



Global Meat Complex: The China Series

China's Dairy Dilemma

The Evolution and Future Trends
of China's Dairy Industry

By: Shefali Sharma and Zhang Rou
Institute for Agriculture and Trade Policy
February 2014

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When we embarked on this project to examine China's role in the Global Industrial Meat Complex, we had intended to produce only one report. Fairly quickly into the research, we realized—given the complexity of China, the scale and scope of production and the rapid rate at which different meat segments in China are evolving—individual sectors such as feed, pork, dairy and poultry merited their own stories. This large endeavor could not have been achieved without the help of numerous people that were involved from the conception, research, drafting, translation and editing phases of the project.

First, we'd like to thank Jim Harkness, IATP's president for 7 years (2006–2013) as the person who conceived this project as a critical contribution to the debate on the expansion of industrial meat production, its increasing concentration and its implications for social and environmental justice. Our interviews, conducted in May 2013, in China would not have been as rich without Jim's excellent contacts, his Chinese language skills and his 16 years of experience living and working in China. His editorial input, suggestions and revisions throughout the process have been invaluable.

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A final caveat: The project has been an enormously enriching process of learning about how China is grappling with its choices to consume and produce more meat and what this means for social and environmental issues within and outside China. It is by no means intended to be a definitive account—an impossible task for a country as complex and vast as China. We hope however, that it will be an important contribution to an evolving debate and process.

—Shefali Sharma

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THE GLOBAL INDUSTRIAL MEAT COMPLEX: UNDERSTANDING CHINA'S MEAT REVOLUTION

When the Chinese company Shuanghui International Holdings announced its intention to purchase Smithfield Foods, it got the attention of the U.S. Congress and the media. The idea of a foreign firm owning a giant U.S. pork producer, and an influential player in the U.S. food system, raised a government debate about the links between food security and national security.¹ The purchase was just the latest in the growing consolidation in the global industrial meat complex—where long supply chains include feed production, genetics and breeding span the globe and blur national identity. Shuanghui's recent name change to WH Group Limited exemplifies this global branding and reach.²

Aside from operating in the U.S., the global meat industry is increasingly interlinked with emerging economies. China and Brazil are now not only big agricultural producers and consumers, they have spawned a new set of agribusinesses, shaping the global meat complex. Their governments have embraced the factory-style meat production promoted by U.S. agribusiness companies. They are also adopting Western diets, including rising meat consumption.

In 2013, the U.S. was the top global importer of beef, and top exporter of pork; Brazil was the top exporter of beef and poultry. China is the world's largest producer and consumer of pork, the second largest producer of poultry and the world's largest soybean (for animal feed) importer. Brazil is increasingly filling the global need for meat, while the U.S. and Brazil compete for China's soy market. With the purchase of Smithfield, Shuanghui/WH Group becomes the largest pork enterprise in the world. Brazilian based JBS is now the world's largest meat company. U.S.-based Tyson remains one of the world's largest poultry companies, competing with JBS's acquisitions in the poultry industry. In short, industrialized meat production, processing and consumption has truly become a global phenomenon with global implications.

U.S.-based corporations, and their model of industrial animal production, have certainly been a major catalyst in the growth of industrial meat production around the world. Over the last 50 years, the rise of industrial meat production in the U.S. has been nothing short of astounding.

Animal production has shifted from a decentralized family farm system to a more concentrated system with fewer companies producing and large numbers of animals in confined spaces. These operations standardized feed for weight gain, genetic selection and the mechanization of feeding and watering.

Six years ago, a commission sponsored by the Pew Foundation examined the industrial meat production in the United States. The Pew Commission issued a series of recommendations, including the phase out of non-therapeutic use of antibiotics in animal production, stronger regulations to manage waste, the shift away from intensive confinement toward more humane treatment, vigorous enforcement of antitrust laws and increased funding for public research on alternative approaches for animal production. "Failure to address these issues will only result in a further lack of confidence in the animal agriculture industry, increased environmental damage, worsening public health, dismal animal welfare, and a grave outlook for rural communities," concluded the commission.³

For the U.S. farm economy, the industrial meat system has pushed out nearly all independent poultry and pork producers, while independent beef producers continue to hang on against all odds. Over 13 years ago, IATP documented the transformation of U.S. hog production in *The Price We Pay for Corporate Hogs*. In a period of 30 years (1950–1980), the number of U.S. hog farms declined by nearly 80 percent, while the average farm size increased six-fold. By 1999, 50 percent or more of the farmers were under some sort of contractual arrangement and four companies (including Smithfield) controlled 20 percent of the production. In the last decade, this process has only further intensified. By 2007, four companies controlled 66 percent of the production—at a great cost to U.S. farmers, consumers, the environment and public health. Further, working conditions at industrial meat processing facilities are considered some of the most dangerous in the U.S.⁴

In response to the numerous problems associated with industrial meat production in the U.S., rural communities, farm groups, environmental and public health organizations around the country have opposed the industrial meat system on a number of different fronts, in many cases winning important battles. But while U.S. meat consumption per capita has declined over the last four years,⁵ U.S. meat production continues to rise, linked to increasing U.S. meat exports. There are clear lessons to be learned from the U.S. experience.

Like most agricultural commodities, the meat industry is not local, regional or national—it is global. And the multinational companies that dominate this industry, from production to feed to processing and distribution, are set on exporting this industrial model of production around the globe. The industry is aided by trade agreements that threaten to lower worker safety, health and environmental standards while further empowering the legal standing of corporations to challenge national regulations.

It is becoming increasingly clear that addressing the economic, environmental and health downsides of the global industrial meat system will have to include an international dimension. Certainly, the health threats associated with industrial meat production—avian influenza, Mad Cow disease, H1N1 (swine flu), antibiotic-resistant bacteria, melamine poisoning—do not recognize national boundaries.

Will countries such as China, Brazil and India continue down the same path of the U.S. on industrializing their meat production? Or, is a different path possible?

In this first phase of our research on the global industrial meat complex, we examine the role of China. We look in depth at four sectors within China associated with animal production: feed, pork, dairy and poultry. It is an endeavor to understand and share how China's transformation towards a U.S. agribusiness model is both a common story of industrial meat production anywhere but is also specific to China. Further, it is an attempt to show how China's story, like the U.S.'s, is a global one, with global links and global impacts.

Understanding how Chinese companies are “going out” to develop their supply chains and how major U.S. and other international livestock and dairy companies are “going in” to China better prepares us to address the global nature of this industrial complex and its impacts—domestic and global. It can help us to get beyond big headlines in the paper about China's growing meat consumption and dig deeper into how and why it is taking place and imagine a different pathway towards fairness, nutrition, public health, environmental protection in food production—lessons that are readily available from the U.S. experience.

The global trend points to ever greater consolidation of fewer and more powerful corporations controlling scarcer water and land resources to feed millions of animals in confined spaces to produce more cheap meat. How citizens and governments deal with the externalities of this sector

and its endemic global ramifications merit careful thought. China—as the largest producer of pork, the second largest producer of poultry, the largest feed importer in the world and the fourth largest dairy producer—is a critical piece of this global puzzle.

Endnotes

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EXECUTIVE SUMMARY

The past three decades have seen both dairy production and consumption in China soar, averaging a 12.8 percent annual growth rate since 2000. This boom in both production and consumption has had critical consequences for both Chinese small dairy producers and consumers as the power of a few large dairy processors and fierce competition among smaller processors “on the fringe” have shaped the dairy value chain.

Government policy is a key factor in understanding the ongoing transformation of the dairy sector in China: there appears to be a strong belief that economies of scale and the industrialization of production practices will lead to an adequate and safe dairy supply. It also presents growing challenges for the government given rising costs of feed and fodder, and the desire to support domestic dairy firms in a globalizing sector.

China’s self-sufficiency in milk production has been declining rapidly in the past years. However, China’s dairy consumption is expected to increase 38 percent by 2022. Dairy imports are therefore expected to rise by 20 percent with 82 percent of those imports being skim or whole milk powder.

The 2000s saw a rapid increase in output and fierce competition among dairy companies. A large number of new products were introduced, and the largest firms extended their supply chains and began sourcing milk from outside the traditional dairy regions. The pace of consolidation in the sector grew, and small dairy processors began to disappear. By 2006, four major domestic dairy companies (Yili, Mengniu, Sanlu and Bright) accounted for close to half of all dairy sales with more than 700 smaller companies splitting the other half. However, even in this boom period, the bulk of the milk supply came from millions of small farmers, supported by national and local government programs. Despite consolidation in processing and marketing, in 2006, more than 81 percent of China’s dairy farms raised fewer than five cows.

However, market failures in the 90s and early 2000s set the stage for the 2008 melamine scandal that would drastically restructure China’s dairy production and alter the fate of many of these small producers. Ever increasing buyer power of a few large dairy processors, combined with a large number of competing firms and products kept consumer prices low. Small producers, whose feed and other production costs continued to rise to keep up with greater demand, were squeezed. To keep operating

costs low, dairy processors helped spawn a vast network of milk-collecting stations, traders, truck drivers and other middlemen to source milk from different regions. As large processors exerted downward pressure on prices through the supply chain, problems with adulteration began to appear. Initially, this took the form of extra water added to milk to increase the volume sold, but over time other substances were added as well, culminating in the melamine scandal in 2008.

The scandal drastically damaged Chinese consumers’ confidence in domestic dairy products and created a large opportunity for foreign firms. The Chinese government responded by pushing for further consolidation of the dairy industry and dairy production—actively demanding the creation of large-scale milk production units and sourcing from large farms. Chinese companies responded with different tactics including more overseas investments and vertical integration. The result of all this has been a massive shift away from traditional dispersed dairy production to concentrated and standardized farms.

In a speech in 2006, Premier Wen Jiabao said, “I have a dream and my dream is that each Chinese person, especially the children, can afford to buy one jin [500 g] of milk to drink every day.” While government policy has focused on dairy as a major source of calcium and protein, nutrition studies show that increased dairy consumption has not guaranteed increased calcium intake in the Chinese population. These studies point to the need for a more holistic nutritional analysis of dairy and meat consumption and public health.

The top three Chinese dairy companies—Yili, Mengniu and Bright—now take up close to 60 percent of the market share in sales for liquid milk in 2012. But these “Chinese” companies also have partial foreign ownership or own foreign ventures themselves. Several companies from the U.S., EU and New Zealand have also entered the Chinese liquid milk market by exporting final products and selling through online grocery services such as Yihaodian or large retailers such as Tesco Plc.

Food safety issues have greatly changed Chinese consumer choices, thereby transforming the dairy sector itself, particularly in their preference for imported milk powder. Upper and middle class parents prefer to pay higher prices for imported products (infant formula in particular) which they consider safer and better. Increasing demand for milk powder of foreign brands has spurred Chinese’ overseas bulk-buying. It has also spurred innovative

tactics by Chinese companies to be seen as foreign brands, their procurement from abroad and an increase in online Chinese vendors who hire shoppers in foreign countries to purchase foreign infant formula brands to be shipped back to China. Chinese consumer preference for imported products has also encouraged more and more dairy companies to build processing factories overseas. Shengyuan, Yili, Yashili and Bright have all built infant formula processing factories in other countries. Meanwhile, four foreign brands: Mead Johnson, Danone Dumex, Nestle's Wyeth and Abbott have taken over 42 percent of China's infant formula market (all implicated in a price-fixing scandal that the Chinese government cracked down on). This has led domestic dairy producers to urge Chinese consumers to "give up their blind faith in foreign formula brands."

With greater consolidation, China's dairy industry, now dominated by big domestic and foreign financiers, has opted to import foreign breeds as they produce almost double the milk of Chinese hybrids and local breeds. Since 2009, China has imported 250,000 cows, with 100,000 (25 ships worth) imported in 2012 alone (see figure 9). Breeding cow imports from Australia have risen by 25 percent to over 15,000 cows and from New Zealand by 13 percent to more than 9,600 cows.

Large-scale operations such as the Modern Dairy are also driving competition for acquisitions of large farms and creating a demand for more and higher-quality feed for foreign breeds. Many of the small producers use corn silage, but large farms are increasingly using processed feed made with alfalfa, creating pressure to increase domestic acreage of alfalfa and sourcing alfalfa abroad. There are now over 40 farms in China with more than ten thousand heads of cattle (grazing and under construction) to fulfill the government's criteria of modern, standardized and scaled dairies. Alfalfa imports increased by 59 percent in 2012 compared to the previous year. The U.S. accounted for nearly 95 percent of China's imports.

The upward trend of alfalfa imports has created concerns in the government. In 2012, the MOA launched a program to boost alfalfa production. The alfalfa exports to China are also creating public interest concerns in major exporting regions. It costs dairy farms in California's central valley twice as much to transport alfalfa to Southern California than to ship the crop to Beijing from the same location. Moreover, it is resulting in water scarcity. The amount of alfalfa shipped to China in 2012 could supply the annual needs of roughly 500,000 U.S. families.

As the dairy industry scales up and intensifies, cows are likely to face greater vulnerability to diseases such as brucellosis, mastitis, foot and mouth disease and anthrax which have already been a problem in China. The dairy cattle vaccine market is expected to grow substantially.

This has serious implications for the ever-rising use of antibiotics and vaccines in the livestock sector and the growing problem of antibiotic resistance in China. In 2008, China already produced 210 million kg of antibiotics, nearly half of which was put to use in the livestock sector. In contrast, the U.S. uses over 29 million pounds (13.2 million kgs) of antibiotics annually on livestock which is 80 percent of total antibiotic use in the country. Antibiotic resistant genes leading to disease resistance are becoming a source of major concern for the Chinese government. The Health Ministry has even launched a National Antibacterial Resistance Investigation Network.

Another health concern related to the dairy boom is the massive decrease in breast-feeding. China's breast-feeding rate is only 28 percent today, lower than the global average of 40 percent and far lower than the 50 percent goal set by the State Council. According to UNICEF, illegal activities (such as infant formula marketing to lactating mothers) have seriously disrupted efforts to promote breast feeding and are "the main factor in declining breast-feeding rates" in China.

In the wake of food safety scandals, land, water and labor constraints, and growing disenchantment with small dairy producers, government support and consumer concerns are leading to more consolidation, much larger-scale farms and intensification of the dairy sector. Ironically, this is creating a need for more imports of "higher quality" feed, cows and genetics, leading to a larger global environmental footprint and increased vulnerability of the domestic sector on foreign resources. Chinese dairy companies are also increasingly sourcing milk from abroad. Moreover, this consolidation and restructuring is doing little to curb the power of the top few domestic dairy producers and the growing power of transnational dairy companies as both the melamine scandal and the price-fixing probe demonstrate.

This oligopolistic power continues to create downward pressure on the entire dairy supply chain, forcing small dairy farmers out of production and creating conditions for future food safety scandals and market manipulations.

The need for feed and milk sources is also leading to land-use and natural resource concerns in regions as far flung as Sudan, New Zealand and California.

As dairy is further industrialized, it is increasingly an economically unsustainable endeavor for small-scale producers in China while at the same time environmental and public health risks are rising. Much more debate and analysis also needs to take place of China's young urban population, their calcium and protein intake and balanced diets as traditionally healthy Chinese diets give way to more processed dairy products and foods, with an over-emphasis on meat consumption.

These issues are also not unique to China; the U.S. model of industrial dairy production, CAFOs and overconsumption of dairy, meat and processed foods has already led to many of these same problems and worse. These issues that span market power, global commodity chains, environment and public health merit deeper thought and discussion and point to the need for further research, collaboration and exchange among researchers, officials and civil society organizations across continents. There is an alternative: a transformation of the current monolithic system of industrialized mass production and consumption toward decentralized agroecological, just, healthy and humane systems.

INTRODUCTION

The people of China drink more milk and consume more dairy products today than ever before. The main sources of calcium in the Chinese diet have traditionally been “green vegetables, beans, bean products, wheat and rice,”¹ and the large majority of the population is lactose intolerant. A new generation of Chinese children is being raised on dairy, thereby changing their capability to digest lactose.² This has rapidly created a new Chinese market and dependence on dairy products as a source of protein and calcium. The past three decades have seen both dairy production and consumption in China soar with the country producing 41 million tons of milk in 2010, averaging a 12.8 percent annual growth rate since 2000.³ This boom in both production and consumption has had critical consequences for both Chinese small dairy producers and consumers as the power of a few large dairy processors and fierce competition among smaller processors “on the fringe” have shaped the dairy value chain.⁴ It also presents growing challenges for the Chinese government as it pushes for further industrialization and economies of scale while trying to balance food safety concerns, rising costs of feed and fodder, and the desire to support domestic dairy firms in a globalizing sector.

Government policy is a key factor in understanding the ongoing transformation of the dairy sector in China: there appears to be a strong belief that economies of scale and the industrialization of production practices will lead to an adequate and safe dairy supply. However, it is also important to examine the strategies and behavior of the domestic and international firms competing to create, satisfy and profit from this enormous market. Finally, it’s necessary to examine the costs of China’s dairy boom. Are the putative benefits of increased milk consumption worth the social, environmental and health impacts of China’s dairy sector transformation to a large-scale, industrialized and globally sourced system?

I. EVOLUTION OF DAIRY IN CHINA

Traditionally, dairy has not been a major component of the Han Chinese⁵ diet because of cultural preferences and high rates of lactose intolerance.⁶ In much of China’s history, milk was primarily consumed by pastoralist ethnic minorities in the Northern and Western regions of China, and of course, by Western foreigners.⁷

The dairy industry was small and entirely under the control of the state and collectives until the post-Mao economic reforms in 1978. With the reforms, privately owned animal-husbandry was permitted and national and local governments launched policies encouraging investment in dairy production, including subsidies and loans to support the sector. Scientific research and international dairy projects also helped increase productivity, making the sector one of the fastest growing animal industries in China at an annual growth rate of 13.4 percent from 1978–93.⁸ In the 80s and 90s, dairy processing enterprises largely utilized “mobile-dispersed milk collecting” practices in which an agent from a dairy company traveled from household to household to buy milk from scattered farmers.⁹

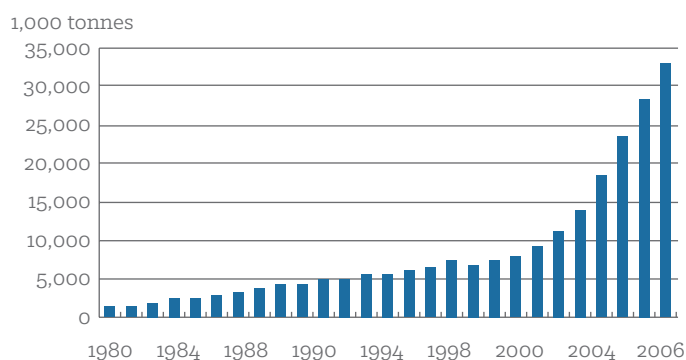
Both national and provincial governments emphasized the development of dairy production in grassland regions of Northern China (Inner Mongolia Autonomous Region, Heilongjiang Province and Hebei Province).¹⁰ These three regions went from producing 1 million tons of raw milk in 1995 to 18 million tons by 2006, in large part due to public investment in the 80s and both public and private investment in the 90s.¹¹ Despite this growth, annual per capita consumption nationally remained low at 4.75 kilograms up until the mid-90s.¹²

After 1993, there was much greater capacity to produce dairy products and the government began to allow competition from foreign enterprises. Two major domestic dairy processors, Yili and Mengniu rose to prominence in the 1990s. Nestle opened its first milk powder factory in Northeast China in 1990 in partnership with the Chinese company Shuangcheng Dairy and Food Industry;¹³ Morgan Stanley became one of three financiers of the venture in 2002.¹⁴

The dairy sector was largely a powdered milk market up to that point due to lack of cold storage chains and refrigeration, and demand remained low because of a lack of preference for powdered milk. (Those preferences would change and demand for milk powder would boom after the 2008 melamine scandal.) When foreign firms introduced ultra-high temperature (UHT) processing technology in 1997, the market changed because UHT allowed for easy storage and transport without a cold chain and a long shelf-life for liquid milk in the market.¹⁵ With the new possibility of marketing liquid milk, the industry became “characterized by hundreds of dairy companies branching out geographically from their home province or city to gain greater retail market share and to expand their milk supply base.”¹⁶

The 2000s saw a rapid increase in output (see Figure 1) and fierce competition among dairy companies. A large number of new products (see Figure 2) were introduced, and the largest firms extended their supply chains and began sourcing milk from outside the traditional dairy regions. The pace of consolidation in the sector grew, and small dairy processors began to disappear. By 2006, four major domestic dairy companies (Yili, Mengniu, Sanlu and Bright) accounted for close to half of all dairy sales with more than 700 smaller companies splitting the other half (see Figure 3 and 4).¹⁷

Figure 1: Milk output in China, 1980–2006



Source: Chinese statistical yearbook
Reproduced from Hu 2009

Remarkably, even in this boom period, the bulk of the milk supply came from millions of small farmers, supported by national and local government programs. Despite consolidation in processing and marketing, in 2006, more than 81 percent of China’s dairy farms raised fewer than five cows.¹⁸

Market failures in the 90s and early 2000s set the stage for the 2008 melamine scandal that would drastically restructure China’s dairy production and alter the fate of many of these small producers (see Box 1). Ever increasing buyer power of a few large dairy processors, combined with a large number of competing firms and products, kept consumer prices low. Small producers, whose feed and other production costs continued to rise to keep up with greater demand, were squeezed. To keep operating costs low, dairy processors helped spawn a vast network of milk-collecting stations, traders, truck drivers and other middlemen to source milk from different regions.¹⁹ Many of the milk stations were either operated or owned by such traders. Small-scale farmers were supposed to milk cows in these centers so that the milk would directly enter machines, thereby minimizing the risk of contamination.²⁰ Dairy husbandry areas, pastoral dairy parks and

dairy farm cooperatives were also created with government support to aggregate small farmers. As large processors exerted downward pressure on prices through the supply chain, problems with adulteration began to appear. Initially, this took the form of extra water added to milk to increase the volume sold, but over time other substances were added as well, culminating in the melamine scandal in 2008.

Figure 2: Number of dairy products sold in retail stores in Beijing, February 2006

SUPERMARKET	TOTAL PRODUCTS VARIETIES	VARIETIES OF DAIRY PRODUCTS
Carrefour	22,000	181
Wal-Mart	20,000	272
Lotus	18,000	127
Chengxiangcangchu	5,100	190
Chaoshifa, Shuanggan Store	3,000	179
Champion	4,500	126
Chaoshifa, Shuangyushu Store	6,000	182
Chaoshifa, Nongkeyuan Store	4,200	126
Xidan	4,200	124

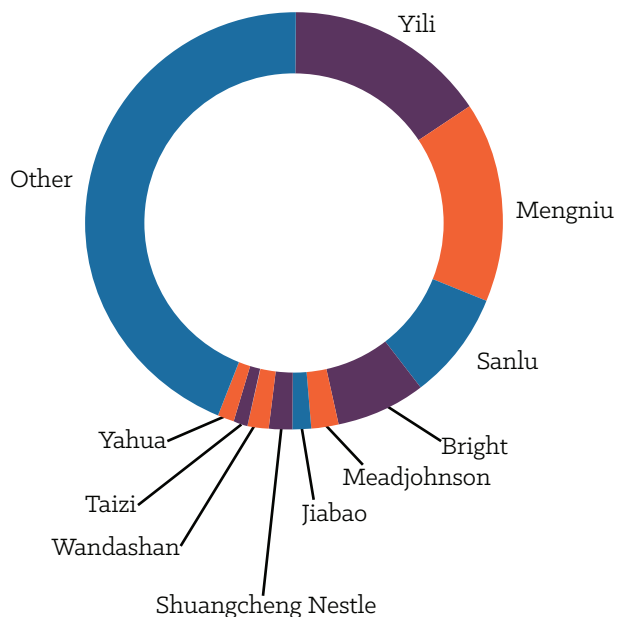
Source: Hu 2009, pg. 31

Figure 3: The total sales of the top-ten dairy-processing enterprises (unit: USD million)

ENTERPRISE NAME	2005	2006
Yili	1,623.3	2,178.5
Meng Niu	1,443.3	2,166.1
Sanlu	993.9	1,158.0
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
Taizinai	62.7	156.8
Yahua	38.1	145.7
Total	6,096.3	7,739.3
National gross sales	11,491.1	13,885.6
Percentage of national gross sales (of the 10) (%)	53.1	55.7

Reproduced from Hu 2009, pg. 31.

Figure 4: Market share of Chinese dairy companies, 2006



Reproduced from Gale et al. (2009), pg 16.

The scandal (See Box 1) marked a major turning point in the Chinese dairy industry, as consumption of milk decreased for the first time since 1998.²¹ See Gale et al. (2009)'s account of the specific market conditions in 2007 that contributed to melamine use. The scandal drastically damaged Chinese consumers' confidence in domestic dairy products and created a large opportunity for foreign firms. The Chinese government responded by pushing for further consolidation of the dairy industry and dairy production, actively demanding the creation of large-scale milk production units and sourcing from large farms.²² Chinese companies responded with different tactics including more overseas investments and vertical integration. The result of all this has been a massive shift away from traditional, dispersed dairy production to concentrated and standardized farms.²³

Box 1: 2008 melamine scandal: Restructuring China's dairy production

In September 2008, Chinese media broke the news that tens of thousands of infants in China had fallen sick after drinking infant formula. Melamine, an industrial chemical, had been added to milk somewhere along the supply chain. Twenty-two dairy companies were eventually implicated in the scandal. The contamination resulted in six infant deaths and over 30,000 children being severely sick with kidney stones and other complications. Sanlu Group, the company whose samples showed the highest amount of melamine, admitted that its milk powder was contaminated and blamed small farmers and middlemen who it claimed had added the substance to give the appearance of higher protein content in milk. The larger causes were poor regulation and fierce competition in the rapidly-expanding dairy industry as dairy companies put downward pressure (due to very low consumer prices) on the entire supply chain.²⁴

New Zealand's Fonterra owned 43 percent of Sanlu at the time (and helped make the news public). Mengniu, Yili and Bright Dairy (China's top three dairy companies) were also among the 22 companies whose dairy products were found to contain melamine.²⁵ Three people, including the head of Sanlu Dairy were sentenced to life in prison, two dairy industry managers were actually executed in November 2009 and 21 industry players went on trial. The companies were also asked to pay compensation to the families.²⁶ The government also tightened its regulation of the industry. This included revoking "inspection free" statuses of the top dairy producers and disallowing the previous policy of "self-inspection."²⁷

In the media frenzy that ensued, blame was spread widely across the dairy sector including on government officials who turned a blind eye to practices that had been known for many months before the scandal.²⁸ The large dairy companies tried to distance themselves from the crisis by placing the blame on "greedy dairy farmers."

Though it is now commonly acknowledged that traders and processors were the main culprits in the melamine scandal, the incident fueled the idea that small-scale, dispersed farming is not just economically inefficient, but a major threat to food safety.

II. CHINA'S DAIRY POLICY

Dairy as nutrition

The Chinese government implemented a series of policies designed to expand the dairy sector because of its perceived health benefits as a source of calcium and protein. In a speech in 2006, Premier Wen Jiabao said, "I have a dream and my dream is that each Chinese person, especially the children, can afford to buy one jin [500

g] of milk to drink every day.”²⁹ In the Chinese Dietary Guidelines, issued by the Ministry of Health, it is recommended that each adult should drink 300 ml of milk every day.³⁰ In 2009, the National Development and Reform Commission (NDRC) launched the “Industry Policies for the Dairy Sector” which stated that dairy consumption is one of the most important criteria to measure a country’s living standard.³¹ In the same year, the NDRC, Ministry of Commerce, Ministry of Agriculture (MOA) and Ministry of Industry and Information Technology (MIIT) together launched the “National Dairy Development Plan 2009-2013” which specified measures to develop the dairy industry, including more investment in research and technology promotion, enhancement of monitoring and proper guidance, and environmental protection.³²

While government policy has focused on dairy as a major source of calcium and protein, nutrition studies show that increased dairy consumption has not guaranteed increased calcium intake in the Chinese population. These studies point to the need for a more holistic nutritional analysis of dairy and meat consumption and public health (see Box 2).

Box 2: Dairy consumption and calcium intake

Between 1982 and 2002, consumption of dairy products in China (per person per day) more than tripled, increasing from 8 to 27 g. In urban areas, it increased much more significantly, from 10 to 66 g. However, average calcium intake per person per day decreased considerably during this period: from 695 mg in 1982 to 388 mg in 2002. The opposite trends in consumption of dairy products and calcium intake during this period are in part due to a decline in consumption of other calcium rich foods such as vegetables and grains and rates of calcium absorption through dairy.³³

Vertical integration and squeezing out small producers

Though big processors and traders created the melamine scandal, the government response was to push further consolidation and larger-scale models in all facets of dairy production, processing and marketing. As a result, many small-scale producers have been driven out of the dairy farming business.³⁴

After the scandal, the Chinese government launched a series of policies that Mo et al. (2011) describe as “marketing management” policies and “cow hotel” policies. These amounted to government incentives for milk marketing companies to source from large dairy complexes or “cow hotels” (*yangzhi xiaoqu*) where farmers would aggregate their cows.³⁵ Farmers were meant to raise and milk their cows in these “hotels” (both the cows and the owners would “check themselves in”) which could be at great distances from farmers’ home villages. Local governments were encouraged to convince small farmers to move to cow hotels for milk production and large dairy units were given subsidies to install equipment that would aid efficient and safer marketing.³⁶ The aim of *yangzhi xiaoqu* was to “provide small farmers with access to modern production practices and to facilitate better monitoring.”³⁷ The government also shifted focus to supporting large-scale ranches and “standardized” farms that would require more capital and technical know-how, emphasizing food safety issues. “Standardization” included a set of common minimum practices that all farms should implement in dairy production (i.e., the type, proportion and amount of feed, size and specifics of enclosures, vaccinations etc.).

The new policies incentivizing large-scale production came as small dairy farms reeled from the economic impacts of the melamine scandal. Mo et al. (2011) report a drastic fall in small dairy farms after the scandal—many dumping their milk and/or slaughtering their animals for meat as raw milk prices and demand for domestic milk crashed. Others estimate that at least 15 percent of China’s entire dairy herd was slaughtered for meat after the scandal.³⁸ Hu (2009) notes that even prior to the scandal, dairy farmers’ incomes were decreasing, with 40 percent of households “not breaking even” and earnings in 2007 lower than 2006. The scandal decimated these producers just as the government redoubled its focus on “scale.”

Figure 5 shows the dramatic shift from smaller to much larger farms in a period of just four years. There was a 72 percent increase in farms with 500 to 999 cows and a 55 percent increase in farms with over 1,000 cows between 2008 and 2009 alone. Between 2009 and 2010, there was a 16 percent and 27 percent rise in such farms, respectively. Though vertical integration continues, the staggering total number of farmers who raise milk cows means that 50 percent of raw milk is still produced on farms with fewer than 10 cows.³⁹

Figure 5: Number of Chinese Dairy Farms at Different Herd Sizes (2007–2010)

	2007	2008	2009	2010	% CHANGE 09/08	% CHANGE 10/09
ANNUAL INVENTORY (HEAD)	FARMS	FARMS	FARMS	FARMS	FARMS	FARMS
1–4	2,159,701	1,970,755	1,816,359	1,750,895	-7.32	-3.60
5–9	295,789	398,744	374,541	345,667	-6.07	-7.70
10–19	149,106	143,358	138,265	138,246	-3.55	0.00
20–49	42,079	51,804	49,490	49,450	-4.47	-0.10
50–99	14,175	13,842	13,685	14,758	-1.13	7.80
100–199	4,421	4,425	4,324	4,640	-2.28	7.30
200–499	2,336	2,679	3,341	3,579	24.71	7.10
500–999	768	1,026	1,773	2,061	72.81	16.20
1,000 and above	339	454	706	898	55.51	27.20

Reproduced from FAS 2012 Semi-Annual (P6) and 2011 Annual (P3)

In order to regulate dairy processors, the state required all dairy companies to reapply for production permits in 2010 and meet new government standards for food safety. Companies that failed to comply were denied permits. Many small enterprises were closed after that policy, driving down the number of dairy processing companies.⁴⁰

According to the central government’s “Number 1” Policy Document of 2013, the government will continue to support the scaling up and consolidation of the livestock industry.⁴¹ As part of that plan, subsidies will be provided to purchase improved varieties of dairy cows and livestock insurance, and for building standardized farms.^{42,43} Large dairy farms will also be supported through general incentives provided by the Ministry of Agriculture (MOA) for large scale farms given MOA’s general bias toward scale, standardization and consolidation as an answer to food safety problems and management of natural resources and environmental concerns.

III. THE DAIRY INDUSTRY TODAY

China’s dairy scene today is still largely based on production in the northern grazing areas and consumption in the wealthier more urbanized South. According to Rabobank, 84 percent of raw milk production in 2012 was concentrated in the North (Inner Mongolia, Heilongjiang, Liaoning) while 67 percent of consumption took place in Southern urban centers.

While total milk consumption continues to grow, the growth rates are not the same for liquid milk, milk powder and infant formula. According to the USDA, Chinese consumption of milk powder both skim milk powder (SMP) and whole milk powder (WMP) almost doubled from 1.06 million metric tons (mmt) in 2008 to 1.9 mmt in 2013 (see Figure 6).

Figure 6: China’s Milk Consumption, 2008–13 (1,000 mmt)

	2008	2009	2010	2011	2012	2013 (EST.)
SMP	107	124	144	186	225	213
WMP	954	1,065	1,373	1,433	1,540	1,725
Fluid	14,581	11,791	12,060	12,600	13,517	14,450

Source: “Dairy: world market and trade,” USDA FAS, July 2013

Liquid milk

During this period, consumption of liquid milk decreased drastically by nearly 3 mmts (Figure 6). It is once again rebounding, in part due to governmental efforts to regulate the industry and restore consumer confidence. However, liquid milk imports are also growing rapidly (see Figure 7). China’s imports from the U.S. for liquid milk, for instance, have increased at a staggering rate from 40 tons in 2010 to 2,750 tons in 2012 and total liquid milk imports are expected to increase by 33 percent in 2013.⁴⁴ China’s total liquid milk imports of 150,000 tons dwarf China’s exports of 30,000 tons (mainly to Hong Kong),⁴⁵ but remain a fraction of China’s total liquid milk production of 34 mmt this year.⁴⁶

Figure 7: China fluid milk imports, 2009–2011 (Year-to-date, Metric tons)

ORIGIN	QUANTITY		QUANTITY COMPARISON		% CHANGE
	JAN–DEC 2009	JAN–DEC 2010	JAN–AUG 2010	JAN–AUG 2011	JAN–AUG 2011/2010
World	12,763	15,889	9,626	21,944	127.97
New Zealand	5,577	7,420	4,235	8,944	112.37
Germany	1,678	3,077	1,627	7,342	351.26
France	2,128	3,421	2,460	3,090	25.61
Australia	1,601	1,423	889	2,042	129.70
United Kingdom	193	231	171	211	23.39
United States	36	43	16	93	481.25
South Korea	1,196	37	37	44	18.92
Other	354	237	191	128	-32.98
HS Codes: 0401.1000, 0401.2000, and 0401.3000					
Reproduced from: FAS China dairy annual: 10/11.					

The top three Chinese dairy companies—Yili, Mengniu and Bright—now take up close to 60 percent of the market share in sales for liquid milk in 2012 (see Box 3).⁴⁷ But these “Chinese” companies also have partial foreign ownership or own foreign ventures themselves.

Box 3: Liquid milk: Major “Chinese” dairy enterprises and their investors

YILI GROUP

<http://www.yili.com/>

Market share of liquid milk: >25 percent

Private company, major shareholders: Hohhot Investment Co. Ltd (10.18 percent), Merrill Lynch International (2.43 percent), National Social Security Fund 104 (2.24 percent)⁴⁸

MENGNUI DAIRY COMPANY LIMITED

<http://www.mengniu.com.cn/>

Market share of liquid milk: > 25 percent

Joint-venture, partly state-owned. Major shareholders: COFCO Limited (20.05 percent) UBS AG (9.08 percent) JPMorgan Chase & Co. (7.08 percent), Arla Foods 5.9 percent, Yinniu Dairy Company Limited (5.78 percent)

Recently, Danone and Mengniu combined their yogurt assets in the country into a production and distribution venture, Danone taking a 20-percent stake in the venture.⁴⁹

BRIGHT DAIRY & FOOD CO.

<http://www.brightdairy.com/home.php>

Market share of liquid milk: ~ 8 percent

Subsidiary of Bright Food.⁵⁰ Major stakeholders: Shanghai Dairy Group (30 percent), Bright Food (Group) Co. Ltd. (25.7 percent)

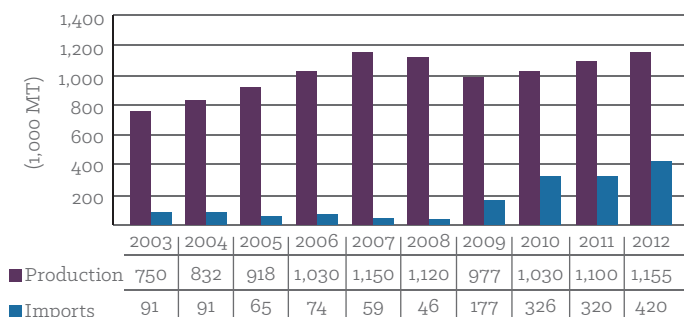
In 2010, Bright acquired a 51 percent stake in the milk processing arm of New Zealand’s Synlait Milk company.⁵¹

Several companies from the U.S., EU and New Zealand have also entered the Chinese liquid milk market by exporting final products and selling through online grocery services such as Yihaodian or large retailers such as Tesco Plc.⁵²

Milk powder and infant formula: Food safety concerns restructure China’s dairy sector

Food safety issues have greatly changed Chinese consumer choices, particularly in their preference for imported milk powder, thereby transforming the dairy sector itself. Upper and middle class parents prefer to pay higher prices for imported products (infant formula in particular) which they consider safer and better.

Figure 8: China's Whole Milk Powder Production and Imports 2003–2012



Reproduced from Ryan Scott and Jianping Zhang, GAIN Report: China-Dairy and Products Annual Report (Washington, D.C.: USDA FAS, 2012).

Increasing demand for milk powder of foreign brands has spurred Chinese' overseas bulk-buying.⁵³ As a result, retailers and local governments in countries such as Hong Kong, Australia, the U.K. and Germany have begun to limit the number of formula containers that consumers can take abroad because of increased domestic shortages.⁵⁴ It has also spurred innovative tactics by Chinese companies to be seen as foreign brands, their procurement from abroad and an increase in online Chinese vendors who hire shoppers in foreign countries to purchase foreign infant formula brands to be shipped back to China.⁵⁵

To cater to the demand for imported infant formula, some Chinese enterprises even adopt "foreign" names for their 100-percent domestically produced brands. Chinese enterprise He Shengyuan (Biostime) increased its net profit by 2,022 percent since 2008 by promoting its products as a French brand.⁵⁶ Some also "foreignize" their product by producing raw milk in other countries to ensure quality to consumers.

Chinese consumer preference for imported products has also encouraged more and more dairy companies to build processing factories overseas. Shengyuan, Yili, Yashili and Bright have all built infant formula processing factories in other countries.^{57,58,59} As of June 2013, there were as many as seven companies investing in overseas production.^{60,61} In a six-month period in late 2012 and early 2013, 200,000 tons of milk powder was produced outside of China by Chinese-owned companies and imported into the country. This was the equivalent of 30 percent of imports during that time.⁶²

Box 4: Dairy-related scandals in China

After the melamine scandal, several other dairy scandals have taken place. This has contributed to Chinese consumers losing confidence in domestic products.

In August 2013, Fonterra warned that a batch of whey protein (produced in New Zealand) contained botulism. China responded with a ban on imports of all Fonterra milk powder and whey protein.

In 2012, Yili Industrial Group recalled six months' worth of infant formula after a "mechanical error" tainted the batch with alkaline water.

In 2011, Mengniu Dairy Group, one of the biggest Chinese dairy companies, said it found milk containing high levels of aflatoxin—which can lead to liver cancer—before it had made its way to market and was sold to the public.

In 2010, Tiantian Dairy Co Ltd in Ningxia (North China) was closed after it repackaged and sold 170 metric tons of melamine-tainted milk powder that it received as "a debt payment" according to the local government.

On December 31, 2009, the Chinese government-run Xinhua news agency announced that melamine was found in milk produced by the Shanghai Panda company.

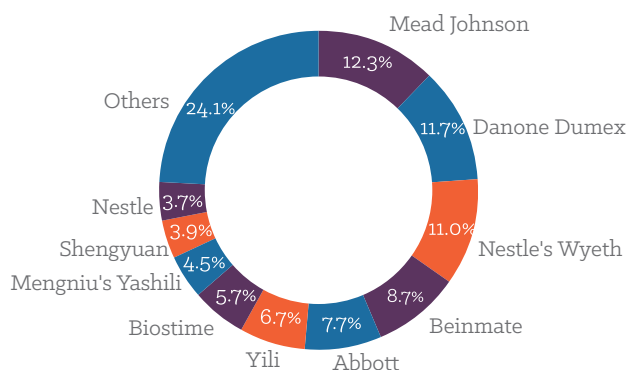
In recent months, China's cabinet announced detailed plans to improve the quality of domestic milk powder and Premier Li Keqiang vowed to improve the integrity of the dairy industry by helping domestic brands regain consumer confidence.⁶³ The "Action Plan for Increasing Milk Powder Quality and Strengthening Consumer Confidence" was launched to regulate the milk powder industry.⁶⁴ According to this plan, a three-month milk powder safety campaign would be launched (June–August) to weed out unqualified producers thereby boosting consumer confidence. MIIT also announced a temporary termination of production permits to new infant formula plants for the coming two years. Key government measures include a 1 billion-yuan investment to accelerate standardized scale farming to create a substantial domestic milk source base and encouraging mergers and acquisition (M&A) in the milk powder and infant formula segments of the market.^{65,66} More consolidation is expected among China's 127 infant formula enterprises.⁶⁷ MIIT said the goal is to increase the production share of the top ten domestic infant formula enterprises from 43 percent to 70 percent within five years.⁶⁸ Mengniu's recent purchase of Yashili, which owns 7 percent of the infant formula market, is a typical example of future consolidation.

Infant formula, consolidation and transnational presence

Euromonitor International, a London-based market intelligence firm, expects China's annual demand for infant formula to double to \$25 billion USD over the next four years, by which time China will account for half of the global sales of \$50 billion USD.⁶⁹

A 2012 report by AC Nielsen said that four foreign brands, namely Mead Johnson, Danone Dumex, Nestle's Wyeth and Abbott, had taken over 42 percent of China's infant formula market, with sales totaling 38.52 billion yuan (\$6.25 billion USD) (see Figure 9).⁷⁰ This has led domestic dairy producers to urge Chinese consumers to "give up their blind faith in foreign formula brands."⁷¹ The recent price fixing scandal involving foreign transnationals demonstrates the power of the TNCs and the government's ability to curb their power (see Box 5).

Figure 9: Infant formula market share⁷²



Source: <http://www.bjnews.com.cn/finance/2013/06/19/268973.html>

Box 5: Transnational presence and competition: The infant formula price-fixing scandal

Foreign investment in the dairy sector is regulated by the Catalogue of Industries for Guiding Foreign Investment (2011 Revision), the document that specifies where foreign investment is "restricted" or "encouraged." Foreign investment in processing of livestock and poultry products is "encouraged." This includes investment in dairy by foreign capital and in principle does not require a permit from Chinese authorities. However, in July 2013, the Chinese government launched an anti-trust probe into nine brands including the global dairy superpowers Nestle, Fonterra and Danone. These companies were charged with price-fixing and raising prices for infant milk powder and for violating China's anti-monopoly law. All nine companies responded by reducing their retail price by 4 to 20 percent and "cooperating" with the government.⁷³

The NDRC concluded the probe in early August and fined six companies a grand sum of \$110 million USD: Illinois-based Mead Johnson (\$33m), New Zealand's Fonterra (\$650k), U.S.-based Abbot Laboratories (\$12.5m), France's Danone Dumex (\$28m), Dutch FrieslandCampina (\$8m) and Chinese Biostime (\$27m).⁷⁴ Nestle's Wyeth Nutrition and Japanese Meiji were exempt from fines for "undisclosed" reasons, but Nestle did slash its prices by 11 to 20 percent saying it will "make up" for the loss by "portfolio management" or in other product "categories."⁷⁵

These price rises took place amidst domestic concerns of runaway food inflation. The Chinese government is well aware of the growing hold of global dairy retailers in the Chinese market following the melamine scandal and is taking steps to curb their power. It is also simultaneously working to restructure dairy production and strengthening domestic brands to compete with the global powers.

IV. OTHER IMPLICATIONS OF THE DAIRY CONSUMPTION AND PRODUCTION BOOM

Section 2 described the exodus of small farmers from the sector as the dairy industry continues to restructure post the 2008 melamine scandal. Linked to the renewed effort by the government and industry to consolidate, vertically integrate and intensify dairy production are increasing imports of cows and genetics (along with foreign investment), feed and growing use of vaccines and antibiotics. The increase in consumption of powdered infant formula is also impacting infant health.

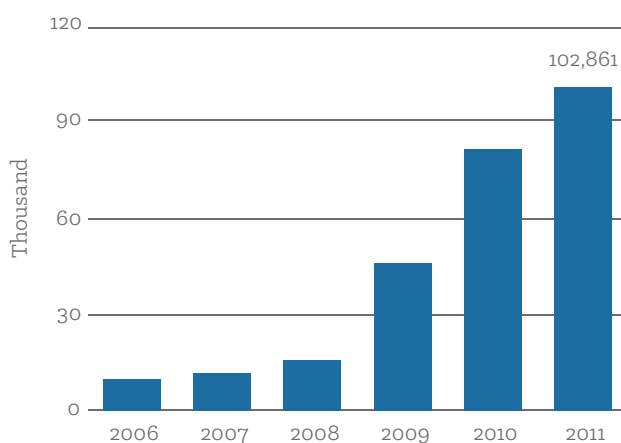
Greater consolidation, profits and imports of cows

With greater consolidation, China's dairy industry, now dominated by big domestic and foreign financiers, has opted to import foreign breeds as they produce almost double the milk of Chinese hybrids and local breeds.⁷⁶ Since 2009, China has imported 250,000 cows, with 100,000 (25 ships worth) imported in 2012 alone (see Figure 10).⁷⁷ Breeding cow imports from Australia have risen by 25 percent to over 15,000 cows and from New Zealand by 13 percent to more than 9,600 cows.⁷⁸

An example of how private equity firms are encouraging such cow imports are U.S.-based KKR and (essentially Chinese) CDH investments into Modern Dairy. When it bought a major stake in dairy in 2008, KKR provided staff to manage the technology and intensification of the production (more liters per cow with imported cows). Modern Dairy has since increased its production from 6.1 tons per cow per year in 2008 to 7.8 tons per cow in 2011.⁷⁹

Both have made major profits from first investing in Modern Dairy in 2008 and then selling off the majority of their shares five years later in 2013 to COFCO-dominated Mengniu.⁸⁰ Modern Dairy, now China's largest dairy company with 22 large-scale dairy farms and producing over 700,000 tons of raw milk a year, will help Mengniu fill its equally large processing capacity. Both CDH and KKR are said to have made three times the return on their investment through this deal.⁸¹

Figure 10: STAMPEDE
China has ramped up the number of live dairy cows it imports to boost production and improve quality



Reproduced from <http://online.wsj.com/article/SB10001424052702303863404577281302732745814.html>

The government is also aware that milk production by Chinese cows (an average of 4 tons of milk per annum compared to New Zealand and U.S.'s 8 tons) is increasing the cost of production for domestic milk. The lower production rate and the need to import alfalfa together increase production costs of Chinese milk, making it RMB 3,000–4,000 per ton (\$420–640 USD) higher than imported milk.⁸² The state is therefore also supporting further intensification of the sector through breeding programs that use foreign breeds, importing heifers from Australia and New Zealand, importing semen and embryos from Canada, the U.S. and other countries. Since 2010, the MOA has also provided subsidies for MOA-approved frozen semen for Holstein and Jersey cows.⁸³ China has a large variety of domestic breeds more suitable to the North and Northwestern region's climate, but these are not seen to be profitable from an industry perspective.⁸⁴

Buying farmland in China and abroad

Large-scale operations such as the Modern Dairy are also driving competition for acquisitions of large farms and creating a demand for more and higher-quality feed for foreign breeds. Many of the small producers use corn silage, but large farms are increasingly using processed feed made with alfalfa, creating pressure to increase domestic acreage of alfalfa and sourcing alfalfa abroad (see feed section below).

Mengniu, Yili and Bright have all made plans to build new farms with more than 1,000 head and decrease the quantity of raw milk collected from dispersed farmers. There are now over 40 farms in China with more than ten thousand head of cattle (grazing and under construction) to fulfill the government's criteria of modern, standardized and scaled dairies.⁸⁵

In response, global dairy giants like Nestle and Fonterra have also started building farms and processing facilities in China, although in different ways. Fonterra, which supplies about 90 percent of New Zealand's milk, plans to have 30 farms in China by 2020.⁸⁶ Nestle, an early mover in the Chinese market, has the largest Asian dairy research center in China⁸⁷ and is training producers to intensify their production without actually buying farms.

Chinese companies have also started investing in overseas farms. In 2012, Pengxin Corporation, a real estate company based in Shanghai, spent 1 billion yuan to purchase 16 farms (8,000 hectare in total) in New Zealand

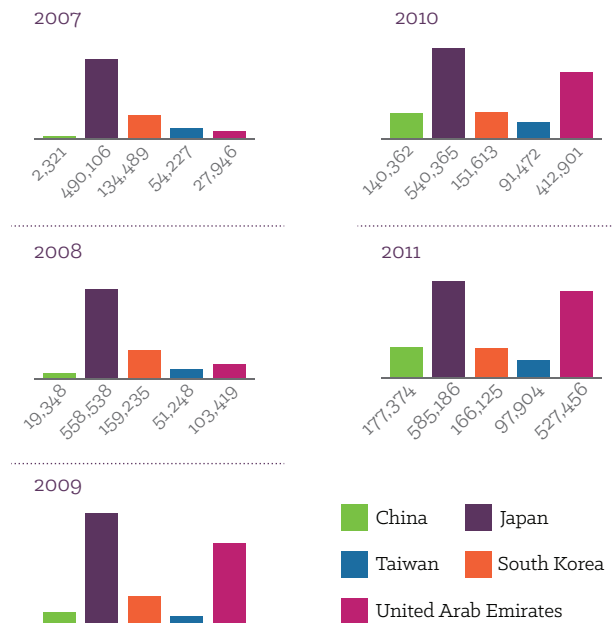
and established a new brand called “Milk New Zealand” to supply the Chinese market.^{88,89} If the land acquisition is successful, it will become the first Chinese private enterprise to own ranches in New Zealand. The New Zealand government has twice approved the sale of Crafar Farms to the Chinese bidders, but the transfer of ownership has twice been held up by appeals to block the deal. A consortium of local farmers and businessmen has taken legal action to try and stop or reverse the sale with concerns about foreign ownership of New Zealand’s land.⁹⁰ This controversy has also forced the New Zealand Government to reverse its plans to liberalize foreign direct investment (FDI) in land; a High Court ruling has also made the office in charge of FDI impose a more rigorous analysis of foreign purchases.⁹¹

New Zealand was one of the first countries that China signed a free trade agreement with and this has created a flood of New Zealand dairy imports into China and an expectation of greater reciprocity when it comes to trade and investment from China. China is supposed to phase out its dairy tariffs to New Zealand in the next five to 12 years (starting with infant formula, yogurt and whey in five years, and milk powder in 12 years). The trade deal is being portrayed in China as a tremendous business opportunity for Chinese and foreign milk suppliers with “broad prospects” for international investment in both directions: Chinese companies investing in overseas farms and factories and foreign enterprises building farms and factories in China.⁹²

Feed: In search of greener pastures

Large-scale industrialized production has rapidly increased the demand of cattle feed for both dairy and beef production. Hay, especially alfalfa, is a major source of protein for cows and makes up 40 to 50 percent of the dry feed used in China’s industrial dairy production. In 2012, 460,244 tons of alfalfa were imported to China, a 59 percent increase from 2011. The U.S. accounted for nearly 95 percent of China’s imports of 442,170 tons valued at \$174 billion.⁹³ USDA points out that the upward trend of alfalfa use will positively impact the United States.⁹⁴ The remaining 5 percent came from Australia and Canada. The U.S. is the largest alfalfa producer in the world, planting 19 million acres in 2011, 17 million acres in 2012 (drought), producing 65 million tons in 2011 and 52 million tons in 2012.⁹⁵

Figure 11: U.S. Alfalfa Hay Exports (in metric tons)



Source: http://www.agweb.com/article/alfalfa_exports_surge/

The upward trend of alfalfa imports has created concerns in the government. In 2012, the MOA launched a program to boost alfalfa production, expecting an increase of 300,000 metric tons this year.⁹⁶ The alfalfa exports to China are also creating public interest concerns in major exporting regions such as the Western United States. For instance, it is now costing dairy farms in California’s central valley twice as much to transport alfalfa from Southern California than it is to ship the crop to Beijing from the same location.⁹⁷ Moreover, it is resulting in water scarcity because alfalfa requires a significant amount of water and the amount of alfalfa shipped to China in 2012 “was enough to supply the annual needs of roughly 500,000 families” in the U.S.⁹⁸ Given the water scarcity faced by states such as Nevada and California and their investment plans for water conservation, public policy experts are beginning to question how water policy is aligning with agriculture and trade policy if billions of taxpayer dollars will be spent in conserving water while feed crops are exported at unsustainable rates abroad.

Meanwhile, the Chinese government and companies are also investing in overseas alfalfa production. Chongqing Foreign Trade Corporation (CFTC) recently acquired 313,00 acres of land in Sudan to grow alfalfa because it can

be harvested several times a year.⁹⁹ The group is supposed to build infrastructure in Sudan to transport and ship the crop back to be processed by Chongqing Agricultural Investment Group, CFTC's own company.¹⁰⁰ The project is expected to generate \$600 million income every year for the corporation. In 2011, Tianjin State Farms Agribusiness Group Company also invested in Bulgaria to rent 4,942 ares of land to grow corn and alfalfa feed for China.¹⁰¹

Wellhope ruminant, with 8,000 tons of monthly production is the largest dairy feed company in China¹⁰² and the Dutch remain important foreign investors in the feed and additives business in China. Wellhope is a joint-venture between De Heus (15 percent share) from The Netherlands and the Chinese Wellhope group (Chinese name: Hefeng) from China (China's Dairy Chain Report 2012).

Disease and antibiotics

China supposedly reached a headcount of 14.2 million heads of cattle in 2012, according to an industry report on dairy vaccines.¹⁰³ The USDA-FAS estimates seem more realistic at 8 million cows.¹⁰⁴ As the dairy industry scales up, intensifies and companies look to cut costs in a brutally competitive market, cows are likely to face greater vulnerability to diseases such as brucellosis, mastitis, foot and mouth disease and anthrax which have already been a problem in China. The dairy cattle vaccine market therefore is "expected to achieve cracking sales volume growth in the future," according to the vaccine industry report.¹⁰⁵ This has more serious implications for the ever-rising use of antibiotics and vaccines in the livestock sector and the subsequent and growing problem of antibiotic resistance in China. In 2008, China already produced 210 million kg of antibiotics, nearly half of which was put to use in the livestock sector.¹⁰⁶ In contrast, the U.S. uses over 29 million pounds (13.2 million kgs) of antibiotics annually on livestock which is 80 percent of total antibiotic use in the country. (For more details on antibiotic overuse in the U.S. livestock sector, see IATP's *No Time to Lose: 147 Studies Supporting Public Health Action to Reduce Antibiotic Overuse in Food Animals* by Jenny Jia and David Wallinga, 2012.)

Due to the overuse of antibiotics, antibiotic-resistant genes leading to disease resistance are becoming a source of major concern for the Chinese government. The Health Ministry has even launched a National Antibacterial Resistance Investigation Network. In 2009, more than 60 percent of samples taken from patients for the *Staphylococcus aureus* bacteria were resistant to methicillin (the

dreaded MRSA—linked to overuse of antibiotics in livestock).¹⁰⁷ This was an increase of 40 percent from 2000. There was also 70 percent resistance to antibiotics used to treat Strep and a 70 percent antibiotic resistance to treat E. Coli, the latter being the highest rate in the world.

Milk powder and infant health

With increased milk consumption and the use of milk powder in particular, China has seen a massive decrease in breast-feeding. According to China's Ministry of Health, China's breast-feeding rate is only 28 percent today, lower than the global average level of 40 percent and far lower than the 50 percent goal set by the State Council in the "Guideline of Chinese Children Development".^{108,109} In contrast, prior to the 1978 Reform, 80 percent of new mothers breast-fed.¹¹⁰ The dramatic decline of breast feeding is caused by many factors, including illegal marketing campaigns by the dairy industry, heavy workloads for working women and lack of public spaces to breast feed.¹¹¹ Data released by the Chinese Consumer Association showed that a little over half (56.2 percent) of the country's mothers received information about alternatives to breastfeeding during their pregnancy or while they were breastfeeding.¹¹² In 2007, milk powder companies spent \$700 million USD in marketing campaigns in China.¹¹³ Save the Children's research into infant formula marketing in China and Pakistan also found evidence of free samples of formula milk products and gifts having been given by representatives of companies such as Nestle and Danone to health workers and mothers in poor countries.¹¹⁴ According to UNICEF, illegal activities (such as infant formula marketing to lactating mothers) have seriously disrupted efforts to promote breast feeding and are "the main factor in declining breast-feeding rates" in China.¹¹⁵ UNICEF is actively cooperating with the government to address this concern.

According to the state's mandated guidelines, medical institutes cannot promote or provide breast milk substitutes to pregnant women or families with newborn babies.¹¹⁶ However, many hospitals continue to provide free milk powder to women who have given birth.¹¹⁷ *Beijing Wanbao* (Beijing Evening Newspaper) reported that compared to small domestic companies, rich foreign companies spent a lot more in promoting infant formula to hospitals and nursing mothers.¹¹⁸

Future direction and food for thought

According to the OECD-FAO 2013 outlook, China's self-sufficiency in milk production has been declining rapidly in the past years. However, China's dairy consumption is expected to increase 38 percent by 2022, the bulk of which will be fresh dairy products.¹¹⁹ As a consequence, dairy imports are also expected to rise by 20 percent with 82 percent of those imports being skim or whole milk powder.¹²⁰ China's domestic milk production is moving from a 12.8 percent growth from 2001–2010 to a projected 3.3 percent growth annually between 2011 and 2020.¹²¹ In comparison, OECD-FAO project a 1.9 percent annual growth rate for global milk production in the same period. Seventy-three percent of the additional global milk production of 150 million tons this decade is expected to come from developing countries with India and China accounting for 38 percent of the gains. China will remain the fourth largest producer of milk in the world for the foreseeable future.

In the wake of food safety scandals, land, water and labor constraints, and growing disenchantment with small dairy producers, government support and consumer concerns are leading to more consolidation, much larger-scale farms and intensification of the dairy sector. Ironically, this is creating a need for more imports of “higher quality” feed, cows and genetics, leading to a larger global environmental footprint and increased vulnerability of the domestic sector on foreign resources. Chinese dairy companies are also increasingly sourcing milk from abroad. Moreover, this consolidation and restructuring is doing little to curb the power of the top few domestic dairy producers and the growing power of transnational dairy companies as both the melamine scandal and the recent price-fixing probe demonstrate.

This oligopolistic power continues to create downward pressure on the entire dairy supply chain, forcing small dairy farmers out of production and creating conditions for future food safety scandals and market manipulations. The need for feed and milk sources is also leading to land-use and natural resource concerns in regions as far flung as Sudan, New Zealand and California.

The Chinese dairy sector seems set for a scenario of increased U.S. agribusiness-type Confined Animal Factory Operations (CAFOs) and feedlots, without clear answers as to how China's numerous small-scale dairy producers, who still produce over 50 percent of the raw milk in China, will fare in the transition. Nor is there

clarity on how “economies of scale,” further industrialization and intensification and milk powder imports will help address the growing public health problems of declining breast feeding rates and increasing antibiotic resistance due to the industry's overuse of antibiotics.

Our preliminary research raises more questions than answers. For instance, though the Chinese government has been concerned about integrating small producers into the dairy chain, the policy bias continues toward vertical integration, leaving small producers as contracted labor for large dairy companies with limited to no bargaining power. This has largely been the trend in the past decade and seems likely to be exacerbated as the industry consolidates. Second, the research indicates ever-increasing costs and externalities of dairy consumption in China due to imported feed and resulting land-use impacts, increased antibiotics and vaccine-use and increased CAFO-like conditions with a much larger carbon footprint. This trend is likely to increase non-point source pollution, the disease incidence of animals and food safety concerns as more and more animals are confined together.

While experts acknowledge the oligopolistic powers of major dairy processors in putting downward price pressure on the supply chain, very little critical analysis of costs associated with environmental and public health externalities of the industrial livestock sector has been carried out. As dairy is further industrialized, it is increasingly an economically unsustainable endeavor for small-scale producers in China while at the same time exacerbating environmental and public health risks. Finally, much more debate and analysis also needs to take place on China's young urban population, their calcium and protein intake and balanced diets as traditionally healthy Chinese diets give way to more processed dairy products and foods, with an overemphasis on meat consumption.

These issues are also not unique to China; the U.S. model of industrial dairy production, CAFOs and overconsumption of dairy, meat and processed foods has already led to many of these same problems and worse. These problems include lack of bargaining power and the exodus of small producers in the dairy value chain and the oligopolistic power of dairy processors and retailers in externalizing costs and setting prices. The U.S. government has also failed to effectively address and account for externalities related to CAFO-related, non-point source pollution, disease, antibiotic resistance and animal welfare concerns or deal with the associated climate and land-use change impacts associated with the industry. These issues that span market power,

global commodity chains, environment and public health merit deeper thought and discussion and point to the need for further research, collaboration and exchange among researchers, officials and civil society organizations across

continents. There is an alternative: a transformation of the current monolithic system of industrialized mass production and consumption toward decentralized agroecological, just, healthy and humane systems.

APPENDIX

Supply chain

Dairy supply chain structure in China



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