Content

Part 1 Fundamentals of Physical Sugar

I. Overview of Sugar Products

(I) Definition and Classification

Sugar is a natural sweetener that is a necessity for people's daily life and an indispensable ingredient for sugar-containing food, such as beverages, candies, and pastries, as well as pharmaceuticals. As a sweet food, sugar is one of the three nutrients (i.e., sugar, protein, and fat) essential for the human body. Once consumed, sugar can provide high calories to the human body (one kg of sugar can produce 3900 calories).

Sugar can be classified in various ways. By source, sugar can be divided into cane sugar and beet sugar. Cane is a crop suitable to grow in the tropics and subtropics as it requires high temperatures and abundant rainfall during the whole growth cycle. Generally, cane requires an annual active accumulated temperature (>10°C) of between 5500℃ and 6500℃, an annual sunshine of over 1400 hours, and an annual rainfall of more than 1200mm. Grown in the tropical and subtropical regions, cane is mainly distributed in most developing countries and a few developed regions in South America, the Caribbean, Oceania, and Africa. Beets grow in temperate regions. Most of the world's beets are distributed in developed countries in Europe and North America, such as the European Union, the northern part of the United States, and Canada, and a few in Asian countries, such as Japan, Russia, and the northern part of China. Some countries, including but not limited to China, the United States, Japan, Egypt, Spain, Argentina, and Pakistan, produce both cane sugar and beet sugar. As one of the earliest cane sugar producers in the world, China has been producing sugar from cane for more than 2000 years and from beets for only decades. Globally, sugar produced from cane is much more in quantity than that from beets, with a ratio of nearly 8:2 between them. Despite their difference in source, cane sugar and beet sugar are almost the same in quality and subject to the same national standard.

Depending on the processing step, processing technology, level of deep processing, and specific use, sugar can be divided into raw sugar, white sugar, soft sugar, rock sugar, cube sugar, and brown sugar. White sugar and soft sugar are commonly known as sugar. White sugar is the most consumed sugar by food and beverage producers and civil consumers. White sugar of Grade I and above accounts for more than 90% of China's total sugar output.

By production technology, white sugar can be divided into sulfurized sugar and carbonized sugar. Carbonized sugar has a longer shelf life and better quality but a higher production cost and market price. Currently, a vast majority of Chinese sugar refineries produce sulfurized sugar. However, the share of carbonized sugar has been rising in recent years, which now reaches about one-third of China's total sugar supply.

Figure 1-1 White sugar

(II) Growth Cycle and Growing Regions

The sugar production period (sugar crop harvesting period) of the world's major sugar-producers differs due to their varying latitudes and climates. Table 1 shows the start and end time of the sugar-crushing seasons in some countries (regions). As a customary practice, a sugar year around the world lasts from October to September.

Table 1-1 Start and End Time of Sugar-Crushing Season in the World's Major Sugar Producers

Sugar producer	Start and end time of sugar-crushing season	Sugar year
Brazil	May to December for the south-central region and September to April for the northeast region	May to April
India	November to September	October to September
Thailand	November to January	December to November
EU	July to January	August to July
United States	October to April	October to September
Mexico	November to July	November to October
Russia	August to January	September to August

China's sugar year runs from October to September, but the start time of the sugar-crushing season varies from north to south. Generally, China's sugar production period continues from November to April. The beet sugar-crushing season starts from the end of September or early October and ends in February. The cane sugar-crushing season lasts from mid-November or early December to between April and June in Guangxi, Guangdong, and Hainan and from the

end of December or early January to between April and June in Yunnan.

(III) Sugar Crushing Process

There are two approaches to make (or refine) sugar from cane: one is to directly produce white sugar using the sulfurous acid method or carbonic acid method (i.e., the one-step approach); the other one is to produce raw sugar using the lime method, which then will be re-dissolved, purified and recrystallized into refined sugar in refineries (i.e., the two-step approach). Europe, the United States, and other developed countries generally use the two-step approach to produce sugar, while all Chinese sugar refineries adopt the one-step approach.

Generally, the diffusion method or carbonic acid method is used to directly produce white sugar (instead of raw sugar) from beets.

(IV) Major Uses

The downstream consumption of sugar includes sugar consumption for industrial use and for civil use. Of the total sugar consumed, roughly 58% is for industrial use and 42% for civil use. Sugar consumed for industrial use mainly refers to sugar consumed for the processing of foods, especially the production of candies, carbonated drinks, juice, frozen foods, canned food, pastries, biscuits, dairy products, preserved fruits, and sweetmeat. Among them，candies use the highest share of sugar per unit weight, and carbonated drinks also use a substantial portion of sugar due to their large output.

(V) Quality Standard

The production of white sugar is subject to the *National Standard of the People's Republic of China for White Sugar* (GB317-2018) (the "*National Standard for White Sugar*"). The *National Standard for White Sugar* contains detailed provisions on the definition, sensory indicators, physiochemical indicators, testing methods, and other aspects of white sugar. The deliverable of white sugar futures is white sugar of Grade I as set out in the *National Standard for White Sugar*. White sugar of Grade I and above makes up more than 90% of China's total sugar output.

Table 1-2 Physiochemical Indicator Requirements for White Sugar

Item	Quality Indicator			
	Refined	**Premium**	**Grade I**	**Grade II**
Sucrose content/(g/100g) ≥	99.8	99.7	99.6	99.5
Reducing sugar content/(g/100g) ≤	0.03	0.04	0.10	0.15
Conductive ash content/(g/100g) ≤	0.02	0.04	0.10	0.13
Loss on drying/(g/100g) ≤	0.05	0.06	0.07	0.10

Color value/IU ≤	25	60	150	240
Turbidity/MAU ≤	30	80	160	220
Insoluble impurity content/(mg/kg) ≤	10	20	40	60

(VI) Storage and Transportation

Storage: Depending upon multiple factors such as climate, processing quality, and storage conditions, the storage period for white sugar ranges from 2-3 years to only about half a year.

Currently, the ex-factory quality of white sugar in China mostly meets the quality criteria for white sugar of Grade I specified in the *National Standard for White Sugar* (GB317-2018). However, the shelf life of white sugar of Grade I produced by different refineries varies significantly under the same storage conditions due to their difference in processing technology. If stored improperly or for a lengthy period, white sugar may become damp, dissolved, fluid, or lumpy; yellow in color; or polluted, with physiochemical and hygienic indicators exceeding the specified limits.

Transportation: Domestic sugar is generally transported by truck, ship, and rail, with a ratio of roughly 5:4:1 among them. Such ratio varies from one production region to another. For example, in Yunnan, most or more than 80% of white sugar is transported to other regions; in coastal regions, the vast majority or over 90% of processed sugar is transported by sea; in Xinjiang, Inner Mongolia, and other beet sugar production regions, beet sugar is primarily transported by rail and truck.

II. Supply and Demand of Sugar

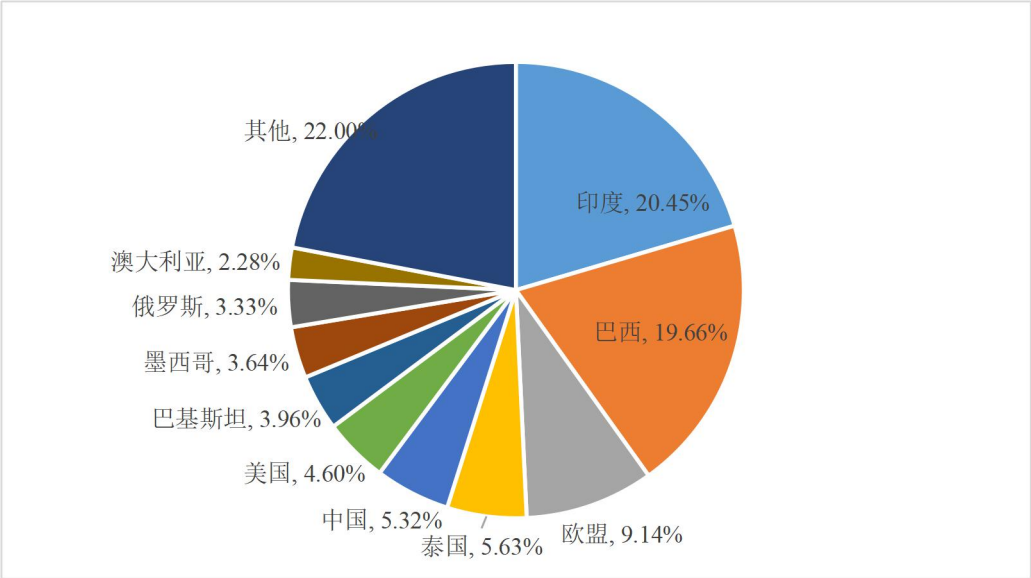
(I) International Market

1. Global sugar production

From 2021 to 2022, global sugar output totaled 180 million metric tons (on a raw value basis), comprising 143 million metric tons of cane sugar (on a raw value basis) or about 79% of the global total and 37 million metric tons of beet sugar (on a raw value basis) or about 21 % of the global total. In the past 10 years, there has been no big change in the shares of cane sugar and beet sugar, with the former moving between 76% and 81% and the latter between 19% and 24%.

From 2021 to 2022, the top ten sugar producers were India, Brazil, the EU, Thailand, China, the United States, Pakistan, Mexico, Russia, and Australia, which, on a combined basis, contributed to 78% of the global sugar output, including 20.45% from India, 19.66% from Brazil, 9.14% from the EU, and 5.32% from China. This indicates that the world's sugar production is relatively concentrated.

Figure 1-2 Output Shares of Major Sugar Producers 2021-2022



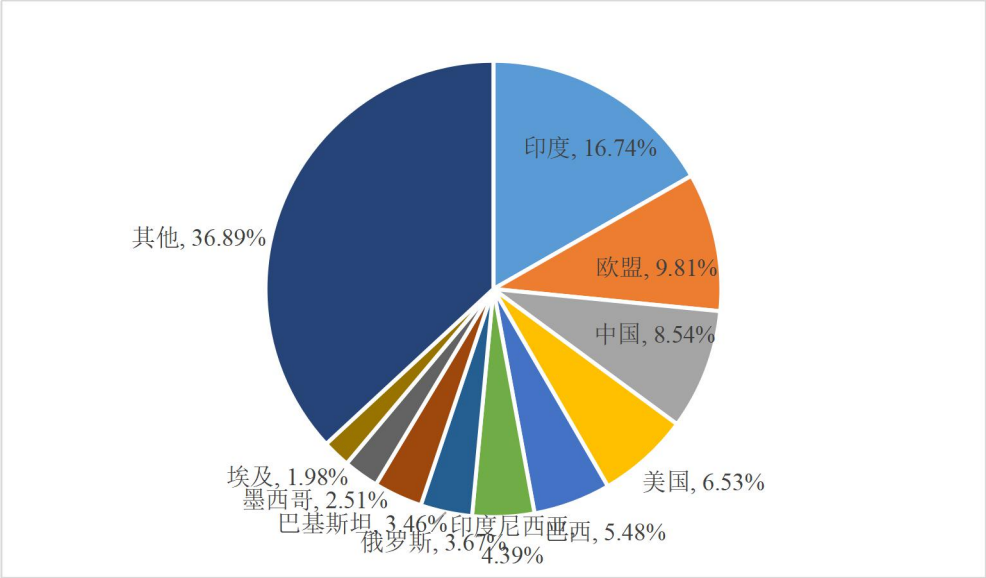
Source: U.S. Department of Agriculture（USDA）

By growing region, cane mainly grows in tropical and subtropical regions and beets grow in temperate regions. The major cane sugar producers include but are not limited to India, Brazil, Thailand, and China. The major beet sugar producers include the EU, Russia, the United States, Turkey, and other countries and regions. China, the United States, Egypt, Iran, and other countries produce both cane sugar and beet sugar.

2. Global sugar consumption

From 2021 to 2022, global sugar consumption reached 173 million metric tons (on a raw value basis), up 0.64% year-on-year (YoY). The world's sugar consumption has generally been on the rise. The top ten sugar consumers were India, the EU, China, the United States, Brazil, Indonesia, Russia, Pakistan, Mexico, and Egypt, which, on a combined basis, accounted for 63.11% of the world's total sugar consumption.

Figure 1-3 Consumption Shares of Major Sugar Consumers 2021-2022



Source: U.S. Department of Agriculture（USDA）

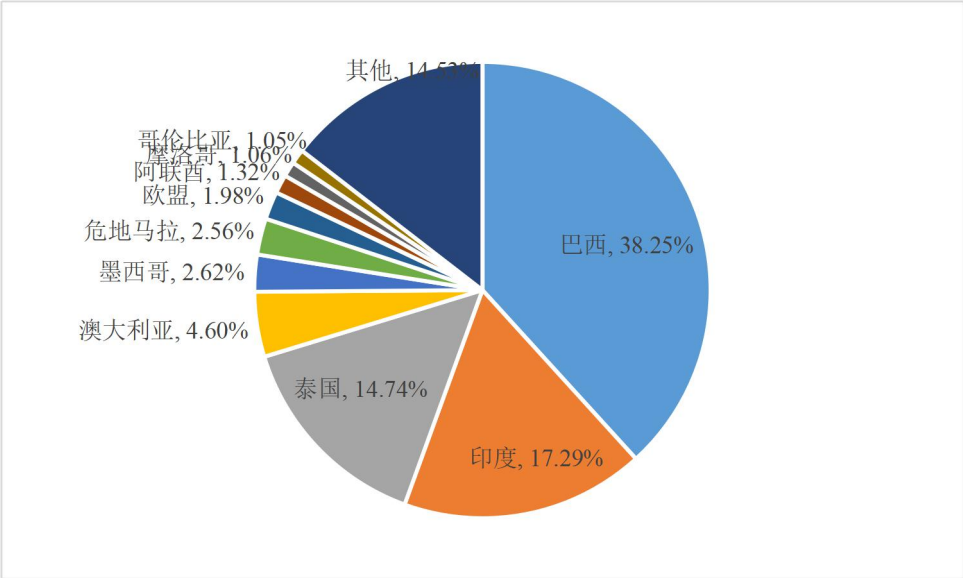
There was a significant difference in the per capita consumption of major sugar consumers. Among the top ten sugar consumers, Brazil had the highest per capita consumption of about 56 kg/year, and China had the lowest per capita consumption of only 12 kg/year, which is less than half of the global per capita consumption.

3. Global sugar trades

From 2021 to 2022, global sugar imports amounted to 55.843 million metric tons (on a raw value basis), accounting for 30.96% of the world's total sugar output. The top ten importers were Indonesia, China, the United States, Bangladesh, Algeria, the EU, South Korea, Malaysia, Nigeria, and Ethiopia, which together contributed to 51.59% of the world's total imports.

The top ten exporters were Brazil, India, Thailand, Australia, Mexico, Guatemala, the EU, the UAE, Morocco, and Colombia, which, on an aggregated basis, represented 85.47% of the world's total exports. The exporters are more geographically concentrated than the importers.

Figure 1-4 Export Shares of Major Sugar Exporters 2021-2022



Source: U.S. Department of Agriculture（USDA）

(II) Domestic Market

China is an important sugar producer and consumer. As an important part of China's agricultural economy, sugar crops rank fourth by output and value, only behind grain, oil crops, and cotton. As one of the earliest cane sugar producers in the world, China has been producing sugar from cane for more than 2000 years and from beets for only decades.

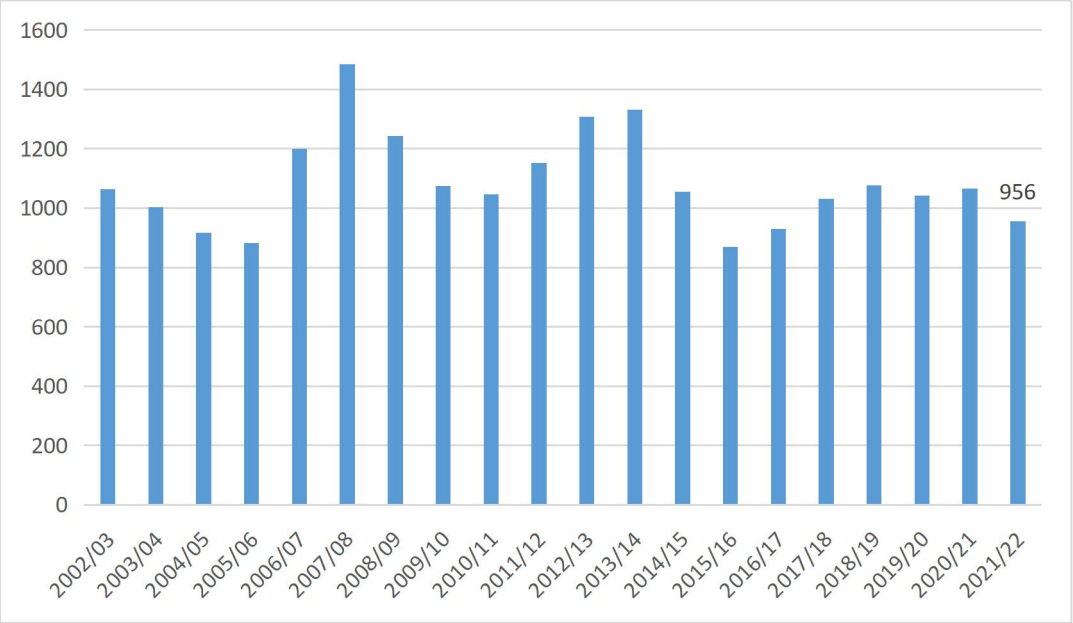
From 2021 to 2022, China was the fifth largest sugar producer, the third largest sugar consumer, and the second largest sugar importer in the world (considering the EU as a whole).

1. China's sugar production

Between 2021 and 2022, China produced a total of 9.56 million metric tons of sugar, down 1.11 million metric tons YoY. Of this figure, 8.7 million metric tons (or 91%) were produced from cane and 860,000 metric tons (or 9%) were produced from beets.

China's sugar production regions are highly concentrated in Guangxi, Yunnan, Guangdong, Hainan, Xinjiang, Inner Mongolia, and other provinces and autonomous regions. In particular, Guangxi, Yunnan, Guangdong, and Hainan produce cane sugar, while Xinjiang and Inner Mongolia produce beet sugar. As the leading production region, Guangxi produced 6.12 million metric tons of sugar between 2021 and 2022, making up 64% of the national total output.

Figure 1-5 China's Sugar Output 2002-2003 to 2021-2022 (10,000 metric tons)



Source: China Sugar Association

2. China's sugar consumption

According to the dietary habits of the Chinese, sugar is considered a condiment only. Therefore, it is difficult for China's sugar consumption to reach the consumption level of western countries. Although China is the world's third largest sugar consumer, its per capita consumption is at a low level of only 12.08 kg/ year, which is less than half of the global per capita consumption. From 2021 to 2022, of China's total sugar consumption, about 58% was for industrial use and 42% for civil use. Sugar consumption for industrial use includes the consumption of sugar as an important ingredient for food, beverage, and pharmaceuticals. China's sugar consumption shows the following characteristics:

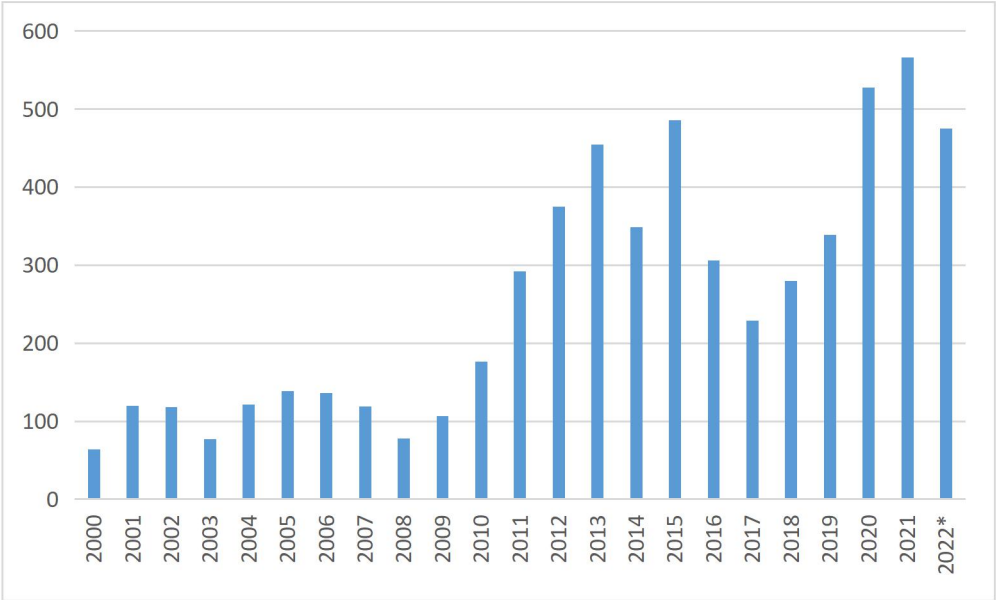
First, sugar consumption is seasonal. For example, the Spring Festival, Mid-Autumn Festival, and summer are the peak seasons for sugar consumption; Second, sugar consumption is correlated with the economic development and resident income of a region, but more closely with the eating habits of its residents. For example, China's sugar is mainly sold to or consumed by the economically developed Pearl River Delta, Yangtze River Delta, and Beijing-Tianjin region; Third, a major part of China's sugar is consumed for industrial use; Fourth, sugar consumption is greatly affected by the supply of sugar substitutes. For instance, the production and sales of starch sugar have a direct impact on the level and development of sugar consumption; Fifth, sugar consumption is a rigid demand, resulting in a low price elasticity for sugar.

3. China's sugar imports and exports

China's sugar trade involves a large volume of imports and a small volume of exports. China implements a tariff quota system for sugar imports. The current quota is 1.945 million metric tons; the tariff is 15% for imports within the quota and 50% for those beyond the quota. To

strengthen the management of sugar imports, in addition to the tariff quota system, China has included sugar imports beyond the quota into the *Catalogue of Bulk Agricultural Products Subject to Import Reporting Requirements* since July 2020 to control sugar imports according to the principle of total equilibrium. In 2021, China imported a record high of 5.66 million metric tons of sugar.

Figure 1-6 China's Sugar Imports 2000-2022 (10,000 metric tons)



Source: GACC

Part 2 White Sugar Futures and Option Contracts and Trading Rules

I. Standard White Sugar Futures and Option Contracts

(1) White Sugar Futures Contract

On January 6, 2006, the white sugar futures("SR") contract was listed on the Zhengzhou Commodity Exchange ("the Exchange").

Table 2-1 White Sugar Futures Contract Specifications

Product	White sugar ("sugar")
Trading Unit	10 metric tons/lot
Price Quotation	Chinese yuan (CNY) per metric ton
Minimum Price Fluctuation	CNY1/metric ton
Daily Price Limit	±4% of the settlement price of the previous trading day and as provided for in the *Measures for the Administration of Futures Trading Risk Control of Zhengzhou Commodity Exchange*
Contract Month	January, March, May, July, September, and November
Trading Hours	Monday to Friday (except public holidays) 9:00 a.m.-11:30 a.m. 1:30 p.m.-3:00 p.m. (Beijing time) Other trading hours specified by Zhengzhou Commodity Exchange
Last Trading Day	The 10th trading day of the delivery month
Last Delivery Day	The 13th trading day of the delivery month
Grade and Quality	See the *Rules of Zhengzhou Commodity Exchange for White Sugar Futures*
Delivery Point	Designated by Zhengzhou Commodity Exchange
Minimum Trading Margin	5% of contract value
Delivery Method	Physical delivery
Product Code	SR
Listing Exchange	Zhengzhou Commodity Exchange

(II) White Sugar Option Contract

On April 19, 2017, the white sugar option contract was listed on the Exchange.

Table 2-2 White Sugar Option Contract Specifications

(Applicable to option contracts with contract month earlier than that of SR2401)

Underlying	SR Contract
Contract Type	Call Option, Put Option
Trading Unit	One SR contract (10 metric tons)
Price Quotation	Chinese yuan (CNY) per metric ton
Minimum Price Fluctuation	CNY0.5/metric ton
Price Limit	The same as the price limit of the SR contract
Contract Months	The two consecutive nearby months of the underlying futures contract; the white sugar option contracts of the following months will be listed on the second trading day after the open interest (on a single-counted basis) in the underlying futures contract exceeds 5,000 lots after clearing.
Trading Hours	Monday to Friday 9:00 a.m. - 11:30 a.m. 1:30 p.m. - 3:00 p.m. Other trading hours specified by Zhengzhou Commodity Exchange
Last Trading Day	The 3rd trading day of the month immediately preceding the delivery month of the underlying futures contract and other dates specified by Zhengzhou Commodity Exchange
Expiration Date	The same as the last trading day
Strike Price	Based on the previous trading day's settlement price of the SR contract, five in-the-money option contracts, one at-the-money option contract, and five out-of-the-money option contracts will be listed according to the strike price interval. The strike price interval is CNY50/metric ton when the strike price is less than or equal to CNY3,000/metric ton; CNY100/metric ton when the strike price is greater than CNY3,000/metric ton and less than or equal to CNY10,000/metric ton; CNY200/metric ton when the strike price is greater than CNY10,000/metric ton.

Exercise Style	American style. Buyers may submit an exercise request during trading hours on any trading day before the expiration date and an exercise or abandonment request before 3:30 p.m. on the expiration date.
Product Code	Call option: SR-contract month-C-strike price Put option: SR-contract month-P-strike price
Listing Exchange	Zhengzhou Commodity Exchange

Table 2-3 White Sugar Option Contract Specifications

(Applicable to option contracts with contract month later than or same with that of SR2401)

Underlying	SR Contract
Contract Type	Call Option, Put Option
Trading Unit	One SR contract (10 metric tons)
Price Quotation	Chinese yuan (CNY) per metric ton
Minimum Price Fluctuation	CNY0.5/metric ton
Price Limit	The same as the price limit of the SR contract
Contract Months	The two consecutive nearby months of the underlying futures contract; the white sugar option contracts of the following months will be listed on the second trading day after the open interest (on a single-counted basis) in the underlying futures contract exceeds 5,000 lots after clearing.
Trading Hours	Monday to Friday 9:00 a.m. - 11:30 a.m. 1:30 p.m. - 3:00 p.m. Other trading hours specified by Zhengzhou Commodity Exchange
Last Trading Day	The third-to-last trading day before the 15th calendar day (inclusive) of the month immediately preceding the delivery month of the underlying futures contract and other dates specified by Zhengzhou Commodity Exchange
Expiration Date	The same as the last trading day
Strike Price	The range of strike price is the previous trading day's settlement price of the underlying futures contract plus or minus 1.5 times the current day's price limit. The strike price interval is CNY50/metric ton when the strike

	price is less than or equal to CNY3,000/metric ton; CNY100/metric ton when the strike price is greater than CNY3,000/metric ton and less than or equal to CNY10,000/metric ton; CNY200/metric ton when the strike price is greater than CNY10,000/metric ton.
Exercise Style	American style. Buyers may submit an exercise request during trading hours on any trading day before the expiration date and an exercise or abandonment request before 3:30 p.m. on the expiration date.
Product Code	Call option: SR-contract month-C-strike price Put option: SR-contract month-P-strike price
Listing Exchange	Zhengzhou Commodity Exchange

II. Basic Trading Rules

(I) Margin Requirements

An SR contract is subject to margin requirements. An SR contract has a minimum Trading Margin of 5% of contract value. Specifically, an SR contract has a minimum Trading Margin rate of 5% of contract value from listing to the 15th calendar day of the month preceding the delivery month ("regular months"); 10% of contract value from the 16th calendar day to the last calendar day of the month preceding the delivery month; and 20% of contract value during the delivery month. To ensure the stable operation of the market, an SR contract has a current minimum Trading Margin rate of 7% of contract value during the regular months.

Table 2-4 Trading Margin Rate of SR Contract

Trading period	Trading Margin rate
From listing to the 15th calendar day of the month preceding the delivery month	5%
From the 16th calendar day to the last calendar day of the month preceding the delivery month	10%
Delivery month	20%

(II) Price Limit

An SR contract has a price limit of ±4% of the settlement price of the previous trading day. To ensure the stable operation of the market, an SR contract has a current price limit of ±5% of the settlement price of the previous trading day.

(III) Position Limit

An SR contract is subject to a position limit. Position limit refers to the maximum size of speculative positions (calculated on a single-counted basis) in a given futures contract that a Member or client is permitted to hold by the Exchange. The position limit of an SR contract is not applicable to futures brokerage Members. During any trading day from listing to the 15th calendar day of the month preceding the delivery month, if the long position or short position held by a non-futures brokerage Member or client in an SR contract is greater than or equal to a certain threshold, the position limit for such Member or client will be 10% of the open interest (on a single-counted basis); if such long position or short position is less than the threshold, the position limit for the Member or client will be a fixed amount. The position limit of an SR contract varies as shown in Table 2-5:

Table 2-5 Position Limit of SR Contract

<table>
<tr><th>Trading period</th><th colspan="2">Maximum long position or short position held by a non-futures brokerage Member or client (lot)</th></tr>
<tr><td rowspan="2">From listing to the 15th calendar day of the month preceding the delivery month</td><td>Open interest＜300,000</td><td>30,000</td></tr>
<tr><td>Open interest≥300,000</td><td>10% of open interest</td></tr>
<tr><td>From the 16th calendar day to the last calendar day of the month preceding the delivery month</td><td colspan="2">6,000</td></tr>
<tr><td>Delivery month</td><td colspan="2">1,000
(0 for individuals)</td></tr>
</table>