DRIVERS OF CHANGE IN CHINA’S DAIRY INDUSTRY — IMPLICATIONS FOR THE U.S. AND WORLD DAIRY INDUSTRIES

William D. Dobson
The Babcock Institute for International Dairy Research and Development
is a joint program of the
University of Wisconsin-Madison College of Agricultural and Life Sciences
University of Wisconsin-Madison School of Veterinary Medicine
University of Wisconsin Extension Cooperative Extension Division

Funding for this study was provided by CSREES USDA Special Grant 05-34266-16416

The views expressed in Babcock Institute Discussion Papers are those of the authors; they do not necessarily represent those of the Institute, or of the University.

ISBN 978-1-59215-110-8
# CONTENTS

**EXECUTIVE SUMMARY**  
1

**GEOGRAPHIC AND ECONOMIC CONDITIONS IN CHINA**  
1

**CHINA’S DAIRY INDUSTRY IN THE MID-2000s**  
1

**DRIVERS OF CHANGE IN CHINA’S DAIRY INDUSTRY**  
2

**IMPLICATIONS OF THE DRIVERS OF CHANGE FOR THE U.S. AND WORLD DAIRY INDUSTRIES**  
3

**GEOGRAPHIC AND ECONOMIC CONDITIONS IN CHINA**  
5

- China’s Geography  
5
- China’s Economy  
6

**A DESCRIPTION OF CHINA’S DAIRY INDUSTRY IN THE MID-2000s**  
10

- China’s Dairy Farms  
10
- China’s Dairy Product Processing Firms  
14
- Characteristics of China’s Consumer Markets for Dairy Products  
18

**DRIVERS OF CHANGE IN CHINA’S DAIRY INDUSTRY**  
19

- Driver No. 1: Income Growth  
19
- Driver No. 2: Pressures for Greater Concentration in Milk Processing  
21
- Driver No. 3: Pressures to Improve the Efficiency of Milk Production  
22
- Driver No. 4: Pressures for Improved Milk Quality  
22
- Driver No. 5: Potential Demand for More Dairy Products in Rural Areas  
23
- Driver No. 6: Pressures for Repeal of General Rule on Labeling of Pre-packaged Foods  
23

**IMPLICATIONS OF THE DRIVERS FOR THE U.S. AND WORLD DAIRY INDUSTRIES**  
24

**REFERENCES**  
25
LIST OF TABLES

Table 1. Population Distribution Figures for China’s Cities, 2000 .......................... 6
Table 2. Selected Statistics for China with Comparisons to the U.S ......................... 7
Table 3. Annual Average Exchange Rates, Chinese Yuan vs. U.S. Dollar, 1995–2006 .... 8
Table 4. Cow’s Milk Production in China, 1991–2006 .............................................. 12
Table 5. The “Big 6” Dairy Processors in China ......................................................... 14
Table 6. Percentage of Dairy Product Sales in Different Product Categories, China, Taiwan, and Japan, 2005 ............................................................ 14
Table 7. Top 5 Ice Cream Sellers in China, 2004–2005 .................................................. 16
Table 8. Average Consumption of Specified Dairy Products by Urban and Rural Consumers in China, Selected Years 1995 to 2005 ........................................... 18
Table 9. U.S. Dairy Exports to China, 2003 to 2005 .................................................... 19
Table 10. Income Elasticity of Demand Estimates for Dairy Products in China ........ 20
Table 11. Estimates of Annual Change in Purchases of Selected Dairy Products in China Based on High and Low Income Elasticities and Population Growth ....................... 21

LIST OF FIGURES

Figure 1. China and the Country’s National Borders .................................................. 5
Figure 2. China’s Administrative Divisions ............................................................... 13
This Discussion Paper consists of (a) background information on China’s geography and economy (b) a description of the country’s dairy industry in the mid-2000s, (c) the drivers of change in China’s dairy industry, and (d) implications of these drivers for the U.S. and world dairy industries.

**GEOGRAPHIC AND ECONOMIC CONDITIONS IN CHINA**

- Climate and geography explain in part why China’s traditional dairy belt developed in the north.
- China’s economy during the last quarter century has changed from a centrally-planned system that was largely closed to international trade to a more market-oriented economy that has a rapidly growing private sector. China became a member of the World Trade Organization (WTO) in November, 2001.
- China’s population was 3.1 billion in mid-2006, 4.4 times that of the United States. Foreign investors in China’s dairy industry have discovered that having access to over a billion customers carries little benefit unless they have effective plans for capitalizing on the large, complex market. A lesson learned by foreign investors is that a large proportion of China’s consumers simply cannot afford to buy foreign products, especially in rural areas.
- China’s currency, the yuan, has remained relatively weak compared to the U.S. dollar for a decade, helping to foster large Chinese exports to the U.S.
- China’s rapid economic growth (10.2 percent growth in real GDP in 2005) has transformed China into an economic power that wields strong influence in international markets and the WTO. The rapid growth of China’s real GDP suggests that domestic sales of most dairy products will expand substantially.

**CHINA’S DAIRY INDUSTRY IN THE MID-2000s**

- China’s dairy farm sector in the mid-2000s was immensely varied, containing operations ranging from one-cow farms to large, industrial farm complexes.
- Driven by relatively strong profits in dairy farming, milk production in China rose by about 25 percent per year from 2000 to 2006, primarily as a result of increases in cow numbers. The USDA forecasted that total milk production in China would be 33.8 million metric tons in 2006, about 41 percent of the U.S. total for the year.
- Barboza’s “Wisconsin of China” is a vast area that stretches from Xinjiang Province in the northwest across Inner Mongolia and east to Heilongjiang Province. Hohhot (dubbed “Milk City”), located 415 miles northwest of Beijing, is the epicenter of a new milk boom in China.
- Milk quality is a significant problem in China’s dairy industry. On many farms and in processing plants in China, problems with milk quality are similar to those found in the least-developed dairy industries of the world.

---

1 W.D. Dobson is an Agribusiness Economist with the Babcock Institute and an Emeritus Professor in the Department of Agricultural & Applied Economics at the UW-Madison. Helpful comments on the paper by Professor Edward Jesse of the Department of Agricultural & Applied Economics at the UW-Madison are acknowledged. Ms. Karen Nielsen, Associate Director of the Babcock Institute, also provided helpful comments on the manuscript and many of the reference documents cited in the paper.
Drivers of Change in China’s Dairy Industry—Implications for the U.S. and World Dairy Industries

• China’s dairy processing sector is concentrated at the top but has a large competitive fringe of about 1,600 small and mid-sized processors. China’s “Big 6” processors accounted for more than one-half of the country’s fresh milk sales in 2004.

• Several international dairy firms (e.g., Kraft, Danone, Parmalat, Unilever and Friesland-Coberco) set up dairy processing operations in China in the 1990s. With few exceptions, these firms lost money, withdrew from the market, and sold their assets to domestic firms for cents on the dollar.

• Equity investments in domestic Chinese dairy firms have replaced the foreign dairy investments of the 1990s. Prominent among these is the equity investment by Fonterra of New Zealand for a 43 percent share (costing U.S.$107 million) of the San Lu Dairy Group of China.

• China has one of the lowest annual per capita consumption rates for dairy products in the world—by one recent estimate only about 22 kg per capita or one-fifth the world average. This figure reflects low incomes in rural areas, lack of familiarity with dairy products, lactose intolerance and other factors.

• In China, rural people consume substantially smaller amounts of dairy products than urban consumers. In the immediate future, China’s dairy firms are likely to find it most feasible to market products such as UHT milk and milk powders in rural areas, products which do not require a well-developed cold chain.

• The U.S. was the leading exporter of whey products to China in 2005.

DRIVERS OF CHANGE IN CHINA’S DAIRY INDUSTRY

• **Driver No. 1:** Income growth. In China most dairy products exhibit relatively high income elasticities of demand. Studies based on urban areas of China indicate that milk had income elasticities ranging from 0.271 to 0.657, while yogurt had income elasticities ranging from 0.135 to 0.600. Only milk powders exhibited negative or low income elasticities of demand. Consequently, income and population-driven increases in dairy product purchases of only a few percentage points a year when spread over China’s large, urbanizing population will produce very large increases in aggregate dairy product sales over a few years.

• **Driver No. 2:** Pressures for greater concentration in milk processing. Price wars that force small processors out of business, economies of scale in dairy processing, marketing and management advantages of larger firms, and greater opportunities for larger firms to partner with foreign companies will all contribute to greater concentration in milk processing.

• **Driver No. 3:** Pressures to improve the efficiency of milk production. Modern dairy farms in China will seek to eliminate the numerous disease and management problems that exist on many of China’s dairy farms.

• **Driver No. 4:** Pressures for improved milk quality. Expect pressures from urban consumers for higher quality milk and dairy products to accompany increases in consumer incomes. The income elasticity of demand for quality attributes in milk and dairy products is probably relatively high in China.

• **Driver No. 5:** Potential demand for more dairy products in China’s rural areas. Business experiments are likely to be carried out to discover ways to capitalize on the potential demand for dairy products in rural China. These efforts will be hampered by low incomes, lack of refrigerators, and lack of familiarity with dairy products.

• **Driver No. 6:** Pressures for repeal of General Rule on Labeling Pre-Packaged Foods. This law prohibits the labeling of pasteurized, non-UHT milk as “fresh.” Only raw milk can be labeled as “fresh.” Problems associated with this law will create pressures for elimination (or non-enforcement) of the law.
IMPLICATIONS OF THE DRIVERS OF CHANGE FOR THE U.S. AND WORLD DAIRY INDUSTRIES

• China is pursuing practices that will permit Chinese farms and businesses to supply most of the country’s dairy products.

• China will likely witness emergence of a two-tiered dairy industry. The segment of the industry serving the country’s urban population will become a modern, more efficient dairy industry within a few years. The industry segment serving rural China will be characterized by less dramatic change. Many business experiments probably will be needed before successful models are identified for serving rural China’s dairy markets.

• Successful foreign investments in China’s dairy processing industry are likely to consist of equity investments in domestic firms or purchasing agreements. Fonterra’s purchase of an equity interest in the San Lu Dairy Group will provide useful insights about the profitability of equity investments.

• U.S. companies will be able to export relatively large quantities of whey products to China for the foreseeable future.

• Cheese is likely to remain a small, niche market in China.

• Opportunities may arise for foreign dairy firms that have had successful experiences in the dairy industries of developing countries—e.g., Africa, the former Soviet Union, and India—to serve dairy markets in rural China.

• U.S. and other foreign firms planning to invest in China’s dairy industry will find it useful to monitor changes in that country’s dairy product mix. Urban consumers are expected to consume more yogurt, ice cream, and milk drinks (and less liquid milk) as their incomes rise. However, income elasticities of demand for the different dairy products raise questions about whether this development will materialize.

• U.S. companies will have opportunities to supply semen and embryos for upgrading the quality of China’s dairy herd.

• China’s large, integrated processing and farming enterprises may seek out foreign technical experts for upgrading herd health and management of their businesses.

The future of China’s dairy industry remains uncertain. An official of Fonterra of New Zealand said that divergent futures are possible for China’s dairy industry, ranging from (a) rapid growth, self-sufficiency, and dairy exporting to (b) little change in the level of dairy self-sufficiency. This paper suggests a future for China’s dairy industry that lies somewhere near the middle of the scenarios described by the Fonterra official. The paper also provides potentially useful hypotheses for future studies of China’s dairy industry.
DRIVERS OF CHANGE IN CHINA’S DAIRY INDUSTRY—IMPLICATIONS FOR THE U.S. AND WORLD DAIRY INDUSTRIES

This Babcock Institute Discussion Paper provides a “snapshot” of the dairy industry of the People’s Republic of China (China) in the mid-2000s. However, the reader should harbor no illusions about the durability of this description. Presently, China’s complex dairy industry has a full range of players, including modern and efficient farmers, processors, and retailers, as well as dairy farms and marketing firms similar to those found in the most underdeveloped dairy industries of the world. Moreover, the country’s dairy industry is in transition, moving to a different configuration. Thus, a picture based on conditions in the mid-2000s will provide an imperfect indication of how the industry will be structured in a few years. Accordingly, this Discussion Paper focuses on identifying drivers of change that will affect China’s dairy industry and on describing the nature of the industry that might emerge as a result of these drivers.

The study consists of (a) information on China’s geography and economy, which provides background for the remainder of the study, (b) a description of the country’s dairy industry in the mid-2000s, (c) the drivers of change in China’s dairy industry, and (d) implications of the drivers for the U.S. and world dairy industries. The paper is also structured to provide background information for possible future studies by the Babcock Institute on China’s dairy industry.

GEOGRAPHIC AND ECONOMIC CONDITIONS IN CHINA

China’s geography and rapidly growing economy will influence the nature of many industries in the country, including the dairy industry. Therefore, it is useful to specify information on China’s geography and economy to provide background for later segments of the paper.

China’s Geography

In terms of geographic size, China is the fourth largest country in the world—only Russia, Canada and the U.S. are larger. Moreover, the U.S. with 9,631,420 square kilometers (3,718,712 square miles) of territory is only 0.4 percent larger than China, which has 9,596,960 square kilometers (3,705,407 square miles) of territory.

China borders Afghanistan, Bhutan, Burma, India, Kazakhstan, North Korea, Kyrgyzstan, Laos, Mongolia, Nepal, Pakistan, Russia, Tajikistan and Vietnam (See Figure 1).

China’s western areas include mountains, high plateaus and deserts. The east has plains, deltas and hilly
areas. The country’s climate is similarly diverse—conditions range from tropical in the south to subarctic in the north. The geographic and climatic diversity influences the nature of dairy farming in different parts of China. In particular, climate and geography explain in part why China’s traditional dairy belt developed in the north of the country.

**Geographic Divisions.** China has 23 provinces, five autonomous regions (Guangxi, Inner Mongolia, Ningxia, Xinjiang and Xizang [known as Tibet]) and four municipalities (Beijing, Chongqing, Shanghai and Tianjin). China considers Taiwan its 23rd province.

Five of China’s major cities, the geographic location of the cities, and selected economic characteristics of each appear below [30]:

- **Beijing** is the national capital of China. In addition, the city is the nation’s economic, cultural, and educational center as well as the country’s most important center for international trade and communication. Situated on the northern edge of the North China Plain, the city had an urban population of 7.34 million in 2000.
- **Shanghai** is China’s largest city, with an urban population of 9.54 million in 2000. Shanghai is located halfway down China’s mainland coastline where the Yangtze River empties into the sea. The city is a major industrial base and harbor.
- **Tianjin** is a major industrial and commercial city in northern China with an urban population of 5.21 million in 2000. Located about 120 km east of Beijing, Tianjin is a major port for ocean shipping and foreign trade.
- **Chongqing**, with an urban population of 6.14 million in 2000, is the largest industrial and commercial center in southwest China and is a hub for land and water transportation in the upper Yangtze valley.
- **Guangzhou**, the capital of Guangdong Province, had an urban population of 4.17 million in 2000. Guangzhou is a major port city and important gateway to South China.

The cities of Beijing, Shanghai, Tianjin, and Chongqing are municipalities, which are directly administered by the central government. A municipality has the same political, economic and jurisdictional rights as a province.

China has a host of other major and smaller cities. China’s Ministry of Foreign Affairs lists 668 cities with populations for the year 2000 distributed by size as shown in Table 1.

**China’s Economy**

**Overview.** China’s economy during the last quarter century has changed from a centrally planned system that was largely closed to international trade, to a more market-oriented economy that has a rapidly growing private sector [43, p.7]. Economic development has been more rapid in China’s coastal provinces than in the interior, and large disparities in per capita incomes have developed between regions.

China now has a mixed economy, consisting of a combination of state-owned and private firms [20]. In recent years, many state-owned firms have been partially or totally privatized. Since the 1980s, the Chinese government has also encouraged foreign investment in certain segments of the economy, offering foreign investors preferable tax, tariff, and investment treatment in special economic zones.

Despite privatization initiatives, a substantial part of China’s economy (including some dairy firms) remains controlled by state owned enterprises (SOEs), many of which are inefficient and unprofitable. China’s government has plans to carry out additional restructuring of SOEs.

**TABLE 1.** Population Distribution Figures for China’s Cities, 2000

<table>
<thead>
<tr>
<th>Population Category</th>
<th>Number of Cities</th>
</tr>
</thead>
<tbody>
<tr>
<td>More than 2.0 million</td>
<td>13</td>
</tr>
<tr>
<td>1.0 to 2.0 million</td>
<td>24</td>
</tr>
<tr>
<td>500,000 to 1.0 million</td>
<td>48</td>
</tr>
<tr>
<td>200,000 to 500,000</td>
<td>205</td>
</tr>
<tr>
<td>Less than 200,000</td>
<td>378</td>
</tr>
<tr>
<td>Total</td>
<td>668</td>
</tr>
</tbody>
</table>

Source: Ministry of Foreign Affairs, China [30].
China entered the World Trade Organization (WTO) in November, 2001. As part of the agreement to secure entry into the WTO, China’s government made commitments to market liberalization that have substantially opened China’s economy to foreign trade and investment.

Performance of the Economy. China’s population is 1.3 billion or 4.4 times that of the U.S. (Table 2). China’s population growth rate is lower than that of the U.S. and its Asian competitor, India. However, China will remain the largest country in the world in terms of population at least until about 2030 when India may overtake it.

While the 1.3 billion population figure identifies China’s huge market, the figure is deceptive. Many foreign investors—including foreign investors in China’s dairy industry—have found that having access to over a billion customers carries no benefit unless viable plans exist for capitalizing effectively on the large, complex market. A lesson learned by foreign investors is that a large proportion of China’s consumers simply cannot afford to buy foreign products.

China’s population in 2000 was about 64 percent rural and 36 percent urban [17]. According to one estimate, China’s urban population has recently increased by about 1.1 percent per year [36]. Therefore, the urban population in 2006 is likely to be several percentage points higher than the 2000 figure. The large rural population has relevance for the current study since, as noted later, challenges face those seeking to expand sales of dairy products to China’s large rural population.

GDP figures expressed in Purchasing Power Parity (PPP) for China and the U.S. show the relative size of the economies (Table 2). China’s total GDP expressed in PPP terms is a surprising 72 percent of the U.S. figure. However, when China’s GDP per capita is expressed in PPP terms it is a much smaller 16 percent of the U.S. figure. The complexities involved in computing GDP in PPP terms (to take into account differences in prices between the countries) are substantial. Therefore the GDP figures expressed in PPP terms in Table 2 should be regarded as approximate. China’s total GDP in PPP terms is particularly subject to question. China’s real GDP growth rate was a phenomenally high 10.2 percent in 2005. The real GDP growth rates for the first half of 2006 were even higher—10.9 percent [7]. When real GDP growth reaches these levels

<table>
<thead>
<tr>
<th>Item</th>
<th>China</th>
<th>U.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Population (July 2006 estimates)</td>
<td>1,313,973,713</td>
<td>298,444,215</td>
</tr>
<tr>
<td>2. Population Growth Rate (%)</td>
<td>0.59</td>
<td>0.91</td>
</tr>
<tr>
<td>3. GDP (PPP in US$ Trillion)</td>
<td>8.859</td>
<td>12.36</td>
</tr>
<tr>
<td>4. GDP Per Capita (PPP in U.S.$)</td>
<td>6,800</td>
<td>41,800</td>
</tr>
<tr>
<td>5. Real GDP Growth Rate (%)</td>
<td>10.2</td>
<td>3.5</td>
</tr>
<tr>
<td>6. Fixed Investment (% of GDP)</td>
<td>48.6</td>
<td>16.7</td>
</tr>
<tr>
<td>7. Unemployment Rate (%)</td>
<td>20.0</td>
<td>5.1</td>
</tr>
<tr>
<td>8. Inflation Rate (%)</td>
<td>1.8</td>
<td>3.2</td>
</tr>
<tr>
<td>9. Literacy Rate (%)</td>
<td>90.9</td>
<td>99.0</td>
</tr>
<tr>
<td>10. Corruption Perceptions Index</td>
<td>3.2</td>
<td>7.6</td>
</tr>
</tbody>
</table>

Sources: CIA World Factbook, 2006 for items 1-4 and 7-9 [43]. Items 5 and 6 for China from J.R. Wu [50] and from CIA World Factbook, 2006 [43] for the U.S. Item 10 was obtained from Transparency International, Corruption Perceptions Index, 2005 [41]. Items 1 and 2 represent 2006 figures. Items 3,4,5,6, and 8 represent 2005 figures. Item 7 represents a 2003 figure for China and a 2005 figure for the U.S.Key for interpreting Corruption Perceptions Index: 10 = highly clean, 1 = highly corrupt.
there is a danger that the economy will overheat and produce strong inflation. In 2005, at least, this was not the situation in China since inflation was a relatively low 1.8 percent. China, of course, had a substantially higher growth rate than the U.S. in 2005. For a number of reasons—primarily its very large GDP base—it would be difficult for the mature U.S. economy to grow at rates recorded for China.

In 2005 gross fixed investment in China was high—48.6 percent of GDP and 2.9 times the U.S. figure. This high level of investment provides the foundation for additional growth in China’s economy. But, as noted later, the funds employed for creating the additional investment carry the seeds of inflation and other problems.

China’s relatively high literacy rate—more than 90 percent—augers well for the country’s economic development. A literate population will help the country’s export-driven economy remain competitive in international markets.

One weakness in China’s economy is revealed in the unemployment rate, which was about 20 percent in 2003. This figure reflects China’s relatively high unemployment in rural areas and lower unemployment in urban areas. The CIA World Factbook reports that urban unemployment was only about 9 percent in 2004 and substantially higher in rural areas where widespread unemployment and underemployment exist [43]. The Economist reports that “. . . China has almost 200 million underemployed workers in rural areas, and it could take at least two decades for them to be absorbed by industry [20, p.63].” Thus, China’s government will be challenged to provide jobs for the unemployed and underemployed in rural areas.

While the corruption existing in China has not prevented the country from achieving rapid economic growth, the Corruption Perceptions Index for 2005 was a relatively high 3.2, little changed from the 2004 figure. In terms of the country’s ranking, China placed at the top of the bottom half of the 158 countries included in Transparency International’s Corruption Perceptions Index for 2005. Corruption in China manifests itself in problems with government regulations, questionable protection afforded domestic firms, difficulties in developing distribution systems, embezzlement, sales of products of substandard quality, and legal disputes. However, China’s government apparently does have a better record of enforcing contract provisions than legal authorities in some other advanced developing countries. China’s dairy industry has not been immune from corruption problems.

**Exchange Rates.** China maintained a nearly fixed exchange rate versus the U.S. dollar for much of the past decade (Table 3). China’s arguably undervalued currency has helped the country maintain strong exports. In 2005, China’s exports totaled about U.S.$752 billion [43]. China’s current account balance was a positive U.S.$161 billion for 2005.

China’s trade surplus with the U.S.—China’s largest export market—hit a record U.S.$202 billion in 2005 [24]. U.S. policymakers and companies affected by China’s exports to the U.S. have complained that China’s currency is undervalued. If these complaints are valid, this favors Chinese exports and discourages imports from the U.S. and other countries with currencies pegged to the U.S. dollar. In response to such complaints, China partially unhooked its currency from the peg to the dollar and allowed the yuan to float within a narrow band against prices for a basket of currencies beginning in July 2005. However, this has produced relatively little strengthening—only 3 to 4 percent—of

<table>
<thead>
<tr>
<th>Year</th>
<th>Exchange Rates (Yuan/U.S. Dollar)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>8.352</td>
</tr>
<tr>
<td>1996</td>
<td>8.314</td>
</tr>
<tr>
<td>1997</td>
<td>8.290</td>
</tr>
<tr>
<td>1998</td>
<td>8.279</td>
</tr>
<tr>
<td>1999</td>
<td>8.278</td>
</tr>
<tr>
<td>2000</td>
<td>8.278</td>
</tr>
<tr>
<td>2001</td>
<td>8.277</td>
</tr>
<tr>
<td>2002</td>
<td>8.277</td>
</tr>
<tr>
<td>2003</td>
<td>8.277</td>
</tr>
<tr>
<td>2004</td>
<td>8.277</td>
</tr>
<tr>
<td>2005</td>
<td>8.195</td>
</tr>
<tr>
<td>2006</td>
<td>7.984</td>
</tr>
</tbody>
</table>

Source: ERS-USDA for 1995-2005 [23] and OANDA.com for 2006 [33].
the yuan vs. the U.S. dollar. Thus, complaints continue about the undervaluation of the yuan.

The value of the yuan in foreign exchange markets has important implications for the viability of China’s economy. China faces the possibility of an overheating economy and inflation partly because of the number of U.S. dollars that the country has acquired as a result of the large trade surplus that China runs with the United States. Andrew Browne, in a Wall Street Journal article, describes the problem as follows [7]:

As dollars flood into China, they are bought by the central bank in return for yuan, a process that keeps the value of its currency stable but floods local banks with cash. Big lenders such as Bank of China and Industrial Bank of China keep lending those funds—the loans are the source of most of their profits.

When the Chinese banks lend the large number of yuan at moderately low interest rates, this stimulates economic growth, but can generate strong competition for resources and inflation. Yuan acquired by the Chinese central bank also end up in government infrastructure projects. Large private sector investments and government infrastructure investments threaten to produce inflation.

Facing these issues, China’s government took the following steps in 2006 to reduce the threat of inflation and address other macroeconomic problems [7,8,9, and 51]:

- Prime bank lending rates were raised by 0.27 percentage point in April 2006 to 5.85 percent and again in August 2006 to 6.12 percent.
- Taxes and down payment requirements were raised in May 2006 to slow the property market and developers were ordered to build affordable apartments.
- Bank reserve requirements for yuan deposits were raised by 0.50 percentage point to 8.0 percent in June 2006 and by an additional 0.50 percentage point to 8.5 percent in July 2006.
- The foreign currency deposit reserve ratio for domestic and foreign commercial banks was raised from 3 percent to 4 percent in September 2006. This action will discourage banks from giving foreign currency loans to companies that could not qualify for yuan-denominated loans.
- Government authorities met with four large commercial banks to give them guidance on how to reduce lending.

These developments beg the question: Why are Chinese government authorities reluctant to let the yuan appreciate against the U.S. dollar? The reasons are too complex to be discussed in full here, but partly it is because Chinese authorities believe that allowing the yuan to appreciate would bankrupt certain exporters and create difficulties for farmers who would face additional competition from imported agricultural goods. The government also values the investments in infrastructure that are indirectly generated by the weak yuan. Reductions in investment in infrastructure might channel additional resources into exporting, exacerbating the problem of the trade surplus with the U.S.

It is unclear how successful China will be in handling problems created by rapid economic growth, the trade surplus with the U.S., the country’s high savings rate, and restrictions on investments by Chinese citizens and businesses in foreign countries. However, the seriousness of the challenges facing China’s economic policymakers should not be underestimated. Under a worst-case scenario, China could end up with problems similar to those that hit Japan (collapse of property markets, deflation, and near zero economic growth) during 1990 to 2005. This is because conditions in Japan immediately before its 15 years of near-zero economic growth paralleled somewhat closely those existing in China today.

**Summary Observations.** Many opportunities face China’s economy. The country’s rapid economic growth has transformed China into an economic power that wields strong influence in international markets and the WTO.

The challenges are also numerous. But two points not covered earlier warrant attention. Air and water pollution—partly attributable to China’s heavy use of coal, soil erosion, rapid industrialization, and a host of other developments—represent a problem. S. Oster in a Wall Street Journal article describes the worsening problem of pollution as follows [34]:
China’s environment has grown markedly worse during the past five years with rising levels of sulfur dioxide, acid rain, and water pollution—despite repeated promises by the government to fix the problems. Emissions of sulfur dioxide from steel mills and power plants nationwide rose 27% between 2000 and 2005 to 25 million metric tons—double what China’s environment can handle—and continued to grow rapidly in the first half of the year, according to a report to China’s top legislature.

It will be costly for China to obtain needed petroleum supplies. This is partly a problem of the country’s own making. The Economist reports that “China has accounted for one-third of the increase in global oil demand since 2000 and so must bear some of the blame for higher oil prices [20, p.62].”

Important implications emerge from data on the economy for China’s dairy industry. First, the rapid growth of real GDP—a proxy for income growth—suggests that sales of items that have a positive income elasticity of demand (including most dairy products) will grow substantially. Secondly, the apparently undervalued yuan will discourage Chinese imports, including dairy products and other agricultural items. Third, the incentives for foreign direct investment in China’s economy may promote foreign investments in the country’s dairy industry. The workings of such forces are complex. Therefore, the implications of the forces for the U.S. and world dairy industries are developed more fully in the section on drivers of change in China’s dairy industry.

**A DESCRIPTION OF CHINA’S DAIRY INDUSTRY IN THE MID-2000s**

China’s dairy industry defies easy description in the mid-2000s. The dairy farm sector is immensely varied, containing operations ranging from one-cow farms to large, industrial farm complexes. The processing sector is concentrated at the top, but has a large competitive fringe of about 1,600 small and medium-sized processors. Milk and dairy product distribution is almost as varied as the farm sector. China’s large cities have supermarkets similar to those found in the U.S. and Western Europe. China’s large rural population, however, is served with dairy products that lend themselves to distribution in areas with poorly developed cold chains.

**China’s Dairy Farms**

Wattiaux, Frank, Powell, Wu and Guo (Wattiaux et al.) conducted a field study of China’s dairy industry in 1999, which was reported in Babcock Institute Discussion Paper 2002-3 entitled, “Agriculture and Dairy Production Systems in China: An Overview and Case Studies [49].” The authors provide a useful history of the development of dairy farming in China.

Wattiaux et al. point out that after 1978 China’s government promoted development of dairy farming as part of the government’s move toward a market economy. This initiative specified that milk production no longer would be confined to state farms in and around large cities. As part of the transition to a market economy, multiple, competing forms of dairy farm ownership emerged in China, namely:

- Household farms, which are small and privately owned.
- Farms owned and operated under various management systems by units of city or provincial governments.
- Collective farms, located primarily in rural areas, which tend to be large and managed by the community.
- Business enterprises, which are large and privately operated.

The authors provided case studies of the following specific types of dairy farms that existed in the 1990s in China [49, p.35]:

- **Subsistence farming found primarily in China’s pastoral regions.** Milk is produced for family use by small ruminants or non-specialized dairy breeds that have multiple roles on the farm.
• **Subsistence farming found primarily in China’s agricultural regions.** Small private producers usually have one to four cows in lactation. Animals are herded alongside roads or in communal grazing areas when forage is available. These producers also harvest and transport forage, and feed stored forage to dairy animals during the winter.

• **Small- to medium-sized producers with 5- to 25-cow herds in which the animals are maintained almost exclusively in barns and exercise yards.** This semi-intensive type of enterprise is usually integrated with an agricultural operation where the producer grows animal feed and may purchase limited amounts of commercially available concentrate feeds.

• **Former state or collective farms in rural China.** These production units are part of the legacy of centralized, government-controlled agriculture. A representative farm from this category would often have a large number of labor units, would be centered around substantial brick buildings, and would have only a limited amount of modern equipment.

• **Peri-urban farms.** These intensive production units may be owned privately, by a township, or by a commune. These units also represent part of the legacy of a centralized economy, but they seem to be moving faster than their rural counterparts to a new structure. These units tend to operate in isolation from a land base. All feed and bedding is purchased from outside sources and all products (including manure) are sold or disposed of off the farm.

Wattiaux et al. noted that the extreme heterogeneity of milk product systems in China makes it difficult to generalize about which systems, if any, would dominate. However, it appears that most of the farm types described by Wattiaux et al. are now declining in importance. Indeed, anecdotal evidence points to trends toward greater concentration and industrialization of China’s dairy farms, trends that produce numerous challenges for the sector.

It is useful to note the nature of China’s dairy herd before considering these trends. China had a dairy herd of about 6.7 million dairy cows in 2005, making it about three-quarters as large as the U.S. dairy cow herd [46]. China’s dairy herd has grown rapidly in recent years—about 24 percent per year from 2000 to 2005. According to the USDA, there were about three million head of Holstein cows in China in 2004 or about 55 percent of the total dairy cows [4, p.4]. The remaining cows were crossbred between local cows and Holsteins or other breeds. China has upgraded the national herd through imports of dairy heifers mainly from Australia and New Zealand and by importing embryos and semen from Canada, the U.S. and other countries.

Analyst Dr. Shengli Li of the College of Animal Science and Technology of China Agricultural University in Beijing commented as follows about the growing number of medium-sized and larger dairy farms that emerged near major cities by the mid-2000s [25]:

> During the last five years (2000 to 2005), there are more and more medium and larger scale dairy farms coming into being around the big cities such as Beijing and Shanghai. These dairy farms have high quality dairy cows and modern equipment to feed and milk dairy cows. The average milk yield on these dairy farms is similar to that of developed countries. But they also have some problems, especially health problems with reproduction diseases (retained placenta, lower fertility and pregnancy rate, too many open days, etc.), metabolic disorders (ketosis, acidosis, etc.), poor body condition during the fresh period and foot diseases.

A Western dairy industry technician in China, described the problems that Mengniu—a large, integrated dairy processing and farming business—encountered in 2006 in efforts to establish large dairy farms in China, in these terms:

> We recently visited one of Mengniu’s new 6,000 milking cow farms (10,000 head total capacity). They imported more than 7,000 Australian heifers. The project is going through some very rough times due to faulty facility layout, design and construction. The management staff is unprepared for the onslaught of issues they will face as a result of rushing into this project. The upper management of this project has told us they will build 10–15 of
these farms, four or five are already moving along in some stage of construction or planning. They told us in clear terms that the only way they can get support from local and central government for dairy development is to do something like this. The government will not pay attention to 2,000–3,000 head dairies but 10,000 (head) is a magical number that brings attention and money. My understanding is that these farms will be largely financed with funds other than Mengniu’s.

This technician summarized the only partially completed transition to larger, industrial dairy farms in China’s dairy industry, as follows:

*I think the dairy industry is very hard to characterize—it is almost anything you want it to be. You can visit 10,000 head farms and one-cow farms and nearly anything in between. What is going on here parallels every other industry we have followed (e.g., poultry and swine). The transition from small household production to large commercial production is a messy and confusing process.*

While the previous comments suggest that China’s dairy farm sector faces difficult problems, this has not prevented China’s dairy farmers from recording large increases in milk production (Table 4). The figures on the increase in milk production in China can be usefully divided into two periods, 1991 to 1999 and 2000 to 2006. Increases in milk production from 1991 to 1999 averaged 5.6 percent per year. By contrast, the average increase in milk production from 2000 to 2006 was about 25 percent per year. The large double-digit increases in milk production in the 2000s were primarily a function of an increase in cow numbers, since milk production per cow commonly rose by only single-digit amounts each year during the early to mid-2000s in China.

In comparison to U.S. dairy farmers, China’s farmers have recorded relatively low milk production per cow. China’s 4.18 MT average milk production per cow was only 47 percent of the 8.88 MT U.S. figure for 2005 [46]. However, China’s milk production per cow increased from 2000 to 2005 at rates roughly equal to or greater than those recorded in some important dairy exporting countries—e.g., New Zealand, Australia and Argentina. For example, in 2000, milk production per
cow in China was essentially at parity with production per cow on farms in New Zealand’s pasture-based system, but in 2005 China’s milk production per cow was 15 percent higher than in New Zealand. This of course is not a remarkable achievement. One might expect higher milk production per cow in China since a larger percentage of the farmers in China feed stored forage and, in some cases, grain concentrates. However, the change has implications for import substitution, since New Zealand is a major exporter of dairy products to China.

*Why did China’s milk production increase so rapidly in the 2000s? Li of China Agricultural University in Beijing attributes the increase to relatively high profits from dairy farming compared to profits from poultry, hog or grain production [25, p.1]. Li notes that beginning in mid-2003, dairy farming profits decreased because of higher costs for feedstuffs, high cost of purchasing cows from New Zealand and Australia, the impact of milk powder use in liquid milk production,*

<table>
<thead>
<tr>
<th>Year</th>
<th>Cow’s Milk Production (1,000 MT)</th>
<th>% Change from Year Earlier</th>
</tr>
</thead>
<tbody>
<tr>
<td>1991</td>
<td>4,650</td>
<td>—</td>
</tr>
<tr>
<td>1992</td>
<td>5,031</td>
<td>+ 8.2</td>
</tr>
<tr>
<td>1993</td>
<td>4,990</td>
<td>-0.8</td>
</tr>
<tr>
<td>1994</td>
<td>5,288</td>
<td>+ 6.0</td>
</tr>
<tr>
<td>1995</td>
<td>5,764</td>
<td>+ 9.0</td>
</tr>
<tr>
<td>1996</td>
<td>6,296</td>
<td>+ 9.2</td>
</tr>
<tr>
<td>1997</td>
<td>6,674</td>
<td>+ 6.0</td>
</tr>
<tr>
<td>1998</td>
<td>6,620</td>
<td>-0.8</td>
</tr>
<tr>
<td>1999</td>
<td>7,176</td>
<td>+ 8.4</td>
</tr>
<tr>
<td>2000</td>
<td>8,274</td>
<td>+15.3</td>
</tr>
<tr>
<td>2001</td>
<td>10,255</td>
<td>+23.9</td>
</tr>
<tr>
<td>2002</td>
<td>12,998</td>
<td>+26.8</td>
</tr>
<tr>
<td>2003</td>
<td>17,463</td>
<td>+34.3</td>
</tr>
<tr>
<td>2004</td>
<td>22,606</td>
<td>+29.4</td>
</tr>
<tr>
<td>2005</td>
<td>28,000</td>
<td>+23.9</td>
</tr>
<tr>
<td>2006 (F)</td>
<td>33,800</td>
<td>+20.7</td>
</tr>
</tbody>
</table>

and the prevalence of cattle diseases such as tuberculosis, brucellosis, and foot and mouth disease. However, the negative impacts of these factors are not strongly evident in the milk production figures for 2004, 2005, or 2006 (Table 4). The location of milk production has changed modestly in China. In the late 1990s, 75 to 80 percent of China’s milk cows were located in or near seven cities and provinces in northern China (Beijing, Tianjin, Heilongjiang, Hebei, Shanxi, Inner Mongolia and Xinjiang) [25, p.2]. The number of cows in these cities and provinces declined to about 74 percent in 2000.

Li forecasts that the country’s milk production—especially from Holstein cows—will remain concentrated in the following, mostly northern, areas of China (see Figure 2) [25]:

- Around large and middle-sized cities (Beijing and Tianjin).
- Northeastern rural areas (mainly Heilongjiang).
- Northern rural areas (Hebei and Shanxi).
- Northwestern pastoral areas (Inner Mongolia and Xinjiang)

Li also notes that the dairy industry has developed rapidly in Shandong province. David Barboza in a New York Times article described the north as the “Wisconsin of China,” pointing out that the government and corporations are now pushing to develop this region [3]. The “Wisconsin of China” he refers to is a vast area that stretches from Xinjiang Province in the northwest across Inner Mongolia and east to Heilongjiang Province. Marshall Sun, a dairy specialist working at Robobank’s Shanghai office, shares this view, noting that “The north is already China’s Dairy Belt [3].”

Barboza elaborated on the nature of China’s dairy belt as follows [3]:

_Hohhot, which is about 415 miles northwest of Beijing, close to the border of Mongolia, is the epicen-

**FIGURE 2.** China’s Administrative Divisions

![China’s Administrative Divisions](image-url)
ter of the new milk boom. This is where China gets much of its raw milk. Two of the country’s biggest dairies, the Yili Corporation and Mengniu Dairy, are based here. And new dairy plants and ice cream factories are sprouting throughout the region. Indeed, Hohhot has already been dubbed Milk City by people here, largely because its outlying villages are dotted with thousands of small dairy farms.

The USDA reports that the top five milk-producing provinces in China in 2005 were Inner Mongolia, Heilongjiang, Hebei, Shandong and Xinjiang [5, p.4].

Milk quality is a significant problem on China’s dairy farms. There are a host of reasons for the poor quality, including unsanitary hand-milking procedures, antibiotics that are allowed to enter milk sold to processors, adulterated milk, inadequate quality testing measures, and the fact that farmers have few incentives to produce high-quality milk. Faced with the quality problems, some processors complain that they do not reject milk of substandard quality because the farmer can simply go down the road and sell the milk to a competitor. A few of China’s larger processors are developing improved mechanisms for measuring milk quality, including measures of somatic cell count.

**China’s Dairy Product Processing Firms**

In the late 1990s, China had only about 700 dairy processors [40]. By the mid-2000s, that number had grown to approximately 1,600 as more dairy processing firms entered the industry to capitalize on the country’s growing demand for dairy products.

In 2005, 90 to 95 percent of the 1,600 dairy processing firms operating in China were small- or medium-sized companies. However, concentration was relatively high at the top end of the distribution. FAS-USDA analyst, L. Schultz, reports that three of China’s “Big-6” processors (Mengniu, Yili and Bright Dairy) accounted for about 42 percent of the country’s dairy product sales in 2005 [40, p.12]. In total, the “Big 6” controlled over half of China’s fresh milk market in 2004 [28].

China’s dairy processors presently focus heavily on sales of liquid milk. In 2005, more than 50 percent of dairy product revenue was obtained from sales of liquid milk (Table 6). This is sharply higher than the comparable figures for Taiwan and Japan. McKinsey analysts, Cheung and Grant, forecast that the heavy emphasis on liquid milk sales will decline as China’s consumers gain familiarity with other dairy products and acquire the purchasing power needed to buy these other items [10].

Currently, UHT milk accounts for about two-thirds of all fluid milk sales in China [40, p.8]. Processors of UHT milk generally obtain higher gross profit margins because UHT milk has a longer shelf life and is cheaper to distribute. The majority of UHT milk is produced and distributed in the north. But, in relatively prosperous South China, northern UHT giants, Yili and Mengniu, have captured a large share of the fluid milk market because of their superior distribution and marketing resources.

**Table 5.** The “Big 6” Dairy Processors in China

<table>
<thead>
<tr>
<th>Name of Firm</th>
<th>Base Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mengniu Dairy Co., Ltd.</td>
<td>Inner Mongolia</td>
</tr>
<tr>
<td>Yili Industrial Co., Ltd.</td>
<td>Inner Mongolia</td>
</tr>
<tr>
<td>Bright Dairy &amp; Food Co., Ltd.</td>
<td>Shanghai Municipality</td>
</tr>
<tr>
<td>Sanyuan Foods Co., Ltd.</td>
<td>Beijing Municipality</td>
</tr>
<tr>
<td>San Lu Group Co., Ltd.</td>
<td>Hebei Province</td>
</tr>
<tr>
<td>Wandashan Dairy Co., Ltd.</td>
<td>Heilongjiang Province</td>
</tr>
</tbody>
</table>

Sources: Lu [28], Patton [38], MarketWatch.com [29].

**Table 6.** Percentage of Dairy Product Sales in Different Product Categories, China, Taiwan, and Japan, 2005

<table>
<thead>
<tr>
<th>Product Category</th>
<th>Product Sales by Country, %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>China</td>
</tr>
<tr>
<td>Liquid Milk</td>
<td>54</td>
</tr>
<tr>
<td>Powdered Milk</td>
<td>24</td>
</tr>
<tr>
<td>Milk Beverages</td>
<td>10</td>
</tr>
<tr>
<td>Yogurt</td>
<td>12</td>
</tr>
<tr>
<td>Cheese &amp; Other Dairy Products</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>102%</td>
</tr>
</tbody>
</table>

Source: Cheung and Grant [10]. Dairy product categories do not include ice cream. Figures for China do not add to 100 because of rounding error in the McKinsey publication.
Processors generally sell fresh, chilled products in local markets. Processors of fresh milk stand to gain market share—particularly in South China—as consumers who value freshness switch to the fresh product. However, the markets for fresh milk hit a snag in October 2005 when the government put into effect the “General Rule on Labeling of Pre-Packaged Foods” (GB7718-2004) [40, p.8]. This law prohibits the labeling of pasteurized, non-UHT milk as “fresh.” Only raw milk can be labeled as “fresh.” Non-UHT milk must be labeled as “pasteurized” or “pure,” terms that carry no image of freshness to Chinese consumers. This General Rule appears to be structured to help small fluid milk processors compete against larger dairy firms.

China’s State Council issued a related rule in October 2005 stating that processors must identify on the product label whether a fluid milk product was produced through reconstitution and specify the percentage of reconstituted product in the ingredient list on the label [5]. This complex rule further specified that milk plants planning to use reconstituted milk for making fluid milk products should register with a local quality supervision agency and provide the agency with the following:

- Information on whether imported milk powder will be used for making reconstituted milk products.
- Information on whether domestically-produced milk powder will be used for reconstitution. If so, the location of the domestic plants and data on the quality of milk powder obtained from the domestic milk powder plants must be specified.
- Identity of the markets areas where the reconstituted milk will be sold.

If this and other information is not provided by a processor, the Administration of Industry and Commerce will not issue a production license for the reconstituted product.

This rule will discourage Chinese processors from making reconstituted milk since, as noted above, Chinese consumers regard such products as inferior to fresh products. Also, the rule, if widely enforced, will limit China’s milk powder imports and deprive processors of a source of raw product, which is frequently cheaper than domestically-produced milk.

These are not the only snags encountered by China’s fluid milk processors. Scandals have hit a few well-known domestic and foreign dairy firms in China, causing consumers to lose confidence in the quality of dairy products [13,27]. Bright Dairy & Food Company was found to reprocess expired milk and to improperly date product containers, creating false impressions about the freshness of milk. Nestle’s baby formula milk was found to contain excessive amounts of iodine. In a related development, infants died from consuming milk formula with no nutritional value made in Fuyang in East China’s Anhui Province.

These appear not to be isolated incidents [13,27]. Recycling expired milk apparently is common in the domestic dairy industry. Milk is also frequently contaminated before it enters the processing procedures [13,27].

Cheese. China’s processors and importers market relatively small amounts of cheese in China. Sales of cheese in China totaled $49.7 million in 2005 [40, p.9]. Schultz of USDA-FAS describes the potential for expanding cheese sales in China and the challenges associated with achieving the potential sales, in these terms [40, p.9]:

As the Chinese become more familiar with cheese, largely thanks to exposure at Western fast-food giants McDonald’s, KFC, and Pizza Hut, sales are growing rapidly. In fact, 2005 sales jumped 18% from 2004, marking a 123 percent increase since 2000. Volume of cheese sales for the year reached 4,160 MT . . . Despite this growth, cheese is still very much a niche market. Per capita consumption of cheese in China is about one-third of a pound—less than one percent of U.S. cheese consumption. A big challenge to marketing cheese is that many Chinese find it hard to digest. There is also limited product availability, especially in rural areas, and cold-chain distribution is relatively underdeveloped.

Different reports show larger consumption figures for cheese in China. Thus, about all that is certain is that cheese presently represents a relatively small, niche market in China.
Powdered Milk. Processors of powdered milk have made important sales gains in the early 2000s, but these gains are likely to be short lived. Schultz characterizes the situation as follows [40, p.8]:

*Sales of milk powder reached $1.6 billion in 2005. This signifies a 9.7 percent gain over 2004, and a total increase of nearly 50 percent since 2000. The long shelf life, low cost and ease of preparation make it an attractive product for many consumers. However, the market for powdered milk is relatively mature compared to other dairy products, and growth is expected to slow over the next five years.*

Ice Cream. Ice cream represents one of the most visible signs of dairy consumption in China. In urban areas, ice cream is sold in a host of outlets including convenience stores, fast food outlets, supermarkets and street vendors. Schultz describes the ice cream market as follows [40, p.9]:

*In 2005 alone, sales of dairy ice cream totaled nearly $2 billion. Thanks to its strong economy and long, hot summers, South China boasts the highest per capita consumption of ice cream in the country. Sales in the region have expanded by over 56 percent since 2000 and are expected to gain an additional 40 percent by 2010.*

Foreign firms have acquired a substantial share of China’s ice cream market (Table 7). Walls, Nestle and Meadow Gold had approximately a 30 percent share of China’s ice cream market in 2004–2005. This suggests that the pricing and marketing strategy of these foreign firms was superior to that of other foreign sellers of dairy products. As noted below, foreign companies that acquired processing plants in China’s dairy industry have experienced numerous difficulties.

Changes in Foreign Investment in China’s Dairy Processing Industry. A host of well-known foreign firms invested in China’s dairy processing industries in the 1990s. With few exceptions, these firms suffered losses and withdrew from the market, frequently selling their dairy processing assets at cents on the dollar to domestic firms. Foreign firms hit by losses included Kraft, Danone, Parmalat, Unilever and Friesland Coberco. Foreign firms returned to China’s dairy processing industry in the mid-2000s under plans that involved equity investments and purchase agreements with domestic dairy firms.

Why did foreign firms experience so much difficulty in China’s dairy industry in the 1990s? Chen Yu, a Beijing-based dairy marketing consultant, reports that multiple factors were involved [28]:

- Most foreign firms did not operate their own dairy farms in China. Chinese consumers value freshness highly. And China’s consumers do not consider imported milk to be as fresh as milk produced by domestic companies, most of which operate dairy farms.
- Foreign companies failed to gain access to valuable distribution networks that extend into many cities and communities.
- Foreign processors largely misread the buying habits of urban consumers, leading to incorrect positioning of their products. Parmalat, for example, focused mainly on marketing its expensive, high-end products in China. Its fruit-flavored yogurt (100 grams) was sold at 2 yuan (U.S.$0.24) per cup, double the price of similar local brands, while its main product, milk, was sold only in large supermarkets.
- Foreign firms seldom used television or newspaper advertising to promote their products, which was a questionable marketing strategy in China’s immature market, where customers have little brand loyalty and are readily influenced by advertising and promotion.

<table>
<thead>
<tr>
<th>Firm</th>
<th>Base Location</th>
<th>Market Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walls</td>
<td>UK</td>
<td></td>
</tr>
<tr>
<td>Nestle</td>
<td>Switzerland</td>
<td></td>
</tr>
<tr>
<td>Meadow Gold</td>
<td>U.S.</td>
<td></td>
</tr>
<tr>
<td>Combined Market Share</td>
<td></td>
<td>30%</td>
</tr>
<tr>
<td>of the Three Foreign Firms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mengniu Dairy Co., Ltd.</td>
<td>Inner Mongolia</td>
<td></td>
</tr>
<tr>
<td>Yili Industrial Co., Ltd.</td>
<td>Inner Mongolia</td>
<td></td>
</tr>
<tr>
<td>Combined Market Share</td>
<td></td>
<td>27%</td>
</tr>
<tr>
<td>of the Two Chinese Firms</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Ying [52].
High operating costs contributed to problems of the foreign firms in an industry where profit margins are thin. In some cases, high salaries for expatriates consumed a major portion of the profits from dairy sales.

How have the new equity and related foreign investments in China’s dairy processing businesses manifested themselves? A few recent equity investments in China’s dairy industry or purchase agreements involving foreign firms are described below:

- Fonterra of New Zealand purchased a 43 percent equity interest in Hebei Province-based San Lu Dairy Group in 2006 [37]. The 43 percent interest in San Lu cost Fonterra about U.S.$107 million.
- Mengniu Dairy Company entered into a joint venture with Arla Foods of Sweden to produce milk powder in 2005 [12]. The joint venture, which is owned 51 percent by Mengniu, will have registered capital of 180 million yuan (U.S.$21.96 million).
- Danone of France announced plans to double its stake in Bright Dairy and Food Company to nearly 10 percent in 2005 [2]. Prior to the 2005 announcement, Danone had acquired a 3.85 percent stake in Bright Dairy.
- French retailer, Carrefour, entered an agreement with Xiajin Dairy in northwest China’s Ningxia Hui Autonomous Region for the production of milk [11]. Milk produced by Xiajin Dairy will be marketed under the Carrefour brand and sold in the French firm’s stores in China. Carrefour estimates that it will purchase about 200 million yuan (U.S.$24.7 million) of production from Xiajin Dairy in the two years after the agreement becomes effective.

Fonterra’s direct investment in San Lu Dairy Group is the largest recent foreign investment in China’s dairy processing business and illustrates the mutual gains expected by San Lu and Fonterra from the investment.

San Lu, which has its headquarters in Shijiazhuang the provincial capital of Hebei, started out as a large-scale state enterprise raising dairy cows and processing and packaging milk and milk powders. The firm now produces about 60 varieties of milk powder, including baby formulas and nutritional supplements, and has expanded into liquid milk, yogurt and flavored drinks [32]. San Lu believes that the firm will benefit from access to Fonterra’s management experience, R&D, and advanced marketing skills under the ownership arrangement.

Gaining access to foreign R&D is likely to be important to San Lu and other Chinese firms for reasons mentioned by Cheung and Grant [10, p.8]:

The top five Chinese dairy companies, for instance, spend less than 1 percent of their revenues on R&D, compared with 3 to 4 percent for their Western counterparts. As a result, domestic Chinese companies tend to differentiate products such as milk beverages by pumping out many different flavors and packaging variations, without considering the logic behind them.

Fonterra, the largest private dairy exporting firm in the world, is the mega-cooperative formed by the merger of the New Zealand Dairy Group, Kiwi Cooperative Limited, and the New Zealand Dairy Board in October 2001. The cooperative recorded total revenue of approximately U.S.$8.76 billion in 2004–2005. Andrew Ferrier, Fonterra’s CEO, made the following comments about the firm’s San Lu investment [37]:

Developing a closer working relationship with San Lu is the logical next step for Fonterra’s business in China. . . . It complements our existing importing and consumer businesses there by partnering us with a local company that has access to local fresh milk supplies . . . New Zealand has been a successful exporter of dairy ingredients to China for decades, but as local production increases to meet the rapidly growing local demand, becoming part of the local industry will give Fonterra further opportunities to employ our expertise in all areas of the business from milk collection to consumer goods.
Characteristics of China’s Consumer Markets for Dairy Products

Many inferences can be drawn about the nature of consumer markets for dairy products in China from material on the country’s dairy processors. However, a few characteristics of the Chinese consumer market for dairy products need to be more fully described.

China’s Low Per Capita Consumption of Dairy Products. China has one of the lowest annual per capita consumption rates for dairy products in the world—by one recent estimate only about 22 kg per capita or one-fifth the world average [6]. A number of factors account for China’s low per capita consumption of dairy products, including lack of familiarity with some dairy products, lactose intolerance and low incomes in rural areas of the country.

Dairy Products are Expensive in China. Certain foreign processors experienced problems in China’s dairy industry in the 1990s because they priced their products too high. But it is not just dairy products marketed by foreign-based dairy firms that are expensive, as noted in the comment by Schultz in 2006 [40, p.12]:

... While many foods in China cost less than half their U.S. counterparts, dairy product prices in China are often similar or even higher than those in the U.S. UHT milk, for example, costs roughly the equivalent of $3.00 per gallon. Fresh milk, on the other hand, is usually more than $4.00 per gallon. At about $2.50 per gallon on a reconstituted basis, powdered milk is the cheapest milk option. To put some of the other products into perspective, cheese costs the equivalent of over $5.50 per pound, while butter is around $2.50 per pound and yogurt costs $7.50 to $1.00 per pint.

Government Attitudes Toward Dairy Products in China. The government of China recognizes the importance of dairy products in the Chinese diet [40, p.4]. Consequently, the government has initiated school milk programs that reached 15 million students in 2005. The government has also implemented a military milk program.

The Urban-Rural Consumption Differential for Dairy Products. Consumption of dairy products by China’s rural consumers is sharply lower than the figure for urban consumers (Table 8). While per capita consumption of selected dairy products by rural consumers in China increased modestly from 1995 to 2005, the increase was sharply lower than the rate recorded for urban consumers. Indeed, consumption by rural consumers as a percentage of consumption by urban consumers declined from percentages in the teens in the late 1990s to single digit figures in 2003 and 2005. Data reported by BizChina show slightly larger dairy product consumption figures for rural China (about 2 kg/year for 2005) than indicated in Table 8 [6]. However, the BizChina figure also shows that consumption of dairy products in rural China is a small fraction of the urban consumption figure.

Schultz provided the following comments about recent trends in consumer markets for dairy products in China, including problems associated with serving rural areas [40]:

- Prices for dairy products are declining and cold-chain distribution for fresh milk, yogurt and ice cream is slowly improving. A wide selection of dairy products including both fresh and UHT-preserved milk, flavored yogurt drinks, and novelty ice cream is now available from supermarkets, convenience stores, and home

TABLE 8. Average Consumption of Specified Dairy Products by Urban and Rural Consumers in China, Selected Years 1995 to 2005

<table>
<thead>
<tr>
<th>Year</th>
<th>Consumption by Urban Consumers (Kg/year)</th>
<th>Consumption by Rural Consumers (Kg/year)</th>
<th>Rural Consumption as % of Urban Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>5.23</td>
<td>0.64</td>
<td>12.2%</td>
</tr>
<tr>
<td>1996</td>
<td>5.56</td>
<td>0.80</td>
<td>14.4</td>
</tr>
<tr>
<td>1997</td>
<td>5.92</td>
<td>0.95</td>
<td>16.0</td>
</tr>
<tr>
<td>1998</td>
<td>7.25</td>
<td>0.93</td>
<td>12.8</td>
</tr>
<tr>
<td>1999</td>
<td>9.19</td>
<td>0.96</td>
<td>10.4</td>
</tr>
<tr>
<td>2003</td>
<td>13.00</td>
<td>1.10</td>
<td>8.5</td>
</tr>
<tr>
<td>2005</td>
<td>21.70</td>
<td>1.10</td>
<td>5.1</td>
</tr>
</tbody>
</table>

Source: China urban and rural residents’ animal products consumption research as reported by Li [25]. The average annual consumption figures include estimates for fresh milk, yogurt and milk powder only.
Drivers of Change in China’s Dairy Industry—Implications for the U.S. and World Dairy Industries


<table>
<thead>
<tr>
<th>Product</th>
<th>Value of U.S. Dairy Exports To China (U.S.$1,000)</th>
<th>Share of China’s Dairy Imports (%)</th>
<th>Rank in 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2003</td>
<td>2004</td>
<td>2005</td>
</tr>
<tr>
<td>Fluid Milk</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Powdered Milk</td>
<td>4,546</td>
<td>9,123</td>
<td>12,646</td>
</tr>
<tr>
<td>Yogurt</td>
<td>16</td>
<td>35</td>
<td>25</td>
</tr>
<tr>
<td>Whey</td>
<td>25,187</td>
<td>30,992</td>
<td>46,378</td>
</tr>
<tr>
<td>Dairy &amp; Butter Spreads</td>
<td>421</td>
<td>12</td>
<td>36</td>
</tr>
<tr>
<td>Cheese &amp; Curd</td>
<td>487</td>
<td>912</td>
<td>1,471</td>
</tr>
<tr>
<td>Total</td>
<td>30,657</td>
<td>41,075</td>
<td>60,558</td>
</tr>
</tbody>
</table>

Source: Global Trade Atlas as reported in Schultz [40, p.14].

delivery services in metropolitan areas across China.

- In China’s urban areas more than 90 percent of urban households own refrigerators, providing the ability to store high-quality milk and dairy products. Less than 18 percent of consumers in rural areas own the appliance.

- Income differentials exacerbate the problem of selling dairy products in rural areas. In 2004, the reported average urban per capita income was U.S.$1,163 (up 11.2 percent from 2003), while the reported average rural per capita income was U.S.$362 (up 12 percent from 2003).

In the immediate future, China’s dairy firms are likely to find it most feasible to market products such as UHT-milk and milk powders in rural areas, products which do not require a well-developed cold chain.

Consumption of Imported Dairy Products. Consumption of imported dairy products varies by region. The Center for Agricultural and Rural Development at Iowa State University indicated that about 66 percent of households in Guangzhou have purchased imported dairy products, citing costs, availability and safety as the major reasons for the purchases [40, p.6]. Consumer purchases of imported dairy products are substantially less frequent in poorer areas and areas distant from the coast.

U.S. firms were the second largest exporters of dairy products to China in 2005, trailing only New Zealand. U.S. dairy exports to China were valued at US$60.6 million in 2005, making China the seventh largest U.S. dairy export market in dollar terms. The biggest U.S. dairy export item was whey—U.S. firms had a market share of more than 29 percent for this item in 2005 (Table 9).

**DRIVERS OF CHANGE IN CHINA’S DAIRY INDUSTRY**

This paper describes an industry in transition. Urban areas exhibit many characteristics of a modern dairy industry—e.g., dairy products are distributed through supermarkets in metropolitan areas. However, distribution of dairy products in China’s rural areas is restricted and confined to a small number of products because of income and cold chain constraints. Processing presents a mixed picture of old and new. Equally great contrasts are found in dairy farming. How will major drivers of change influence this picture?

**Driver No. 1: Income Growth**

Probably the most important driver of change is the rapid income growth in China, especially in urban areas. The real GDP growth figure in Table 2 (10.2 percent in 2005) provides a proxy for income growth. This figure, a population growth estimate (0.59 percent for 2006, Table 2), and income elasticities of demand for dairy products can be used to generate rough estimates of future increases in dairy product sales in China.
Specifically, annual increases in dairy product sales can be estimated by multiplying the rate of increase in income by the income elasticity of demand and adding this product to the rate of increase in population.

The income elasticity of demand estimates for dairy products listed in Table 10 generally pass reasonableness tests. However, the income elasticities of demand for milk and all dairy are surprisingly high compared to the figures for yogurt and ice cream. One might expect purchases of yogurt and ice cream (luxury items in the eyes of some consumers) to be more responsive to income increases than milk or all dairy products. A number of factors could account for these differences in income elasticities, including different estimation techniques and the different time periods reflected in the data. The income elasticity of demand estimates for milk powder are plausible. In the Fuller et al. study referenced in Table 10, milk powder has a negative income elasticity of demand and in another study a low (0.122) value, suggesting that as incomes in China grow, income-driven purchases of this product will show little increase or decline.

Estimates of annual changes in product purchases using the formula described above and the high and low income elasticities from Table 10 appear in Table 11. These estimates would apply mostly to urban areas because the income elasticities were estimated mainly from data for urban populations. For milk, the forecast increases in consumption are 3 to about 7 percent per year. For all dairy products, the comparable figures are 4 to 5 percent. The range in increase for yogurt is larger, varying from 2 to over 6 percent per year. Owing to the surprisingly low income elasticity estimate for the product, ice cream purchases would increase by only 2 to 3 percent per year. Milk powder sales would decrease or increase by only small amounts.

While these estimates apply mostly to China’s urban population, the impact should not be underestimated. By 2010, for example, China’s urban population could be as high as 47 percent of the total population [36]. Forty seven percent of 1.345 billion people—China’s estimated population in 2010 at current growth rates—represents a total of about 632 million people. Therefore, China’s urban population represents a huge market.

Rough estimates were developed of the increase in purchases of milk, yogurt and milk powder by China’s

<table>
<thead>
<tr>
<th>Study</th>
<th>Data</th>
<th>Product</th>
<th>Income Elasticity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuller, Beghin and Rozelle [22]</td>
<td>2001 Survey Data from Beijing, Shanghai and Guangzhou</td>
<td>Milk</td>
<td>0.366</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yogurt</td>
<td>0.135</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Milk Powder</td>
<td>-0.084</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ice Cream</td>
<td>0.190</td>
</tr>
<tr>
<td>Wang, Zhou and Yang [48]</td>
<td>1999 Survey Data from Jilin, Inner Mongolia, Shandong, Jiangsu, Sichuan and Guangdong</td>
<td>Milk</td>
<td>0.320</td>
</tr>
<tr>
<td>Liu and Chern [26]</td>
<td>1998 Expenditure Survey Data from Shandong, Jiangsu, and Guangdong</td>
<td>Milk</td>
<td>0.657</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yogurt</td>
<td>0.600</td>
</tr>
<tr>
<td>Zhang and Wang [54]</td>
<td>1998 Survey Data for All Dairy 30 Major Cities</td>
<td>Milk</td>
<td>0.381</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yogurt</td>
<td>0.271</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Milk Powder</td>
<td>0.182</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.122</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Jiangsu</td>
<td>0.464</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Shandong</td>
<td>0.329</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Guangdong</td>
<td>0.339</td>
</tr>
</tbody>
</table>
urban consumers by the year 2010 under the following assumptions:

- Income-driven increases in purchases of milk, yogurt and milk powder average 2.9 percent per year (based on average income elasticities for these products in Table 11).
- China’s total population increases by 0.59 percent per year.
- China’s urban population increases by 1.1 percent per year [36].
- Base year (2005) consumption of milk, yogurt and milk powder by urban consumers was 21.7 kg per year (figure from Table 8).

The assumed values for these variables produce increases in purchases of milk, yogurt and milk powder by China’s urban consumers from 11,329,176 metric tons in 2005 to 15,828,544 metric tons in 2010—nearly a 40 percent increase. Because other data sources show a slower rate of urbanization for China, the 40 percent figure may overestimate the actual increase in dairy product sales. Nonetheless, the analysis suggests that increases in dairy product purchases of only a few percentage points a year—when spread over China’s large, urbanizing population—produce very large increases in aggregate dairy product sales over a few years.

Figures in Table 6 show that people in Japan and Taiwan consume more milk beverages and yogurt and less liquid milk than the Chinese consumer. McKinsey analysts, Cheung and Grant, predict that China’s consumption patterns will become more like those of Japan and Taiwan as the incomes of the Chinese people increase [10]. This may be so, but the income elasticities in Table 10 provide little support for such an argument. Rather these data suggest that milk purchases, for example, might increase by a larger percentage than purchases of yogurt in response to income gains in China.

There is evidence that income elasticities of demand for livestock products have increased over time in China. This raises the possibility that the relationship among income elasticities of demand for different dairy products might also change over time. Accordingly, income elasticities based on more recent data might support the predictions of the McKinsey analysts about income-generated changes in China’s dairy product mix.

**Driver No. 2: Pressures for Greater Concentration in Milk Processing**

In the mid-2000s, China had approximately 1,600 milk processors. Forces are in play that will produce a more concentrated dairy processing industry in China in the future. Price wars already have reduced margins and forced some small dairy processors out of business [40, p.12].

In a 2006 McKinsey report, Cheung and Grant described the reasons for a shakeout in China’s dairy processing business and the increased concentration that will result, as follows [19]:

*Milk beverages and yogurt, for example, are innovation-driven products requiring strong R&D*
formulation and consumer segmentation skills, and many domestic dairy companies have little of either. . . . The top five Chinese dairy companies, for instance, spend less than 1 percent of their revenues on R&D, compared with 3 to 4 percent for their Western counterparts . . . The domestic companies must build new capabilities in areas such as product development, branding, account management and marketing . . . But many of the smaller companies without such advantages (advantages gained in part from teaming with foreign firms) are likely to disappear in a wave of consolidation . . . We expect that by 2010 more than half of China’s 1,600 domestic dairy manufacturers will fail to survive the transition (emphasis supplied).

Surviving processors will be larger and employ advanced technologies, upgraded management skills, and R&D acquired, in part, from foreign investors. Because it includes these attributes, the Fonterra-San Lu Dairy Group partnership might be a successful model for China’s future dairy processing industry.

In many of the world’s dairy economies, important economies of scale exist in milk processing. If similar economies of scale are to be realized in China, many processors will find it necessary to merge with other firms or simply go out of business as bigger firms gain market share. Expect China’s “Big 6” processors and their foreign partners to gain market share as they achieve scale economies.

Niche markets will continue to exist for small processors in the future, particularly those that discover profitable ways of serving rural customers in China.

Driver No. 3: Pressures to Improve the Efficiency of Milk Production

China’s dairy farms will be pressured to elevate milk production per cow and eliminate disease and management problems.

Mike Ginnivan, Managing Director of Dairy Australia, noted in 2005 that China wants to boost milk production from about 3,000 liters per cow per year to 5,000 liters per cow annually [14]. He added that the push for higher domestic milk production in China stems from “. . . ongoing strong economic growth, urbanization, the desire for self sufficiency (emphasis supplied), and nutritional benefits . . . [14].”

According to Ginnivan, the Chinese will attempt to achieve increases in milk production per cow mainly through improved genetics and nutrition. Surprisingly, he did not predict that the improvements in China’s dairy herd would occur mainly through importing dairy heifers from Australia and New Zealand. While about 59,500 (84 percent) of Australia’s dairy cattle exports of 70,800 head were shipped to China in 2004-2005, Australia’s dairy cattle exports have since declined to low levels. Several reasons were given for the decline, including concerns about heifer quality and the suitability of the Australian heifers for conditions in China. Evidently, embryos and semen will become an increasingly important substitute for imported heifers as a mechanism for upgrading the genetics of China’s dairy herd.

Management upgrades will be necessary if milk production per cow is to increase substantially in China. Chinese business and government officials may find that 10,000 cow farms are too difficult to manage efficiently under current conditions. Bad experiences with very large dairy firms in the former Soviet Union suggest how difficult it can be to manage such farms successfully. A few of China’s large dairy processors have found it profitable to partner with foreign firms to improve the efficiency of their operations. Additional input from foreign technical experts could also increase milk production and improve herd health on China’s large dairy farms.

Driver No. 4: Pressures for Improved Milk Quality

Expect pressures from urban consumers for higher quality milk and dairy products to accompany increases in consumer incomes. Indeed, among urban consumers the income elasticity of demand for quality attributes in milk and dairy products is probably relatively high in China. There is anecdotal evidence for such an idea since urban consumers already have expressed strong displeasure with processors who sold improperly-dated, adulterated, and reprocessed milk. This displeasure was marked by a decline in loyalty for the products of offending firms.
The larger processors that survive the shakeout in the dairy processing industry will be equipped to supply milk and dairy products of better quality to consumers. A few large processors already have developed better testing mechanisms—e.g., tests of somatic cell counts—to measure the quality of the milk purchased from farmers. If higher quality milk and dairy products generate higher profits for such firms, they will be in position to give farmers incentives to produce high quality milk. The improvements in the efficiency of milk production described in Driver No. 3 can also be expected to contribute to higher milk quality.

**Driver No. 5: Potential Demand for More Dairy Products in Rural Areas**

While expanding milk production, processing and distribution in China’s rural areas would improve nutrition and expand employment in these areas, it is unclear whether large increases in demand for dairy products will materialize in rural areas. Shortcomings in the cold chain and income constraints presently limit dairy product purchases in rural China.

Two ways of satisfying desires of rural consumers for additional dairy products come to mind. First, innovative entrepreneurs might craft mechanisms for providing a needed cold chain and basic dairy products at relatively low prices for consumers in selected rural areas. If profits materialize from such efforts, this would lure other entrepreneurs into the business. Secondly, government officials might subsidize production and distribution of dairy products in rural areas to improve nutrition and increase rural employment. Of course, China’s rural markets can be supplied with dairy products by other means. Thus, experiments with different ways of expanding dairy product sales in rural areas are likely to occur.

Babcock Institute personnel have heard anecdotal reports about one program that involved gifts of dairy cows by the government to poor rural families. According to the anecdotal accounts, this program has failed to work satisfactorily. In some cases, the poor rural families receiving the cows lacked the resources needed to feed the cows properly. In addition, some of the cows gifted to the rural families were low-producing cull cows from large dairy operations. If these pathologies are common, the program would be of questionable value for improving nutrition, farmer incomes, and sales of dairy products in rural areas.

**Driver No. 6: Pressures for Repeal of General Rule on Labeling of Pre-packaged Foods**

This law, it will be recalled, prohibits the labeling of pasteurized, non-UHT milk as “fresh.” Only raw milk can be labeled as “fresh.” The law apparently was designed to help small processors compete against larger processors. This law presumably discourages pasteurization of milk and harms the health of consumers. It is also doubtful whether this measure will do much to preserve the financial health of small dairy processors. In view of the problems created by the law, pressures probably will build for elimination or non-enforcement of the law’s provisions. It is already unclear whether the law is being widely enforced.

As these drivers play out, a more modern dairy industry will emerge in China. There will of course be remnants of the types of dairy industry that Wattiaux et al. described in their study. In particular, small farms that provide milk for family consumption in rural areas will remain in the industry. Experience with industrialized farms will likely define more successful (probably smaller) models. While milk production in China is unlikely to increase as rapidly as in the early and mid-2000s, it will continue to expand at a faster rate than recorded in the 1990s.

China’s dairy processing industry will become more concentrated. The Fonterra-San Lu Dairy Group partnership might become a model for other processors since this type of partnership brings to San Lu needed management skills, marketing skills, and R&D and gives Fonterra access to domestic milk supplies. Processors will respond to demands for better quality dairy products.

Milk and dairy product sales will increase most rapidly in urban areas. Experimentation with viable distributions for the rural areas will be common. However, it is unclear whether rural consumers will become important consumers of dairy products in the next decade. China’s rural areas will continue to feature informal milk distribution systems that resemble those found in underdeveloped countries.
In summary, China will likely witness emergence of a two-tiered dairy industry. The segment of the industry serving the country’s urban population will become a modern, more efficient dairy industry within a limited number of years. The industry segment serving rural China will be characterized by less dramatic change. Indeed, many business experiments will probably be needed before successful models are identified for serving rural China’s dairy markets.

**IMPLICATIONS OF THE DRIVERS FOR THE U.S. AND WORLD DAIRY INDUSTRIES**

Implications emerge from the drivers and other information in this paper for the U.S. and world dairy industries. More than a decade ago scholarly papers were published and seminars held on the question of “Who Will Feed China?” Frequently the answer was “China Will Feed China.” The rapid development of China’s dairy industry suggests that China will supply most of the dairy products desired by China’s consumers.

Developments in China’s dairy industry are too complex to support the idea that China is implicitly pursuing an import substitution strategy regarding dairy products. However, the paper suggests that China is increasing efforts to achieve greater self-sufficiency in milk and dairy product production.

Other implications for the U.S. and world dairy industries are less sweeping and include the following:

- Successful investments in China’s dairy processing industry are likely to be equity investments or purchasing agreements. Investments similar to Fonterra’s equity investment in the San Lu Dairy Group probably have the greatest chance for success.
- Fonterra’s decision to partner with the San Lu Dairy Group says something about opportunities for foreign direct investment versus exports of dairy products to China. New Zealand (and hence Fonterra) is the No. 1 exporter of dairy products to China. The fact that Fonterra chose to make a relatively large direct investment in dairy processing in China indicates how the firm views the relative payoffs from direct investment versus exports.
- China is a complex dairy market with large differences in purchasing power among different consumer groups. China’s urban consumers will represent a market of substantially over a half billion people within a few years. Moreover, increases in dairy product purchases of only a few percentage points per year—when spread over China’s large, urbanizing population—produce very large increases in aggregate dairy product sales over a few years. Domestic and foreign firms will compete aggressively for this large market in the next several years.
- China’s rural consumers will remain difficult to serve profitably for at least a decade because of low rural incomes and a poorly developed cold chain. Opportunities may arise for foreign dairy firms that have successful experience in the dairy industries of developing countries—e.g., Africa, former Soviet Union and India—to serve this market profitably. Foreign firms that partner with domestic companies probably will have the best chance to succeed.
- U.S. companies may continue to export large quantities of whey powder to China. Whey is a versatile product that can be used to produce products ranging from animal feeds to nutrition bars in China. Hence, there probably will be strong demand for U.S. whey imports.
- Cheese is likely to remain a small, niche market in China. Opportunities to export cheese to China will continue to be available for firms serving hotels, fast-food restaurants and expatriates in mostly urban areas of China.
- Foreign firms planning to invest in China’s dairy industry will find it useful to monitor changes in that country’s dairy product mix. McKinsey analysts forecast that China’s urban consumers will shift to consume more yogurt, ice cream and milk drinks (and less liquid milk) as their incomes rise. However, the income elasticities for different dairy products raise doubts about this predicted change.
• U.S. and other foreign companies may have opportunities to supply semen and embryos for upgrading the quality of China’s national dairy herd. Operators of large dairy farms in China have found it difficult to obtain the full production potential from dairy heifers imported from Australia and New Zealand. These experiences are likely to push China to make greater use of imported semen and embryos for upgrading dairy herds.

• China’s large, integrated processing and farming businesses may find it profitable to make greater use of foreign technical experts for upgrading health-care and management on large, industrial-type dairy farms.

• Statistics on China’s economy and dairy industry are imperfect. Investment decisions relating to China’s dairy industry should take into account the problems created by the less-than-fully-reliable statistics.

There are, of course, no guarantees that the drivers of change will generate the impacts and produce the implications for the U.S. and world dairy industries described in the paper. Indeed, Simon Tucker of Fonterra of New Zealand said at a Babcock Institute conference that the future of China’s dairy industry is highly uncertain [42]. Tucker laid out two divergent futures for China’s dairy industry. One was a rapid-growth scenario that had China becoming largely self-sufficient in dairy products and a dairy exporter. The other was a slow-growth scenario under which it was unclear whether China would increase its level of self-sufficiency in dairy products. He attached no probabilities to the two scenarios. This paper suggests that the future of China’s dairy industry lies somewhere near the middle of the two scenarios described by Tucker. In particular, China’s milk production is not likely to increase as rapidly in the future as during 2000 to 2006. However, neither are there indications that the country’s milk production will slow to rates recorded in the 1990s.

This paper provides potentially useful hypotheses for future studies of China’s dairy industry.

REFERENCES

32. New Zealand Herald. “ Fonterra’s San Lu Investment Looms Large,” nzherald.co.nz, 21/11/05.
42. Tucker, S. Vice President, Fonterra of New Zealand, Comments Delivered at Babcock Institute’s “Great Milk, Great Markets” Conference in La Crosse, Wisconsin on September 12, 2006.