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COMMENTARY

New Food Safety Law of China and the special issue on food safety in China

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1. Introduction

There have been a number of serious incidents of compromised food safety in China in recent years. To list a few, these include: a *Salmonella* outbreak, the use of horse-meat in burgers, the illegal use of phthalates as a clouding agent, the contamination of formula milk by melamine, the meat scandal of Shanghai Hui Food Company which sold reprocessed stale meat to many fast food chains including McDonald's, Burger King, and KFC across the world, the finding of sudan dyes and the recycling of gutter oil for cooking (Chen K *et al.* 2015; Chiou *et al.* 2015). The incidents have raised serious concerns about the quality of food product and food standards within China as well as the economic ripple effect on international trade. Furthermore, these incidents exemplify a larger problem that has brought up deeper and more complex issues within the entire food production, processing and distribution systems in China.

The public concern over food safety has partly prompted the revision of the 2009 *Food Safety Law of China* (FSL),

which was passed by the 14th Session of the 12th Standing Committee of the National People's Congress of China on April 24, 2015. This new law that is widely considered one of the most comprehensive and severe pieces of legislation on food safety thus far, went into effect on October 1, 2015 already. Fig. 1 shows the content of the 2015 FSL. Fig. 2 below shows how food safety and food production input standards are determined in FSL.

The key responsibilities are designated to the China Food and Drug Administration (CFDA) and the National Health and Family Planning Commission of China (NHFPC). CFDA is mainly responsible for the supervision and administration of food safety laws in food production and supply chain activities. The main responsibilities for NHFPC are to conduct food safety risk analysis: surveillance, assessment, management, and communication, and to publish standards jointly with CFDA. In this administrative system, the Ministry of Agriculture of China is responsible for the quality and safety management of primary agricultural products for consumption (or "edible agricultural products") and shall abide by the *Law of the People's Republic of China on Quality and Safety of Agricultural Products* (QSAP). However, the marketing and sales of edible agricultural products, the development of safety standards and publishing of relevant safety information, as well as the quality and safety management of agricultural inputs, are covered by FSL and shall abide by this Law (FSL Article 2.6). An example of food safety evaluation of edible agricultural products is shown in Li Z M *et al.* (2015) and the administrative procedure of MOA

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Fig. 1 Main contents of the 2015 *Food Safety Law of China* (FSL). Adopted at the 7th Session of the 11th Standing Committee of the National People's Congress of the People's Republic of China on February 28, 2009 and revised at the 14th Session of the 12th Standing Committee of the National People's Congress of the People's Republic of China on April 24, 2015 and is implemented on October 1, 2015. The new FSL contains 10 chapters and 154 articles.

on genetically modified organism (GMO) safety evaluation is described in Kou *et al.* (2015).

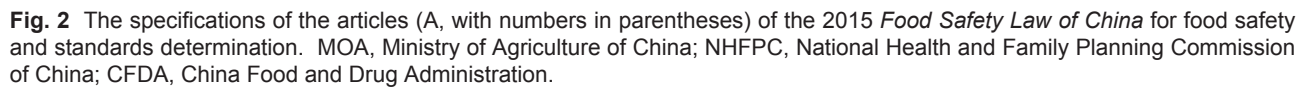
2. Main issue

FSL provides the necessary legal framework and mandates of food safety in China (Fig. 1). However, food safety is such a complex issue, the successful execution of laws and effective protection of food safety will certainly have to face many more known and unexpected challenges. Some of the major challenges and their potential mitigation approaches are presented in this special issue, which are briefly discussed below.

2.1. Synchronization of regional and international food safety standards

The food supply chain includes food production, processing, packaging, transportation, marketing and consumption. The impact of an indigenous regulation applied in a region or a country would likely stretch across many ethnic and/or geo-political boundaries may it be regional or transnational. The customs and jurisdiction systems in these regions or nations are usually different, thus understanding how national laws and standards internationally poses a real challenge. In the paper "No country is an island in regulating food safety", Snyder (2015) pointed out that trade policies of member

nations of the World Trade Organization (WTO) must be reviewed by the Trade Policy Review Mechanism (TPRM) of WTO periodically. In the case of China, the review is every two years. On food safety reviews, the focuses are: types of standards, alignment of domestic standards with international standards, the roles of different domestic institutions, transparency and notification of food safety measures under the WTO Agreements on Sanitary and Phytosanitary Measures (SPS), and on Technical Barriers to Trade (TBT Agreement), etc. In Article 28 of FSL, it is stipulated that "the standard development shall also refer to relevant international standards and the international food safety risk assessment results" (Fig. 2). Snyder's (2015) research provided past review experiences from which lessons should be drawn, on understanding international perspectives. He also strongly supports the notion of cross referencing between national and international laws, which if properly communicated can improve food safety in China and increase international confidence in the safety of Chinese food products. Unnevehr and Hoffmann (2015) reviewed the international experiences and suggested that a middle-income country such as China needs to develop the capacity to carry out risk analyses in order to better focus public resources on the most important risks. Quality risk analysis and scientifically based standards would not only modernize the food production system domestically but would also gain recognition and acceptance when negotiating differences internationally.



The FSL demands the performance of comprehensive risk analysis on the total food supply chain. This is necessary to protect consumer health and welfare. Risk analysis involves risk assessment, risk evaluation, risk management and risk communication (FAO and WHO 2006). The task of risk assessment and risk communication by definition requires input from diverse groups: scientists of multiple disciplines, industrial and consumer group representatives or 'the third party' delegations in addition to governmental officials. Some of the groups, such as industrial and consumer associations are crucial parts of the regulators yet currently not well developed in China (Zhang M *et al.* 2015). Article 23 of FSL, as a way of providing feedback for risk assessment states, "the food safety risk assessment expert committee and its technical institutes, shall organize food producers/traders, food testing institutions, certification organizations, food industry associations, consumer associations and media to exchange information on food safety

risk assessment ...” (Fig. 2, A23). In Article 28, referring to the food safety standard evaluation says, “The national food safety standards shall pass a review by the NHFPC organized National Food Safety Standard Evaluation Committee. The Committee shall be made up of experts in medicine, agriculture, food, nutrition, biology and environment, etc., as well as representatives from relevant departments of the State Council of China, the food industry associations, and consumer associations ...” (Fig. 2, A28). Thus, the establishment of mature and knowledgeable social and community citizen groups are required to accomplish the FSL mandates of risk assessment and standard evaluation. These private groups are also fundamental for formation of a strong public-private partnership, a mechanism of co-regulation, which has existed in Europe and America for many years and has proven effective for food safety protection (Chen K 2015; Snyder 2015). Unnevehr and Hoffmann (2015) pointed out the following advantages to developing a strong public-private partnership to improve food safety: public-private partnerships may offer the opportunity to achieve greater efficiency in moving to higher standards

through adoption of approaches that are acceptable to the private sector and viable in practice; in developing market systems undergoing rapid transformation, third party certification and food safety process verification have the potential to fill the gap between growing consumer demand for food safety and limited public enforcement capacity. Chen *K et al.* (2015) pointed out, though that it is evident that the Chinese government is more conscientious about obtaining stakeholder input when formulating food safety regulations or standards in recent years, no new co-regulatory policies are included in the 2015 FSL and thus an opportunity to further strengthen the co-regulatory mechanism is apparent.

2.3. Valid science-based risk analysis and risk communication

The importance of valid risk assessment with transparent risk communication rooted in solid traceability evidence, can never be overstated. The credibility of the safety assessment and public trust of food safety laws must come from open, transparent and scientifically sound assessment processes. FSL Article 5 states that the State Council delegated the responsibility of the design and execution of the food safety risk surveillance plan squarely to CFDA and NHFPC. The requirement of CFDA and NHFPC to properly communicate risk information to other governmental agencies and private organizations was explicitly and implicitly expressed throughout all articles of FSL, as is especially noted in Articles 21–23, 27–31. Regarding the protection of the safety of the entire food chain, the tracking and traceability abilities become crucial. Article 42 stated that “CFDA will work with MOA and relevant departments to establish the coordinated traceability system for food safety that covers the whole process” (Fig. 2). In addition, “Food producers and traders shall establish the food safety traceability system pursuant to provisions of this law to guarantee traceability of foods”. Articles 84–89 on Food Inspection further defined the qualifications and legal responsibilities of food testing agencies and inspectors (Fig. 1, Chapter 5). These laws are extremely complex to implement since they depend on strong science and technological capabilities, the effectiveness of horizontal (different organizations) and vertical (various levels of governmental agencies) communication, and the incentives and policies of private participations; some of the conditions are not quite mature in China, especially those policies on public and private relationships. However, the 2015 FSL may stimulate and create innovative approaches.

Ding *et al.* (2015) presents a study, which is briefly introduced below and could serve as a new model of government-private partnership to improve food safety and traceability. In recent years, the government has invested considerable resources to establish the so-called production

base (PB) and direct farm (DF). A PB is a special form of farm organization that coordinates all farming activities within the farm. A DF is a production base with direct procurement relationships with downstream retailers. The Ministry of Agriculture of China (MOA) and Ministry of Commerce of China (MOC) launched a major government sponsored direct farm program in 2008, which created a directly link to supermarkets with producers of PBs in order to promote the standardization of food production, the efficiency of farm operations, and traceability through the food supply chain. From a survey of 35 DF production bases in 2012, Ding *et al.* (2015) concluded that the potential to improve product traceability and marketing arrangements for food safety is high.

Valid risk analyses and establishment of sound standards largely rely upon laboratory testing services. However, conventional methods for detection of food contaminants and toxicants require sophisticated sample preparation procedures, long analysis time, expensive instruments and professional personnel to perform the analytical tasks (Chiou *et al.* 2015; Dong *et al.* 2015). These methods are usually unable to analyze large numbers of perishable samples within a short turnaround time in urgent situations and thus greatly hinder risk assessment and timely communication of outcomes. In this issue, we assembled 5 papers that reviewed rapid or easy detection methods that could serve as screen techniques capable of testing large samples within a reasonably short time. Chiou *et al.* (2015) reviewed most of the current and potential rapid detection methods for many notorious food contaminants and toxicants including microbial agents, toxic ions, pesticides, veterinary drugs and preservatives, as well as detection of genetically modified food genes and adulterated edible oil. They concluded that the development of rapid, accurate, easy-to-use and affordable testing methods could motivate food handlers and the public to actively screen for food contaminants and toxicants instead of passively relying on monitoring by government facilities. Lately, immuno based assays are being widely used due to their simple operation, high speed, and low cost. Effective immuno assay kits have been developed to be used in the field and in storage systems to detect the mycotoxin. Microarray based immunoassays can simultaneously detect aflatoxin and zearalenone (Selvaraj *et al.* 2015) as well as milk contaminants (Xu *et al.* 2015) with good sensitivity. Aptamer based assays can detect ochratoxin, aflatoxins and fumonisins with high specificity in food products. These types of methods can be further developed for a broader application (Dong *et al.* 2015; Selvaraj *et al.* 2015). In a review of avian influenza caused by influenza A virus, Shi *et al.* (2015) recommended an integrative, systematic approach to detect the virus by a selection or combination of two or more techniques from

immunomagnetic beads, oligonucleotide probes, nanoparticles, and electrochemical sensor devices according to the stage in the poultry supply chain.

Risk assessment needs to determine the safe levels of chemical applications. Zhang M H *et al.* (2015) analyzed 20 years' pesticide residue data from California Pesticide Residue Monitory Program and highlight the challenges of determining appropriate pesticide use for safe food production. They also introduced integrated pest management methods to improve food and environmental safety. Pesticide management and risk ranking in China are respectively discussed in Chen Z L *et al.* (2015) and Li Z X *et al.* (2015). Zhou *et al.* (2015) studied how safety measures are implemented among farm cooperatives, agricultural companies and family farms. They found that agricultural companies adopted more food safety control measures than the family farms, which substantiates the fact that family farms are the most difficult to control. Li Z M *et al.* (2015) found similar problems related to family farms and suggested that improvements could be made by enlarging farm size, standardizing farming practices, improving tracking mechanisms, and development of early warning systems.

One way to eliminate possible fungicide contamination in farm production systems is to develop alternative approaches to chemical-dependent fumigation methods for soil borne pests and pathogens control. Strauss and Kluepfel (2015) developed an alternative method called Anaerobic soil disinfestation (ASD). ASD involves the application of a carbon source, irrigation to field capacity, and covering the soil with a plastic tarp. This method showed great promise for use in the control of soilborne pathogens and pests and is more natural and organic than otherwise. Zhang X N *et al.* (2015) suggested that polluted water could be a source of contamination and infection in farm operation. Winter *et al.* (2015) questioned the appropriateness of adopting maximum residue limits (MRLs) as pesticide food safety standards levels. They advocated a different approach to develop the acute and chronic pesticide food safety standard (PFSS) levels. This approach could be considered to determine appropriate safety levels and pesticide use standards for China.

The mandate of CFDA and NHFPC to properly communicate risk information to various governmental agencies and private organizations was explicitly and implicitly expressed throughout all articles of FSL, and especially noted in Articles 21–23, 27–31. Communication must be a two way street to be meaningful. Public hearings and debates on public issues often result in a better and more practicable governmental policy in the USA. Relevant stockholders of food safety in China need to be identified and invited to participate in various formal or informal discussion groups and workshops sponsored by the assessment and evaluation com-

mittees to make sure different needs are understood. Food safety has huge economic implications. Economic benefits from improved food safety should be clearly articulated and communicated to enhance efficiency in the functioning of food markets. With market economy value in mind, risk assessment should include cost-benefit analysis in which both human and environmental health and market rewards should be considered. Thus we suggest agricultural and resource economists should be included in the expert panels described in Articles 23 and 28. Communication of science based information of safety assessment to the public is important in another way. Huang and Peng (2015) conducted a survey and found that consumers in urban China have significantly changed their perceptions about the safety of genetically modified organisms (GMO). The percentage of the interviewers who perceived such food as unsafe for consumption increased by more than 30%, from 13% in 2002 to 45% in 2012. The change has been partly due to frequent negative reports by the news media, who obtained their information from special interest groups, none of which was scientific sources. The rising frequency of food safety scandals has provoked consumers' suspicious of food safety in general, which have partly contributed to the negative feelings even though these scandals have nothing to do with GMO. Unfortunately, some of the misinformed public opinions have a negative effect on related policies on biotechnology research. In response to misinformed popular media reports, MOA issued a guideline for advertisement in January 2015, which says all discriminatory advertisements for GM or non-GM foods are prohibited. Furthermore, China's No. 1 Central Document of 2015 stated that China will strengthen biotechnology research, safety management and science education. In response to consumer's concern, China amended its *Food Safety Law of China* on April 24, 2015, to require GM food be labeled in markets. This is the first time for GM food to be included in the national law, which provides the legal ground for the government's supervision of GM food safety. This episode illustrates the importance of meaningful and fact-based risk communication. Without a solid science background, risk analysis, risk assessment, risk management and risk communication can't be truly beneficial to the people's health and economy growth.

3. Concluding remarks

Food safety is indeed a world concern. On September 10, 2015, the US Food and Drug Administration (USFDA) announced that the two preventive rules of the *FDA Food Safety Modernization Act* (FSMA): the Preventive Controls for Human Food and the Preventive Controls for Animal Food are finalized and the compliance dates for some

businesses will begin in September 2016. These rules are part of the *FDA Food Safety Modernization Act*, aimed at implementing modern food manufacturing processes to prevent food hazards. These rules require food companies to be accountable for monitoring their facilities and identifying any potential hazards in their products and prevent those hazards. The preventive measures could become the mainstream approach for food safety regulation development elsewhere in the world (www.fda.gov/Food/GuidanceRegulation/FSMA/). This approach could be imbedded in new *Food Safety Law of China* as well.

Food safety is essential for human health regardless where you live and who you are. The 2015 *Food Safety Law of China* marks a national determination to elevate public health concerns to one of the highest national priorities. This action will undoubtedly have a strong positive effect on food safety domestically and food trade internationally as well. However, a full realization of the laws will take effort and time to achieve. China will have to invest heavily in the fundamental mechanisms to make the system components function: an effective communication system among constituencies or stockholders, the capacity to invent new technologies dealing with ever new food safety challenges, alignment of national to international regulations to name a few.

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