Europe began exploring similar concepts (similar to the EU sugar program with pooling, albeit significantly more complicated to establish and administer). If both the United States and EU adopted such schemes, most of the progress achieved in the GATT/WTO regarding dairy markets would be eliminated.

With respect to Canada/U.S. trade, the United States would export less to Canada under an "export class" regime than under the legislation actually passed by the House this week. There remain significant barriers to dairy trade between the United States and Canada today. As these barriers are lowered, the US is naturally positioned to export to Canada. However, if the United States established an "export class" and a 2-tier price regime, with only NFDM and butter competitive in world markets, the US would have stifled commercial exports to Canada.

Fortunately, the course actually set for U.S. dairy policy differs sharply from the "export class" -mandatory pooling proposal discussed above. The reduction and ultimate elimination of support prices and reform of federal orders, continues the gradual deregulation trend experienced over the last few years.

While gradual, the policy change implemented in the 1995/96 Farm Bill will have a significant impact on structure, efficiency and trade. The elimination of support prices will raise many questions about the location and price of manufacturing milk production and alter the pace of trends in utilization of technology to accommodate spatial allocation. One technology that has existed for many years but has never been utilized commercially is ultra-filtration (UF) on the farm. High support prices and the accompanying milk price regulations render on-farm UF cost-ineffective at present. However, as regulation decreases, we could well see the trend to on-farm UF accelerate greatly.

Other questions arise under a deregulation scenario with respect to the seasonal pattern of milk production. Today, regulation, and specifically pooling, has a major impact on the seasonal pattern of milk production. As the industry continues along the trend towards market forces, the seasonal pattern of production may change. A change in the temporal equilibrium for milk production and pricing would have a significant impact on manufacturing location and efficiency and purchasing practice.

Another major impact of the elimination of pooling regulation would involve changes in the component quality of milk for manufacturing and fluid milk production. Manufacturers are interested in solids, protein and fat (as raw materials in manufacturing, the more per unit the better.) Fluid bottlers are more interested in volume and are less concerned about the solids level in milk. At present, milk shifts back and forth from manufacturing to fluid bottling, but is priced by regulation on the same basis (primarily volume and fat.) With the elimination of pooling arrangements, the fluid milk and manufacturing milk industries would be more like other sectors of the food economy with separate (but related) fresh and industrial milk markets. Moreover, milk production and pricing would specialize to cater specifically to what manufacturers and fluid bottlers each want. Allocative efficiency should certainly increase with the elimination of the artificial and arbitrary pooling regulations that exist today.

From the trade perspective, a gradual deregulation scenario in the United States has a very different impact on world prices and trade flows than "export class" policies. Rather than perpetuating a "surplus clearing" world price scenario, gradual deregulation in the United States reduces export subsidies and should allow world prices to rise. Rising world prices make the United States more competitive, stimulate milk production in traditional exporting nations like Australia and New Zealand, and increase trade pressure on Canada.

This summary of some of the structure, efficiency and trade effects of new directions in U.S. dairy policy, suggests some areas for further academic work useful for assessing existing programs and developing policy for the U.S. dairy industry:

- develop a better understanding of the equilibrium price surface for manufacturing and fluid milk without pooling, or other regulatory inefficiencies,

- develop an understanding of the true value of the components of milk (protein, fat and other solids) for various uses of milk (for instance, manufacturing or fluid bottling),

- and, substantial work to develop an understanding of just what supply, demand and prices would be in world dairy markets outside of the narrow experience provided by the past century of market regulation .

Clearly, the U.S. dairy industry would look quite a bit different without the regulations that have shaped dairy industry structure historically and govern behaviour today! We have a way to go to understanding the future of the dairy industry, but it should be interesting.

—DISCUSSION—
A CANADIAN PROCESSOR'S PERSPECTIVE

Kempton L. Matte

Much of the detailed analysis that is available, focused as it is on the primary producer, neglects the very critical inter-sectoral relationships that exist. In a supply managed system, the interdependencies are so great that to ignore one sector is to leave the entire system vulnerable. For this reason, policy makers must be acutely aware that processors, whether co-operative or private sector, are infinitely more than an income transfer mechanism within the system. Until these realities are recognized, and until the individual sectors are studied and considered or assessed on the basis of their total or full role, huge gaps will remain in the policy advice offered by analysts.

There is no doubt that governments have traditionally taken their policy advice from the primary producers and their agents. This has largely been due to the concern for rural development and sustainability of agricultural systems. However, as international trade imperatives loom over national dairy systems worldwide, this policy advice must expand to reflect the trade impacts inherent in bilateral and multilateral agreements. These impacts are not limited to the primary sector, nor to the rural economy. Analysts must also address the reality of the fallout from trade deals in terms of viable domestic and export trade experiences in the processing sector. Without such analysis little will be known of the processing sectors' ability to "pay into" the rural economy in any sustainable way.

In Canada, for example, processors have historically been largely excluded from dairy policy development process. In recent years, steps have been taken to permit their input into the redesign process, but they have never been granted a decision making role. Decisions remain the purview of farmers—and Ministers!

This is understandable to the extent that supply management is intended for the benefit of dairy farmers. It is shortsighted because dairy farmer security is really dependent on consumer acceptance of dairy products in a continuously more competitive food supply environment. Market acceptance is the only assurance of continued dairy industry growth and subsequent prosperity.

Trade issues bring into question the issue of whether or not a sufficient common interest exists and is seen to exist between the sectors for policy analysts to consider both as critically important from a policy development perspective. With the strong support of primary producers, protectionism remains rife in both Canada and the United States. For every tariff line there may exist two or three or more non tariff barriers that are regularly called into play by one country or the other to hinder access or to block trade altogether. These NTBs and the practices surrounding their use require study and assessment for policy making purposes.

Examples abound but let us just mention the PMO and its requirement that milk be traceable back to the originating farm; product labelling rules under the NLEA that are totally unrelated to international standards or guidelines such as the Codex; and the belief and expectation in the United States that "harmonization" really means all other countries will adopt the U.S. system. One current example is the plant inspection system.

It is questionable whether policy analysts have begun assessing the effects on farmers and processors, importers and exporters of these mundane and NTBs relating to dairy trade and trade flows. In Canada, policy makers and their advisors don't appear to have given any great thought to the dairy processing sector and why processor consolidation is advancing so rapidly. This process is generally applauded from the sidelines. However, if such radical shifts were taking place at the farm level the phenomena would be studied to death and commented on profusely.

Policy decisions do have enormous impact on dairy processors in Canada. The Offer to Purchase programs, the export assistance programs all cause certain effects, many of which are badly understood if at all. Any dairy policy shift may contain the seed of an impact which will undermine the processors' ability to pay into the administered pricing system at an appropriate level. Processor level impacts most frequently go unstudied by the agricultural policy analysts resulting in potentially deficient advice going forward to the policy makers and their political masters.

Dairy processors are not a homogeneous, single interest, group. They are fierce competitors in the market place and will often want to support opposing policy options. On the other hand, their commitment to their industry and their product is every bit as strong as any dairy farmer's. Policy analysts must understand and recognize this. Dairy processors are equipped for and want to process milk, not orange juice or bottled water!

It is this commitment that led Canada's ice cream manufacturers to benchmark their plants against each other and U.S. plants. Currently a similar exercise is underway in the cheese industry. These activities have been industry driven with a desire to be winners within the marketplace. It is not Canada's dairy processors' interest or intent to relinquish one iota of market share to any competitor without a battle in the market. Changes in the markets are coming but our sense is that given the international and U.S. dairy industries' predilection for protectionism, which is at the very least as strong as our own, the change won't come overnight. Nonetheless, as instability and uncertainty have crept into our previously very stable system dairy processors have been preparing for the worst.

CONCLUSION

What is badly needed now is good analysis by experts of the numerous NTBs previously referred to . We need to define in common terms what we mean by "harmonization" so that analysts, negotiators and stakeholders speak the same language with the same meaning.

Major areas requiring "harmonization" include the whole area of product labelling, nutritional claims, plant inspection procedures, farm inspection methods, process methodologies, and product standards. So far, governments have set up committees to do the harmonizing work but the critical and objective analysis to support changes has not been begun. If it is not undertaken, the results will be haphazard, not appropriate for consumers and detrimental to the dairy industry in both countries.

THEME: REFLECTIONS ON DAIRY POLICY RESEARCH NEEDS

SUMMARY OF RESEARCH NEEDS

Alfons Weersink

Near the conclusion of the workshop many of the major issues that had been addressed by presenters over the two and one half days began to surface as presentations referred to earlier statements, and the discussion began to refer to the common ground of what had already been said. Participants were asked to submit a list of two or three major issues that they believed were worthwhile pursuing. This note provides a summary of what was suggested as well as what was discussed after the overview was presented.

The essential research needs of the dairy industry are in many ways similar to the research needs of any sector in agriculture, and yet also point to certain fairly unique situation that have arisen due to different institutional approaches in Canada and the United States. The needs are in the areas of supply response, demand analysis, pricing, industrial organization, institutions and regulations, and distributional effects. The first section of this review will focus on the data and the methods that are necessary to address these questions.

DATA

The most basic issue that faces agricultural economics is the development of appropriate data files on industry that are continuous and allow us to see the nature of both economies of scale and economies of scope at the same time. Primary emphasis should be placed on production costs at the farm level and by region. A renewed theoretical emphasis will need to be placed on the definitions that we use in terms of farm size and the apparent—and sometimes not apparent—linkages through to the processing level. Similarly, reviews of transportation costs and costing procedures are required that may also shed insight on the overall network of movement effects in this sector.

At the price level itself we have farm price surfaces for Class I to Class III milk that do not include the California effect. Yet there are very strong pressures that may force pricing distortions in the areas surrounding California simply because of its immense size as a market as well as a supply point.

At the processing level there are even greater questions surrounding the nature of value added and whether this value is indeed added because of the nature of the product produced or the particular tastes and preferences that are known to the companies in the industry. Is there any similar dominance in the retail sector and does it make a difference? What are the major price effects of supply managed products such as are prevalent in Canada and the comparable price managed systems in the United States? Linkages and leakages may well be more significant in this context than in other sectors.

Data will also be needed on non-tariff barriers and administrative practices that include labelling and packaging requirements.

The main data challenge facing agricultural economists as they analyse the milk market is whether or not data actually capture the kind of information that is useful, and how can this be assembled in an orderly fashion. If we do not address this problem we will be faced with the situation in which our models move millions of gallons of milk as marginal cost curves are balanced yet in the real world very little milk actually moves without recovery of all prices and transportation costs, and utilization charges from the processors. These transactions costs may well be more significant in this sector than in any other that we face.

METHODS

It is fairly clear from the producers perspectives that there is a sense that the industry is moving towards a more regional focus with specialization in production and more concentration on systematic issues. The models that we use currently tend to extend simple cost minimization or revenue maximization schemes through a number of analytic engines that produce a series of transfers and shadow prices for any further movement. What is often introduced as an enabling assumption is the capacity utilization in each sector at the first next level of processing before product is moved any further. The algorithms that we use fill aggregate capacity as if the access for milk were the same in all areas and that there is no shortage or surplus within any particular region that goes unfilled. In effect many of the models that we use impose "success" on all of the sectors by assuming that everyone makes money by means of their activities even if there is a capacity adjustment due to losses or exceptional profits. This may not be the case unless our models focus more on how the capacity in the system fills up and the adjustments in the capital markets that this may cause. There are some who question openly whether exports of milk products are realistic at all unless the capacity to handle and ship is put in place.

The models that we use assert perfect competition in the results that are presented, but there is concentration in the processing industry at least and probably in other areas of the industry as well. The assumption that quantity optimization is always in effect may be proven inappropriate if clear patterns of concentration can be identified. Withholding quantity may well be present and prevalent within the industry but has been undetected so far because of the analytic biases in the models that are used.

The models that we have are essentially static, moving product around with little concern for how that movement might actually take place. The dynamics of the shifts in supply and demand can have severe long term effects that are a fairly significant challenge to the overall pattern of adjustment. An equation of motion introduced into the modelling frameworks for a perishable product must recognize the physical properties of milk as well as its profit generating potential.

PRODUCTION

The emphasis on production has largely been as if a model or representative farm could be developed and used to identify technological transformation functions and to bring along the entire family of production and cost equations that would determine supply. There are many who question whether technology transfer actually drives the size of the dairy farm, especially if the technology is discontinuous and open up ranges within which there are no meaningful solutions. Some have expressed concerns that these discontinuities not only drive farm size, but additional pressures such as optional usage for land located near to urban centres, alternative feed supplies from many different possible rations, and overall concern for health conscious diets may be fairly significant as well.

On the production side there is also the mystery of why Canada's milk/cow production results have flattened out when comparable results do not exist in the United States.

Reactions of farmers to changes in prices and costs are no longer viewed by some as stable and predictable. Indeed the factors that influence farm decision making seem to be changing rapidly and an increasing reliance on off-farm income may well move reaction functions into new regions of decision making. Given that individual farm decision making may have become more volatile, how are regional reaction functions valid? The ability to speak meaningfully about a Canadian or U.S. farm perspective is being challenged by many studies on the dairy industry.

On an international basis is there a competitive advantage or a comparative advantage that might never be breached - or at least not appear to be worthwhile for a considerable period of time? On an even larger scale, are there other broadly reaching agricultural policies that will have a significant impact on dairy as other sectors advance or recede? Is there a theoretical explanation for the "no trade" regions of our marginal cost curves that are derived from production analysis or must our analysis of production become more encompassing and sensitive to broader issues?

DEMAND ANALYSIS

The demand elasticities that we use are rather volatile and not overwhelmingly convincing. Further efforts that extend the type of methodologies that we use are in order. Should we look at long term demand or short term demand? What impact does the perishability of milk in its raw form and the somewhat slower perishability of processed products have on these elasticities? Do milk components have the same or different elasticities? Are there biological regimentation pressures on these elasticities that may alter overall potential profitability?

The true values of milk components by consumers and by markets which may also involve processors remains elusive. The potential for misguided policy is large when there is an assumed demand that is prepared as a result of a theoretical elasticity and an existent clearing point, with no basic assessment of the capacity of the market to actually clear products.

In the same fashion the potential for market growth and the overall ability to develop new markets and new products seems to be suspect if the current period model is somewhat ill defined.

PRICING

Currently economic theory does not have a lot to say about price transmission mechanisms or marketing chain efficiency. In essence theory assumes that the transmission is complete and that there is an efficient and effective allocation in transmission of price signals. The ability to understand this market will be enhanced when this issue of speed of transmission and price spreads along the marketing chain are investigated.

In dairy, is there a broadcast impact of concentration at any one sector that has an effect on prices or is the concentration at a specific sector of the industry a damper on the overall process of adjustment. It was observed by several presenters that the volatility in U.S. milk prices at the farm gate was quite profound, but that the actual price at the processor level was perfectly flat through time. Do the processors blend milk prices across time or through corporate structures in order to bring this about? Are there other pressures that support this effect?

In terms of pricing are there market structural issues that would generate higher or lower differentials for milk used in fluid markets versus industrial milk?

INDUSTRIAL ORGANIZATION

Throughout the workshop it has been implicit in the discussions that many believe that there is a market for milk products in the international arena and that indeed there are potential markets for both Canadian and U.S. producers. Critical questions remain about whether or not a new initiative in large scale milk exports would be well received by the major international corporations that are currently active in the market. If it is potentially worthwhile for large processors to consider vertical organization options in order to overcome potential difficulties with the U.S. Farm Bill, will the international corporations not be encouraged to control their own production?

There is also some reason for concern as to whether or not institutional or contractual arrangements would take over and cause new systems to emerge in the structure of the industry. Is there a potential for producer organizations to attempt to coordinate markets in an expanded world trade environment?

What factors will influence this overall adjustment and will there be room for government policy to react to these changes as trends emerge?

INSTITUTIONS AND REGULATIONS

For the purposes of relations between Canadian and U.S. producers there is a question as to how cooperation can be improved. If cooperation depends on harmonization of standards and policies, how do we effectively define harmonization in order to achieve this. Is there any reason to believe that harmonization in dairy will be more effective than it has in other areas (such as softwood lumber) where conflict among partners has lead each group to retreat behind its own protective shield based on certification? Areas where emphasis should be placed include packaging, labelling, quality and areas in which there are similar terminologies and regulations. If similar interests are the motivation, then how do we define these similar interests and on what basis do we implement these understandings?

Are non-tariff trade barriers and trade related investment measures a significant factor in this industry and are there more being created or less as the result of free trade? Can these be successfully eliminated to the benefit of producers or processors or both? Is there a common interest that would lead to complementarity as a result of negotiations amongst producers and processors in each country or with their counterparts across the border?

Is there an effect that can be detected for a change in the distribution system that can be foreseen and planned for?

DISTRIBUTION

Recent agricultural policy in both countries has focussed on deregulation. Little analysis has been done as yet on whether there have been major improvements in efficiency and industry effectiveness as a result of these efforts. Whether there is an inertia in this process is also worthy of further investigation.

Areas of emphasis include the effect of deregulation within regions, across regions, and between the producer and the consumer. The critical analytic question then becomes deciding which policies are capable of making a difference in terms of this adjustment process and how major advantage can be determined in this area.

The overall discussions of the workshop focussed on how the future might unfold if the common interest of Canadian and U.S. producers were brought together by agricultural economists. Yet beneath the surface there was a considerable degree of uncertainty based on the major issues outlined above. The issues identified above are listed to encourage independent research by all who see a particular question that needs to be addressed, and therefore this listing is merely the seed from which new research projects can flow.

WHAT WE LEARNED

Ronald D. Knutson, A.J.W. Pursaga and R.M.A. Loyns

Historically, dairy has been one of the most highly protected commodity areas within U.S. and Canadian agriculture. Until recently, any discussion of free trade in dairy products would have been viewed as being purely academic. However, withdrawal of the grain transportation subsidy on the Canadian prairies, and phasing out of dairy price supports in the 1996 Farm Bill demonstrate how fast political and economic realities can change.

This workshop was characterized by spirited discussion which was fostered by the inclusion of industry interests, but was stimulated as well by the significant differences that exist in the institutional aspects of the industry in the two countries. The focal point of discussion related to two central issues:

- The relative competitiveness of the U.S. and Canadian dairy industry.
- The potential for Canada to take bold steps in eliminating its production quota policy.

There is no doubt that past policies have had a major impact on the structure of both the U.S. and Canadian dairy industries. Unimpeded by quotas, U.S. dairy farms have grown to the point where in most regions, industrial farms of 1000 cows or more are present. In some regions, such as the U.S. Southwest and West, large industrial dairies are prevalent. The Canadian size contrasts are striking—attributable largely to quota policies. Efficiency differences were believed to relate more to the farm level than to the processing sector. Farm level differences in efficiency are believed to be largely size related—once the value of the Canadian quota is removed. Provincial barriers to trade have become as much of an obstacle to Canadian adjustment as has border barriers.

The major contemporary thrust of Canadian dairy policy is one of facilitating freer trade among the provinces and removing some of the basic pricing inefficiencies that developed over time. A removal of provincial barriers to trade is a desirable first step toward rationalizing U.S./Canadian trade disputes. The U.S. policy changes brought on by the 1996 Farm Bill may put greater pressure on Canada to reform its dairy policy. Both GATT and NAFTA rulings could play a critical role in dictating the pace of change.

Free trade models suffer from incomplete information on the economic factors that can be expected to affect cross-country movement of dairy products. One of the most critical missing links is the marginal cost of producing milk in Canada, relative to the United States. Since marginal costs in the two countries will be equal (except for transfer costs) under free trade, these autarky values will largely determine the direction of trade flows. U.S. economists tend to assume that U.S. dairy farms are substantially move efficient, while Canadians expect their farmers to achieve similar levels of efficiency with the removal of output controls. Based on the results of Meilke, et. Al., it appears that there would be no major change in Canadian milk production and only small net trade flows between the two countries under a wide range of economic assumptions. If so, regional trade flow predictions coming from U.S. models, based on the assumption of no change in milk production and demand conditions, take on added significance. In general, these models predict that milk would move South from Quebec to serve large populations centres in Northeast United States.

Both U.S. and Canadian government economists emphasized the needs for data and improved modelling. Econometric models based on historical data in the virtual absence of trade have inherent weaknesses. The need for collaboration in filling the data gaps was stressed.

Representatives of Canadian and U.S. dairy interests stressed the importance of these types of interchanges providing insights into the effects of policy changes. While U.S. interests stressed the importance of moving ahead, Canadian interests logically preferred a posture of maintaining the current policy or at least allowing a prolonged adjustment period..

Perhaps one of the most perceptive comments arising from a discussant was Matte's observation on the role and importance of policy harmonization in this sector as a vehicle for trade dispute avoidance. As a Canadian processor representative, he is acutely aware of the importance of trading relations within Canada, and between Canada and the United States. His comments in this area impressed the organizers of the workshop to the extend that the issue of harmonization of policies and programs in the agriculture and food industry is on the agenda for the next workshop in this series. Suggestions for that topic would gladly be received by any of the workshop planners.

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