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Modern Agricultural Transformation and Trends of Food Supply and Demand in China

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Abstract: This study aims to clarify the direction for agricultural transformation, the transformation path of production, and the trend of food supply and demand in China, and to propose development strategies and policy suggestions for China's agriculture transformation. Facing six major challenges in agricultural development, China should further promote supply-side structural reform for its agriculture, optimize production structure, improve the supply and demand of agricultural products, and upgrade the quality of these products. After analyzing the panel data of farmer surveys, we propose promoting China's modern agricultural transformation by improving the land transfer market and the socialized service system. Our projection analyses indicate that the imbalance between supply and demand of many agricultural products in China will be prominent by 2035. China's feed self-sufficiency rate will continue to decline, and the demand gap for sugar and edible oil will gradually expand. The production of livestock products and the gap between supply and demand will largely depend on the feed grain trade and grassland development policies, while the export of vegetables and fruits still maintains a certain comparative advantage.
Keywords: agricultural production structure; food security; supply; demand

1 Introduction

Given domestic and global resources and environmental constraints, China's agricultural development is facing many challenges. To ensure national food security and nutrition among the population, China should rely on agricultural science and technological innovation to maintain agricultural growth and transform small-scale production while modernizing agriculture. Rising wages and land rents have led to a decline in the comparative advantage of agricultural commodities, which has clearly affected the competitiveness of agricultural commodities in the international market. In the short term, we should solve the issues resulting from the mismatch between production structure and the actual demand under market distortion, the gap between domestic and international prices and the increased storage of major grain crops. In the long term, water shortages and the degradation of arable land threaten the sustainability of China's agriculture.

In 2019, the *Opinions of the CPC Central Committee and the State Council on Giving Priority to Agricultural and Rural Development* highlight two goals: maintain the supply of major agricultural products based on domestic production and strategically rely on both domestic and international markets and production resources to maintain

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food security. To better adapt to the new context of agricultural development, a better understanding of answers to the following questions is urgently needed. For example, from a global perspective, how can the structure of agricultural production be adjusted based on changes in China's food supply and demand? How can the transformation of the agricultural structure be promoted and food security ensured given the comparative advantages of China's agricultural products? How should the direction and trend in modern agricultural transformation be clarified to develop a pathway for China? This paper presents the characteristics confronting China's agriculture and the challenges facing future agricultural development and focuses on the pathway for China to achieve a food security strategy and modern agricultural transformation from the perspective of the comparative advantage of agricultural products and the stakeholders.

2 Background on global agricultural development

2.1 Demand for agricultural products

The United Nations predicts that the global population will increase from 7.5 billion in 2017 to 9.7 billion by 2050. [1] With the growth in income and rapid urbanization in developing countries, food consumption per capita will continue to increase; in particular, the consumption of high value-added agricultural products (aquatic products, livestock products, vegetables, etc.) will maintain significant growth.

2.2 Distribution of cultivated land and water resources

Differences in the distribution of arable land and population around the world have greatly affected the production structure and trade in agricultural products. Disparities in arable land per capita have led to differences in the supply of agricultural products across the country. Due to the uneven distribution of arable land and population, for some countries trade in agricultural products has a very important impact on food security. From a global perspective, an increase in cultivated land mainly occurs in countries with smaller populations which thus have more available land, while the cultivated land in countries with increasing population density may decline. This means that the difference in cultivated land per capita will further expand, and hence so too will the scale of international trade in agricultural products. Food is one of the most important tradable commodities, and food imports per capita will continue to grow regardless of whether a country has more or less arable land per capita.

The distribution of water resources is even more severely unequal than that of cultivated land [2]. On the one hand, the demand for irrigation water is increasing, while the demand for water resources for other uses in the industrial sectors is also increasing. On the other hand, it is predicted that the total supply and availability of water will barely increase. By 2050, the global water shortage will have become increasingly severe, especially in Northern China. Some studies show that the greatest threat to global food security is not a shortage of land resources but a shortage of water resources [3].

2.3 The current situation of grain production

The average yield of cultivated land in the United States is approximately 8 t/(hm^2·a), but only 5% of countries in the world reach this level, and the corresponding grain output accounts for approximately 1% of the total global output. China's grain yield is close to 6 t/(hm^2·a); the number of countries at this level accounts for 42% of all countries, and the corresponding grain output accounts for approximately 50% of the total global output. In other words, approximately half of the world's grain is produced in countries with a grain yield of less than 5 t/(hm^2·a). Thus, there is still great potential for growth in global food production, and agricultural growth in the future will mainly depend on improvements to productivity. To ensure food security in China, we also need to pay more attention to the potential growth of agricultural production in developing countries.

2.4 Agricultural policies of developed countries

In the past 30 years, agricultural policies in developed countries have changed from intervention- to market-oriented, from providing huge agricultural subsidies to improving agricultural productivity and maintaining the sustainability of resources and the environment. In developed countries, enhancing competitiveness and sustainable development is a policy priority for agricultural development.

3 The main challenges to China's agricultural development from a global perspective

China's agricultural production is facing a series of challenges in the potential risk of maintaining food self-

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sufficiency and food security, the comparative cost disadvantage of its agricultural products, the weak growth of agricultural productivity, small-scale production and operation, a rigid market protection mechanism for agricultural commodities, and the degradation of natural resources.

3.1 Food security and safety

It is difficult to balance the overall supply and demand for food in China, in that the supply of some agricultural products simply cannot meet demand. The overall self-sufficiency rates for both food and grain crops are declining. Without major breakthroughs in agricultural science and technology, it is estimated that the food self-sufficiency rate will be less than 85% in 2030. The import volumes of feed crops, for example, corn and soybeans, will reach 4×10^7 t and 1×10^8 t, respectively. The import volume of edible oil, sugar, dairy products, and forage grass will also increase significantly [4].

Malnutrition in China cannot be ignored, and food safety is a serious problem. Malnutrition and micronutrient deficiency in the population are still relatively common. According to a survey conducted by the China Agricultural Policy Research Center, Chinese Academy of Sciences, poor rural infants and young children continue to have poor nutritional status; in particular, anemia is prevalent, affecting 33% of primary school students. The continuous occurrence of food safety incidents directly affects consumers' confidence in domestic food safety.

3.2 Increasing wages and decreasing comparative advantages of agricultural products

Though the real rise in wages helps poverty reduction in rural areas, it has somewhat reduced the comparative advantage of China's agricultural commodities. In recent years, the opportunity cost of labor in agricultural production has increased significantly, with an 8% annual growth rate. If technology is not adopted, including substituting labor with machines [5], the comparative advantage and competitiveness of China's agricultural commodities in the international market deserve the special concern. For example, the comparative advantage of corn dropped sharply after 2007, and began to show an obvious comparative disadvantage after 2010. Cotton and soybean have been at an obvious comparative disadvantage since 2003. Pork has been at a comparative advantage since 2006 but shifted to a comparative disadvantage after 2015. Even though vegetables and fruits have always maintained their comparative advantages, the level of comparative advantage has also declined.

3.3 Agricultural science and technology innovation

Another challenge is the agricultural scientific research and agricultural technology extension systems [4]. The prominent problems in the agricultural scientific research system include: (1) a lack of incentive for agricultural scientific research; (2) a mismatch between agricultural scientific research projects and the actual technologies demanded in agricultural production, (3) the unclear status of agricultural public scientific institutions, and the barriers faced by large enterprises to joint cooperation in agricultural scientific and technological innovation; and (4) the limited investment in agricultural research which forces researchers to focus on short-term benefits. These factors make it difficult to achieve breakthroughs in key research fields.

The problems in the agricultural technology extension system are summarized as follows: (1) the agricultural technology extension bureau has not fully clarified its orientation; (2) the management system of the agricultural technology extension at the grassroots level remains disorganized; (3) extension technicians lack incentives; (4) the capability building within this system is weak, and it is difficult to meet the requirements of new technology diffusion; (5) the traditional "top-to-bottom" technology extension pathway is not meeting the needs of agricultural development and lacks a feedback mechanism for obtaining information on farmers' technical needs, making it difficult to meet the diversified needs of farmers; and (6) there is insufficient investment in agricultural technology extension.

3.4 Small-scale production of farmers

China's small-scale agricultural production is a constraint to improve the labor productivity and realize agricultural modernization. China's production is dominated by more than 200 million small-scale stakeholders. The average farm size decreased from approximately 0.8 hm^2 in the early 1980s to less than 0.54 hm^2 in 2003. Although the average farm size has increased since then, it remained at only approximately 1.0 hm^2 in 2016. Such small-scale production also constrains farmers' investments in production and thus their capability to increase their income. Small-scale production also constrains the adoption of new technology, mechanization, and information and

communications technologies.

3.5 Agricultural support policies

It has proven difficult for agricultural support policies in China to achieve the expected objectives, due to the following issues: (1) the agricultural subsidy policy has a high financial cost and is decoupled, so its positive impact on agricultural productivity and sustainable development is limited [6]; (2) price intervention policies do not reduce the production cost but instead distort the market mechanism and the rational allocation of resources. However, canceling the price intervention policy may have a negative impact on farmers' income; (3) tariffs can only provide very limited protection to China's agricultural products against impacts from the international market. The average tariff level for China's agricultural products (approximately 15%) is far lower than the average tariff level for global agricultural products (approximately 62%), and trade protection measures are ineffective. In addition, the adoption of non-trade barriers can only deliver limited short-term benefits (which often leads to trade disputes).

3.6 Agricultural resources and environment

China's agricultural production is facing the increasingly severe threat of water shortages and the degradation of cultivated land. China is one of the countries experiencing the greatest degree of water shortage worldwide. With rapid industrialization and urbanization, the deterioration of water and soil resources also threatens food security, and climate change has also brought many uncertainties and risks to agricultural production.

4 Comparative advantages of agricultural products and the adjustment of agricultural structure

4.1 Products

Stabilizing rice and wheat production is crucial to grain ration security and national food security. It is important to adopt better varieties, improve product quality, reduce production costs, and enhance competitiveness under the shock of importation.

To further improve the comparative advantages of China's vegetables and fruits while ensuring the quality of exports, we should rely on technological progress and improvements to production, operations, and management to reduce production costs, maintain China's price advantage, and increase its share in the international market.

To improve the comparative advantage of aquaculture, we should consider residents' consumption preferences for fresh products and improve product quality.

We suggest that China produces agricultural commodities with comparative advantages and capital-intensive commodities. China should also rely on its policy portfolio to guide capital investment, expand its production share and enhance its competitiveness in the international market, thus narrowing the gap caused by the reduction in China's traditional labor-intensive agricultural products.

4.2 Policy

The focus of financial support for agriculture should gradually shift from agricultural subsidies and market intervention to investments oriented to improve productivity and reduce production costs. Furthermore, policy should also increase its support for the development of high-quality agricultural products and industries which ensure the quality and safety of agricultural products.

Policy development should focus on implementing policies that support an increase in farmers' incomes; support the development of efficient aquaculture and rural tourism; promote integrated development of primary, secondary, and tertiary industries to expand the value chain; promote growth of farmers' employment and income; support the development of scaled operations; rely on agricultural insurance policies; and improve farmers' capacity to counter natural disaster and market risks.

Improving support policies for green development would include adhering to the guidance of green ecological sustainability; reducing the use of chemical fertilizers and pesticides; promoting diversified treatment of crop residuals and manure; encouraging the development of water-saving technologies; advocating for the ecological protection of cultivated land and grassland; and subsidizing farmers who adopt fallow, rotation, and return grazing to grassland.

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4.3 The target effect

We should ensure national food security and an effective supply of agricultural products, optimize the share of products, maintain stable growth in farmers' incomes, maintain the sustainability of ecology, increase the effectiveness of the driving force for agricultural development, improve agricultural productivity, and promote the development of rural areas. The specific objectives are as follows:

(1) Steadily improve the comprehensive capacity of agricultural production, ensure basic self-sufficiency for grain and the absolute security of food rations, enhance productivity and competitiveness, and ensure the supply of livestock products.

(2) Promote agricultural supply-side structural reform, facilitate structural change in the production, balance the supply and demand of agricultural products, and improve food quality and safety.

(3) Carry out green production, implement zero growth for pesticides and chemical fertilizers, vigorously improve the efficient utilization of water resources, effectively deal with severe problems in rural environments like the effects of overuse of chemical fertilizer, etc, and maintain the ecological sustainability.

(4) Adhere to market orientation and improve the price and price adjustment mechanisms of major agricultural products.

5 Explore the pathway for modern agriculture transformation from the perspective of development among stakeholders

5.1 The trend of stakeholders

According to the survey data for Northeastern and Northern China, the number of stakeholders such as large households (or family farms), cooperatives, and agricultural enterprises has rapidly increased. Since 2008, in particular, cooperatives and agricultural enterprises independent of family farmers have become new production stakeholders (Table 1). These stakeholders (with farm sizes of more than 7 hm^2) accounted for 27% of cultivated land in 2013 and more than 35% in 2016, although they accounted for only approximately 1% of the total number of stakeholders.

Table 1. The proportion and average farm size of different stakeholders.

	The proportion of different stakeholders (%)				Average farm size (hm^2)			
	2003	2008	2013	2016	2003	2008	2013	2016
Land cooperatives	0	0.0005	0.14	0.2	—	55.0	216.0	339.0
a) Pay rent only	0	0	0.01	0.05	—	—	109.0	—
b) Profit sharing only	0	0.0005	0.12	0.15	—	67.0	138.0	—
c) Both pay rent and share profits	0	0	0.01	0.	—	—	128.0	—
Companies	0	0.0002	0.01	—	—	43.0	500.0	400.0
Farmers	100	99.999	99.85	99.75	1.7	2.2	4.5	5.0
<1 hm^2	73.4	68.5	59.5	53.9	0.5	0.5	0.5	0.5
1–2 hm^2	15.7	17.2	18.8	21.2	1.4	1.4	1.4	1.5
2–3 hm^2	6.6	8.6	12.7	13.7	2.4	2.4	2.3	2.5
3–7 hm^2	4.1	5.4	8.1	9.6	4.4	4.6	4.4	5.0
7–15 hm^2	0.2	0.2	0.5	1.1	9.7	9.7	9.9	10.1
>15 hm^2	0	0	0.2	0.3	24.2	33.0	50.6	31.1

Note: The data in 2003, 2008, and 2013 were from six provinces: Heilongjiang, Jilin, Liaoning, Shandong, Hebei, and Henan. The data in 2016 were samples from four provinces: Heilongjiang, Jilin, Shandong, and Henan. All data are weighted.
Source: Author's survey data

5.2 Factors affecting development among stakeholders

An empirical study based on a survey in Northeastern and Northern China shows that rapid development among stakeholders and the significant increase in the operation scale in recent years are mainly due to three driving forces

in the market and two policy factors.

5.2.1 Driving forces in the market

The first driving force is the rapid increase in labor wages. Since 2008, unskilled labor wages (or the opportunity costs of agricultural production) and the wages of hired labor in agricultural production have both increased at an average annual rate of approximately 8%, and this has promoted rural to urban migration. Wage growth also increases the production cost of farmers using labor-intensive technology, thus accelerating the transfer of cultivated land and land consolidation.

The second driving force is the development of the land rental market. The land transfer platforms established in many regions in recent years are more functional than those in earlier years. Land transfer platforms in some regions have become an important institutional reform because they significantly reduce the transaction costs and risks of agricultural land transfer and play an important role in promoting land transfer and expanding operation size. For example, in Northeastern and Northern China, the ratio of farmers who rented in to those who rented out land was 1:1.3 in 2003, whereas it was 1:3 in 2013 and 1:4 in 2016.

The third driving force is the rapid development of the market-oriented social service system. The functioning of the rural capital market and the rapid development of social services have provided mechanization and equipment that helps farmers expand their area of operation. The development of the social service system for mechanization can provide effective support helping small-scale stakeholders to overcome investment constraints in expanding the scale of operation. Its impact on farm size is positive.

5.2.2 Policy factors

First, policy should consider the target price of grain and other agricultural products and the policy for storage. A minimum purchase price for rice and wheat and the temporary purchase and storage policy for corn and other agricultural products have maintained stable prices for grain and other commodities, reduced risk, and encouraged different stakeholders, including enterprises and individuals, to invest in agricultural production. In some regions, new stakeholders now dominate in agricultural production.

Second, subsidies for new stakeholders, such as large-scale farmers, cooperatives and enterprises, are important. Many local governments promote large-scale stakeholders aiming to expand farm size as a pathway to agricultural modernization. Since 2008, subsidies and prioritization for new stakeholders have been implemented in many regions. The minimum operation size of the stakeholders must be no less than 100 mu (1 mu≈666.67 m^2) up to more than 250 mu subject to being subsidized. These policies have clearly promoted the development of large-scale stakeholders and the expansion of operation size.

5.3 Problems faced by the development of stakeholders

5.3.1 Exceeding the optimal operation level

Farm size and grain yield have an inverted U-shaped relationship, with an average turning point of less than 100 mu. This turning point will change due to variations in the operation size, the quality of land, crops, the management capability of stakeholders, and the availability of mechanization. Keeping all other factors constant, the optimal farm size varies between 40–200 mu across regions.

Farm size and production cost (yuan/kg) present a U-shaped relationship, with an average turning point of approximately 100 mu, which is slightly higher than the average turning point for farm size with yield. Similar to yield, this turning point also varies in different areas.

5.3.2 Some challenges

From 2008 to 2013, even when food prices were rising, majority of large-scale stakeholders obtained a surplus only after being subsidized. As food prices fell in 2016, most of stakeholders suffered substantial losses and faced a “dilemma” in production. If food prices continue to fall, these large-scale stakeholders face risk bankruptcy.

5.3.3 The issues of subsidy

Subsidies and other support policies have raised the price of agricultural labor but distorted the land market and encouraged the emergence of inefficient large-scale stakeholders. This reduces not only grain productivity and market competitiveness but also the added value of commodities, which negatively impacts the income of the majority of farmers and employment.

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5.3.4 Other factors including capital, technology, and talent

In many areas, the conditions for the promotion of large-scale stakeholders are not mature. In the survey, nearly half of the county-level agricultural leaders and nearly one-third of township cadres believe that capital, technology, and talent are the main factors correlated with the development of large-scale stakeholders. This shows that without institutional reform, the development of moderate/large-scale stakeholders will continue to face challenges.

5.3.5 Lack of supervision and evaluation of large-scale stakeholders

The survey shows that a lack of supervision of large-scale stakeholders and the arbitrage of state subsidies are common. Some stakeholders registered in the name of the large-scale stakeholders to earn the subsidy and are not subject to the cutoff of farm size. None of the local governments evaluate the impact of the support policies.

5.3.6 Some social problems

Given the constraints of off-farm employment and food demand (for example, vegetables), many women over 40 and men over 55 years old are engaged in small-scale production. However, because land has been consolidated in some villages and transferred to enterprises or large-scale stakeholders, laborers who used to work in agriculture are jobless, which may cause new social problems if livelihoods in the countryside are not diversified.

5.4 Policy suggestions for the development of large-scale stakeholders

5.4.1 Promote large-scale stakeholders to specialization

We suggest that large-scale stakeholders should be classified into crop production, non-crop production (such as vegetables and greenhouses and orchards), livestock production, and fisheries.

The optimal farm size should be subject to specialization in production; with a favorable market environment, optimal farm size will be achieved.

5.4.2 Promote cooperatives mainly among large-scale farms

At present, in many regions, the promotion of large-scale stakeholders aims to expand the operation size. However, the production cost per unit (yuan/kg), that is, agricultural competitiveness, deserves attention as a way to increase farmers' income and sustainability.

Considering policy, it should be oriented toward improving the total factor productivity and the competitiveness of agricultural products (reduce the production cost per unit) and increasing farmers' income.

In other words, policy should support stakeholders with a moderate scale of operation especially farmers, and government should stop subsidizing very large-scale stakeholders.

5.4.3 Improve the land rental market and the social service system

Resource allocation should be market-oriented to reduce transaction costs and the risks of land rental activity; institutional reform can promote moderate-scale stakeholders through policy support (such as finance, credit, and technology) allowing them to play an important role in agricultural production.

Large-scale operations should be encouraged in parallel with urbanization. If the average farm size reaches 100 mu, only 1.8×10^7 family farms are needed; if the average farm size reaches 250 mu, only 7.2×10^6 family farms are needed. Creating employment opportunities for hundreds of millions of farmers should thus be a priority. Promoting large-scale stakeholders will be a long-term process.

6 Projections of food demand and supply

The trend for the supply and demand for agricultural commodities in China is predicted based on the baseline analyses, and we propose policy implications for the future supply and demand of agricultural products.

6.1 Macroeconomic and social indicators in the baseline analysis

To analyze the trends in the supply and demand for different agricultural commodities in China until 2025 and 2035, we made the following assumptions for economic growth, urbanization and wage growth rates, urban and rural incomes, price elasticity, and technological progress by commodities.

In terms of the GDP growth rate: by 2020, the average annual GDP growth rate will be 6%–7%; from 2021 to 2025, it will increase by 5%–6%; from 2026 to 2030 by 4%–5%; and will remain above 4% from 2031 to 2035.

The income gap between rural and urban residents will gradually decrease in the future. Trends in the past decade show that the income of rural residents is increasing more rapidly than that of urban residents. Thus, it is assumed

that the annual disposable income per capita of rural residents will increase by 6.2% in real terms by 2025. From 2026 to 2035, the increase will be 5.3%. For urban residents, by 2025, the average annual real growth rate will be 5.6%; with a 4.8% annual real growth rate from 2026 to 2035.

According to the *National Population Development Plan (2016–2030)*, China's total population will reach its peak around 2030. Therefore, from 2021 to 2025, the average annual population growth rate will be 0.21%. From 2026 to 2030, the average annual population growth rate will be 0.10%, reaching 1.45 billion by 2030. From 2031 to 2035, the total population will drop slightly and remain at the level of 1.4–1.45 billion.

China's urbanization rate is increasing. It is estimated that from 2021 to 2025, the urbanization rate will increase annually by 1.5% and reach 64% in 2025. The urbanization rate will increase by 1.6% annually from 2025 to 2030 and reach 70% by 2030. Finally, the urbanization rate will increase by 1.7% annually from 2031 to 2035 and reach 75% by 2035.

In the research and development of agricultural science and technology, the government will continue to increase investment in agricultural science and technology, but with the increase in marginal cost per unit, the contribution of technology has a downward trend.

In terms of global food prices, the prices of international agricultural products before 2025 are mainly based on the projection of the United States Department of Agriculture and the Organization for Economic Cooperation and Development-Food and Agriculture Organization (OECD-FAO). It is expected that the price of international agricultural products will remain stable from 2026 to 2035.

6.2 Projection of the supply and demand of agricultural products

The projections of demand and output of major agricultural products are shown for 2025 and 2035 in Figs. 1 and 2, respectively. As a whole, the imbalance between the supply and demand for agricultural products in China will become more prominent in the future, and this situation will continue until 2035.

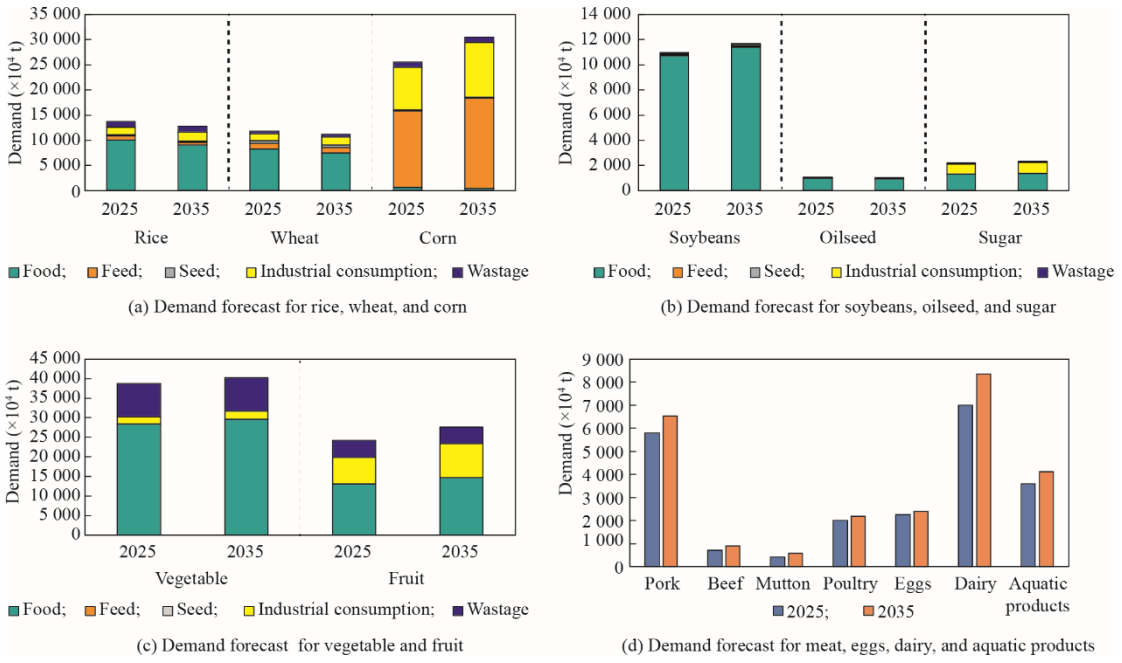

Fig. 1. Demand forecast for major agricultural products in 2025 and 2035 (10^4 t).

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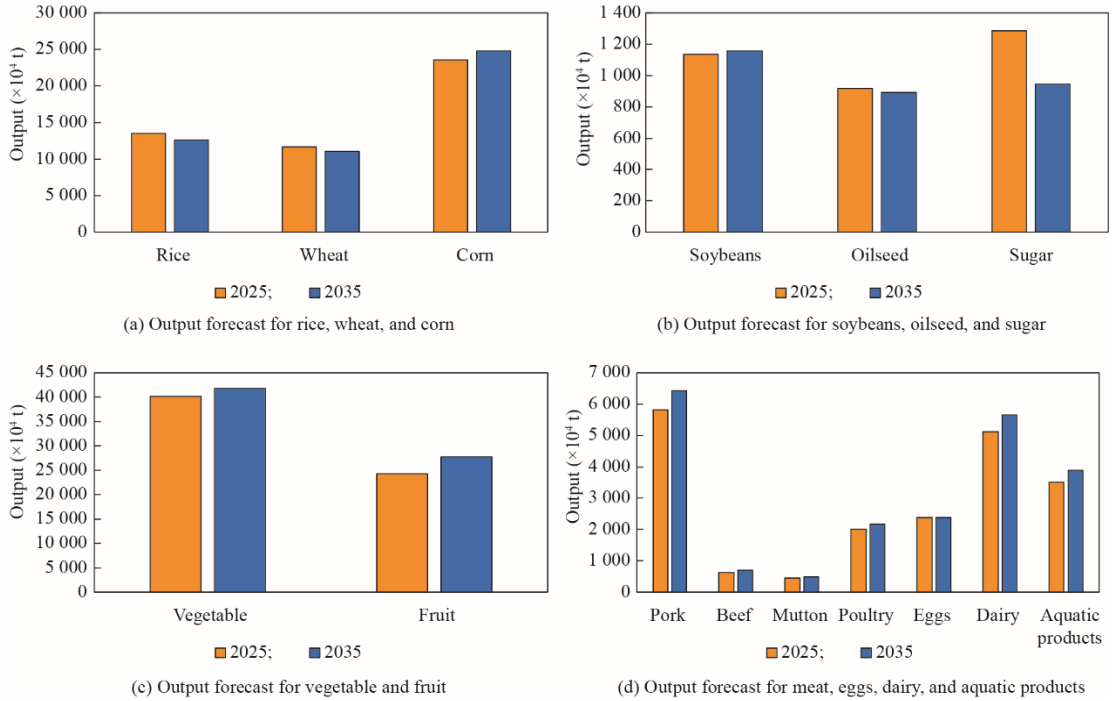

Fig. 2. Output forecast for major agricultural product in 2025 and 2035 (10^4 t).

The demand for feed crops in China will be significantly higher than that of domestic production, and the self-sufficiency rate will continue to decline. Under a scenario of domestic agricultural production resources, policies, technological progress and changes in demand, rice, wheat, and other staple grain crops will be basically self-sufficient by 2035. Although corn was oversupplied due to ongoing policy intervention and a policy to address a gross surplus in corn stock has been under way since 2016, it is projected that the demand for feed crops will increase significantly in near future because the demand for livestock products will continue to increase. If the tariff quota is canceled, the import of corn will exceed 5.6×10^7 t in 2035, and the self-sufficiency rate of corn will drop to 82%. The gap between the supply and demand for soybeans will be further widened.

China's demand for sugar and edible oil will be significantly higher than its domestic production, and the gap between supply and demand will gradually widen. According to the projection, the self-sufficiency rate for sugar will be reduced to 40% in 2035. A self-sufficiency rate for oil crops will remain at approximate 87%.

China's cotton production will gradually shrink, and the gap between the supply and demand for cotton will further widen. With China's maintaining cotton production mainly in Xinjiang, the self-sufficiency rate of cotton will be reduced to 67% in 2035. It is worth noting that cotton production has overused the limited water and soil resources in Xinjiang and other regions.

The output of vegetables and fruit (including melons and fruits) will increase steadily and continue to maintain a comparative advantage in export. China is one of the world's major exporters of vegetables and fruits. By 2035, the self-sufficiency rate of vegetables will remain at approximately 104% and that of fruits will remain at approximately 100%.

The production of many livestock products and the gap between supply and demand will depend to a large extent on the trade policy for feed and grain crops and the policy for grassland and the development of husbandry. The supply and demand for livestock products will be basically balanced, with slight imports by 2035, but the supply and demand balance of livestock products is uncertain. To ensure food security (mainly the supply of livestock products), a clear strategy and policy portfolio is required to determine whether to increase the import of livestock products or to increase the import of feed crops. If the feed crop market is liberalized and domestic husbandry is developed through imported feed, the supply and demand for other livestock products, except beef, mutton, and dairy products will, in essence, remain balanced. However, under a scenario that restricts the import of corn and overlooks the development of grassland and husbandry, China's import of livestock products will increase significantly and depend on the unreliable supply in the global market. Apart from imported pork and chicken, the import growth rate of beef, mutton, and dairy products will be more significant. By 2035, China's self-sufficiency

rate in these products will drop to 70%~80%.

7 Conclusion

China's agriculture has entered a new era, and it needs new strategies and tactics. Over the past 40 years, China's agricultural growth has been achieved at the expense of the environment and sustainability. The past agricultural production pathway can no longer meet the requirements of ensuring food security and sustainable agricultural development in the future.

Based on the background of global agricultural development, this paper identifies the specific challenges faced by China's agricultural development and indicates the direction for agricultural structure adjustment considering the aspects of products, policies, and objectives. Applying survey data and projection analysis, this research predicts the future adjustment target for China's agricultural production structure and the transformation path of modern agricultural production. Accordingly, this study proposes strategic targets and policy suggestions for the agricultural transformation.

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