

China's Dairy Market: Consumer Demand Survey and Supply Characteristics

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Abstract

This report documents data and other information gathered from a survey of urban households in Beijing, Shanghai, and Guangzhou, China. The survey was conducted as part of a research project aimed at understanding the evolution of dairy markets in Asia and the implications for dairy product trade. The survey data provide insights into the purchasing behavior and attitudes of urban consumers in China with respect to dairy products. The report describes the survey and collection process, summarizes selected data from the survey, and provides anecdotal information about the development of dairy production, processing, and product marketing in China.

Keywords: China, dairy products, demand, production, supply chain, survey data.

CHINA'S DAIRY MARKET: SURVEY RESULTS FOR CONSUMER DEMAND AND SUPPLY CHARACTERISTICS

Introduction

This report documents data and other information gathered from a survey of 314 urban households in Beijing, Shanghai, and Guangzhou, China. The survey was conducted in the fall of 2001 as part of a research project aimed at understanding the evolution of dairy markets in Asia and the implications for dairy product trade. This research was funded by the U.S. Department of Agriculture (USDA) through the National Research Initiative Competitive Grants Program (NRICGP). Two primary objectives of the research proposal were to collect dairy market data for key countries in Asia and to estimate demand equations for dairy products. The information gathered under these two objectives is intended for use in a policy simulation exercise to assess the impacts of trade reforms in Asian dairy markets.

China's National Statistical Bureau (NSB) collects a wide range of expenditure and demographic data from urban and rural households through its annual surveys. Dairy products have historically played a small role in household food consumption for the vast majority of Chinese consumers; consequently, the NSB household surveys gather only limited data about expenditures on dairy products. Expenditures on fresh milk, yogurt, and milk powder constitute the bulk of Chinese consumer outlays on dairy products, and NSB data is available for these three product categories. However, the rapid growth in disposable incomes and the increased availability of both domestically produced and imported dairy products in recent years have stimulated a rapid increase in both the quantity and the variety of products purchased by Chinese consumers, particularly in urban areas. The survey described in this report is designed to augment data available from the NSB by gathering information about butter, cheese, and ice cream purchases. Moreover, several questions in the survey are intended to elicit responses that may help researchers identify demographic characteristics, purchasing behaviors, and marketing practices that promote consumption of dairy products. In addition to the formal

consumption survey, a number of interviews were conducted with government officials, dairy processors, farmers, and retailers to uncover facts about the industry practices, government policies, and other factors driving recent developments on the supply side of China's dairy product markets.

The remainder of this report is divided into two major sections. First, the survey instrument and sample are described. Summary statistics and some preliminary analysis of the data are also presented. Second, the supply chain for dairy products in urban China is described based on the information gathered from interviews in Beijing and Shanghai. The report concludes with summary comments about this snapshot of urban China's dairy market.

Survey Description

Survey Scope

The dairy product consumption survey was designed to supplement the regular household expenditure survey conducted by the NSB. The dairy survey was administered to 100 households in Beijing and Shanghai and 114 households in Guangzhou, generating a total sample size of 314. The survey was administered late in the fall of 2001. The survey instrument was developed and administered in cooperation with Dr. Dinghuan Hu at the Chinese Center for Agricultural Policy in the Chinese Academy of Agricultural Sciences (CAAS).

Survey questions focus on household expenditures for a broader set of dairy products than those covered in the NSB survey and also inquire about various purchasing behaviors, such as the location of purchase, package size, brand, and frequency of purchase. One block of questions seeks to uncover changes in dairy product consumption over time by asking consumers to compare current consumption levels to levels two years earlier. Other questions investigate the relative importance of various factors in the purchasing decision. Three blocks of questions ask directly about consumption of imported dairy products and factors influencing purchases. Finally, two blocks inquire about the prevalence of dairy product advertisements in a variety of media. The survey form is provided in the Appendix to this report.

Data Summary

General Household Characteristics. The demographic data collected in the first block of questions in the survey are summarized in Table 1. The median household size was three in all three of the cities surveyed and for the entire sample. Households reporting fewer than three members accounted for only 11.8 percent of the sample, with roughly half of those households located in Shanghai. Just fewer than 20 percent of the households had four or more members, and 46 percent of those were reported in Guangzhou. The data suggests that household sizes tend to be larger in Guangzhou and smaller in Shanghai. Chi-squared tests of these differences are significant at the 5 percent level. Similar differences between cities were also evident in the number of young children and older adults. More than 72 percent of the households do not have children under the age of 14, but 55 percent of those that do are located in Guangzhou. In contrast, 44 percent of the households with adults over the age of 60 were in Shanghai. These

TABLE 1. Household demographic information: Sample average or median

	Units	Beijing	Shanghai	Guangzhou	Entire Sample
Household size	Number	3	3	3	3
Children < 14	Number	0	0	1	0
Adults > 60	Number	0	0	0	0
Household income	Yuan/Mo.	2,954	2,803	3,250	3,013
Wages of male household head	Yuan/Mo.	1,382	1,204	1,387	1,327
Spouse's wages	Yuan/Mo.	996	1,007	1,201	1,074
Other income	Yuan/Mo.	481	591	615	564
Age of household head	Years	48	52	46	49
Spouse's age	Years	48	50	43	47
Education of household head	Years	12	12	10	11
Spouse's education	Years	11	11	10	10

statistics, coupled with the information on household size, indicate that, on average, the households surveyed in Shanghai are more mature in the sense that household members are older and children are grown.

Additional evidence in support of this observation can be found in the number of households reporting a household member who is retired. Fifty-two households in Shanghai contained at least one member who was retired, while only 24 households (21 percent) in Guangzhou had a retired member. Beijing was in the middle with 36 percent. The larger number of retired individuals in the Shanghai sample has an impact on average monthly household income. Analysis of the variance of household income by city indicates there is a significant difference in the mean income levels. The source of the difference appears to be in the number of retired females in the city samples. The mean income for males does not differ significantly across cities, but it does for females. More than 75 percent of the retired individuals in each city sample are females, and monthly incomes for retired females are an average of 184 yuan lower than for working females. An analysis of the partial sum of squares for female incomes demonstrates that retirement contributes significantly to the differences in mean incomes at the 1 percent level, but the city is not significant at the 10 percent level.

On average, the households included in the survey were located about 6 km from the center of city government. All but one respondent had shopped at a supermarket within the last year, and the average distance to a preferred supermarket is 1.4 km from the home. The median number of supermarkets within 500 meters of the household is two, and 45 percent of the households frequented one of these markets. Roughly 60 percent of the respondents lived 1 km or less from a McDonald's restaurant.

Dairy Product Purchasing Behavior. All but five households reported purchases of one or more dairy products, and all five of the households with zero dairy product purchases were located in Guangzhou. Table 2 displays the number of households in each city indicating purchases of dairy products. Fluid milk is purchased by the majority of households in the sample, and tests of the sample means by city do not indicate significant differences. Yogurt purchases, however, are significantly higher in Beijing than in Guangzhou and Shanghai. A much higher percentage of households in Guangzhou reported purchases of milk powder, but the difference in the sample means

TABLE 2. Households reporting purchases of dairy products

	Beijing	Guangzhou	Shanghai	Entire Sample
Count				
Milk	91	99	94	284
Yogurt	78	57	50	185
Milk powder	25	37	26	88
Ice cream	59	67	43	169
Cheese	10	6	5	21
Butter	5	3	6	14
Percent of sample				
Milk	91.0	86.8	94.0	90.4
Yogurt	78.0	50.0	50.0	58.9
Milk powder	25.0	32.5	26.0	28.0
Ice cream	59.0	58.8	43.0	53.8
Cheese	10.0	5.3	5.0	6.7
Butter	5.0	2.6	6.0	4.5

across cities was not statistically significant. One possible explanation for more frequent milk powder purchases in Guangzhou is the greater number of households with small children. Infant formula and vitamin enriched milk powder formulations designed for young children are most likely included in the milk powder purchases reported in Table 2. However, the survey instrument does not enable isolation of infant formula purchases, so this proposition could not be formally tested.

The highest percentage of households indicating purchases of ice cream occurs in Guangzhou, followed by Beijing and Shanghai. The sample means are significantly different across cities at the 5 percent level. As expected, the number of households reporting purchases of butter and cheese is quite small, and there does not appear to be substantial differences across cities.

Table 3 shows the details of household purchasing behavior for the four most frequently purchased products. The combination of the number of purchases, packages per purchase, and package size determine the total quantity purchased by the household.

TABLE 3. Weekly dairy product purchasing behavior

	Units	Fluid Milk	Yogurt	Milk Powder	Ice Cream
Average purchase frequency	Number				
Beijing		3.132	1.024	0.074	0.352
Guangzhou		2.190	0.700	0.112	0.406
Shanghai		4.065	0.577	0.078	0.112
Total sample		3.087	0.764	0.089	0.295
Average expenditure/purchase	Yuan				
Beijing		6.496	5.449	5.120	8.342
Guangzhou		14.066	5.742	9.265	4.522
Shanghai		7.061	3.851	6.179	4.919
Total sample		9.424	5.042	6.955	5.865
Average number of packages	Number				
Beijing		4.820	4.330	0.300	1.899
Guangzhou		6.310	2.908	0.436	1.575
Shanghai		2.647	1.234	0.283	1.300
Total sample		4.664	2.827	0.344	1.590
Mode package size ^a	Kg ^b				
Beijing		0.250	0.100	0.000	0.000
Guangzhou		0.250	0.000	0.000	0.000
Shanghai		0.250	0.000	0.000	0.000
Total sample		0.250	0.000	0.000	0.000
Average annual quantity Purchased per capita	Kg				
Beijing		56.827	17.075	0.837	4.081
Guangzhou		27.354	7.056	1.143	2.410
Shanghai		51.449	7.639	0.679	0.594
Total sample		44.414	10.433	0.898	2.364

^a Average package size is zero for yogurt, milk powder, and ice cream. Mode numbers reported are for households that reported purchases of the product

^b Package size for milk is in liters. An average conversion factor of 1.031 kg/liter was used for the computation of the quantity of milk purchased per person.

Differences in each of these variables are observed in the data. For example, households in Shanghai indicate a greater average number of milk purchases each week but fewer packages per purchase than households in Beijing. Nevertheless, the amount of milk purchased per household member is virtually the same. Milk purchases per person in Guangzhou are just over half the level of the other two cities, a difference that is statistically significant at the 1 percent level. Although consumers most frequently purchased milk in 250 ml packages in all three cities, 19 percent of households in Beijing purchase milk in half-liter containers, and 34 percent of households in Shanghai purchase milk in liter containers.

From Table 4 it is evident that households in Shanghai make greater use of home delivery services and dedicated delivery points for procuring fluid milk than households in Beijing or Guangzhou. Home delivery and dedicated delivery services in Shanghai appear to substitute largely for milk purchases from grocery stores. Most households that utilized these services purchased milk daily. The majority of households in all three locations purchase milk from supermarkets. Only 19 households reported milk purchases at school, and 12 of the 19 households are located in Guangzhou. Based on responses regarding the availability of school milk programs, 29 respondents indicated that their child's school had a school milk program, and there were no significant differences in responses across cities. However, very visible differences are present in utilization of these programs. Roughly 70 percent of households reporting availability of school milk in Guangzhou actually purchased milk at school. This percentage drops to 66.7 in Shanghai, and only one of seven households in Beijing that reported the existence of a school milk program actually purchased milk at school.

Per capita yogurt purchases in Beijing are nearly double the quantity purchased in either Shanghai or Guangzhou. Unlike fluid milk purchases, home delivery services and dedicated delivery points do not appear to be widely used, even in Shanghai. The overwhelming majority of households purchase yogurt from supermarkets, with a substantial share of households in Beijing and Guangzhou making purchases at grocery stores. As with fluid milk, households in Beijing and Shanghai purchase larger packages (0.5 and 1 kg packages) more frequently than do households in Guangzhou.

TABLE 4. Location of milk and yogurt purchases

Location	Beijing	Guangzhou	Shanghai	Entire Sample
Percentage of Households Reporting Purchases				
Milk				
Home delivery	15.38	18.09	32.32	22.18
Delivery point	0.00	7.45	21.21	9.86
Supermarket	56.04	71.28	48.48	58.45
Grocery store	23.08	21.28	2.02	15.14
School	1.10	13.83	6.06	7.04
Street vendor	6.59	7.45	2.02	5.28
Other	10.99	5.32	2.02	5.99
Yogurt				
Home delivery	1.28	8.00	7.02	4.86
Delivery point	1.28	12.00	8.77	6.49
Supermarket	82.05	78.00	80.70	80.54
Grocery store	14.10	28.00	0.00	13.51
School	0.00	6.00	1.75	2.16
Street vendor	3.85	6.00	0.00	3.24
Other	6.41	6.00	0.00	4.32

Of the four major milk products, milk powder purchasing behavior is the most consistent across cities. Most households do not purchase milk powder; however, those that do tend to buy one 500-gram package every month. The median cost per package is 15 yuan in Beijing, 20 yuan in Shanghai, and 22 yuan in Guangzhou.

Differences in ice cream purchases by city are significant at the 5 percent level, with only 43 percent of Shanghai households reporting ice cream purchases compared with 60 percent in the other two cities. Households in Beijing tend to purchase larger packages, while consumers in Guangzhou and Shanghai purchase single-serving package sizes (250 grams or less). The median behavior for households that report ice cream purchases paints a slightly different picture than the averages in Table 3. Households in Beijing purchase one 250-gram package of ice cream every two weeks at a median price of 10 yuan per package. Households in Shanghai that reported ice cream purchases purchased

one 250-gram package of ice cream every month at a median price of 10 yuan. In Guangzhou, households purchase one 100-gram package of ice cream every two weeks at a median price of 5 yuan.

Only 6.7 percent of the surveyed households purchase cheese, and even fewer households buy butter. In Western diets, cheese is an important, high-value dairy product that is frequently a key ingredient in convenience and restaurant foods. Although cheese is not a traditional food in Chinese diets, the expansion of several restaurant chains serving Western-style foods into Chinese cities can be expected to have an impact on cheese consumption in China. One block of survey questions asked specifically about consumption of a number of selected foods containing cheese, namely, cheeseburgers, pizza, cheese slices, and cheese in a sandwich, with crackers, or in another food. Table 5 summarizes household responses to these questions.

TABLE 5. Purchases of products containing cheese

Product	Beijing	Guangzhou	Shanghai	Entire Sample
Report product consumption				
	Number of Households			
Cheeseburger	45	43	32	120
Pizza	30	11	11	52
Cheese slices	9	7	6	22
Other cheese dish	24	37	44	105
Median frequency of consumption ^a				
	Times Per Month			
Cheeseburger	2.00	1.00	1.00	1.00
Pizza	0.50	1.00	1.00	0.50
Cheese slices	0.50	1.00	0.75	0.75
Other cheese dish	1.00	1.00	2.00	1.00
Report product consumption but no cheese purchases				
	Number of Households			
Cheeseburger	40	39	29	108
Pizza	26	9	9	44
Cheese slices	1	1	3	5
Other cheese dish	20	34	42	96

^a The sample median frequency was zero for all four cheese products. The numbers reported for median frequency are for households with positive consumption of the product.

One of the most striking observations is that several households reported consumption of products containing cheese, while few households reported purchases of cheese. One possible explanation for the apparent contradiction is that Chinese consumers are developing a taste for foods that contain cheese, but very few households have culinary knowledge needed to prepare foods that contain cheese at home. Consequently, most households do not purchase cheese for consumption in the home, but they are willing to purchase foods that contain cheese when eating outside the home. This reasoning is consistent with the low number of households that consumes cheese by itself, a form most likely associated with home consumption, compared with the number of households that consumed cheeseburgers, pizza, or other prepared foods with cheese. The median consumption frequencies suggest that households consuming foods containing cheese typically do so only once or twice a month. Mean frequencies for cheeseburgers and other cheese dishes were slightly higher than the median values, but means for consumption of pizza and cheese slices were below the medians.

Import Product Results. A number of questions in the dairy product survey focused on purchases of dairy items produced by foreign companies or foreign joint ventures. More than half of the households (169) in the sample purchase one or more dairy items produced abroad or by a foreign joint venture (“imported products”). In Guangzhou, 63 percent of the households purchase imported products, which is significantly higher than the 50 percent reported in Beijing and Shanghai. Table 6 displays the number of households indicating purchases of imported dairy products listed by product. Pearson Chi-Squared tests indicate that the differences across cities are significant at the 5 percent level for milk, whole milk powder, yogurt, and other dairy products.

The bottom half of Table 6 shows the percentage of households reporting purchases of a particular product that also indicated purchasing that product from foreign companies.¹ One observation from the share data is that a large share of households that purchase butter and cheese buy butter and cheese from foreign companies. This may be due to the low level of domestic production of these two commodities. A second observation is that a larger share of households in Guangzhou purchase imported products. This is true for virtually all of the product categories. We can gain some insight into why households in Guangzhou are more apt to purchase imported dairy products by

TABLE 6. Purchases of dairy products produced by foreign companies or foreign joint ventures

Location	Beijing	Guangzhou	Shanghai	Entire Sample
Purchase imported or joint venture products				
	Number of Households			
Milk	11	54	31	96
Butter	6	3	2	11
Cheese	5	8	5	18
Non-fat dry milk	9	20	5	34
Whole milk powder	8	20	22	50
Infant formula	4	5	2	11
Yogurt	18	39	28	85
Other	27	11	6	44
Share of total reporting purchases of the product				
	Percentage			
Milk	12.09	55.79	32.98	33.22
Butter	80.00	66.67	16.67	50.00
Cheese	50.00	100.00	80.00	71.43
Non-fat dry milk	28.00	35.14	23.08	29.55
Whole milk powder	16.00	37.84	61.54	38.64
Infant formula	4.00	8.11	3.85	5.68
Yogurt	23.08	43.59	33.33	41.94

examining the importance of selected factors on the consumers purchasing decision.

Table 7 summarizes consumer rankings of four factors affecting purchases.

More than 70 percent of the households that purchased imported products in Guangzhou indicated that the lack of domestic alternatives was important to their decision. The numbers are significantly lower in Beijing and Shanghai. A greater share of households in Guangzhou also reported that the perceived superior safety, taste, and quality of imported products played an important role in their decision to buy imports. Price plays an important role in household purchasing decisions in all three cities, but there was no statistically significant difference between consumers in different locations.

Other Results. The remaining survey questions investigate which household members consume dairy products and what environmental factors may influence their consumption decision. The household members who consume the most dairy products vary with the composition of the household. For example, in households with only two members, the most common response was that the household head and spouse each consumed about 50 percent of the dairy products purchased. However, at least 20 percent

TABLE 7. Factors influencing the decision to purchase dairy products produced by foreign companies or foreign joint ventures

	Very Important	Important	Not Important
	Percent		
Domestic products not available			
Beijing	15.00	35.00	50.00
Guangzhou	17.33	56.00	26.67
Shanghai	22.22	27.78	50.00
Total sample	17.88	43.71	38.41
Imports/joint venture products are safer			
Beijing	25.00	47.50	27.50
Guangzhou	26.67	62.67	10.66
Shanghai	19.44	44.44	36.12
Total sample	24.50	54.30	21.20
Imports/joint venture products have better taste or quality			
Beijing	70.00	25.00	5.00
Guangzhou	48.00	42.67	9.33
Shanghai	47.22	25.00	27.78
Total sample	53.64	33.77	12.59
Imports/joint venture products cost less			
Beijing	17.50	52.50	30.00
Guangzhou	21.33	61.33	17.34
Shanghai	22.22	44.44	33.34
Total sample	20.53	54.97	24.50

of the households with two members reported that one member consumed two-thirds or more of the household dairy purchases.

More than 68 percent of the survey sample had a household size of three. Figures 1 and 2 display the histograms for product consumption shares for adults and children in these households. One interesting observation is that despite the rather recent increase in availability and awareness of dairy products in China, only 42 households (20 percent) reported that children consumed 75 percent or more of household dairy purchases. In most households, one or more adults consume a significant share (20-50 percent) of the household's dairy products.

The decision to purchase dairy products can be influenced by a number of environmental factors, including recommendations from authoritative figures such as health care providers, exposure through travel, and advertisements. More than 25 percent of all households reported that a health care worker or physician had recommended that someone in their household should drink milk. Although there was some variation across cities, with the highest percentage of households indicating such a recommendation located in Guangzhou, the differences were not statistically significant. When asked about foreign travel, 56 respondents had traveled to a foreign country within the last 10 years. The vast majority of these individuals (40 of the 56) were from Guangzhou. Forty percent said they consumed dairy products while abroad, but only 10 of the 56 said that they increased their dairy product consumption after they returned to China.

All but one household reported seeing or hearing advertisements for dairy products on television, radio, billboards, or other media. Television ranked consistently as the most common media for dairy product ads, with 93 percent of the sample indicating they had seen dairy product commercials on television. Billboards ranked number two, reaching 70 percent of the households surveyed. Nearly 60 percent of the households had seen dairy product ads in flyers distributed at the market, and 38 percent had heard ads on the radio. The data suggest that radio ads are more common in Shanghai, while billboards and market flyers are much more common in Guangzhou. There did not appear to be significant differences in television advertisements across locations.

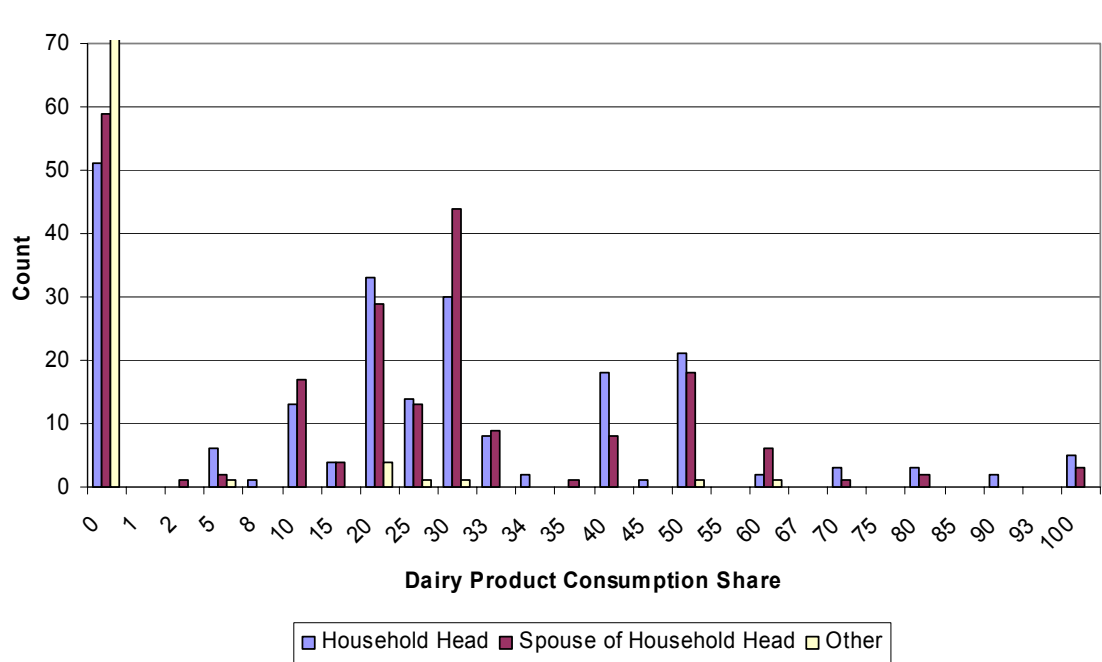


FIGURE 1. Histogram of reported dairy product consumption shares for adults in households with three members

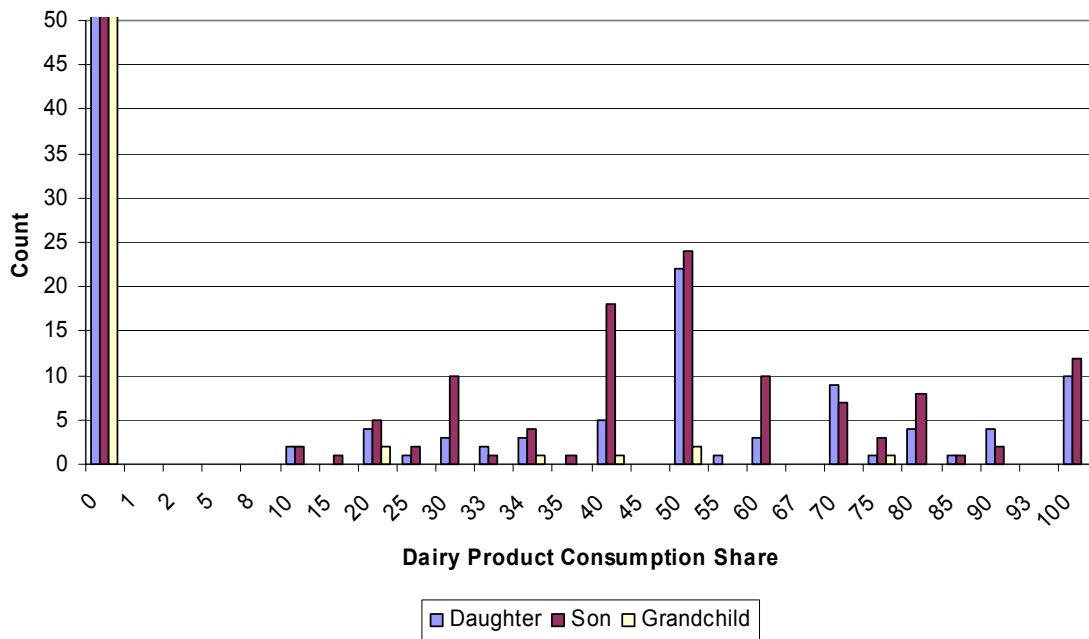


FIGURE 2. Histogram of reported dairy product consumption shares for children in households with three members

Interviews and Anecdotes

In addition to the consumption survey previously discussed, researchers from the Center for Agricultural and Rural Development (CARD) and CAAS visited a number of dairy producers, commercial associations, and retailers to discuss the dairy supply and marketing situation in the Shanghai and Beijing areas. The proceeding information is a summary of the more interesting facts and anecdotes relayed during the interviews. Market share, revenue, and other commercial data could not be independently verified, so the reader should exercise caution in using this information. The discussion is broken into three sections: milk production, processors, and retail marketing.

Milk Production

General Production Information. Milk production in China increased about 7.5 percent annually over the last decade and 11 percent annually from 1997 to 2002. Based on interviews with officials in the Chinese Ministry of Agriculture (MOA), the Chinese government is paying close attention to the dairy industry, especially to the production and processing technology. The government wants to develop new dairy products that are suited to Chinese tastes, and several research institutes are working on such products. China's dairy policy has the following objectives.

1. Improve the genetics of the dairy herd through importation of semen from Canada, the United States, and Australia.
2. Establish funding for a dairy breeding program.
3. Implement a nationwide school milk program.
4. Facilitate the development of the processing industry.
5. Establish standards for processing and farm production

The MOA is considering the possibility of instituting policies in rural areas to ensure that farmers can sell their milk to processors. The MOA wants to encourage competition among processors for milk supplies and to encourage more milk production. It also wants to help farmers set up associations. The associations are intended to act as a collective bargaining organization for farmers as well as an extension service to promote

improvement of production technology and management. The associations could be set up by the local government in cooperation with processors.

Shanghai Area Farms. According to information obtained from the Shanghai Dairy Association, there were roughly 60,000 dairy cattle in Shanghai in 2001, producing collectively between 230-250 thousand metric tons (tmt) of milk annually. The dairy industry in Shanghai grew rapidly in the late 1980s and early 1990s, until the period of price inflation in 1993 caused feed costs to rise sharply. Milk prices are stabilized in Shanghai by the local government, so many producers lost money and some left the industry. Since 1993, milk cow numbers have been fairly stable, but milk production has risen. The average yield per cow in Shanghai is 4.2 metric tons (mt), but yields on some farms reach 7.4 mt. In 1995, yields began to increase more rapidly following increased importation of semen from the United States.

Large farms operated by the Guangming (Bright) Dairy & Food Company account for 21 percent of the dairy cows in the Shanghai area. Cattle on these farms yield above the province average, producing 8 mt per cow. Other large farms account for an additional 19 percent of the total dairy farms in Shanghai. Roughly 25 percent of the total dairy cattle in Shanghai are on state-owned farms, with an average inventory of 300 head. Private small- and medium-sized farms own the remaining 35 percent of the milk cows.² There are about 11,000 small dairy farm households in the Shanghai area. Crossbred dairy cattle on these farms yield about 3.5 mt per head annually.

Researchers from CARD and CAAS visited two dairy farms in the Shanghai area. The first farm was an independent operator, and the second farm was owned and operated by Guangming. The independent farm was owned and operated by Mr. Zhou. Zhou was a general farmer until 1982. At that time he started working for a local dairy farmer. Zhou learned about dairy farm management from his employer, but he later took some training courses in dairy production and management in Nanjing. The farmer eventually sold the dairy farm to Zhou for RMB 90,000 (renminbi). At that time he had more than 50 head of cattle.

In 1999, Zhou had to move his farm farther away from the city of Shanghai because new city regulations increased the distance from Shanghai required for location of dairy farms. In 2002, Zhou had 430 head of cattle, 260 of which were lactating. His cattle are

Holsteins that he has purchased from Guangming dairy farms. He can purchase a yearling heifer for RMB 8,000, and his cattle yield an average of 6,000 kg/year.

Zhou sells his milk to Guangming on contract. He entered into the contract arrangement with Guangming in 1999, and his contract runs for five years. The contract specifies the purchase price, quality standards and their associated premiums, and the payment schedule. Zhou receives payment for his milk three times a month. Guangming also transports the milk from Zhou's farm to the processing plant, and it will buy whatever quantity Zhou produces. Zhou can receive some technical assistance from Guangming if he requests it.

Before establishing the contract, Zhou sold his milk to Guangming because it was the only processor in his area. At that time, Guangming needed more raw milk inputs for its processing facilities, so Zhou was not worried about the company refusing to purchase his milk. Competition among the milk processors for raw milk supplies increased sharply in the late 1990s, as regional dairies began to expand operations into new markets in other provinces. Consequently, many processors started contracting with farmers to make it difficult for new processors to enter their market.

Zhou contracts with local farmers to provide the feed he needs. Table 8 gives the approximate quantities and cost of feed given to each animal on a daily basis. Soybean meal and concentrate feed is purchased from a feed company. The improved forage, mostly alfalfa, is brought in from Hebei province. Mr. Zhou mixes and distributes all of his feed manually.

Zhou uses artificial insemination to impregnate his cows, purchasing the semen from the Shanghai Dairy Center for RMB 40 per insemination. The male calves he obtains are fed for 20 months and then sold for about RMB 4,000 each. The heifers are usually retained for replacement stock. Zhou can sell a three-month-old heifer for about RMB 5,000. His cows usually give birth to about 100 heifers each year. He milks his cows for six or seven years and then sells the spent cows for RMB 2,500-7,000.

The Zhou farm has automatic milking machines that pipe the milk directly into his 6 ton refrigerated bulk storage tank. The milking machines, which he has had for five years, were made by a Japanese company. The bulk storage tank was manufactured by a Chinese company and installed in 1999. Before he purchased the bulk tank, Zhou took his

TABLE 8. Daily feed ration per cow and feed costs

Feed Type	Quantity	Cost per Metric Ton
	Kg	RMB
Corn silage	10	200
Grass (60% improved forage)	5.5	1,150
Brewers grains (wet, from beer)	10	160
Concentrate feed (including soybean meal)	1.5-2	1,500

milk to a collection station. Now, Guangming collects milk from Zhou's tank daily. Roughly every 10 days, Guangming sends someone by to draw a sample of Zhou's milk to test bacteria, fat, and protein content. This occurred on the day of our visit to the Zhou farm, as shown Figure 3.

The barn where the cows are housed (see Figure 4) has a drainage channel for the animal waste. The channel is cleaned out and the waste is placed in wheelbarrows. Zhou has to pay the local farmers to haul the manure away. The farm employs 30 workers and pays them RMB 1,000 per month plus room and board. Zhou's fixed investment is RMB 2.08 million, about 410,000 of which is the value of his cows. Roughly 60 percent of the capital was provided from Zhou's own resources, and the remaining 40 percent was borrowed from a private bank at 6 percent interest. Zhou estimates that his profit per cow is roughly RMB 2,000. Last year he had total revenues of RMB 4.8 million and profits of RMB 627,000.

Zhou would like to expand his operation to 600 cows, which is his maximum size because of all the industry in the area. He would also like to increase his cow yield to 8,000 mt/head.

The second farm visited in the Shanghai area was Guangming Dairy Farm No. 9. The farm is managed by Mr. Yuan, a 34-year old graduate of the Shanghai Agricultural College in Veterinary Medicine. Yuan worked at Guangming Dairy Farm No. 10 from 1991 to December of 2001, when he took over management of dairy technology for Guangming in the Shanghai area. Yuan has 24 farms under his management, with a combined total of 20,000 head of cattle, 11,000 of which are lactating. The largest farm in the area has 2,400 head and the smallest has 80. Guangming also has six farms outside the Shanghai area located in Nanjing, Qingtao, Wuxi, and Nixing. The largest of these farms



FIGURE 3. Guangming employee drawing milk for testing



FIGURE 4. Cattle barn on a medium-sized Shanghai dairy farm

has 600 head and is located in Qingtao. The farms in Nanjing do not necessarily provide milk for Guangming dairies. Rather, Guangming manages the farms and provides technical assistance, but the farm sells milk to any dairy processor that is purchasing milk.

Four of the Guangming farms in the Shanghai area are considered joint ventures between Guangming and independent farmers. The cattle are owned by Guangming, but the farmers provide the land, labor, and cattle barns. Guangming owns 40 percent of the equity in the farms, and the farmers own the remaining 60 percent. Guangming provides technical assistance to the farmers for improving feeding practices and disease control.

Ten of Guangming's farms in the Shanghai area are owned by the Farm Bureau of the Shanghai government. Guangming provides the cattle and the buildings and pays rent to the Farm Bureau for the land. Because of its state-owned history, Guangming is obligated to maintain ownership of some production, but it is slowly eliminating these holdings. In the future, it plans to buy from independent farmers, largely through contractual arrangements. The quality of milk obtained from contract farmers like Zhou is equivalent to that obtained from Guangming's own farms.

Guangming Dairy Farm No. 9 has 1,200 head of cattle. The farm is a joint venture with a Canadian partner. The Canadians provided some cows and equipment to improve the farm's productivity. Semen used to inseminate the cows is obtained from Canadian companies. The average yield for the cows on this farm is 9 mt/head, and total daily production is between 17 and 18 mt. Daily feed rations and costs are shown in Table 9. The farm has 25 tons of refrigerated storage capacity, so trucks from the processing plant pick up the milk daily and cover the cost of hauling.

The male calves born on this farm are sold for RMB 120 per head shortly after they are born. The female calves are generally retained as replacement heifers. The farm usually milks its cows for five to six years before replacing them.

The farm has 70 workers, who each receive RMB 1,200 per month in addition to free room and board. The city of Shanghai required that the farm put in a water purification plant, and this has reduced profits. The farm's water, electric, and water purification costs are roughly RMB 1 million annually.

Before the market reforms in the early 1990s, the Shanghai Dairy Company was the largest state-owned dairy company in China. During the reforms, Guangming was split

TABLE 9. Daily feed ration per cow and feed costs for Guangming Farm No. 9

Feed Type	Quantity (kg)	Cost per Metric Ton (RMB)
Dry alfalfa	3.0	1,200
Corn silage	10.0	200
Dry vegetable matter	2.5	1,000
Dry brewer's grains	1.5	1,200
Corn milling waste	1.0	1,200
Other grass	2.0	900
Concentrate feed (including soybean meal)	9.5	1,500

off from the Shanghai Milk Company as a separate entity. The Shanghai Dairy Company still owns 40 percent of the equity in Guangming. Each year, RMB 3.1 million is paid to the Shanghai Milk Company for the rental of the land and buildings used on the farm. Last year the farm had profits of RMB 2 million.

The farm has four milking houses with 24 machines per house (see Figures 5 and 6). The milking machines were produced by Alpha Laval Agri and were installed in 1994. Cows are milked three times daily. The farm has a total of 13 cattle barns with a capacity of roughly 100 head per barn. As with the other farm, waste is collected from the cattle houses in wheelbarrows and local farmers are paid to haul it away. The farm is experimenting with the possibility of processing the manure into pellets to sell as fertilizer.

Beijing Area Farms. Unlike Shanghai, Beijing does not have many small dairy farms around the city. Most of the large farms in the area were initially state-owned farms. As in the Shanghai area, environmental policies are causing the dairy farms in Beijing to move farther away from the city. The government provides some subsidies for farmers who have to relocate. In addition to local supplies, processors in Inner Mongolia also send both fluid milk products and milk powder products to the Beijing market.

The Daxing district is located south of the city of Beijing and is a major dairy area in the province. In 2002 there were about 20,000 dairy cows in Daxing. The largest farms in the area have more than 1,000 head, but most farms have between 50-100 head. Most of



FIGURE 5. Milking parlor at Guangming Farm No. 9



FIGURE 6. Milking machines at Guangming Dairy Farm No. 9

the milk produced in this district is purchased by the San Yuan Food Company, but there are several small-scale processors in the district. The small-scale processors send most of their milk as fluid milk into Beijing for sale at grocery stores and supermarkets. In 2002, the Daxing district did not yet have a school milk program.

The government in Daxing has policies designed to help dairy farmers improve their dairy cows. The district set up a breeding farm and began to purchase high-quality semen and ova. At the time of the interview, they had implanted 400 ova, and they planned to implant 1,000 ova in 2002. The district government gives the breeder RMB 500 for each implantation. The government also provides a RMB 500 subsidy per cow for the purchase of cows from the district breeding farm. Local banks also provide financing of up to RMB 5,000 for the remainder of the cost. The district government subsidizes the use of internationally acquired semen by local farmers. The district purchases the semen from a company in Beijing for RMB 40 per unit. Farmers pay half the cost of the semen. The district expected to purchase 20,000 units in 2002. According to the director of the livestock bureau in Daxing, yields in the district are between 5,000-6,000 kg/head. Large-scale farmers in Daxing can make about RMB 3,000 per cow in net returns. The director of the bureau believes that every level of government in China recognizes that livestock production is the best way to raise farmer incomes. Consequently, the district is planning to increase dairy cattle inventories in Daxing to 50,000 head by 2007.

The Daxing district has 10 large milk associations that collect the milk from farmers and send it to processors. The associations also work with farmers to help them improve their technology. The Daxing government established an association to administer dairy production and negotiations with the processors. Most farmers have contracts with a processor, but the duration of the contracts are typically only six months. The farmers are not worried that the San Yuan Food Company will refuse to renew their contracts because San Yuan wants to retain its milk supplies and its reputation with local farmers. San Yuan also has been promoting the development of dairy production in the district. The company and the district have a long relationship because the original state-owned farms that evolved into the San Yuan Company were located in the district. The standard price paid by San Yuan for raw milk is RMB 1.8/kg for machine-milked product and RMB 1.6/kg for hand-milked product. The Daxing district government has some

concerns that milk production is expanding too rapidly in the region and will outpace demand growth. Consequently, the district is focusing on raising the quality of the milk, as well as the productivity of the local dairy cows.

Researchers from CARD and CAAS visited the Kang Liu Dairy Farm in Daxing. The farm is a proprietorship that was started in 1995 by Mr. Kang, a local farmer. Kang rents the land the farm is on from other local farmers for RMB 100,000 a year. However, he receives a tax break on the land he rents. When he started, Kang had only 150 cows, but in 2002 his cattle inventory was roughly 1,000 cows. His cattle are all Holsteins that he purchased through the Daxing cattle improvement program. Typical daily feed rations on the farm are shown in Table 10. The cattle produce about 7,000 mt/head annually. Kang has a milking parlor with automatic milking machines, and his workers can milk up to 120 head at a time. His cows are milked three times a day.

Kang built a processing plant on the farm in 1998, and he received some money from the Daxing government to set up the processing facility. All of his processing machinery is Chinese-made. The plant makes fresh milk and yogurt, which is marketed in Beijing under the farm's own brand, Jing Shi Kang. The farm locks in prices with retail outlets in Beijing, mostly supermarkets, through short-term contracts. Every day the retailers call in their orders, and the farm uses its own refrigerated trucks to deliver the orders to the retailers in Beijing. The farm does not sell much milk in the district, but Kang has plans to start marketing locally in the near future. Though he does not have any plans for expansion at the moment, Kang indicated that the farm does have room to expand on the land he currently rents. Kang has 60 employees who work on the farm and in the processing plant. He estimates that he earns about RMB 3,000 per cow in net revenues each year.

TABLE 10. Daily feed ration per cow at the Kang Liu Dairy Farm, Daxing

Feed Type	Quantity (kg)
Dry alfalfa	2.5
Corn silage mixed with protein meal	10.0
Wet grass	15
Dry grass	4.5

Kang does his own marketing. He collects his market information by visiting the stores in Beijing, and he talks with the retailers to persuade them to carry his products. He often allows the store managers to taste his products to check their quality. Kang believes he is competitive with the large dairy companies because he has an integrated operation. His customers recognize his brand and are familiar with the quality of his products. He does not advertise, but he is willing to bus consumers out to his farm so they can see the conditions under which the milk is produced and can taste the quality of his products.

Dairy Processing

According to information obtained from the Shanghai Dairy Association, there were five dairy processors in China in 2002 with annual gross revenues in excess of RMB 2 billion, 25 with gross revenues between RMB 200 million and 2 billion, and 1,000 with annual revenues of less than RMB 200 million. The top five companies produce about 30 percent of processed dairy products manufactured in China.

Milk powder is an important processed product in China. In 2001, China produced 580 tmt of milk powder. The breakdown of the powder products is as follows: 30 percent sweetened whole milk powder (WMP), 20 percent unsweetened WMP, 20 percent infant formula, and 30 percent other milk powder (roughly 10 percent of which is skim milk powder). The top 82 companies in China increased raw milk purchases by 41.5 percent in 2001, and profits rose 27.1 percent. Their total output of processed dairy products increased 28.9 percent, but their output of fluid milk products rose 51.1 percent, indicating the growing importance of fluid milk products. Fluid milk consumption in China in 2000 could be broken down into the following categories: 55 percent pasteurized fresh milk, 25 percent ultra high temperature (UHT) milk, 12 percent yogurt, and 8 percent other fluid products.

A number of individuals interviewed in China believe the rapid growth in milk consumption in China in recent years will continue, leading them to speculate that the dairy sector in China has great potential for growth. In 2001, per capita milk production exceeded 8 kg. If the newly introduced school milk program reaches its full potential, 200 million students will drink an average of 200 ml of milk each school day. The additional milk consumption generated by this program could be roughly equal to total milk production in

China in 2001. Dairy production in 2002 accounted for about 5 percent of the value of total Chinese agricultural production, and that share is expected to increase to 13 percent by 2005.

Because of this tremendous potential, foreign companies are investing in Chinese dairy processing. Nestlé purchased some dairy processing plants in Yunnan to service the Chinese market and to export milk products to other Asian countries. Companies from Denmark, France, Australia, New Zealand, Holland, and the United States have invested in China's dairy industry. Chinese milk processors also have their eye on international markets. Most domestic processors are adopting ISO standards in their plants so they can compete with imported products in China and in other Asian markets. Some companies are considering investing in milk production and processing assets in Australia to export milk to China. These companies are hoping to capitalize on the low production costs in Australia. In order to realize the potential in China's dairy market, rural consumers must begin to drink more milk.

With increased foreign investment, competition in China's dairy processing sector has increased sharply. One official with the Shanghai Dairy Association anticipated that the Chinese dairy industry would undergo major consolidation in the near future. Small- and medium-sized processors and dairy producers will be bought out by larger companies. At the time of the interview, the official stated that most dairy processors were trying to establish contracts with households to secure milk supplies and to block competitors from gaining access to local milk production.

Guangming Dairy Group, Shanghai. The Guangming Group is the largest dairy company in the Shanghai area. Its goal is to be one of the top 20 dairy companies in the world by 2005 and in the top 10 by 2010. In 2001, Guangming's profits were RMB 3.5 billion, the highest in China. The company is a joint venture between a number of foreign and domestic investors. Table 11 lists Guangming's major investors and their equity shares in 2001.

Guangming has three major departments: resources (milk procurement), distribution, and processing. Within the processing department there are four major product categories: general temperature goods (milk powder, other room-temperature products), chilled products, bottled and bagged milk, and butter and cheese. Guangming has

TABLE 11. Guangming investors and equity shares

Investor	Equity Share
	Percent
Shanghai Dairy Company (Shanghai local government)	40
Shan Shi (Hong Kong)	40
Danone (France)	5
Xiwang (Chinese feed company)	5
Dazhong Zhou Tong (Chinese car company)	5
National Cattle Management Company	5

processing plants and designated milk suppliers in the following locations: Beijing, Wuxi, Heilongjiang, Shandong, Shanghai, Wuhan, Nanjing, Inner Mongolia, and Xian.

Three plants in Shanghai and plants in Wuhan, Xian, and Beijing all produce chilled products. The plants in Heilongjiang and Inner Mongolia produce UHT milk. One company official said that in 2001 Guangming started sourcing 100 tons of milk a day for the Shanghai area from Zhejiang and Jiangsu (Suzhou). Guangming had plans in 2002 to enter the markets in Guangzhou, Yunnan, and Kunming in 2003. It plans to set up processing plants and contract with farmers in the areas around these cities.

In 2000, Guangming's sales reached RMB 19.5 billion, of which RMB 11.7 billion was in Shanghai. In 2002, Guangming had 53.5 percent of the total dairy product market in Shanghai and 84 percent of the fluid milk market. Guangming produces 210 tmt of fluid milk, mostly in Shanghai. The company packages 52.3 percent of its fluid milk in cartons, 42.9 in bottles, and 4.8 percent as UHT. In 2001, Guangming processed 500 tmt of milk in total, 200 tmt of which were sourced from Inner Mongolia and Heilongjiang.

Guangming's major competitors are other Chinese companies such as San Yuan and Mengniu. Nestlé and Danone tried to enter the Shanghai market in the 1990s but their plants were not profitable. They responded by selling their facilities and entering into joint ventures with Chinese companies. Although one Guangming official expressed his opinion that the foreign entrants failed because Guangming's brand name and quality were more recognized by Chinese consumers, a former official from the Shanghai Dairy

Company believes that the foreign companies did not have the ability to get adequate high-quality milk supplies.

In the Shanghai area, Guangming is the price leader. The company follows a formula of cost plus desired profit to set prices, and other processors in the region generally follow Guangming's lead. Raw milk prices in the Shanghai area are fixed by the local government. The goal is to stabilize milk prices and provide dairy farmers with a reasonable profit. The government factors milk production costs, desired profit, returns from other livestock products, processor profits, marketing margins, and prices in other provinces into its price determination decision. The local government designates two general classes for milk: high quality and low quality. In 2002 the price for high-quality milk paid to large-scale producers was RMB 2.2/kg. Small-scale farmers received RMB 2.12/kg, the price for low-quality milk. Premiums or discounts are also applied to an individual farmer based on the milk's fat content and bacteria count.

Because raw milk prices are set by the Shanghai government, processors could suffer in the short run if consumer prices fell sharply or if the processing cost rose rapidly. Consequently, the government assesses a RMB 0.4/kg fee at the consumer level to create an emergency fund for dairy processors in the Shanghai area. The emergency fund is designed to provide temporary support for the processing sector if profits are squeezed because of policies that protect farm prices.

Researchers from CARD and CAAS visited Guangming's Dairy Plant No. 2 in Shanghai. For 80 years, the plant was located near the city center on Huai Hai road. In the early 1990s, the old plant was torn down and a new plant was built at its present location outside the city. Most of the machines in the old factory were made in China, but when the factory was relocated, new processing machinery was purchased from Sweden and packaging equipment was purchased from the United States. The original factory could process about 100-150 tons of milk daily using 1,000 employees. The new plant can process about 600 tons per day with only 400 workers.

Before marketing reforms were introduced in 1992, this plant produced a wide variety of products. However, after 1992 it began focusing on fluid milk and UHT milk production. The plant can produce about 300 tons of fluid milk and 300 tons of UHT milk each day. Processing Plant No. 2 produces 120,000 tons of fresh milk, 90,000 tons

of UHT milk, and about 3,000 tons of fruit juice (apple and orange) each year. The fresh milk is sold in Shanghai, but the UHT milk is sold in other provinces up and down the eastern coast of China. Guangming has a sales department that contacts supermarkets and makes contracts with them to carry its milk products. Guangming also has a household distribution network for fluid milk and yogurt.

Beijing Milk Processors. Researchers visited two dairy processors in the Beijing area. Shi Ta Ke is a local processor operating at 50 tons per day. The company is a joint venture with Mengniu, the largest milk processor in Inner Mongolia. The milk processed by Shi Ta Ke is sold in Beijing under the Mengniu label. Shi Ta Ke also produces UHT milk for the school milk program in Beijing. This is the only joint venture of this type in the Daxing district, but it is viewed by the local government as a good model for economic development. The district government has plans to encourage further investment by large dairy processors by offering low-cost land to locate processing facilities, local financing, and reductions in local taxes.

Most small processors in Daxing have established relationships with retailers in Beijing to carry their milk products. In addition to inspections by Beijing city officials, the district government inspects the small processors for safety and quality. The manager at Shi Ta Ke believes that processors pay close attention to the quality of their milk because local newspapers will print a story that will ruin their business if there is a problem. There are some small processors in Daxing that produce yogurt, but there are no powder plants in the district.

The second plant visited was San Yuan's Plant No. 1. The San Yuan Dairy Company was created in 1997 when the Western Suburb Dairy, Dongwai Dairy, Youanmen Dairy, Shuangqiao Dairy, Nankou Dairy, and the Sino-Sweden Dairy Training Center were consolidated through a joint-venture investment by the Beijing Dairy Company (state-owned enterprise) and the Chinese equity in the Beijing McDonald's. San Yuan is a member of the Beijing Holding Company Ltd., which is listed on the Hong Kong stock exchange.

The Youanmen plant manufactures yogurt, the Shuangqiao plant (Plant No. 1) processes fluid milk, and the Nankou plant makes milk powder. San Yuan also has a powder plant in Inner Mongol. Plant No. 1 packages fluid milk in cartons and plastic

pouch packages. The fresh milk is sent to Beijing and the surrounding area. UHT milk that is produced in this plant may be sold in Beijing or sent to other provinces, such as Fujian and other outlying areas.

The processing equipment in the plant was imported from Switzerland. The packaging equipment came from France, China, and the United States (International Paper Co.). About 85 percent of the machinery is new and meets international standards. The plant processes 600 tons of milk daily. Roughly 100-200 tons are UHT milk, and less than 100 tons are processed into drinking yogurt. The remaining milk is pasteurized and sold as fresh milk. The plant packages about 70-80 tons of fresh milk in cartons, and the rest is packaged in plastic bags. Plastic bags are preferred because they are cheaper, and the cost reduction is passed on to the consumer. UHT milk is packaged in foil pouches.

The fluid milk resources used in this plant all come from the Beijing area. San Yuan does not deal directly with farmers; rather, it works through the local dairy associations. There are roughly 10 small, private processors that provide fluid milk to Beijing, but Plant No. 1 is the only San Yuan plant that services the fluid milk demand (excluding yogurt, which also comes from the Youanmen plant) in Beijing. Guangming recently invested in a milk processing plant in the Beijing area, and San Yuan is making investments in Shanghai. San Yuan is also negotiating with Australian firms to set up a manufacturing plant in Australia to produce fluid milk products to import into China. According to the manager of Plant No. 1, it is possible to bring fresh milk to Beijing from Australia. The reason San Yuan wants to use Australian milk is that it is cheaper and of better quality than the local milk. The fat and protein content of Chinese milk usually averages 3.5 to 3.6 percent and the protein content is 3.1 to 3.2 percent. The fat content of Australian milk averages 8 percent higher than Chinese milk, and the protein content is more the 12 percent higher.

Retail Marketing of Dairy Products

The survey described in the first half of this report demonstrated that Chinese consumers purchase dairy products through a number of marketing channels. In this section we describe retail dairy marketing from the perspective of a few retailers in Shanghai and Beijing. We begin the discussion in this section by presenting some additional facts about consumer behavior in Shanghai gathered through a survey by the

Shanghai Dairy Association in 2000. Table 12 gives some statistics about dairy consumption and expenditures for consumers who participated in the survey.

Fluid milk accounts for 64 percent of the total milk consumption in Shanghai, while yogurt represents 14 percent of milk consumption. Fluid milk consumption in Shanghai constitutes 30 percent of the national total. Roughly 85 percent of consumers surveyed in Shanghai drink milk, and 56 percent drink milk daily. Most people who drink milk consume 200 ml of milk at a time, usually in the morning or evening. The majority of consumers preferred to purchase milk in bottles rather than in cartons. About 60 percent of the milk purchased by the sample households was bought by middle-aged women, who are the gatekeepers for the household food supply. The survey data indicates that health-conscious consumers are more likely to purchase milk. A majority of the sample households preferred home delivery for milk products. UHT milk consumption is greatest among the student population. The average price paid for milk in Shanghai was RMB 0.5 per 100 ml. The Shanghai survey also found that dairy product purchases from small grocery stores and food vendors was declining (also reflected in the survey results reported in this paper), but purchases through supermarkets, home delivery, and delivery to designated pick-up points were increasing.

Agricultural Industry and Commerce Supermarket No. 118, Shanghai. Researchers from CARD and CAAS visited the Agricultural Industry and Commerce Supermarket No. 118 (Nong-Gong-Shang or NGS) in Shanghai. NGS owns 200 supermarkets and 100

TABLE 12. Annual dairy consumption statistics for Shanghai

Dairy Consumption and Expenditures/Unit	Amount Reported
Average GDP per person (RMB)	34,652
Consumption expenditures per person (RMB)	8,759
Food expenditures per person (RMB)	3,740
Dairy expenditures per person (RMB)	144
Milk consumption per person (kg)	30
Total milk consumption for Shanghai (tmt)	390
Value of dairy product consumption (billion RMB)	1.87

convenience stores. About 150 of those stores are in the Shanghai area. NGS is part of a group that was started by a state-owned farm as an outlet for its products. This company also owns 40 percent of the equity in the Shanghai Dairy Company, and the management of the Shanghai Dairy Company is mostly from NGS's parent company. The parent group focuses on four major activities: dairy products, supermarkets, textiles, and housing. It has been involved in several other industries in the past, but these were not successful. The company Web site is <http://www.ngs1685.com>

NGS sells pork, vegetables, and rice from its own farms. The company is completely vertically integrated and has farms that produce green (Grade A)³ and organic foods and vegetables. The store is set up in a "superstore" format, with both food and daily living items available. The company has developed its own clothing line that it designs, manufactures, and sells. Its target market is the average and low-income consumer. It also has a large deli and fresh-processed food section. NGS views its stores as a lower-cost alternative to the large, multinational supermarket chains, such as Carrefour and Walmart.

NGS uses marketing surveys to discover consumer preferences for particular products. The salespeople also provide input in the product selection process. The company has an information department that collects information and test markets new products. Brands that are not well known in a region are not likely to get shelf space in an NGS store. Finally, it considers the consumers' purchasing power and is not likely to choose products that would be too expensive for the average Chinese consumer.

The company does not charge slotting fees to manufacturers, but it does negotiate contracts for price, quality standards, and prompt payment and delivery. Shelf space is proportional to sales volume share. The stores generally receive their products directly from the manufacturer. The NGS dairy manager noted that in recent years the variety of dairy products available in Shanghai has increased substantially. Purchasing agents within the company procure imported products for the local stores, but Supermarket No. 118 does not carry very many imported products.

NGS frequently uses dairy product promotions to increase sales. The most common types of promotion formats are buy one-get one free, temporary price reductions, and complementary daily articles with the purchase of a dairy product. The cost of these

promotions is usually shared by the dairy product supplier and NGS. Likewise, promotions are initiated by both sides, but the company does run loss-leader promotions.

Beijing Retailers. In Beijing, the research team visited with the Beijing Commercial Committee and two supermarkets. In 2002, the Beijing Commercial Committee had four major priorities for development of the local food distribution system.

1. Organizing the distribution of agricultural products to maintain and improve food safety.
2. Developing the capacity to access food risks.
3. Restructuring of the wholesale distribution system, including consolidation of wholesale markets and reducing their number to 10, limiting access to wholesale markets to major buyers, and enforcing product standards.
4. Establishing standards and regulations governing the supermarket and fresh agricultural product retail system, including management standards, information systems, and the interface between retailers and suppliers.

According to the committee, farmers are prohibited from selling raw milk directly to consumers in Beijing; the milk must be processed before sale. Small vendors are required to obtain a license from the city. Fresh milk in Beijing is sent directly to retail markets from the processors, but UHT and other milk products that can be stored may pass through a wholesale market. The large retailers in Beijing either own their own or work with a distributor that owns a centralized distribution facility, but the smaller retailers buy direct from the factory.

Yikelong Commercial Company, Beijing. The Beijing Yikelong Commercial Company was established in 1995, and it owns eight company supermarkets and four franchise stores. It also owns its own distribution center for the larger supermarkets. Last year it had RMB 600 million in sales, including sales for food, clothing, travel, and other products. The company director, Mr. Chen, stated that he has witnessed a rapid increase in the demand for dairy products at his stores. Yikelong sells four major brands of dairy products: Guangming, San Yuan, Mengniu, and Yili. Fresh milk and yogurt are their largest sellers, with sales from January through June of 2002 of RMB 6 million. Sales during the same period in 2001 were RMB 3.5 million.

The director of Yikelong believes that milk consumption increases as consumer incomes rise and as they become more health conscious. Fresh milk sales in his stores have risen rapidly, but milk powder sales have decreased gradually, declining 8 percent annually. This is a general trend across all of Yikelong's supermarkets in Beijing. Chen believes the decline is due to consumer concerns about the healthiness of products. He stated that the BSE (bovine spongiform encephalopathy) and FMD (foot and mouth disease) crises in the European Union may have had an impact on powder consumption, but more importantly, the Chinese preference for fresh food is a driving factor. UHT milk sales have increased but not as rapidly as the fresh milk sales in Chen's stores. The milk in plastic packages is the best seller. The store often sells out a couple of hours after opening. Chen believes the popularity is due to the low cost. Table 13 shows the breakdown of sales for major dairy products and major brands at Yikelong stores for the first six months of 2001 and 2002.

TABLE 13. Dairy product sales at Yikelong Company stores

Product/Company	Sales in Million RMB, Jan.-June	
	2001	2002
Product totals		
Fluid milk	2.40	4.00
Yogurt	1.40	2.00
Milk powder	2.26	2.18
Fluid milk totals by brand		
San Yuan	1.22	1.56
Mengnui	0.24	1.07
Guangming	0.23	0.66
Yili	0.32	0.69
Milk powder by brand		
Nestlé	0.36	0.34
Sanlu	0.09	0.33
Wandashan	0.29	0.28
Hui Si	0.10	0.18
Hongxing	0.11	0.16

Yikelong chooses the dairy products it places on its shelves based on historical sales volumes and does not charge slotting fees. The company receives a 10 percent margin on dairy products. This is higher than the margin received on pork or eggs, but it is lower than for many other products because milk is an item purchased daily by consumers. The dairy products manufactured locally are ordered and delivered daily to the store. If the foreign company has an office in China, Yikelong will work directly with that office to procure imported dairy products; otherwise, it purchases its imported product through a third-party import company. According to Chen, consumers may think that imported products are of higher quality than domestic products, but the cost is often too high for them to purchase regularly. Consumer perceptions of the quality of Chinese dairy products are improving over time.

Yikelong's target clientele is the middle- and low-income consumer in Beijing. The store often runs promotions on dairy products. Typically it gives away dairy products with the purchase of a product, offers temporary price reductions, or gives away a gift with the purchase of a dairy product. The processor generally initiates the product promotion, and the processor will absorb the cost of the promotion. Yikelong requires that it receive its desired 10 percent margin on the products sold under the promotion.

Carrefour, Beijing. The research team visited a Carrefour supermarket in Beijing that opened in 1995. In 2002, Carrefour had 29 stores in China, generating RMB 10 billion in annual revenues. There were four Carrefour locations in Beijing. Carrefour carries a full line of dairy products, including fresh milk, yogurt, cheese, butter, UHT milk, and milk powder. Fluid milk and yogurt are obtained from San Yuan, Guangming, Yili, and Parmalat. Butter and cheese are imported from France, Australia, New Zealand, and Denmark. The company also gets cheese from a Pikifou plant in Tianjin and from Guangming.

Imported dairy products are obtained from one of several independent distributors. Carrefour sends orders to the distributors, and the distributors procure the products. Most products are obtained from the company's three top distributors: Sinodis (Shanghai), Good Well, and Capital Lide (Beijing). Fresh milk and yogurt are ordered and delivered daily to the store. Cheese is ordered once every other week, and UHT is ordered twice a week. The manager of the Carrefour location we visited stated that the store did not get

volume discounts directly from its suppliers. All prices and procurement terms are negotiated by the company headquarters in Shanghai. Carrefour has divided its stores into four regions, and each region has a negotiation team that is charged with negotiating terms with local suppliers. In 2002, Carrefour did not have a central distribution center, but it had plans to establish a distribution facility in Tianjin sometime in the next five years. Once that is in place, the store manager thought Carrefour may be able to increase its bargaining power with suppliers. Carrefour usually does have a slotting fee that is negotiated by the central office; however, the local manager can negotiate with a supplier for additional space.

Milk product sales at this location had not increased much in the last year. The monthly average dairy product sales breakdown for 2001 is shown in Table 14. Roughly 80 percent of the milk powder sales are of imported products, about 66 percent of which are sales of infant powder. Red Star and Nestlé dominate the sales of domestically produced milk powder. Danone and Yoplait are the best-selling yogurt products. The store manager thought that Chinese consumers view the imported products as being of higher quality than domestic products, but the quality of Chinese products is improving.

Carrefour also runs frequent promotions on dairy products. It reduce prices, gives away free dairy products with a purchase, gives away small gifts with a purchase, or holds a lottery (the purchase of a dairy product enters the consumer in the lottery). When it runs a promotion, the company will have a margin of 0-3 percent on the product. The processor also shares in the cost of the promotion. When products sell for the regular

TABLE 14. Annual dairy consumption statistics for Shanghai

Product	Sales in 1,000 RMB
Fresh milk	300
UHT milk	50
Yogurt	200
Butter and cheese	50
Milk powder	600-800

price, Carrefour's margin is 10-15 percent. Carrefour seeks to be a low-cost food provider, so it sees itself reaching every segment of the Chinese market. The manager believes Carrefour is competitive on prices for most food items. Moreover, he believes that its success is evident in the fact that several Chinese supermarkets are emulating Carrefour's format.

Summary Comments

This report is an eclectic collection of facts and opinions about dairy production, distribution, and consumption in urban China in 2002. While one must be very careful about drawing general conclusions for a country as large and diverse as China from such a small sample, some recurring themes do appear in the survey data and the information gathered in interviews. This section briefly identifies a few of these ideas, but the authors leave it to the reader to assess their applicability to other urban areas in China.

It is clear, both from the survey data and from interviews, that urban consumers in China view dairy products in a positive light. Dairy products are considered healthy, nutritious foods that should be integrated as a staple component of daily diets. Most households in our survey sample purchased some dairy products. Chinese consumers value freshness, safety, and taste when choosing dairy products, so purchases are frequent and in small quantities, usually single-serving packages. Consumer confidence in domestically produced products is increasing, but households tend to purchase imported dairy products when safe, high-quality domestic products are not readily available.

The most popular dairy products are milk, yogurt, and ice cream. Milk powder appears to be an inferior good, and as fresh milk becomes increasingly available and affordable, consumers are decreasing their milk powder purchases. Cheese consumption in the household is infrequent and is unlikely to become a regular part of household consumption until methods for integrating cheese into traditional Chinese-style cuisine are developed. However, cheese consumption in restaurants is growing and is already becoming a regular part of some consumers' diets away from home.

Contrary to the opinion that milk consumption is a trend among young Chinese consumers, dairy product consumption does not appear to be associated with any particular age group. Both young and old consume dairy products regularly. Education

and income are important factors having a positive impact on milk consumption, as is exposure to dairy products through travel abroad. Moreover, a substantial number of individuals in our survey sample had been counseled to drink milk by healthcare professionals, and the Chinese government is encouraging milk consumption through the creation of school milk programs. At the time of the survey, it did not appear that school milk programs were widespread in Beijing, Shanghai, or Guangzhou, but their influence is likely to grow over the coming decade.

Aside from the positive health benefits of dairy product consumption, the government of China is promoting the development of the domestic dairy industry to improve the incomes of farmers. All of the farmers interviewed in this study indicated that dairy production was quite profitable during this time of short supply and growing demand. If the average of RMB 2,000 per head can be achieved by small dairy farms, then adding 10 dairy cows to a typical rural household's production activities could roughly double its income. Local governments in some regions near population centers are encouraging dairy production by providing technical assistance and financial incentives to develop both dairy production and processing. Nevertheless, supplies of raw milk are still not sufficient to meet processors' demands.

We see some indications of the current supply problems in the household survey from the respondents that indicated they purchased imported dairy products because domestic products were not available or were not safe. Moreover, the fact that Yikelong often sells its daily supply of fresh milk within a couple of hours suggests that low-cost supplies of fresh milk are still insufficient to satisfy the demand. It was revealed in a number of interviews that access to good quality raw milk supplies is crucial to maintaining a successful processing operation. The quest for milk supplies is one factor driving consolidation in China's dairy processing sector. Firms, such as Guangming, have purchased farms and processing plants in Inner Mongolia and Heilongjiang to increase their access to milk supplies and to position themselves to enter new regional markets. This is a positive development for urban consumers because the growing competition between domestic dairy processors is increasing the quality, availability, and variety of dairy products offered in urban markets.

Another critical factor driving the expansion of dairy product consumption in urban China has been the development of interregional supermarket chains. Spurred on by investments from foreign multinationals, China's dairy product supply channels are rapidly changing, with supermarkets playing an increasingly important role. Some consumers make regular dairy product purchases from supermarkets, and stores are able to obtain a competitive margin on their product sales. Chinese supermarket chains are emulating the major multinational chains, both in format and in marketing practices. However, prices are a very important factor for Chinese consumers. While it is unclear whether differences in cost or clientele were the driving force, there were substantial differences in the relative importance of individual dairy products in the sales revenues of Carrefour and Yikelong. Multinationals, such as Carrefour, have been successful in developing the Chinese retail market, but expansion of domestic chains, such as Yikelong and NGS, may play a greater role in bringing affordable dairy products to a greater number of urban consumers in China.

Finally, the information gathered for this study reveals that dairy product consumption in China is still quite diversified by region. Variations in historical dairy production patterns, current regional dairy product supplies, and demographics play important roles in explaining the differences. As regional barriers to the movement of goods are overcome and as nationally recognized brands are established, these differences may diminish. Nevertheless, in all three regions discussed in this report, the outlook for China's dairy sector is bullish. Rapid expansion of consumption and domestic production is expected to continue in the near term in urban areas, but the key to the long-run growth of the industry lies in cultivating milk consumption in rural households.

Endnotes

1. For most products, some households indicated purchases of dairy products from foreign or joint venture companies but no purchases of the product in question block 3 of the survey. These observations are included in the counts in the top half of Table 6. Responses to questions in block 3 are used as the basis for computing the shares in the lower half of Table 6. Consequently, observations with conflicting responses are not included in the share computations. The number of deleted observations was most significant for cheese, butter, and powdered milk products.
2. Small farms are defined as farms with dairy cattle inventories of fewer than 100 head. Medium farms own between 100 and 1,999 head of cattle, and large farms have 2,000 or more cows.
3. Green food is a special designation given to food products that are produced with low inputs of chemical fertilizer and pesticide. There are two classifications of green food: A and AA. AA green food production standards are similar to international organic food standards.

Appendix

Survey of Household Consumption of Dairy Products

1. Basic Household Information
 - 1.1 Number of people living in the household _____
 - 1.2 Number of children under 14 years old _____
 - 1.3 Number of adults over the age of 60 _____
 - 1.4 Average monthly household income _____ yuan.
 - 1.41 Average monthly salary income of male head of household _____ yuan.
 - 1.42 Average monthly salary income of household head's spouse _____ yuan
 - 1.43 Other monthly income other than salary _____ yuan

1.51	1.52	1.53	1.54	1.55
Relationship to household head	Age in years	Gender	Number of years of formal education	Occupation
Household Head		1=male 2=female		
Spouse of household head		1=male 2=female		

2. What is the distance from your household to the following location?

Location	Distance
2.1 Distance from household to city center*	km
2.2 Have you shopped at a supermarket this year	1=yes 2=no
2.3 Distance to the supermarket where you usually shop	km
2.4 The number of supermarkets located within 500 m from your house	
2.5 Distance to the nearest McDonalds restaurant	km

*The city center is defined as Tiananmen Square in Beijing or the location of the city government offices in Shanghai and Guangzhou.

8. Indicate the importance of the following variables in your decision to purchase dairy products.

8.1 Price	1 = Very important 2 = Important 3 = Not important	8.4 Health benefits of eating dairy products	1 = Very important 2 = Important 3 = Not important
8.2 Taste	1 = Very important 2 = Important 3 = Not important	8.5 Whether or not the product was imported or produced by a joint venture	1 = Very important 2 = Important 3 = Not important
8.3 Product safety	1 = Very important 2 = Important 3 = Not important	8.6 Brand name	1 = Very important 2 = Important 3 = Not important

9. Do you purchase the following imported products (include products produced by a foreign joint venture).

9.1 Milk	1 = Yes 2 = No	9.5 Whole milk powder	1 = Yes 2 = No
9.2 Butter	1 = Yes 2 = No	9.6 Infant formula	1 = Yes 2 = No
9.3 Cheese	1 = Yes 2 = No	9.7 Yogurt	1 = Yes 2 = No
9.4 Non-fat dry milk powder	1 = Yes 2 = No	9.8 Other	1 = Yes 2 = No

10. Indicate the importance of the following variables in your decision to purchase imported dairy products. (Skip if you do not purchase imported dairy products)

10.1 Domestic products are not available	1 = Very important 2 = Important 3 = Not important
10.2 Imported products are safer to consume	1 = Very important 2 = Important 3 = Not important
10.3 Imported products have better quality and taste	1 = Very important 2 = Important 3 = Not important
10.4 Imported products cost less	1 = Very important 2 = Important 3 = Not important

11.1 Does your child's school have a school milk program? Yes No

11.2 Has a doctor or other healthcare professional ever suggested that your family members should drink milk? Yes No

12. Have you seen or heard advertisements for dairy products in the following media?

12.1 Television	1 = Yes 2 = No	12.4 Flyers in the market	1 = Yes 2 = No
12.2 Radio	1 = Yes 2 = No	12.5 Internet	1 = Yes 2 = No
12.3 Billboards	1 = Yes 2 = No	12.6 Other	1 = Yes 2 = No

13. Please rank the following media according to the number of advertisements for dairy products you have seen or heard (1 = most frequent)

13.1 Television		13.4 Flyers in the market	
13.2 Radio		13.5 Internet	
13.3 Billboards		13.6 Other	

14.

14.1 Have you traveled abroad in the last 10 years?	1 = yes 2 = No
14.2 Did you consume dairy products when you were abroad?	1 = yes 2 = No
14.4 After you returned home, did you increase your consumption of dairy products?	1 = yes 2 = No