

Linking Markets to Smallholder Dairy Farmers in China: Quality as a New Driver*



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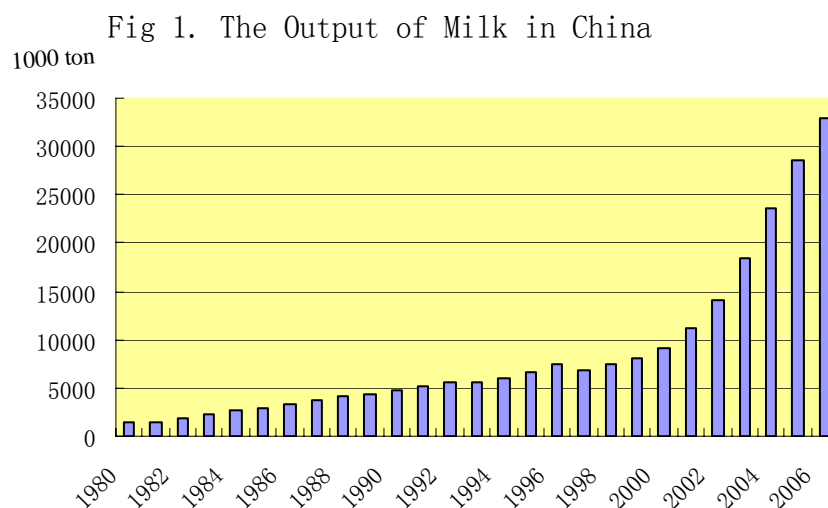
Linking Markets to Smallholder Dairy Farmers in China:

Quality as a New Driver

Globally China is the largest country in terms of population in the world. However, up till now, in terms of dairy consumption and production, it is relatively small. The population in China represents one-fifth of global totals but total dairy product output accounts for only 4 percent of world production. Since the beginning of the 21st century, however, the industry has been changing rapidly. Dairy product production jumped exponentially from 9.2 million tons in 2000 to 337 million tons in 2006. This rapid development of the dairy industry in China has not only met the demands for domestic increasing consumption of dairy products, but more importantly provided an opportunity of increasing employment and incomes for small farm households¹. The objective of this paper is to identify the factors changing the face of the dairy industry in China, review the implications for small dairy farmers, and draw some conclusions on how to link small dairy farmers to this growth in demand within the context of some of the main problems facing producers.. Hopefully some of the lessons learned in China, within the context of the history of the industry and the current situation will be helpful in identifying suitable approaches to linking small producers to markets in other Asian developing countries.

1. Dairy development in China

The economic reforms started in the 1970s laid the foundations for a rapid development of Chinese economy and laid the seeds for the rapid development of dairy industry in China. In 1980, the total milk output was 1.4 million tons in China, by 2006, it had increased to 33 million tons, an increase of 4,274% during a period of 26 years. Per capita consumption of milk in China rose from 1 kg to 25 kg over the same period (See fig 1) .



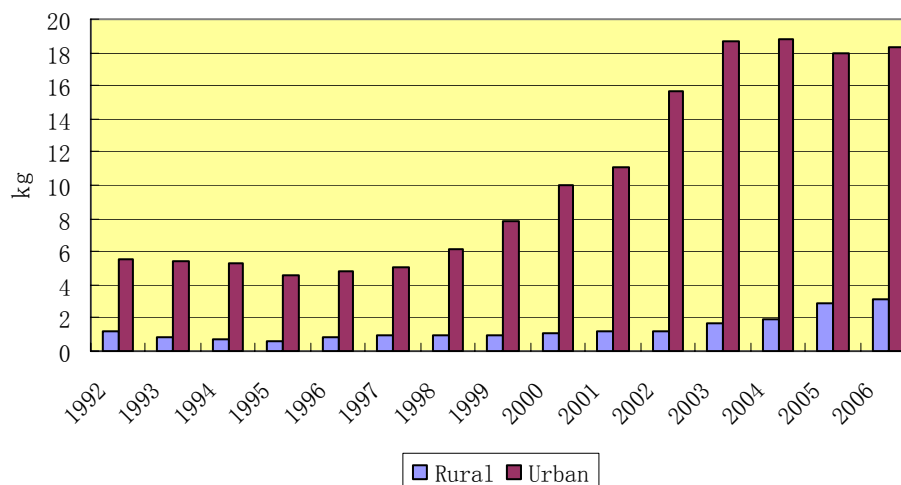
Source: Chinese Statistical Yearbooks.

There is a big difference in consumption of dairy products between urban residents and rural residents in China. The per capita consumption of dairy products of urban residents was nearly 6 kg in 1992, increasing to 18 kg by 2006, This compares to per capita consumption of dairy products of rural residents which only increased from 1 kg to 3 kg over the same time period. The

¹ The income from dairy cow raising is higher than that from crop planting in China. See Chapter 2 in detail.

per capita consumption of dairy products of rural residents averaged only 17% of that of urban residents in 2006. Rural residents' consumption of dairy products is mainly constrained by low incomes. Furthermore, rural residents have a very limited tradition of fresh milk consumption (Hu, Fuller & Readron, 2005).

Fig 2. The Per Capita of Dairy Products Consumption for Rural and Urban Household in China



Source: Chinese Statistical Yearbooks.

During the period from the 1970s to the beginning of the 21st Century, the development of dairy industry in China can be broken down into three development phases: the urban dairy industry phase, the base dairy industry phase and, finally, the multi-modal dairy industry phase. The impact of each phase on the development of the dairy industry in China is reviewed in the section below.

1.1 Urban Dairy Industry Phases

Urban dairy development is also called “Urban Suburbs Dairy Industry”, which refers to the dependence on raw milk for manufacture of dairy products for consumption by urban residents on supply by dairy farms in the urban suburbs (or nearby regions, including dairy cattle husbandry by rural households nearby large- and medium-size cities (Xu Ji et al., 1991) Traditionally, apart from minority ethnic nationalities inhabiting west pastoral regions, the majorities of the Han nationality (occupying over 95% of the total population in China) do not have the habit of consuming fluid milk and other dairy products (Chen Zhao, 2001). Initially the practice of raising dairy cattle was to meet the demand for dairy products by foreigners in the territory of China with most of the dairy cattle directly transported from Europe to China. With most foreigners inhabiting coastal cities, the early urban dairy industry was concentrated in the large cities along the coast. Shanghai was one of the five open coastal cities in 1842. Before 1870, the special purpose dairy cattle breeds were introduced to Shanghai from Europe (Dong Debao et al., 2000). Dairy cattle in Tianjin were also brought to China by foreign missionaries in late-19th Century (Wang Shugui, 2000). Meanwhile, dairy cattle in Dalian City were introduced by foreign residents from Japan and Russia during the Japan-Russia War (Dalian City Dairy Products Project Office, 2000).

Influenced by the consumption habits of foreigners, the Chinese urban residents started to realize the nutritional benefits of dairy products. This was reinforced by changing food consumption tendencies of Chinese who lived abroad and the number of people drinking milk increased, generating dairy product markets in large- and medium-size cities (Li Yifang 1, 1998). Before

1949, the raw milk supply for urban cities in China mainly came from dairy farms operated by Chinese and foreigners as well as dairy cattle husbandry rural households in the suburbs of large cities (Dong Debao, 2000; Liu Yuanying, 2000). In 1956, the Chinese Government started to undertake ownership reform in private enterprises and dairy cattle raised by private entrepreneurs were transferred to dairy farms affiliated to the state owned dairy product processing enterprises or state farms in the suburbs (Wang Shugui, 2000).

Over the period from 1949 to 1979, the growth rate of Chinese raw milk supply slowed down, growing at an annual rate of 5% and increasing from 210,000 tons in 1949 to almost a million tones by 1979. Production gains were mainly restricted by inadequate marketing systems and an inadequate feed supply. As the supply of dairy products could not meet consumption requirements, the government implemented an allocation system for dairy product, with the objective of ensuring adequate supplies to meet the demand of the old people, babies, patients and officials of certain grade level. There were no similar guarantees in small-size cities and rural area (Tuo Guozhu, 2000). In the 1980s, urban dairy industry development in China started to grow rapidly. In 1980, the total output of dairy products in Beijing Municipality was 61.8 thousand tons, and in 1985 it had increased to 137 thousand tons, with an annual growth rate of 24.3%; in 1990, the total output of dairy products was 218 thousand tons, with an annual growth rate of 11.8%. In 1980, the total output of dairy products in Shanghai Municipality was 73.3 thousand tons, and in 1985 it had increased to 142 thousand tons, with an annual growth rate of 18.7%; in 1990, the total output of dairy products was 227 thousand tons, with an annual growth rate of 12.0%. In 1980, the total output of dairy products in Tianjin Municipality was 22.4 thousand tons, and in 1985 it had increased to 44 thousand tons, with an annual growth rate of 19.3%; in 1990, the total output of dairy products was 77 thousand tons, with an annual growth rate of 15.0%. Other cities such as Chongqing, Dalian, Nanjing, Kunming, etc. had also gained similar development in dairy industry (Wang Huaibao, 2000).

The rapid development of urban dairy industry was promoted by multiple factors, ranging from macro-economic factors, government policies, and international assistance. Firstly, rising urban resident's incomes supported a growing demand for dairy products. The gap between consumption and production grew resulting in awareness that "it is difficult to buy milk". In cities, especially large cities, "the fresh milk supply has been very tense" (Xu Ji et al., 1991). In order to reduce these imbalances, the Chinese Government adopted active policies to increase the productive capacity of urban dairy industry. The Government introduced a policy of allowing private to raise dairy cattle, thus breaking the monopoly of dairy industry by single state ownership, and bring into full play the initiatives of private people to increase the supply of milk source (Tuo Guozhu, 2000). To increase the purchase price of raw milk the government introduced milk price subsidies which stimulated the growth of milk output (Liu Yuanying, 2000). The government invested a large amount of funds to support the development of urban dairy industry. For example, the Beijing Municipal Government allocated 400,000 US\$ as annually, a special government financial allocation fund to support dairy cattle development, provided dairy cattle subsidies for cattle shed that need remodeling, and provided subsidies for dairy farms that needed to add new equipment (Liu Yuanying, 2000). In the 1980s, China had grain supply imbalanced and some cities had adopting the policy of "using grain to exchange for milk". In other words, the government provided dairy farmers a certain proportion of parity feed price on the basis of the number of dairy cattle raised by the dairy farm (Chongqing Municipal Dairy Industry Administration Office, 2000). In addition, the government adopted active support policies to urban suburbs rural households raising dairy cattle (Ouyang Qian, 2000). Meanwhile, international assistance also played an active role supporting urban dairy industry development and increased milk supplies in China. China has about 20 large- and medium-size cities that received a total amount of US\$ 156 million assistance from the World Food Programme (WFP) and EEC (Tuo Guozhu, 2000).

Before the 1990s, the major products in large cities, such as Beijing, Shanghai, Tianjin, Dalian, Nanjing, and Kunming pasteurized milk and produced small quantities of milk powder (Liu

Yuanying, 2000; Dong Debao, 2000; Wang Shugui, 2000; Dalian City Dairy Product Project Office, 2000; Sang Wanbang, 2000; and Ouyang Qian, 2000). Due to limited available supplies of fresh milk, pasteurized milk provided the only form of liquid milk to urban residents, consequently consumers had limited choice in dairy product selection. As of the early 1990s, China had just entered the stage of market economy, people's life styles were fairly regulated; they consequently formed the habit of drinking milk in the morning. This was supported by lack of refrigeration. Urban dairy product processing enterprises have since developed sophisticated distribution systems and the consumers can get milk at any time of the day.

Since the 1990s, the growth rate of urban dairy industry supply has declined.. For example in Beijing, the dairy product output in 1990 was 77 thousand tons, till 1999, it only reached 129 thousand tons with an annual growth rate of 0.46%; in Tianjin, the dairy product output in 1990 was 218 thousand tons, till 1999, it only reached 241 thousand tons with an annual growth rate of 5.19%; in Shanghai, the dairy product output in 1990 was 227 thousand tons, till 1999, it only reached 246 thousand tons with an annual growth rate of 0.84%; which were far below the growth rate of 11.8% in Beijing, 12.0% in Shanghai, and 15.0% in Tianjin during the period from 1985 to 1990.

The reasons restricting the high speed growth of urban dairy industry supply in China can be attributed to the following factors: (1) rapid development of the national economy, prompted urban industries, housing construction and commerce to expand outside of city limits, raising land values and thus restricting the construction of dairy farms. 2) this was also accompanied by an increasing wage rates in urban suburbs (3) as original dairy farms were gradually surrounded by new residential houses, they were required, due to environmental concerns, to close or move to new places further farther from the downtown region; (4) decreasing farmland led to a scarcity of fodder and feed resources;(5) influenced by many of the factors above, the production cost of urban dairy production increased, reducing profitability. For instance, Bright Group, one of the largest dairy processing enterprises in Shanghai had 10 dairy farms in 1985, but now only 2 remain, with the remainder shut down and/or consolidated. (Jiang Yaming, 2004; Wang Yongkang, 2004)2.

1.2 Dairy Industry Phases in North China Agricultural Region (1980-2000)

Since the mid-1980s, overall raw milk supplies in China didn't decline in the context of lower urban, peri-urban availabilities. .Rather, the Northern China agricultural region gradually became the major source of raw milk to dairy processors in China. The North China agricultural region refers to the crop cultivation zone north of the Yellow River, especially those located in Inner Mongolia, Heilongjiang Province and Hebei province3. In 1975, the total raw milk output of Inner Mongolia, Heilongjiang Province and Hebei province, at less than a million tons, accounted for only 13% of national totals. By 1985, the total regional output more than doubled to 2.4 million thousand tons and then rose to 10.7 million tons by 1995. In 2006, the total output of the three provinces jumped to 18 million tons, or more than half of the national total output (See table 1).

Table 1. Raw Milk Output in North China Agricultural Region

	1975	1980	1985	1990	1995	2000	2005	2006
Output (100t)								

² The author of this paper visited the Ninth Pastoral farm of the Shanghai Bright Group and met Mr. Jiang Yaming, Director of the Farm. During the interview with Mr. Jiang, he mentioned the major difficulties in dairy farm operation by the Shanghai Bright Group in the suburbs of Shanghai. Here is a summary of 4 points.

³ In the north China pastoral zone, due to serious desertification of grassland and inconvenient communication and other reasons, dairy industry has not developed as expected (John Longworth, 1998).

Inner Mongolia	645	702	2590	3960	5120	8300	6969	8805
Hebei	216	265	1000	1430	3890	9620	3486	4170
Heilongjiang	130	1385	1540	1027	1666	1565	4442	4646
Total	991	2352	5130	6417	10676	19485	14897	17621
National	7552	13422	28940	47510	67260	91890	28648	33663
Ratio (%)								
Inner Mongolia	8.5	5.2	8.9	8.3	7.6	9.0	24.3	26.2
Hebei	2.9	2.0	3.5	3.0	5.8	10.5	12.2	12.4
Heilongjiang	1.7	10.3	5.3	2.2	2.5	1.7	15.5	13.8
Total	13.1	17.5	17.7	13.5	15.9	21.2	52.0	52.3
National	100	100	100	100	100	100	100	100

Resource : Department of China Dairy Yearbook edited "China Dairy Statistical Report".

The remarkable and rapid development of the dairy industry in the three provinces in the North China agricultural region has many reasons. Compared with dairy husbandry in city suburbs or even in some of the agricultural regions south of the Yellow River, Hebei Province, Heilongjiang Province and Inner Mongolia Autonomous Region have favorable conditions for dairy cattle husbandry. Per capita farmland availability in Heilongjiang Province and Inner Mongolia Autonomous Region is 0.6 h and 0.5 h, respectively, exceeding the national average by 0.3 h. It is certainly far larger than the per capita farmland in the suburbs of Beijing, Shanghai and Tianjin (they are 0.2 h, 0.1h and 0.3h, respectively). These three provinces have fairly abundant labor resources and low wages. For example, the portion of the population of rural residents engaged off-farm in Hebei, Heilongjiang and Inner Mongolia is 18%, 11% and 10%, respectively compared to rural residents in Beijing, Shanghai and Tianjin whose share of off-farm income is 66%, 74% and 54%, respectively⁴. Wage rates play a decisive role in determination of the production cost of raw milk. The per capita income in North China agricultural region is lower than that in urban suburbs and rural residents in South China. The rural per capita income in Hebei, Heilongjiang and Inner Mongolia is less than US\$400 while that in Beijing, Shanghai, Tianjin, Jiangsu and Zhejiang ranges between US\$627 and US\$883. Air temperature also plays an important role in influencing the dairy cattle milk production, and the average air temperature in North China is over 3°C lower than that in South China. These factors have contributed to the competitiveness and potential of dairy product production in the North China agricultural region.

Additional factors supporting dairy development in North China agricultural region include the following: (1) dairy product consumption in large- and medium-size cities has exceeded the development pace of urban dairy industries ; (2) local governments have adopted active policies to promote dairy industry development; (3) growing investment in dairy product processing enterprises; (4) available credit, foreign investment and access to technology.

Growth in dairy consumption

Over the 1992 to 2000 period, the annual average growth rate of raw milk supply in Beijing, Tianjin and Shanghai was 3.0%, 9.0% and -0.8%, respectively. However, during the same period, in the same cities the expenditures spent on dairy products grew at an annual average rate of 52%, 33%

⁴ In Jiangsu and Zhejiang Provinces in South China, the share of rural residents working off-farm is 56% and 63%, respectively.

and 29%, respectively. The gap between supply and demand has created conditions for dairy products from other regions to enter the urban markets.

Local policies

Financing of local governments in China is heavily reliant on local taxation. This dependency has prompted local governments to actively develop/and attract outside businesses to local regions through tax policies.. In the coastal regions in South China, due to their existing industrial base, local governments have actively adopted policies to promote taxation in town and village enterprise (TVE). They have, at the same time, absorbed rural laborers in large quantities so as to increase the income of rural residents (Sonobe, Hu, Otsuka, 2002; Hu, 2003). North China agricultural region lacked an industrial base; therefore, the local governments supported the development of local dairy industries through policy and capital support. For example, in the 1980s, the Government of the Inner Mongolia Autonomous Region listed the “dairy product processing industry as the leading sector of the whole Autonomous Region”. Over the 1980 to 1985 period, the total investment in dairy product processing in the region was 11 million US\$ and the Autonomous Region initiated the technical transformation and expansion on 25 dairy product processing enterprises (E Guangyu, 2000). The governments of Shijiazhuang City and Tangshan City in Hebei Province perceived the “dairy industry as a pillar industry to strengthen the cities and made use of preferential policies to support dairy industry, encouraged rural farmers in dairy cattle raising, supported the leading enterprises and used preferential policies to invite outside investment”. The preferential method to encourage investment by leading enterprises was to “reduce by half over a five year period, the local portion of the income tax for the production type enterprises, dairy product processing enterprises and feed processing enterprises”. Initiatives of over US\$ 3.75 million investment were exempt of land use fund, and land rent fees were reduced by half. (MOA Dairy Industry Project Office 1, 2004).

The original dairy product processing enterprises in the North China agricultural region were small in scale with limited processing capacity. For example in 1978, Heilongjiang Province had a total number of 34 dairy product processing enterprises with a daily processing fresh milk capacity of 340 tons, or with an average daily processing capacity of only 10 tons per enterprise (Zhang Xiulan, 2000). In Hebei Province, the daily fresh milk processing capacity (excluding Sanlu Co).was below 5 tons (Ju Guoquan, 2000).

Dairy product processing expansion in Inner Mongolia

By 1987 the number of dairy product processing enterprises in Inner Mongolia had increased to over 100, however, with limited market access to the high demand areas in China, over half of the dairy product processing capacity was not utilized.(E Guangyu, 2000). The predecessor of **Yili**, Huhhot Hui Nationality Food Processing Plant, had total fixed assets of only US\$8,000, consisting of small plants and hand-made workshops. Since changing management with the placement of Mr. Zheng Junhuai as the plant director, multiple system reforms have taken place within the enterprise. In 1993, it was changed to an equity enterprise, and, in 1996, the stock of Yili started to be marketed in the Shanghai Stock Exchange Institute. Since, by going public, it could leverage funds urgently needed for enterprise expansion, the business revenues of Yili reached US\$ 106 million and a profit of US\$ 8.2 million was generated. The daily fresh milk processing capacity in Inner Mongolia reached 2,900 tons (Yili, 1999, 2003).

Mengniu Group, headed by Mr. Niu Gensheng, was established in July 1999, and is a dairy product processing enterprise organized by higher level administrators and technicians withdrawn from the Yili Co.. Originally Mengniu had investment funds of only US\$ 1.25 million. Adopting an enterprise development strategy of “establishing the market first and then establishing the plant”, the marketing of Mengniu dairy products increased from US\$ 5.0 million in 1999 to US\$ 263 million in 2002. It was thereafter that the fresh milk daily processing capacity of the Mengniu Group increased by 1,700 tons (Niu Gensheng, 2003).

The successful dairy product processing enterprises also included **Wandashan** dairy product Co. Ltd. in Heilongjiang Province (Zheng Xinmin, 2003) and **Sanlu Group Co.** of Shijiazhuang in Hebei Province (Gao Yucheng, 2003). These enterprises absorbed local resources and expanded dairy product processing capacity while establishing milking stations through loans. They additionally expanded dairy husbandry so as to increase fluid milk supplies in the region (Hu, 2005).

Financial support for industry expansion

The stock of Yili was listed in 1996 and by December 2003 it had obtained a total fund of US\$ 49 million from capital markets (Yili, 2004). Mengniu procured a total amount of US\$ 1.706 billion from the Hong Kong stock market (Xie Baokang, Cheng Dong, 2004). Large quantities of capital funds have been invested into the dairy product processing enterprises in North China agricultural region. This allowed dairy product processing enterprises in these regions adequate funds to expand plants, invest in modern equipment and technologies, assist rural household dairy cow husbandry in surrounding regions to expand milk source supply, and develop sophisticated product marketing strategies..

Foreign capitals entered the North China agricultural region through the form of joint ventures, establishing dairy product processing enterprises in this region and making use of the resource advantages of this region to benefit from growing demand for dairy products in China. The **Shuangcheng Nestle Co. Ltd.** was a joint venture dairy product processing enterprise between the Swiss Nestle Co and Shuangcheng Dairy and Food Industry Co., with producing milk powder as its major product. The total investment, generating an average daily fresh milk processing capacity of 900 tons, had increased from US\$ 10 million to US\$ 75.8 million. The three international institutions of **Morgan, Yinglian and Dinghui** injected funds into Shuangcheng Nestle Co. Ltd. in October 2002 and October 2003. In the first round capital increment, the three international institutions of Morgan, Yinglian and Dinghui had injected a total amount of US\$26 million drawn from the companies abroad, and in the second round, they invested a total amount of US\$ 35 million (Yu Yongfang, 2005).

New technologies open markets

The dairy industry in North China agricultural region started to grow in the 1980s and mainly relied on the South China market where the per capita income was higher, particularly large- and medium-size cities. At this time, restricted by transportation conditions (lack of cold chain), the major product was milk powder. The proportion of national milk powder produced in the North China agricultural region was 58% in 1982, rising to 78.0% by 1991 and declining to 69% by 1997 (Nan Qingxian, Lu Ling, 2000). From these data, it is clear that nationally, the dairy product supplies by North China agricultural region had gradually increased and dominate national production. With processed milk powder, the abundant raw milk resources in the North China agricultural region can be tapped but it has disadvantages. In particular, for consumers, the use of milk powder is not very convenient and the taste is not as good as liquid milk. More importantly, many urban consumers held the view that the nutritional benefits of milk powder is not as good as that of liquid milk (Guo Benheng, Zheng Xiaoping, 2000). These perspectives restricted further growth of milk powder consumption. In the context of continuously increasing milk powder production in North China, there was a phenomenon of surplus milk powder. By the end of 1997, there were 50,000 tons of milk powder in stock, accounting for 15% of the total national milk powder output. This resulted in financial difficulties for some medium- and small-scale dairy product processing enterprises, or even bankruptcy. This held implications for the income of the dairy farms and rural dairy cow raising households who provide raw milk for these enterprises. (Tuo Guozhu, 1999).

However, during this period, the dairy industry in North China identified a new development opportunity, i.e, the introduction of UHT milk production technology. UHT milk production

technology gave the North China agricultural region new opportunities to bring into full play the advantages of low cost and large quantities of raw milk supply. UHT milk was first introduced by foreign enterprises into China with the aim to meet the demand of high income consumers. Restricted by adopting urban raw milk as the raw material, high costs had limited the interests of common consumer market in large- and medium-size market (Hu, 2005). Yili Group started to introduce UHT milk processing equipment derived from the Sweden Tetra Laval Holdings & Finance SA in 1996; it went into production in 1997. By the second quarter of 1998, UHT milk in the markets of large- and medium-size cities was in strong demand (Sun Xianhong, Zhang Zhiguo, 2006). Mengniu Group introduced UHT milk production technology in 1999, and in 2000, it adopted new packing material called Lile Pillow developed by the the same Swedish company. This kind of packing material had a lower cost than the original UHT milk packing material, but the shelf life was also reduced from the original 6 months to 45 days. This low cost UHT milk enabled the Mengniu Group to enhance its competitiveness and expand its market share in markets of large- and medium-size cities (Sun Xianhong, Zhang Zhiguo, 2006).

UHT milk then was freely available in the markets of large- and medium-size cities. According to data of the China Association of Dairy Product Industry, the output of UHT milk had increased from 2 million tons in 1999 to 3.8 million tons in 2000 to a remarkable 48 million tons in 2004. Its share of liquid milk output increased from one fifth in 1999 nearly 60% in 2004. (See Table 2).

Table 2. The Output and Ratio of Liquid Milk Variety in China⁵

	1999	2000	2001	2002	2003	2004
Output (1000t)						
Pasteurized Milk	5815	8291	6965	10485	12549	18470
UHT	2045	3785	7146	15397	31987	47820
Yoghourt & Others	1640	2827	4126	7520	9030	14380
Total	9500	14903	18237	33402	53566	80670
Ratio (%)						
Pasteurized Milk	61.2	55.6	38.2	31.4	23.4	22.9
UHT	21.5	25.4	39.2	46.1	59.7	59.3
Yoghourt & Others	17.3	19	22.6	22.5	16.9	17.8
Total	100	100	100	100	100	100

Resource : China Dairy Industry Association.

The rapid expansion of UHT milk in China was due to the fact that: (1) UHT milk allowed fresh milk to be transformed to meet the shortage of urban milk and effectively utilized the milk resources in in North China to meet the demand of the broad masses of consumers in large- and medium-size cities; (2) the problem of liquid milk transportation and long distance transportation was solved under conditions of limited cold chain systems; (3) UHT milk can be preserved under constant temperature for fairly long period of time, thus allowing consumers to buy one box at one time so as to avoid the inconvenience of purchasing milk daily; (4) it eliminated the need for distribution of fresh milk household delivery and overcame the requirements of limited milk consumption at only

⁵ The association did not publish new data since 2004.

certain times of the day; especially for the higher income consumers who frequently travelled and had less time flexibility than lower income consumers (5) it is convenient for retail stores for marketing, particularly because it doesn't require refrigeration; (6) advertising convinced consumers that the nutrition benefits of UHT milk is higher than that of the pasteurized milk (Hu, 2005).

Dairy product processing enterprises in North China have directly entered the dairy industry market in large- and medium-size cities through the marketing of UHT milk which was a key ingredient supporting the rapid development of dairy cow husbandry industry in North China agricultural region (Hu, 2005). Good resource bases and competitively produced milk, has allowed the North China agricultural region to firmly occupy the urban liquid milk market but also become the competitive opponents of urban dairy product processing enterprises. With the aid of UHT milk, the Yili and Mengniu Groups became the second and third largest dairy product processing enterprises in China, second only to the Shanghai Bright Group.

2. Multi-Modal Dairy Industry Phase (2000 to the present)

Since the year 2000, supported by the sustainable and high-speed development of the dairy sector, the dairy market in China has gradually changed from one of shortage to relatively surplus (Tuo Guozhu, 2000). The supportive factors are numerous. Firstly, to develop local economies, local governments, in many cases, blindly adopted policies of promoting dairy development. This resulted in dairy product processing enterprises actively expanding investment that pushed the growth of dairy product processing capacity beyond that of consumption. According to the data released by the China Association of Dairy Industry, in 2002, the capacity of the national dairy product processing industry exceeded by 30% the actual processing needs of the country (Fang Yousheng, 2003). Heightened competition, in order to capture higher market share led dairy product processing enterprises to reduce product prices (Yi Chengjie, 2004). Dairy product processing enterprises that are small in scale, have obsolete equipment and backward technology, are poorly managed and lack of product competitiveness have been forced out of business (Tuo Guozhu, 2000). At this point, the dairy industry in China entered into a multi-modal development phase, in other words, starting a dairy industry restructuring and integration process with asset recombination as the typical characteristic.

The first characteristic of the multi-modal industry phase is a **mutual penetration between dairy enterprises** in the North China agricultural region and urban dairy enterprises, and the regional character with enterprises borders starting to disappear gradually. The original urban dairy industry enterprises started to feel enormous pressure as Mengniu, Yili, Sanlu, Wandashan, etc. entered into markets of large- and medium-size cities through the venue of UHT milk and milk powder. Peri-urban dairy enterprises that had certain scale and market share start to adapt their original strategy of safeguarding urban suburbs resources through marketing of pasteurized milk and started to actively adopt the strategy of exploring foreign, export markets. During this period, the **Shanghai Bright Group** formulated their development strategy of "using national resources to explore the national market" (Wang Jiafen, 2002). Here, the resources refer to the milk availabilities in the North China agricultural region of Heilongjiang Province and Inner Mongolia Autonomous Region. Through establishing dairy product processing enterprises in the North China where the milk source is abundant, the Bright Group procured low cost raw milk. The national market refers to the dairy product markets in other large- and medium-size cities rather than Shanghai. In 2002, the share of the Shanghai Bright Group elsewhere than Shanghai reached over 60% of the total milk marketing. (Wang Jiafen, 2003).

Through 2004, the Bright Group had established 14 dairy product processing plants in 11 provinces and autonomous regions outside of Shanghai. Currently, the Bright Group has a total daily milk processing capacity of 6,508 tons (including dairy product processing plants in Shanghai). The major milk source of the Shanghai Bright Group is North China, specifically one

dairy product processing plant in Inner Mongolia and Heilongjiang Province, respectively, producing UHT milk and milk powder. Obviously, accessing these resources enabled the Bright Group to compete in UHT milk and milk powder with the Mengniu and Yili in the North China agricultural region. Meanwhile, the Bright Group also has dairy product processing plants in Beijing, Tianjin and other large cities, with major products consisting of pasteurized milk, yogurt and dairy beverages. Their aim is to seize the dairy industry markets in other cities. In addition to Beijing and Tianjin, the Shanghai Bright Group has also established dairy product processing enterprises in Jiangsu, Henan, Hubei, Hunan, Guangdong and Shaanxi and made use of the raw milk resource of these regions to dominate the markets in these cities. In addition to the Shanghai Bright Group, the **Sanyuan Group** in Beijing has also established dairy product processing plants in the Inner Mongolia with major products being UHT milk, milk powder and yogurt. This company has also established a plant in Shanghai to produce pasteurized milk, yogurt and dairy beverage so as to compete with the Bright Group. The **Weigang Group** in Nanjing, Jiangsu Province has also established dairy product processing plants in Shanghai, Anhui and Jiangxi provinces so as to expand their market share in these regions (see Table 3).

**Table 3. Distributing of Processing Manufactories of
Top 8 Dairy Processing Enterprises in China**

Enterprise Name	District	The Number of the Processing Factories	Daily Processing Capability (Ton)	Main Products					
				Fresh Milk	UHT	Yogurt	Dairy Drink	Milk Powder	Others
Sanyuan	Beijing	7	1227	*	*	*	*		*
	Tianjin	1	100	*					
	Inner Mongolia	2	350	*	*		*	*	
	Shanghai	2	130	*		*	*		
Bright	Beijing	4	360	*		*	*		
	Tianjin	1	300	*		*			
	Heilongjiang	1	1000		*			*	
	Inner Mongolia	1	350		*				
	Shanghai	4	3750	*	*	*	*		*
	Jiangsu	2	250	*		*	*		
	Henan	1	140	*	*	*			
	Hubei	1	128	*	*	*		*	
	Hunan	1	80	*		*			
	Guangdong	1	300	*		*	*		
Shanxi	1	200		*	*				
Mengniu	Beijing	1	250			*	*		
	Inner Mongolia	2	5700		*		*		

	Henan	1	800		*				*
Yili	Beijing	1	500			*	*		*
	Hebei	2	360		*		*	*	
	Inner Mongolia	2	5600		*	*		*	
	Shanghai	1	280			*	*		*
	Heilongjiang	2	240		*			*	
	Shanxi	1	800		*	*			
Wandashan	Tianjin	1	350			*	*		
	Liaoning	1	150		*		*		
	Heilongjiang	1	1200		*			*	
Weiwei	Jiangsu	1	560	*					*
	Shandong	2	600	*	*	*	*		
	Shanxi	1	180	*		*		*	
Sanlu	Hebei	10	3660	*	*	*	*	*	*
	Henan	1	460	*	*	*			
Weigang	Shanghai	1	50	*					
	Jiangsu	4	500	*	*	*	*	*	
	Anhui	1	50	*					
	Jiangxi	1	70	*	*	*	*		

Source : Department of China Dairy Yearbook edited by “China Dairy Statistical Report, 2005”.

In addition to the adopting the development strategy of “using national resources to explore the national markets” by urban dairy enterprises, the agricultural enterprises in the North China agricultural region have expanded their operations by penetrating into the dairy product processing sector in urban areas. The **Yili Group** has established plants in Beijing to produce pasteurized milk, yogurt and ice-cream. Meanwhile, through purchasing a dairy product processing enterprise in Shanghai, the Yili Group also produces pasteurized milk, yogurt, dairy beverage and ice-cream so as to avoid long distance transportation. The **Mengniu Group** has also invested in a dairy product processing enterprise to produce yogurt and dairy beverage. By making use of the advantage of competitively produced fluid milk, the Mengniu Group is producing high valued pasteurized milk, yogurt, dairy beverage and other dairy products (see Table 4 for reference).

The second characteristic of the multi-modal industry phase is the multi-modal and **expanding diversity of dairy products**. Since 2000, the diversity of dairy products in China has increased very rapidly. In 2003, a supermarket dairy product variety investigation by the China Association of Dairy Industry revealed that there were a total number of 381 dairy products produced by different manufacturers on the display shelves in the Huapu supermarket, Jingkelong and other 11 supermarkets in Beijing. They included 45 types of pasteurized milk varieties, 45 UHT milk choices, 111 types of yogurt, 62 different whole milk powders, 8 sugar added whole milk powder varieties, 16 skimmed milk powder types, and 94 different baby formulated milk powders (Li Yifang, 2003). In January 2006, students at the Graduate School of the Chinese Academy of Agricultural Sciences conducted a survey on liquid milk marketing in 9 supermarkets in Beijing. The survey

found that, on average, each supermarket presented 167 varieties of liquid milk to consumers, consisting of 6 types of pasteurized milk, 32 UHT milk packages, 93 different types of yogurts, 36 distinct dairy beverages (See Table 4).

Table 4. The Variety of Dairy Products Sold at Supermarkets in Beijing

Supermarket Name	Area of Shopping	Area of Food Area	Total Products Varieties	Area of Frozen Dairy Products	Area of Fresh Dairy Products	Varieties of Dairy Products
	Square Meters		Number	Square Meters		Number
Carrefour	16000	4500	22000	155	220	181
Wal-mart	18000	5000	20000	120	180	272
Lotus	12600	3500	18000	80	150	127
Chengxiangcangchu	2500	1200	5100	35	50	190
Chaoshifa, Shuangang Store	700	550	3000	25	30	179
Champion	3000	2000	4500	80	120	126
Chaoshifa Shuangyushu Store	3960	1800	6000	30	50	182
Chaoshifa Nongkeyuan Store	1560	780	4200	20	30	126
Xidan	4500	1700	4200	50	70	124

Source: Survey data by the author and his students, Feb, 2006

The rapid increase of dairy product varieties is in response to strong competition for dairy products by consumers, with each “large-scale dairy product processing company relying on the development of new products to expand their market, and increase the added value of dairy products to obtain even higher return” (Du Binhua, 2003).

The third dimension of the multi-modal industry phase is that the **dairy product processing capacity is concentrated in the large-scale dairy product processing enterprises**. The number of dairy production processing enterprises which processing capacity of over 50 ton per day in China was 698 in 2005 and 717 in 2006, generating total sales of US\$ 6.1 billion and US\$ 7.7 billion, respectively. The top ten rankings of these enterprises, according to sales, are Yili, Mengniu, Sanlu, Bright, MeadJohnson, Jiobao, Wandashan, Taizinai and Yahua. The total sales of 10 top enterprises was US\$ 6.1 billion in 2005 and US\$ 7.7 billion in 2006. In 2005 and 2006, the proportion of the dairy product processing enterprises of these 10 enterprises was less than 2 percent of the total number of dairy product processing enterprises in China, yet the proportion of total marketing amount of these 10 dairy product processing enterprises exceeded more than half of total dairy product market amount in China, respectively (See table 5).

Table 5. The Total Sales of 10 Top Dairy Processing Enterprises
(unit : million US\$)

Enterprise Name	2005	2006
Yili	1623.3	2178.5
Mengniu	1443.3	2166.1
Sanlu	993.9	1158.0
Bright	920.5	961.7
Meadjohnson	200.0	266.7
Jiabao	254.4	254.4
Shuangcheng Nestle	360.0	244.7
Wandashan	200.0	206.7
Taizina	62.7	156.8
Yahua	38.1	145.7
Total	6096.3	7739.3
National gross sales	11491.1	13885.6
The Proportion of the Top 10 Enterprises (%)	53.1	55.7

Source : "China Dairy Statistical Report, 2006 & 2007".

The fourth characteristic is that in order to seize market, the dairy product processing enterprises have invested huge amount of fund in **marketing and advertising** to expand enterprises and improve product image in the hearts of the consumers. According to the total advertisement investment amount released by the AC Nelson Co. during January-October 2003, the total advertisement input fund for dairy products was US\$ 353 million. Out of this, Changfu milk had an advertisement fund of US\$ 11.5 million which accounted for 30% of the marketing expenses. Meanwhile, Wandashan had an advertisement budget of US\$13.5 million, or 10% of the marketing costs. Wahaha spent US\$30.1 million, 9% of the marketing costs; Mengniu spent US\$46.75 million--9% of marketing costs only to be surpassed by Yili who spent US\$53.4 million (8.7% of marketing costs). Bright spent only US\$27.1 million, accounting for 5.5% of the marketing budget while Sanlu limited marketing expenses to 2.9 billion RMB yuan, (Zhongqiu Advertisement Co. Ltd., 2003). By 2004, in the CCTV yellow gold section advertisement tender conference, Mengniu became the new champion by spending US\$38.8 million, then followed by Yili Group at US\$ 26.8 million. In addition, the Sanlu, Wandashan, Weiwei and other dairy product processing enterprises had also participated in the tender conference (Dong Suyu, Nie Yan, 2005).

Finally, **foreign capital enterprises and capital** has played a very important role in speeding up the development of dairy product in China. There are 3 ways for foreign capital enterprises to enter the Chinese market. The first method is to directly establish dairy product processing enterprises in China and produce branded dairy product. In the 1990s, the Nestle Co. had established a large-scale milk powder processing enterprise in Shuangcheng City, Heilongjiang Province through a joint venture. Since then, it has continuously expanded its production scale. By 2004, the total

investment of milk powder production line in China by the Nestle Co. reached nearly US\$ 84 million (China Network, Harbin Channel). In 2004, revenues reached US\$ 3 billion, ranking them fourth among the dairy product processing enterprises in China. Among the top 10 dairy product enterprises in China there are 3 foreign direct invested enterprises: **Nestle Co., Inter Co. and Mei Zancheng Co.** (See Table 5 for reference). The second method is joint venture, such as the Daneng Co., which bought up shares of the Bright Group through stock purchases. By the end of the 2005, through numerous purchases, Daneng possessed 12% of the Bright Group stocks. Meanwhile, Daneng had also handed over its own brands to the Bright Group and both parties agreed to establish a dairy product research center in China in the future (Gao Suying, 2005). The third method is direct investment. For example, in 2002, the Morgan Stanley Co., Dinghui Investment Co., and Yinglian Investment Co. Ltd. invested over US\$26 million in the Mengniu Group, buying up 32% of the company shares. In 2003, these 3 investment institutions injected an additional amount of US\$35.2 million into the Mengniu Group from the foreign mother companies. Currently the 3 companies own one third of the Mengniu Group stock (Hu, 2005).

3. Dairy production in Chinese farm households

Before the implementation of policy reforms in the 1970s and the opening up to the outside world, there was nearly no individual dairy cow raising farm households or individual milk sellers in China. Policies didn't allow privately held dairy cow operations and the state-operated and the people's commune-owned dairy cow farms were the main source of raw milk (Xu & Yin, 2004). Since the implementation of the household contract responsibility system, the government reversed the policy limiting individual farm households from raising dairy cows. Within the context of increasing market demands for dairy products and promoted by government policy, more and more farm households have engaged in dairy cow raising and milk production.

Dairy cow raising farm households and dairy cow farms in China are just like a pyramid. The base of the pyramid is the small farm households who raise 1-5 dairy cows while the top of the pyramid are large scale dairy cow operations with more 1000 dairy cows. According to the statistics of Dairy Association of China, China had approximately 1,37 million dairy cow farms in 2002. Out of this total, 1.14 (or approximately 83%) raised 1-5 dairy cows, 200,000 raised 6-20 cows (15%), 26,000 held 21-100 cows (2%), and less than 2,000 farms maintained between 101-200 cows (only .13%) of the total, and less than 1,000 farms kept between 200-1,000 (less than 1%).

By 2006, the total number of dairy cow farms and dairy cow raising farm households was 1.6 million, up 15% as compared with 2002. 1.3 million raised 1-5 dairy cows (81.0% of the total), 263,715 raised 6-20 cows (17%), 30,780 raised 21-100 cows (less than 20%), 2,294 raised 101-200 cows (0.15%), 950 raised 201-500 cows (0.06%), 336 raised 501-1000 cows (or 0.02%) and 162 raised over 1000 cows which occupies 0.01% of the total (See table 6).

**Table 6 The Number of Dairy farms of Different Scales in China
(2002 and 2006)**

Herd Size	Number of Farms		Number of Cows		Milk Output (ton)	
	Number	%	Number	%	Number	%
Year 2002						
1-5	1,140,022	83.30	3,042,197	44.79	4,951,102	37.30
5-20	200,083	14.62	1,991,830	29.32	3,665,841	27.62
21-100	25,698	1.88	950,090	13.99	2,115,959	15.94
101-200	1,789	0.13	243,137	3.58	673,210	5.07
201-500	650	0.05	193,814	2.85	603,855	4.55
501-1000	262	0.02	172,991	2.55	605,886	4.56
>1000	112	0.01	198,488	2.92	658,050	4.96
Total	1,368,616	100.0	6,792,547	100.0	13,273,903	100.0
Year 2006						
1-5	1,271,729	81.00	4,034,876	44.10	5,356,552	35.31
5-20	263,715	16.80	2,714,241	29.67	4,135,290	27.26
21-100	30,780	1.96	1,257,814	13.75	2,827,367	18.64
101-200	2,294	0.15	335,503	3.67	713,905	4.71
201-500	950	0.06	336,148	3.67	741,448	4.89
501-1000	336	0.02	235,228	2.57	707,555	4.66
>1000	162	0.01	234,816	2.57	688,867	4.54
Total	1,569,966	100.0	9,148,626	100.0	15,170,984	100.0

Source: *China Dairy Statistical Yearbook, 2006 and **China Dairy Information, 2007.

Small scale dairy cow farms continue to dominate milk production, serving as the main suppliers of raw milk to Chinese consumers and processors. The more than one million dairy cow raising farm households have expanded since the implementation of policy reform, particularly over the recent 10 years. This is despite the many obstacles involved in shifting from crop growers to dairy cow operators; these include lack of credit⁶, production practices, and market access. The factors supporting the inclusion of over one million common farm households in smallholder dairy production include: (1) good economic returns; (2) policy/institutional support by central and local governments; (3) involvement and support by private sector milk product processing enterprises.

⁶ The price for purchasing a dairy cow is more than 10000 yuan RMB 1200 US\$ but the annual income of a farm household is only 3000-5000 yuan.

3.1 Comparison of economic benefits

Most of the farm households transformed from crop growing to dairy cow raising are driven by favourable economic returns (Hu, 2005). In China, farmer income from growing crops is much lower than that from engaging in animal raising. Table 7 presents a cost-profit analysis (or calculation of returns) of planting maize and potatoes versus returns from engaging in dairy. The average milk yield of a dairy cow in a farm household is 4,875 kg/year translating into a value of 1,334 US\$. The total production cost of the milk is 1,061.6 US\$, leaving a net annual profit of 273 US\$ and a cost-profit rate of nearly 27%. By comparison, a farmer choosing to grow one mu potato realises annual net profits of 76.2 US\$, while that of a farmer growing one mu⁷ of maize obtains 19.3 US\$ of net profit (Table 7).

The profit from dairy cow raising is higher than that from growing potato and maize with the net profit obtained from raising one dairy cow 14 times higher than that from growing one mu of maize and 3.6 times of that from growing on mu of potato.

In most parts of China, the small scale dairy farmers also plant maize. They use maize produced to feed dairy cows, thus reducing commercial requirements of buying feed. Meanwhile, fermented dairy cow manure can be used as an organic fertilizer for growing maize, enhancing yields at a low cost as well as and reducing environmental pollution.

Table 7. Comparison of the costs of dairy cow raising and maize and potato growing

Per mu/per head	Unit	Dairy cow raising (head)	Maize growing (mu)	Potato growing (mu)
a. Output of main products	Kg	4875.9	423.5	1561.8
b. Total output value(c+d)	USD	1334.2	74.2	179.1
c. Output value of main products	USD	1204.2	71.6	178.9
d. Output value of by-products	USD	130.0	2.6	0.2
e. Total cost (f+k)	USD	1061.6	54.9	102.8
f. Production cost (g+h)	USD	1058.3	45.1	91.3
g. Materials and service charge	USD	920.9	25.1	57.6
h. Labor cost(i+j)	USD	137.3	20.0	33.7
i. Family labor covert into money	USD	136.8	18.7	29.6
j. Labor-hiring cost	USD	0.5	1.2	4.1
k. Land cost(l+m)	USD	3.3	9.8	11.5
l. Land rent	USD	0.0	0.7	0.4

⁷ 1 mu = 0.067 ha

m. Self-owned land rent	USD	3.3	9.1	11.1
n. Net profit(b-e)	USD	272.6	19.3	76.3
o. Cost-profit ratio (n/e*100)	%	25.7	35.2	74.2

Source : Compilation of cost-profit ratios of agricultural products of the whole country” compiled by Price Department of National Development and Reform Commission, 2007.

3.2 The policy promoting the dairy development

In recognition of the relative profitability of dairy, the Chinese government, as well as local government, supporting industry development, have formulated favourable policies to support breeding stock purchases by local farm households.. Mr. Wen Jiabao, President of the State Council, said when he investigated the Scientific Raising Base of Dairy Cow in Chongqing on April 23, 2006 that “I have a dream and my dream is that each Chinese, and especially the children, can afford to buy one jin (500 g) of milk to drink every day”.

Since 2000, the state council and department concerned enacted favourable policies for promoting the sector. The main programmes are: (1) 10,000 high yielding cow embryos transfers; (2) development plans in large milk producing regions; (3) studies on key technologies; integrated demonstration of technologies in the Fifth-Five year plan; (4) “Circular of the Ministry of Agriculture on rapid development of animal husbandry” transmitted by the General Office of the State Council; (5) The Fifth-Five year plan of animal husbandry, feed, national food industry and light industry and the long-range objective plan of 2015; (6) The program of dairy industry in land reclamation and cultivation sectors, etc.

The more important objectives of the central government are focused on increasing farmer incomes through dairy cow raising and the development of dairy processing projects. Under the leadership of the central government, the local governments, especially those of Inner Mongolia, Heilongjiang and other provinces support the dairy sector because of its contribution to farmer income, but also overall economic growth.

Supporting these policies, the ministries and commissions concerned fund projects. The government has eased credit access to farmers for the purchase of dairy cows. Since 2002, 16 dairy processing projects have been supported by national debt funds issued by the central government; in total, these projects received 21 million USD. Use of national debt funds has effectively mobilized the resources of Bank, local governments, enterprises and social forces to assist the sector. The ministries and commissions under the state councils have made continuous investments in dairy industries. One representative one is “Good Animal and Poultry Varieties Engineering of the Ministry of Agriculture”. Since the beginning of implementation of the Good Animal and Poultry Varieties Engineering from 1998 to 2001, the investments made by the central financial department in breeding reached 6.5 million USD, or one-quarter of the total investments. In 2002, the Ministry of Agriculture invested 126 million yuan RMB to establish 17 original stock dairy farms, 9 better bull stations, and 6 embryo transfer centres. In 2002, the Ministry of Agriculture implemented the embryos transfer activities in 9 cities, provinces and autonomous regions including Beijing, Xinjiang, Heilongjiang, Inner Mongolia, Ningxia, Shaanxi, Shanxi, Hebei and Shandong. In 2003, the Ministry of Agriculture invested more than 15 million USD, 14 million USD in good animal and poultry varieties/stock engineering (Hu, 2005).

The local governments also provided financial support .. For instance, they supplied dairy processing enterprises with funds to buy equipments from foreign countries, to invest in dairy barn and dairy plants, and construct dairy farms. The local governments provided farm households with loans and they allowed farmers to raise mortgage credits on their dairy cows, cattle barns and related facilities or equipments and other fixed assets from the banks. To ensure and stabilize the raw milk supplying base areas, dairy processing enterprises assisted farmers to procure loans by

providing guarantees. Table 8 provides examples of policies and measures enacted by Central and local governments to support sector development..

Table 8 Policies and measures adopted by the local governments and dairy processing enterprises to support the farm households to raise dairy cows

	Regions	Events	Source of data	Remarks
	Government policy			
1	Shijianzhuang City and Tangshan City, Hebei	Dairy cow raising households can procure loans of up to 10,000 yuan based on identity card and up to 50,000 yuan on the provision of certificate of house property. The specialized dairy development fund of the city financial department will pay 50% of the discount interest for farm households who have borrowed loans.	Dairy Industry Talking, pp.29-30	
2	Shuozhou City, Shanxi	Construction of dairy cow barns on land contracted by farm household. If the farm households have no land to construct cattle barns, the village or township governments will provide them land freely. If one dairy cow is added in a farm household, the farm household will get a loan of 3,000-5,000 yuan with discount interest from the government. If a village has more than 200 dairy cows, a milking station will be constructed by the government.	Dairy Industry Talking, pp.31-32	
3	Shuangcheng County, Heilongjiang	The farmers are organized in dairy associations with members eligible for loans to purchase dairy cows.	Dairy Industry Talking, pp.46	The Nest Company is situated in Shuangcheng County.
4	Tianjin	The government supports the construction of dairy cow raising areas, with the government providing 400,000 yuan for each dairy cow raising area.	Dairy Industry Talking, pp.52	
5	Daxing District, Beijing	The government stipulated a policy in 2002 to support and encourage farmers to raise dairy cows. A farm household can get a loan of 5,000 yuan from the bank for the purchase of one dairy cow. The government encourages farmers to use high quality bull semen and embryo transfer technology, through the provision of 150 yuan and 1, 500 yuan subsidies	Yearbook of Chinese Dairy Industry, 2003, pp.131	

		for each cow, respectively.		
6	Tumotezuo League, Inner Mongolia	The government helps the farm households to get loans from the bank to purchase dairy cows. In 2000-2002, under the assistance of the government, the farm households received 190 million yuan from the bank resulting in the purchase of 18, 000 dairy cows.	Yearbook of Chinese Dairy Industry, 2003,pp.136	
7	Daqing City, Heilongjiang	The government uses 7 million yuan to discount interest of loans for farm households to purchase imported dairy cows. The farm households were eligible for loans of 8,500 yuan for purchasing a dairy cow and 400 yuan as free discount interest.	Yearbook of Chinese Dairy Industry, 2003,pp.138	
8	Huairou District, Beijing	In the 1984-1998 period, the government encourage farm households to raise dairy cows through the provision of household loans of 20,000-40,000 yuan with discount interest. Later, the government continued this policy..	Yearbook of Chinese Dairy Industry, 2004, pp.173	
9	Yanmao Hui Autonomous County, Xinjiang	The county government pursues a project of "one hundred households with one hundred dairy cows engineering". Te dairy processing enterprises provide dairy cows and the cows are distributed to farm households and fed by them, with the farm households use milk to pay the enterprises for purchasing dairy cows.	Yearbook of Chinese Dairy Industry, 2002, pp.185	
10	Wuhan City, Hubei	Wuhan city government encourages the farm households to purchase dairy cows from other regions. The dairy cow raisers could get a subsidy of 800 yuan for purchasing a dairy cow from other regions and subsidy of 4,250 yuan for purchasing a high yielding cow from foreign countries.	Yearbook of Chinese Dairy Industry, 2005,pp.98	
	Policy of enterprises			
11	Huhehot and Baotou cities, Inner Mongolia	Cooperative dairy cow raisers eligible for loans of 6,000 yuan from Mengniu Group Company for purchasing a cow while cooperative dairy cow raisers could get a loan of 4,500 yuan from Yili Group Company. The farm households repay the loan by using earnings of milk sold to the company within a 3-4 year period.	Dairy Industry Talking, pp.43	The two cities are base areas of raw milk of Yili and Mengniu dairy products processing companies.

12	Shijiazhuang City, Hebei	Sanlu Group Company supports cooperative households to purchase dairy cows through a variety of programmes: 1) leasing the dairy cows to farm households according to the value of cow with the households repay the company by using 1/3 of earnings from selling milk for each month. When the rent is paid off within three years, then the household will own the cow. 2. The company selling the dairy cows to farm households at 30% discounted price. 3. The company agreeing to be guarantor when the farm households get 50% of the loan from the bank for purchasing cows.	Dairy Industry Talking, pp.76 –77	Sanlu Group Company is the largest milk powder processor and it is situated in Shijiazhuang City, Hebei.
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Source: collected by the author.

3.3 The supportive role played by dairy enterprises

The rapid increase of raw milk in China is closely related with strong linkages between dairy product processing enterprises to promote the development of dairy producers. Within the context of the strong expansion of dairy product markets and improvement of production capacity of dairy processing enterprises in China, the supply of raw milk was the major constraint to dairy development. So the dairy processing enterprises initiated measures, with the objective of enhancing producer incomes and generate supplies, to help the farm households purchase cows.. In particularly interventions focused on: (1) helping farm households to get a loan from the bank for purchasing dairy cows. (2) provide households technical guidance. The following are cases of Sanlu Group Company and Jinniu Group Company (Case 1). There many cases like this in China. Mengniu, Yili, and other companies use this strategy to develop their own dairy cow raising base areas.

Case 1 :

The headquarters of Sanlu Group Company is situated in Shijiazhuang City of Hebei Province. The predecessor of the company was a cooperative of 18 farm households, 30 cattle and 170 sheep. Now Sanlu Group Company is the largest milk powder processing company in China. It has total assets of 324 million USD and the annual income from sales is 1158 million USD. In early 1990s, in order that the farm households around the company have dairy cows to raise, the company leased 2,080 dairy cows from its own farm to households who were willing to raise the cows at favorable price. The households paid off the loan to the company through milk sales. Additionally, the company as a guarantor also facilitated accessing loans. This way, Sanlu Group Company has developed more than 4,100 cooperative dairy cow raising households in 754 villages of 24 counties of Hebei Province (Source: Author's investigations made in 2004).

Jinniu Group Company is located in Jiangxi Province and it is a medium-sized dairy product processing enterprise. The company was initiated under a development plan, starting with thirty thousand heads of dairy cattle in 1992. The company has selected the households around the company; families with laborers under 40 and willing to raise dairy cows. As a guarantor, the company helps these households to get loans from the bank for purchasing dairy cows. The company provides the households with technical training. The company also established technical service stations in villages with large amount of dairy cows and provides veterinary services in disease control and cow breeding. The company's feed processing mill provides concentrated food for households. The company established milk collecting stations in village, thus making selling milk convenient for the households. Over the course of 6 years , 11 specialized dairy cow raising villages and 436 dairy cow raising households were developed and 8,800 dairy cows fed (Source: Guo Jiwan, "Establishing 10 thousand dairy cow raising base areas and promoting the industrialized development of dairy industry", "History of Dairy Industry " compiled by Li Yifang, China Agricultural Press, 1998, pp.157-161).

4. Model linking small dairy cow raisers and the market

4.1 Dispersed raising and the mobile-dispersed milk collecting model

From 1980s to 1990s, a mobile-dispersed milk collecting model was adopted by dairy processing enterprises in purchasing raw milk, e.g. the consignee of the enterprise drives a truck with a milk tank on it going to rural areas and purchases milk from the households and then transports the milk to processing plant. The enterprises purchase milk by using cash. The enterprises don't focus on specific households and the households sell to any enterprise.

The most serious problem of the mobile-dispersed milk collecting model is that the quality of raw milk can not be guaranteed because the raw milk collected by the milk collecting chill car was aggregated and stored in a container. The farm households do not have appropriate chilling equipment, thus leading to high bacterial counts. Some households violate regulations and mix water in milk, thus causing economic losses. In addition, the quality of milk is lowered. To respond to this issue, in the process of collecting raw milk, the dairy processing enterprises use concentration meters to determine the level of adulteration. However, some households adopt other measures to nullify the test, with the quality of the milk declining even further. (Hu, 2005).

Correspondingly, the dairy processing enterprises have developed milk collecting station models.

4.2 The model of company + milking station + farm households

Since the middle of 1990s, most of the dairy processing enterprises in China have adopted the model of company + milk collecting station + farm households in support of sector development. The so-called milking station revolves around the construction of mechanical milking facilities linked to households who bring their dairy cows to the station for milking. Under the supervision of management personnel, milk is directly transported through milking machine to milk storage tanks, thus maintaining low temperatures, preventing the adulteration of the milk. Usually, the milking station is constructed in large dairy cow raising villages and towns. At present, one milking station services about 200 dairy cow raising households. The dairy cow raisers bring their cows to station at a fixed time (twice a day). The workers at milking station keep records of the amount of milk procured and pay the households once a month.

According to investors, the governance of these milking stations can differ:

(1) The dairy product processing enterprises' milking station

In order to ensure milk supplies, some large dairy product processing enterprises such as Mengniu, Yili and others, invest and construct milking stations near the processing plant or in large dairy cow raising villages and towns. The company then leases the stations to individuals and the purchased milk must be supplied to the processing enterprise.

(2) The individual milking station

In some cases, private individuals construct milking stations. The milk procured by these stations can be sold to one dairy product processing enterprise, but also to some others.

(3) The dairy product cooperative's milking station

Over the past decade, supported by governments policies, specialized cooperatives have developed rapidly, including those organized by dairy cow raisers. The cooperatives' milking stations collect milk from the members of the cooperative. Funds for construction come from the governmental project with some funding supplied by members of the cooperative themselves (Case 2).

Case 2:

Beijing Miyun County Ligezhuang Dairy Raising Cooperative obtained 100,000 yuan from the government to construct a milking station, purchase equipments and technically train cooperative members.

Shanxi Jinzhong Yuci District Xiuwen Dairy Association sourced 150,000 yuan from the government to purchase sterilized milk tanks, fresh milk testing equipment and other equipment.

Liaoning Huludao City Lianshan district Dairy Raising Cooperative obtained 150,000 yuan from the government to procure milking machines.

Qinghai Huangzhong County ZongZhai Town used 150,000 yuan of government funds to purchase milk tanks.

Source: China Dairy Industry Yearbook, 2006, pp.61.

2006》, pp.61.

The construction of milking stations directly benefits dairy cow raisers by not only reducing labor requirements but ensuring the availability of a stable market and technical training for dairy cow raisers. The dairy product processing enterprises benefit from a stable source of high quality raw milk, limiting opportunities for milk adulteration. (Duan, 2007).

4.3 The model of company + dairy cow raising area + farm households (or dairy zones)

The dairy cow raising area regroups dispersed dairy cow raisers in a designated area. The infrastructure in this area is constructed by dairy product processing enterprises, combined with villages and township government. Some individuals also invest in it's construction.. Usually, at a minimum, there are dozens of households in a dairy cow raising small area holding approximately 200-300 cows, and sometime reaching 500-1000 cows. The cow sheds/barns and other facilities are uniformly designed and constructed and the households manage their own dairy cows. Fresh fodder are produced, harvested and processed by households themselves. The concentrated feeds are purchased from specialized feed processing plant. Although the dairy cow are fed by households, milking, disease control and supportive activities are contracted to administrative and managerial departments within the region.

The cow raising zone is facilitated technical assistance and supervision while the separation between production and residential areas benefits disease control and possible infection between man and animals. Under the support of the government⁸, some large scale dairy product processing enterprises make investments in these zones. For instance, Sanlu Group Company in Shijiazhuang, Hebei Province established more than 200 zones in cooperation with farm households. These zones of Sanlu Group Company adopt the a model of "one separation and four unifications", which means that the ownership of dairy cattle belongs to the household and zone management provides "unified milking, unified selling milk, and unified services" for households. Sanlu Group Company made investments of about 100 million yuan in construction of dairy cow raising small areas. Similarly, Yili Group Company constructed 85 zones with 300-500 dairy cattle in each and 92 areas with 500-1000 dairy cattle⁹.

The advantages of dairy zones is that: (1) households have access to stable markets and technical services, (2) it improves the quality of raw milk, (3) sufficient quantities of quality raw milk

⁸ The largest support of the government to construction of dairy cow raising small areas is the granted land. In rural areas of China, the use of land is strictly controlled. The government's support includes the granted waste lands which do not appropriate for crop cultivation, or allows a part of cultivated lands transfer into dairy cow raising areas.

⁹ In Huhehot city and Hulunben'er grassland of Inner Mongolia and Du'er'bote grassland of Heilongjiang.

can be guaranteed for enterprises, and (4) assistance in financial subsidies is available due to the government's supporting policies (Case 3).

Case 3 :

Since 2002, Wuqing District, Tianjin obtained subsidies for construction of dairy zones, but also 5 million yuan financial support from the government to improve dairy cattle. Consequently, the population of dairy cattle in 2002 in the district reached 33,000 heads, a 65% increase in one year. Similarly, the governments of Beichen District and Jinghai County, Tianjin appropriated specialized funds for construction of roads and bridge for promotion of the development of dairy zones. (Li, 2003).

4.4 The model of company + pastoral park

In pastoral region/areas, large dairy cow raising households join together, creating a large dairy cattle raising region. Yili and Mengniu adopted this type of approach and in 2003, Yili Group Company made an investment of more than 13 million yuan in construction of an integrated dairy cattle pastoral region in Huhehot City. This investment was characterized as a "individual pasture land + dairy cow raising small area + pastoral park + modern milking station". Each household in pastoral park has more than 200 dairy cows, regrouping more than 6,000 dairy cows in the park. The annual output of fresh milk is estimated at 30,000 tons. In addition, Yili Group also constructed 6 pastoral parks with the population of dairy cows between 1,000 and 3, 000 while Mengniu has constructed 5 large dairy cow pastoral parks.

The characters of the pastoral park are that (1) the milk processing enterprises initiate the construction of pastoral park directly, the enterprises make investments in constructions and facilities with the farm households raising the cows, (2) the genetics of the animals are good as is the management techniques with households benefiting from technical assistance from the enterprises. Some pastoral parks also produce organic milk (author's investigation).

4.5 The model of company + dairy farm household cooperative

Over the reform period until recently, there were no farmer associations or cooperatives representing the smallholders in the dairy sector in China. The dispersed small dairy cow raising households lack the negotiating and bargaining power necessary to benefit from marketing arrangements with dairy processing enterprises and feed marketing enterprises. After the year 2000, the Chinese government recognized the potential importance of farmer cooperatives and gave strong support to the establishment of cooperative societies. For instance, the Chinese government issued the Law of Farmer Specialized Cooperative Society in 2007, thus providing legally based organizational guarantees for farmer cooperative organizations. Some local governments are exploring and supporting dairy operators to set up "Dairy Industry Cooperatives". For instance, under the support of Anda city government of Heilongjiang Province, more than 50 dairy associations and dairy industry cooperatives have been established. Among them, the Taipingzhuang Dairy Association has more than 730 members and 4,200 heads of dairy cows produce a daily output of fresh milk of over 30 tons¹⁰.

¹⁰ Source:<http://suihua.northeast.cn/system/2007/07/23>

5. Problems faced by the small dairy cow raising households

Small dairy cow raising households face problems and the most important ones related to: (1) poor remuneration resulting in declining income, (2) meeting the quality standards for raw milk.

5.1 Declining incomes for dairy operators

According to the statistics of the Ministry of Agriculture, since early 2007 incomes of dairy cow raisers' have decreased gradually. 40% of the dairy cow raising households are not breaking even and the average earnings from each cow are 1,500 yuan lower than that in 2006. Some dairy cow raisers have resorted to selling or slaughtering their cows due to low profitability¹¹.

The reduction in incomes is due to higher production costs and relatively stable milk prices paid by processors. Price collusion among processors is resulting from a market structure characterized by oligopolistic behavior with the purchasing price of raw milk controlled by only a few dairy processing enterprises. The dispersed farm households have no bargaining power and are unable to negotiate higher prices, so they are obliged to receive the price offered by dairy processing enterprises².

Stable prices for output compare to rising costs of feed corn which over a one year period increased by 16%, that of dry alfalfa hay increased by over 20%. Meanwhile the purchasing price of milk in Inner Mongolia, Shanxi, and Heilongjiang increased only by 6%, 3% and 7%, respectively¹².

5.2 Quality control of raw milk

Of considerable concern to the industry and consumers is effective controls on milk quality. The quality of raw milk not only influences quality of dairy products and safety of consumers on the one hand but limits its use in the production of value added products. For instance, in the course of fermentation of sour milk and milk drinks, some raw milk can not be used if the level of antibiotics is too high. Before 1980s, most of the raw milk was supplied by state-owned dairy farms to consumers in urban areas and the quality of milk could be controlled easily. After 1990s, most of the dairy cows fed by farm households had a raising capacity of less than 5 heads. Owing to the great difference among households in technical and management skills, sanitary conditions and quality awareness, combined with more dispersed households engaged in dairy cow raising, effective supervision is very difficult. Consequently quality problems in raw milk in China has evolved into a major concern. Current quality problems in raw milk include: (1) variable protein levels due to the influence of different feeding regimes; (2) high bacterial count; (3) high levels of antibiotic substances due to lack of knowledge of dairy cow raisers. Often when dairy cows are taking or injected with antibiotic substances, raisers, due to economic interests or lack of knowledge, do not stop to milk the cow.(Hu, 2005).

¹¹ Source: A paper "Loss incurred in 40% of the dairy cow raisers in the whole country and the Ministry of Agriculture considers that the milk price forming mechanism is not reasonable" <http://www.yndaily.com> 2007 07 7.

¹² Source: "China Securities Journal"2007-11-26 "The dairy cow raisers kill their dairy cows as a result of increase of cost and thus resulting the high price of milk in the whole country".

6. Concluding Remarks and Implications for Regional Dairy Development Strategy

The development of China's dairy industry over the past decade has been an impressive one. Encouraging participation of smallholders in milk production has been a national and regional policy to promote regional development and reduce poverty. During this process, large processors have played a significant role in expanding and keeping smallholders in operation. Through the introduction of centralized milk collection stations, millions of small farmers have entered into the sector, particularly in the poor western provinces of China. This has been supported by enabling policies by central and local governments, particularly those which encouraged, through the provision of loans, investments in higher quality animals and infrastructure investment,

Though China's dairy sector has enjoyed rapid growth, it has encountered new challenges. The dairy industry is under rapid transformation – the quantity-based expansion is being replaced by the need to ensure milk quality. It is difficult for scattered small dairy farmers to produce the quality milk that processors and markets require. Goals of developing large commercial dairy farms is unlikely to be a viable model in China, particularly in the medium term. Rather alternative models such as company +milking station +small dairy cow raisers, dairy parks, and farmer associations which link small dairy farmers with processors are developing and proving to be viable.. Many other different organizational models exist in practice. This calls for further evaluation on the performance of different organizational forms for linking small farmers with processors.

It is clear that the large processors have dominated and will continue to drive the next stage of China's dairy development. Critical to ensuring strong growth in the sector is the development of incentive systems for rewarding good practices to increase milk quality, either market based or institution based. The processors need to take a leadership role in setting up effective premium based pricing systems to support a sustainable dairy sector in China. Implementing higher standards means high costs for producers. It is important to understand the cost of compliance to adhering to these new standards, particular to small farmers if they choose to participate in these evolving systems. In addition, it is important to look at innovative ways of cost-sharing these costs between cow raisers and processors, ensuring that producers receive remunerative and fair prices for high quality milk.

Dairy development policies, particularly regional policies, are very much biased towards large dairy farms in China. The government needs to aim to promote the development of rural economy and improve the well-being of the rural population through increased technical support and financial subsidies. The policy objectives should focus on enhanced dairy practices, farm management, and higher quality of milk. The regional governments tend to focus on the development of the regional economies in the short term, prioritising quantitative increase in production. Less attention is paid to improving remunerably rewards for quality product through enhancing farming practises through technical training.. That has resulted in demand imbalance characterized by short supplies of raw milk nationwide and oversupplies in some regions. Limited incentives are in place for the farms to improve their farming and raw milk quality management. Current pro-large dairy policies will need to be re-visited if one of the policy objectives is to provide effective assistance to small dairy farmers.

It is also clear that the current oligopolistic economic stage of the sector, owing to smallholder inability to negotiate with the large scale dairy processing enterprise, result in dispersed small dairy farmers not receiving remunerative prices for raw milk. Therefore, dispersed households need to organize themselves, strengthen their capacity in negotiation with enterprises, ensuring long term profitability to their investment and economic activities. The government should formulate a positive policy to encourage and support the small dairy farmers to establish institutional systems, such as cooperative organizations.

References

1. Xu Ji, Li Yifang et al.; "Modern Livestock Industry in China", Modern Press, 1991, pp.141.
2. Chen Zhao; "Food Culture in China", Shanghai Old Book Press, 2001, pp.77.
3. Dong Debao, Chen Xin; "The History and Basic Experience of Dairy Industry in Shanghai", Wang Huaibao, "50 Years of Chinese Dairy Industry", Ocean Press, 2000, pp.21.
4. Wang Shugui, Qu Jinduo; "Difficult Path and Glorious Achievements: Retrospective of 50 Years of Tianjin Dairy Industry", in Wang Huaibao, "50 Years of Chinese Dairy Industry", Ocean Press, 2000, pp.27.
5. Dalian City Dairy Product Project Office; "Advances of the Dalian Dairy Industry"; Wang Huaibao, "50 Years of Chinese Dairy Industry", Ocean Press, 2000, pp. 52.
6. Tuo Guozhu; "Retrospective and Prospective of 50 Years of Chinese Dairy Industry", Wang Huaibao, "50 Years of Chinese Dairy Industry", Ocean Press, 2000, pp. 3~13.
7. Wang Huaibao, "50 Years of Chinese Dairy Industry"; in Wang Huaibao, "50 Years of Chinese Dairy Industry", Ocean Press, 2000, pp. 37, 51, 93.
8. Li Yifang 1.; "Where to Go for Urban Dairy Industry?" in Li Yifang, "Spring and Autumn of the Dairy Industry" China Agriculture Press, 1999, pp. 61.
9. Liu Yuanying; "Integration of production, supply and marketing has promoted the development of dairy industry in Beijing", in Wang Huaibao, "50 Years of Chinese Dairy Industry", Ocean Press, 2000, pp. 18.
10. Chongqing Dairy Industry Office, "Development of Dairy Industry in Chongqing" in Wang Huaibao, "50 Years of Chinese Dairy Industry", Ocean Press, 2000, pp.37~38.
11. Sang Wanbang; "Four Peaks of Dairy Industry Development in Nanjing Since the Founding of the People's Republic of China"; in Wang Huaibao, "50 Years of Chinese Dairy Industry", Ocean Press, 2000, pp.70~74.
12. Ouyang Qian; "Sustainable Developed Dairy Industry in Kunming", in Wang Huaibao, "50 Years of Chinese Dairy Industry", Ocean Press, 2000, pp.96~97.
13. Jiang Yaming; the author of this paper had visited Mr. Jiang Yaming, the Director of the Ninth Farm of the Shanghai Bright Group in July 2004, see the Chinese Dairy Industry Report published by FAO, 2004.
14. Teysushi Sonobe, Dinghuan Hu, Kejiro Otsuka, "Process of Cluster Formation in China: A case Study of a Garment Town", "The Journal of Development Studies", Vol.39, No. 1, October 2002, pp.140-164.
15. Dinghuan Hu, "*The Stratagem of How to make Chongqing Become The Largest Motorcycle City in the world*", The Information of Motorcycle, Vol.3, 2003.
16. E Guangyu; "The advanced dairy industry in Inner Mongolia", in Wang Huaibao, "50 Years of Chinese Dairy Industry", Ocean Press, 2000, pp.45~49.
17. MOA Dairy Product Project Office; "The Supporting Policies of the Government to Promote Dairy Industry Development, Part One of the Integrated Operation Report on Dairy Industry Superiority Region", in "Dairy Industry World" Economic Daily Press, pp. 29~31.
18. MOA Dairy Product Project Office; Part Five of the Integrated Operation Report on Dairy Industry Superiority Region", in "Dairy Industry World" Economic Daily Press, pp. 41~44.
19. Zhang Xiulan; "Flourishing Developed Dairy Industry in Heilongjiang Province"; in Wang Huaibao, "50 Years of Chinese Dairy Industry", Ocean Press, 2000, pp. 60~64.
20. Ju Guoquan; "Current Situation and Development Countermeasures of the Dairy Product Industry in Hebei Province", in Wang Huaibao, "50 Years of Chinese Dairy Industry", Ocean Press, 2000, pp. 38~40.

21. "1999 Annual Report of the Yili Group Co. Ltd. In Inner Mongolia".
22. "2003 Annual Report of the Yili Group Co. Ltd. In Inner Mongolia".
23. Niu Gensheng; "The Exploration and Innovation of the Mengniu Group and Continuous Expansion of Enterprise Scale", in "2003 Yearbook of Chinese Dairy Industry", China Agriculture Press, pp. 235~236.
24. Zheng Xinmin; "Wandashan Establish Its Scale Superiority and Completion of Span Development", in "2003 Yearbook of Chinese Dairy Industry", China Agriculture Press, pp. 236~237.
25. Gao Yucheng; "Insist on Taking People's Interest as the Principle and Forcefully Create Sanlu Brand, in "2003 Yearbook of Chinese Dairy Industry", China Agriculture Press, pp. 234~235.
26. Hu Dinghuan et al.; "Analysis Report on Dairy Industry of China: Challenges and Opportunities", Beijing Orient Dairy Consultants Ltd. 2005, pp.41~42/150~152.
27. "2004 Annual Report of the Yili Group Co. Ltd. In Inner Mongolia".
28. Xie Baokang, Chen Dong; "Wealth Story of Mengniu Group Stock to be Marketed in Hong Kong", Financial and Economic Observation Network: <http://qb.chinabroadcast.cn>.
29. Shuangcheng Nestle Co. Ltd., (<http://www.investchina.com.cn>)the Harbin Channel of the China Network:
30. Yu Yongfang; "Tengxun, Mengniu, Gome: Analysis of the listed companies in foreign Financial Cases", in "Global Finance", June 9, 2005, in http://www.cfn.com.cn/statics_pub.
31. Nan Qingxian, Lu Ling; "50 Years Retrospective of Dairy Industry in China", in Wang Huaibao, "50 Years of Chinese Dairy Industry", Ocean Press, 2000, pp. 295~306.
32. Wang Yongkang; "The Role of Urban Dairy Industry in the Process of Dairy Cattle Production in China", in "Report and Proceedings of the Chinese Dairy Industry Development Conference", China Association of Dairy Industry, 2004, pp. 214~216.
33. Guo Benheng, Zheng Xiaoping; "Current Situation, Problems and Countermeasures of Milk Powder Product in China", in Wang Huaibao, "50 Years of Chinese Dairy Industry", Ocean Press, 2000, pp. 306~314.
34. Sun Xianhong, Zhang Zhiguo; "Inside Information on the Mengniu Group", Peking University Press, pp. 54~122.
35. Tuo Guozhu; "The Market Process of Dairy Industry in China and the Faced Options", in Li Yifang, "Dairy Industry World", China Agriculture Press, 1999, pp.347~361.
36. Fang Yousheng; "Current Situation and trend of Dairy Industry Development in China", in Liu Chengguo ed. "2003 Yearbook of Dairy Industry in China", China Agriculture Press, 2003, pp. 33~37.
37. Yi Chengjie; "Thoughts on the Development of Dairy Industry in China", in China Association of Dairy Industry, "Report and Proceedings of the Chinese Dairy Industry Development Conference", April 2004, pp.12~17.
38. Wang Jiafen; "Bright Dairy Group Has Started Professional Steps, Industrial Development and Nationalization Operation", in Liu Chengguo ed. "2002 Yearbook of Dairy Industry in China", China Agriculture Press, pp. 244~245.
39. Wang Jiafen; "Bright Dairy Group Has Started Professional Steps, Industrial Development and Nationalization Operation", in Liu Chengguo ed. "2002 Yearbook of Dairy Industry in China", China Agriculture Press, pp. 230~231.
40. Li Yifang; "Urban Dairy Industry Has a Long Way to Go: More Discussion on Where to Go by Urban Suburb Type Dairy Industry", in Organization Committee of Urban Dairy Industry Development Strategy Symposium, "Proceedings of the Symposium on Urban Type Dairy Industry Development Strategy" November 2003, pp. 3~6.

41. Du Binhua; "Develop Functional Type Dairy Products", in Organization Committee of Urban Dairy Industry Development Strategy Symposium, "Proceedings of the Symposium on Urban Type Dairy Industry Development Strategy" November 2003, pp. 51-53.
42. Zhongqiu Advertisement Co. Ltd.; "Great Secret Exposure of the Enormous Advertisement Quota in Chinese Dairy Industry", (<http://www.zgad.com.cn/news/view.asp>) December 8, 2003,
43. Dong Suyu, Nie Yan; "CCTV Champion: The Game of Money Knocking that Appear Very Briefly?", People's Network, (<http://finance.people.com.cn>) on November 19, 2005
44. Harbin Channel of the China Network; in website of (<http://harbin.china.com.cn/market>) "Shuangcheng Nestle Company"
45. Gao Suying; "Daneng Asian Co. has increased its possession of Bright Share", People's Network (<http://finance.people.com.cn>) on November 3, 2005.
46. Duan Shenhao; "A preliminary analysis on advantages of construction of milking station in small dairy cow raising area", 《China Dairy Cattle》, ·No. 3, 2007, pp.60-61.
47. Li Yifang ; "Appreciation of the development of reasonable scale of small dairy cow raising area", 《China Dairy Industry》, No. 7, 2003, pp.12-15.

Appendix 1

Smallholder Dairy Farmer SWOT Analysis

Strengths	Weaknesses
	The farm households are deficient in funds, they have to get loans from bank to purchase dairy cows, so scale of dairy cow raising is difficult to be expanded as inhibited by funds.
Income from dairy cow raising is higher than that from grain crops or other crops, so the farm households are active to raise dairy cows.	The dairy raisers' techniques are low, thus resulting in low yield of dairy cows ¹³ .
The small dairy cow raisers can use the corn and fodder produced by themselves, and thus reducing the cost.	The farm households are lack of high quality dairy cows.
Dairy cow manure can be used as fertilizer, thus increasing the content of organic matter in soil and attenuating environmental pollution.	Some farm households are deficient in food safety awareness and the produced milk is in low quality, thus affecting the purchasing price of raw milk.

Opportunities	Threats
The government has positive policies to encourage and support the small dairy raisers to raise dairy cows.	The dairy processing enterprises have entered into oligopolistic economic stage, the price for purchasing milk is stipulated by the enterprises, so it is difficult to meet the requirements of the dispersed farm

¹³ The output of a dairy cow in large dairy farms reaches 8 tons per year, but that in small dairy farms is less than 4 tons per year.

	households for increasing the price of raw milk.
In order to procure more raw milk, the dairy processing enterprises help the small dairy raiser to purchase dairy cows and give them technical assistance.	The rising up of the price of the means of agricultural production, the increase of cost, and difficulties in increasing milk price result in the profits from dairy cow raising lower and lower.
There is a great potential market for raw milk. China has a population of 1.3 billion and per capita consumption of milk is only less than 1/4 of the average consumption in the world.	Since entering into WTO, China has opened its dairy product market to the outside world completely. Along with the appreciation of RMB, foreign dairy products will further scramble domestic dairy product market.