Impacts of Trade Liberalization on the U.S. Dairy Market

Contractor and Cooperator Report No. 21
August 2006

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Abstract

A world dairy model is employed to assess the economic effects of further trade liberalization on U.S. dairy markets. The model incorporates both vertical and spatial characteristics of dairy sectors. Among the vertical characteristics is accounting for farm milk components (fat, casein, whey protein, and lactose) in the production of many different dairy products. Important spatial aspects include the distribution of milk production and the demand for and trade of dairy products. This report examines multilateral domestic and trade policy changes to assess how U.S. farm milk prices and production, consumer and producer surpluses, and U.S. Government revenues and dairy program expenditures respond. Empirical results from the model indicate generally modest price and production effects on U.S. milk producers when multilateral liberalization is assumed.

Acknowledgments

The authors and project representative would like to thank Andrew M. Novakovic, Cornell University, Howard McDowell, USDA-Agricultural Marketing Service, and Milton Madison, USDA-Farm Service Agency, for review comments. We also thank Sharon Lee (USDA-Economic Research Service) for editing and preparing the manuscript for publication.

This study was conducted by the University of Wisconsin-Madison under a cooperative research contract with USDA's Economic Research Service (ERS) (ERS project representative: Don P. Blayney). The views expressed are those of the authors and not necessarily those of ERS or USDA.

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Introduction

The U.S. dairy industry is facing the emergence of an ever more global dairy industry at several different levels. As the industry continues to undergo changes on the domestic front—such as changing structure of farms and production, changing demand for milk and dairy products, increasing interest by processing and manufacturing industries in mergers and acquisitions, and changing domestic dairy policy concerns—it must also look at its role in the global setting.

This report addresses the global issues revolving around trade. Multilateral trade negotiations under the auspices of the World Trade Organization (WTO) now formally include agriculture. The WTO member countries, have been negotiating to further liberalize world trade in agricultural products in the Doha Round. Although negotiations were recently suspended on July 24, mainly as a result of difficulties in finding common ground in agriculture, any future rules negotiated for the continued liberalization of agricultural trade will likely have important implications for world dairy markets.

Dairy industries worldwide have changed in several dimensions since the conclusion of the Uruguay Round of the General Agreement on Tariffs and Trade, the precursor to the current Doha Round. This dynamic suggests that periodic assessments of dairy trade liberalization, which is essentially tied to the provisions of the Uruguay Round Agreement on Agriculture (URAA) until new provisions arise, are important for evaluating where dairy industries stand in the context of adjusting to more open or liberalized trade relationships. This report provides analyses of the economic effects of further dairy trade liberalization on U.S. dairy markets, part of a USDA project to examine the emerging global dairy industry and its implications for the U.S. industry.

The authors employ a world dairy model that is specified so that assessment of both vertical and spatial characteristics of dairy sectors is possible. The vertical characteristics include the processing of farm milk components (fat, casein, whey protein, and lactose) into many different dairy products. The spatial characteristics include the distribution of milk production and the demand for and trade of dairy products in different countries. The authors examined multilateral domestic and trade policy changes to assess how U.S. farm milk prices and production, consumer and producer surpluses, and government revenues and dairy program expenditures respond. A short review of key dairy policy and trade issues provides context.

Overview of Dairy Policy

Government policies may generate trade distortions that result in departures from competitive market equilibriums. The URAA made protection more transparent, included disciplines on use of export subsidies, called for greater market access through tariffication and minimum access requirements, and proposed controls on trade-distorting domestic policies used to support farm prices and incomes (USDA, FAS, 1999). For U.S. dairy industry interests and for other industries around the world, there are three key concerns when it comes to international trade proposals: market access, domestic support programs, and export subsidies.

Market Access

Market access policies, usually designed to discourage imports, may consist of tariffs or nontariff barriers. Historically, the nontariff barriers often applied to dairy products included import quotas, minimum import prices, and discretionary import licensing. Specific duties, *ad valorem* duties, or some combination of the two were also operating in dairy product markets around the world. Specific duties depend on the quantity imported, whereas *ad valorem* tariffs depend on the import value.

While tariff barriers have an indirect impact on import volumes through their price effects, most nontariff barriers restrict trade by directly affecting volumes. For example, the United States applied Section 22 import quotas on products from specific countries until it committed to changes under the URAA. An important issue for trade analysis involves the allocation of quota rents resulting from such restrictions (McCorriston and Sheldon, 1994). Governments may seek to collect these rents by selling the quota rights through auctions (as is done in the United States on some occasions), or may give import authority to government agencies—e.g., CONASUPO (the National Company for Popular Subsistence) in Mexico and LIPC (Livestock Industry Promotion Corporation) in Japan. In general, quota rents can have large effects on the distribution of producer and consumer benefits associated with import policy.

The URAA eliminated many nontariff barriers, and a special type of import restriction, the tariff-rate quota (TRQ), is now more prevalent. TRQs are two-tiered (in-quota and over-quota) tariff systems where the tariff quota plays a pivotal role. As quantitative import restrictions were prevalent in international agricultural trade, this two-tiered tariff-rate quota approach has led to some standardization of import policies. Note that the tariff-rate quota will converge to a simple rate tariff as the difference between the two rates decreases or as the quota level increases. TRQ commitments for dairy products in major countries and regions are described in table 1.

To expand market access, member countries promised to replace all nontariff border measures by tariffs that provide substantially the same level of protection. These tariffs (derived from this process, known as "tariffication") and other tariffs on agricultural products were to be reduced by specified levels over specified time period. Levels and times are not the same for all countries. The least developed countries were not required to reduce

Table 1
TRQ commitments for WTO members under the URAA

Country/ region	Cheese		Butter		Skim milk powder		Whole milk powder	
	Base	2000	Base	2000	Base	2000	Base	2000
					1,000 tons			
Western Europe	37.1	123.1	79.5	91.3	41.2	69.2	0.7	1.1
Japan	NA	NA	3.5	3.5	99.8	99.8	0	0
Korea	NA	NA	0.3	0.4	0.6	0.9	0.3	0.5
Southeast Asia	NA	NA	20.1	20.1	79.5	85.5	2.1	2.1
Canada	20.4	20.4	2.0	3.3	0.9	0.9	0	0
United States	116.4	136.4	7.5	13.1	1.3	5.3	0.5	3.4
Mexico	9.4	9.4	0	0	56.0	56.0	24.0	24.0

TRQ = tariff-rate quota; WTO = World Trade Organization; URAA = Uruguay Round Agreement on Agriculture; and NA = Not applicable.

Source: Cox, Coleman, Chavas, and Zhu, 1999.

tariffs. Concurrent with tariffication, provisions were also made for the maintenance of current access opportunities and market access increases in the future.

Market access was a particularly contentious issue for dairy trade negotiations under the Uruguay Round as questions arose as to how to measure existing access and then implement more opening of markets. The transition to tariff-based import measures was relatively smooth in concept, but the actual implementation of these rules has created some debate. As trade analysts examine the potential liberalization of dairy policies and programs, the tariff and access issues will continue to be major components for inclusion in empirical modeling efforts.

Domestic Support and Other Programs

Within the trade liberalization context, trade-distorting domestic policies and programs are of much concern for many products, including those in the dairy complex. Such policies, which include consumption subsidy programs and production or price supports, have direct production effects that in turn distort international trade. WTO members calculated how much support of this kind they were providing (using calculations known as "total aggregate measurement of support" or "Total AMS") for the agricultural sector per year in the base years of 1986-88 and committed to reducing them, but again the least developed countries were not required to make any cuts. Production, consumption, and storage subsidies are common dairy policies around the world. A production subsidy shifts the supply curve down; while a consumption subsidy shifts demand curves up. Both the prices and quantities of dairy products in the domestic markets, and in world markets if the country is involved in international trade, are affected. Price support programs generally provide minimum floor prices. Price support systems often work together with policy instruments, such as border measures or production controls.

Policies that are deemed to have minimal trade impacts can be used freely. These policies include U.S. Government services such as research and development, disease control, infrastructure, and food security. The study of genetic improvements and nutritional requirements in dairy cattle, efforts to understand and control cattle diseases, like Johne's disease, and development of new technologies for the milking parlor are examples of these activities that dairy farmers, in particular, would find useful. Direct payments to farmers—such as assistance to help farmers restructure agricultural businesses and direct payments under environmental and regional assistance programs—are examples that dairy farmers can take advantage of. So too are school lunch programs that have dairy products as important components, like those in the United States, South Korea, the European Union (EU), and Japan.

A third set of policies and programs that may have some effect on dairy trade is more problematic. Examples are direct payments under production-limiting programs and certain U.S. Government assistance measures to encourage agricultural and rural development in developing countries. Some developed countries (e.g., Canada and the EU) have implemented direct production quotas as a means of dealing with dairy market imbalances caused by price support systems. Quotas with significant over-quota penalties are the simplest direct dairy production measure. Price discrimination policies, often implemented through classified pricing systems, may also have effects on international trade through production and price effects on manufactured dairy products, the dominant products traded internationally (Cox et al., 1999; and Knutson and Loyns, 1996). There is no explicit discipline on price discrimination policies applied to domestic dairy markets under the WTO, but the system in Canada was challenged by the United States and New Zealand.

Export Subsidies

Export policies include export restrictions and export promotion instruments. While most export policies were associated with food aid in earlier years, export promotion policies have become a feature of the current world market situation, including dairy markets. Export subsidies generally work together with other border instruments (e.g., tariffs and import quotas) to prevent products similar to the exported commodities from being shipped back to the original exporting countries. Under the URAA, both the value of export subsidies and the quantity of subsidized exports were to be reduced, except no reductions were required of the least developed countries.

International markets have been used by several countries for disposal of surplus milk production (as dairy products). Without the international outlet, domestic markets would absorb a supply shock. With these policies in place, the shock is absorbed by world markets. Typically, the prices in the international markets become more volatile when these subsidies are used.

Dairy Trade Liberalization and the Emerging Global Dairy Industry

The UW-World Dairy Model (UWWDM) used for this analysis is an updated annualized version of a model developed at the University of Wisconsin. Earlier versions were used to assess the impacts of full deregulation and extending the URAA dairy modalities, the broad outlines for final commitments, from 2000 to 2005 (Cox et al., 1999) and for a World Bank study of the impacts of developed-economy dairy policies on the developing economies (Cox and Zhu, 2004). Other previous empirical analyses of dairy trade liberalization are noted in the appendix.

The model is a classic mathematical programming, spatial equilibrium model, with an additional structure to address a spatial equilibrium in hedonic (characteristic) space. This hedonic spatial equilibrium model incorporates 24 regions, 9 dairy products, and 4 milk components (fat, casein, whey protein, and lactose), using databases from the Food and Agricultural Organization (FAO) and Organisation for Economic Co-operation and Development (OECD). All regions and markets are linked via transportation costs and trade policy distortions (export subsidies and/or import tariff-rate quotas). Within- and over-quota tariffs, import quotas, and export subsidies are modeled using URAA dairy commitments for all developed economies. The model is structured so that the developing economies continue to open access to their dairy markets through 2005, as they committed to do under the URAA. Once the commitments are met, they are held constant for the remainder of the estimation period.

The current model specification is the result of a major effort to update the previous version (see the appendix). We incorporated recently updated milk supply and dairy product demand elasticities for the countries and regions in the model. We also included two key domestic policy changes: (1) the MILC (Milk Income Loss Contract) program, a target price deficiency payment introduced in the United States in 2002, and (2) EU Common Agricultural Policy (CAP) reform starting in 2005. The CAP reform proposals call for:

- Reducing the butter intervention price by 25 percent from 2004 to 2007 and the skim milk powder intervention price by 15 percent from 2004 to 2006;
- Limiting intervention buy-in of butter to 30,000 tons by 2008;
- Moving milk quota increases scheduled under Agenda 2000 back 1 year, to begin in 2006 and adding an extra 200,000 tons to the quota for Greece;
- Paying a premium to dairy producers to compensate for the intervention price cuts beginning in 2004, based on the milk quota per holding (reduced by the amount by which the total national quota was increased since 1999/2000); and
- Allocating to member states an additional payment to be paid to dairy producers according to "objective criteria." Both the dairy premium and the supplementary member state payment are to be incorporated into the

Single Farm Payment (SFP) scheduled to begin in 2007. Member states may opt to incorporate all or part of the additional payment into the SFP from 2005.

We also added to the model the scheduled dairy import access granted to Australia by the U.S.-Australia Free Trade Agreement beginning in 2005 and the essentially free trade in dairy products between Australia and New Zealand benchmarked to 2002. Transportation costs are explicitly specified and assumed to increase 15 percent every year, based on the large increase in China's demand for raw and processed materials, pressuring ocean transport and increasing oil prices.

We introduced economic distortions generated by various domestic dairy support policies and dairy trade policy instruments into the model. Regional milk and commodity prices, as well as trade flows and producer and consumer welfare measures, are computed under the alternative policy scenarios. The results are compared with a baseline scenario to assess the ceteris paribus changes induced by the new policy context. For further details of the model, see Zhu, Cox, and Chavas (1999).

Policy Scenarios

The quantitative assessment described here of the impacts of further domestic support and trade liberalization on the world dairy sector is based on the updated UWWDM, with the year 2002 used for calibrating the baseline scenario. The model is solved recursively (1 year at a time, with the previous year's solution the starting point for the following year). World Bank regional GDP and population data are used to annually shift regional commodity demands, and 5-year moving average supply growth rates from FAO are used to annually shift regional milk production. The period of simulation is from 2002 to 2007. A description follows of the scenarios analyzed and their assumptions.

Base Scenario

The base scenario is a simulation of the world dairy market situations from 2002 to 2007; it accounts for current tariffs, import quotas, TRQs, and export subsidies implemented according to URAA commitments and the currently defined domestic support policies. The developed economies are assumed to fulfill their commitments, meaning that during the simulation period, domestic support, tariffs, and export subsidies will be the same as their final commitments. Developing economies are assumed to fulfill their final commitments in 2005 and stay level until 2007. We used regional production, price, and trade data for 2002 from FAO as the starting point of the model, although, where possible, we used data from the Food Agricultural Policy Research Institute or OECD. After a calibration exercise, the base scenario was able to replicate actual data values within 5 percent, plus or minus, for most regions and product categories and to provide a reasonably good representation of world dairy markets. As a result, the base scenario is used as the benchmark for comparisons with results from other scenario simulations.

Scenario 1—WTO 2007/World No Trade

This scenario, which could be called a "free dairy-trade situation," eliminated all trade policy distortions during the simulation period—that is, all export subsidies and import TRQs (quotas, within- and over-quota tariffs)—while retaining domestic support policies as in the base scenario. In this case, we would expect an increase in world dairy trade, increased world market prices, and considerable strain on several domestic support policies (intervention price program costs, in particular) in the protected dairy sectors.

Scenario 2—WTO 2007/World No Domestic

In this case, trade polices are retained as in the base scenario, but all domestic dairy support and other types of policies are eliminated. The support measures eliminated include the intervention/support prices for skim milk powder in the EU; butter and skim milk powder in Canada; butter, cheese, and skim milk powder in the United States and in other countries. Classified pricing in the United States and Canada—modeled as a price wedge/premium for residual (fluid, soft, and frozen) products over manufactured products—and the milk production/marketing quotas in the EU and Canada are also eliminated.

Scenario 3—WTO 2007/World Liberalization

The base scenario assumptions are retained except that all of the trade and domestic dairy policies, support, and other types, are eliminated.

Simulation Results

Tables 2 to 5 summarize the impacts of the three scenarios above relative to the base scenario simulation. For comparison, we provide the information from all regions. The discussion focuses on regional milk production and price changes, producer and consumer welfare impacts, government revenue, and total welfare impacts shown in tables 2, 3, and 4, and U.S. Government revenue and expenditure changes in table 5.

There are several model scenarios noted above, but only one receives a relatively full treatment in this report, the WTO 2007/World Liberalization scenario. This scenario is akin to those defined as full multilateral dairy trade liberalization in world dairy markets. That is, all trade and domestic policies and programs are eliminated in all countries and regions. This analysis provides important information about the competitiveness of each region in world dairy markets.

The simulation results indicate that full liberalization leads to lower average dairy product prices worldwide but higher marginal world dairy prices—the prices in the major competitive exporting region, Oceania (table 2). U.S. consumers gain about $1.6 billion, which implies that U.S. consumer prices were above the world average and will fall as a result of liberalization. Producers face the opposite situation—U.S. milk prices and production

Table 2
World dairy trade and domestic program liberalization—changes from base scenario, 2007

Country/ region	Milk production	Milk price	Producer surplus		Consumer surplus		Total government revenue/cost	Total welfare	
	Percent -----change-----		*$US million*	*Percent change*	*$US million*	*Percent change*	*$US million*	*$US million*	*Percent change*
Developed economies, heavily protected dairy:									
EU-15	11.6	-54.7	-24,062	-53.3	14,909	9.6	5,154	-3,999	-2.0
Japan	-21.5	-57.2	-2,932	-62.9	3,191	10.8	-153	106	0.3
Other Western Europe	-20.0	-31.3	-555	-41.4	534	6.7	33	12	-0.1
Total	8.1	NA	-27,549	-53.8	18,634	9.7	5,034	-3,881	-1.6
Developed economies, less heavily protected dairy:									
United States	-1.8	-4.1	-1,884	-10.7	1,637	1.6	1,045	798	0.7
Canada	8.8	-51.7	-1,906	-51.8	1,861	13.6	145	100	0.6
Total	-0.9	NA	-3,790	-17.8	3,498	3.0	1,190	898	0.7
Developed economies, competitive exporters:									
New Zealand	8.1	24.9	415	31.0	-190	-3.6	0	225	3.4
Australia	-1.3	-3.5	-66	-4.3	166	2.2	72	172	1.9
Total	3.8	9.4	349	12.1	-24	-0.2	72	397	2.6
Less developed economies, potentially competitive exporters:									
Total	0.8	NA	755	2.3	-341	-0.2	-382	32	0
Less developed economies, net importers:									
Total	-1.1	NA	-3,287	-8.7	4,452	1.8	-1,352	-187	-0.1

EU-15 = the 15 member states of the European Union, and NA = Not applicable.

decline about 4.1 and 1.8 percent, respectively, and ultimately lead to producer losses of around $1.9 billion. Government revenue and expenditure changes result in a gain of $1 billion where lost tariff revenues are more than offset by savings from elimination of export subsidies and domestic supports. The summation of consumer and government gains and producer losses yields a total welfare gain of approximately $800 million.

Compared with several other regions, the impacts of world dairy trade liberalization on the United States are quite modest. EU dairy producers suffer the greatest losses, with a farm milk price decline of 55 percent generating producer losses of around $24 billion. EU consumers gain about $15 billion, but even adding government revenue gains due to liberalization (tariff revenue losses are offset by savings from elimination of export subsidies and domestic supports), EU's total welfare falls by around $4 billion. Farm milk prices in Japan and Canada are also significantly reduced, by 57 and 52 percent, leading to producer surplus losses of $3 billion and $2 billion, respectively. However, consumer benefits of $3.2 billion and $1.9 billion, plus government revenue savings generate total welfare gains of about $100 million in each country. Note that EU and Canadian milk production increase (11.6 and 8.8 percent), while their farm milk prices decrease, a direct result of the elimination of the milk production quota.

Oceania (Australia and New Zealand), as the predominant world dairy-exporting region, basically sets world marginal dairy prices in a spatial equilibrium context. Under full, multilateral dairy liberalization, Oceania domestic—hence world marginal—dairy product prices and farm milk prices increase 9.4 percent. With these higher milk prices, Oceania milk production expands 0.8 percent, with an associated producer surplus increase of $349 million. Conversely, these higher dairy product prices generate consumer surplus losses of $24 million. Overall, after accounting for government revenue changes, total welfare in the region increases about $400 million (2.6 percent).

To understand the impact on less developed countries, we aggregate them into two groups: potential competitive exporters[1] and net importers.[2] For the competitive exporters, producer surplus and consumer surplus move in the same directions as in Oceania, as higher milk prices increase producer welfare, but higher dairy product prices are detrimental for consumers. Producers gain $755 million and consumers lose $341 million. After government revenue changes are considered, total welfare gains are $32 million.

The net importing group faces a different challenge: as competition from other regions reduces producer surplus (by $3.3 billion or 8.7 percent) due to lower dairy product (consumer) prices, consumers gain $4.5 billion (1.8 percent). However, government tariff revenues fall $1.3 billion due to the elimination of trade distortions, and total welfare for the group declines by about $187 million after government revenue losses are subtracted.

[1]Includes: India, other eastern Europe, Argentina, Uruguay, Chile, China, Mongolia, Poland, and the Republic of South Africa.

[2]Includes: the Former Soviet Union, Brazil, other South America, other South Asia, Middle East, Mexico, North Africa, Central America, and the Caribbean, South and North Korea, Southeast Asia, and Rest of World.

Comparing the Impacts of Domestic Support and Trade Policies

We can also compare the impacts of eliminating domestic dairy policies and programs alone (table 3) or trade policies alone (table 4). The simulation results suggest that U.S. milk producers get more protection from domestic support policies than from trade policies. Without domestic support policies and other programs, American producers suffer a loss of $2.1 billion as the farm milk price and milk production decline 5.3 and 2.3 percent, respectively. Due to expanding market demands, the multilateral elimination of trade policies suggests an increase in world market prices and a gain to U.S. producers of about $419 million with the farm milk price and milk production increases of 3.7 and 1.6 percent, respectively. Consumer surplus moves in the opposite direction in these two cases, increasing about $1.3 billion under WTO 2007/World No Domestic and declining around $1.1 billion under WTO 2007/World No Trade. Net total welfare changes are $165 million (0.1 percent) under WTO 2007/World No Domestic and $595 million (0.5 percent) under WTO 2007/World No Trade.

The EU results are similar, with domestic support policies providing more than twice the protection to EU producers as trade policies. Without domestic support policies, EU producers face losses of about $24 billion, and farm milk prices fall by some 55.3 percent. If only dairy trade policies are eliminated, EU producers suffer a loss of $10 billion, and the farm milk price declines by about 25.6 percent. Given the size of the farm milk price

Table 3

World dairy only domestic program liberalization—changes from base scenario, 2007

Country/ region	Milk production	Milk price	Producer surplus		Consumer surplus		Total government revenue/cost	Total welfare	
	Percent ---change---		*$US million*	*Percent change*	*$US million*	*Percent change*	*$US million*	*$US million*	*Percent change*
Developed economy, heavily protected dairy:									
EU-15	11.5	-55.3	-24,322	-53.9	15,042	9.7	3,934	-5,346	-2.7
Japan	-0.6	-1.6	-95	-2.0	-80	-0.3	-18	-193	-0.6
Other Western Europe	-1.4	-2.2	-43	-3.2	35	0.4	19	11	0.1
Total	10.2	NA	-24,460	-47.8	14,997	7.8	3,935	-5,528	-2.3
Developed economy, less heavily protected dairy:									
United States	-2.9	-5.3	-2,142	-12.2	1,301	1.3	1,006	165	0.1
Canada	10.6	-39.0	-1,365	-37.1	1,377	10.0	87	99	0.6
Total	-1.2	NA	-3,507	-16.5	2,678	2.3	1,093	264	0.2
Developed economy, competitive exporters:									
New Zealand	-1.4	-4.2	-67	-5.0	-47	-0.9	0	-114	-1.7
Australia	-5.5	-15.3	-282	-18.2	291	3.9	0	9	0.1
Total	-3.3	-10.4	-349	-12.1	244	1.9	0	-105	-0.7
Less developed economies, potentially competitive exporters:									
Total	-0.8	NA	-760	-2.4	716	0.4	-133	-177	-0.1
Less developed economies, net importers:									
Total	-0.8	NA	-1,289	-3.4	1,339	0.5	-168	-118	0

EU-15 = the 15 member states of the European Union, and NA = Not applicable.

change, the size of consumer surplus increases is not surprising—$15 billion under WTO 2007/World No Domestic and $8.4 billion under WTO 2007/World No Trade. Note that in both cases, EU milk production does not drop (increases of 11.5 and 0 percent, respectively) due to the elimination of production quota. But, the impacts of the price reduction more than offset any effects resulting from the production increases, and, consequently, total producer surplus declines.

Domestic polices also provide more protection to Canada's producers than trade policies, although the difference is not as great as for the United States and the EU. Without domestic support policies, Canada's producers suffer a loss of about $1.3 billion and farm milk prices decline by 39 percent, while, without dairy trade policy distortions, producer surplus losses are $1.2 billion and farm milk prices decline 31 percent. Canada's consumer surplus gains are $1.4 billion and $1.2 billion, respectively, for the two scenarios.

For Japan, the opposite results occur—trade policies provide much more protection to producers than domestic support and other policies. Multilateral elimination of domestic dairy policies and programs has minimal impact on the farm milk price or producers' and consumers' surplus. However, the multilateral elimination of trade policies causes the farm milk price to decline by 44.8 percent and milk production to decline by 16.8 percent, resulting in producer losses of some $2.4 billion. Of course, due to these sharply lower prices, consumer surplus increases by about $3 billion.

Table 4

World dairy only trade liberalization—changes from base scenario, 2007

Country/ region	Milk production	Milk price	Producer surplus		Consumer surplus		Total government revenue/cost	Total welfare	
	Percent ---change---		*$US million*	*Percent change*	*$US million*	*Percent change*	*$US million*	*$US million*	*Percent change*
Developed economy, heavily protected dairy:									
EU-15	0	-25.6	-10,476	-23.2	8,447	5.4	1,517	-512	-0.3
Japan	-16.8	-44.8	-2,356	-50.5	3,028	10.3	-153	519	1.5
Other Western Europe	-14.3	-22.4	-410	-30.6	474	6.0	33	97	1.0
Total	-1.7	NA	-13,242	-25.9	11,949	6.2	1,397	104	0
Developed economy, less heavily protected dairy:									
United States	1.6	3.7	419	2.4	-1,118	-1.1	05	594	-0.5
Canada	0	31.0	-1,205	-32.8	1,148	8.4	41	-16	-0.1
Total	1.6	NA	-786	-3.7	30	0	146	-610	-0.5
Developed economy, competitive exporters:									
New Zealand	7.7	23.9	397	29.6	-112	-2.1	0	285	4.3
Australia	6.0	16.6	322	20.8	-165	-2.2	72	229	2.6
Total	6.9	19.8	719	24.9	-277	-2.2	72	514	3.3
Less developed economies, potentially competitive exporters:									
Total	2.2	NA	3,358	10.4	-2.906	-1.6	-382	70	0
Less developed economies, net importers:									
Total	-0.5	NA	-3,191	-8.4	4,298	1.7	-1,352	-245	-0.1

EU-15 = the 15 member states of the European Union, and NA = Not applicable.

An inspection of welfare changes suggests that Oceania benefits only from the elimination of trade policies, with a net welfare gain of $500 million (after adding government revenue changes), and suffers a loss of about $100 million from multilateral elimination of domestic support and other types of policies. This latter result is driven mainly by the increase in the EU and Canadian milk supplies with the elimination of production quotas. Increased milk supplies in those countries, absent additional market access in the face of sharply lower domestic dairy product prices, means they are less attractive export destinations and reduce, at least in the short term, opportunities for sales by competitive exporters.

For less developed economies, the impacts on potential competitive exporters of eliminating trade policies or domestic dairy policies are similar to those of Oceania. Total welfare gains of $70 million are generated from the elimination of trade policies, with losses of $177 million from multilateral elimination of domestic policies. For the net importers, any kind of trade liberalization is detrimental. Elimination of trade policies generates aggregate producer losses of $3.2 billion and consumer gains of $4.3 billion but ultimately a net total welfare loss of $245 million. In the case of eliminating only domestic supports and other types of policies, the losses to producers are about $1.3 billion, consumers gain about the same amount, and, after accounting for government revenue losses, total welfare loss is about $118 million.

Decomposition of U.S. Government Revenues and Expenditures

To further understand the impacts of trade liberalization on the U.S. dairy market and the role of the U.S. Government in this process, we decomposed U.S. Government revenues and expenditures into tariff revenues, export subsidy costs, Milk Income Loss Contract (MILC) program payments, and Commodity Credit Corporation (CCC)[3] purchase expenditures. The first two are revenues associated with trade policy, and the last two are domestic support policy expenditures.

[3]The Commodity Credit Corporation is the U.S. Government agency that purchases surplus dairy products at specified prices from product manufacturers. Those purchases, in turn, support the milk price at a minimum level.

The base scenario indicates that almost 90 percent of U.S. Government expenditures are for the MILC program (table 5). U.S. milk producers received more than $1 billion each year, except 2003, during the study period. It should be noted that this result is partly due to the choice of the base year—2002 was a year of low milk prices and high MILC expenditures in the United States. In fact, those low prices in part prompted the inclusion of the MILC program in the 2002 Farm Bill. Choosing a base year with higher milk prices and lower MILC payments would lessen the impacts of removing domestic support policies in these simulations.

Even though U.S. import tariff and export subsidy rates are fixed at the 2000 URAA levels over the study period, the decline between 2004 and 2005 in subsidies and tariff rates for other sets of countries coincides with the assumption that 2005 is the first year that developing countries' final commitments on tariffs, TRQs, and domestic support became binding. This action will have two effects. First, further opening of developing-economy markets will help reduce U.S. imports, since some imports originally destined for the U.S. market are likely to be diverted to developing-country markets; a reduction in U.S. imports will translate to a reduction in tariff revenues. Second, U.S. exports will likely face more intense competition in developing-country markets, especially from Australia and New Zealand. In this case, a reduction in U.S. exports results in lower export subsidy costs. Based on the estimated tariff revenue and export subsidy costs, the quantities of U.S. imports and exports should be very small in 2007 compared with 2002 levels.

Relative to the 2007 base scenario, eliminating only domestic dairy policies and programs generates U.S. Government savings of about $1 billion in 2007, all of it from the elimination of the MILC program. Both tariff revenue and export subsidy costs increase, but the changes are very small, suggesting that U.S. imports and exports increase slightly in this scenario. The goal of the WTO emphasis on reducing or eliminating domestic support policies is to encourage world trade, but the United States cannot gain much from its efforts to do so unless there is also some emphasis on opening the markets of other countries.

When only trade policies are liberalized, U.S. Government savings are about $105 million compared with the base scenario. In this case, the MILC program payment savings are $368 million, since elimination of trade policies around the world increases the U.S. milk price 3.7 percent through the expansion of market demand, which consequently increases dairy product

Table 5

U.S. Government revenues/expenditures

Item	2002	2003	2004	2005	2006	2007
			$US million			
Trade tariff revenues/subsidy costs:						
Total (net) trade revenues/costs—						
Base scenario	-94	-90	-85	-56	-42	-29
No domestic programs: World	-80	-69	-20	-15	-18	-39
No trade barriers: World	0	0	0	0	0	0
Full liberalization: World	0	0	0	0	0	0
Tariff (revenues)—						
Base scenario	48	44	38	15	4	3
No domestic programs: World	62	60	55	52	45	16
No trade barriers: World	0	0	0	0	0	0
Full liberalization: World	0	0	0	0	0	0
Export subsidy (costs)—						
Base scenario	-142	-134	-123	-71	-46	-32
No domestic programs: World	-142	-129	-75	-67	-63	-55
No trade barriers: World	0	0	0	0	0	0
Full liberalization: World	0	0	0	0	0	0
			$US million			
Government domestic programs:						
Total domestic programs—						
Base scenario	-1,353	-967	-1,055	-1,089	-1,056	-1,020
No domestic programs: World	0	0	0	0	0	0
No trade barriers: World	-908	-949	-965	-813	-779	-652
Full liberalization: World	0	0	0	0	0	0
Commodity Credit Corporation milk price support—						
Base scenario	0	0	0	0	0	0
No domestic programs: World	0	0	0	0	0	0
No trade barriers: World	0	0	0	-34	-182	-288
Full liberalization: World	0	0	0	0	0	0
Milk Income Loss Contract program—						
Base scenario	-1,353	-967	-1,055	-1,089	-1,056	-1,020
No domestic programs: World	0	0	0	0	0	0
No trade barriers: World	-908	-949	-965	-813	-779	-652
Full liberalization: World	0	0	0	0	0	0
			$US per hundredweight			
MILC payment:						
Base scenario	0.80	0.56	0.60	0.61	0.59	0.54
No domestic programs: World	0	0	0	0	0	0
No trade barriers: World	0.53	0.55	0.49	0.45	0.41	0.36
Full liberalization: World	0	0	0	0	0	0

MILC = Milk Income Loss Contract.

consumer prices. The MILC payment premium declines from $0.54 per cwt to $0.36 per cwt and overrides any effects from an increase in milk production; therefore, the total MILC program payment falls. However, CCC purchase expenditures rise to about $288 million as producers may garner some compensation from other existing domestic support policy structures no longer protected by border measures.

Insights and Possible Actions: No Easy Answers

The impacts of trade liberalization on the U.S. dairy market are investigated by extending the current URAA commitments to the year 2007 in a base simulation. We analyzed separately the impacts of: (1) removing only domestic support and other types of policies, (2) removing only trade policies, and (3) a full liberalization, around the world. The changes in producer and consumer surplus and in U.S. Government revenues and expenditures within these three contexts are also examined. This analysis provides useful insights of the effects on the U.S. dairy sector of changing domestic industry policies and trade policies. While the primary focus is on the United States, we also provide a comparison of the impacts on other developed and less developed economies to better understand who is likely to gain/lose under alternative world dairy trade liberalizations.

Compared with other regions, the impact of world dairy trade liberalization on the U.S. dairy market is found to be generally moderate in the medium term (5 years of adjustment). These results indicate that the developed economy distorted dairy sectors—as in the United States and EU, and, to a lesser extent, Canada—are more protected by domestic support and other types of policies and programs than by trade policies. Japan, in contrast, is more protected by trade policies. On the other hand, competitive exporters in Oceania and among the developing regions—e.g., Argentina, Uruguay, Chile, India, and Eastern Europe—gain more from elimination of dairy trade distortions than from eliminating domestic support or other types of policies. In a WTO discussion context, these results suggest that potential win-win dairy trade negotiations may involve more rapid liberalizing of dairy trade policy (minimizing impacts on protected developed economies and maximizing benefits to competitive exporters) while allowing for longer adjustment periods in reforming domestic dairy policies and programs.

While this research sheds light on dairy sector effects of domestic and trade liberalization in the United States and around the world, its limitations should be noted. First, the dairy trade policy is not negotiated in isolation. The impacts of liberalizing other agricultural sectors (grains, oilseeds, and other livestock products) can significantly influence negotiators' multicommodity bargaining positions. Exploring multicommodity impacts under alternative liberalization proposals can provide additional insights into the policymaking process. Second, the linkages between the agricultural sector and the macro-economy can also be important (e.g., monetary policy and exchange rates).

In addition, given that the base/calibration year for the current model is 2002, a year of relatively low milk/commodity prices and high domestic

supports in the U.S. dairy sector, the impacts of eliminating domestic support and other programs (with or without eliminating trade distortions) could be overstated were prices to rise. That is, a different base/calibration year with higher milk/commodity prices, and lower domestic program contributions would have generated smaller impacts of liberalization on the United States than in this report. A related domestic support/program issue is the modeling of milk production quotas in the EU and Canada. Standard modeling procedures involve subtracting quota rents from protected domestic all-milk prices to compute the marginal cost of milk. Hence, the large quota rents imply potentially quite competitive marginal costs of milk production, which is evident with the expansion of milk production in the EU and Canada when we eliminated milk quotas along with other domestic supports. Thus, removal of milk production quotas, as modeled in this report, likely implies a hyper-competitiveness that would require a radical restructuring of the EU and Canadian dairy sectors. Finally, because of these issues, impacts of eliminating domestic policies and programs (with or without eliminating trade distortions) on competitive exporters are likely overstated.

References

Cairns Group Farm Ministers. 1998. Communiqué. Sydney, Australia. April 2-3.

Coleman, J.R. 1998. "World Dairy Trade Overview: Trade Policy and the WTO." Paper presented at the Workshop for Dairy Economists and Policy Analysts, Cornell Program on Dairy Markets and Policy, Baltimore, MD. Oct. 26-27.

Cox, T.L., J.R. Coleman, J.P. Chavas, and Y. Zhu. 1999. "An Economic Analysis of the Effects on the World Dairy Sector of Extending Uruguay Round Agreement to 2005." *Canadian Journal of Agricultural Economics*, Volume 47, No. 5, pp. 169-183.

Cox, Tom, and Yong Zhu. 2004. "Assessing World Dairy Markets and Policy Reforms: Implications for Developing Countries." *Global Agricultural Trade and Developing Countries*. M. Ataman Aksoy and John C. Beghin (Editors). World Bank. Washington, DC.

Griffin, M. 1999. "The Effects of Agricultural Trade Liberalization on Global Dairy Markets." Paper presented at the Fourth Interleite Symposium on Intensive Dairy Production, Caxambu, Brazil, July 22-24.

Ingco, M.D. 1995. "Agricultural Trade Liberalization in the Uruguay Round. One Step Forward, One Step Back?" *Policy Research Working Paper, No. 1500*, World Bank, Washington, DC. August.

International Dairy Arrangement. 1994. *Summary of the Results of the Uruguay Round in the Dairy Sector: Special Annex to the World Market for Dairy Products 1994*. Geneva, Switzerland: General Agreement on Tariffs and Trade, November.

International Dairy Food Association (IDFA), Alliance of Western Milk Producers, American Dairy Products Institute, National Milk Producers Federation, and U.S. Dairy Export Council. 1999. Position paper, "Preparing for the Seattle Round: U.S. Dairy Industry Negotiating Priorities," submitted to the Office of the U.S. Trade Representative, Washington, DC, July 23.

Kirkpatrick, E., Chairman, U.S. Dairy Export Council. 1998. Editorial comments. *Cheese Reporter*. July 10.

Knutson, Ronald D., and R.M.A. Loyns. 1996. "Understanding Canada/United States Dairy Disputes." *Proceedings of the Second Canada/U.S. Agricultural and Food Policy Systems Information Workshop*. Loyns, R.M.A., K. Meilke, and R. Knutson (editors). Department of Agricultural Economics and Farm Management, University of Manitoba, Winnipeg, Manitoba.

Langley, Suchada, et al. 2003. "A Trade Liberalization in International Dairy Markets." Paper presented at the American Agricultural Economics Association Annual Meeting, Montreal, Canada, July 27-30.

Martin, W., and L.A. Winters. 1995. "The Uruguay Round. Widening and Deepening the World Trading System." Directions in Development Series. The World Bank. October.

McCorriston, S., and I.M. Sheldon. 1994. "Selling Import Quota Licenses: The U.S. Cheese Case." *American Journal of Agricultural Economics*, Volume 76, pp. 818-827.

Meilke, K.D., D. McClatchy, and H. de Gorter. 1996. "Challenges in Quantitative Economic Analysis in Support of Multilateral Trade Negotiations." *Agricultural Economics*, Volume 14, pp. 185-200.

Notification to WTO Committee on Agriculture. *Individual Country's Market Access, Domestic Support, and Export Subsidy Information.* http://www.wto.org/english/tratop_e/agric_e/agric_e.htm accessed 03/09/06.

Oxford Analytica. 1998. "European Union: Farm Trade." Daily Brief. June 2.

U.S. Dairy Export Council. 1998. "Dairy Export Subsidies and the WTO Canada Case." *World Dairy*, Volume 3, No. 4, July.

U.S. Department of Agriculture, Economic Research Service. 1999. "Agriculture and the Evolution of Tariff Bargaining." *Agricultural Outlook*, August, pp. 28-31.

_____, Foreign Agricultural Service. 1999. "A Summary of the Final Act of the Uruguay Round." http://www.fas.usda.gov/itp/policy/gatt/sum_fact.html accessed 03/09/06.

Zhu, Y., T.L. Cox, and J.P. Chavas. 1999. "An Economic Analysis of the Effects of the Uruguay Round Agreement and Full Trade Liberalization on the World Dairy Sector." *Canadian Journal of Agricultural Economics*, Volume 47, No. 5, pp.187-200.

Appendix—
Previous Empirical Assessments of Dairy Trade Liberalization

Early assessments indicated that by 2000, when the URAA provisions were to be fully implemented in developed countries, almost 60 percent of world dairy trade would still:

- Be exported with subsidies (U.S. Dairy Export Council, 1998),
- Be regulated by tariff-rate quotas (TRQs) with prohibitively high rates of over-quota duty (as high as 300 percent *ad valorem*)(Griffin, 1999), and
- Face special safeguards, low minimum access requirements, and small tariff reduction requirements for individual commodities undermining the market access provisions of the URAA (Coleman, 1998).

As a result, considerable scope remained for further removal of trade barriers in the next WTO Round.

As part of the URAA, countries agreed to begin new agricultural negotiations by the start of 2000, and dairy groups in several countries detailed their policy objectives and positions early on in preparation for the Doha Round. A white paper by the International Dairy Foods Association (IDFA) and other U.S. dairy industry groups outlined U.S. dairy industry negotiating priorities, including gradual elimination of export subsidies, reduction and harmonizing of high tariffs, and tightening of disciplines on domestic supports (IDFA et al., 1999). Eliminating export subsidies and reducing import barriers, it is assumed, would cause world prices to rise sufficiently for the United States to be competitive on world markets (Kirkpatrick, 1998). Cairns group countries (with the exception of Canada), representing smaller and medium-sized farm-product exporting countries, supported measures that went even further than those of the United States toward market and trade liberalization (Cairns Group Farm Ministers, 1998). The negotiating goals of the EU were not clearly articulated, but priorities were expected to involve minimizing increases in import access and reductions in export subsidies, as well as other issues (Oxford Analytica, 1998). Meilke, McClatchy, and de Gorter (1996) suggested that, as policy positions are formulated and negotiations proceed, it is important for trade negotiators to have the capability to evaluate quantitative impacts of alternative policy proposals.

Cox et al. (1999) used a spatial equilibrium model of the world dairy sector to simulate the regional impacts of extending the 1995 URAA dairy commitments to 2005. They found that the extension more than doubled the producer and consumer welfare impacts for most regions relative to a 2000 base scenario. Aggregate producer and consumer welfare changes were estimated to be in the $2 billion to $5 billion range. Results suggested that Western Europe would remain heavily protected in 2005 and that its dairy producers lost the most with the further, post-URAA dairy trade liberalization. In contrast, dairy producers in low-cost dairy-exporting regions (New Zealand, Australia, and southern South America) gained the most. Impacts on Japan, the United States, and Canada were found to be relatively small.

Langley et al. (2003)—using the Economic Research Service/Penn State WTO model, now known as the PEATSim (Partial Equilibrium Agricultural Trade Simulator)—estimated that world dairy prices for all dairy products increase, ranging from 9 percent for nonfat dry milk to 58 percent for butter, relative to a base, under a total liberalization for milk and dairy products scenario. The price increases range from 10-60 percent under a total liberalization for all commodities scenario. The world trade value increases 37-38 percent for butter under both scenarios and 29-33 percent for cheese. The higher world dairy product prices in both the dairy-only and the all-commodities scenarios are due to lower production of raw milk and dairy products in heavily subsidized countries (Canada, EU, Japan, and United States) that range from 3-4 percent in the first scenario to 4-6 percent in the second. The effects of full dairy trade liberalization on the U.S. dairy sector were small relative to the value of U.S. dairy industry. Nonsubsidizing exporting countries, such as Oceanic and South American countries, benefit from the liberalization, with higher trade levels and higher valued milk production. Heavily subsidized countries, such as the EU, Canada, and the United States, face lower prices relative to the base.