Global Prospects for Dairy in Argentina and Chile: Evidence from Field Visits and Model Simulations

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Executive Summary

We assess the international competitiveness of the dairy industries in Argentina and Chile, combining recent market intelligence gathered from field visits with quantitative simulations of global policy reform scenarios. Both countries exhibit strong potential for export growth but face significant internal and external barriers to expanding their dairy industries. Global policy reforms would resolve some of the international obstacles to their expansion. Argentina has great potential, but it is handicapped by its current macroeconomic policies, trade policy distortions, and the uncertainty associated with policy implementation. Chile is more limited in terms of natural capacity for expansion, but it has a positive trade and investment environment.

Keywords: Argentina, agricultural trade policy, Chile, comparative advantage, competitiveness, dairy processing, exports, milk production.

GLOBAL PROSPECTS FOR DAIRY IN ARGENTINA AND CHILE: EVIDENCE FROM FIELD VISITS AND MODEL SIMULATIONS

As the Doha Round of negotiations in the World Trade Organization (WTO) progresses, it is becoming clear that international dairy markets are likely to undergo substantial change. Dairy markets in many countries saw little impact from the Uruguay Round Agreement on agriculture because countries were able to protect domestic producers and limit imports by establishing very restrictive tariff rate quotas (TRQ) with high over-quota duties. In addition, reductions in export subsidies were very modest, allowing the European Union and other countries with substantial producer support to continue to export dairy products despite high internal price supports. The significant tariff cuts and elimination of export subsidies currently proposed in the Doha negotiations, if implemented, are likely to create notable shortages in international dairy markets until a new equilibrium is established. Rising world prices will undoubtedly generate a supply response in some countries, but it is not clear which countries will step in to fill the void created by the removal of subsidized dairy products.

Combining information from field visits and formal policy reform analysis, this report takes a closer look at the dairy sectors in Argentina and Chile to assess their potential for export growth in the coming decade. Many of the observations are the result of field visits by the authors in Argentina and Chile in November and December 2005. We use the information gathered from interviews with producers, industry participants, and government officials in combination with other research to point out factors favoring growth. We also highlight the obstacles that must be overcome in order for each country to realize its growth potential. We complement this expository discussion with new evidence obtained from simulations of potential Doha outcomes. The simulations place magnitudes, both on the potential impacts of a WTO agreement and on the likely responses by the Argentine and Chilean dairy industries to such an agreement.

Argentina

In Argentina, the economic and political climate bears heavily on developments in the agricultural sector. Consequently, we begin our analysis of Argentina's dairy industry with an overview of the political and economic institutions. Then, we focus directly on the characteristics and competitiveness of the industry in the context of the present political economy.

The Political Environment

Argentina is a representative democracy; however, this has not always been the case. Democratic rule has been repeatedly set aside by military coups. The last military dictatorship ended after Argentina's defeat in the war with Great Britain in 1983 with the democratic election of President Raúl Alfonsín. Carlos Menem followed Alfonsín as president and remained in office until 1999, when Fernando de la Rúa was elected. Following several years of rapid price inflation, Menem and de la Rúa were able to reduce and stabilize inflation rates by fixing the Argentine peso to the U.S. dollar at a one-peso-to-one-dollar exchange rate. However, domestic inflation in Argentina was higher than U.S. inflation, which caused the currency to become dramatically overvalued relative to its buying power within Argentina. The currency overvaluation played a key role in the economic crisis that developed in 2001. Thereafter, de la Rúa could not manage the crisis or the violent riots, and he resigned on December 21, 2001. Several short-term interim presidents held office until the National Congress finally selected Eduardo Duhalde to rule until some sort of social and economic peace could be restored. Duhalde called for democratic elections, and Néstor Kirchner was chosen. Kirchner took office on 25 May 2003, and is expected to serve until 2007.

Despite the civilian unrest, the armed forces remained firmly under civilian control. Menem and de la Rúa had exerted control over the military by reducing its funding. Kirchner has taken more active steps, forcing top ranked officers to resign and forcing younger officers to make an explicit commitment to preserve human rights and submit to the decisions of the civilian government.

Policy

Eduardo Duhalde's interim term was marked by the need to restore peace in the country and to soften the impact of the crisis on citizens after the forced devaluation of the local currency. In a matter of a few months, the Argentine peso lost three-quarters of its value. Duhalde employed a mixture of traditional Peronist populism (in the form of a monetary subsidy for heads of families) and neo-Keynesian economic principles to stabilize the economy and calm the social unrest.

Néstor Kirchner, who belongs to the moderate center-left wing of Peronism (rooted in the leftist Peronist factions of the 1970s), continued Duhalde's measures. Heavy taxes on exports have served to keep local prices of essential commodities in check while also increasing government revenue, especially from energy products and agricultural exports such as soybeans.

Argentina's restrictive monetary policy pursued in the 1990s has become aggressively expansive. The Central Bank has injected large amounts of cash into the economy and bought dollars from currency markets in order to accumulate reserves. The fiscal policy is also expansive and lacking discipline. The government has increased private and public salaries by decree on several occasions and has encouraged negotiations between the private sector and the labor movements. Inflation has again become a concern. The government has frozen prices in certain sectors of the economy (e.g., milk, some foods, and natural gas) and put heavy pressure on others to limit price increases. Failure to comply on the part of beef producers led to a punitive suspension of exports for 180 days starting in March 2006, which was intended to increase domestic supply. These policies reduce the economic capital generated by previous administrations and seem destined for failure.

Government Structure

The constitution requires a balance between federal and provincial powers. In practice, political power is centralized with the president in charge, and provincial influence translates into fiscal transfers from federal to provincial levels. The president is head of state and commander-in-chief of the armed forces. The president appoints a cabinet whose chief runs the government on a day-to-day basis and can be removed by a majority vote in each chamber of the Congress. The president also appoints judges to the Supreme

Court, with the approval of the Senate. The legislature (National Congress) is bicameral and consists of a 257-member Chamber of Deputies (lower house) and a 72-member Senate (upper house). Each province also has its own constitution, roughly mirroring the structure of the national constitution.

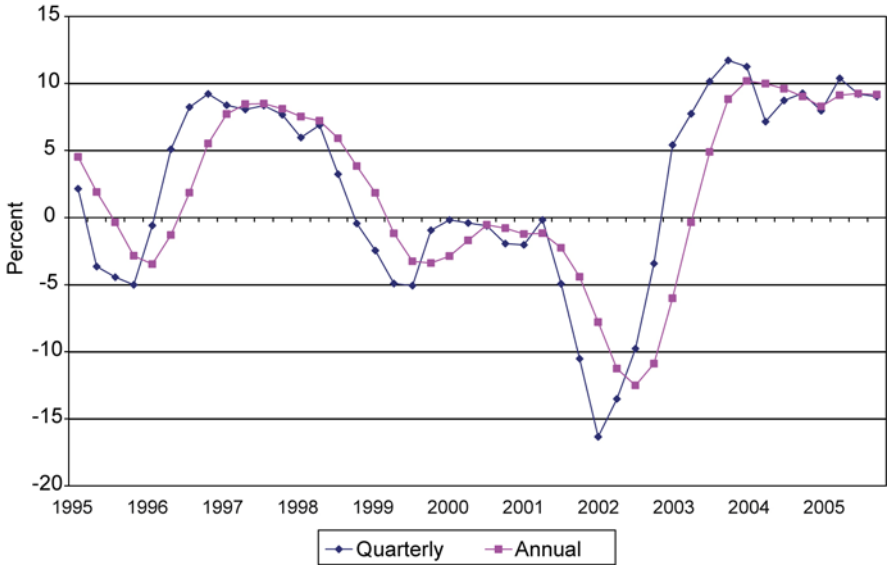
The president and vice president used to be elected indirectly by an electoral college to a single six-year term, and they were not allowed to seek immediate reelection. The constitutional reform of 1994, among other things, reduced the presidential term to four years, abolished the electoral college in favor of direct voting, and limited the president and vice president to two consecutive terms. They are allowed to stand for a third term or more after an interval of at least one term. The president appoints cabinet ministers and the constitution grants him considerable power, including a line-item veto.

Provinces traditionally have sent two senators, elected by provincial legislatures, to the upper house of Congress. Voters in the federal capital of Buenos Aires elected an electoral college, which chose the city's senators. The revised constitution mandated a transition to direct election for all senators beginning in 2001. The constitution also adds a third senator who represents the largest minority party from each province and the capital. The revised constitution reduced senatorial terms from nine to six years. One-third of the Senate will stand for re-election every two years.

Members of the Chamber of Deputies are directly elected to four-year terms. Voters elect half the members of the lower house every two years through a system of proportional representation. One difference between these elections and the U.S. system is that voters chose a party, and the party chooses the list of potential senators or deputies. The number of representatives selected by a party is proportional to the number of votes the party receives. Deputies therefore spend time and effort to obtain a place on the list and do not need to represent a set of local voters. The skills required to become part of a party list are different from those required to represent voters, and, as a result, Argentina has severe problems with political corruption. In addition, politicians are encouraged to adopt populist policies that attract votes for the party, even when the policies work to the detriment of the regional constituents they represent. An example of this behavior is the recent decision to ban the exportation of Argentine beef, so as to reduce beef prices.

The Argentine Economy

Argentina has the resource base to be a vibrant economic power. It has an abundant natural resource base, a highly literate population, good transportation and communication infrastructure, an export-oriented agricultural sector, and a diversified industrial base. However, economic mismanagement has kept Argentina's standard of living much below its potential. The most recent crises were precipitated by the forced currency devaluation, which caused real GDP to fall by 10.9% in 2002. GDP has rebounded, growing at an annual rate of 9% from 2003 to 2005 (see Figure 1). This growth is being led by a revival in domestic demand, solid exports, and favorable external conditions. The government boosted spending ahead of the October 2005 midterm congressional elections, but strong revenue performance allowed Argentina to maintain a budget surplus. Inflation has been rising steadily and reached 12.3% in 2005.



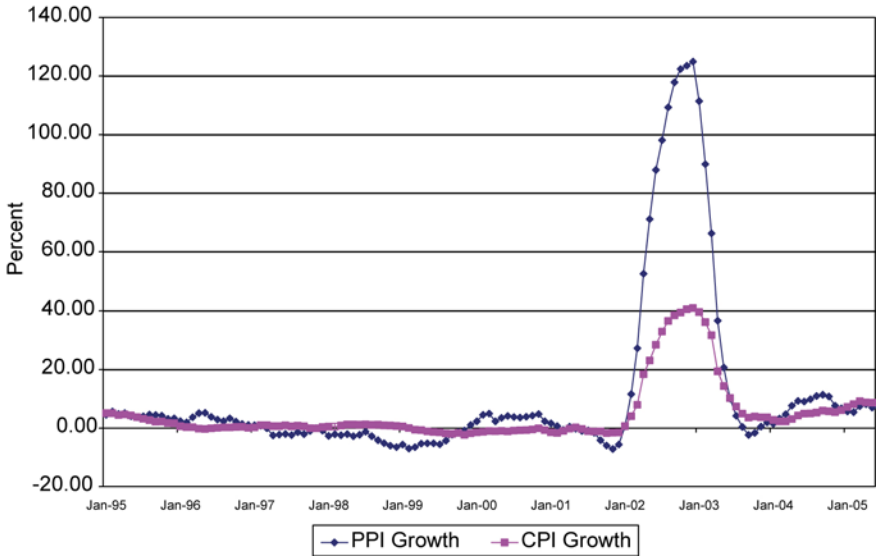
Source: IMF, 2006

FIGURE 1. Argentina: gross domestic product growth rates, 1995-2005

The Monetary Climate

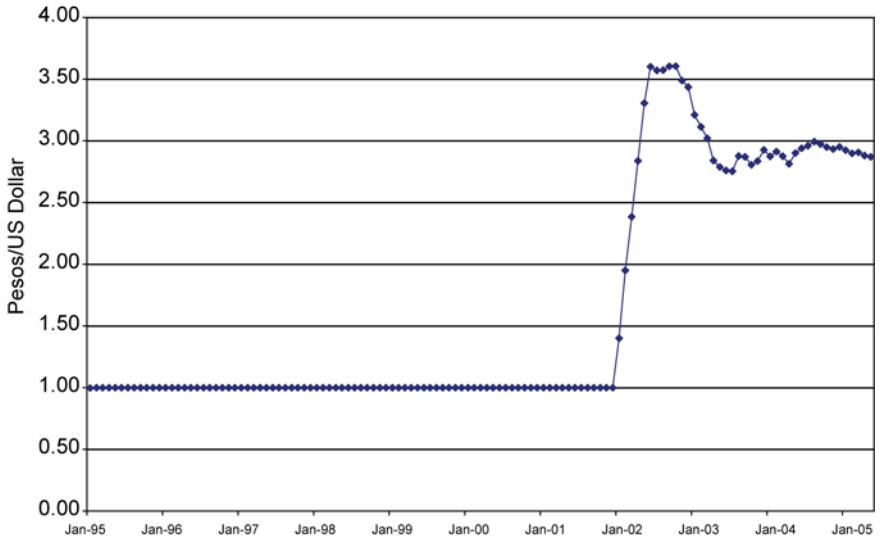
Inflation. Annual consumer price inflation from January 1995 to January 2006 is shown in Figure 2. After a surge during the recent economic crisis the inflation rate fell to almost zero but has more recently returned to a level of about 10% in 2006. Recent price controls coerced from several industries help understate the true inflationary pressures at work.

Currency and Exchange Rate. Prior to January 2002, the Argentine exchange rate was fixed relative to the U.S. dollar; however, after January 2002 it was allowed to depreciate to a level of almost four pesos to the dollar (see Figure 3). Since January 2003, the Argentine currency has been trading in a range of approximately three pesos to the dollar. With slightly higher inflation rates than in the U.S., the Argentine currency should eventually begin to depreciate.



Source: IMF, 2006

FIGURE 2. Argentina: consumer and producer price inflation rates, 1995–2006



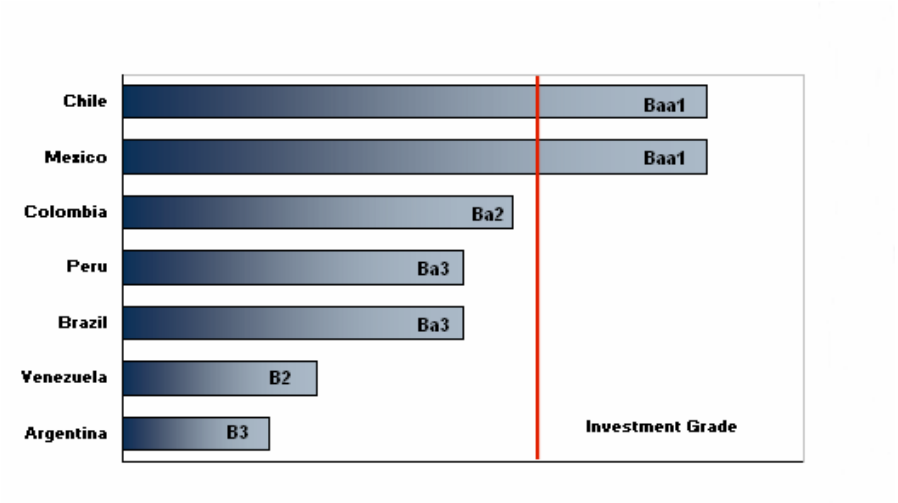
Source: IMF, 2006

FIGURE 3. Argentina: exchange rate depreciation, 1995–2006

Sovereign Risk. All of the major rating agencies downgraded Argentine bonds in 2002, and none of these agencies has yet upgraded. Current sovereign risk ratings are shown in Figures 4–6.

Future Economic Progress

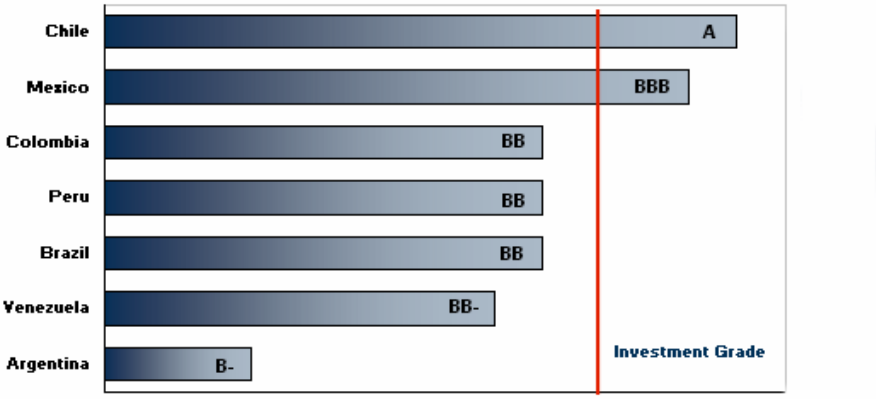
Using the usual macroeconomic standards by which economies are compared, Argentina appears to be ready for stable growth and prosperity. Growth is rapid, unemployment is falling quickly, and monetary reserves and the currency are strong. All of this information appears to conflict with the extremely low ratings the country is given by international ratings agencies. However, the international ratings take into account the investment climate and risk that are not reflected in the macroeconomic indicators, resulting in the lackluster outlook for the economy.



Source: Axco Insurance Information Services Ltd.

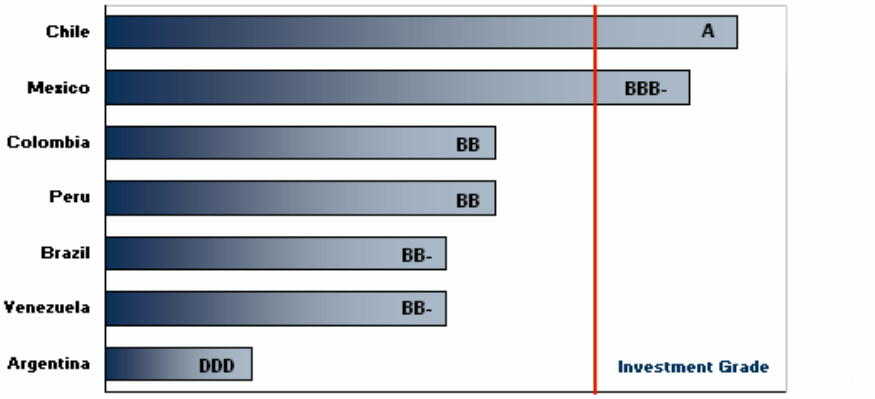
FIGURE 4. Argentina: Moody's Investors Service long-term foreign currency ratings

It is true that economic growth has surged, but this growth is coming from an extremely low base. The disaster that hit Argentina in 2001 and 2002 was worse in relative terms than the Great Depression in the United States. The improvement in monetary reserves and the currency reflects the new government's attempts to discourage imports through import substitution. The government has also improved its own financial performance by increasing taxes and tariffs on export sectors such as agriculture. The government is essentially subsidizing the sectors of the economy that do not have an international



Source: Axco Insurance Information Services Ltd.

FIGURE 5. Argentina: Standard and Poor's long-term foreign currency ratings



Source: Axco Insurance Information Services Ltd.

FIGURE 6. Argentina: Fitch IBCA, Duff and Phelps long-term foreign currency ratings

comparative advantage and taxing the sectors that do. The economy is currently benefiting from this transition, as import-substituting sectors grow and as the export sectors struggle to survive. However, economic theory and historical experiences of other countries that have attempted to grow in this manner both suggest that this approach will eventually fail. The outlook is even worse when one considers the corruption that is endemic within the political establishment and that the government is holding down the reported rate of price inflation by artificial means. Hence, the short, and perhaps the medium, outlook for Argentina is positive, but the long-run outlook remains pessimistic.

Impact of Fiscal Policies on the Agricultural Sector

Argentina does not belong to the Organization for Economic Cooperation and Development (OECD), and therefore internationally comparable data on the degree to which the government subsidizes or taxes the agricultural sector are not readily available. However, it is very clear that Argentina taxes agriculture heavily. Soybean farmers pay 23.5% of revenue as a tax. Corn and wheat farmers pay 20%. Meat has a 15% export tax when exports are permitted. As mentioned earlier, beef exports are currently banned to temporarily control price inflation, which has the same effect as an even larger (prohibitive) export tax.

Robert Hoff, the current agricultural attaché at the U.S. embassy, recently said the following: "The government looks at agriculture as a way to fund its social programs. Tax collection doesn't work in Argentina. Paying up front on exports, it's easy to collect from the farmers. Although agriculture has a huge impact on the economy—representing directly 13% of the domestic product and 30% indirectly—the government treats it like a stepchild" (Barnett, 2006).

Description of the Dairy Industry

The dairy industry in Argentina can trace its origins back to the 1886 Exhibition of Rural Society Argentina, where Erik Adde demonstrated the operation of a mechanical cream separator developed by Of Laval (founder of DeLaval). Seeing the potential profitability of butter production, early investors began producing milk for butter manufacture. As early as 1895, Argentine creameries began exporting butter to Europe. However, like several other countries, growing milk supplies relative to processing capacity in the early 1900s caused milk prices to decline, and producers responded by forming cooperatives to improve profitability. Recognizing the vast milk production potential in Argentina's Pampa region, investors from Europe and Australia brought new technologies to the country and helped finance the expansion of the industry in the early years (CIL, 2006a).

In 1990, Argentina ranked 17th in world milk production, and milk production continued to grow at an annual rate of 6% throughout the 1990s. By 1999, Argentine milk production reached 10.3 million metric tons (mmt), placing Argentina 13th in global milk

production, right behind New Zealand. In that same year, Argentina was a major exporter of whole milk powder (WMP) and a growing exporter of cheese. However, the economic crisis in 2002 prompted a severe contraction of dairy production. The sector has emerged from the crisis as a viable industry with tremendous potential. The impacts of Argentina's economic crisis on the dairy sector are discussed in more detail later in this report. The remainder of this section briefly describes the primary characteristics of Argentina's dairy sector.

Dairy Production Characteristics

Argentina's dairy industry is concentrated in the central and east-central parts of the country, in Córdoba, Santa Fe, and Buenos Aires provinces. Figure 7 shows the primary milk producing regions and their respective shares of total milk production. These production areas are located in the cropland regions of the Pampas. The exception to this is the Buenos Aires River Basin, which is part of the more humid Flooding Pampa. The cropland Pampa is the primary cropping area in Argentina, so dairy pastures compete with soybeans, corn, and wheat production for land. Many dairy farms are diversified operations devoting between 10% and 50% of their land to crop production. Sowing fields to improved pastures—typically alfalfa, tall fescue, and clover—is part of the crop rotation pattern to preserve soil fertility (Garbulsky and Deregibus, 2005). However, the direct competition between crops and dairy pastures makes milk production in Argentina unusually sensitive to the relative profitability of crop and dairy activities. Farmers in the region suggest that as much as 25% of the planted area may move in and out of pasture depending on crop and milk prices (Personal communication with SanCor, 29 November 2005).

Farms located in the two primary dairy regions of Santa Fe and Córdoba are typically pasture-based operations, and dairy cows are not confined while they are lactating. Dairy operations in western Santa Fe and eastern Córdoba often milk 150 to 250 cows, while farms in southern Córdoba and western Buenos Aires may have 350 to 600 head. Roughly 50% of the dairy farms in Santa Fe province have fewer than 200 head;

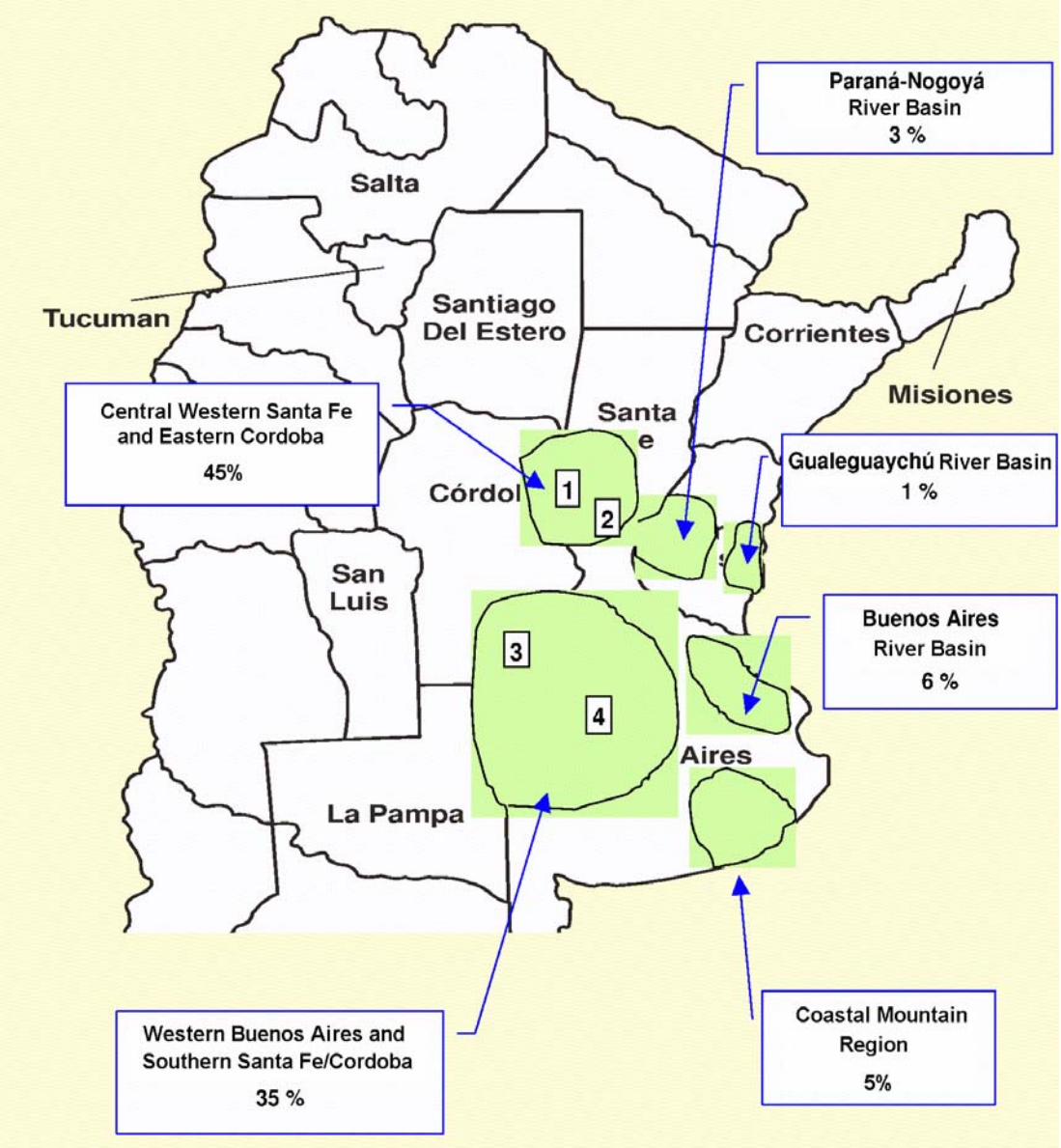


FIGURE 7. Milk production regions in Argentina (Ostrowski and Deblitz, 2001)

however, these farms in total own less than 20% of the province's dairy cattle inventory. The majority of dairy cattle are on farms with 300 to 500 cows (Sodiro and Castignani, 2005). Producers in both regions supplement cattle diets with corn silage and some grain concentrates. Supplemental feeding tends to increase with the size of the operation, ranging from 600 kg/head per year on small farms to 2,500 kg/head per year on the larger operations in Buenos Aires province. The primary dairy cattle breeds in Argentina are

Holstein breeds, and milk output per animal runs between 4.0 and 7.3 metric tons (mt) (Ostrowski and Deblitz, 2001). The national average was 4.7 mt/cow in 2005. Productivity increases with supplemental feeding, but costs also increase.

Variable costs for milk production run between $0.07 and $0.09 per liter. The cost of capital is about $0.03–$0.05 per liter, and total production costs are $0.15–$0.17 per liter. An index of dairy product prices in Argentina tends to follow international dairy product prices, making the dairy industry vulnerable to changes in international market conditions and trade policies (Personal communication with SanCor, 1 December 2005).

An example of a small but forward-looking dairy farm in the western Santa Fe region is the Vincente Bauducco family farm. Figure 8 summarizes the farm's characteristics. The research team visited the farm on 1 December 2005. The farm is a father-son operation, with the farm's pastureland and buildings split between two locations. At the time of the visit, Mr. Bauducco had 112 lactating cows, which produced about 220 liters of milk per day. The farm has been using artificial insemination for about 30 years, with semen imported from France, Canada, and Italy. Mr. Bauducco sells his milk to SanCor, one of the largest cooperatives and milk processors in Argentina. He feeds his cows a diet based on alfalfa and corn silage, supplemented with cottonseed and sweetened sorghum. The local cooperative develops a balanced diet that is usually followed by the producers in this area, but the feeding regimen is not required by the cooperative. The bulk of the farm's arable land is planted to alfalfa pasture, but about 20% is planted with soybeans. The farm has a small herringbone milking parlor, and the cows are milked twice daily. The milk goes directly into the 5,000 liter storage tank purchased from a French company. SanCor collects the milk daily and performs quality tests. The identity of the sample collected at the farm is achieved by placing a bar code on the vial that corresponds to the farm. The test results are available for the farmer to view on the Internet as soon as the sample is processed. Milk prices are based on the characteristics of the sample (temperature, fat, protein, other solids, lactose, urea, and bacteria count). Milk prices are set by SanCor, and there is about a 15% to 20% price variation throughout the year. The farmers and the cooperative have not organized any sort of pricing or delivery scheme to smooth out the inherent seasonality of production. SanCor has minimum quality and technology standards (such as on-farm cold storage requirements), and these

VICENTE BAUDUCCO DAIRY FARM
HUMBERTO I° - SANTA FE - ARGENTINA
November 2005

	Current	Predicted	
Total area	110	110	ha
Rented area	40	40	ha
Permanent pastures	80	80	%
Herd size	180	270	heads
Stocking rate	1,64	2,45	head/ha
Dairy cows	140	180	heads
Milking cows	112	140	heads
Total milk production	912.500	1.328.600	lt/yr
Daily milk sales	2.500	3.640	liters
Dairy cow productivity	22	26	lt/cow/day
Butterfat	3,70	3,80	%
Protein	3,31	3,30	%
Bacterial count	10.000	10.000	PC/ml
Somatic cell count	220.000	150.000	SC/ml
Land productivity (milk)	8.295	12.078	lt/ha/yr
Land productivity (milksolids)	582	858	kg milksolids/ha/yr
Land productivity (beef)	44	100	kg/ha/yr
Calving interval	14	14	months
Lactation length	345	330	days
Age at first calving	24	24	months
Supplementary feeding	10	10	kg dry matter/cow/day (concentrate) + silage
Supplementary feeding	280	230	gr dry matter/liter (concentrate)
Total labor use	3,30	3,30	ME (man-equivalents)
Family labor	10	10	%
Labor for milking operations	2	2	ME (man-equivalents)
Labor productivity	19.384	28.585	kg milksolids/ME

Milking operation

Milking system:	herringbone
Number of units	10
Milk tank (liters)	2.500
Total power (HP)	14
Own electric generation?	No
Feeding:	The dairy herd is fed divided in two groups
Breeding:	AI

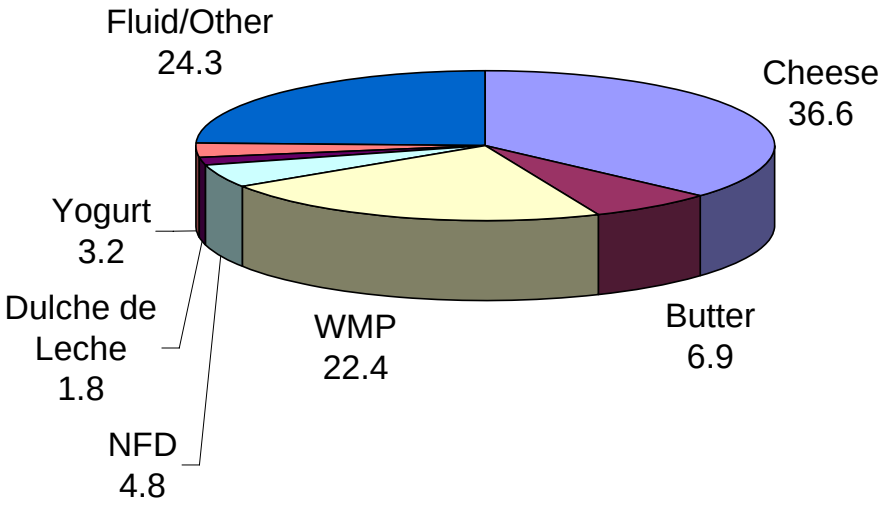
FIGURE 8. Farm data for the Vincent Bauducco Farm in Sante Fe, Argentina

standards have imposed some additional costs on its producers. Mr. Bauducco said that investments in new technologies were difficult prior to the financial crisis because there was not enough profitability in dairying. Currently, the local cooperative handles the coordination between farmers and SanCor's processing plants, but there are plans to allow farmers to market milk directly to SanCor in the future.

The Bauducco farm is somewhat atypical for farms in its region in two important respects. First, the Bauducco family has been very successful at purchasing and applying modern technologies and management practices in its operation. Second, the adoption of new technologies has enabled the Bauduccos to achieve above-average productivity. According to a recent study conducted by the National Institute of Agricultural Technology (Instituto Nacional de Tecnología Agropecuaria) in the region serviced by the Experiment Station in Rafaela (Santa Fe province), the average dairy farm in the area, including the Bauducco farm, has between 100 and 300 hectares of land. About half of those farms specialize in dairy production, and 35% integrate dairy and crop production. The average age of the dairy owners is 50. These statistics are consistent with the Bauducco farm. Unlike the Bauducco operation, more than two-thirds of the farms in the region produce 16 liters/cow/day or less. The study suggests that credit constraints, low milk prices, a lack of human capital, and a lack of entrepreneurial skills have prevented other farms in the region from achieving the productivity of the Bauducco farm. The study also concludes that these older, less productive dairy producers are likely to leave the industry in the future, as the competition from larger and more progressive farms make it unprofitable to continue (Sodiro and Castignani, 2005).

Milk Processing

Argentina's dairy processing sector is dominated by 10 large companies that process more than half of the milk produced in the country. The three largest dairy companies are SanCor, Mastellone Hermanos, and Saputo. There are also about 1,000 mid-sized plants that specialize primarily in cheese production. According to one industry analyst, the processing capacity in the country was at roughly 90% utilization in December 2005. Argentina's dairy processing sector is divided into two distinct components: an export-oriented segment and an "informal" or domestic segment. The export-oriented firms account for 50%-55% of Argentina's dairy production, and the remaining 45%-50% stays on the domestic market (Personal communication with SanCor, 1 December 2005). Figure 9 shows the distribution of processed milk among the major dairy products. At just under 9 kg/person, Argentines consume more cheese per person than the population of any other South American country. It is not surprising that 36% of milk produced in Argentina is used to manufacture cheese. Roughly 21% of the milk used for cheese is



Source: CIL, 2006b.

FIGURE 9. Distribution of milk for processing in Argentina, 2004

processed into hard cheeses, 42% is used for soft cheeses, and the remaining 37% is processed into semi-hard varieties. Semi-hard cheeses are the most common types exported, accounting for 62% of all Argentine cheese exports in 2004. WMP is the second-largest use for industrial milk. More than half of the WMP produced in Argentina is bound for export markets. Domestic consumption of fresh and fluid products is about 48 kg/person (CIL, 2006b).

SanCor Cooperative. SanCor began in 1938 as a milk cooperative association of dairy farmers. The majority of the cooperative's farms are located in the Pampas in the provinces of Santa Fe and Cordoba, hence the name SanCor. The cooperative controls about 18% of Argentina's milk production, and it receives milk from about 2,100 farmers. Milk quality has not been a problem for SanCor since 1995, when the cooperative stopped collecting warm milk from farmers. The bulk of SanCor's products are destined for the domestic market. SanCor uses independent marketing agents to distribute its products to smaller stores and shops, but it deals directly with supermarkets. SanCor has a research and development lab to develop new products. It currently has two product lines: a premium brand and a value brand. SanCor also has a marketing agreement with Nestlé to distribute Nestlé's products domestically in Argentina. In

2004, SanCor established a cooperative marketing agreement with Arla Foods, which is owned by Fonterra. The goal of the alliance was to use Fonterra's international marketing connections to expand SanCor's export potential. SanCor's primary foreign markets include other Mercusor countries (i.e., Argentina, Brazil, Uruguay, and Paraguay), Mexico, Algeria, and the United States (Personal communication with SanCor, 29 November 2005).

Mastellone Hermanos. SanCor's primary domestic competitor is Mastellone Hermanos, which also processes about 18% of total milk production. Mastellone focuses primarily on fresh products for the domestic market, particularly in the Buenos Aires region. Mastellone also exported $52 million in dairy products in 2005 (mainly WMP) to 32 countries (Tomás, 2006). Mastellone has an alliance with Danone to market Danone's products in Argentina.

Saputo. Saputo is Canada's largest dairy processor and Argentina's third-largest processor. Saputo branched into the South American market by purchasing Molfino Hermanos S.A., and it currently operates two large processing facilities in Argentina. Saputo's processing capacity is estimated at 1.6 million liters, roughly 10% of total milk production. Prior to the acquisition, Molfino was exporting between 40% and 50% of its output (Wesselink, 2006).

Dairy Trade and Policy

Argentina is the third-largest exporter of WMP, shipping 185 thousand metric tons (tmt) in 2005. Since the start of the recovery from the economic crisis in 2003, Argentina's cheese exports have nearly doubled, reaching 45 tmt in 2005. However, the Argentine government put a damper on export growth by increasing the export taxes on dairy products. In addition, the government no longer provides partial refund on the value added tax (VAT) for exported dairy products. The Argentine processors use plants in Uruguay when they face processing capacity constraints. This allows them to bypass the export tax but of course involves shipping milk to Uruguay, the neighboring country to the east. The export tax level is a political decision that appears to be driven primarily by the financial needs of the government and, to some extent, by the desire to keep sufficient products in country to satisfy domestic demand at lower prices, as recent price freezes have been enacted (Personal Communication with SanCor, 1 December 2005).

Transportation costs for milk powder exports from plants located in Santa Fe are roughly $16/mt to truck the product to Buenos Aires and an additional $100/mt to ship the product to a port in the Middle East or Europe. If international prices for cheese were sufficiently high, a SanCor analyst suggested that roughly one-third of the informal cheese production would be able to meet international standards and could be exported. Roughly 14% of Argentina's dairy exports go to Mercosur countries, 14% to NAFTA, 35% to African countries, and 23% to ALADI countries (Association of Latin American Integration). The export tax is a substantial drag on production growth for exports. Some companies like Saputo did not expect the recent changes in the export tax, and they have suffered losses as a result.

Impacts of the Economic Crisis on the Dairy Sector

The 1990s was a period of fairly stable economic growth for Argentina. The dairy sector benefited from the attractive investment climate and increasing domestic incomes. Argentine milk production grew 60% during the period from 1992 to 1999, reaching 10.3 mmt. However, the financial crises in Russia, Asia, and Brazil in late 1998 shook the confidence of Argentine consumers and international investors in the long-run stability of the Argentine economy. By the second half of 1998, Argentina was slipping into a recession that deepened over the next three years, culminating with the dissolution of the Argentine currency board and the government's default on its debt.

In 1999, consumer demand for dairy products was weakening, and international dairy prices were falling at double-digit rates, along with other major agricultural commodities. The record milk production in that year pushed the domestic processing sector to its capacity; consequently, farmgate milk prices dropped to $0.14/liter, roughly the level of production costs. Many producers were deep in debt from expanding their operations during the mid-1990s, and roughly 1,500 of the 19,000 dairy farms exited the industry in 1999. Processors were also stressed because the large retailers continued to demand long payment periods (usually 60 days), and retailers put pressure on processors to provide value and private label products. With returns from export sales declining and interest rates rising, domestic processors could no longer afford to invest in expanding capacity (Shull and Joseph, 1999).

Argentine milk output declined 4.8% in 2000 and an additional 3% in 2001. Despite declining production, farmgate milk prices continued to drop, averaging $0.13–$0.15/liter in 2001. Argentina was losing competitiveness in international markets because of its overvalued currency, particularly with respect to Brazil, its biggest trading partner. Brazil's 2001 imports of fluid milk from Argentina dropped 75% compared with 2000 levels, and imports of cheese and WMP declined 65% and 63%, respectively. Brazil also accused Argentina of dumping WMP on Brazilian markets, and a settlement was negotiated in 2001 that created a minimum import price for WMP from Argentina at $1,900/mt, further eroding Argentina's export competitiveness. The Argentine government sought to offset some of the impacts of the peso's peg to the dollar by giving processors a tax rebate of 6.8%–9% on exported products, but the rebates had little or no effect on export levels (Mergen and Joseph, 2000; Shull and Joseph, 2001).

Declining profitability prompted an additional 3,000 dairy producers to exit the industry in 2000 and 2001. Many opted to sell their animals to more efficient producers and convert pastures to crop production. Soybeans were considerably more profitable than dairy because of their low input costs and improving international prices. Capacity utilization among the major dairy processors declined to 75%–80%, and losses led to consolidation and rationalization of productive capacity (Shull and Joseph, 2001). The crisis culminated in January 2002 with the dissolution of the currency board and the devaluation of the Argentine peso by 40%. One month later the peso was allowed to float, and by mid-2002 the peso was trading at 3.6 pesos/U.S. dollar, compared to its previous 1 peso to 1 U.S. dollar. The government attempted to put a lid on inflation by freezing prices for utilities and by limiting creditors' rights. Moreover, private debts held in U.S. dollars were converted to pesos at the fixed rate of 1:1, pushing the cost of the devaluation off of individuals and private firms and onto the banking system (IMF, 2003).

Agriculture benefited greatly from the devaluation because commodity prices, which were more closely tied to international prices, rose dramatically relative to input costs. This was particularly true for the crop sector. From 2001 to 2002, profitability of corn and soybeans jumped from $18/hectare and $106/hectare, respectively, to $218/hectare and

$224/ha. Milk net revenues also increased several-fold, increasing from $6/ha to $36/ha, but the higher cost of feed made dairying less attractive than crop production. Supplemental feeding, which had already declined substantially during the previous two years, was cut to a minimum; nevertheless, keeping alfalfa pastures generated high opportunity costs for dairy farmers (Kuss and Joseph, 2002). Farmers responded by culling 300,000 cows, reducing the national herd to 1992–1993 levels, and cutting milk production by 10%. Inventory reductions continued in 2003, culling another 150,000 animals, and milk production fell to 7.9 mmt, 23% lower than the peak in 1999.

Despite diminished milk supplies, Argentina's exports of dairy products actually increased in 2002 because the devaluation improved Argentina's competitiveness on international markets. Exports to Brazil improved somewhat, but the decline in Brazilian imports in the previous two years had forced Argentine exporters to expand sales in other regions, particularly Africa. Products were available for export because domestic consumption had collapsed following the devaluation. The milk equivalent of domestic per capita consumption of dairy products fell to 170 kg in 2002, a decline of 26% from the pre-crisis peak levels. Weak domestic demand diminished the leverage available to large retailers, and the dairy processors were able to negotiate more favorable terms of exchange. After the devaluation, the government rolled back some of the incentives for exports by decreasing tax rebates to 3.4%–4.5% for most dairy products and by reinstating a 5% export tax on dairy products.

While many participants in the dairy sector were devastated by the financial crisis, the industry that emerged from the crisis is in many respects stronger and more competitive than it was before the crisis. Milk production in 2006 is projected to reach the peak level of 1999, but average productivity per cow is 16% higher than in 1999. The crisis forced less efficient and financially fragile producers out of the industry, and those that survived the crisis have been able to maintain profitability despite low milk prices. Likewise, the consolidation and rationalization of processing capacity that occurred during the crisis improved processing efficiency and prompted industry leaders to explore alliances with multinationals to increase export sales.

Positioning for Future Growth

Comparative Advantage and Competitiveness in the Dairy Industry

Comparative advantage is the ability of a nation (measured at the margin) to undertake an activity at a lower cost, relative to the cost of other activities in the nation, than competing nations. From farm production to ocean freight to delivery at the final destination, there are many sources of comparative advantage or forces hindering international competitiveness—the ability to export. Lower unit cost of key inputs entering production is a major source of comparative advantage. The ability to adopt technology and quality control mechanisms to meet strict quality standards is another. Finally, export marketing channels and systems have to be in place to realize the export potential of producing goods at a low price. Entrepreneurs have to exist and be willing to take the risk associated with the export opportunities. Finally, government policies condition comparative advantage by altering input and output price incentives, and by influencing investment decisions with macroeconomic and fiscal policies.

Sources of Competitiveness in Farming. Argentina has several critical components that contribute to its comparative advantage in milk production. First, feedstuffs are abundant and high quality. Feed costs are typically the largest component of variable production costs for livestock. The co-location of Argentina's primary milk and cropping regions plays an important role in the low milk production cost in Argentina. Moreover, there is adequate land area to facilitate both crop production and improved pasture, without intense competition. Second, dairy farmers have access to and use high-quality genetic stock. Generally, the farmers producing the largest share of milk output are educated and possess or have access to the management systems and infrastructure needed to enable their animals to reach their productive potential. Third, Argentine dairy farms are capable of producing excellent-quality milk. They have the infrastructure on the farm (automated milking and on-farm cold storage) to preserve the quality of the milk and meet international standards for export. Pricing incentives are already in place to pay farmers for low bacteria counts, high fat, and high milk solid content. As the older, less market oriented operations continue to exit the industry, average productivity in the sector will rise and the efficiency of the sector as a whole will improve.

Sources of Competitiveness in the Processing Sector. Argentina has a competitive processing sector with large firms, such as Mastallone, SanCor, and Saputo, that have a clear export orientation. Many of the top firms have been involved with export markets for a long period of time and have been able to build some brand equity in foreign markets. Moreover, the connections between domestic firms and international partners, such as Nestlé, Fonterra, and Saputo, give the Argentine processors access to expanded marketing opportunities abroad. Finally, these processors have proven they have the ability to meet the demand of international consumers in terms of quality and product safety.

Sources of Competitiveness in the Public Sector. The road infrastructure is excellent even in remote areas, and it is not saturated. This is in sharp contrast to Brazil and, to a lesser extent, Chile. The communication infrastructure seems more than adequate. The farms visited by the authors had computers with Internet access and kept computerized records to monitor individual animals. The phone infrastructure appears dependable and inexpensive. These good communication channels allow a price discovery mechanism and easy communication channels between the processors and farmers for sample test results and other marketing matters.

Hindrances to Growth

Macroeconomic Policy. The peso is projected to further devalue nominally against the U.S. dollar in the coming decade. However, this nominal devaluation of the peso could translate into a small real appreciation of the peso if annual inflation in Argentina relative to inflation in the United States is much stronger than the nominal devaluation against the U.S. dollar. If this occurs, competitiveness based on the massive nominal devaluation in recent years may not be long-lived, as inflation will eat away the initial gains from a weaker currency. In addition, the negotiated food price controls may prove to be a futile attempt to stop inflation and may only increase tensions between the government and industry. Finally, the squeeze on industry profits caused by the price freeze is compounded by recent mandatory 50% increase in wage rates in response to strikes in urban areas.

Domestic Dairy and Trade Policies. The government of Argentina imposes significant export taxes on dairy products, handicapping the industry. This is done to raise government revenues and lower the cost of food for urban constituencies. There are also

threats of further distortions by pushing the dairy industries into signing "agreements" with the government to freeze dairy product prices, effectively resulting in administered price controls. The price controls affect the farming sector because processors will lower raw milk prices to offset the lost sales revenue. In the short term, the price freeze may not have much effect because supply is not responsive in the short run. In the long run, supply will be inhibited by these distortions, both at the processing and farm levels because of the tax on returns.

Before the crisis, the government refunded 3.5% of the VAT on dairy products when products were shipped out of the country. The government has stopped refunding the VAT. This change acts as a marginal increase in the export tax. The government could do much better in terms of targeting food security of the poor by providing targeted consumption subsidies or dairy vouchers to the poor and unfreeze prices and reduce export taxes. In addition to this implicit export tax, the government charges an explicit export tax on most agricultural products. Table 1 displays the export tax rates on dairy products as of the fall of 2005. The government has a history of adjusting the export tax rate as international prices change, and this discretionary approach adds to the uncertainty of future profitability for dairy producers and processors, further inhibiting the sector's growth potential.

Table 1. Argentine export taxes on dairy products, fall 2005

Commodity	Export Tax Rate (%)
Fluid milk (UHT)	15.0
Whole dry milk (<2 Kg)	15.0
Whole dry milk (>2 Kg)	15.0
Nonfat dry milk (<2 Kg)	15.0
Nonfat dry milk (>2 Kg)	15.0
Soft cheese (<5 Kg)	10.0
Hard cheese (>8 Kg)	10.0

Source: Joseph, 2005.

Trade Policies in Other Countries. Market access issues, mostly tariffs and TRQs were the primary barriers to Argentine dairy exports. Argentina exports milk powder to OPEC countries (Algeria, Iran, Iraq, and Nigeria), which tend to have relatively low

duties on powder. For example, Algeria applied a 5% duty on milk powder products. Subsidized products, primarily from the European Union, have some impact on their potential foreign sales because Argentine exports compete with EU exports. The progressive elimination of EU export subsidies is likely to be part of a WTO Doha agreement. In some markets the European Union has preferential agreements with importers (e.g., Algeria) with preferential market access at a lower tariff rate or duty-free. If the elimination of export subsidies takes place, the potential for exports from competitive suppliers may be tremendous, not only for milk powder but also for butter and cheese products (hard cheese and soft cheese for food processing). The Argentine dairy industry views sanitary and phytosanitary issues as political barriers rather than as serious health-based concerns. Processors are confident they can meet quality standards of importers (Personal Communication with SanCor, 29 November 2005).

Chile

Country Overview

Chile is a middle-income country with a population of approximately 15 million people located on the west coast of South America (see Figure 10). The Andes Mountains run down the entire length of Chile's eastern border with Argentina. A desert forms Chile's border with Peru in the north, and the Pacific Ocean lies on its western and southern borders. Chile is long and narrow, with a total land area of 756,950 square kilometers. Not surprisingly, Chile's unique geographic characteristics provide a wide range of elevations and climatic conditions, enabling its farm sector to produce a number of horticultural crops, grains, livestock, and other agricultural commodities.

Source: https://www.cia.gov/cia/publications/factbook/geos/ci.html

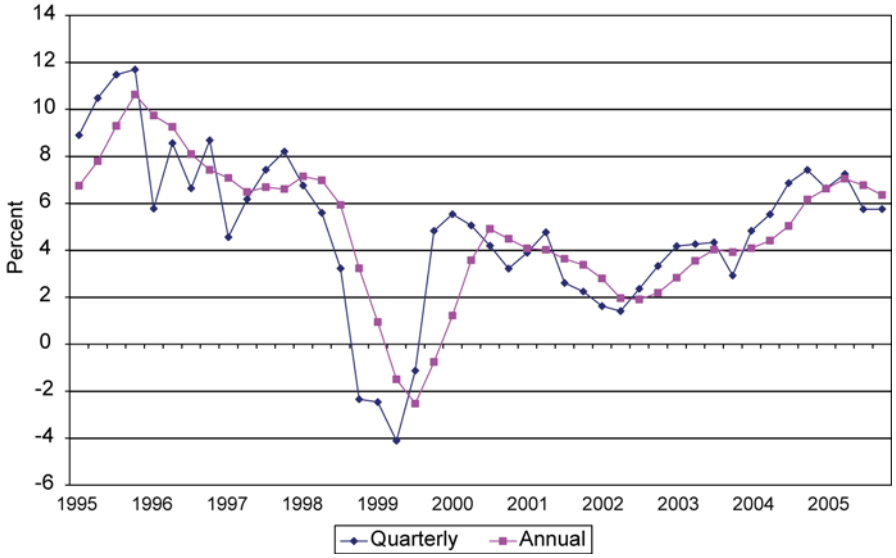
FIGURE 10. Map of Chile

The Chilean Economy

Measured in terms of purchasing power parity, per capita income in Chile is about U.S.$9,000-$10,000. Recent GDP growth rates are between 4% and 6% annually (see Figure 11), and the country has enjoyed economic and political stability since the transition to civilian rule beginning in 1988 with the plebiscite that rejected continuation of military rule. Chile's current constitution was adopted by plebiscite in 1980 (with significant amendments in 1989, 1993, and 1997), and it places a premium on slow political change and a strong executive.

The president serves a single term of six years, senators, eight years, and representatives, four years. The government is unitary but broken into 12 regional administrative districts. The heads of the districts are appointed by the president, but local municipal governments have elected mayors and councils.

The government is committed to an open economy, which has led to extremely low tariffs by international standards, increasing competitiveness in export-oriented and import-competing sectors and significant integration into world markets. Chile is a leader in establishing free trade agreements with various countries. Moreover, Chile is an associate member of the Mercosur regional trade agreement. Unemployment in Chile is currently 8%, which is very low by Latin American standards.

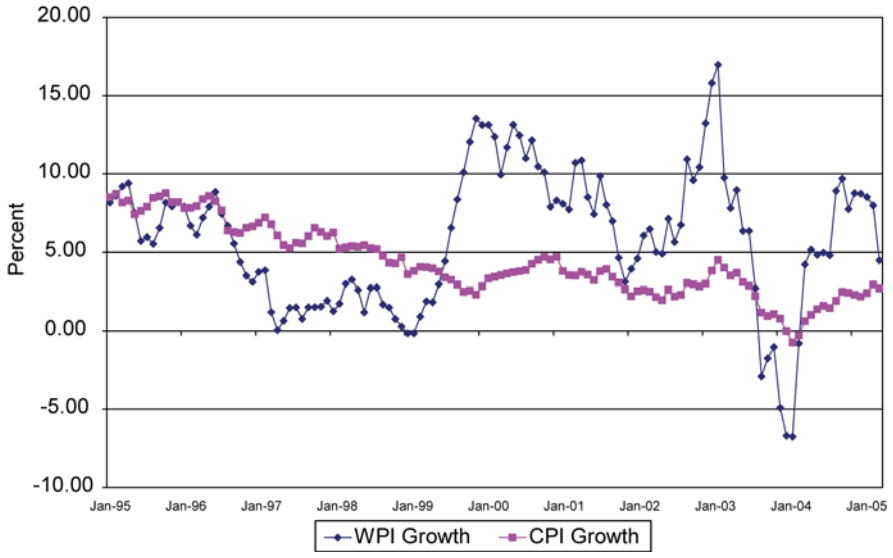


Source: IMF, 2006

FIGURE 11. Chile: annual and year-over-year GDP growth, 1995–2005

In addition to the political and economic stability of the country, the quality of the financial sector and the improving state of public infrastructure has resulted in Chile receiving high rankings as an investment target for the international business community. The Economist Intelligence Unit ranks Chile as the best country in Latin America for doing business and ranks it in 19th place out of a total of 60 countries considered. In comparison, Spain ranks 21st, Korea 26th , Japan 28th, Mexico 33rd, Brazil 37th, India 43rd, and Argentina 47th. Chile is ranked 11th out of 155 economies by the Heritage Foundation's Economic Freedom Rankings (2006) and 20th out of 127 by the Fraser Institute (Gwartney, Lawson, and Gartzke, 2005). Chile ranked 8th out of the 40 best destinations in the world in A.T. Kearney's "2005 Offshore Location Attractiveness Index."

Monetary Policy and Taxation Environment. The Chilean Central Bank is formally and effectively independent of political decisions, and the Ministry of Finance, although politically directed, has been strongly pro-growth and tight money. Inflation rates have been about 1%-2% most recently (see Figure 12), and foreign exchange reserves are high. The value of Chile's currency floats, however, and because of the fluctuation of export

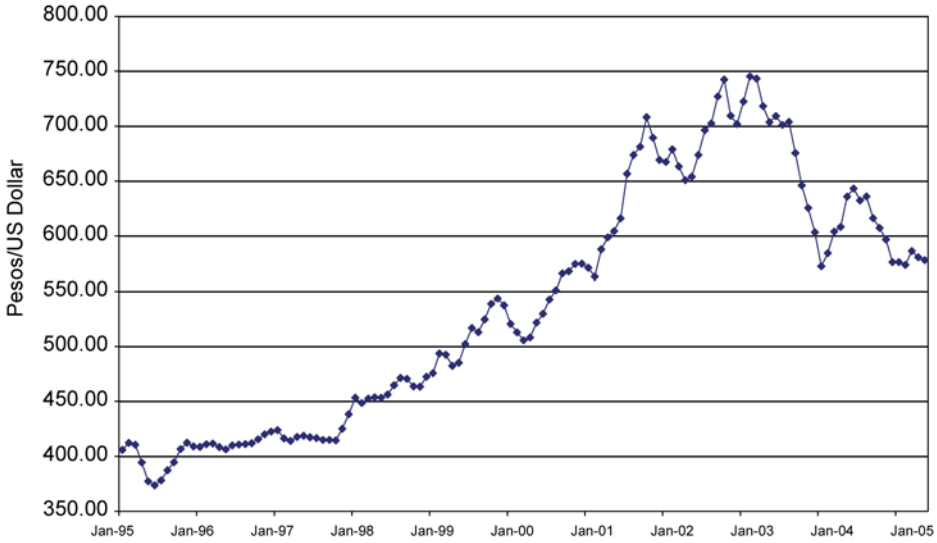


Source: IMF, 2006

FIGURE 12. Chile: consumer (CPI) and wholesale price (WPI) inflation rates, 1995–2005

values (mainly copper) and the decisions of the U.S. monetary authorities, exchange rates have been highly variable. Recently, the value of the dollar against the Chilean peso has been extremely weak (see Figure 13), which has put Chile's agricultural exports at a disadvantage in U.S. markets and against U.S. exporters.

Almost all laws, especially with regard to taxes and regulations, are determined centrally and apply equally throughout Chile. There are household and corporate income taxes and property taxes, which are fairly uncomplicated by U.S. standards, but the country does have a significant VAT of 19%. Corporate taxes are straightforward. They are currently based on a 17% levy on accrued income, and a 35% tax on profits distributed to shareholders, partners, or foreign parent companies. (The 17% initial tax on accrued income acts as a credit on this 35% profit tax.) Foreign companies investing more that U.S.$50 million can opt for a guaranteed 42% fixed rate for 20 years (10 years for investments less than U.S.$50 million), or the currently more remunerative general tax scheme just described, but without guarantees.



Source: IMF, 2006

FIGURE 13. Chilean exchange rate, Chilean pesos per U.S. dollar, 1995–2006

Sovereign Risk. The country's long-term sovereign rating was increased by Fitch Ratings from A- to A, and that agency reports that Chile's fiscal surplus "demonstrates that Chile's structural fiscal balance rule is working, allowing the government to pay down debt during periods of faster growth while leaving space for some counter-cyclical easing when the economy slows" (Fitch Ratings, 2006). The increased rating was also the result of the breadth and strength of the export sector. Although copper exports and high international prices have tended to put upward pressure on the currency, non-copper exports—including agricultural products—increased 23% in 2004. External debt relative to exports has fallen to its lowest level in 10 years. Moody's index of financial strength for December 2004 ranked Chile above Germany, Mexico, Brazil, Japan, and China (in that order). JP Morgan Chase reports (in Emerging Markets Bond Index, available at www.morganmarkets.com) that Chile's sovereign spread average in 2005 was 65 basis points, which can be compared to the European average for the same year of 185, and to that of Latin America as a whole of 364.

The system of managing public finances has contributed to the maintenance of lower and more stable financing costs in domestic and foreign capital markets. The government has remained committed to its surplus fiscal rule, and this has enhanced the credibility among investors of the country's public finances. It has led to reduced interest rates through lower country risk ratings and enhanced flexibility for private sector financing. The management of the fiscal surplus has had a positive impact on how international markets perceive the soundness of public finances, as has been demonstrated in risk rating agencies' reports. Chile's sovereign debt risk premium has varied around the historically low levels of around 70 basis points.

Access to external financing is very favorable, despite the recent increases in short- and long-term international interest rates. During the second half of 2005 the risk rating on sovereign bonds rose slightly compared to the first half (8 basis points), but the corporate premium fell (30 basis points) during the same period. Nevertheless, domestic firms preferred domestic financing during the last year. Codelco issued the only foreign bond in 2005, in September of that year.

Trading Strategy

It was noted earlier that Chile has actively pursued a strategy of trade liberalization in both bilateral and multilateral contexts. The objective of this strategy is to increase the pace of economic growth and development by reducing the barriers faced by Chilean export products with a comparative advantage on international markets and the cost of imported goods, for which Chile does not have a comparative advantage. The open market policy also promotes increased efficiency by exposing domestic industries to competition from the top international producers. Moreover, the economic stability and attractiveness to foreign investors facilitates rapid technology transfer through direct investment and joint ventures with international firms, providing dynamics in cost advantages.

Traditionally, Chile's primary import suppliers for many products have been neighboring countries such as Argentina and Brazil. With new trade agreements being negotiated and existing agreements being expanded, it is expected that other Latin American countries will increase their shares of Chile's import market. Chile's main export markets regionally are Asia (30%), the EU countries (26%), NAFTA (22.5%), and Mercosur (9.5%). The largest single export market for Chile is still the United States, which purchases 17% of Chile's total exports. Figure 14 shows the composition of Chilean exports in 2004.

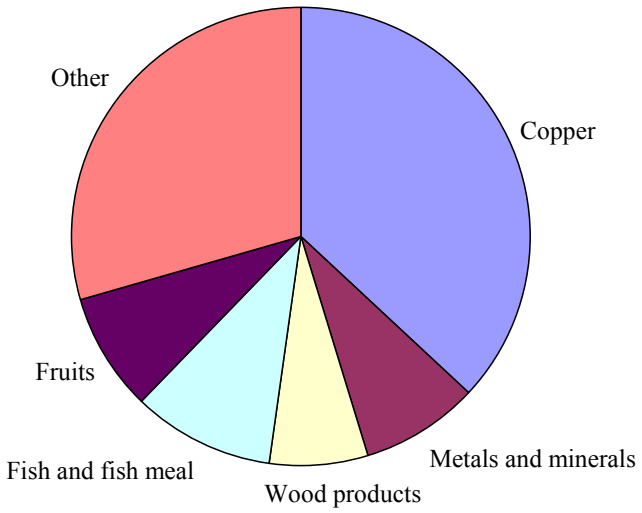


FIGURE 14. Composition of Chilean exports in 2004

Agricultural Sector

Over the last two decades, Chilean agriculture has shown remarkable growth; both in terms of total value and in terms of productivity. Agricultural GDP grew about 5% annually on average during the 1990s, and lately this rate has accelerated. More importantly, agricultural export growth is double that of GDP growth, approximately 10% to 12% annually. At present, agriculture directly contributes about 4% to 5% of national GDP but nearly 25% of export earnings. Copper is still the single largest source of export earnings. Approximately 33.8% of the workforce is employed in the agricultural sector. Around 5% of the land in Chile is used for farming, and another 18% consists of permanent pastures. While the Central Valley in Chile is dominated by export-oriented horticultural activity, the South is mainly used for aquaculture, beef, sheep farming, and dairy.

The climate of Chile favors an evolution of the agricultural sector toward what is observed on the West Coast of the United States and Canada (between Baja California and the fjords of British Colombia). Growth in the agricultural sector, which in recent years has been faster than the overall economy, has been primarily attributable to growth in fresh and processed fruit, wine, dairy and forestry products. Nevertheless, productivity in cereal production is quite high, although there are still tens of thousands of poor, small farmers, typically growing wheat or other cereals. The transition toward a completely commercial agriculture such as that in the United States will likely take at least a generation. The Central Valley of Chile, where most of the high-valued fruit and wine are produced, is temperate, with dry summers, good irrigation, and with rare occurrences of droughts or hail. The fruit and horticulture sector is highly sophisticated; production, processing and marketing practices are oriented to the those in the United States and European Union. Sanitary and phytosanitary practices (even labor practices) go beyond governmental regulations and aim to please supermarket chains in the developed world, especially in Britain and the United States.

As one moves south, the climate becomes wetter, cereal production takes place, and the grasslands and pasture make livestock, primarily beef and dairy, particularly profitable. The agricultural sector in southern Chile has been most affected by the establishment of various free trade agreements because its agricultural system for wheat, sugar beets, and other grains is not as efficient as it is in other countries. Chile uses its universi-

ties and technological centers to adapt to these pressures. Of the cereals grown in this region, corn production will likely remain stable, and any growth in demand will be satisfied by increased imports. Wheat producers are currently under pressure from cheap Argentine flour imports, and it is possible that wheat area may decline. Contract seed production is increasing rapidly. However, rice is likely the only field crop with a dynamic future, being grown in areas similar to California's Sacramento River region.

The Dairy Industry

While fruits, vegetables, and wine are the major agricultural exports, there has been significant growth in the dairy industry and dairy exports as well in recent years. The dairy industry is a sector targeted as a potential key export in the future. In 2003, the value of Chile's dairy product exports was U.S.$55 million; however, in only the first five months of 2005 the value of dairy exports had already exceeded that amount. Figure 15 shows the increase in value of dairy exports. Imports of dairy products have declined by over 100% since 2000 while exports have also grown by more than 100% during this same period.

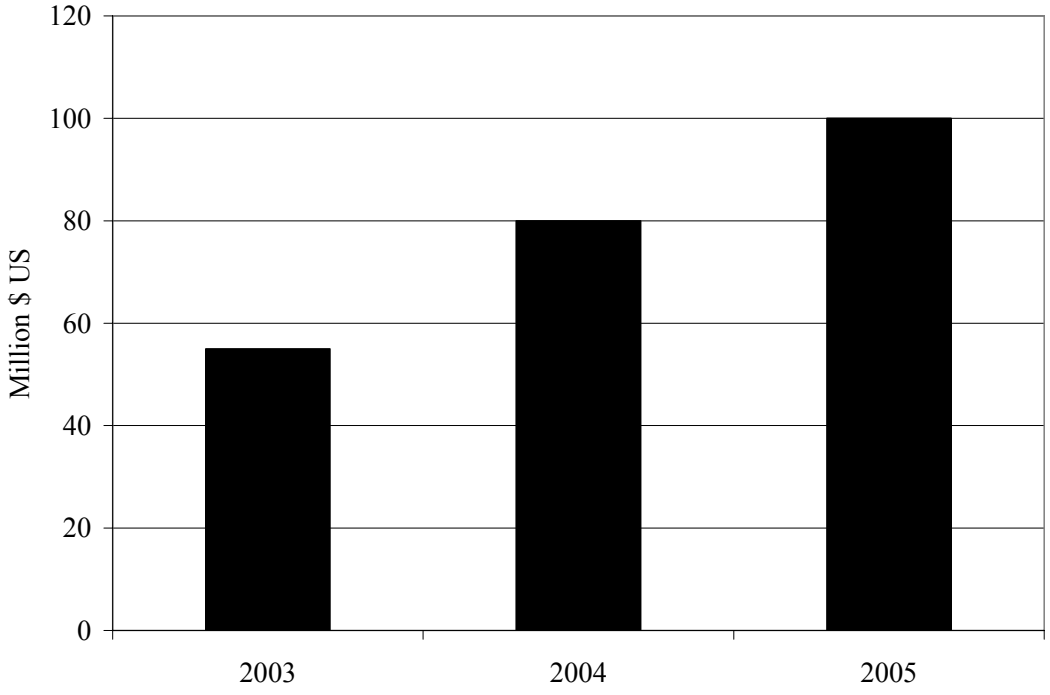


FIGURE 15. Chilean dairy exports over the 2003-2005 (first five months only) period

Figure 16 shows that cheese is the principal export, followed by condensed milk and milk powder. The main export market for these products is Mexico, which accounts for almost 65% of all dairy exports, followed by Cuba (9%), Costa Rica (7%), and other South American countries (Figure 17). For its exports, Chile focuses on countries with which it has trade agreements. Mexico signed a free trade agreement in 2002, and cheese represents a significant part of its dairy imports from Chile. Chile has become the largest exporter of hard cheeses to Mexico, shipping roughly 18,000 mt of cheese annually under its preferential agreement.

The main production sector in Chile is the 10th Region, Los Lagos (see Figure 18). Puerto Montt is the administrative capital of the 10th Region. This area has a great deal of pasture and is ideally situated with regard to temperature and climate for dairy production. In 2004, roughly 70% of Chile's milk was produced in the 10th Region. However, the bulk of Chile's population and demand for dairy products is further north in the Santiago area. Consequently, the bulk of the milk produced in the 10th Region is processed for transport north as powered milk or shipped to export destinations. Thus, the 10th Region is the location with the greatest growth potential for dairy production in Chile and the primary source for growth in dairy product exports.

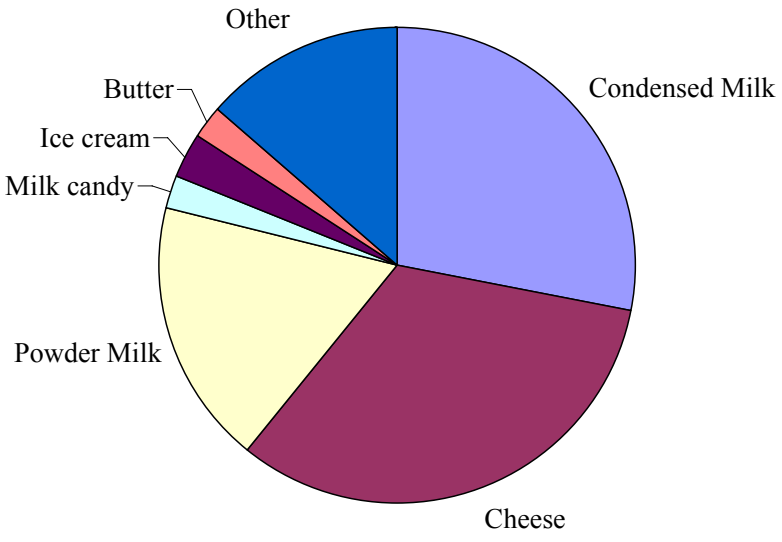


FIGURE 16. Composition of Chilean dairy exports in 2004

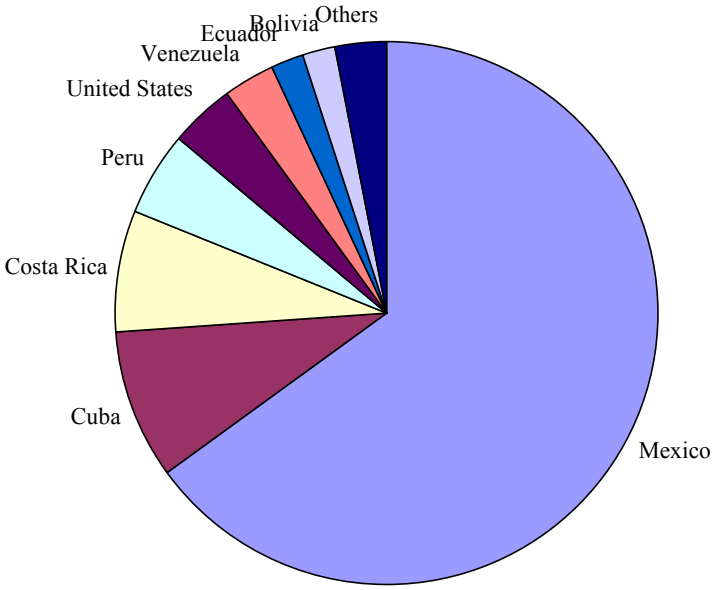
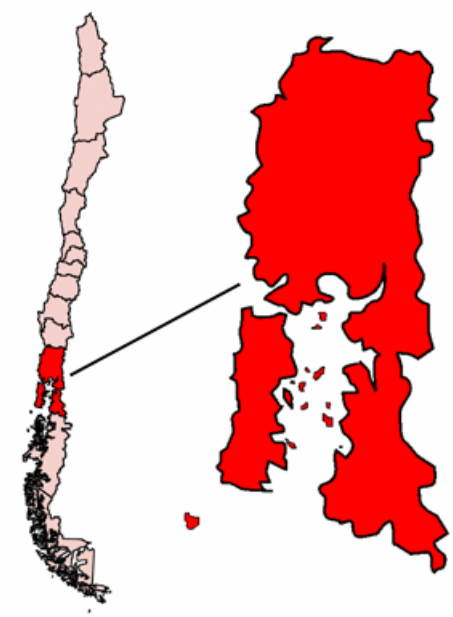


FIGURE 17. Chile's main trade partners for dairy products in 2004

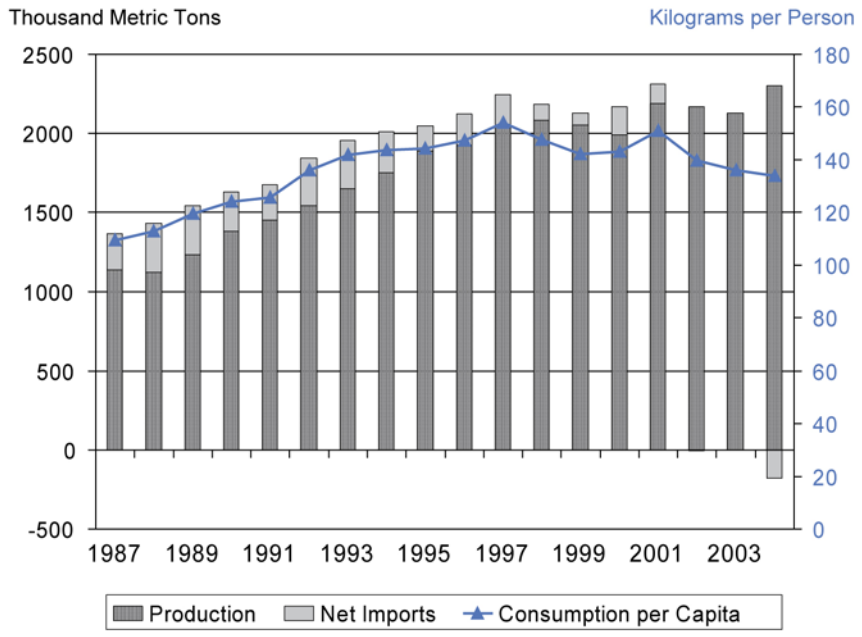


Source: http://en.wikipedia.org/wiki/Image:ChileRegionLagos.png

FIGURE 18. Chile's 10th Region

Transformation from Net Importer to Net Exporter

Although the dairy sector is targeted for export growth, Chile has been historically a small net importer of dairy products. Since 1993, the milk equivalent of Chile's net imports of dairy products has trended downward. Figure 19 shows milk production and the milk equivalent of net imports and per capita dairy consumption. Milk consumption per capita in Chile has been relatively stagnant since the early 1990s, while milk production has continued to trend upward. The growing supply of milk has enabled a substantial degree of import substitution, particularly for cheese and WMP. During this same period, Chile aggressively pursued its open market strategy, creating new export opportunities for dairy products. Chile's exports of cheese and WMP have grown steadily since 2000. Figure 20 shows Chile's monthly dairy trade since January 2001. Chile moved back and forth from a net importer to a net exporter of dairy products throughout 2002 and 2003, but it became a clear net exporter in 2004.



Source: Computations using FAOSTAT data

FIGURE 19. Milk production, net imports, and consumption per capita in milk equivalent

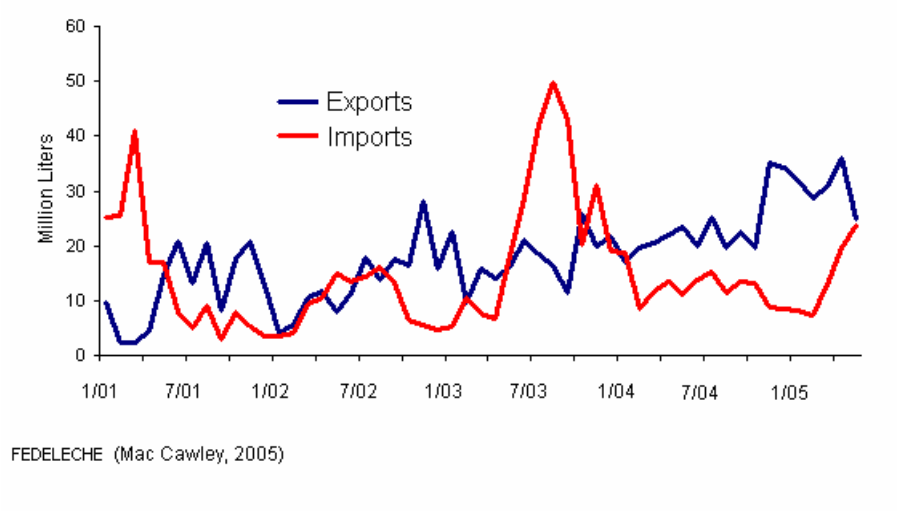


FIGURE 20. Monthly dairy product imports and exports in milk equivalent liters

Decline in Milk Prices and Shift in Industry Perspective. As a country transitions from a net importer of a product to a net exporter, the domestic price for the product should decline from the world price plus tariffs and transportation costs to the world price. Figure 21 shows the evolution of milk prices in the 10th Region. For comparison, the FOB northern European nonfat dry milk powder (NFD) and WMP prices have been converted to a milk equivalent price and displayed in the graph. All three prices are weighted averages of monthly prices, where the weights are the monthly production shares for the region. It is interesting to note that prior to 2000, the milk price in the 10th Region was close to the milk equivalent price of WMP, the higher of the two international prices. In 2000, international milk powder prices rose sharply, but the milk price in Chile did not fully reflect this price change. Likewise, in 2001, Chilean milk prices fell while international powder prices rose. Thus, in those two years, milk prices in Chile adjusted downward to a new level relative to international dairy prices. Since 2001, the milk price in Chile's 10th Region appears to have moved closely with international prices, but the relative price has remained at the lower 2001 level. According to ODEPA (Chile's Ministry of Agriculture), the realignment of milk prices was prompted by inexpensive imports from Argentina; thus, the open border policy that Chile has been pursuing is forcing its dairy producers to become competitive at international prices.

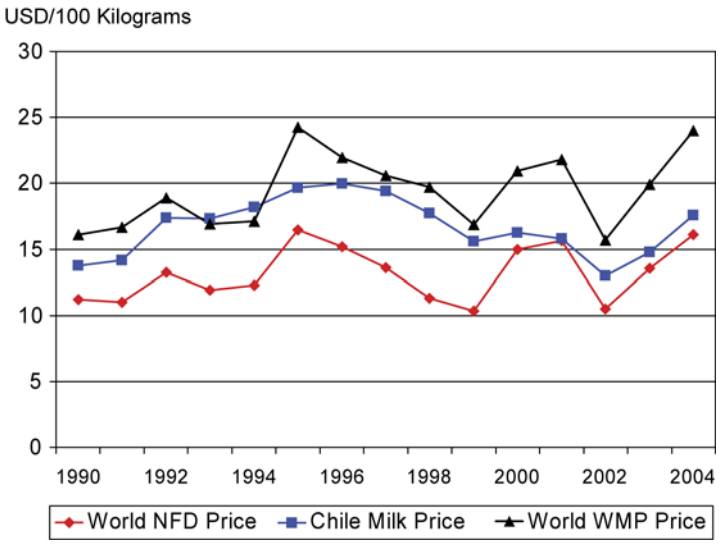


FIGURE 21. Chilean milk price in the 10th Region and the milk equivalent prices of NFD and WMP on world markets

Government Policy Response. This realignment of milk prices did not go unnoticed by Chile's dairy producers. Since 2001, the government has been talking to the dairy industry's export federation, Fedeleche, about how to improve the competitiveness of the Chilean dairy sector. Both government and industry participants believe that Chile's milk production will continue to grow at an average of 6% annually for a number of years, facilitating increased dairy export growth. To capitalize on this opportunity, the government and industry agreed on a set of 15 measures embodied in the 2003 Dairy Accord. The provisions of the Dairy Accord focus heavily on milk pricing and protection of milk producers from opportunistic behavior on the part of dairy processors. Key components of the accord include increased transparency in pricing formulas, premium-based pricing, improvements in technical efficiency, provision of statistics, and the development of a seasonal production component.

In accordance with the new price transparency policies and provision of statistical information, ODEPA set up a Web site that publishes export prices, milk prices, product production, product values, and stocks. In addition to facilitating marketing decisions, the pricing information is intended to reduce the distrust between producers and processors that has developed in recent years. Policies intended to improve technical efficiency include the soil reconditioning program and assistance in constructing irrigation systems. There is also some funding for export promotion activities.

Major Firms Operating in Chile's Dairy Industry

In 2004, the top four firms—Soprole, Nestlé, Colún, and Loncoleche—processed 75% of the milk collected in Chile. In the first 10 months of 2005, Loncoleche's processing volume was 10% lower than in 2004, but the other three firms posted increases of 1.2%–8.4%. Soprole, Chile's largest processor, handles roughly 24% of milk production in Chile and showed the largest increase in milk production in 2005. Nestlé is the second-largest processor with 19.3% of the market, but Colún Cooperativa is gaining ground and may soon overtake Nestlé. Figure 22 shows the market share changes over time for milk produced in the 10th Region.

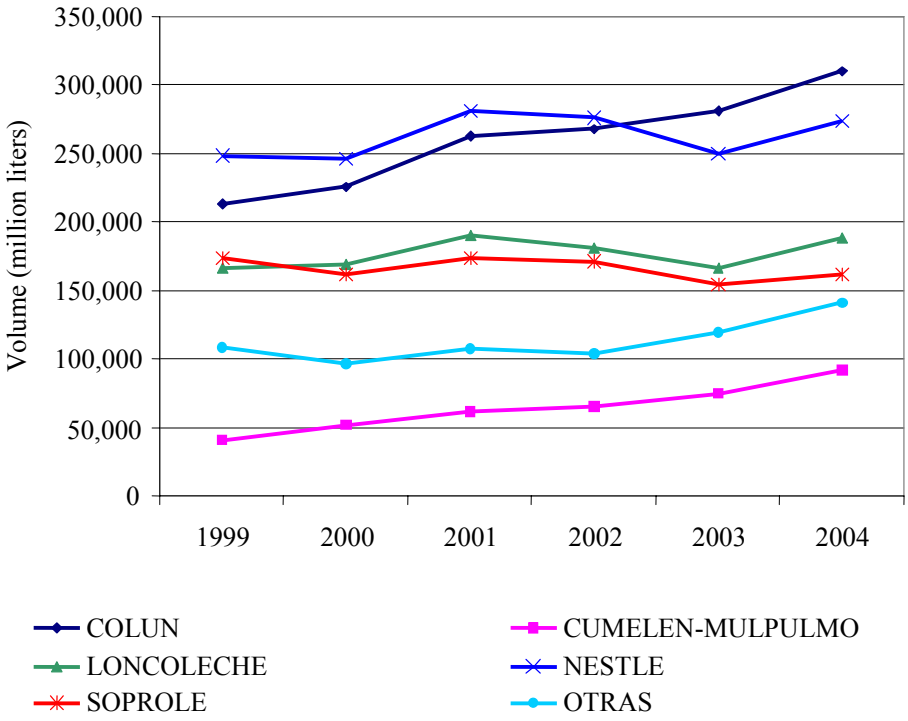


FIGURE 22. Milk reception volumes by firm in Chile's 10th Region

Soprole. Soprole is a Chilean-based company that was founded in 1948 as a producer cooperative in the Santiago area. At that time it manufactured pasteurized milk, fresh cheeses, and butter, concentrating its sales in Santiago. Since then, Soprole has undergone many changes that have made the company a leader in Chile's dairy market.

Soprole has 75%–80% of the dairy market in Santiago, but it has expanded its operations to other parts of the country. The New Zealand Dairy Board purchased a majority share in Soprole in 1993, and the company is now a member of the Fonterra group, the successor to the Dairy Board. In 2000, Soprole decided to centralize the administration, distribution, and commercialization of all the Soprole brand products. Soprole's vision is to provide the most inexpensive products with the best logistics and also increasingly concentrate on value-added products. Soprole employs more than 3,000 workers in four plants within Chile and uses advanced technology that contributes to a milk reception capacity of over 380 million liters per year. Soprole just announced plans to build a milk drying plant in Orsorno in March 2006.

Careful examination of Figure 22 reveals that Soprole, while the largest processor nationally, is not the largest processor in the 10th Region. Roughly half of Soprole's processing capacity is located in Santiago and the other dairy producing regions north of the 10th Region. Fonterra has indicated that it would like to make Soprole a significant player in international dairy markets, and expanding processing capacity for exports is most profitable in the 10th Region. However, recent events have created some ill-will between Soprole and the small dairy farmers in the 10th Region. In particular, two events in recent years have raised suspicions about the Fonterra's intentions. First, Fonterra attempted to merge Soprole with Dairy Partners of America (DPA), its joint venture with Nestlé. Approval of the merger was blocked by the Isabel Aninat Foundation, a charitable trust administered by the Catholic Church and owner of 43% of the company's shares at the time of the merger attempt. Had the merger gone through, the DPA joint venture would have placed roughly 40% of the country's milk resources in the hands of one company, and producers and other industry participants were concerned about the impacts on milk prices (Astaburuaga, 2005). Since 2002, Fonterra has gradually increased its holdings in Saprole, and it is still seeking to merge Soprole into the DPA at some point in the future (Fox, 2005).

The second event that cast suspicions on the intentions of New Zealand investments in the dairy industry was the negotiation and eventual conclusion of the free trade agreement with New Zealand and Singapore. The agreement opens Chile's dairy markets to duty-free imports over a 10-year period. The very gradual reduction in tariffs was negoti-

ated by Chilean dairy interests in hopes that the sector could be protected during this time of transition from net importer to net exporter. The concern on the part of some constituents in Chile's dairy industry was that cheap imports from New Zealand would lower domestic prices and put small farmers out of business. Soprole has an active producer education effort underway to alleviate concerns about the company's objectives and to promote more efficient production practices in the 10th Region.

Nestlé Chile. Historically, Nestlé has focused on the marketing activities of its products in its foreign market operations. Nestlé's Chilean dairy operations are unique in that they involve both procurement and processing. Nestlé has operated in Chile since 1934, but it entered the fluid milk market in 1993 with its purchase of Milkmaid of the South. Currently, Nestlé owns eight centers of production in Chile that produce yogurt, milk powder, and a wide variety of other dairy products targeting the needs of markets in Chile and many foreign countries.

In past years, the number of products made by Nestlé Chile that trade internationally has greatly increased. Nestlé's main South American markets are Argentina, Bolivia, Brazil, Colombia, Ecuador, and Peru. The statistics show the increase in foreign trade from 1993, when 9,000 tons of products (fluid milk equivalent) were exported to seven countries, to 2002, when 19,000 tons were exported to 17 countries. This shows the great trading capacity of Nestlé Chile in foreign markets.

Colún Cooperativa. At present, Colún Cooperativa has 1,300 workers. This organization is currently the largest dairy products manufacturer in the 10th Region, producing an extensive range of products such as different types of cheeses, butter, fluid milk, and special delicacy products (manjar). Colún's processing facilities are centralized in one location in La Union in the 10th Region. The Colún Cooperativa also provides various services to its associate members. These include programs of technical support in general agronomy, help to small dairy producers, veterinary support, and artificial insemination services. The organization has also ensured improvement in the quality of milk through its dairy inspection system, by installing milk parlors, and by expanding the use of refrigerated on-farm storage. Colún has formed alliances among cooperatives and milk producers in Chile, which has given it great market strength in the southern part of Chile. Producers in the 10th Region have a very favorable opinion of Colún, in part because of

its history in the region but also because of the perception that the milk prices and assistance offered by Colún is superior to those of other firms in the region (Personal Communication with German Stolzenbach, 3 December 2005).

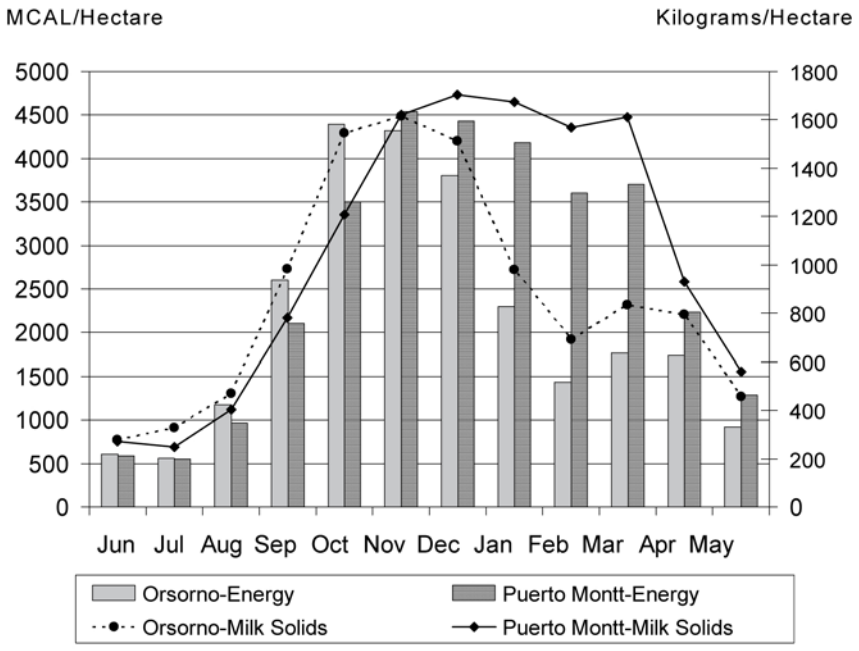
Positioning for Future Growth

It is evident from the foregoing discussion that Chile's dairy industry is in a period of transition, and the future growth of milk production and exports depends on the agreement over the direction of change and exuberance with which different segments of the industry embrace the changes. A central point of disagreement among producers and processors in the 10th Region is whether seasonal or non-seasonal production and pricing systems will best stimulate growth and yield the greatest benefits to both producers and processors. The New Zealand dairy industry has excelled at developing production techniques and the necessary infrastructure to make the seasonal production model profitable for both sides of the milk market. Given the climatic and geographic similarities between New Zealand and Chile's 10th Region, it is not surprising that Soprole is advocating the adoption of seasonal production and component-based pricing of its milk for its southern operations. In fact, Chile's 10th Region has slightly more rainfall and a longer growing season than does New Zealand.

However, Chile's dairy sector has been oriented toward non-seasonal production for decades to provide a steady supply of milk and dairy products to Santiago and other population centers. The importance of the Santiago market is reflected in the pricing practices used in the 10th Region. Prices are typically set according to the cost of milk production in the Santiago area less transportation costs. Moreover, producers can be paid as much as a 50% premium for winter milk over prices during the peak production season. Thus, there are strong price incentives for dairy farms to continue with the non-seasonal production model. The problem with the non-seasonal model for Chile as a dairy exporter is that it does not efficiently utilize the pasture resources of southern Chile, and it is more costly because of the substantial amounts of supplemental (often imported) grains that must be fed to produce milk when pastures are less productive. Therefore, it will be more difficult for Chile to be competitive on international markets over the long run.

Costs and Benefits of Seasonal Production

The idea behind seasonally oriented milk production is to maximize milk production during the time when pastures are most productive, thereby lowering the cost of feed inputs and the unit cost of milk production. Effective seasonal production requires milk producers to impregnate their cows during a narrow 60-day window between October and December. This enables the cows to calve in the spring (July and August) when pastures are increasing their output (see Figure 23), and both pastures and cows reach peak production at roughly the same time. As pasture productivity declines in the late summer cows are gradually dried off, beginning with the pregnant cows and least productive cows. When pastures are their least productive, the cows are not milked at all, giving producers a break from the daily chore of milking. Under seasonal production systems, the average lactation period runs between 255 and 300 days (Agritech, 2003; Ely, 2003). Consequently, seasonal dairy production implies seasonal income for milk producers, which requires careful budgeting and asset management by the farm household.



Source: Mac Cawley, 2005

FIGURE 23. Energy and milk solids production per hectare of pasture in the Orsorno and Puerto Montt areas

Because cattle obtain the vast majority of their nutrients from the pasture under a seasonal system, milk yields tend to be lower than with more intensive feeding regimes. Average yields in New Zealand were 3,627 liters/cow from 2002 to 2004, while yields in the United States averaged 8,252 liters/cow. The advantage of seasonal production shows in the lower cost structure relative to non-seasonal production methods. Table 2 shows the estimated cost of producing milk in Chile's 10th Region for both seasonal and non-seasonal producers based on data gathered by researchers at the Católica University in Santiago. Direct and total economic unit costs for seasonal production are more than 20% lower than for non-seasonal production. The greatest savings are achieved in supplemental feed costs and labor. Capital costs are also frequently lower because cattle are not housed during

TABLE 2. Estimated cost of production in the 10th Region by production system

	Units	Seasonal Production	Non-seasonal Production
Costs			
Direct	$/Hectoliter	10.5	13.8
Total (excluding land)	$/Hectoliter	12.4	19.1
Total economic	$/Hectoliter	15.9	20.4
Total economic	$/100 kg milk solids	226.0	288.0
Return over land	Percent	8.0	4.0
Cash flow	$/Hectare	376.0	376.0
Total Investment	1,000 $	461.3	841.2
Farm Characteristics			
Number of cows	Head	133	205
Pasture area	Hectares	88	128
Stocking density	Cows/hectare	1.5	2.0
Supplemental feeding	Percent by weight	8.0	29.0
Total production			
Fluid milk	Hectoliters	6642.0	13,420.0
Milk solids	Metric tons	46.8	95.3
Seasonal index (summer/winter)	Index	3.1	1.4
Yields			
Fluid milk	Hectoliters/hectare	75.5	104.9
Milk solids	Kilograms/hectare	532	745

Source: Mac Cawley, 2005.

lactation. Cash flow on a per hectare basis is the same, as shown in Table 2, but this is not an unusual finding (see Groover, 2000). The important point is that with lower production costs, equal revenue per hectare implies that the residual rate of return for seasonal producers is double that of non-seasonal producers.

Despite the economic incentives for switching to seasonal production, there are several factors hindering the transition. First, changing to a seasonal production system requires substantial investments by individual dairy farmers. Some capital investment is required to purchase a bulk tank that is sufficiently large to handle the milk volumes generated at peak production levels. Depending on the herd structure and feeding practices prior to the change, producers will most likely have to gradually adjust their herds' genetic stock to breeds that are more productive on pasture rations (such as Jersey and Black Frisk). The producers will also need to aggressively cull animals that have difficulty getting pregnant because of the narrow time window for calving. Finally, seasonal producers have to invest in improving the quality of their pastures, fencing, and watering systems to employ rotational pasture management techniques that maximize productivity. Both the financial and educational investments needed to adopt seasonal dairying are major disincentives for many dairy producers who are in their fifties, a group that accounts for a large segment of the dairy farmers in Chile's 10th Region.

Second, the industry in Chile currently lacks the financial and support services required to make seasonal production sustainable. In particular, farmers have difficulties securing financing for investments and for working capital. Saprole is attempting to address this issue by offering producers contracts that it hopes banks will accept as collateral for loans. So far, the contracts have received a lukewarm reception from the banking sector. Likewise, the local insemination, veterinary, and contract labor systems needed to efficiently manage a seasonal dairy operation are currently not in place. In New Zealand, a well-structured system of contract labor, share-milkers, and independent farmers has developed to enable new producers to enter and older producers to exit.

Third, milk processors currently do not have the capacity to handle a significant move toward seasonal production. Processors need to have the ability to handle the large supply of milk that comes during the summer months. In addition, developing that capacity implies that they will have considerable excess capacity during the off season. Ely (2003)

estimates that the average capacity utilization for dairy processors in New Zealand is 70%. While both Colún and Saprole are expanding their processing capacity in the 10th Region, these investments are partly a reflection of the fact that they are struggling to handle the current milk production volume during the summer months.

International Market Opportunities

Regardless of the pace of developments on the production side, Chile's pursuit of free trade agreements will open doors for Chile's dairy industry in foreign markets. Since 1996, Chile has been a signatory on nine free trade agreements (FTA), including agreements with China, Korea, Mexico, the European Union, and the United States. Perhaps the most beneficial agreement for the dairy sector to date is the agreement with Mexico. Chile has become the largest exporter of hard cheeses to Mexico, shipping roughly 18,000 mt of cheese annually under its preferential agreement. The agreement with China in 2005 is expected to lead to an increase in China's imports of Chilean whey powder imports in the near term. At the time of our visit to Chile, Colún Cooperativa had a new milk drier under construction that was intended to increase its capacity to dry whey for export. Cheese imports from Chile will enter China duty free after five years. The U.S.-Chile agreement opens U.S. dairy markets to Chilean imports over a 12-year period by gradually expanding duty-free access for dairy products. In the 12th year of the implementation period, all dairy products from Chile will enter the United States without tariffs. While the short-term access to U.S. markets is quite limited, establishing a foothold in the market may create much greater opportunities when full liberalization is complete. The Chilean government also anticipates that the preferential agreements already negotiated or under negotiation with its neighbors in South America will increase export opportunities for the dairy sector as the agreements are implemented.

The FTA with New Zealand concluded in 2005 is not expected to increase Chile's exports of dairy products to New Zealand; rather, Chile's market will be gradually opened to imports from New Zealand over a 12-year period. By providing duty-free access to a low-cost producer, such as New Zealand, the Chilean government is creating market incentives for the domestic industry to remain internationally competitive. With the expectation that a new agreement in the Doha Round of negotiations in the WTO will include the elimination of export subsidies, dairy producers that are internationally competitive stand to gain

substantially with the reduction in exports from the European Union. So, while this strategy has raised concerns on the part of small milk producers and processors in Chile, and perhaps rightfully so, it improves the overall industry's potential for capitalizing on developments in multilateral trade negotiations.

Attractive International Investment Location

In contrast to many other Latin American countries, Chile is a safe and profitable investment location. The significant and continued presence of Nestlé and Fonterra in Chile speaks to the potential that exists for dairy production, particularly in the 10th Region. While involvement of large, multinational firms can put downward pressure on industry cost structure and promote a general increase in production scale, particularly in low- and middle-income countries, the competition they provide to domestic firms can accelerate the rate of technology adoption. Moreover, the infusion of international funds increases the rate of structural change in the industry. Chile's dairy industry has already experienced significant technological change, both in primary production and in processing, as a result of opening markets to foreign investment and competition (Faiguenbaum, Berdegué, and Reardon, 2002). As the industry moves forward, investments from Fonterra and others will likely continue to be a driving force in the adoption of better production and management practices at the farm level.

Industry Challenges

A number of challenges facing development of Chile's dairy industry were mentioned in the discussion of seasonal production. In particular, the financial sector does not provide adequate support and services for the producers to make the investments needed to modernize at the farm level. Another challenge faced at the farm level is the aging demographic of Chile's dairy farmers. The current institutional structures make it difficult for the younger generation to begin new dairy operations. Moreover, many young people in rural areas migrate to urban centers for employment. These institutional and financial systems will need to change and develop to facilitate the growth and technological transformation required for Chile to become more than a marginal exporter of dairy products.

The sector's historical focus on domestic markets presents challenges at the processor level, as well as at the farm level. In particular, the lack of excess capacity will inhibit

Chile's ability to service foreign markets, even if the demand exists. Currently, foreign consumers are largely unfamiliar with Chilean dairy products. The Chilean fruit and wine industries have been very successful at promoting Chilean products in foreign markets. The government hopes to build on Chile's reputation in food markets by providing up to $10 million for market promotion activities targeted toward dairy products. The desire is to improve consumer awareness and appreciation of the quality of Chilean dairy products in foreign markets, and the program is implemented in cooperation with the domestic dairy industry. One final hindrance to the growth in Chile's dairy exports is the strong value of the peso relative to the U.S. dollar. This is most relevant, as Chilean exporters seek to enter the U.S. market. However, Chilean exporters may also see stiffer competition in countries where the U.S. dairy industry is active, particularly in milk powder and whey markets.

Looking Forward

In previous sections, the potential growth of dairy production and exports in Chile and Argentina was discussed in the context of current economic and geopolitical conditions. However, as the Doha Round of negotiations draws closer to an agreement, it is worthwhile to consider how Argentina and Chile are likely to fare in a more liberalized trading regime. In order to estimate the impacts of trade liberalization on dairy production, consumption, and trade in Chile and Argentina, we conducted two simulations using the CARD International Dairy Model (CIDM). The scenarios focus on two of the three pillars of the WTO negotiations on agriculture, namely, export subsidies and market access. The remainder of this section briefly describes the CIDM and the baseline projections for Argentine and Chilean dairy sectors. The baseline summary is followed by a description of the scenario assumptions and a brief presentation of the key results. Only selected results are presented in this report, but some additional tables are provided in the appendices.

The CARD International Dairy Model Baseline

The CIDM is a multi-market, partial equilibrium model of international dairy markets. The model was developed to analyze the impacts of domestic and trade policy changes on international prices, production, consumption, and trade volumes for butter, cheese, NFD and WMP. The model is a close relative to the Food and Agricultural

Policy Research Institute's (FAPRI) international dairy model. The key differences between the two models lie in the modeling platform, countries covered, and in some individual country model characteristics and parameters. For more information about the FAPRI international dairy model, visit http://www.fapri.iastate.edu/models/dairy.aspx.

In order to measure the impacts of trade liberalization, a baseline projection under current policies must be established as a point of comparison. We use the FAPRI baseline projections (FAPRI, 2006) for the dairy products covered in the CIDM. The baseline formalizes expert opinion and assumptions on major drivers in dairy and related markets in a consistent fashion. The macroeconomic and policy assumptions underlying their projections are published on the FAPRI web site, which interested readers should consult for the complete set of baseline assumptions and tables. As the FAPRI baseline does not include Chile in its 2006 outlook, so projections for the Chilean dairy sector and other missing countries were created using the FAPRI baseline international dairy prices and exchange rate and GDP growth projections obtained from Global Insight. The additional countries in the CIDM were disaggregated from the original rest-of-the-world in the original FAPRI baseline. The net result is that total traded volumes in the CIDM are identical to the FAPRI baseline. Table 3 summarizes the baseline results for Argentina and Chile.

In the FAPRI baseline, international dairy product prices gradually rise in nominal terms, but real dairy prices slowly decline at an average rate of 0.8% per year. Profitability of dairy production remains stable over the projection period and increases slightly in the latter half. This is possible because productivity in Argentina and Chile is expected to increase annually 1.1% and 1.5%, respectively. Moreover, real feed prices decline relative to dairy prices over the long term. Argentina's dairy cattle inventory increases 29% from 2006 to 2015, creating an additional 3.75 mmt of milk.

Less than 20% of the growth in milk production in Argentina is consumed domestically as fluid products. The remaining 80% is processed into other products, with more than 60% converted into cheese. Additional WMP production accounts for about 16% of the increase in factory milk. Roughly 50% of the increase in WMP is exported, while only 25% of the cheese is shipped to other countries.

TABLE 3. Baseline projections for Argentine and Chilean dairy sectors

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
International Prices	U.S. Dollars per Metric Ton									
Butter	1,755	1,803	1,853	1,849	1,860	1,891	1,920	1,946	1,972	1,992
Cheese	2,689	2,749	2,842	2,851	2,860	2,905	2,948	2,976	3,001	3,017
NFD	1,983	2,040	2,101	2,131	2,134	2,146	2,154	2,158	2,160	2,163
WMP	2,069	2,132	2,233	2,245	2,243	2,282	2,303	2,318	2,339	2,344
Cow Inventories	Thousand Head									
Argentina	2,149	2,197	2,246	2,294	2,343	2,394	2,448	2,503	2,560	2,618
Chile	627	633	638	643	649	653	659	668	677	688
Milk Production	Million Metric Tons									
Argentina	10.30	10.67	11.03	11.42	11.81	12.22	12.66	13.11	13.57	14.05
Chile	2.38	2.43	2.48	2.55	2.61	2.67	2.75	2.83	2.92	3.02
Argentine Net Exports	Thousand Metric Tons									
Butter	5.0	5.2	5.4	5.4	5.8	6.2	6.8	7.5	8.2	9.0
Cheese	63.5	65.9	66.6	68.0	73.5	82.1	91.6	101.0	110.4	119.5
NFD	22.2	24.5	26.4	28.3	30.2	32.0	34.1	36.4	38.7	41.3
WMP	184.9	189.5	195.4	200.0	199.8	202.4	205.1	208.3	212.5	216.3
Chilean Net Exports										
Butter[a]	-1.4	-1.3	-1.3	-1.2	-1.3	-1.5	-1.6	-1.7	-1.7	-1.7
Cheese	10.5	7.6	8.5	9.4	10.6	11.6	12.5	13.8	15.5	17.5
NFD[a]	-3.7	-4.6	-4.5	-4.2	-4.0	-3.9	-3.9	-3.8	-3.5	-3.2
WMP	6.0	9.6	13.5	15.7	17.6	19.9	23.3	27.2	31.3	35.7

[a] Negative numbers denote net imports.

Chile's dairy herd is projected to increase more gradually, rising less than 1% per year. Milk production increases 27%, with roughly 80% of the growth used for manufactured products. Additional cheese production accounts for 43% of the growth in factory milk, and WMP absorbs 36% of the increase. All of the additional WMP production is destined for export markets, representing a sixfold increase in Chile's WMP exports over the period. Roughly 30% of the growth in cheese production is exported. These are fairly conservative projections for Chile, and they do not embody a major shift toward an

export orientation in Chile's southern production region. A concerted effort to adopt an aggressive growth strategy in the region could possibly double the production growth contained in our baseline projections. While this is a distinct possibility, our impression from our brief time in Chile was that the transformation in the region was proceeding only gradually.

Scenario 1: Exports Subsidy and Export Tax Elimination

The first scenario focuses on the elimination of export subsidies and export taxes. Similar to the U.S. proposal submitted to the WTO in the fall of 2005, we assume that export subsidies are eliminated in four equal increments starting in 2007 and ending in 2010. In addition, we assume that Argentina removes its export tax on dairy products over the same period. The countries/regions most affected by this policy change are the European Union, Canada, United States, Norway, Switzerland, and Argentina. All other policies are kept at their baseline levels. The scenario results for Chile and Argentina are summarized in Table 4 in terms of percentage change from the baseline levels.

It is clear from Table 4 that international markets for dairy products are not affected equally by the removal of export subsidies. In particular, butter and cheese prices rise substantially more than do milk powder prices. This is because of the elimination of EU subsidized butter exports. CAP policies that keep butter prices above international levels prevent the European Union from exporting butter once subsidies are removed. This assumes that the European Union will not change its butter and NFD support prices beyond the reforms enacted in 2004 and that it will support both butter and NFD prices at 95% of the legislated intervention price. Consequently, butter and NFD production remain attractive to domestic producers, and substantial government stocks are allowed to accumulate.

As subsidy cuts deepen in 2008 and 2009, higher international prices stimulate additional exports from Argentina, Australia, New Zealand, Uruguay, the Ukraine, Chile, and the United States for selected products. The growth in Argentine exports is further encouraged by the removal of the export tax, boosting domestic prices an additional 10% to 15%. In percentage terms, Argentine butter and cheese exports experience the greatest

TABLE 4. Scenario 1 results for Argentina and Chile

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
International Prices	Percentage Change from the Baseline									
Butter	0.0	1.6	10.2	13.2	25.1	22.0	20.1	19.7	19.2	18.5
Cheese	0.0	3.6	6.4	7.0	10.6	8.2	7.2	7.1	7.7	7.5
NFD	0.0	6.2	8.7	2.2	-0.3	-2.2	-1.4	-1.0	1.5	1.6
WMP	0.0	3.3	4.3	1.5	1.1	-0.1	0.1	0.2	0.8	0.7
Cow Inventories										
Argentina	0.0	0.0	0.9	2.2	3.3	4.6	5.2	5.6	5.8	6.1
Chile	0.0	0.0	0.3	0.8	1.0	1.4	1.6	1.6	1.7	1.8
Milk Production										
Argentina	0.0	0.0	0.9	2.2	3.3	4.6	5.2	5.6	5.8	6.1
Chile	0.0	0.0	0.4	1.1	1.2	1.8	1.8	1.9	1.9	2.0
Argentine Net Exports										
Butter	0.0	10.9	43.2	55.8	87.9	83.9	80.2	76.2	74.5	69.6
Cheese	0.0	6.8	13.7	26.9	43.7	43.5	45.5	45.1	44.0	42.2
NFD	0.0	4.4	12.2	11.7	15.8	17.1	18.4	18.8	20.5	20.4
WMP	0.0	1.3	3.2	7.3	10.1	13.9	15.9	17.1	17.5	18.5
Chilean Net Exports										
Butter	0.0	-23.5	-57.3	-19.7	-15.7	-15.7	-24.2	-26.8	-38.6	-41.4
Cheese	0.0	-0.4	2.9	21.1	34.1	32.7	33.5	30.7	27.1	24.9
NFD	0.0	-9.1	-14.4	5.9	18.0	17.6	9.8	8.0	-0.3	-1.7
WMP	0.0	16.5	26.0	19.5	17.5	16.9	12.4	11.8	11.5	10.6

growth, rising an average of 65% and 35%, respectively. However, in actual volumes, cheese and WMP net exports increase the most in Argentina, increasing to 50 tmt and 40 tmt, respectively, by the end of the simulation period. Argentina captures roughly 18% of the cheese trade lost by European countries following the removal of subsidies.

Higher dairy product prices translate into higher milk prices and profitability for dairy producers in Argentina. Farmers respond by adding up to 159,000 new dairy cows to the herd, generating 0.8 mmt of milk. Production of all four major products increases in Argentina, but cheese and WMP production absorbs roughly 70% of the additional milk produced.

The Chilean dairy sector also benefits from removal of export subsidies. Unlike Argentina, the domestic price effects are purely driven by changes in world market prices. Consequently, the changes in cattle inventories and milk production are substantially lower than in Argentina. The more moderate production effects also reflect the fact that the Chilean industry is not poised to respond as readily to changes in international conditions as is the Argentine dairy sector. Nevertheless, Chilean milk production increases up to 2% over the baseline. The additional milk is roughly evenly split between cheese and WMP production. All of the additional cheese production and most of the WMP is placed on international markets. Chile is a net importer of butter in the baseline, and net imports decline slightly as a result of lower domestic consumption at higher prices. Chile is also a net importer of NFD, but NFD imports increase slightly in some years because small quantities of milk are shifted from NFD and butter production to more profitable cheese and WMP production.

Scenario 2: Exports Subsidy and Tariff Liberalization

This scenario builds on the first scenario by reducing tariffs according to the schedule of cuts outlined in the November 2005 U.S. proposal for the Doha Round of trade negotiations. Table 5 shows the banded schedule of tariff cuts for both developed and developing countries. The magnitude of each country's tariff cuts are determined by the ad valorem equivalent of the average tariff rate from 1999 to 2001. Tariff cuts are only applied to bound tariffs and over-quota rates for TRQs. In-quota tariff rates were not changed; however, if reduced over-quota rates fall below current in-quota rates, the over-quota rate is the effective tariff rate. Sensitive product exemptions to the tariff cuts were

TABLE 5. Schedule of tariff cuts

	Developed Country Cuts (%)		**Developing Country Cuts (%)**	
Thresholds of ad valorem equivalent of tariffs	Beginning tier	Ending tier	Beginning tier	Ending tier
$0 < d \leq 20$	55.00	65.00	36.67	43.33
$20 < d \leq 40$	65.00	75.00	43.33	50.00
$40 < d \leq 60$	75.00	85.00	50.00	56.67
$60 < d$	85.00	90.00	56.67	60.00

not considered. Likewise, existing TRQ quantities were not changed in the scenario. Tariff cuts for developed countries were implemented in five equal cuts beginning in 2007. Reductions in developing country tariffs were implemented similarly over a10-year period. Finally, tariff cuts were only applied to current WTO member countries. The impacts of tariff liberalization and export subsidy elimination on Argentina and Chile are summarized in Table 6.

The tariff cuts outlined in Table 5 are substantial, particularly for developed countries. Consequently, world net imports of butter and milk powders are higher than in the previous scenario, but net imports still remain substantially below the baseline, except for WMP. World price increases relative to the baseline are much larger than in the first scenario, particularly for butter. These higher prices offset some of the impacts of tariff reductions on import levels. This is particularly evident in the case of cheese, where net imports are lower in this scenario than in scenario 1.

Higher international dairy product prices induce an even larger expansion of Argentina's milk production compared to the first scenario. Milk prices in the latter half of the scenario average about $0.19 per liter, which is 21% higher than the baseline level. By 2015, Argentina's milk production reaches 15 mmt, which is more than a million metric tons over the baseline level. Thus, the growth in Argentine milk production following tariff liberalization is more than 20% higher than with export subsidy elimination alone. Roughly 40% of the additional milk production is used to make cheese, and one-third of the growth is used to make WMP. Butter and NFD production also expands slightly. On a milk-solids basis, Argentina is the exporting country that gains the most from trade liberalization, raising total dairy exports by 67 tmt of milk solids over the baseline in 2015. Most of Argentina's growth in exports occurs in cheese and WMP trade. New Zealand, Australia, and Brazil also gain substantially, with each increasing its total dairy product exports by more than 40 tmt on a milk-solid basis.

Although Chile is a net importer of butter and NFD, it currently applies duties on dairy products that are much lower than its bound rates. Consequently, the cuts to bound rates have no impact on domestic dairy product prices. Thus, the changes in Chile's dairy sector following tariff liberalization are simply reflections of changes in world market prices. As expected, milk production in Chile increases relative to the baseline and

TABLE 6. Scenario 2 results for Argentina and Chile

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
International Prices	Percentage Change from the Baseline									
Butter	0.0	4.1	12.9	17.0	35.7	32.4	32.0	32.7	33.6	34.1
Cheese	0.0	4.9	6.7	7.1	15.0	12.0	11.1	11.4	12.3	12.7
NFD	0.0	6.5	9.1	1.6	0.9	-1.1	-0.3	-0.3	1.5	1.4
WMP	0.0	3.9	5.3	2.9	4.0	2.6	3.2	3.6	4.4	4.8
Cow Inventories										
Argentina	0.0	0.0	1.0	2.4	3.5	5.3	6.1	6.7	7.1	7.4
Chile	0.0	0.0	0.4	1.0	1.4	2.2	2.5	2.9	3.2	3.4
Milk Production										
Argentina	0.0	0.0	1.0	2.4	3.5	5.3	6.1	6.7	7.1	7.4
Chile	0.0	0.0	0.6	1.4	1.7	2.7	3.0	3.4	3.7	4.0
Argentine Net Exports										
Butter	0.0	16.1	49.4	62.7	108.1	105.1	103.9	100.0	97.9	92.3
Cheese	0.0	9.4	13.4	27.0	51.2	49.6	53.3	54.1	53.8	52.8
NFD	0.0	4.8	13.2	11.8	17.6	20.2	22.2	22.6	24.1	23.9
WMP	0.0	1.2	3.7	8.3	10.8	15.6	18.4	20.3	21.4	22.9
Chilean Net Exports										
Butter	0.0	-22.6	-70.9	-36.3	-36.2	-43.9	-58.8	-62.6	-75.9	-82.5
Cheese	0.0	2.3	3.0	24.1	44.3	44.9	50.5	50.0	48.4	47.5
NFD	0.0	-7.1	-16.7	4.4	20.2	16.9	5.7	4.7	-2.4	-3.6
WMP	0.0	20.7	32.9	27.5	32.3	33.8	27.7	27.4	26.8	25.9

relative to the result in the first scenario. Milk production reaches 3.1 mmt by 2015, and the dairy cow inventory grows to 714,000 cows. The growth in milk production is double the growth under export subsidy elimination alone. Farm milk prices in Chile average $0.25 per liter in the latter half of the scenario, which is roughly 7% higher than the baseline levels. The additional milk is split fairly evenly between cheese and WMP production, increasing net exports an average of 48% and 28%, respectively, over the baseline in the latter half of the scenario. High international butter prices cause domestic butter consumption and imports to decline, and Chile very nearly becomes a net exporter of butter in some years.

Conclusions

This report assessed the international competitiveness of Argentina and Chile's dairy industries, combining market intelligence gathered from recent field visits and from the literature with quantitative simulations of global policy reform scenarios based on the CDIM model. Both countries exhibit strong potential for export growth, but each faces its own internal and external hindrances to dairy industry expansion. Both countries also face common barriers to expansion caused by distortions in world dairy markets.

Argentina has the strongest dairy potential based on its multiple sources of competitiveness in dairy markets, including modern dairy and processing industries, cheap feedstuffs, abundant pasture, and good infrastructure. Its major handicaps stem from its macroeconomic and trade policies that discourage investment in the dairy sector and make the country risky for foreign investment. Chile's natural potential for dairy expansion is not as sizeable as Argentina's, but its trade and macro policies are export oriented and provide a significant source of competitiveness. Chile's country risk is the lowest in Latin America, and political institutions are aligned with market forces to promote economic growth there. The success and speed of the dairy industry's transition from a domestic market focus to export-driven growth will determine whether or not Chile will become a major player in international dairy markets in the foreseeable future.

The simulation results suggest that global policy reforms would resolve some of the common international obstacles faced by these two countries in foreign dairy markets. If, as part of the reform process, Argentina removes its export taxes on dairy products, the gains to the Argentine dairy sector will be substantially greater than would otherwise be the case. World dairy prices are expected to increase significantly with trade liberalization. In the scenario analysis, butter prices increase 34% by 2015, chiefly because of the removal of sizeable export subsidies in the European Union. Herds and milk production in Argentina would increase by more than 7%; whereas the expansion in Chile would be more modest, representing a bit more than 3% by 2015. Dairy exports for the two countries would expand as well. Argentina's exports of butter and cheese would increase by 92% and 53% respectively, while Chile's exports of cheese and powder would increase by nearly 48% and 26%, respectively.

These two case studies highlight the synergistic relationship between economic resources and sound policies in determining a country's competitiveness in international markets. An abundance of the right resources—land, feedstuffs, technology, financial capital, human capital—is critical to the development of low-cost dairy production. Nevertheless, sound economic and trade policies can either facilitate or hinder the exploitation of resource advantages. Chile is also an interesting example because it illustrates the transition a country goes through as an industry develops and the country becomes a net exporter.

The experiences of Argentina and Chile also shed light on U.S. dairy prospects in global markets. The U.S. dairy industry combines most of the sources of competitiveness characterizing its two South American competitors: availability of inexpensive feed and land in many regions suitable for dairy production, high human capital, access to modern technology, an efficient processing sector, excellent transportation and communication infrastructures, low capital cost and credit risk, and a tradition in dairy production. So it is puzzling that the United States does not export more dairy products. The current U.S. dairy program, with its price distortions and border impediments, obscures the international competitiveness of the U.S. dairy sector and provides producers with incentives to remain focused on domestic rather than on foreign markets. Eliminating the policy-driven incentives that create a domestic bias would force the U.S. dairy industry to turn its attention outward, where it is well equipped to be internationally competitive in world markets, especially in an environment with increased international market access.

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Appendix 1

CIDM Baseline Tables

Table A1.1. Baseline butter trade

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Net Exporters				(Thousand Metric Tons)						
Argentina	5	5	5	5	6	6	7	8	8	9
Australia	77	81	82	87	91	96	99	103	107	111
Brazil	-1	1	2	1	0	-1	-2	-3	-3	-4
EU New Member States	43	46	49	53	55	57	58	57	56	55
European Union-15	177	172	167	165	163	160	158	157	156	155
New Zealand	310	310	314	317	321	325	330	335	339	344
Ukraine	30	28	26	26	26	26	25	25	26	25
Uruguay	10	12	14	15	16	16	16	16	16	15
Total Net Exports *	664	676	687	695	701	708	713	716	719	719
Net Importers										
Algeria	16	17	18	20	21	22	23	24	26	27
Bulgaria	1	1	1	1	1	1	1	1	1	1
Canada	8	10	10	10	10	10	10	11	11	11
Chile	1	1	1	1	1	1	2	2	2	2
China	26	27	28	30	32	33	34	35	36	36
Colombia	1	1	2	2	3	3	4	4	5	6
Egypt	23	25	27	30	32	34	37	40	42	45
India	-12	-21	-28	-26	-22	-23	-20	-15	-12	-5
Indonesia	11	11	12	12	12	13	13	14	14	14
Japan	6	7	8	10	11	12	13	14	15	16
Malaysia	10	10	11	11	12	12	12	13	13	14
Mexico	56	57	59	60	62	64	66	68	71	74
Norway	0	0	0	0	0	0	0	0	0	0
Philippines	10	10	10	11	11	11	11	12	12	12
Peru	3	3	3	3	3	3	3	3	4	4
Romania	5	4	4	4	4	4	4	4	4	4
Russia	162	165	164	163	163	163	163	161	159	157
Saudi Arabia	39	39	40	42	44	45	47	49	52	55
South Korea	1	2	2	3	3	3	2	3	3	2
Switzerland	4	4	3	3	2	2	2	2	2	2
Thailand	15	15	16	16	17	17	18	19	20	20
United States	15	15	16	18	19	20	22	23	24	26
Venezuela	2	2	2	2	3	3	3	3	3	3
Vietnam	7	7	7	8	8	8	9	9	10	10
Rest of World	244	242	242	237	229	221	211	199	188	175
Total Net Imports	664	676	687	695	701	708	713	716	719	719
Price				(U.S. Dollars per Metric Ton)						
FOB Price N. Europe	1,755	1,803	1,853	1,849	1,860	1,891	1,920	1,946	1,972	1,992

* Total net exports are the sum of all positive net exports and negative net imports.

Table A1.2. Baseline cheese trade

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Net Exporters				(Thousand Metric Tons)						
Argentina	63	66	67	68	73	82	92	101	110	119
Australia	190	193	209	220	235	251	268	283	298	313
Brazil	3	4	5	2	-2	-6	-9	-12	-16	-19
Bulgaria	15	16	16	18	18	18	19	19	19	19
Chile	10	8	8	9	11	12	12	14	16	17
Colombia	-1	-2	-3	-4	-6	-7	-8	-10	-11	-13
EU New Member States	127	118	114	116	119	120	121	122	124	125
European Union-15	391	380	378	386	395	401	405	409	416	420
New Zealand	253	296	306	317	327	337	348	358	368	378
Norway	9	9	9	8	8	8	8	8	8	8
Switzerland	48	53	58	62	63	63	64	65	66	68
Ukraine	125	125	124	124	125	126	127	128	129	131
Uruguay	18	20	22	24	25	26	27	28	28	29
Total Net Exports *	1,254	1,287	1,316	1,356	1,403	1,449	1,495	1,541	1,590	1,636
Net Importers										
Algeria	28	30	31	32	34	35	36	37	39	40
Canada	19	19	18	18	18	17	17	16	15	14
China	30	32	39	45	51	55	60	63	66	68
Egypt	7	7	7	7	8	9	9	10	10	11
Indonesia	8	9	9	9	10	10	10	12	12	11
Japan	214	217	221	227	232	236	240	244	248	251
Malaysia	7	7	8	8	8	9	9	9	10	10
Mexico	85	90	84	84	86	86	86	88	92	96
Peru	2	3	2	2	2	2	3	3	3	3
Philippines	20	21	21	22	23	23	24	25	26	27
Romania	-1	-1	-2	-3	-3	-4	-5	-6	-7	-8
Russia	210	220	223	228	235	242	248	253	258	262
Saudi Arabia	71	73	74	77	80	82	85	87	90	94
South Korea	42	42	43	46	48	50	51	53	54	55
Thailand	2	3	3	3	3	3	4	4	4	4
United States	122	124	126	128	130	131	133	135	137	139
Venezuela	13	15	16	18	20	21	23	24	25	27
Vietnam	1	1	1	1	1	1	1	2	2	2
Rest of World	369	374	387	396	409	422	438	454	471	489
Total Net Imports	1,254	1,287	1,316	1,356	1,403	1,449	1,495	1,541	1,590	1,636
Price				(U.S. Dollars per Metric Ton)						
FOB Price N. Europe	2,689	2,749	2,842	2,851	2,860	2,905	2,948	2,976	3,001	3,017

* Total net exports are the sum of all positive net exports and negative net imports.

Table A1.3. Baseline nonfat dry milk trade

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Net Exporters				(Thousand Metric Tons)						
Argentina	22	25	26	28	30	32	34	36	39	41
Australia	179	182	182	183	182	184	186	187	188	190
Brazil	-1	-1	-1	-1	-3	-4	-5	-6	-5	-5
Canada	-3	7	6	0	3	2	3	4	5	5
Colombia	0	0	0	-1	-1	-1	-1	-1	-1	-1
EU New Member States	166	159	156	160	165	165	166	167	169	170
European Union-15	141	132	130	130	128	128	127	125	122	121
India	19	30	32	34	36	38	40	43	46	49
New Zealand	233	235	235	236	236	237	238	240	241	243
Norway	0	0	0	0	0	0	0	0	0	0
Switzerland	14	15	15	15	15	15	15	15	16	16
Ukraine	64	61	59	58	56	55	52	51	51	49
United States	264	273	303	332	359	400	443	485	526	567
Uruguay	15	18	20	21	22	21	21	20	19	18
Total Net Exports	1,117	1,137	1,165	1,197	1,233	1,277	1,325	1,372	1,420	1,468
Net Importers										
Algeria	105	109	114	119	124	129	134	138	143	148
Bulgaria	2	2	2	2	2	2	2	2	2	2
Chile	4	5	5	4	4	4	4	4	4	3
China	54	56	57	57	58	59	61	62	63	65
Egypt	20	20	20	21	22	22	23	23	24	24
Indonesia	90	94	98	101	105	109	113	117	121	126
Japan	20	19	21	23	24	26	28	30	31	32
Malaysia	55	57	59	60	62	64	66	68	70	72
Mexico	172	173	175	177	180	184	188	191	195	199
Peru	7	7	7	7	7	7	7	7	8	8
Philippines	135	138	141	144	147	151	154	158	161	165
Romania	2	1	1	1	1	1	1	2	2	1
Russia	45	49	49	49	49	50	50	49	48	46
Saudi Arabia	28	29	29	30	31	33	34	35	36	38
South Korea	1	2	4	4	4	4	4	4	4	4
Thailand	87	89	92	94	96	98	100	103	106	108
Venezuela	7	7	7	7	7	7	7	7	7	7
Vietnam	31	33	35	38	40	42	45	48	50	53
Rest of World	249	245	248	257	266	280	299	317	337	360
Total Net Imports	1,117	1,137	1,165	1,197	1,233	1,277	1,325	1,372	1,420	1,468
Price				(U.S. Dollars per Metric Ton)						
FOB Price N. Europe	1,983	2,040	2,101	2,131	2,134	2,146	2,154	2,158	2,160	2,163

* Total net exports are the sum of all positive net exports and negative net imports.

Table A1.4. Baseline whole milk powder trade

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Net Exporters				(Thousand Metric Tons)						
Argentina	185	189	195	200	200	202	205	208	212	216
Australia	179	191	208	223	240	259	278	298	319	340
Brazil	12	3	5	3	-1	-5	-9	-12	-15	-19
Chile	6	10	13	16	18	20	23	27	31	36
Colombia	24	23	23	21	18	15	12	9	5	1
EU New Member States	38	37	37	37	37	38	37	37	37	37
European Union-15	613	594	589	596	600	601	597	594	594	591
New Zealand	627	674	695	710	725	743	760	777	794	812
Norway	0	0	0	0	0	0	0	0	0	0
Ukraine	19	18	18	17	17	17	16	16	16	16
Uruguay	12	24	27	31	34	38	42	46	49	53
Total Net Exports	1,714	1,765	1,811	1,853	1,888	1,933	1,971	2,012	2,058	2,101
Net Importers										
Algeria	165	170	176	182	187	193	199	205	210	216
Bulgaria	2	2	2	2	2	2	2	2	2	2
Canada	4	4	3	3	3	3	3	4	4	4
China	19	28	32	33	37	47	43	31	25	13
Egypt	6	6	6	6	7	7	7	7	8	8
Indonesia	24	26	28	30	32	33	35	37	39	41
Malaysia	91	94	98	102	106	110	114	119	123	128
Mexico	29	33	35	38	42	45	48	51	55	58
Peru	7	7	7	8	8	9	9	10	10	11
Philippines	16	17	19	20	21	22	23	24	26	26
Romania	5	5	5	5	5	5	5	5	5	5
Russia	27	29	30	30	33	35	38	40	42	44
Saudi Arabia	116	121	124	129	134	139	145	151	157	163
South Korea	0	0	0	0	0	0	0	1	1	1
Thailand	38	39	40	42	42	42	43	44	44	45
United States	4	5	4	4	4	4	4	4	4	4
Venezuela	96	99	101	104	107	110	114	117	120	123
Vietnam	47	51	56	61	66	71	76	81	87	94
Rest of World	1,018	1,028	1,045	1,055	1,051	1,050	1,054	1,068	1,082	1,096
Total Net Imports	1,714	1,765	1,811	1,853	1,888	1,933	1,971	2,012	2,058	2,101
Price				(U.S. Dollars per Metric Ton)						
FOB Price N. Europe	2,069	2,132	2,233	2,245	2,243	2,282	2,303	2,318	2,339	2,344

* Total net exports are the sum of all positive net exports and negative net imports.

Table A1.5. Baseline Argentine dairy supply and utilization

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
					(Thousand Head)					
Milk Cow Numbers	2,149	2,197	2,246	2,294	2,343	2,394	2,448	2,503	2,560	2,618
					(Kilograms)					
Milk Production per Cow	4,790	4,855	4,910	4,975	5,040	5,105	5,170	5,235	5,300	5,365
					(Thousand Metric Tons)					
Cow Milk Production	10,296	10,666	11,029	11,415	11,808	12,221	12,656	13,107	13,572	14,048
Fluid Milk Consumption	2,001	2,068	2,141	2,216	2,292	2,366	2,442	2,520	2,599	2,682
Manufacturing Use	8,291	8,593	8,882	9,194	9,512	9,851	10,210	10,582	10,967	11,361
Butter										
Production	50	51	53	55	58	60	62	64	66	69
Domestic Supply	52	53	55	57	60	62	64	66	68	71
Consumption	45	46	48	50	52	53	55	57	58	60
Net Exports	5	5	5	5	6	6	7	8	8	9
Ending Stocks	2	2	2	2	2	2	2	2	2	2
Domestic Use	52	53	55	57	60	62	64	66	68	71
Cheese										
Production	426	438	456	477	501	527	554	582	610	639
Domestic Supply	456	472	490	511	535	561	588	616	644	673
Consumption	358	372	389	409	428	445	462	481	500	519
Net Exports	63.5	65.9	66.6	68.0	73.5	82.1	91.6	101.0	110.4	119.5
Ending Stocks	34	34	34	34	34	34	34	34	34	34
Domestic Use	456	472	490	511	535	561	588	616	644	673
Nonfat Dry Milk										
Production	42	45	48	50	53	55	58	61	64	67
Domestic Supply	44	47	50	52	55	57	60	63	66	69
Consumption	20	20	21	22	23	23	24	25	25	26
Net Exports	22	25	26	28	30	32	34	36	39	41
Ending Stocks	2	2	2	2	2	2	2	2	2	2
Domestic Use	44	47	50	52	55	57	60	63	66	69
Whole Milk Powder										
Production	270	284	293	301	305	311	317	323	331	338
Domestic Supply	294	303	312	320	324	330	336	342	350	357
Consumption	90	94	97	101	105	108	112	115	118	122
Net Exports	185	189	195	200	200	202	205	208	212	216
Ending Stocks	19	19	19	19	19	19	19	19	19	19
Domestic Use	294	303	312	320	324	330	336	342	350	357

Table A1.6. Baseline Chilean dairy supply and utilization

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
					(Thousand Head)					
Milk Cow Numbers	627	633	638	643	649	653	659	668	677	688
					(Kilograms)					
Milk Production per Cow	3,797	3,838	3,896	3,962	4,026	4,091	4,164	4,239	4,313	4,388
					(Thousand Metric Tons)					
Cow Milk Production	2,382	2,428	2,485	2,549	2,611	2,672	2,746	2,830	2,921	3,020
Fluid Milk Consumption	480	487	495	508	522	536	552	569	586	604
Manufacturing Use	1,731	1,769	1,817	1,868	1,915	1,961	2,018	2,085	2,157	2,236
Butter										
Production	14	15	15	15	16	16	16	17	17	17
Domestic Supply	14	15	15	15	16	16	16	17	17	17
Consumption	16	16	16	17	17	17	18	18	19	19
Net Exports	-1	-1	-1	-1	-1	-1	-2	-2	-2	-2
Ending Stocks	0	0	0	0	0	0	0	0	0	0
Domestic Use	14	15	15	15	16	16	16	17	17	17
Cheese										
Production	73	73	75	78	81	83	86	89	93	97
Domestic Supply	73	73	75	78	81	83	86	89	93	97
Consumption	63	65	67	68	70	72	74	75	77	80
Net Exports	10	8	8	9	11	12	12	14	16	17
Ending Stocks	0	0	0	0	0	0	0	0	0	0
Domestic Use	73	73	75	78	81	83	86	89	93	97
Nonfat Dry Milk										
Production	11	11	11	12	12	12	12	12	13	13
Domestic Supply	14	13	13	14	14	14	14	14	15	15
Consumption	16	16	16	16	16	16	16	16	16	16
Net Exports	-4	-5	-5	-4	-4	-4	-4	-4	-4	-3
Ending Stocks	2	2	2	2	2	2	2	2	2	2
Domestic Use	14	13	13	14	14	14	14	14	15	15
Whole Milk Powder										
Production	60	65	68	70	71	73	75	78	81	85
Domestic Supply	63	69	72	74	75	77	79	82	85	89
Consumption	53	56	55	54	54	53	52	51	50	49
Net Exports	6	10	13	16	18	20	23	27	31	36
Ending Stocks	4	4	4	4	4	4	4	4	4	4
Domestic Use	63	69	72	74	75	77	79	82	85	89

Appendix 2

Export Subsidy and Export Tax Removal Scenario:

Supplemental Tables

Table A2.1. Scenario 1 butter trade change

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Net Exporters				(Thousand Metric Tons)						
Argentina	0	1	2	3	5	5	5	6	6	6
Australia	0	1	5	6	11	9	9	10	10	10
Brazil	0	0	1	2	3	3	3	3	3	3
EU New Member States	0	-6	-3	-9	-12	-13	-15	-17	-18	-20
European Union-15	0	-2	-81	-108	-191	-178	-167	-167	-166	-165
New Zealand	0	2	6	6	8	8	9	9	10	11
Ukraine	0	0	3	6	7	8	8	8	8	8
Uruguay	0	0	1	1	2	2	3	3	3	3
Total Net Exports *	0	1	-39	-62	-83	-89	-93	-95	-93	-94
Net Importers										
Algeria	0	0	0	0	-1	-1	-1	-1	-1	-1
Bulgaria	0	0	0	0	0	0	0	0	0	0
Canada	0	1	-1	-1	-2	-2	-1	-1	-1	-1
Chile	0	0	-1	0	0	0	0	0	-1	-1
China	0	0	-2	-3	-5	-5	-4	-4	-4	-4
Colombia	0	0	0	0	-1	-1	-1	-1	-1	-1
Egypt	0	0	-3	-3	-6	-5	-5	-5	-5	-5
India	0	-4	-25	-32	-56	-49	-45	-43	-42	-40
Indonesia	0	0	0	0	0	0	0	0	0	0
Japan	0	0	0	0	1	1	1	1	1	1
Malaysia	0	0	0	0	0	0	0	0	0	0
Mexico	0	-1	-3	-3	-5	-5	-5	-5	-5	-5
Norway	0	0	0	0	0	0	0	0	0	0
Philippines	0	0	0	0	0	0	0	0	0	0
Peru	0	0	0	0	-1	-1	-1	-1	0	0
Romania	0	0	0	0	0	0	0	0	0	0
Russia	0	-2	-9	-16	-23	-23	-22	-22	-23	-23
Saudi Arabia	0	-1	-4	-5	-8	-8	-8	-8	-8	-8
South Korea	0	0	-2	-2	-4	-4	-4	-4	-4	-4
Switzerland	0	0	0	-1	-1	-1	-1	-1	-1	-1
Thailand	0	0	0	0	0	0	0	0	0	0
United States	0	0	-2	-3	-5	-6	-7	-9	-9	-12
Venezuela	0	0	0	0	0	0	0	0	0	0
Vietnam	0	0	0	0	0	0	0	0	0	0
Rest of World	0	5	-11	-23	-49	-46	-42	-41	-38	-36
Total Net Imports	0	1	-39	-62	-83	-89	-93	-95	-93	-94
Price				(U.S. Dollars per Metric Ton)						
FOB Price N. Europe	0.0	26.9	177.8	228.6	437.6	390.5	363.3	360.2	355.9	346.9

* Total net exports are the sum of all positive net exports and negative net imports.

Table A2.2. Scenario 1 cheese trade change

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Net Exporters				(Thousand Metric Tons)						
Argentina	0	4	9	18	32	36	42	46	49	50
Australia	0	-1	-2	14	23	23	23	23	21	21
Brazil	0	4	9	12	19	18	17	17	18	19
Bulgaria	0	1	2	2	3	3	2	2	2	2
Chile	0	0	0	2	4	4	4	4	4	4
Colombia	0	0	0	1	1	1	1	1	1	1
EU New Member States	0	10	19	20	20	18	15	13	12	10
European Union-15	0	-32	-64	-123	-181	-190	-199	-203	-207	-212
New Zealand	0	-1	-1	10	18	20	21	20	19	20
Norway	0	-3	-6	-9	-12	-12	-12	-12	-12	-12
Switzerland	0	-12	-25	-41	-57	-57	-58	-58	-58	-58
Ukraine	0	0	2	11	18	19	21	21	20	20
Uruguay	0	0	0	1	2	3	3	3	3	3
Total Net Exports *	0	-30	-58	-81	-108	-118	-125	-130	-139	-146
Net Importers										
Algeria	0	0	0	-1	-1	-1	-1	-1	-1	-1
Canada	0	1	2	4	6	6	7	7	6	6
China	0	1	1	-4	-8	-7	-6	-5	-4	-4
Egypt	0	-1	-1	-1	-2	-1	-1	-1	-1	-1
Indonesia	0	0	0	0	0	0	0	0	0	0
Japan	0	0	-1	-2	-2	-3	-3	-2	-2	-2
Malaysia	0	0	0	0	0	0	0	0	0	0
Mexico	0	-2	-5	-10	-16	-16	-15	-15	-15	-15
Peru	0	0	-1	-1	-2	-1	-1	-1	-1	-1
Philippines	0	0	0	0	-1	-1	0	0	-1	-1
Romania	0	0	1	-1	-1	-1	-1	-1	0	0
Russia	0	-7	-19	-33	-46	-60	-71	-72	-75	-78
Saudi Arabia	0	-2	-4	-4	-6	-5	-4	-4	-5	-5
South Korea	0	-1	-2	-3	-5	-5	-5	-5	-5	-5
Thailand	0	0	0	0	0	0	0	0	0	0
United States	0	-10	-21	-24	-32	-29	-25	-26	-25	-26
Venezuela	0	-1	-3	-3	-4	-4	-3	-4	-3	-3
Vietnam	0	0	0	0	0	0	0	0	0	0
Rest of World	0	-6	-3	2	10	11	10	10	7	6
Total Net Imports	0	-30	-58	-81	-108	-118	-125	-130	-139	-146
Price				(U.S. Dollars per Metric Ton)						
FOB Price N. Europe	0.0	103.4	191.3	208.9	318.6	249.1	222.4	222.1	243.1	236.5

* Total net exports are the sum of all positive net exports and negative net imports.

Table A2.3. Scenario 1 nonfat dry milk trade change

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Net Exporters				(Thousand Metric Tons)						
Argentina	0	1	3	3	5	5	6	7	8	8
Australia	0	4	8	7	13	14	15	16	18	17
Brazil	0	3	6	7	9	10	11	12	13	14
Canada	0	-8	-10	-4	-7	-6	-7	-8	-9	-9
Colombia	0	0	0	0	0	0	0	0	0	0
EU New Member States	0	-4	-21	-36	-57	-56	-57	-58	-59	-61
European Union-15	0	-38	-84	-55	-54	-50	-52	-69	-101	-113
India	0	4	10	8	11	10	10	10	11	12
New Zealand	0	4	12	10	12	12	13	14	17	17
Norway	0	0	0	0	0	0	0	0	0	0
Switzerland	0	-4	-7	-11	-15	-15	-15	-15	-15	-15
Ukraine	0	1	6	10	10	12	12	12	12	13
United States	0	12	22	17	21	20	17	31	40	51
Uruguay	0	0	1	1	1	2	3	3	3	3
Total Net Exports	0	-25	-51	-42	-49	-42	-45	-47	-63	-63
Net Importers										
Algeria	0	0	0	0	0	0	0	0	0	0
Bulgaria	0	0	0	0	0	0	0	0	0	0
Chile	0	0	-1	0	1	1	0	0	0	0
China	0	-3	-4	0	1	2	1	1	-1	-1
Egypt	0	0	0	0	0	0	0	0	0	0
Indonesia	0	-1	-1	0	0	0	0	0	0	0
Japan	0	0	1	0	0	0	0	0	0	0
Malaysia	0	0	0	0	0	0	0	0	0	0
Mexico	0	-2	-4	0	1	1	0	0	-1	-1
Peru	0	0	-1	0	0	0	0	0	0	0
Philippines	0	-1	-1	0	0	0	0	0	0	0
Romania	0	0	0	0	0	0	0	0	0	0
Russia	0	-3	-9	-17	-20	-20	-21	-22	-24	-26
Saudi Arabia	0	-2	-2	-1	0	1	0	0	0	0
South Korea	0	-1	-2	-2	-2	-3	-3	-3	-3	-3
Thailand	0	-1	-1	0	0	1	0	0	0	0
Venezuela	0	0	0	0	0	0	0	0	0	0
Vietnam	0	-1	-1	0	0	0	0	0	0	0
Rest of World	0	-10	-26	-22	-31	-25	-23	-23	-30	-29
Total Net Imports	0	-25	-51	-42	-49	-42	-45	-47	-63	-63
Price				(U.S. Dollars per Metric Ton)						
FOB Price N. Europe	0.0	141.1	203.0	50.9	-6.7	-52.8	-33.3	-23.6	37.0	37.6

* Total net exports are the sum of all positive net exports and negative net imports.

Table A2.4. Scenario 1 whole milk powder trade change

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Net Exporters				(Thousand Metric Tons)						
Argentina	0	2	6	15	20	28	33	36	37	40
Australia	0	-1	-5	-2	-3	-1	1	1	0	1
Brazil	0	7	12	9	12	10	11	12	14	15
Chile	0	2	3	3	3	3	3	3	4	4
Colombia	0	1	1	0	0	0	0	0	0	0
EU New Member States	0	2	2	-3	-7	-7	-8	-7	-7	-7
European Union-15	0	-46	-75	-70	-72	-76	-78	-83	-88	-96
New Zealand	0	0	-2	5	2	7	8	8	6	9
Norway	0	0	0	0	0	0	0	0	0	0
Ukraine	0	0	1	3	4	5	5	5	5	5
Uruguay	0	1	6	7	7	10	5	5	6	7
Total Net Exports	0	-32	-49	-33	-34	-25	-29	-33	-37	-39
Net Importers										
Algeria	0	0	0	0	0	0	0	0	0	0
Bulgaria	0	0	0	0	0	0	0	0	0	0
Canada	0	0	0	0	0	0	0	0	0	0
China	0	-12	-21	-14	-11	-6	-5	-4	-6	-6
Egypt	0	0	0	0	0	0	0	0	0	0
Indonesia	0	0	-1	0	0	0	0	0	0	0
Malaysia	0	0	0	0	0	0	0	0	0	0
Mexico	0	-1	-2	-1	-1	-1	-1	-2	-2	-2
Peru	0	0	-1	0	0	0	0	0	0	0
Philippines	0	0	0	0	0	0	0	0	0	0
Romania	0	0	0	0	0	0	0	0	0	0
Russia	0	-1	-3	-6	-6	-8	-8	-9	-9	-10
Saudi Arabia	0	-2	-3	-1	-1	0	0	0	0	0
South Korea	0	0	0	0	0	0	0	0	0	0
Thailand	0	0	0	0	0	0	0	0	0	0
United States	0	0	0	0	0	0	0	0	0	0
Venezuela	0	0	0	0	0	0	0	0	0	0
Vietnam	0	-1	-1	0	0	0	0	0	0	0
Rest of World	0	-14	-17	-10	-14	-7	-6	-6	-5	-5
Total Net Imports	0	-32	-49	-33	-34	-25	-29	-33	-37	-39
Price				(U.S. Dollars per Metric Ton)						
FOB Price N. Europe	0.0	83.6	113.0	38.5	28.7	-4.6	1.2	5.2	20.6	19.0

* Total net exports are the sum of all positive net exports and negative net imports.

Table A2.5. Scenario 1 Argentine dairy supply and utilization pct. change

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
					(Percent)					
Milk Cow Numbers	0.00	0.00	0.85	2.24	3.30	4.63	5.24	5.60	5.82	6.07
Milk Production per Cow	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cow Milk Production	0.00	0.00	0.85	2.24	3.30	4.63	5.24	5.60	5.82	6.07
Fluid Milk Consumption	0.00	-0.56	-1.03	-1.04	-1.35	-1.13	-1.05	-0.99	-1.00	-0.93
Manufacturing Use	0.00	0.13	1.30	3.04	4.42	6.02	6.75	7.17	7.44	7.72
Butter										
Production	0.00	0.29	1.59	1.95	3.18	3.91	4.56	4.93	5.48	5.67
Domestic Supply	0.00	0.28	1.53	1.88	3.07	3.78	4.42	4.78	5.32	5.51
Consumption	0.00	-0.91	-3.11	-3.91	-6.25	-5.42	-4.86	-4.55	-4.25	-3.93
Net Exports	0.00	10.85	43.21	55.77	87.88	83.85	80.19	76.23	74.53	69.65
Ending Stocks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Domestic Use	0.00	0.28	1.53	1.88	3.07	3.78	4.42	4.78	5.32	5.51
Cheese										
Production	0.00	-0.39	-0.49	0.90	2.57	3.62	4.75	5.27	5.49	5.65
Domestic Supply	0.00	-0.36	-0.46	0.84	2.40	3.40	4.48	4.98	5.20	5.36
Consumption	0.00	-1.66	-2.92	-3.41	-4.50	-3.73	-3.32	-3.10	-3.00	-2.76
Net Exports	0.00	6.77	13.70	26.86	43.70	43.46	45.50	45.10	43.96	42.21
Ending Stocks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Domestic Use	0.00	-0.36	-0.46	0.84	2.40	3.40	4.48	4.98	5.20	5.36
Nonfat Dry Milk										
Production	0.00	1.38	5.20	5.38	7.84	8.95	9.83	10.30	11.42	11.59
Domestic Supply	0.00	1.32	4.99	5.17	7.55	8.63	9.50	9.97	11.07	11.26
Consumption	0.00	-2.24	-3.49	-2.78	-2.84	-2.32	-2.32	-2.25	-2.49	-2.35
Net Exports	0.00	4.40	12.17	11.69	15.83	17.15	18.37	18.81	20.53	20.38
Ending Stocks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Domestic Use	0.00	1.32	4.99	5.17	7.55	8.63	9.50	9.97	11.07	11.26
Whole Milk Powder										
Production	0.00	-0.01	0.73	3.43	4.88	7.52	8.80	9.58	9.87	10.51
Domestic Supply	0.00	-0.01	0.69	3.22	4.60	7.08	8.30	9.05	9.33	9.95
Consumption	0.00	-2.63	-4.24	-4.27	-4.98	-4.37	-4.18	-3.97	-3.90	-3.65
Net Exports	0.00	1.30	3.21	7.33	10.08	13.88	15.86	17.06	17.53	18.47
Ending Stocks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Domestic Use	0.00	-0.01	0.69	3.22	4.60	7.08	8.30	9.05	9.33	9.95

Table A2.6. Scenario 1 Chilean dairy supply and utilization pct. change

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
					(Percent)					
Milk Cow Numbers	0.00	0.00	0.30	0.80	1.02	1.42	1.56	1.63	1.69	1.75
Milk Production per Cow	0.00	0.00	0.15	0.29	0.21	0.32	0.24	0.23	0.23	0.24
Cow Milk Production	0.00	0.00	0.45	1.09	1.23	1.75	1.80	1.86	1.92	2.00
Fluid Milk Consumption	0.00	-0.70	-1.44	-1.06	-1.66	-1.23	-1.13	-1.10	-1.14	-1.05
Manufacturing Use	0.00	0.19	1.00	1.77	2.09	2.67	2.69	2.76	2.83	2.91
Butter										
Production	0.00	1.87	3.42	-0.54	-2.72	-2.05	-0.72	-0.28	1.05	1.30
Domestic Supply	0.00	1.87	3.42	-0.54	-2.72	-2.05	-0.72	-0.28	1.05	1.30
Consumption	0.00	-0.23	-1.55	-1.97	-3.71	-3.21	-2.88	-2.75	-2.62	-2.46
Net Exports	0.00	-23.46	-57.26	-19.71	-15.71	-15.67	-24.15	-26.77	-38.63	-41.38
Ending Stocks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Domestic Use	0.00	1.87	3.42	-0.54	-2.72	-2.05	-0.72	-0.28	1.05	1.30
Cheese										
Production	0.00	-0.41	-0.34	1.84	3.43	3.76	4.19	4.09	3.85	3.87
Domestic Supply	0.00	-0.41	-0.34	1.84	3.43	3.76	4.19	4.09	3.85	3.87
Consumption	0.00	-0.41	-0.76	-0.82	-1.23	-0.93	-0.80	-0.77	-0.81	-0.76
Net Exports	0.00	-0.38	2.90	21.06	34.11	32.70	33.54	30.69	27.07	24.94
Ending Stocks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Domestic Use	0.00	-0.41	-0.34	1.84	3.43	3.76	4.19	4.09	3.85	3.87
Nonfat Dry Milk										
Production	0.00	2.65	4.14	-2.54	-5.95	-5.34	-2.86	-2.23	-0.17	0.17
Domestic Supply	0.00	2.24	3.51	-2.17	-5.09	-4.57	-2.46	-1.92	-0.15	0.15
Consumption	0.00	-0.83	-1.21	-0.31	0.04	0.31	0.19	0.13	-0.21	-0.21
Net Exports	0.00	-9.09	-14.40	5.89	17.98	17.62	9.76	7.99	-0.32	-1.75
Ending Stocks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Domestic Use	0.00	2.24	3.51	-2.17	-5.09	-4.57	-2.46	-1.92	-0.15	0.15
Whole Milk Powder										
Production	0.00	0.96	3.64	4.57	4.47	5.69	4.54	4.68	4.79	4.88
Domestic Supply	0.00	0.90	3.44	4.32	4.23	5.39	4.31	4.45	4.57	4.66
Consumption	0.00	-1.71	-1.87	0.25	0.20	1.46	1.01	0.89	0.57	0.69
Net Exports	0.00	16.46	25.97	19.50	17.53	16.93	12.43	11.82	11.55	10.64
Ending Stocks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Domestic Use	0.00	0.90	3.44	4.32	4.23	5.39	4.31	4.45	4.57	4.66

Appendix 3

Tariff Liberalization and Subsidy Removal Scenario: Supplemental Tables

Table A3.1. Scenario 2 butter trade change

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Net Exporters				(Thousand Metric Tons)						
Argentina	0	1	3	3	6	7	7	8	8	8
Australia	0	2	5	6	13	10	12	13	14	15
Brazil	0	1	1	2	4	4	4	5	5	5
EU New Member States	0	-4	-1	-7	-7	-8	-10	-11	-11	-12
European Union-15	0	-13	-82	-99	-194	-178	-174	-173	-171	-169
New Zealand	0	2	7	7	10	11	12	13	15	15
Ukraine	0	0	4	6	8	9	9	10	10	10
Uruguay	0	0	1	1	2	3	4	4	4	5
Total Net Exports *	0	-5	-40	-56	-78	-87	-89	-92	-91	-94
Net Importers										
Algeria	0	0	0	0	-1	-1	-1	-1	-1	-1
Bulgaria	0	0	0	0	0	0	0	0	0	0
Canada	0	2	4	6	10	11	11	11	11	11
Chile	0	0	-1	0	0	-1	-1	-1	-1	-1
China	0	-1	-3	-3	-6	-6	-6	-6	-7	-7
Colombia	0	0	-1	-1	-1	-1	-1	-1	-1	-1
Egypt	0	-1	-3	-4	-8	-7	-7	-8	-8	-8
India	0	-5	-21	-25	-49	-38	-31	-27	-23	-19
Indonesia	0	0	0	0	0	0	0	0	0	0
Japan	0	0	1	1	3	3	4	4	8	9
Malaysia	0	0	0	0	-1	0	-1	-1	-1	-1
Mexico	0	-1	-4	-3	-6	-6	-6	-6	-6	-6
Norway	0	0	0	1	2	2	2	2	2	2
Philippines	0	0	0	0	0	0	0	0	-1	-1
Peru	0	0	0	0	-1	-1	-1	-1	-1	-1
Romania	0	0	0	0	0	0	0	0	0	0
Russia	0	-3	-11	-18	-29	-30	-31	-32	-33	-34
Saudi Arabia	0	-1	-4	-5	-10	-10	-11	-11	-12	-12
South Korea	0	0	-1	-1	-1	0	1	2	3	4
Switzerland	0	0	-1	-1	-2	-2	-2	-2	-2	-2
Thailand	0	0	0	0	0	0	0	0	0	0
United States	0	0	1	5	6	5	4	2	1	-2
Venezuela	0	0	0	0	0	0	0	0	0	0
Vietnam	0	0	0	0	0	0	0	0	0	0
Rest of World	0	1	-16	-29	-61	-58	-56	-55	-54	-53
Total Net Imports	0	-5	-40	-56	-78	-87	-89	-92	-91	-94
Price				(U.S. Dollars per Metric Ton)						
FOB Price N. Europe	0.0	69.5	223.3	294.5	621.8	575.6	577.2	598.9	623.1	639.2

* Total net exports are the sum of all positive net exports and negative net imports.

Table A3.2. Scenario 2 cheese trade change

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Net Exporters				(Thousand Metric Tons)						
Argentina	0	6	9	18	38	41	49	55	59	63
Australia	0	1	-4	14	28	26	30	33	34	37
Brazil	0	6	9	13	26	25	25	27	29	31
Bulgaria	0	1	1	1	1	0	0	-1	-1	-2
Chile	0	0	0	2	5	5	6	7	8	8
Colombia	0	0	0	1	2	2	2	2	2	2
EU New Member States	0	5	6	-3	-18	-22	-25	-28	-28	-31
European Union-15	0	-35	-82	-156	-223	-236	-245	-251	-254	-260
New Zealand	0	0	-2	10	21	23	27	29	31	33
Norway	0	-3	-7	-10	-14	-14	-14	-14	-14	-14
Switzerland	0	-11	-25	-41	-55	-54	-55	-55	-54	-54
Ukraine	0	1	2	11	20	20	25	26	26	27
Uruguay	0	0	0	1	3	3	4	5	5	5
Total Net Exports *	0	-30	-91	-136	-163	-170	-170	-166	-166	-165
Net Importers										
Algeria	0	0	0	0	-1	0	0	0	0	0
Canada	0	3	7	12	19	19	20	19	19	19
China	0	0	2	-3	-8	-7	-5	-5	-4	-4
Egypt	0	-1	-1	-1	-2	-2	-1	-2	-2	-2
Indonesia	0	0	0	0	0	0	0	0	0	0
Japan	0	0	1	3	7	11	16	20	23	25
Malaysia	0	0	0	0	0	0	0	0	0	0
Mexico	0	0	4	4	6	13	22	30	39	48
Peru	0	0	-1	-1	-2	-1	-1	-1	-1	0
Philippines	0	0	0	0	-1	-1	-1	-1	-1	-1
Romania	0	0	1	0	-1	-1	-1	-1	-1	-1
Russia	0	-8	-22	-36	-54	-72	-87	-91	-96	-101
Saudi Arabia	0	-3	-3	-3	-7	-6	-5	-5	-5	-5
South Korea	0	-1	-2	-2	-3	-2	-1	0	1	2
Thailand	0	0	0	0	0	0	0	0	0	0
United States	0	-13	-73	-113	-127	-141	-138	-142	-141	-143
Venezuela	0	-1	-4	-4	-5	-6	-5	-6	-6	-6
Vietnam	0	0	0	0	0	0	0	0	0	0
Rest of World	0	-5	0	7	15	16	16	17	15	15
Total Net Imports	0	-30	-91	-136	-163	-170	-170	-166	-166	-165
Price				(U.S. Dollars per Metric Ton)						
FOB Price N. Europe	0.0	143.2	200.5	213.2	452.0	368.1	344.9	357.1	388.3	402.2

* Total net exports are the sum of all positive net exports and negative net imports.

Table A3.3. Scenario 2 nonfat dry milk trade change

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Net Exporters				(Thousand Metric Tons)						
Argentina	0	1	3	3	5	6	8	8	9	10
Australia	0	4	9	7	15	17	19	20	23	23
Brazil	0	4	7	7	13	14	16	18	20	22
Canada	0	-9	-10	-5	-8	-7	-8	-9	-9	-10
Colombia	0	0	0	0	0	0	0	0	0	0
EU New Member States	0	-2	-17	-37	-55	-55	-54	-57	-58	-62
European Union-15	0	-45	-90	-47	-63	-69	-76	-90	-113	-124
India	0	5	10	7	12	10	9	9	10	9
New Zealand	0	4	14	11	15	17	19	20	23	23
Norway	0	0	0	0	0	0	0	0	0	0
Switzerland	0	-4	-7	-11	-15	-15	-15	-15	-15	-15
Ukraine	0	0	6	10	11	13	14	15	15	16
United States	0	12	21	18	17	20	15	31	36	51
Uruguay	0	0	1	1	2	2	4	4	5	5
Total Net Exports	0	-28	-51	-32	-51	-46	-48	-46	-55	-49
Net Importers										
Algeria	0	0	0	0	0	0	0	0	0	0
Bulgaria	0	0	0	0	0	0	0	0	0	0
Chile	0	0	-1	0	1	1	0	0	0	0
China	0	-2	-4	0	1	2	2	2	1	1
Egypt	0	0	0	0	0	0	0	0	0	0
Indonesia	0	-1	-1	0	0	0	0	0	0	0
Japan	0	0	1	0	0	0	0	0	0	0
Malaysia	0	0	-1	0	0	0	0	0	0	0
Mexico	0	-2	-4	0	1	2	2	2	2	3
Peru	0	0	-1	0	0	0	0	0	0	0
Philippines	0	-1	-2	0	0	0	0	0	0	0
Romania	0	0	0	0	0	0	0	0	0	0
Russia	0	-4	-10	-17	-22	-24	-26	-27	-30	-32
Saudi Arabia	0	-2	-2	0	0	1	1	1	1	1
South Korea	0	0	-1	1	3	4	5	7	9	11
Thailand	0	-1	-1	0	1	1	2	2	2	3
Venezuela	0	0	0	0	0	0	0	0	0	0
Vietnam	0	-1	-1	0	0	0	0	0	0	0
Rest of World	0	-14	-27	-18	-38	-34	-33	-33	-38	-38
Total Net Imports	0	-28	-51	-32	-51	-46	-48	-46	-55	-49
Price				(U.S. Dollars per Metric Ton)						
FOB Price N. Europe	0.0	147.9	212.7	38.8	21.1	-27.2	-6.4	-7.5	36.3	34.3

* Total net exports are the sum of all positive net exports and negative net imports.

Table A3.4. Scenario 2 whole milk powder trade change

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Net Exporters				(Thousand Metric Tons)						
Argentina	0	2	7	17	22	32	38	42	46	49
Australia	0	-2	-5	-1	-3	0	3	4	5	6
Brazil	0	9	15	12	20	19	20	21	23	24
Chile	0	2	4	4	6	7	6	7	8	9
Colombia	0	1	1	1	1	1	1	1	1	1
EU New Member States	0	2	3	-2	-7	-7	-7	-7	-7	-7
European Union-15	0	-42	-69	-66	-65	-69	-70	-76	-81	-89
New Zealand	0	-1	-1	9	4	11	15	18	19	23
Norway	0	0	0	0	0	0	0	0	0	0
Ukraine	0	0	2	3	4	5	5	5	5	5
Uruguay	0	2	7	7	9	16	9	9	10	11
Total Net Exports	0	-27	-36	-16	-10	9	11	13	14	16
Net Importers										
Algeria	0	0	0	0	0	0	0	0	0	0
Bulgaria	0	0	0	0	0	0	0	0	0	0
Canada	0	1	2	3	3	3	3	3	3	3
China	0	-13	-23	-17	-17	-12	-12	-12	-14	-14
Egypt	0	0	0	0	0	0	0	0	0	0
Indonesia	0	0	-1	0	-1	0	0	-1	-1	-1
Malaysia	0	0	-1	0	0	0	0	0	-1	-1
Mexico	0	-1	-2	0	0	0	1	2	2	3
Peru	0	-1	-1	0	-1	0	0	-1	-1	-1
Philippines	0	0	0	0	0	0	0	0	0	0
Romania	0	0	0	0	0	0	0	0	0	0
Russia	0	-2	-4	-8	-8	-12	-13	-15	-17	-19
Saudi Arabia	0	-2	-3	-1	-1	0	0	0	-1	-1
South Korea	0	0	0	0	0	1	1	1	1	1
Thailand	0	0	0	0	0	0	0	-1	-1	-1
United States	0	0	0	0	0	0	0	0	0	0
Venezuela	0	0	0	0	0	0	0	0	0	-1
Vietnam	0	-1	-1	0	-1	0	-1	-1	-1	-1
Rest of World	0	-8	-2	10	17	35	44	51	59	66
Total Net Imports	0	-27	-36	-16	-10	9	11	13	14	16
Price				(U.S. Dollars per Metric Ton)						
FOB Price N. Europe	0.0	98.5	138.4	75.2	105.3	68.6	85.3	98.1	120.9	132.1

* Total net exports are the sum of all positive net exports and negative net imports.

Table A3.5. Scenario 2 Argentine dairy supply and utilization pct. change

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
					(Percent)					
Milk Cow Numbers	0.00	0.00	0.98	2.43	3.50	5.26	6.12	6.69	7.06	7.43
Milk Production per Cow	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cow Milk Production	0.00	0.00	0.98	2.43	3.50	5.26	6.12	6.69	7.06	7.43
Fluid Milk Consumption	0.00	-0.64	-1.09	-1.09	-1.62	-1.38	-1.30	-1.24	-1.24	-1.18
Manufacturing Use	0.00	0.15	1.48	3.28	4.74	6.85	7.90	8.58	9.03	9.46
Butter										
Production	0.00	0.35	1.74	1.99	3.51	4.55	5.49	5.94	6.53	6.76
Domestic Supply	0.00	0.34	1.68	1.92	3.39	4.40	5.32	5.76	6.34	6.57
Consumption	0.00	-1.44	-3.64	-4.62	-8.13	-7.19	-6.77	-6.55	-6.35	-6.08
Net Exports	0.00	16.15	49.39	62.66	108.09	105.12	103.94	99.96	97.93	92.33
Ending Stocks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Domestic Use	0.00	0.34	1.68	1.92	3.39	4.40	5.32	5.76	6.34	6.57
Cheese										
Production	0.00	-0.31	-0.60	0.89	2.84	3.91	5.41	6.19	6.63	6.94
Domestic Supply	0.00	-0.29	-0.56	0.83	2.66	3.67	5.10	5.85	6.28	6.59
Consumption	0.00	-2.03	-3.00	-3.44	-5.47	-4.53	-4.09	-3.88	-3.79	-3.59
Net Exports	0.00	9.39	13.45	26.96	51.23	49.63	53.35	54.15	53.79	52.76
Ending Stocks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Domestic Use	0.00	-0.29	-0.56	0.83	2.66	3.67	5.10	5.85	6.28	6.59
Nonfat Dry Milk										
Production	0.00	1.56	5.71	5.51	8.74	10.61	12.02	12.54	13.60	13.75
Domestic Supply	0.00	1.49	5.48	5.30	8.42	10.24	11.62	12.15	13.19	13.35
Consumption	0.00	-2.30	-3.57	-2.67	-3.06	-2.51	-2.51	-2.35	-2.49	-2.33
Net Exports	0.00	4.78	13.15	11.84	17.58	20.17	22.24	22.64	24.14	23.89
Ending Stocks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Domestic Use	0.00	1.49	5.48	5.30	8.42	10.24	11.62	12.15	13.19	13.35
Whole Milk Powder										
Production	0.00	-0.11	0.94	3.94	5.05	8.38	10.12	11.36	12.05	12.97
Domestic Supply	0.00	-0.10	0.88	3.71	4.76	7.90	9.54	10.73	11.39	12.28
Consumption	0.00	-2.84	-4.57	-4.72	-5.88	-5.17	-5.05	-4.87	-4.81	-4.61
Net Exports	0.00	1.25	3.69	8.33	10.82	15.64	18.37	20.32	21.42	22.87
Ending Stocks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Domestic Use	0.00	-0.10	0.88	3.71	4.76	7.90	9.54	10.73	11.39	12.28

Table A3.6. Scenario 2 Chilean dairy supply and utilization pct. change

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
					(Percent)					
Milk Cow Numbers	0.00	0.00	0.40	1.02	1.38	2.15	2.55	2.87	3.16	3.45
Milk Production per Cow	0.00	0.00	0.20	0.36	0.30	0.55	0.46	0.47	0.49	0.53
Cow Milk Production	0.00	0.00	0.61	1.38	1.69	2.71	3.01	3.36	3.67	4.00
Fluid Milk Consumption	0.00	-0.96	-1.78	-1.54	-2.82	-2.32	-2.34	-2.39	-2.50	-2.50
Manufacturing Use	0.00	0.26	1.32	2.29	3.01	4.26	4.63	5.09	5.51	5.93
Butter										
Production	0.00	1.39	4.20	0.19	-2.72	-1.07	0.92	1.40	2.68	3.00
Domestic Supply	0.00	1.39	4.20	0.19	-2.72	-1.07	0.92	1.40	2.68	3.00
Consumption	0.00	-0.61	-1.94	-2.54	-5.27	-4.73	-4.58	-4.58	-4.59	-4.53
Net Exports	0.00	-22.58	-70.88	-36.30	-36.23	-43.92	-58.83	-62.58	-75.87	-82.48
Ending Stocks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Domestic Use	0.00	1.39	4.20	0.19	-2.72	-1.07	0.92	1.40	2.68	3.00
Cheese										
Production	0.00	-0.27	-0.37	2.19	4.33	5.08	6.27	6.69	7.01	7.50
Domestic Supply	0.00	-0.27	-0.37	2.19	4.33	5.08	6.27	6.69	7.01	7.50
Consumption	0.00	-0.57	-0.79	-0.83	-1.74	-1.37	-1.24	-1.24	-1.29	-1.29
Net Exports	0.00	2.33	2.96	24.12	44.28	44.85	50.49	50.03	48.35	47.51
Ending Stocks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Domestic Use	0.00	-0.27	-0.37	2.19	4.33	5.08	6.27	6.69	7.01	7.50
Nonfat Dry Milk										
Production	0.00	1.75	4.99	-1.89	-6.92	-5.31	-1.77	-1.36	0.41	0.66
Domestic Supply	0.00	1.48	4.23	-1.61	-5.92	-4.55	-1.52	-1.18	0.35	0.57
Consumption	0.00	-0.87	-1.27	-0.23	-0.13	0.16	0.04	0.04	-0.20	-0.19
Net Exports	0.00	-7.07	-16.71	4.35	20.22	16.92	5.69	4.72	-2.41	-3.63
Ending Stocks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Domestic Use	0.00	1.48	4.23	-1.61	-5.92	-4.55	-1.52	-1.18	0.35	0.57
Whole Milk Powder										
Production	0.00	1.32	4.73	5.94	7.12	9.83	8.61	9.43	10.01	10.57
Domestic Supply	0.00	1.24	4.47	5.62	6.74	9.32	8.18	8.97	9.54	10.10
Consumption	0.00	-2.01	-2.22	-0.28	-1.10	0.78	0.08	-0.10	-0.48	-0.53
Net Exports	0.00	20.68	32.85	27.46	32.27	33.83	27.69	27.35	26.76	25.86
Ending Stocks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Domestic Use	0.00	1.24	4.47	5.62	6.74	9.32	8.18	8.97	9.54	10.10

Appendix 4

Contact Information for Individuals and Agencies Visited During the Study Trip

Contacts in Argentina

Contacts in Chile

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