# Analysis and Outlook of China's Soybean Supply and Demand Situation

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**Abstract:** *Soybeans are crucial to national food security and public nutritional health. With the rapid economic and social development, China's soybean consumption has continued to grow rapidly, but production capacity has increased slowly, resulting in a huge gap between supply and demand. Not only has the import dependence remained high at over 80%, but there is also the risk that more than 90% of imports come from American countries such as Brazil, the United States, and Argentina. This paper analyzes the supply and demand situation of China's soybeans in detail, applies the CAMES model to forecast and study China's soybean production, consumption, imports, and prices over the next 10 years, providing some reference for a comprehensive understanding of the current and future supply and demand situation of China's soybeans.*

**Keywords:** Soybean Yield; Consumption; Imports; Price; Supply and Demand Outlook.

## 1.  Analysis of Current Situation of China's Soybean Supply and Demand

1) Output hits a record high. In 2023, domestic soybean output reached 20.84 million tons, an increase of 2.8% year-on-year, exceeding 20 million tons for two consecutive years and setting a new record. Among them, the national soybean sown area was 157.05 million mu, an increase of 3.451 million mu or 2.2% year-on-year, remaining stable above 150 million mu for two consecutive years. Notably, the demonstration areas undertaking large-scale promotion of strip intercropping have further expanded, with pilot provinces increasing from 16 to 17, task counties to 1,354, and participating new agricultural business entities to over 120,000, covering a total planting area of more than 20 million mu. The increase in sown area is attributed to the state further raising soybean producer subsidies, expanding the subsidy gap between corn and soybeans, increasing financial credit support, promoting soybean-corn strip intercropping, guiding new agricultural business entities to grow soybeans, and introducing grain-producing county rewards. In terms of yield per unit area, 2023 marks the first year of implementing the large-scale soybean yield improvement campaign. Focusing on "good seeds, good fields, good methods, good machinery, and good systems", various regions have continuously addressed weaknesses restricting soybean yield improvement, achieving remarkable results. Despite severe floods in parts of Northeast and North China, the national average yield per mu reached 132.7 kg, an increase of 0.5% year-on-year, with market-circulated soybeans having larger protein particles and higher protein content than the average level of previous years.

2) Consumption increased steadily and slightly. In 2023, domestic soybean consumption reached 111.76

million tons, an increase of 2.21 million tons or 2.0% compared to the previous year. In terms of structure, crushing accounted for 84.7%, edible consumption for 11.9%, and seed use, soybean puffing processing use, loss, and other uses together accounted for 3.4%. In 2023, the domestic pig inventory remained above the normal stock level, increasing feed consumption and thereby stimulating demand for protein meal; however, affected by the Ministry of Agriculture and Rural Affairs' implementation of the action to reduce and replace feed soybean meal, as well as the continued decline in pig breeding profits, consumption of feed grains such as soybean meal was continuously reduced. The soybean crushing volume was 93.8 million tons, an increase of 2.2% over the previous year. In terms of edible consumption, China is the world's largest producer and consumer of soy products, with a solid mass foundation and strong rigidity in consumption growth. However, due to the low prices of other agricultural products and increased substitutability, the recovery of soy product consumption fell short of expectations, with annual consumption reaching 13.2 million tons, an increase of 1.5% over the previous year; seed use was 860,000 tons, an increase of 2.4% over the previous year; soybean puffing processing and loss stood at 2.9 million tons, basically the same as the previous year.

3) Imports continued to increase. Affected by the growth in domestic crushing demand and the high operation of soybean meal prices, China's soybean imports stopped falling and rebounded in 2023, but did not exceed the historical high of 100 million tons. According to data from the General Administration of Customs, China imported 99.41 million tons of soybeans in 2023, an increase of 10.19 million tons or 11.4% compared to the previous year; the import value was 59.76 billion US dollars, an increase of 4.8% compared to the previous year. Among them, imported genetically modified soybeans were 97.71 million tons, accounting for 98.3%. In terms of import sources, the ranking of China's main soybean import source countries in 2023 was Brazil (69.95 million tons), the United States (24.17 million tons), Argentina (1.99 million tons), Canada (1.47 million tons), Russia (1.29 million tons), and Ukraine (49,000 tons). However, the import shares changed: Brazil's share increased from 61% to 70.4%, the United States' share decreased from 31.2% to 24.3%, Argentina's share decreased from 3.9% to 2%, and the shares of Canada, Russia, and Ukraine all decreased.

4) Prices continued to decline. In 2023, the prices of domestic soybeans in both production and sales areas showed a downward trend. Among them, the annual average price in Heilongjiang, the production area, was 5.16 yuan/kg, down from

It fell by 14.6% last year, with monthly price year-on-year declines all exceeding 10%; the annual average factory-gate price in Shandong sales area was 5.82 yuan/kg, down 10% from the previous year, with monthly price year-on-year declines exceeding 6%. The direct reasons for the continuous decline in domestic soybean prices are the "double increase" in soybean production and imports, weak demand recovery, and continued decline in import prices. The fundamental reason is that the competitiveness of the domestic soybean industry chain needs to be improved, as the 明显 lower soybean yield per unit area than the international level leads to poor planting economic benefits, and the purchase price is significantly higher than the landed cost of imported soybeans. Due to the processing scale advantage and price advantage of imported soybeans, enterprises mostly choose imported soybeans for pressing soybean oil and soybean meal, while domestic soybeans are mainly used for food consumption and protein processing, which has a small volume compared with pressing consumption. The downstream demand for domestic soybeans urgently needs to be expanded.

## 2.  Outlook and Analysis of China's Soybean Supply and Demand Situation

1) Forecasting Model. This article adopts the China Agricultural Monitoring and Early-warning System (CAMES) developed by the Agricultural Information Institute of the Chinese Academy of Agricultural

Sciences. It integrates technical methods such as data mining, artificial intelligence, statistical analysis, and neural networks, applies multidisciplinary knowledge including economics, agronomy, meteorology, and computer science, and realizes the integration of biological mechanisms and economic mechanisms in accordance with the principles of relevance, unity, and balance. It has multiple functions such as monitoring, analysis, simulation, early warning, and outlook, and is a庞大 cluster system of multi-variety and multi-market models. Based on assumptions about certain economic and social conditions (economic development, population changes, urbanization level, urban and rural residents' income, consumer prices, RMB exchange rate, international crude oil prices, etc.) and agricultural production conditions (primary industry employment, cultivated land resources, water resources, scientific and technological progress, policy changes, etc.), CAMES provides outlook on the production, consumption, trade, and prices of 20 types (categories) of China's major agricultural products.

2) Production Outlook. (1) Stable increase in sown area. The 2024 Central Document No. 1 states, "Consolidate the achievements of expanding soybean cultivation and support the development of high-oil and high-yield varieties." It is estimated that China's soybean sown area in 2024 will be 156.44 million mu, basically the same as the previous year. Over the next 10 years, as China further implements the National Project for Enhancing Soybean and Oilseed Production Capacity and continues to provide supportive policies for soybean cultivation, the soybean production area will increase steadily. It is projected that the soybean sown area will reach 184.47 million mu by 2033, an increase of 27.42 million mu compared to 2023, with an average annual growth rate of 2.4% over the next 10 years (Figure 2). (2) Significant improvement in yield per mu. 2024 is the second year of the large-scale soybean yield improvement campaign, which will continue to focus on key aspects such as "good seeds, good fields, good methods, good machinery, good systems" and socialized agricultural services. Multiple measures will be taken to promote soybean yield per mu. It is expected that the soybean yield per mu will be 138 kg/mu, an increase of 4.0% over the previous year. Over the next 10 years, with the vigorous promotion of high-yield and high-oil soybean varieties, the integrated extension of high-yield and efficient technologies, and the continuous improvement of mechanized operation capacity, the domestic soybean yield per mu will be significantly enhanced. It is projected to reach 193 kg/mu by 2033, an increase of 45.8% compared to 2023, with an average annual growth rate of 3.9% over the next 10 years (Figure 2). (3) Significant growth in output. Due to the stable increase in soybean area and significant improvement in yield per mu, output will grow significantly and self-sufficiency rate will continue to rise. It is estimated that soybean output in 2024 will be 21.59 million tons, an increase of 750,000 tons or 3.6% over the previous year. It is projected that soybean output will reach 35.68 million tons by 2033. Over the next 10 years, the average annual growth rate will be 6.4%, and the soybean self-sufficiency rate will exceed 30%.

3) Consumption Outlook. (1) Stable yet declining crushing volume. Affected by the gradual decrease in total population and the accelerated aging process, residents' pork consumption will show a stable downward trend. Coupled with the continuous national regulation of live pig production capacity and the in-depth implementation of the feed soybean meal reduction and substitution initiative, the consumption of soybean meal for pig breeding will continue to decline. However, large-scale livestock and aquatic farming and the processing of high-value-added soybean protein products will increase the demand for soybean meal, limiting the reduction in soybean meal consumption. It is estimated that the soybean crushing consumption in 2024 will be 93.19 million tons, a decrease of 0.7% from the previous year. Nevertheless, due to the domestic soybean processing subsidy policy, the use of domestic soybeans in the crushing sector will increase. By 2033, soybean consumption will be 91.30 million tons, a decrease of 2.5 million tons or 2.7% compared to 2023. Over the next 10 years, the growth rate of crushing processing will decline by an average of 1.2% annually, in sharp contrast to the 2.5% growth

rate of crushing processing in the past 10 years. (2) Steady increase in edible consumption. In the future, as residents' health awareness continues to improve, the concept of "reducing oil and increasing beans" will be widely accepted. It is expected that the proportion of soybean products in the diet will continue to rise, which is expected to drive a steady growth in the total consumption of soybean products. It is estimated that China's edible and edible processing consumption of soybeans will be 13.53 million tons in 2024, an increase of 2.5% from the previous year; by 2033, edible consumption will increase to 16.99 million tons, a growth of 28.7% compared to 2023. Over the next 10 years, the average annual growth rate will be 2.6%. (3) Stable yet slightly increasing seed usage. With the increase in sown area, the usage of soybean seeds continues to grow, but the improvement in seeding technology and the improvement of soybean varieties have increased the seed efficiency per unit area. It is estimated that the consumption of soybeans for seed use will be 870,000 tons in 2024 and 970,000 tons in 2033. (4) Stable consumption of losses and other uses. With the continuous improvement of technologies in storage, processing and other links, other consumption such as soybean puffing processing and loss usage show a stable and slightly increasing trend. It is estimated that the consumption of soybean losses and other uses will be 3.02 million tons in 2024 and will increase to 4.03 million tons in 2033. (5) Slightly increasing total consumption. Affected by the increase in edible soybean consumption and the high level of feed demand, soybean consumption will increase slightly while remaining stable. In 2024, China's total soybean consumption is expected to be 110.61 million tons, a decrease of 0.1% from the previous year; by 2033, total soybean consumption will increase to 113.29 million tons, an increase of 2.53 million tons or 2.3% compared to 2023. Over the next 10 years, the average annual growth rate will be 0.3%.

4) Trade Outlook. Imports Decline from a High Level. Over the next 10 years, imported soybeans will remain the main source to meet domestic feed consumption. Brazil and the United States will continue to be the primary countries for China's soybean imports, with import volumes remaining at a high level. However, affected by the continuous decline in domestic feed processing consumption, the increase in domestic soybean production capacity, and the rising self-sufficiency rate of soybeans, soybean imports will show a downward trend. It is projected that China's soybean imports will reach 91.72 million tons in 2024, a decrease of 7.7% from the previous year; and 78.69 million tons in 2033, a decrease of 20.8% from 2023. Over the next 10 years, the average annual reduction will be 1.9%.

5) Price Outlook. In the short term, domestic soybeans have achieved bumper harvests for two consecutive years, imported soybeans have increased, and reserve rotation soybeans are sufficient. This has made demand entities price-sensitive, purchasing as needed. Coupled with the expected continued increase in production, domestic soybean price increases will be suppressed. However, considering farmers' planting costs and maintaining their enthusiasm for planting, domestic soybean prices are not expected to drop significantly and will operate steadily with a weakening trend throughout the year. Over the next 10 years, with the growth in domestic demand for soy products and high-quality protein, the demand for high-quality soybeans will be strong, and soybean prices are projected to rise steadily.

## 3. Analysis of Future Uncertainty Factors

1) Climate Factors. The National Climate Center predicts that in 2024, affected by the El Niño climate, many domestic regions may experience relatively frequent rainfall, which will to a certain extent increase the risk of rainstorms and floods in some areas; major grain-producing areas may face a polarization of drought and flood; some parts of the world may face more extreme weather, which will have a significant impact on global agricultural production. In the future, changes in the global climate, especially disasters such as early frost, drought, low temperature, freezing, and floods, will bring certain uncertainties to the production of major soybean-producing countries and domestic major soybean-producing areas, thereby affecting domestic and international soybean supply and prices.

2) Policy factors. The 2023 Central Document No. 1 proposed to "intensify efforts to expand soybean and oilseed cultivation, and further advance the project to enhance soybean and oilseed production capacity", "improve subsidies for corn and soybean producers, and effectively implement trials of full-cost insurance and planting income insurance for soybeans", and "further implement the action to reduce and replace feed soybean meal"; the 2023 Central Rural Work Conference proposed to "consolidate the achievements of expanded soybean cultivation"; the 2024 Central Document No. 1 proposed to "consolidate the achievements of expanded soybean cultivation and support the development of high-oil and high-yield varieties". In the future, the stability and continuity of policies will help the continuous development of domestic soybeans, but the actual effects of policies have certain uncertainties for the development of the soybean industry.

3) International factors. As an agricultural product with large global trade volume, soybeans are a key focus of international capital and are highly susceptible to factors such as monetary policies, exchange rate fluctuations, logistics conditions, and geopolitics. In 2024, the world economy is still in a period of moderate-to-low growth recovery, and downside risks to trade remain. Over the next 10 years, the global economy will face reform and reshaping due to the escalation of great power games, and the prevalence of protectionism and unilateralism will also hinder the process of economic globalization. Politics will become an important factor impeding international economic and trade relations. As the largest soybean importer, China faces certain uncertainties in import security.

4) Other factors. In 2021, the state launched pilot work on the industrialization of genetically modified (GM) corn and soybeans. In 2023, 14 GM soybean varieties were approved, and the first batch of GM soybean seed production and operation licenses were issued, accelerating the commercialization process of GM technology. In the future, a low-carbon economy will become an inevitable choice for the sustainable development of the global economy, and the growth in global demand for renewable energy may increase the use of soybeans in biodiesel. In addition, factors such as innovation and promotion of soybean breeding, research and development of GM technology, major animal epidemics, and public health emergencies will all change the supply-demand pattern and price trends of domestic and foreign soybean markets.

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