

China Dairy Case Study

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I. Executive Summary

China's efforts to roll out a comprehensive and centralized legal regime for food safety,² which include the amended Food Safety Law (2015) (FSL), are expected to have a positive impact across a number of agricultural value chains. As this case study focused on China's dairy sector highlights, leveraging the legal system to improve food safety, quality control, traceability, and trade are particularly important for a sector such as dairy, which has significant potential in both domestic and international markets. This case study on dairy is part of an ongoing series of work on China's legal and regulatory system for food safety done in partnership by the Syngenta Foundation for Sustainable Agriculture (SFSA) and the New Markets Lab (NML). Along with the other cases studies in this series,³ it is approached through the lens of the impact that the new legal framework for food safety has on agricultural development and small farmers. The series includes additional case studies on important value chains (horticulture, Chinese medicinal herbs, potatoes, and kiwifruit), an assessment of global best practices in food safety, and a report on China's evolving landscape for e-commerce in the context of food and agriculture.⁴

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² See, Katrin Kuhlmann, Mengyi Wang, and Yuan Zhou, *China Food Safety Legal and Regulatory Assessment*, March 2017, https://www.syngentafoundation.org/sites/g/files/zhg576/f/china_food_safety_-_legal_framework_2.pdf.

³ See, Katrin Kuhlmann, Mengyi Wang, and Yuan Zhou, *Chinese Medicinal Herbs Case Study*, November 2017, <https://www.syngentafoundation.org/food-safety-china>; Katrin Kuhlmann, Mengyi Wang, and Yuan Zhou, *China Horticulture Case Study*, November 2016, https://www.syngentafoundation.org/sites/g/files/zhg576/f/china_horticulture_case_study_0.pdf; and Katrin Kuhlmann, Mengyi Wang, and Yuan Zhou, *China Potatoes Case Study*, January 2019.

⁴ Supra, notes 2 and 3. See Katrin Kuhlmann, Mengyi Wang, and Yuan Zhou, *Assessment of Good Regulatory Practices for Food Safety in Electronic Commerce*, 2019.

This case study presents an overview of the dairy industry in China, including some of the main challenges associated with implementing a food safety regime that can support growth of the sector domestically and internationally. It was based on desk research and analysis of the laws, regulations, policies, and institutional frameworks surrounding the dairy value chain in China, as well as on-site consultations with dairy stakeholders in Heilongjiang and Shanghai. The sections below include both relevant legal and regulatory frameworks and industry perspectives, leading to several recommendations for improvement of the dairy value chain.

China's dairy sector has been growing rapidly over the last few decades. In just ten years, China's milk production grew over 400 percent, and it is today the number three milk producer in the world.⁵ Continued growth of the sector is also a priority of China's Ministry of Agriculture; the National Dairy Industry Development Plan for 2016-2020 aims to have domestic producers supply three-quarters of all dairy consumed in China.⁶ While the 2008 milk scandal, which revealed dangerous levels of melamine in milk and infant formula, initially set back the industry, since then both the government and private sector have focused extensively on ensuring food safety in milk products. China has pledged to continue to address the issue of food safety and aims to have 99 percent food safety compliance for dairy products as the sector grows.⁷

While China's dairy industry is made up of mostly small producers, large companies are becoming more dominant.⁸ These larger farms are typically more modern and sophisticated and are able to process larger quantities of milk more efficiently.⁹ Still, concerns with food safety remain, and many issues stem from the rapid development of the sector, leading most of the large dairy production companies to source milk from the many small farms scattered throughout different regions.¹⁰ This fragmented growth pattern has created challenges with ensuring that milk farmers use consistent farm management and food safety techniques.

Milk and dairy products are distributed to consumers through three main channels: e-commerce, modern grocery stores, and traditional grocery stores. The expansion of modern retail – supermarkets, hypermarkets, and convenience stores – has been key in broadening the distribution of dairy products. As with other food products, e-commerce sales are also on the

⁵ PricewaterhouseCoopers, *Managing Upstream Risks in China's Food Safety Chain* (2015), 11, <https://www.pwccn.com/en/food-supply/food-supply-chain-risk-aug2015.pdf>.

⁶ ELIZABETH GOOCH, ROGER HOSKIN, AND JONATHAN LAW, *CHINA DAIRY SUPPLY AND DEMAND* (2016)

⁷ David Stanway, "China Sets Out Measures to Rejuvenate Dairy Sector," *Reuters*, June 11, 2018, <https://www.reuters.com/article/us-china-dairy/china-sets-out-measures-to-rejuvenate-dairy-sector-idUSKBN1J72RH>.

⁸ PricewaterhouseCoopers, *Managing Upstream Risks in China's Food Safety Chain* (2015), 12, <https://www.pwccn.com/en/food-supply/food-supply-chain-risk-aug2015.pdf>.

⁹ PricewaterhouseCoopers, *Managing Upstream Risks in China's Food Safety Chain* (2015), 12, <https://www.pwccn.com/en/food-supply/food-supply-chain-risk-aug2015.pdf>.

¹⁰ Felicity Lawrence, "Can the World Quench China's Bottomless Thirst for Milk," *The Guardian*, March 29, 2019, <https://www.theguardian.com/environment/2019/mar/29/can-the-world-quench-chinas-bottomless-thirst-for-milk>.

rise, and the sale of milk through e-commerce platforms may make dairy products accessible to a greater portion of the Chinese population.¹¹ As seen in other case studies in this series, the use of e-commerce as a distribution channel creates a significant opportunity for domestic dairy companies. However, brand power does have a major impact on consumers, and many still favor international companies as they are perceived to be safer.

In recognition of this sizeable market opportunity, dairy products are now designed to appeal to Chinese preferences, which include healthy, shelf-stable, single-servings geared toward children. Developing markets drive demand for flavored milk products, primarily because of their stability on the shelf and a new interest in healthy drinks. In 2016, China represented a majority of the global market for drinkable yogurt and flavored milk products. The lack of advanced cold chain technologies also prompted the popularity of shelf-stable milk, which was produced using ultra-high-temperature (UHT) processing early on; recently, additional products such as flavored milk drinks are becoming more popular.¹² While infant formula still makes up a major share of the market, the rise in popularity of fresh milk products poses interesting questions for the application of the legal framework for quality and safety management, and fresh milk products are the focus of this case study.

II. Overview of China's Dairy Industry

Chinese consumer interest in dairy products peaked in 2008, just before the discovery that Sanlu Dairy company and others had been doctoring their milk powder products with melamine, a toxic chemical that resulted in higher protein percentages.¹³ This greatly set back the development of the domestic sector, while also leading to major reforms in food safety regulations within China. The market for milk production is still recovering; overall production decreased in 2015, 2016, and 2017.¹⁴ At the same time, milk consumption is increasing,¹⁵ and China imported 26 percent of dairy produced worldwide in 2017.¹⁶ As consumer demand rises, there is an opportunity for the domestic industry in China to grow; however, the domestic industry will also need to compete with foreign producers and importers, who are known for

¹¹ For a discussion of the regulation of food safety in e-commerce channels, see Katrin Kuhlmann, Mengyi Wang, and Yuan Zhou, *Assessment of Good Regulatory Practices for Food Safety in Electronic Commerce*, Forthcoming 2019.

¹² Jim Cornell, "Study Shows Complex Chinese Preferences for Flavored Milk," *Dairy Reporter.com*, June 21, 2016, <https://www.dairyreporter.com/Article/2016/06/22/Study-shows-complex-Chinese-preferences-for-flavored-milk>.

¹³ Yanzhong Huang, "The 2008 Milk Scandal Revisited," *Forbes Asia*, July 16, 2014, <https://www.forbes.com/sites/yanzhonghuang/2014/07/16/the-2008-milk-scandal-revisited/#27921d684105>.

¹⁴ Dong Xiaoxia and Wang Dongjie, "Prospects for China's Dairy Products Market in 2018 – 2027," *Dairy Information Network*, May 2, 2018, available at: <http://www.dac.com.cn/index/gndt-18050314582278510536.jhtm>.

¹⁵ Dong Xiaoxia and Wang Dongjie, "Prospects for China's Dairy Products Market in 2018 – 2027," *Dairy Information Network*, May 2, 2018, available at: <http://www.dac.com.cn/index/gndt-18050314582278510536.jhtm>.

¹⁶ "Continued Demand for Dairy Imports from China Expected," *AHDB Dairy*, January 2, 2018, <https://dairy.ahdb.org.uk/news/news-articles/january-2019/continued-demand-for-dairy-imports-from-china-expected/#.XRv48-hKhpY>.

developing products using more stringent quality control standards with access to improved technologies.

While the dairy industry includes a number of unique products, all follow the same general value chain, as noted in Figure 1 below. As noted above, this study focuses specifically on fresh milk but, when appropriate, includes examples and takeaways from other dairy products that are applicable to the industry as a whole.

Figure 1: Dairy Value Chain



Production of dairy products starts with livestock farming, and historically, China’s dairy market was comprised of scattered small farms which have two to four cows. There are still a good number of dairy farmers with fewer than 20 cows in China, although the industry is changing rapidly. Even the definitions of farm size are changing; now a “small farm” in some regions of Heilongjiang province consists of 300 cows or fewer (according to one stakeholder). The definition differs depending upon location, and Heilongjiang province’s farms are typically larger than others. Most dairy production occurs in the northern provinces such as Hebei, Shandong, Heilongjiang, and Inner Mongolia.¹⁷ Figure 2 below maps the major dairy production areas in China. While dairy production and farming are distributed across many smaller farms, dairy processing and sales are distributed across a handful of large domestic producers. China Mengniu Dairy, the Yili Industrial Group (based out of Inner Mongolia), and Bright Dairy (from Shanghai) are the largest companies active in the space.¹⁸ Foreign competitors, such as New Zealand’s Fonterra Co-operative Group and Nestle, are also major suppliers and have a competitive edge with consumers given their strong brands known for quality and safety.

¹⁷ “2017 China Dairy Industry Analysis,” *Chemlinked*, <https://food.chemlinked.com/market-insights/2017-china-dairy-industry-analysis>, March 14, 2018.

¹⁸ Celine Sun, “China’s Dairy Firms Bulk Up with Milk Shortage Set to Deepen,” *China South Morning Post*, March 26, 2014, <https://www.scmp.com/business/commodities/article/1457527/chinese-dairy-giants-global-race-milk-leaves-small-local>.

More recently, dairy production has begun to modernize, and more milk is now produced on larger-scale farms, often operated under the authority of large dairy production companies.¹⁹ In addition, smaller dairy producers often use processing stations maintained by larger enterprises. Consolidation of farms can help make it easier to monitor food safety, since they make traceability and prevention of food safety incidents more manageable.²⁰ However, consolidation within the sector is still underway, and industry fragmentation and scattered capacity remain ongoing challenges. As discussed below, continued capacity building across large-scale dairy farming and production operations, alongside more harmonized legal frameworks across provinces, could help the sector develop.

Figure 2: Milk Production in China



Source: MILK, “China: The Dragon in the Room,” *Edairy News*, January 30, 2018, <https://edairynews.com/en/china-the-dragon-in-the-room-57820/>.

Food safety and quality control is critically important along each stage of the milk value chain. At the production stage, the diets of milk cows (the ingredients and quality of animal feed) can impact the quality and safety of the milk. There are two types of feed commonly used: coarse fodder/roughage (粗饲料) and concentrates (精饲料). According to stakeholders, these are generally mixed together, and the precise percentage of each differs across farms. Whole-plant corn silage is the most common ingredient. Farmers must comply with standards that designate the maximum level of pesticides in the ingredients. Bigger farms tend to make their own feed,

¹⁹ Felicity Lawrence, “Can the World Quench China’s Bottomless Thirst for Milk,” *The Guardian*, March 29, 2019, <https://www.theguardian.com/environment/2019/mar/29/can-the-world-quench-chinas-bottomless-thirst-for-milk>.

²⁰ Katrin Kuhlmann, Mengyi Wang, and Yuan Zhou, “China Food Safety Legal and Regulatory Assessment,” *Syngenta Foundation for Sustainable Agriculture and the New Markets Lab* (March 2017), 10.

while smaller ones tend to purchase pre-made feed. However, self-made feed is becoming more expensive given the rising costs of the raw ingredients (these are often imported, and the trade war with the United States has impacted the price of raw materials).

Animal health is also critically important. Disease control, monitoring of the animal feed used, and proper handling of raw milk are all very important components of a safe farming practice.²¹ The most common form of disease control is vaccination. The government provides vaccines for some diseases, most often foot and mouth disease. Two of the farms surveyed in this study noted that they purchase their own vaccines because they don't trust the quality of government-provided vaccines due to risks in cold chain logistics. Another common practice is the use of medicines to strengthen livestock health before and after giving birth; this is done to avoid paralysis or sickness in mother cows.

The production process for dairy is controlled fairly strictly. Whether sold fresh or powdered, milk typically goes through a pasteurization process to maintain freshness and safety, and this is carefully addressed in the law. Many regulations and standards relate to the prohibition of chemical additives, accepted levels of pesticide residues, and temperature controls. The cold chain is also an important part of temperature control throughout the processing and transport process, but overall China's cold chain technologies remain underdeveloped. Some processing techniques, such as UHT processing can reduce the challenges associated with the underdeveloped cold chain system in the country.²² This technique is popular in China and results in a product with a longer shelf life than pasteurized milk.²³ However, cold chain management is one area where additional review of food safety measures, alongside improvements in machinery and transport vehicles could have a large impact.

Like dairy farms, China's market for dairy products has changed from local distribution and state-owned milk stores in the 1980s-1990s, to increasingly large firms distributing products in a wider variety of retail outlets.²⁴ At the same time, as incomes in China began to rise, diets began changing, and more consumers began to focus on milk and dairy products.²⁵ The progression of the market also supported close links with product quality and brand identity,

²¹ PricewaterhouseCoopers, *Managing Upstream Risks in China's Food Safety Chain* (2015), 12, <https://www.pwccn.com/en/food-supply/food-supply-chain-risk-aug2015.pdf>.

²² PricewaterhouseCoopers, *Managing Upstream Risks in China's Food Safety Chain* (2015), 11, <https://www.pwccn.com/en/food-supply/food-supply-chain-risk-aug2015.pdf>.

²³ Dinghuan Hu, "China: Dairy Product Quality as the New Industry Driver," <http://www.fao.org/3/i0588e/i0588E04.htm>, last visited 3 July 2019.

²⁴ Frank H. Fuller, Jikun Huang, Hengyun Ma, and Scott Rozelle, "The Rapid Rise of China's Dairy Sector: Factors Behind the Growth in Demand and Supply," *Working Paper 05-WP 394, Center for Agricultural and Rural Development, Iowa State University*, May 2005, 8-9, available at: <https://www.card.iastate.edu/products/publications/pdf/05wp394.pdf>; Frank Fuller and John C. Beghin, "China's Growing Market for Dairy Products," *Iowa Ag. Review*, Vol. 10, No. 3, 10-11, 2004, available at: https://www.card.iastate.edu/iowa_ag_review/summer_04/IAR.pdf.

²⁵ Fred Gale and Dinghuan Hu, "Supply Chain Issues in China's Milk Adulteration Incident," *Contributed Paper Prepared for Presentation at the International Association of Agricultural Economists' 2009 Conference*, August 16-22, 2009.

and many shoppers tend to trust certain brands based on perceived credibility for food safety and quality.²⁶

III. Institutional and Regulatory Framework

A. National Laws, Regulations, Policies, and Standards

At the national level, there are two general provisions relevant to the dairy sector. The revised *Food Safety Law* serves as the general overarching authority over food safety measures in China and notably does not have specific provisions regarding dairy products. However, it does impose strict, specific requirements on infant formula. Because infant formula comes in the form of milk-based formula and soybean-based formula,²⁷ the heightened requirements on infant formula impact dairy production indirectly.²⁸ The law's general requirements on traceability, inspection, and other similar measures would also apply to the dairy sector. In addition to the Food Safety Law, the *Regulation on the Supervision and Administration of the Quality and Safety of Dairy Products* ("Dairy Quality Regulation") details the requirements applicable at different parts of the production and business operation of the value chain for dairy products, including dairy animal raising, purchase of fresh milk, production of dairy products, sale of dairy products, supervision and inspection, and legal liabilities.

There are also a few relevant policies that have been enacted to guide the development of the dairy sector as a whole as well as establish a legal and regulatory framework. The main national policy is the Development Plan for the Milk Industry in 2016-2020, which covers a number of key elements tied to growth of the dairy sector, including the development of more locations for dairy production, capacity building for breeding programs and processing facilities, and additional commitments to improve food safety and traceability systems.²⁹ The plan was developed through the collaboration of five different ministries, including the Ministry of Agriculture, the China Food and Drug Administration, and the Ministry of Commerce, which should help streamline objectives. In addition, in June 2018 the Ministry of Agriculture and Rural Affairs issued a circular reaffirming national goals to revitalize the dairy industry.³⁰ By 2020, the goal is to have up to 99 percent of products meet relevant standards.³¹ To achieve

²⁶ Frank H. Fuller, Jikun Huang, Hengyun Ma, and Scott Rozelle, "The Rapid Rise of China's Dairy Sector: Factors Behind the Growth in Demand and Supply," *Working Paper 05-WP 394*, Center for Agricultural and Rural Development, Iowa State University, May 2005, 9, available at: <https://www.card.iastate.edu/products/publications/pdf/05wp394.pdf>.

²⁷ Ministry of Health of the People's Republic of China, *Terms and Definitions, National Food Safety Standard-Infant Formula*, available at <https://www.mpi.govt.nz/dmsdocument/14380/send>

²⁸ Yanzhong Huang, "The 2008 Milk Scandal Revisited," *Forbes Asia*, July 16, 2014, <https://www.forbes.com/sites/yanzhonghuang/2014/07/16/the-2008-milk-scandal-revisited/#587008964105>.

²⁹ Rachel Shen, "China Announces Dairy Industry development Roadmap," *Chemlinked*, January 20, 2017, <https://food.chemlinked.com/news/food-news/china-announces-dairy-industry-development-roadmap>.

³⁰ "China to Invigorate its Milk Industry," *Ministry of Agriculture and Rural Affairs of the People's Republic of China*, June 15, 2018, http://english.agri.gov.cn/governmentaffairs/pi/201806/t20180615_295995.htm.

³¹ "China to Invigorate its Milk Industry," *Ministry of Agriculture and Rural Affairs of the People's Republic of China*, June 15, 2018, http://english.agri.gov.cn/governmentaffairs/pi/201806/t20180615_295995.htm.

this goal, the government is planning on further consolidating production in northern provinces, while also supporting growth in the south. Strengthened standards and regulations are emphasized throughout the circular, and industry self-regulation is also encouraged.³² These policies prioritize growth of the dairy industry, which has a lot of potential but still faces challenges and competition from popular foreign brands.

In addition to these policies, the industry is now governed by a number of specific regulations and standards designed to ensure food safety. Table 1 below summarizes a few of the most relevant national laws, regulations, and standards.

Table 1: National Laws, Standards, and Regulations Governing the Dairy Industry in China

Laws		
Name of Law	Issuing Authority	Details
<i>Food Safety Law of the People's Republic of China (2015 Revision)</i>	Standing Committee of the National People's Congress	As highlighted throughout this case study series, the Food Safety Law creates the basic framing for food safety within China. It includes measures on traceability, enforcement, inspection, and labeling (among other key provisions).

Regulations		
Name of Regulation	Issuing Authority	Details
<i>Regulation on the Supervision and Administration of the Quality and Safety of Dairy Products (2008)</i> ³³	State Council of the People's Republic of China	This regulation details requirements on different parts of the production and business operation of dairy products, including dairy animal raising, purchase of fresh milk, production of dairy products generally, sale of dairy products, supervision and inspection, and legal liabilities.
<i>Administrative Measures for the Production and Purchase of Fresh Milk (2008)</i> ³⁴	Ministry of Agriculture (MOA)	These measures establish additional procedures and details in accordance with the <i>Regulation on the Supervision and Administration of the Quality and Safety of Dairy Products</i> . The measures specifically address fresh milk products.
<i>Administrative Measures for the Registration of Product Formulas of Infant Formula Milk Powder (2016)</i> ³⁵	China Food and Drug Administration (CFDA)	These are implementing regulations in accordance with the Food Safety Law and establish the CFDA as the institution in charge of the registration for infant formula and milk powder products. The measure requires that all infant formula and milk

³² "China to Invigorate its Milk Industry," *Ministry of Agriculture and Rural Affairs of the People's Republic of China*, June 15, 2018, http://english.agri.gov.cn/governmentaffairs/pi/201806/t20180615_295995.htm.

³³ Available at: <http://en.pkulaw.cn/Display.aspx?lib=law&Cgid=109190>.

³⁴ Available at: <http://en.pkulaw.cn/display.aspx?cgid=110498&lib=law>.

³⁵ Available at: <http://en.pkulaw.cn/display.aspx?cgid=272039&lib=law>.

		powder products are properly registered before they are sold on the market.
<i>Measures for the Supervision and Administration of Inspection and Quarantine of Imported and Exported Dairy Products (2013)</i> ³⁶	Promulgated by State Administration of Quality Supervision, Inspection, and Quarantine (AQSIQ)	These are implementing regulations in accordance with the Food Safety Law and establish AQSIQ as the government institution in charge of inspection of dairy products as well as sets out specific import and export requirements. These measures also set out labeling requirements.

Standards ³⁷		
Name of Standard	Issuing Authority	Details
<ul style="list-style-type: none"> • <i>GB 19301-2010 National Food Safety Standard Raw Milk</i> • <i>GB 10765-2010 National Food Safety Standard Infant Formula</i> • <i>GB 19302-2010 National Food Safety Standard Acidified Milk</i> • <i>GB 19644-2010 National Food Safety standard Milk Powder</i> • <i>GB 19645-2010 National Food Safety Standard Pasteurized Milk</i> • <i>GB 19645-2010 National Food Safety Standard Sterilized Milk</i> 	Ministry of Health (MOH)	Standards set out food safety and quality control thresholds and targets. For example, they include requirements on safe levels of pesticide residues and temperature controls. These are supplemented by additional specific standards at the local government level.

As with kiwi and other value chains in this series of case studies, the national level laws governing the dairy sector in China are written very broadly, leaving it up to local authorities to add detail and implement policies. These local measures are considered third level laws³⁸ underneath the basic laws enacted by the National People’s Congress and the administrative measures promulgated by the State Council and relevant ministries. Interestingly, several of the local standards are also specific to milk powder, which makes sense given that local regulations are often reactive measures that are passed after food safety incidents.³⁹

B. Local Standards

Local standards differ greatly between provinces. For instance, some provinces like Shanxi, Zhejiang, Fujian, Jiangxi, Hubei, Hunan, and others have no specific standards for dairy products. In contrast, Beijing, Hebei, Inner Mongolia, Xinjiang, and Heilongjiang have multiple standards specifically for the dairy sector (Hebei has an especially detailed system, with 14 standards). Interestingly, adjacent provinces are likely to use similar words to describe a standard. For example, Beijing and Hebei both use similar language to regulate “technical specifications for dairy production.” This might suggest that neighboring provinces are consciously making an effort to harmonize their legal frameworks. It is also worth noting that many of the provinces with a greater number of standards (such as Hebei) are some of the

³⁶ Available at: <http://en.pkulaw.cn/display.aspx?cgid=194279&lib=law>.

³⁷ Standards are listed on the searchable website: <http://www.cnspbzw.com/bz.asp>.

³⁸ See China Food Safety, at 6-7

³⁹ Katrin Kuhlmann, Mengyi Wang, and Yuan Zhou, “China Food Safety Legal and Regulatory Assessment,” *Syngenta Foundation for Sustainable Agriculture and the New Markets Lab* (March 2017), 7.

biggest dairy producers in China. Other provinces have very little or no regulations specific to the dairy industry. Table 2 below summarizes the standards within the different provinces in China.

Table 2: Local Standards Related to Dairy Products

Province(s)	Standard(s)
Beijing ⁴⁰	<ul style="list-style-type: none"> • There are five standards covering breeding, reproduction, feeding and feedstuff, hygiene and health, and epidemic prevention and animal health, respectively). • There is one standard on the environmental conditions for fields and barns, as well as requirements for a buffer area for dairy breeding operations.
Tianjin ⁴¹	<ul style="list-style-type: none"> • One standard on sales of dairy products. • One standard on production management for dairy enterprises • One standard on farm environments and supervision.
Hebei ⁴²	<ul style="list-style-type: none"> • Hebei is a major dairy production region and has some of the most extensive local standards of any province. • There are five general standards on dairy production • There are three standards related to disease prevention (one at the production stage, one at the transport stage, and one for breeding). • One standard on registration for cows. • Three standards related to breeding plots and techniques. • One standard on nutrition and monitoring. • One standard on milking.
Inner Mongolia ⁴³	<ul style="list-style-type: none"> • Inner Mongolia is another large dairy production area, and most of its standards deal with cattle breeding, feeding, and milking requirements. • There are two breeding specific standards. • One standard on quality of cow feed. • One standard on cleaning of mechanized milking equipment. • One standard for traceability of milk powder and infant formula.
Liaoning ⁴⁴	<ul style="list-style-type: none"> • Three standards related to disease prevention and technology. • Two standards on milk purchasing stations.

⁴⁰ The standards on dairy production are [DB11/T 150.5-2007](#); [DB11/T 150.4-2002](#); [DB11/T 150.3-2002](#); [DB11/T 150.2-2002](#); and [DB11/T 150.1-2002](#). The standard on environmental/field conditions is [DB11/T 425-2007](#).

⁴¹ The standards are [DB12/T 460-2012](#); [DB12/T 459-2012](#); and [DB12/T 655-2016](#).

⁴² Dairy production standards are [DB13/T 542.1-2004](#); [DB13/T 542.2-2004](#); [DB13/T 542.3-2004](#); [DB13/T 542.4-2004](#); and [DB13/T 542.5-2004](#). Disease prevention standards are [DB13/T 989-2008](#); [DB13/T 497-2004](#); and [DB13/T 1183-2010](#). The registration standard is [DB13/T 994-2008](#). The breeding standards are: [DB13/T 909-2007](#); [DB13/T 982-2008](#); and [DB13/T 1066-2009](#). The nutrition standard is [DB13/T 1247-2010](#). The milking standard is [DB13/T 897-2007](#).

⁴³ The standards on breeding are [DB15/T 1161-2017](#); and [DB15/T 421-2005](#) (cattle breeding in alpine areas and in northern pastoral areas). The standard on quality of cow feed is [DB15/T 1172-2017](#). The standard on milking equipment is [DB15/T 483-2010](#). The infant formula standard is [DB15/T 990-2016](#) (the standard specifically addresses the use of bar codes).

⁴⁴ The standards on disease prevention are [DB21/T 1766-2009](#); [DB21/T 2595-2016](#); and [DB21/T 2470-2015](#). The standards on milk purchasing are [DB21/T 2086-2013](#); and [DB21/T 2342-2014](#) (raw and fresh milk purchasing).

Jilin ⁴⁵	<ul style="list-style-type: none"> • One standard on breeding and dairy farm management. • One standard on testing for chemical residues in raw milk.
Heilongjiang ⁴⁶	<ul style="list-style-type: none"> • Three standards on the design, building, and technical specifications for dairy farms. • One standard on milk sampling for quality control.
Shanghai ⁴⁷	<ul style="list-style-type: none"> • One standard on the transport of milk and livestock. • One standard on large scale dairy production.
Jiangsu	<ul style="list-style-type: none"> • One regulation on management of dairy cows.⁴⁸
Anhui ⁴⁹	<ul style="list-style-type: none"> • Two standards on testing for melamine in raw milk • Two standards on cow feed and management. • One dairy production hygiene standard. • One standard on glass baby bottles for infant formula (packaging).
Zhejiang, Fujian, Jiangxi, and Shanxi	<ul style="list-style-type: none"> • No local standards found.
Shandong ⁵⁰	<ul style="list-style-type: none"> • One standard on milk quality management. • One standard on traceability. • One standard on milk station construction. • One standard on dairy feed.
Henan ⁵¹	<ul style="list-style-type: none"> • There are three standards all dealing with the testing procedures for melamine in milk.

Reviewing the local standards reveals a few additional interesting patterns. First, many of these local regulations were promulgated between 2008-2011, the period right after the melamine milk scandal. Many of these deal with milk quality management and specific inspection and testing procedures. There seems to be a second wave of more recent measures (2014-2016) dealing with the management and design of cattle farms and production operations. This suggests that modernization of dairy farms has become a priority. Overall, there are very few measures on transport and cold chain management and logistics. It would be interesting to see if local governments begin to promulgate more rules in this area in an attempt to further streamline and harmonize the industry.

⁴⁵ The standards are [DB22/T 2741-2017](#); and [DB22/T 1998-2014](#) (Determination of benzoimidazoles residues in raw milk by liquid chromatography).

⁴⁶ The standards are [DB23/T 1693-2016](#); [DB23/T 1285-2008](#); [DB23/T 1560-2014](#) ; and [DB23/T 1617-2015](#).

⁴⁷ The standards are [DB31/T 537-2011](#) and [DB31/T 356-2006](#).

⁴⁸ [DB3201/T 029-2003](#) (this deals specifically with nuisance, so it seems to be more about the maintenance of dairy farms in relation to residential or other commercial environments, rather than food safety).

⁴⁹ The standards are [DB34/T 863-2008](#); [DB34/T 1374-2011](#); [DB34/T 321-2003](#) (Anhui cows feed safety standards); [DB34/T 1603-2012](#)(feeding and management technical regulations of lactating dairy cows); [DB34/T 320-2003](#); and [DB34/T 1686-2012](#).

⁵⁰ The standards are [DB37/T 2812-2016](#) (quality management for raw milk of dairy goats); [DB37/T 1805-2011](#) (General technical requirements for electronic information traceability system for dairy products); [DB37/T 2822-2016](#) (standard on fresh milk station construction); and [DB37/T 2136-2012](#)(feeding technical specification of total mixed ration in dairy cattle)

⁵¹ [DB41/T 549-2008](#) (determination of melamine in raw milk, LC-MS-MS method); [DB41/T 547-2008](#)(determination of melamine in raw milk, high performance liquid chromatography); and [DB41/T 548-2008](#)(determination of melamine in raw milk, GC-MS method).

IV. Specific Opportunities and Challenges along the Value Chain and Industry Perspectives

A. Livestock Farming and Production

According to stakeholders consulted, one of the biggest challenges facing the overall development of the sector and food safety is capacity and knowledge of good practices. This is true across all parts of the dairy value chain but is especially pronounced in the areas of animal health and farm management, business management, and quality of inputs (animal feed). While other dairy producing countries have benefited from both industry associations and government programs to build capacity, this is not the case in China, according to stakeholders. Programs to build capacity for dairy farmers across China will remain critically important to ensuring the success of the sector overall. Currently, there are not many programs available for farmers, processors, and other stakeholders along the value chain to receive the training and knowledge they need to make their businesses grow and improve food safety and quality. There are a few examples, however, such as Nestle's investment in a Dairy Farming Institute (DFI) in Harbin within Heilongjiang province that provides capacity building and training for small, medium, and large farms as well as milk processors. DFI, which also engages in a number of partnerships to extend the institute's reach, is an example of a good practice in capacity building that could be scaled up across dairy-producing areas; however, replicating this model would require an enterprise of a certain scale.

Nestle's DFI is unique, in that it offers a series of systematic training courses to encourage the growth and development of milk quality management and good business practices for small, medium, and large farms. DFI also functions as a multi-pronged platform that engages government and business partners to support the sustainable transformation of China's dairy industry. DFI's programs are focused on value addition (such as cost reduction through the use of higher quality feed that will increase protein and fat content in milk, thus leading to higher prices), quality control, and environmental protection (which is engrained in Nestle's corporate culture). Thus, participants in the program have the opportunity to focus on multiple aspects of the production process at the same time, improving their overall confidence and know-how.

There are four tiers of classes at DFI: level one focuses on farm workers' use of machines and basic disease detection methods, and it includes a three-day on-site training to build practical skills. Level two focuses on farm specialists, such as veterinarians and breeders, and also includes a five-day on-site training. Level three is for farm managers and includes advanced classes on farm management and design, supply chain integration, and financial management with a 2-week on-site training. Finally, level four is for Chinese undergraduate students from Agriculture Universities, with trainings focused on farm management and key skills. DFI also tailors its classes based on demand by large dairy companies and farms.

The impact of DFI's program has been felt beyond Nestle's suppliers. The program has helped scale up farms across China, promoted the standardization of operations, and trained numerous professionals. DFI has also partnered with other major companies and academic institutions,

further integrating science-based techniques with business strategies.⁵² However, one institution can only go so far, and additional programs and work with more farms and businesses nationally are needed.

Beyond building capacity to implement the current standards for farm management, training may be needed to address gaps in existing rules and regulations. One area that stakeholders noted in this regard is inadequate regulatory coverage of the use of pesticides in animal feed. Existing standards only cover seven of the most dangerous pesticides, but, according to stakeholders, many of the most common pesticides are still not included. When applied improperly, even common pesticides can pose food safety risks. Larger dairy companies (the buyers of raw milk) may have more stringent standards, but it can be challenging for small farmers to meet these requirements without adequate training.

Environmental Concerns

With the government encouraging the growth of the sector by promoting milk consumption and prioritizing safe growth of the dairy sector, there are rising environmental concerns that will need to be addressed if the industry is going to grow sustainably.⁵³ While not directly tied to food safety and quality, large scale dairy production does have significant impacts on the environment and, by extension, consumer health, both in terms of methane emissions and climate impacts, safe disposal of waste, and land management. There are already several local rules related to the design of dairy farms, and more provinces may continue to regulate this as large-scale production increases. In Beijing, for example, there are regulations specifying conditions for fields and barns, as well as requirements for a “buffer area” for dairy breeding operations. These buffer areas mandate that farms do not operate within certain distances of urban centers – something that is increasingly challenging in areas that are rapidly urbanizing such as Beijing. The restrictions have led to the further consolidation of farms, since small farms find that they struggle to comply with these environmental standards.⁵⁴ These issues should continue to be addressed, and there are a number of international good practices from which China could draw as the industry grows.

For example, the Food and Agriculture Organization of the United Nations (FAO) has released guidelines on sustainable dairy farming that are based on Good Agricultural Practices (GAP), the Codex Recommended International Code of Practice – General Principles in Food Hygiene,

⁵² Christian Fruitger, “Business can Lead Transformational Change,” *Nestle*, May 2018, available at: <https://www.nestle.com/stories/nestle-shared-value-summit>; “Nestle Cooperates with NEZU on Dairy Research,” *China Daily*, May 7, 2019, available at: <http://govt.chinadaily.com.cn/a/201905/07/WS5cd0feed498e079e6801f9a6.html>.

⁵³ Felicity Lawrence, “Can the World Quench China’s Bottomless Thirst for Milk,” *The Guardian*, March 29, 2019, <https://www.theguardian.com/environment/2019/mar/29/can-the-world-quench-chinas-bottomless-thirst-for-milk>.

⁵⁴ Abraham Inouye, “Dairy and Products Semi-annual, Higher Profits Support Increased Fluid Milk Production,” USDA Foreign Agricultural Service, *Gain Report*, July 17, 2019, available at: https://gain.fas.usda.gov/Recent%20GAIN%20Publications/Dairy%20and%20Products%20Semi-annual_Beijing_China%20-%20Peoples%20Republic%20of_7-25-2019.pdf.

and the Codex Code of Hygienic Practice for Milk and Milk Products.⁵⁵ There is an entire chapter on environmental concerns, which includes proper prevention of runoff, managing livestock to reduce environmental impact, and the balanced production and use of inputs such as animal feed.⁵⁶ In China's case, these measures would need to be adopted across different provinces in order to be the most effective, meaning harmonization of local rules will continue to be important.

Some stakeholders noted that adhering to more stringent environmental standards would be challenging. For example, stakeholders mentioned that it is already becoming difficult to get adequate land for farming given the environmental restrictions already in place. Further, one current rule dictates that dairy farms must be at least 500 meters away from villages, which is considered unreasonable and difficult to achieve. Some environmental standards are thought to be confusing and difficult to understand as well. As with other issues, effective implementation will require balancing the creation of reasonable rules with the need to move the industry forward.

B. Processing, Transport, and Cold Chain Logistics

Additives

The presence of additives in milk products is a huge concern for consumers, especially after the melamine milk incident. China's amended Food Safety Law requires that any food additives used in food-related products must come from an approved list (the National Food Safety Standard for the Use of Additives, or GB 2760-2014).⁵⁷ However, food additives appear to be more strictly enforced in milk and dairy-specific regulations, for example the Regulation on the Supervision and Administration of the Quality and Safety of Dairy Products (2008), which forbids the addition of any substance during the production, purchase, storage, and transport stages of fresh milk production.⁵⁸ Stakeholders noted that no additives are used in the processing stages of fresh milk and are only included in inputs such as animal feed. Stakeholders did not report any incidents of illegal additives being used in dairy products, and it seems that this issue has been adequately addressed by legislation. However, consumers are still very hesitant to trust domestic producers, and foreign firms continue to dominate the market for infant formula in particular.⁵⁹

⁵⁵ "Guide to Good Dairy Farming Practice," *Food and Agriculture Organization of the United Nations and the International Dairy Federation*, (2011) available at: <http://www.fao.org/3/ba0027e/ba0027e00.pdf>.

⁵⁶ "Guide to Good Dairy Farming Practice," *Food and Agriculture Organization of the United Nations and the International Dairy Federation*, (2011) available at: <http://www.fao.org/3/ba0027e/ba0027e00.pdf>.

⁵⁷ The Amended Food Safety Law (2015), Articles 39 and 40; Food Safety Legal Framework at 11.

⁵⁸ The Regulation on the Supervision and Administration of the Quality and Safety of Dairy Products (2008), Art. 7.

⁵⁹ Rachel Chang, Daniela Wei, and Corinne Gretler, "China's Lethal Milk Scandal Reverberates a Decade Later," *Bloomberg News*, January 21, 2019, <https://www.bloomberg.com/news/articles/2019-01-21/china-s-lethal-milk-scandal-reverberates-a-decade-later>.

Transport

The Regulation on the Supervision and Administration of the Quality and Safety of Dairy Products contains specific requirements for transport of fresh milk; Article 25 requires that transport vehicles must have a permit issued by the stockbreeding and veterinary administrative department of the local people's government at or above the county level as well as a freight delivery receipt.⁶⁰ Delivery receipts are required to show information on the purchase station and recipient, which supports traceability efforts (see below). The exact requirements and design of the transport permit and delivery receipt is left up to local governments, meaning there may be discrepancies between requirements of specific provinces and localities. There are also requirements in the Regulation on the Supervision and Administration of the Quality and Safety of Dairy Products on the minimum temperatures required to transport fresh milk and dairy products, which is linked with the system of cold chain management.

Adequate temperature control is very important for the proper preservation of fresh milk, and a cold chain is required that can preserve milk quality from farm to consumer through unbroken refrigeration.⁶¹ As noted in other case studies in this series, lack of advanced cold chain technology and accepted standard practices make it difficult to be successful in the Chinese market for perishable goods.⁶² China has recently promulgated some promising policies that could help transform the cold chain system. These include the Opinion of the General Office of the State Council on Accelerating the Development of Cold Chain Logistics to Ensure Food Safety and Promote Consumption Upgrading (2017),⁶³ which is meant to support the development of infrastructure and standards in accordance with existing rules. The Ministry of

⁶⁰ 第二十五条 (Art 25) 生鲜乳运输车辆应当取得所在地县级人民政府畜牧兽医主管部门核发的生鲜乳准运证明, 并随车携带生鲜乳交接单。交接单应当载明生鲜乳收购站的名称、生鲜乳数量、交接时间, 并由生鲜乳收购站经手人、押运员、司机、收奶员签字。生鲜乳交接单一式两份, 分别由生鲜乳收购站和乳品生产者保存, 保存时间2年。准运证明和交接单式样由省、自治区、直辖市人民政府畜牧兽医主管部门制定。

第三十一条 (Art 31) 乳制品生产企业应当建立生鲜乳进货查验制度, 逐批检测收购的生鲜乳, 如实记录质量检测情况、供货者的名称以及联系方式、进货日期等内容, 并查验运输车辆生鲜乳交接单。查验记录和生鲜乳交接单应当保存2年。乳制品生产企业不得向未取得生鲜乳收购许可证的单位和个人购进生鲜乳。

⁶¹ "The Cold Chain," *Global Cold Chain Alliance*, 2017, <https://www.gcca.org/about/cold-chain>; PricewaterhouseCoopers, *Managing Upstream Risks in China's Food Safety Chain* (2015), 12, <https://www.pwccn.com/en/food-supply/food-supply-chain-risk-aug2015.pdf>.

⁶² See, e.g., Katrin Kuhlmann, Yuan Zhou, and Nini Hou, *China Kiwi Case Study*, Forthcoming, January 2019; see also, "Cold Chain Market in China – Between 20% and 50% of Food Gets Wasted in China, Reports Technavio," *Business Wire*, May 16, 2018, <https://www.businesswire.com/news/home/20180516005617/en/Cold-Chain-Market-China---20-50>; Greg Knowler, "China's Growing Cold Chain Needs Better Industry Standards," *JOC.com*, July 13, 2017, https://www.joc.com/international-logistics/logistics-providers/china%E2%80%99s-growing-cold-chain-needs-better-industry-standards_20170713.html.

⁶³ Available at:

http://www.pkulaw.cn/fulltext_form.aspx?Db=chl&Gid=4f65e36403584bdcdbfb&keyword=%E5%86%B7%E9%93%BE&EncodingName=&Search_Mode=accurate&Search_IsTitle=0.

Commerce's National Standardization Administration Committee has also promulgated a rule to standardize the cold chain within China.⁶⁴ These measures also include an interesting policy that creates a cooperation channel between Beijing, Tianjin, and Hebei provinces (the "Beijing-Tianjin-Hebei Agricultural Products Circulation System Innovation Action Plan").⁶⁵ This agreement is part of a larger Beijing-Tianjin-Hebei Integration Plan,⁶⁶ and integrates eight standards related to the cold chain that touch on storage, transport, and logistics designed to support the regional development of the industry. These measures are very promising, as harmonization will be very important to ensure there are no gaps in the cold chain as dairy moves more widely across the country.

C. Traceability, Inspection, and Enforcement

Traceability

Consumers typically do not rely upon government-mandated traceability measures as a sign of food quality and safety, and instead will often rely on brand recognition in making purchasing choices. Despite this, a strong legal framework for traceability is nevertheless important for the development of the sector overall. Strong traceability and recordkeeping are important requirements for competing in global markets, and traceability also supports chain of custody, a requirement for certified claims about products in international standards such as the GLOBALG.A.P.⁶⁷ China has mandated certain procedures to support traceability in the dairy industry through a number of regulations. Notably, there are slightly different documentation requirements as milk products move along each stage of the dairy value chain.

First, the Administrative Measures for the Production and Purchase of Fresh Milk requires that dairy farms maintain records according to Article 13 of the Regulation on the Supervision and Administration of the Quality and Safety of Dairy Products.⁶⁸ Also according to Article 13, community dairy operations are expected to set up such recordkeeping gradually, which can serve as a helpful way to support smaller dairy operations that might have more limited capacity. Next, the Regulation on the Supervision and Administration of the Quality and Safety of Dairy Products sets out requirements for fresh milk purchase stations under Article 22.⁶⁹ Purchase

⁶⁴ Available at:

http://www.pkulaw.cn/fulltext_form.aspx?Db=chl&Gid=ffc6434cdff38183bdfb&keyword=&EncodingName=&Search_Mode=accurate&Search_IsTitle=0.

⁶⁵ Available at: <http://zjj.beijing.gov.cn/zwdt/V20180416171242124587.html>; see also, Tongjuan Liu, Songmiao Li, Shaobo Wei, "Forecast and Opportunity Analysis of Cold Chain Logistics Demand of Fresh Agricultural Products under the Integration of Beijing, Tianjin and Hebei," *Open Journal of Social Sciences*, 5, 63-73 (2017), <https://doi.org/10.4236/jss.2017.510006>

⁶⁶ Mark Preen, "The Beijing-Tianjin-Hebei Integration Plan," *China Briefing*, April 26, 2018, <https://www.china-briefing.com/news/the-beijing-tianjin-hebei-integration-plan/>.

⁶⁷ Chain of Custody Standard, General Regulations, *GlobalG.A.P.*, October 26, 2018, available at: https://www.globalgap.org/uk_en/documents/#.

⁶⁸ 第十一条 (Art 11) 奶畜养殖场应当按照《乳品质量安全监督管理条例》第十三条 规定建立养殖档案, 准确填写有关信息, 做好档案保存工作。奶畜养殖小区应当逐步建立养殖档案。

⁶⁹ 第二十二条(Art 22) 生鲜乳收购站应当建立生鲜乳收购、销售和检测记录。生鲜乳收购、销售和检测记录应当包括畜主姓名、单次收购量、生鲜乳检测结果、销售去向等内容, 并保存 2 年。

stations buying fresh milk must maintain records for at least two years on the purchase, sale, and testing of products. These documents must include, for example, the animal owner's name, quantity of a single purchase, test result of fresh milk, and where the milk was sold. Similarly, Articles 35 and 38 place requirements on production companies.⁷⁰ Dairy product sellers are required to maintain a system to inspect and verify the goods purchased and maintain that information for two years.⁷¹

Stakeholders reported that traceability systems are vertically integrated, with more specific requirements applicable at the farm level, and more general requirements applicable at the end of the value chain. Businesses have long used technology to improve traceability systems, including QR codes on the bottom of products (external traceability) and software that copies paper records onto a database that can trace food safety incidents within hours. Stakeholders noted that both large and small companies should be implementing these standard procedures for traceability, but such procedures may be costly for smaller companies.

Testing and Inspection

Like traceability, testing and inspection are cross-cutting issues that apply across multiple stages of the dairy value chain. According to stakeholders consulted during the development of this case study, milk products typically go through two to three sets of inspections, some of which are mandatory, and others of which are voluntary or internal company standards. “Regular testing” in accordance with the National Standards for Quality Safety of Dairy Products, is required under Article 22 of the Administrative Measures for the Production and Purchase of Fresh Milk. The regulations also state that purchase stations are responsible for paying testing fees and are not supposed to transfer these fees to farms. Given that the milk buyers at this stage are large dairy companies, this is a good way to reduce some of the cost burden for testing that might otherwise fall on small farmers.

The number and type of inspections varied depending on the inspection point in the value chain. Farms reported a number of self-inspections using simple equipment, but official government inspections happen less than once a year. The reason is that companies purchasing raw milk would test all batches, so using more advanced equipment and more frequent inspections are not necessary. On the other hand, factories reported “countless” random inspections from many levels of government (central, provincial, and cross-provincial). Inspectors generally test for the presence of common antibiotics and other quality standards. The existence of cross-provincial inspections is especially interesting, because this means that companies must be aware of and meet standards and requirements in other provinces. For example, inspectors from Yunnan province could inspect enterprises based in Heilongjiang. While this could encourage

⁷⁰ 第三十五条 (Art 35) 乳制品生产企业应当如实记录销售的乳制品名称、数量、生产日期、生产批号、检验合格证号、购货者名称及其联系方式、销售日期等。

⁷¹ 第三十八条 (Art 38) 乳制品销售者应当建立并执行进货查验制度，审验供货商的经营资格，验明乳制品合格证明和产品标识，并建立乳制品进货台账，如实记录乳制品的名称、规格、数量、供货商及其联系方式、进货时间等内容。从事乳制品批发业务的销售企业应当建立乳制品销售台账，如实记录批发的乳制品的品种、规格、数量、流向等内容。进货台账和销售台账保存期限不得少于 2 年。

greater harmonization (or at least more widespread adoption of more stringent standards), it also means that enterprises must be aware of standards across the country, which could be challenging for some.

Stakeholders also reported that while there are third-party and public-private inspectors active in China, most inspections are completed by government officials. This is due in part because the government does not want to be seen as too relaxed in regulating food safety and does not want private inspectors to catch non-compliant products instead of the government. However, greater industry involvement in inspections and the design of testing standards themselves could help a greater number of farmers and processors meet requirements while still maintaining a high level of quality and safety. While standards should be benchmarked against competitors and international best practices, meeting very stringent standards can be costly. The right program will strike a balance between costs and quality. Working with industry associations could be a helpful way to create reasonable standards, as the associations have access to a large amount of data on the industry.

One good practice in regard to inspection and self-regulation is Hazard Analysis and Critical Control Point (HACCP) training. HACCP takes a preventative approach to quality control and may lead to optimal animal welfare and food safety.⁷² HACCP integrates food safety controls at multiple stages of the value chain and identifies critical control points (CCP) where risks are highest and require more careful monitoring.⁷³ Nestle has been training processors and factory owners in HACCP, and stakeholders consulted noted that these are their preferred self-inspection practices. Greater capacity for HACCP food safety practices could help the industry continue to grow.

Enforcement

Enforcement of dairy regulations remains a challenge and should be an area of focus moving forward. There are measures in place that detail the consequences of violations of the regulations; for example, Article 50 of the Regulation on the Supervision and Administration of the Quality and Safety of Dairy Products requires that industry ministries keep records of violations of dairy products and submit those records to the People's Bank of China.⁷⁴ These records remain on the permanent files of enterprises' credit information, which could be a very worthwhile incentive to not violate the provisions of the regulations, adding teeth to

⁷² "Application of HACCP Principles in Dairy Herd Health and Production Management," *Veterinary Ireland Journal*, Vol. 5 No. 9, available at:

<https://pdfs.semanticscholar.org/25fc/1b2e9f79b4126218ceb014e9153655ab302c.pdf>

⁷³ "Application of HACCP Principles in Dairy Herd Health and Production Management," *Veterinary Ireland Journal*, Vol. 5 No. 9, available at:

<https://pdfs.semanticscholar.org/25fc/1b2e9f79b4126218ceb014e9153655ab302c.pdf>; Bhushan Jayarao, "HACCP-based Programs for Use on the Dairy Farm," *Pennsylvania State University*, <http://www.international-food-safety.com/pdf/HACCP%20based%20programs%20for%20use%20on%20the%20dairy%20farm.pdf>.

⁷⁴ The Regulation on the Supervision and Administration of the Quality and Safety of Dairy Products (2008), Article 50.

enforcement measures.⁷⁵ Likewise, violations are also expected to be reported to the relevant health and safety ministries as well as the public security ministries.⁷⁶ Other penalties for violations include revocation of operational licenses and criminal liability.⁷⁷ These enforcement measures are all good practices that encourage heightened compliance.

However, stakeholders consulted in this study noted that there are ways in which actors along the value chain can circumvent the rules. For example, companies will sometimes refrigerate their products well below the minimum standards established in the rules in order to pass a first round of inspections at the beginning of transport. Since products are not checked again until the end of the journey, this means that companies do not have to pay for refrigeration during transport and instead can reliably pass inspection at the other end because the product will have thawed to the minimum temperature threshold. While technically these transporters are not in violation of the law, the intended results and protections are nevertheless undermined. This poses problems for both quality and safety, since not maintaining a consistent temperature means that bad bacteria might be able to grow, while over-chilling could mean that good bacteria present in dairy is killed off.

Moving forward, laws could be redesigned or adapted to focus more on the process rather than the end results to better achieve their intended purpose. However, any enforcement regime is costly for both governments and the private sector, and enforcement is much easier when rules are designed to be fit-for-purpose. Stakeholders reported that some standards are seen as too difficult to comply with. For example, the current standard on lactotransferrin (LF or LTF), a protein found in milk, is considered unreasonable. The central government raised it from 90 percent to 95 percent, which is considered unnecessary from a health or quality perspective. Such a standard can be extremely disruptive for the market, because most farms cannot produce milk that conforms to the standard. That said, the percentages are likely aligned with international standards,⁷⁸ so perhaps a greater emphasis on capacity building and training would support farmers in the long run.

V. Findings and Recommendations

Food safety in the dairy industry has been a priority for China at least since 2008. While the industry has changed significantly over the last ten years, there is still room for growth if the industry is going to continue to meet rising consumer demand and compete with international importers. China will need to identify ways to support the growth of domestic production without sacrificing food safety and quality, and while minimizing environmental impacts. Given the perishability and risk of food safety incidents, continued development of the cold chain and food safety management along the value chain will also be important. The

⁷⁵ Katrin Kuhlmann, Mengyi Wang, and Yuan Zhou, “China Food Safety Legal and Regulatory Assessment,” *Syngenta Foundation for Sustainable Agriculture and the New Markets Lab* (March 2017), 20.

⁷⁶ The Regulation on the Supervision and Administration of the Quality and Safety of Dairy Products (2008), Articles 51-53.

⁷⁷ The Regulation on the Supervision and Administration of the Quality and Safety of Dairy Products (2008).

⁷⁸ See, *Dairy Lactoferrin Standard*, American Dairy Products Institute, available at: <https://www.adpi.org/Portals/0/Standards/Lactoferrin.pdf>.

recommendations outlined below highlight interventions that could help facilitate implementation of China's Food Safety Law, strengthen the food safety system in China, and improve development of the dairy value chain.

1. Develop Harmonized and Tailored Rules and Standards

First, although China's current national legal system provides general guidance for activities across the dairy value chain, details are left to implementing regulations, rules, and local standards. This issue is particularly important, given that dairy products are transported across the country yet production is concentrated in only a few provinces. In order to address gaps in this regard, the following actions are recommended:

- In the short term, continued cross-provincial inspection should be continued. In order to make these inspections as successful as possible, the government should work with businesses to ensure that smaller producers and processors are aware of the different standards across the country.
- Over the longer term, in order for the FSL to be most effective, it will be important for local governments to work together to harmonize their rules and milk standards, especially as cross-provincial testing becomes more common. The Beijing-Tianjin-Hebei Agricultural Products Circulation System Innovation Action Plan is a good practice that should be replicated and may be especially effective given that it links a major urban market with the biggest dairy production province.
- Drafting laws, regulations, and standards could be done in close consultation with industry associations in order to be more realistic and fit-for-purpose. Some current standards may be overly strict, while others (for example testing of pesticides) may not be thorough enough. Working closely with industry representatives could provide governments with better data and evidence to support their legislative decisions. For example, certain fines are set to levels that would make sense in Beijing but are much higher than any farmer could pay in a more rural area. As a result, fines are rarely issued, and instead inspectors rely on a warning system. However, this makes enforcement challenging because it weakens the effectiveness of the fines. Working with associations to establish the right mix of reasonable yet enforceable fines could result in more effective implementation, rather than a need to rely on very stringent measures.

2. Improve Implementation of Laws

- Enforcement remains a challenge, and although the standards and regulations overall are a positive step towards increased food security, most of the time only the largest farms and producers are able to meet these requirements, meaning that smaller farms are in danger of being pushed out. This causes some to seek ways to circumvent stringent standards by finding alternatives to meeting results-focused rules. For example, for example in the cold chain process, rules could be revised to better control

temperatures at multiple points along the cold chain, rather than at the beginning and end only, to ensure standards are continuously upheld. Focusing on enforcing the rules governing the process would help improve the implementation of the FSL and ensure that high quality and safety is maintained.

- Inspections happen frequently but may be overly burdensome for certain producers. Allowing more third-party inspections might help the industry grow by reducing the costs on the government and improving the ability to reach both farms and factories.

3. Build Capacity Across Value Chain Stakeholders

- Overall, if the domestic producers are going to compete with foreign importers, there is a great need for more capacity building programs and training to ensure that more farmers are able to follow the increasingly stringent food safety and quality standards. Capacity building programs can raise awareness of standards across different provinces, help farmers and processors develop cost-effective food safety monitoring and inspection programs, and spread knowledge about good practices to prevent food safety incidents, such as HACCP programs. However, these capacity building programs can be very expensive, and currently in China there is only one institute providing this kind of training. Expanding these practices across the country could be one way to ensure that China's domestic market remains (and becomes more) competitive. As noted above, however, comprehensive capacity building initiatives like this may be challenging due to the existing fragmentation in the market. As an interim step, adopting good practices in this area on a more incremental basis, for example drawing lessons from individual initiatives of the Dairy Food Institute in Harbin, could help bridge the current capacity gap.

4. Improve Cold Chain Logistics

- The cold chain remains underdeveloped in China and could be hindering the development of the domestic dairy sector. Foreign importers have an advantage, because they have access to better technology and can meet more stringent standards much more easily than small domestic producers. The government should invest in developing policies that support the adoption of cold chain technologies and develop programs to encourage greater use of cold chain processes and procedures. A process-oriented approach would also help ensure proper compliance with cold chain measures.