Research on Traceability Strategy of Agricultural Product Quality and Safety

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Abstract: With the continuous improvement of domestic supply-side reforms, the quality and safety of agricultural products are facing new challenges. From a macro perspective, the supply-side reform should be carried out simultaneously with the protection of agricultural product quality and safety demand management; from the perspective of enterprises, enterprises should improve their product traceability and achieve management innovation of "product quality can be protected, corporate integrity can be considered and problem responsibility can be investigated". Through the analysis of the status of the quality of agricultural products in China, this paper summarized the results and the "short board" of China's agricultural product quality and safety system construction. The traceability development of agricultural product quality and safety in the new era is connected with the supply side reforms to realize the innovative development of agricultural product quality and safety.

1. Introduction
In recent years, food safety incidents throughout the country have occurred frequently, causing widespread concern in all sectors of society. At present, governments and scientific research institutions are actively studying countermeasures to solve agricultural product safety problems. The agricultural product quality traceability system has the special function of solving market incomplete information and asymmetry, making it an important tool to ensure the quality and safety of agricultural products.

2. Summary of traceability of agricultural product quality and safety

2.1. Background source of agricultural product quality and safety traceability
The traceability system for agricultural products was the prototype of the traceability system developed by the British government in 1990 to trace mad cow disease \cite{1}. As a response to the British mad cow disease, the European Union introduced the retrospective system in 1997 and signed the No. 820/97 Decree on the establishment of a bovine animal inspection and registration system, labelling of beef and beef products \cite{2}. In 2001, the European Union issued the Decree No. 178 (2002), which requires that the foods sold in the EU from 2005 can be tracked and traced, otherwise it will not be allowed to go on sale \cite{3}. The decree actually formed a new "green trade technical barrier." The EU, the United States, Australia and South Korea have established relatively standardized traceability systems for agricultural product quality and safety. China has been actively carrying out traceability
construction of agricultural products quality and safety. In 2004, the Shanghai Municipal Government promulgated the "Interim Measures for the Safety Supervision of Edible Agricultural Products in Shanghai" to ensure the traceability of agricultural products [4].

2.2. Establishment of traceability framework for quality and safety of agricultural products

In 2017, Central Committee issued the No. 1 Document of "Several Issues on Deepening the Structural Reform of Agricultural Supply Side and Accelerating the Cultivation of New Dynamics of Agricultural and Rural Development" proposed a project of agricultural product quality and food safety supervision system. Establish a comprehensive traceability and comprehensive service platform that can be traced and shared by the whole process. The Ministry of Agriculture issued the "13th Five-Year Plan for National Agricultural Product Quality and Safety Improvement", stating that the establishment of a national agricultural product quality and safety traceability system, the conditional "vegetable basket" products and the "three products and one standard" scale production subject are the first to achieve traceability. "The National Standardization System Construction and Development Plan (2016-2020)" proposes that the product traceability code is the basis, and the product code must be unified to meet the construction requirements of the national traceability system.

The agricultural product quality traceability system is in the stage from construction point to promotion development. The ministries that carry out traceability of agricultural products at the national level mainly include the Ministry of Agriculture, the Ministry of Commerce, the General Administration of Food and Drug Administration, and the Ministry of Industry and Information Technology. There are four characteristics of agricultural products quality traceability system, including "separate politics", "three-stage", "government-led" and "Follow the operation and maintenance".

2.3. The traceability of agricultural product quality and safety has achieved remarkable results.

By standardizing agricultural production, agricultural product processing and trade, China has built 8 batches of 4,272 national agricultural standardization demonstration zones and 5,782 provincial agricultural standardization demonstration zones. At the national level, a national food safety traceability platform has been established. Since 2010, the Ministry of Commerce has supported batches of pilot projects to build a meat and vegetable circulation traceability system centered on the central, provincial and municipal level 3 traceability management platforms. The Ministry of Agriculture has established four industry traceability systems for planting, animal husbandry, aquaculture and farmland. The State Administration of Entry-Exit Inspection and Quarantine has initiated the management of export food traceability. At the local level, the Beijing Municipal Agriculture Bureau and the Hebei Provincial Department of Agriculture jointly undertake the "Pilot Project of the Quality Traceability System for Vegetable Products in Beijing". Jinan City launched a pilot project for the construction of a video security credit system, and the Sichuan mode began with the promotion of "three products and one standard". The Xiamen mode uses hierarchical management and integrity management. The Wuxi mode implements chain node supervision and setting requirements for distribution nodes.

In the first quarter of 2017, the Ministry of Agriculture launched the quality inspection of agricultural products. There are 83 varieties of 4 major categories of vegetables, fruits, livestock and poultry products and aquatic products in 155 large and medium-sized cities in 31 provinces (autonomous regions and municipalities), monitoring 94 residues of agricultural and veterinary drugs and illegal additives, and sampling 10,228 sample samples. The monitoring results show that the overall pass rate of random inspection is 97.6%. Among them, the pass rate of sampling for vegetables, fruits, livestock and poultry products and aquatic products were 96.8%, 95.3%, 98.3%, 99.4% and 96.0% respectively, and the pass rate of "lean flesh" sampling test for livestock products was 99.8%. The quality and safety situation continues to be stable and positive.
3. Problems in the traceability of agricultural product quality and safety

3.1. The short board of the legal norm "orientation"
At present, the documents issued by governments at all levels lack binding force on the main body of production and operation. In the construction of China's traceability system, the regulations, methods, guidelines and requirements issued by the General Administration of Quality Supervision and Inspection and the Ministry of Agriculture lack compatibility and interoperability. The record system of production and operation of agricultural products is not perfect, and there is no unified standard of traceability coding for packaging labeling. Faced with the current traceability pilot "blossoming everywhere", there is a chaotic situation of ten thousand "codes" running around. There are still many blind spots in the orientation of how to move from a single product to a multi-product R&D and production product chain, and from a product chain to a multi-layout industrial chain.

3.2. The short board of the key node "positioning"
Institutional functions are unclear and lack of coordination at the national level and within departments. The mode of "sectional management, unified coordination" is adopted in our country. In the process of practice, the concept of traceability is vague, the problem of supervision vacuum or duplication appears, and even the game of interests between departments appears, which is manifested in the predicament of "everyone is in charge but no one can handle the dilemma". At present, the mode of decentralized production and small-scale operation in China makes it difficult to establish production record files and carry out standardized labeling. The traditional methods of judging the quality of wholesale market and agricultural market are not enough to judge the real quality of agricultural products. Some enterprises are faking, and social false advertisements are rampant, which leads to low social trust. The storage period of agricultural products is relatively short, some agricultural products can not be packaged or disassembled many times, which increases the difficulty of packaging labeling.

3.3. The short-board of talent technology "determination"
The traceability system of agricultural product quality and safety in China is still in the stage of technological innovation and trial, lacking basic research on standard formulation, insufficient technical reserve and large talent gap. The problem of incompatibility between traceability systems in different regions is serious. There are bottlenecks in information processing of traceability chain. First, it is difficult to upload data and verify the authenticity of information. Second, the construction of database is lagging behind. Third, provincial and municipal local databases and central databases can not be linked.

3.4. The short board of support threshold "fixed limit"
The construction of traceability system for agricultural product quality and safety is a long-term investment process. In addition, the implementation of traceability threshold is high, the external supply chain does not create an environment for traceability system capital spillovers, and the investment of the participants can not be recovered. As a result, most consumers are not enthusiastic about traceability of agricultural products. The information obtained by the government involves the business secrets of enterprises, and enterprises are not willing to invest in the traceability system. Small-scale and low-grade traceability subjects lead to high traceability costs. Traceability system is a common phenomenon of best game no one played. Honesty is also the key to success or failure.

3.5. Discuss the root cause of the "short board"
China's agricultural industry application foundation is weak, the market mechanism is imperfect, and the cultural level of employees is not high. In terms of the operation process of traceability system of agricultural product quality and safety, the cost of designing and producing archives, collecting information, building information platform and quality control activities is relatively high; in terms of agricultural product circulation mode, traditional agricultural product circulation mainly depends on
wholesale market, agricultural market and mobile vendors, and traceability information collection is difficult; In terms of the construction of agricultural product traceability system, many government-led traceability systems for agricultural product quality and safety have the problems of rebuilding, setting up and neglecting management, and traceability management mode has the problem of "water control in Kowloon". On the whole, the problem of insufficient investment is more prominent and cannot meet the needs of legal supervision. From the perspective of the management and practice of developed countries, most of the traceability of agricultural products has unified and specialized agencies responsible for promoting, and there are clear provisions on capital investment, policies, laws and regulations.

4. Docking of Agricultural Product Quality and Safety Traceability and supply side reform
The traceability of agricultural product quality and safety from the supply side is a necessary means of innovation and development. The scope of traceability involves a multi-sectoral, multi-industry and multidisciplinary process from national legislation to industry organizations, from central to local, agricultural production to processing, logistics management to statistical analysis of data. At present, we should seize the historical opportunity of agricultural supply-side structural reform, make a comprehensive analysis of the demand for supply-side structural reform to ensure the quality and safety of agricultural products, reshape the relationship between government and enterprises from the perspective of market mechanism, the pre-construction and the later operation and maintenance, starting from the market mechanism. The relationship between pre-test and post-promotion, trace the relationship between premium and retroactive investment.

4.1. Docking with “Adhere to Problem Orientation and Adjust Work Focus”
The current production of agricultural products in China urgently needs to adopt modern new technologies to improve management level. Agricultural production and processing retail enterprises generally have scattered layout, large number, low level of information technology, low quality of employees, lack of professional knowledge of information technology. Therefore, it is necessary to adopt innovative schemes which are suitable for the national conditions, such as the lowest use cost, the simplest deployment and maintenance cost. It is necessary to adjust the focus of work to the direction of changing the mode, adjusting the structure and promoting the reform so as to promote the joint efforts of production units, technological research and development institutions, scientific research departments, certification and implementation agencies, government supervision departments and social business enterprises, so as to upgrade the overall industrial transformation and upgrade, to solve the short-board problems and to cultivate industry. New kinetic energy. For example, in the stage of designing information system, we need to consider relevant laws, regulations and technical support. In the process of popularization, we need to gradually guide and standardize the production management and operation process of enterprises in order to effectively guarantee the efficient operation of information system.

4.2. Docking with “Paying Attention to the Change of Quality Demand and and Pursuing Green Ecological Sustainability”
In the development of agricultural industry in our country, we must take “ensuring the national agricultural security” as the premise, closely focus on changes in market demand, and adopt the principle of “adapting measures to local conditions, advantageous development of resources and appropriate scale” to increase farmer's income and ensure effective supply. The main direction is to increase farmer's income, ensure effective supply and provide quality of agricultural supply. The fundamental way is to reform the system and innovate the mechanism, optimize the agricultural industry system, production system, management system, improve the utilization rate of land resources, labor productivity, and promote the development of agriculture and rural areas by over-reliance on resource consumption and ownership. Promoting the transformation of agricultural and rural development from over-reliance on resource consumption to pursue green ecological
4.3. Docking with “Implementing Good Agricultural Production Standards and Enhancing Traceability of Domestic Agricultural Products”

Agricultural product quality and safety traceability system is currently recognized as the most effective means of preventing food safety risks. Through the construction of the national agricultural product quality and safety traceability information platform, the traceability system of agricultural products suitable for China's national conditions and international exchanges is designed. We have initially established a structure system jointly constructed by government supervision, enterprise self-discipline and consumer supervision to promote the innovation of government supervision mode and enhance the level of enterprise information management and quality control ability. At the same time, information such as supervision, law enforcement, detection, early warning and credit will be included in order to comprehensively promote the intelligence of supervision information, improve the efficiency of supervision, strictly guard against, strictly control and strictly control the risk of agricultural product quality and safety.

4.4. Interfacing with “Accelerating the Accumulation of Value of Agricultural Enterprises and Promoting the Formation of Regional Agricultural Brands”

The key to successful traceability of agricultural products is through government supervision and consumer recognition. While making up for the company's retroactive cost, the profitability of traceable agricultural products exceeds the profitability of non-retroactive agricultural products, that is, the realization of retroactive premium. From the point of view of cost-sharing, it will be shared by the government, enterprises and consumers in a short period of time, and will be undertaken by enterprises for a long time. Through the retrospective premium, promote the formation of regional agricultural brands, enhance the “hematopoietic” function of enterprises, and form a virtuous circle. With the increase of the amount of application, all kinds of costs are reduced, and the coverage of traceability of agricultural product quality and safety is gradually expanded.

5. Action strategy based on supply-side reform theory

5.1. Improve laws and regulations, optimize top-level planning and design

Government should play the leading role, unify the deployment and scientific management from the institutional level, guide the construction and operation of traceable quality and safety of agricultural products, and be in line with international standards. Accelerate the construction of traceable management platforms for important products at the central, provincial and municipal levels, unify data interfaces, realize data sharing, and truly break the situation of segmentation [5]. We will improve the coordination and promotion mechanism and incorporate the construction of important product traceability system into the work assessment indicators. Adhering to the construction method of enterprise construction and government review, it is necessary to clarify the main position of the enterprise, and be responsible for the maintenance of the enterprise traceability system, fund raising and maintaining the traceability system, namely enterprise-direct responsibility, local government-indirect responsibility, ministry-regulatory responsibility. Agricultural products traceability system should be encouraged to give priority to the application of high and new technologies such as big data, cloud computing, Internet of Things and artificial intelligence. It is necessary to strengthen Department cooperation, establish information docking mechanism for the whole process of production and operation from farmland to dining table, and gradually establish market access system based on traceability code. We will link quality traceability with "three products and one standard" certification, leading enterprise evaluation and organic certification grade of agricultural products, and gradually establish a regulatory system covering the quality and safety of agricultural products.
5.2. Connecting with international standards, promoting standardization of agricultural product quality traceability and following up electronic information

The traceability of agricultural products should be piloted according to the varieties, starting from livestock products, then gradually develop to grain and vegetables. On the premise of adhering to the "variety pilot project"; large enterprises with long chain, high degree of informatization and high market share should build traceability system first. Based on the national standards for agricultural products and food safety risk monitoring parameters, establish a unified agricultural product quality and safety traceability standardization system, including agricultural product classification and coding standards, data standards, software and hardware facilities standards, information applications and service standards. So as to realize the sharing of information resources in agricultural industry chain, and establish cross-sectoral and cross-regional agricultural product data center to solve the problem of information chain fault. Actively introduce and apply agricultural standards of international organizations, European Union, United States and Japan, and associate food traceability system with HACCP, GAP and GMP systems. Establish a standard system and speed up the development of national unified traceability safety information management system software for agricultural products.

5.3. Strengthening scientific and technological research and personnel training, speed up multi-source information fusion

The construction of China's agricultural product quality and safety traceability system must rely on scientific research institutions and colleges and universities. Promote the rapid transformation of scientific and technological achievements through tight guidance around demand. It is necessary to speed up the research on agricultural product quality traceability technology innovation and actively promote smart agriculture. Based on XML technology and taking the identification of agricultural product quality traceability as the main line, the interface standards between different systems are standardized to solve the problems of database and network. In terms of data collection, the government unifies and integrates. The State Council Food Safety Committee Office can collect the traceability data of agricultural products on behalf of the government, and review the data collected by the responsible department. The agricultural product traceability data chain must upload data step by step according to the responsibility levels of enterprise-county-city-province-national. We will improve the paper traceability system for the quality and safety of agricultural products, such as tickets and bills, and achieve traceability management for the whole process of the quality and safety of agricultural products.

5.4. Encourage rural e-commerce participation and encourage enterprises to create brand effects

Taking agricultural producers as the core and focusing on the production environment of agricultural products is the key to effectively guarantee the quality of agricultural products. From the characteristics of the new normal, on the one hand, China's agriculture will accelerate the transformation and upgrading, the agricultural product market will be more mature and perfect, and the agricultural products e-commerce will better solve the problems of information asymmetry and supervision difficulties, and focus on solving the traceability problem in the production and operation of small-scale agricultural products. On the other hand, e-commerce can greatly increase consumers' attention to agricultural product brands, enhance the value of agricultural products, rationally digest the cost of establishing traceability systems, and achieve sustainable development of traceability systems, and then promote the overall upgrading of agricultural industry.

5.5. Deepening Government Promotion and Increasing Social Media Supervision

The government should promote and publicize the quality and safety of agricultural products. Promote the retroactive premium of the company through the way of awarding, rewarding and labeling the company. Through the official media trusted by consumers, we can publicize the information of traceable products in various forms, such as news, improve consumer's willingness to pay for traceable agricultural products, and actively guide consumers to identify traceable identification codes.
Encourage large-scale chain enterprises, hospitals, schools and other groups to preferentially purchase traceable products and create a favorable market environment for traceable products consumption.

6. Conclusion
The implementation of traceability of agricultural product quality and safety needs to adapt to the structural reform of agricultural supply side in order to show good prospects. This paper studies the traceability system of agricultural product quality and safety in line with China’s actual conditions, integrates resources to solve the key problems of traceability of agricultural product quality in China.

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