

# Analysis of the food crisis in the new era

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**Abstract:** Under the new development model of "dual circulation," it is essential to ensure absolute food security and to nip potential risks in the bud regarding food production and supply issues. In the face of extreme natural environments and a complex international situation, timely emergency measures should be taken and appropriate preparations should be made. To this end, this paper proposes the following suggestions on how to ensure China's food security: First, focus on agricultural production to enhance the overall production capacity and ensure a sustainable food supply. Second, break through key technologies such as "bottleneck" grain breeding and selection, and agricultural machinery equipment, using technological innovation and information exchange as means to achieve large-scale development of grain production. Third, from the perspectives of agricultural and industrial production, pay attention to the issue of food quality and safety. Fourth, in terms of grain import and grain reserve settings, consider both unblocking the grain path and hiding grain among the people.

**Keywords:** New situation; Food Security; Production ideas.

## 1. Introduction

According to the United Nations Food and Agriculture Organization's definition of food security, it means that everyone has access to, and can afford, sufficient, safe, and nutritious food to meet their dietary needs and food preferences. It clarifies the relationship between "external circulation" and "internal circulation," emphasizing the need to deeply advance supply-side structural reforms, fully utilize China's vast market and domestic demand, and form a new development pattern of "dual circulation" for common prosperity. Under the new development model of "dual circulation," China should take a more proactive approach to establishing a more robust food supply system to ensure food security.

## 2. Food security production risks

### 2.1. Natural Disaster

Due to various natural disasters such as drought, flooding, windstorms, and pest infestations, there has been a reduction in grain production for the year. The three northern provinces of China, Henan, Shandong, and Anhui, as well as Hubei and Hunan, which are major grain-producing regions, have frequently suffered from natural disasters under extreme climatic conditions (for example, the northern floods and southern droughts in 2021), which have had a certain impact on China's grain output.

### 2.2. Market Risk

Currently, the "inversion" of domestic grain prices is one of the most significant trends in international grain price fluctuations. Constrained by the idea that "cheap grain hurts farmers," the grain prices in China have far exceeded global grain prices. However, across the country, the opportunity cost of different crops growing on the same land is the highest, and this situation is even more severe relative to labor. Due to the existence of the "three highs" (high costs, high inputs, and

high prices), the primary function of our country's grain production is to ensure the supply of food for the population. Small-scale farmers are not solely engaged in agriculture; there are also many part-time farmers, which leads to an unstable main body of grain production and results in the abandonment of cultivated land.

### 2.3. Circulate Risk

In the current economic environment, Chinese enterprises are facing cash flow difficulties, with a declining trend in foreign exchange reserves for external turnover, and restrictions on logistics channels and personnel flow; there is a shortage of agricultural supplies between different regions, a lack of labor in production bases, and difficulty in connecting agricultural machinery services; the rise in oil prices has led to a sharp increase in logistics costs for agricultural product transactions in China, and there are circulation risks both domestically and internationally.

## 3. Ideas for food security production under the new development pattern

### 3.1. Relying on Science Technology and Intelligence

Firstly, to secure one's "job," it is essential to strengthen the fundamental exploration of food science and technology. Key technologies, including seeds and pesticides, must be in our own hands, rather than relying on imports. In rice breeding and cultivation methods, projects such as the "Sea Rice Project" (Hunan Hybrid Rice Research Base) have achieved significant results, but there is still a considerable gap compared to advanced international levels in soybean variety breeding, efficient pesticide application, and technological application. On this basis, further strengthen innovation in the seed industry and pesticide technology, and make important progress in the development of new seeds and pesticides, the cultivation of new varieties, and effective reproduction.

Secondly, it is necessary to increase investment in small-

scale agricultural industrial equipment. From 2019 to 2021, the comprehensive mechanization rates for planting and harvesting in China's agricultural production were both above 70%. However, there is currently a high rate of mechanized tillage in China's agricultural production, but the rates of mechanized sowing and harvesting are quite low, especially in the southern mountainous and hilly areas. For instance, mountainous and hilly areas account for 66% of Hunan Province, while the plain areas only make up 13%, but the overall mechanization level in the Dongting Lake area is higher than other regions. Loudi Shuangfeng County has focused on the development of small-scale agricultural machinery, developing small agricultural machinery equipment such as tractors, seedling transplanters, rotary tillers, and harvesters suitable for hilly areas, but these have not been widely promoted or popularized. In the coming years, Loudi in Hunan should become a national research and development base for agricultural machinery equipment in the southern regions, and agricultural machinery equipment should be included in the scope of national subsidies, with reforms in the form of subsidies to organically combine subsidies for purchasing machinery with fuel subsidies. In economically underdeveloped major grain-producing areas, the "Loudi" model of agricultural machinery should be adopted, and the state should unify the leasing and allocation of machinery to save farmers' mechanical costs.

Thirdly, it is essential to strengthen work in production tracking and disaster prevention and mitigation. The growth of grain, market conditions, and disaster situations are all changing daily, which requires a convenient and unobstructed channel for information transmission. With the three major communication operators as the information publishing platform, on one end, weather forecasts, agricultural production conditions, market trends, and agricultural resource information are sent to farmers via short messages, while on the other end, agricultural information development trends are reported to local government departments in a timely manner. To achieve this, it is necessary for multiple departments such as the agricultural and rural departments, meteorological departments, grain wholesale markets, and communication companies to work in concert to realize data sharing based on Beidou remote sensing. Through market regulation, farmers are guided to manage grain production well, and forecasts for meteorological conditions, pest and disease control, and drought and flood disasters can help reduce losses when natural disasters occur.

### **3.2. Optimize the layout of agricultural production and improve product quality**

Firstly, the goal is to achieve standardized production in advantageous grain regions and selective cultivation in non-advantageous grain regions. Grain mainly includes cereals, legumes, and tubers, with a particular emphasis on legumes, which, in addition to being used as food, can also be used for livestock and poultry feeding and for making edible oils. Therefore, the annual demand for legumes is substantial. Moreover, as soybeans can be planted throughout the year, it is necessary to establish more realistic price subsidies and incentive policies to guide sowing as early as possible. In addition to grain, in the cultivation of soybeans, measures such as centralized distribution and application of fertilizers, and unified plant protection and pest management should also be adopted. By employing standardized techniques to reduce the costs of production materials such as pesticides and

fertilizers, agricultural productivity can be better enhanced.

Secondly, it is necessary to strengthen investment in scientific and technological efforts to reduce Cd (cadmium) pollution. Amid a public opinion storm over cadmium-tainted rice in Yunnan, the main grain-producing province of Hunan was also affected. Several well-known brands in Hunan saw a year-on-year sales decline of 45%. Online news reports and offline merchants jointly boycotted Hunan rice, triggering a negative effect and turning "cadmium rice" into a "sensitive term," which is related to the quality and safety of grain. Hunan, Jiangxi, and Guangdong in China are rich in non-ferrous mineral resources, but the soil heavy metal content is relatively high, and there is still a need to strengthen scientific research on the control of heavy metal pollution. The arable land contaminated by heavy metals has regional characteristics; high-cadmium soil does not necessarily lead to the cultivation of high-cadmium rice, and the Cd concentration in rice grown on low-to-moderate toxicity soil has a certain random distribution. According to regulations, the cadmium level must not exceed 0.3 milligrams per kilogram in 2022, and it may reach above 0.4 milligrams per kilogram next year. In recent years, Hunan Province has been conducting in-depth research and continuously increasing support for this technology. It has prohibited rice cultivation on severely polluted land and has carried out physical and chemical treatments in moderately and mildly polluted areas. Preliminary research has found that rice has a weak absorption of Cd. By testing the soil (not overusing chemical fertilizers, applying lime), and practicing water-saving irrigation during the vigorous growth period of rice, the absorption of Cd by rice can be reduced. Taking Nan County in Hunan as an example, it has now formed a rice and shrimp cultivation area of 550,000 mu, producing 100,000 tons of crayfish and 250,000 tons of "rice-shrimp rice" annually, achieving a total economic output of over 10 billion yuan. This cultivation method takes low-concentration Cd rice and shrimp as the research subject, uses "rice-shrimp" as the advantageous resource, leverages the ecological advantage of "rice-shrimp," and represents it with low-Cd, low-Cd "rice-shrimp rice." With its unique ecological advantages, it has become an important ecological resource in China.

Thirdly, it is necessary to achieve a unified standard for the testing of heavy metal elements in soil. With the continuous improvement of people's quality of life and the enrichment of dietary structures, the daily intake of rice is also decreasing. Therefore, the author has proposed a concept consistent with international standards, which is that both rice and rice cadmium content should not exceed 0.4 mg/kg (the current standard is 0.2 mg/kg). Substances containing 0.4 mg/kg to 0.8 mg/kg, after expert discussion and scientific experiments, are recommended for use as animal feed according to the requirements of not wasting food and scientific consumption; as for industrial grain, there is no strict regulation on the cadmium content in rice.

### **3.3. Build a modern grain logistics industry**

To ensure the implementation of the aforementioned measures, it is essential to establish a strong "agriculture, rural areas, and farmers" team from an institutional perspective. Drawing on the "three rural" organizations of countries such as Japan and South Korea, and relying on existing "three rural" organizations, the establishment of a "China Three Rural Association" is proposed. This association should work in conjunction with relevant functional departments to

promote the specific implementation of various measures. A safe, efficient, and integrated grain logistics system should be established. Strive to build multiple national grain routes, inter-provincial grain routes, and inter-county grain routes in the coming years to ensure the stability and smoothness of grain crop production and sales between regions under extreme climate conditions.

## **4. Strategies for ensuring food security production under the new development pattern**

### **4.1. Intensify support for agriculture**

Stabilizing grain production should be the entry point for appropriately adjusting the planting structure, adjusting the methods and focus of subsidies, and appropriately increasing the proportion of high-quality seeds, cultivation methods, and superior products, thereby laying a solid foundation for national food security and the effective supply of major agricultural products [3]. Attention should be paid to planting costs and benefits, and the implementation of grain subsidies and agricultural machinery purchase subsidies should be strengthened. Increase efforts in the construction of agricultural infrastructure such as high-standard arable land, as well as in agricultural scientific research such as variety breeding, and accelerate the establishment of a "production, purchase, storage, processing, and sales" grain production system. Adhere to the implementation of the "six-stability" work policy, strengthen monitoring and analysis, and make fine-tuned adjustments to maintain food security and stability.

### **4.2. Establish and improve emergency rescue mechanisms for emergencies**

Construct and improve emergency grain processing, supply, and transportation networks, and integrate the emergency grain supply network with local grain logistics development plans to achieve effective use of grain. The layout of the emergency supply network should take into account urban and rural areas as well as remote regions, ensuring sufficient coverage and a reasonable and balanced layout. In coordination with transportation and other relevant departments, plans for emergency road and transportation capacity guarantees should be well prepared. It is essential to fully establish a long-term and stable coordination and collaboration mechanism with transportation, logistics, and other relevant departments, and accelerate the establishment of a multi-department collaborative grain integrated management system. Strengthen the construction of a big data system for food security, quickly integrate data on domestic and international grain production, processing, storage, sales, markets, population, policies, weather, and natural disasters, and fully utilize modern technologies such as remote sensing, aerospace, geographic information, cloud computing, and artificial intelligence to conduct scientific monitoring, early warning, and situational judgment of the current state of global and national food security, and to make scientific responses to various exogenous shocks.

### **4.3. Promote a higher level of agricultural opening-up**

Agricultural production should be expanded, strengthened, and optimized. In terms of "going global," it is necessary to strengthen the green, clean, and legal operations of

agricultural enterprises, adhere to national policies, actively take on social responsibilities, and prevent malicious market competition. Promote the WTO negotiation process, enhance international cooperation in the field of grain circulation, better leverage China's significant role in international organizations and institutions such as the Food and Agriculture Organization (FAO) of the United Nations and the Asia-Pacific Economic Cooperation (APEC), actively participate in the formulation of international trade rules, including transaction methods, quality, quantity, pricing currencies, and pricing currencies, and strengthen cooperation between bilateral governments to jointly address new challenges in global food security. The international agricultural aid model has been optimized, and a comprehensive international aid system guided by industrial layout, supported by human resource development, and backed by public sentiment has been established, thereby enhancing its international strength.

### **4.4. Improve the enterprise quality, safety and reputation tracking system**

Enhance digital capabilities in rural areas and promote the development of high-speed internet and mobile internet in rural areas. Utilize modern digital agricultural technologies such as the Internet of Things (IoT) and 3S technology to accelerate the construction of a unified, authoritative, clearly defined, coordinated, and efficient traceability system for agricultural product quality and safety, expand its coverage to a broader range, and strengthen the connection with online and offline sales platforms and supermarkets, thereby promoting the consumption of traceable products. On the basis of ensuring information security, promote collaboration between governments and third-party institutions, and accelerate the establishment of a unified big data platform for agriculture, rural areas, and farmers, strengthen the construction of the rural credit system, and help financial support policies such as agricultural insurance, credit, and subsidies to be precisely implemented [4].

## **5. Conclusion**

In summary, food security has become a focal point of concern for the broad masses of the people. In the new era of socialism with Chinese characteristics, China's food security is facing new challenges. Relevant departments must implement the strategic thinking of national food security into practical actions, seize opportunities, and enhance capabilities. They should start from multiple aspects such as legislative construction, publicity guidance, green production, basic guarantees, and emergency guarantees to ensure the stability of food supply and the quality of food, making new contributions to the realization of food security in the new era.

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