

## China Horticulture Case Study

Katrin Kuhlmann, Mengyi Wang, and Yuan Zhou<sup>1</sup>

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### Executive Summary

In order to enhance food safety for domestic and exported products, China has undertaken significant reforms to its legal and regulatory system over the past several years. The Syngenta Foundation for Sustainable Agriculture and New Markets Lab are partnering on a series of work on China's legal and regulatory system for food security. This case study on the horticultural sector in China is the first of several that highlights challenges that are arising with respect to implementation of the 2015 amended Food Safety Law, particularly from the industry perspective. Despite China's increasingly comprehensive and centralized legal regime for food safety, which is assessed in a separate Legal Assessment under this work series,<sup>2</sup> a number of implementation issues are surfacing, including the pervasive lack of awareness of relevant laws and standards across actors in the value chain, structural challenges posed by small-scale farms (including issues with respect to traceability, pesticide application, self-inspection, and record keeping and publication), and insufficient local capacity to conduct inspections and perform other functions.

The case study illustrates the turning point that China is facing in the reform of its food safety regime, which hinges largely on the effective implementation of the amended Food Safety Law. At this point, focused efforts to better implement relevant laws and regulations could have a significant impact on enhanced food safety. In particular, capacity development in local

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<sup>1</sup> President and Founder, New Markets Lab; Senior Fellow, New Markets Lab; and Yuan Zhou, Head of Research and Policy Analysis, Syngenta Foundation for Sustainable Agriculture. The authors wish to thank Sara Prince, Yi Shen, and Xingyu Mou of the New Markets Lab for their contribution.

<sup>2</sup> See Kuhlmann, Katrin, Wang, Mengyi, and Zhou, Yuan. *China Food Safety Legal and Regulatory Assessment*. Syngenta Foundation for Sustainable Agriculture, publication forthcoming.

jurisdictions, innovative models for advancing private sector participation, improvements in enforcement that build in flexibility to accommodate for variations in economic development and enterprise size, effective consumer outreach, and smooth collaboration among public stakeholders will be vital to improving food safety.

## **I. Introduction**

China is the largest producer and consumer of vegetables and fruits, accounting for over 50 percent of vegetable production and over 20 percent of fruit production worldwide.<sup>3</sup> Production has grown rapidly since 1980, with a ten-fold increase in vegetable production.<sup>4</sup> Meanwhile, pesticides, food additives, and food quality labels have emerged as major challenges for food production, processing, and distribution.

At the production stage, the increasingly heavy use of agricultural inputs, including fertilizers and pesticides, has fueled the marked growth in production. Use of pesticides for example, as shown in Figure 1, has risen steadily from 1991-2012. Pesticide use per hectare (ha) of arable land in China is multiple times that of several developed countries. Further, based on MOA's estimate, the use of insecticides alone rose 9.2 percent from 2009-2011 to 2012-2014.<sup>5</sup>

The upward trend in pesticide use has bred two attendant concerns: excessive or inappropriate application of approved pesticides and use of banned pesticides. For instance, in 2010, yardlong beans with excessive amounts of isocarbophos residue, a prohibited chemical pesticide, were detected in 11 cities in China.<sup>6</sup> In addition, the well-publicized "exploding watermelons" incident, where farmers inappropriately applied a legal plant growth regulator that led to explosion of watermelons, highlights these concerns. More recently, a Greenpeace inspection report, based on samples from six major supermarkets in eight cities, again brought the issue of pesticide residue into sharp focus.<sup>7</sup> According to the report, pesticide residues were found to have exceeded the maximum levels allowed in more than 15 percent of the samples from two supermarkets. Additionally, banned pesticides were detected in five of the six supermarkets.

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<sup>3</sup> PricewaterhouseCoopers, *Managing Upstream Risks in China's Food Safety Chain* (2015).

<sup>4</sup> PricewaterhouseCoopers, *Managing Upstream Risks in China's Food Safety Chain* (2015).

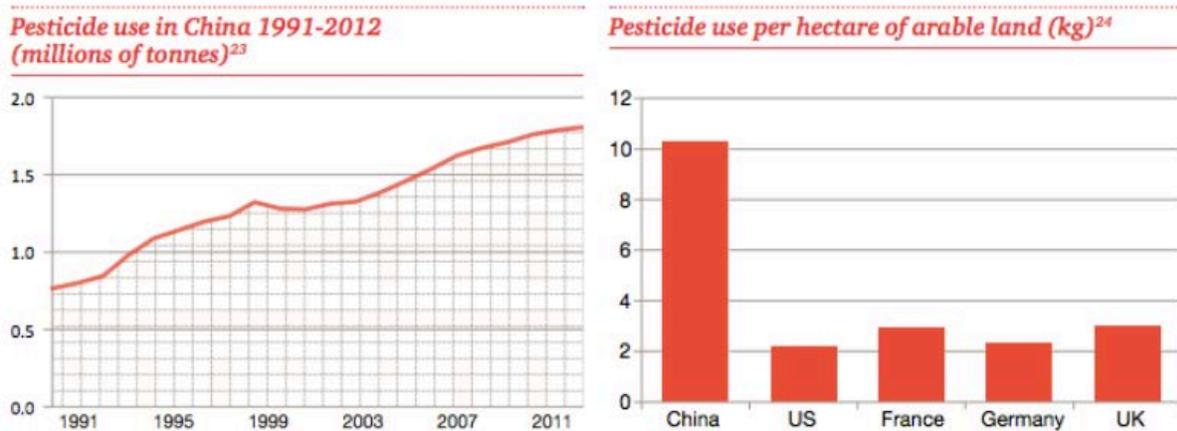
<sup>5</sup> Ministry of Agriculture (MOA) Website, [http://www.moa.gov.cn/zwl/m/tzgg/tz/201503/t20150318\\_4444765.htm](http://www.moa.gov.cn/zwl/m/tzgg/tz/201503/t20150318_4444765.htm)

<sup>6</sup> Liwei Sang, *Food Safety Legislation, Regulation, and Practices in China*, Global Food Safety Forum (2011).

<sup>7</sup> Greenpeace, *Report on Pesticide Residues of Vegetables in Six Supermarkets* (2016),

<http://www.greenpeace.org.cn/wp-content/uploads/2016/10/2016%E5%B9%B4%E5%85%AD%E5%A4%A7%E8%B6%85%E5%B8%82%E8%94%AC%E8%8F%9C%E5%86%9C%E8%8D%AF%E6%AE%8B%E7%95%99%E6%8A%A5%E5%91%8A%EF%BC%88%E5%90%AB%E9%99%84%E5%BD%95%EF%BC%89-final.pdf>

Figure 1 Pesticide Use in China



Source: PricewaterhouseCoopers, *Managing Upstream Risks in China's Supply Chain* (2015)

At the processing stage, excessive application of food additives is a primary concern. For instance, the China Food and Drug Administration (CFDA) recently announced that it had found that the amount of sulfur dioxide, a food additive for preservation and color protection, in some vegetable and fruit samples exceeded the maximum level permitted.<sup>8</sup> In addition, 41 batches of Chinese vegetable exports and vegetable preparations to the United States were detained or recalled for excessive food additives.<sup>9</sup>

The credibility of food quality labels has been called into question in recent years. The three food quality labels (green food, organic food, and no-public-harm food) have initially gained some ground, as rising population in middle and higher income brackets has stimulated demand for higher quality food. However, consumer confidence has waned as fraudulent labels and purchased labels regularly appeared.

## II. Institutional and Legal Framework

As noted, CFDA and MOA are primarily responsible for the safety and quality of vegetables and fruits, from farm to fork. While MOA oversees production, including agricultural inputs, CFDA manages processing, marketing, and distribution. For historical reasons, the administrative arm of MOA has continued to supervise the distribution of edible agricultural products, along with

<sup>8</sup> CFDA website, <http://www.sda.gov.cn/WS01/CL1199/163649.html>

<sup>9</sup> Linhai Wu, Dian Zhu, *Food Safety in China: A Comprehensive Review*, pg102.

local branches of CFDA. With respect to inspection of pesticide residues, the recent decoupling of testing agencies and government inspection agencies has introduced competition into the market and led to significant growth in private food testing agencies.

Of note, two subordinate institutions under MOA are particularly relevant to pesticide and food quality labels: the Institute for the Control of Agrochemicals (ICAMA) and China Green Food Development Center (CGFDC). ICAMA is in charge of pre- and post-market pesticide regulation. Pre-market pesticide registration, market access regulation, and provision of guidance on pesticide application constitute the core of ICAMA's work.<sup>10</sup> Post-market, ICAMA supervises the pesticide market and monitors pesticide residues.<sup>11</sup> CGFDC is responsible for national green food development and management. Its main functions include accreditation, education and training, and monitoring. To date, CGFDC has designated 60 green product quality inspection agencies and 65 green food producing environmental monitoring agencies.<sup>12</sup>

Legally, a number of laws, standards, and guidelines govern vegetables and fruits. The Law on Agri-Product Quality and Safety (2006) articulates rules for the production, supervision, and inspection of agricultural products. Importantly, Article 11 explicitly recognizes that all agricultural product quality safety criteria are mandatory technical regulations.<sup>13</sup> Additionally, Article 21 mandates the establishment of licensing systems for pesticides and fertilizers, regular and random inspections, and publication of inspection results.<sup>14</sup>

The other legislative pillar is composed of the amended Food Safety Law (2015), the Draft Implementation Regulation, and subsequent administrative measures. These legal measures regulate market sales, formulate related quality and safety standards, and set forth the compulsory nature of standards on agricultural inputs.<sup>15</sup> The provisions relevant to vegetables and fruits include those that are applicable to all products and those specifically targeting edible agricultural products. The most important provisions are summarized below:

- *Compliance with Relevant Standards:* Producers of edible agricultural products must use agricultural inputs in accordance with food safety standards. They must also fully adhere to the provisions on application intervals and non-application of agricultural inputs. The use of extremely or highly poisonous pesticides for production of vegetables and fruits is prohibited.<sup>16</sup>
- *Self-Inspection:* Both food producers and distributors must set up a self-inspection system for food safety and regularly inspect and assess food safety. When a potential risk relating to food safety is discovered, the producers or distributors must cease the production or distribution and report to the local CFDA.<sup>17</sup>
- *Record-Keeping (Producer):* Enterprises and specialized farmer cooperatives must establish a production record for edible agricultural products.

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<sup>10</sup> MOA website, [http://english.agri.gov.cn/aboutmoa/iium/201301/t20130115\\_9535.htm](http://english.agri.gov.cn/aboutmoa/iium/201301/t20130115_9535.htm)

<sup>11</sup> MOA website, [http://english.agri.gov.cn/aboutmoa/iium/201301/t20130115\\_9535.htm](http://english.agri.gov.cn/aboutmoa/iium/201301/t20130115_9535.htm)

<sup>12</sup> MOA website, [http://www.greenfood.agri.cn/jg/zxjj/201110/t20111018\\_2358700.htm](http://www.greenfood.agri.cn/jg/zxjj/201110/t20111018_2358700.htm)

<sup>13</sup> The Law on Agri-Product Quality and Safety (2006).

<sup>14</sup> The Law on Agri-Product Quality and Safety (2006).

<sup>15</sup> The Amended Food Safety Law (2015), Article 2.

<sup>16</sup> The Amended Food Safety Law (2015), Article 49.

<sup>17</sup> The Amended Food Safety Law (2015), Article 47.

- *Record-Keeping (Distributor)*: Distributors of edible agricultural products must establish and maintain an inspection record for edible agricultural food that includes essential information (name, quantity, and purchase date of the products, and name, address and contact information of the supplier) Distributors are required to maintain records and appropriate credentials for no less than 6 months.<sup>18</sup> Distributors that sell unpackaged edible agricultural products in wholesale/retail markets must publish product “name/production place/name of the producer or trader at the conspicuous spot of the booth/counter.”<sup>19</sup>
- *Obligations of Wholesale Market*: Wholesale markets of edible agricultural products must have inspection equipment and engage inspectors or entrusted food inspection agencies to conduct sampling inspections or fast testing of food.<sup>20</sup> Where a non-compliant product is detected, the markets shall require that the distributor cease to sell and report to the local CFDA.<sup>21</sup> They also assume the responsibility of training traders in their markets.<sup>22</sup>
- *Supervision and Guidance*: Local MOA branches are mandated to enhance the administration and guidance on the application of agricultural inputs and establish and improve a safe application system for agricultural inputs.<sup>23</sup> They are also encouraged to engage industry associations, consumer associations, and media in order to disseminate knowledge of food safety regulations.<sup>24</sup>

Apart from laws and regulations, several recently updated standards are integral to regulation of the horticulture sector. GB 2763-2014 is the national standard for maximum residue limits for pesticides in food. The standard is expected to be updated in the near future, as China notified the Sanitary and Phytosanitary (SPS) SPS Committee of the WTO of its draft standards on 1,058 maximum residue limits (MRLs) for 160 pesticides in August 2016.<sup>25</sup> GB2760-2014 is the national standard governing food additives.

Besides promulgating legislation and standards, MOA has actively sought to halt the rising use of agricultural inputs. In 2015, MOA issued Action Plans for Zero Growth in Application of Pesticide and Fertilizer to achieve zero-growth in the total amount of pesticide and fertilizer use by 2020.<sup>26</sup> With respect to pesticides in particular, the Plan has three principal aims: “replacing highly-toxic and high-residue pesticides with efficient, low-toxic and low-residue pesticides; replacing small pesticide application equipment with large/medium-sized and efficient equipment, and expanding the pilot program to subsidize the application of low-toxic biological

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<sup>18</sup> The Amended Food Safety Law (2015), Article 65.

<sup>19</sup> 2016 Draft Implementation Regulation, Article 74.

<sup>20</sup> Administrative Measures for the Supervision of Markets of Edible Agricultural Products (2016), Article 8; the Amended Food Safety Law (2015), Article 64.

<sup>21</sup> Administrative Measures for the Supervision of Markets of Edible Agricultural Products (2016), Article 8; the Amended Food Safety Law (2015), Article 64.

<sup>22</sup> 2016 Draft Implementation Regulation, Article 71.

<sup>23</sup> The Amended Food Safety Law (2015), Article 49.

<sup>24</sup> Administrative Measures for the Supervision of Markets of Edible Agricultural Products (2016), Chapter IV.

<sup>25</sup> AQSIQ Website: <http://www.tbt-sps.gov.cn/tbcx/getTbcxContent.action?mid=18960&TBTtype=1>

<sup>26</sup> Institute for the Control of Agrochemicals, MOA website, <http://www.icama.org.cn:8080/doc15/15030301.html>

pesticides.”<sup>27</sup> In practice, some local MOA branches have partnered with multinational pesticide companies to boost the adoption of low-toxic and low-residue pesticides.

As for food quality labels, three labels are commonly seen in the market: “organic food,” “green food,” and “no-public harm food.” Organic food is produced in accordance with organic farming standards, which prohibits the use of synthetic fertilizers, pesticides, growth regulators, and the use of genetically engineered organisms and their products.<sup>28</sup> China’s Certification and Accreditation Administration (CNCA) has approved 69 certification agencies in China to certify organic labeling.<sup>29</sup> Green food is produced in compliance with principles of sustainable development and is subdivided into levels A and AA.<sup>30</sup> No-public harm food must meet relevant national regulations and standards and is equivalent to level A of green food.<sup>31</sup> The credibility of the three labels has decreased in recent years due to lax monitoring and reports of fraudulent or purchased labels.

### III. Industry Experience

In the development of this case study, interviews were conducted with three fruit producers, two wholesale market distributors, a vegetable retailer, and two local MOA officials to better understand the implementation challenges of the amended Food Safety Law in relation to horticulture.<sup>32</sup> Common problems include the lack of awareness of relevant laws and standards, structural challenges posed by small-scale farms, and insufficient local capacity. All of the interviewees work in the neighboring cities of A and B in Western China. City A is a fruit production hub and distributes the bulk of its products to city B. Their experiences are summarized below.

**Fruit Producers A and B** are owners of two adjacent micro-scale family farms that grow kiwi fruit. Both farms are in the mountains, within the jurisdiction of city A. Their production is labor intensive and does not involve any medium-sized equipment. They primarily sell their products to third-party suppliers who then sell to wholesale markets in city A. Fruits are sold based on a three-tiered system (categories 1, 2, and 3), depending entirely upon their appearance. For instance, those with larger size and more even skin fall under category 1 and are sold at a higher price. Compared to products in categories 2 and 3, category 1 products are much more likely to eventually enter high-end supermarkets.

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<sup>27</sup> Institute for the Control of Agrochemicals, MOA website, <http://www.icama.org.cn:8080/doc15/15030301.html>

<sup>28</sup> Liaoning Food and Drug Administration website, <http://www.lnfda.gov.cn/CL1462/36153.html>; Zhanjiang Food and Drug Administration website, <http://www.gdda.gov.cn/publicfiles/business/htmlfiles/fdazj/pspszs/200810/179435.htm>

<sup>29</sup> CNCA website, <http://ffip.cnca.cn/ffip/publicquery/certSearch.jsp>

<sup>30</sup> Liaoning Food and Drug Administration website, <http://www.lnfda.gov.cn/CL1462/36153.html>; Zhanjiang Food and Drug Administration website, <http://www.gdda.gov.cn/publicfiles/business/htmlfiles/fdazj/pspszs/200810/179435.htm>

<sup>31</sup> Liaoning Food and Drug Administration website, <http://www.lnfda.gov.cn/CL1462/36153.html>; Zhanjiang Food and Drug Administration website, <http://www.gdda.gov.cn/publicfiles/business/htmlfiles/fdazj/pspszs/200810/179435.htm>

<sup>32</sup> New Markets Lab Senior Legal Fellow Mengyi Wang conducted interviews in October and November 2016.

In terms of agricultural inputs, Producers A and B are not aware of relevant standards or their compulsory nature. For pesticides, they have distinguished between insecticides and plant growth regulators. In selecting insecticides, they deem the most important factors to be the effectiveness of insect control and the resulting appearance of the fruits. Toxicity of the insecticide, the impact on the environment, and the level of residue are either secondary or negligible considerations.

Neither Producer A or B has purchased banned insecticides, since the pesticide retail store does not sell them and has a poster with a list of banned items. Neither is sure whether the list is up-to-date. When applying insecticides, both use small machines and try to conform to the recommended dosages. For plant growth regulators, both stated that, based on industry norms, use of forchlorfenuron, which increases fruit size, is virtually required; otherwise their products would be too small to be marketable. The method of application and dosage of forchlorfenuron are entirely based on prior experience

With respect to fertilizers, Producers A and B have not inquired into the relevant standard, because they are confident they would not exceed those limits. They claim that they do not have the need to apply fertilizer, because the relatively high altitude of the mountain is extremely favorable to the growth of kiwi fruit.

In terms of inspection of pesticide residue, they are not aware of the self-inspection obligation and do not conduct self-inspection. To date, they have not been inspected by CFDA or MOA. They do not maintain any inspection certification or record. They have never been asked by downstream suppliers to show their inspection records or have their products tested.

As for traceability, Producers A and B have not been asked by suppliers to present their identification. Suppliers generally visit their farms and make purchases on the spot, and they do not maintain long-term cooperation with any particular suppliers.

Overall, they show a lack of awareness of the food safety legal framework, including their own legal obligations. They have not received any formal or informal training and do not belong to any industry association where they could exchange relevant information.

**Producer C** is a mid-sized grape producing enterprise with 13.2 acres of land. Producer C has marketed the enterprise as “green, healthy, and eco-friendly” and provides frequent tours of the farm to visitors. Producer C sells products directly to end consumers: the visitors of the farm.

Producer C has engaged Third-party Service Provider D who assists with the whole production process. More specifically, C and D have a three-year contract whereby D provides all agricultural inputs (seeds, pesticides, and fertilizers), training, and supervision through regular field visits. For instance, D would instruct C to stop applying pesticides four to five months before grapes become ripe. Producer C receives food safety training almost exclusively from D and rarely from MOA or CFDA.

With respect to standards, Producer C is aware that there are relevant national standards but cannot verify their compliance. After all, all fertilizers and pesticides are packaged and delivered

by D with instructions on dosage and application intervals. The packages do not contain brands of pesticides, fertilizers, or their ingredients. However, Producer C does purchase various plant growth regulators and is aware that some of them may be harmful in large doses; Producer C deems the use of plant growth regulators necessary for bettering the appearance of the products.

In terms of inspection, Producer C has set up a production record and has a self-inspection system in place to assess food safety risks. On the other hand, governmental inspection has rarely occurred.

**Wholesale Market Distributor E** sells apples, oranges, and bananas. It sources all fruits from large-scale farms located in a Northern province of China. Wholesale Market Distributor E does not work with third party suppliers but instead travels to farms in the destination province before the harvest of fruits. Each year, after examining products from different farms, it makes quick purchases and immediately ship fruits back for storage and distribution. All transactions are one-off, based on the best combination of price, quality, and appearance of products at the time of harvest. Generally, the supply from one big farm could satisfy E's annual demand.

After fruits have been purchased and stored, Wholesale Market Distributor E actively applies ethylene, a plant growth regulator that controls the ripening of fruits, to different batches of fruits in order to stagger the dates of distribution. Wholesale Market Distributor E is not aware of any relevant national standards and gauges the dosage purely based on experience. When the dosage is large, fruits ripen faster than planned. In those circumstances, it simply sells them at an earlier date, sometimes at a reduced price.

In terms of record-keeping, Wholesale Market Distributor E does not maintain any inspection records for its incoming fruits and does not publish product name/production place/name of the producer at their booth. In fact, Wholesale Market Distributor E does not check producers' inspection records when making purchases. To Wholesale Market Distributor E, the responsibility of food quality control should fall squarely on producers' shoulders.

As for inspection, while Wholesale Market Distributor E has installed inspection equipment and employed inspectors, they are seldom in use. Inspections by local MOA and CFDA have occurred sporadically. Additionally, Wholesale Market Distributor E has not received any training, either from the government or from the wholesale market.

**Wholesale Market Distributor F** sells eleven types of vegetables, such as leeks and cabbage, at the same wholesale market as Wholesale Market Distributor E. It sources all vegetables from nearby small-scale farms on a daily basis. It is usually able to sell all of the vegetables by the end of the day, which has vitiated the need for growth management and storage through pesticides or food additives.

Because of the limited quantity and types of vegetables produced by small-scale farms, Wholesale Market Distributor F has to source different vegetables from different farms and sometimes the same vegetable from multiple farms. Wholesale Market Distributor F has thus considered any record keeping to be overly onerous and has refrained from doing so.

In addition, Wholesale Market Distributor F is unaware of the amended Food Safety Law and has not received any food safety training either from the government or from the wholesale market. They have not been inspected by anyone for the past year and a half.

**Retailer G** owns a mid-sized store in a residential area and sells about two dozen types of vegetables to individual residents. The store is run by a family of three and sources from a nearby wholesale market every day.

Retailer G does not maintain or publish any records, including inspection records, for its incoming and outgoing products and is not aware that they should do so. Retailer G noted that it would probably not be able to obtain those records from the distributors at the wholesale market. It further remarked that layers of transactions that occur between producers and wholesale market distributors render traceability infeasible.

Retailer G is aware that it should not apply poisonous food additives to build a façade of freshness, but it does not know the full scope of relevant standards. It does not conduct self-inspection for pesticide residues and has not been inspected for the past two years.

**MOA Official 1** is a lead figure in enforcing the amended Food Safety Law, whose core duties include the supervision of inspection of pesticide residues and traceability.

In Official 1's view, inspection has improved substantially in terms of capacity, frequency, and administration. First, city and county people's governments have set aside a budget to gradually establish more testing agencies and expedite the accreditation of more local agencies. Second, based on internal policy and practice, regular and random inspections at wholesale and retail markets have risen steadily. Third, to prevent corruption via data tampering, all testing results are immediately uploaded onto a shared platform.

However, when it comes to inspection of producers, the predominance of small family farms poses severe challenges. Given that most farms in the province range from 1 to 15 acres, the city has between 1000 and 5000 family farms. Even monitoring a small portion of producers stretches the capacity of the local MOA to its limit.

Likewise, structural challenges presented by the dominance of small family farms extend to traceability. Due to the small quantities of fruits and vegetables produced, downstream suppliers frequently source the same product from numerous farms; they have no incentive or patience to maintain a record. The number of contractors that operate between wholesale market traders and producers further compounds the difficulty of traceability.

**MOA Official 2** works closely with farmers in their application of pesticides and occasionally manages inspections.

From Official 2's perspective, two reasons account for pesticide misuse at the production level. First, economically motivated misuse is prevalent and is manifested in two ways. On the one hand, some farmers try to purchase and apply banned or otherwise highly toxic pesticides because they are cheaper. On the other hand, farmers sometimes apply legal pesticides that

exceed the dosage printed on the labels to “be on the safe side.” In particular, farmers sometimes apply extra herbicides and insecticides to ensure that insects and weeds do not interfere with plant growth. Second, small farms operating on thin margins mainly employ labor-intensive, small-sized equipment that undermines the precision and consistency of pesticide application. Therefore, even when the appropriate concentration of pesticide is prepared, variation and overuse emerge when it is sprayed on fruits and vegetables. Farmers often end up spraying different amounts of pesticides to products in two corners of the same farm.

In terms of inspection, Official 2 has witnessed enhanced rigor but has also seen circumstances where inspectors deliberately inspect markets or farms with good compliance records. This practice enables local officials to maintain a high compliance rate in their jurisdictions, in an attempt to demonstrate effective local management to their superiors.

#### **IV. Findings and Recommendations**

As noted, China is on the cusp of more fully implementing its new national food safety system. How the new institutional and legal framework will develop in practice over the next few years will determine the efficacy and long-term viability of China’s food safety regime. A number of recommendations, outlined below, have emerged based on this case study and related analysis that will facilitate the implementation of the amended Food Safety Law and strengthen the food safety system in China.

**Develop Capacity in the Public Sector:** As public and private stakeholders have both noted, capacity challenges are significant in local jurisdictions, which has implications all along the value chain. Needs include increased training for enforcement officials, improved (and additional) testing facilities, and additional personnel. There is also a significant knowledge gap regarding legal requirements that spans both the public and private sectors. Addressing capacity challenges related to the training of local officials could, at least initially, follow a top-down, streamlined approach. For instance, CFDA and other national agencies could devise a training manual and a mechanism for evaluating the learning process, which would promote more uniform understanding of the new system and more accurate testing. Local officials, ideally working with legal professionals in different jurisdictions, could then derive information on the relevant legal obligations of private sector actors from the training materials and relay the information accordingly. Educational outreach to private actors could take various forms, including posters in wholesale and retail markets, meeting with industry associations, and dissemination through social media groups.

**Boost Private Sector Participation:** The recent decoupling of testing agencies and government inspection agencies is a notable step forward in increasing private sector participation in the food safety sector. The government could channel more investment flows and regulatory support into the development of food safety related sectors, including equipping additional inspection agencies with sophisticated equipment and enabling third party service providers to improve traceability and management programs. The government could also streamline procurement contracts or organize collective bargaining for producers and distributors who are considering engaging third party service providers.

**Tailor Approaches to Promote More Effective Implementation** Variations in economic development, geography, and enterprise size are vast in China. The one-size-fits-all approach obstructs implementation when local officials refrain from imposing hefty mandatory fines or when small enterprises and farms choose to ignore the new law or cut corners elsewhere to appear compliant. Approaches better tailored to particular circumstances will be conducive to better implementation. For example, with respect to the minimum fine, flexibilities could be introduced in subsequent measures that allow provinces to set their own benchmarks. For instance, CFDA could introduce a uniform formula that factors provincial GDP and annual household income into the equation. A benchmark that closely tracks the economic development of each province and the financial capacities of small enterprises would encourage local officials to impose tailored mandatory fines, leading to more effective implementation. Further, subsequent measures could include staggered timelines for entry into effect that would vary among private sector actors, depending upon their size. This approach would be akin to the method adopted in the U.S. Food Safety Modernization Act. Different phase-in dates would allow smaller enterprises more time for adjustment; this would be coupled with the continued push for scaling up to provide more resources for compliance.

**Design and Implement Effective Consumer Outreach:** Proactive consumer participation can enhance food safety in two manners. First, consumer outreach can collectively shape the demand for food with better quality and safety standards. Currently, most consumers still choose products based on their appearance; products with a larger size, brighter skin tone, and more even skin are preferred. Producers have reacted, based on consumer preferences, by applying more plant growth regulators, including banned substances and legal ones in excess of the maximum limits. With scientific information in hand, consumers could reverse the course. Second, consumers could become a formidable force in inspection through consumer associations and government programs that allow for free consumer inspection. To stimulate consumer participation in both areas, the government could launch a media campaign to disseminate relevant information, such as the correlation between plant growth regulators and appearance of fruits, free testing programs, the types of chemicals that consumer should request to be tested at testing agencies, and the locations of consumer associations. News channels, social media, and interactive mobile phone applications could be deployed.

**Expedite Institutional Reform and Strengthen Inter-agency Coordination:** As mentioned, the diverging pace of institutional reform at different levels of governance has impeded integration in local jurisdictions. To remedy the situation, all levels of government should set a definitive plan, including dates, for institutional restructuring. CFDA could additionally exert reputational pressure by publishing the progress of different provinces. Moreover, inter-agency coordination could be enhanced. Recent institutional reform, particularly the establishment of CFDA, has considerably slashed regulatory inefficiency. Nevertheless, overlapping supervision and inadequate collaboration have partially remained, both nationally and locally. Clarification of responsibilities, streamlined data collection, more efficient planning, and a lower bar for enforcement could go a long way towards inter-agency coordination.

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