

# **Practice and Effect of Agricultural Big Data in China**

China Agricultural Monitoring And  
Early Warning Delegation

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II. Development of Agricultural Big Data

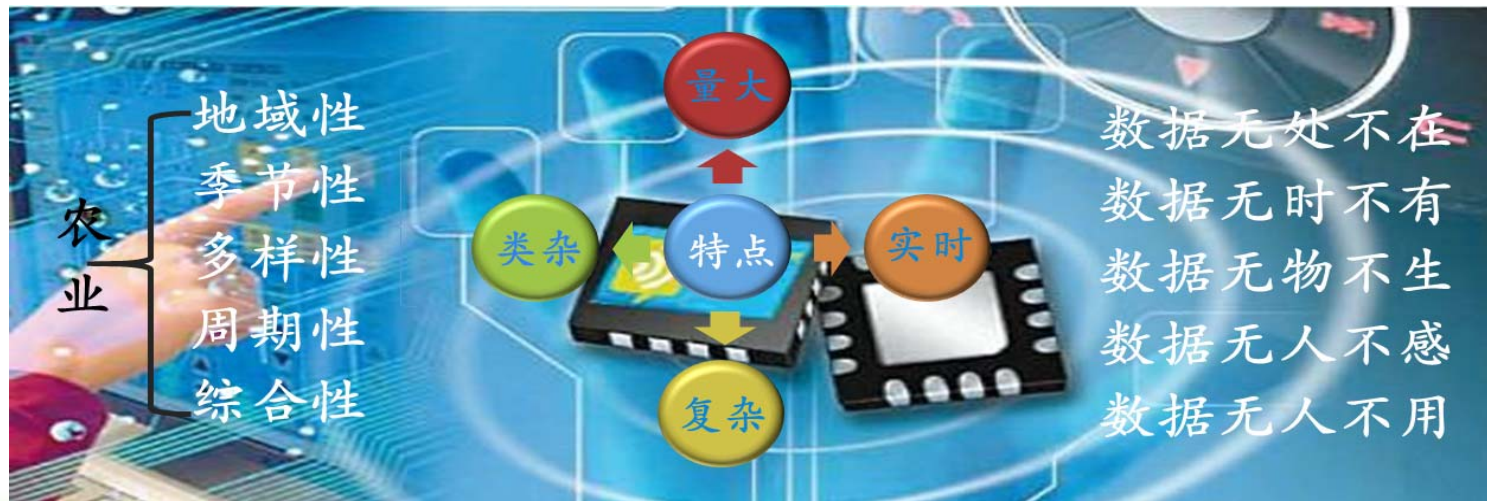
III. The Application of Agricultural Big Data



# **I. China's agricultural big data policy support**

# Agricultural big Data

Agricultural big data refers to the massive data with high added value and multi temporal and spatial characteristics formed in modern agricultural production, operation, management, service and other links and activities. Specifically, it can include biological information data, resource and environment data, agro-meteorological data, production data, agricultural statistical data, etc.



**Chinese government and relevant departments have carried out a series of actions**

**1、 In August 2015, the State Council of China issued 《The action plan for promoting the development of big data 》**

- The plan puts forward: developing agricultural and rural big data and implementing modern agricultural big data project

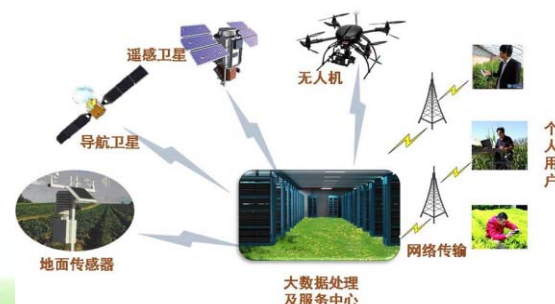


## 2、 In December 2015, the Ministry of Agriculture issued the implementation opinions on promoting the development of agricultural and rural big data

It is proposed to comprehensively promote the construction of agricultural big data from the aspects of agricultural **production, operation, management and service**, and make an important deployment for the construction of agricultural big data in China in the next 5 – 10 years.

### 3、 In December 2016, the State Council issued the 13th five year plan for national informatization

- Implementation of the “Internet + modern agriculture” action plan;
- Promote the application of agricultural and rural big data. Integrate and build national agricultural big data center and national agricultural cloud; establish national agricultural product quality and safety supervision and traceability management information platform.
- Emphasizing the establishment of information monitoring, analysis and early warning system for the whole agricultural industry chain



#### 4、 In May 2019, Central Committee and the State Council issued the strategic outline of **digital rural development**

- **Strengthen the foundation of digital agriculture.** Improve the "one map" of remote sensing monitoring of natural resources and promote the application of Beidou satellite navigation system in agricultural production.
- **Develop the digital economy.** Promote the digital transformation of agriculture, accelerate the application of cloud computing, big data, Internet of things and artificial intelligence in agricultural production, operation and management;
- **promote the integrated development of urban and rural informatization.** develop digital villages and smart cities.



## 5、 In 2016, the Ministry of Agriculture issued the agricultural and rural big data pilot program

- Agricultural and rural big data pilot projects were carried out in 21 provinces, including Beijing, Shanghai and Jiangsu, et, al
- Through about three years, by the end of 2019, data sharing and single variety big data construction.
- Carry out the construction of big data for the whole industrial chain of a single variety.



## **II. Development of Agricultural Big Data**

# 1、 Formed a research team jointly promoted by multiple types of institutions

## (1) Information Center

Information center of the Ministry of agriculture and rural areas, local provinces, cities and counties.

## (2) Scientific Research Institutes

Chinese Academy of Agricultural Sciences, Provincial Academy of Agricultural Sciences

## (3) Colleges and Universities

China Agricultural University, Nanjing Agricultural University, Zhejiang University

## (4) Agricultural Product Information Analyst Team Of MAO

The first group of national agricultural product analysts, provincial agricultural product information analysts and information collectors with more than 2000 people

## 2. Forming a relatively complete industrial chain of agricultural big data industry

01

**Agricultural big data standards and specifications**

05

**Agricultural big data security**

02

**Agricultural big data collection**

06

**Agricultural data storage and management**

03

**Analysis and mining of agricultural big data**

07

**Operation and maintenance of agricultural big data**

04

**Agricultural big data application**

### 3、 Formed a multi-level and systematic method of agricultural big data acquisition

- (1) agricultural data monitoring and statistics
- (2) agricultural remote sensing information acquisition
- (3) agricultural sensors and Internet of things
- (4) mobile collection of agricultural market information



# (1) Agricultural data monitoring statistics

Statistical statement formed by the Ministry of agriculture and rural areas

- Agricultural comprehensive investigation system
- Statistical report system of rural operation and management
- Statistical report system of agricultural resources and environment information
- Statistical report of national soil and fertilizer specialty
- Statistical report of national plant protection specialty
- Statistical report system of Agricultural Mechanization Management
- Seed enterprise report

.....



## (2) Agricultural sensor and Internet of things technology

### Monitoring of crop growth data

The real-time monitoring instruments and equipment will be monitored all the time. With the increase of equipment types and the decrease of price, the monitoring points will grow exponentially, and the data generated will grow rapidly.



### (3) Mobile collection of agricultural product market information

"Agricultural information Collector" (portable agricultural products holographic market information collector) is a new type of agricultural products market information collection equipment. The popularization and application of "agricultural credit mining" can be widely used in the holographic information collection of agricultural products in Field market, wholesale market and retail market.





# ◆ Content of Agricultural products market information collection

Develop standardized agricultural product market information collection technology and system

Innovative data intelligent processing and analysis technology of agricultural products market



The information transmission optimization model and location matching collection technology of agricultural products market are established

Innovative design concept has developed advanced special equipment with convenience, high adaptability and ease of use

# Agricultural Information Collector (AIC) is widely used in China

In Beijing, Tianjin, Hebei, Fujian, Hunan, Guangdong, Hainan and other provinces and cities, hundreds of field, wholesale and retail markets were promoted and applied, and a total of more than 8 million data were collected.

From September 1, 2014, the target prices of soybean and cotton in Xinjiang, Heilongjiang, Jilin and Inner Mongolia were collected by the national development and Reform Commission and the Ministry of agriculture.



- Institute of agricultural information, Chinese Academy of Agricultural Sciences, the innovation team of agricultural monitoring and early warning has built:

## 8 kinds of Agricultural Databases

production data

Consumption data

Price data

Trade data

Inventory data

International Data

Macro economy

Resources and environment

grains

Oil Material

Sugar Material

Veg

Fruit

Meat

Egg

Milk

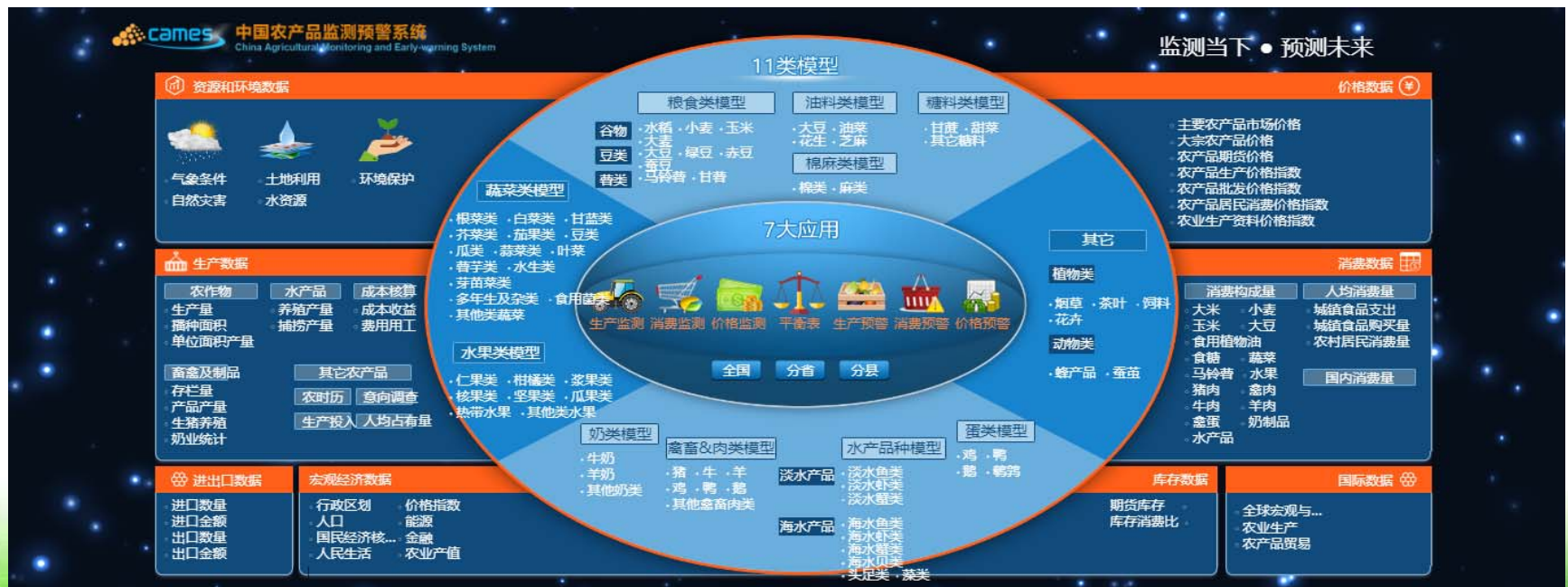
Aquatic Production

Linseed or Cotton

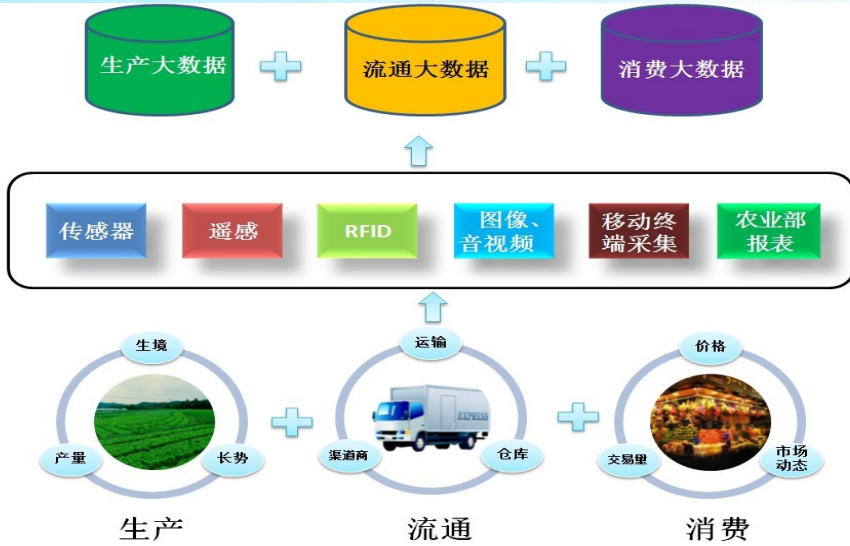
Others

# 4、 Establishing the monitoring and early warning model system of China's agricultural products (CAMES)

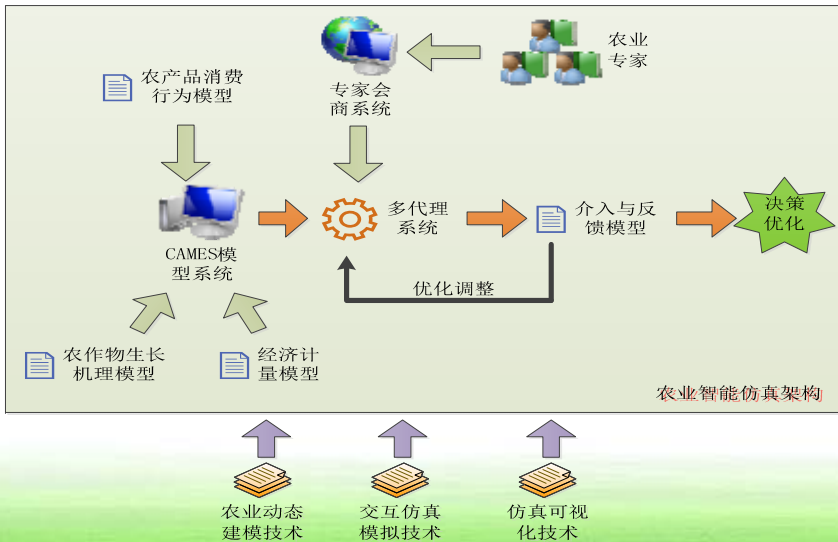
There are many kinds and varieties of agricultural products for monitoring and early warning, **covering 11 categories** of agricultural products; the monitoring and early warning is widely distributed and regional; the monitoring and early warning period: **short-term, medium-term and long-term**; the monitoring and early warning model covers **meteorological, input and management factors**.



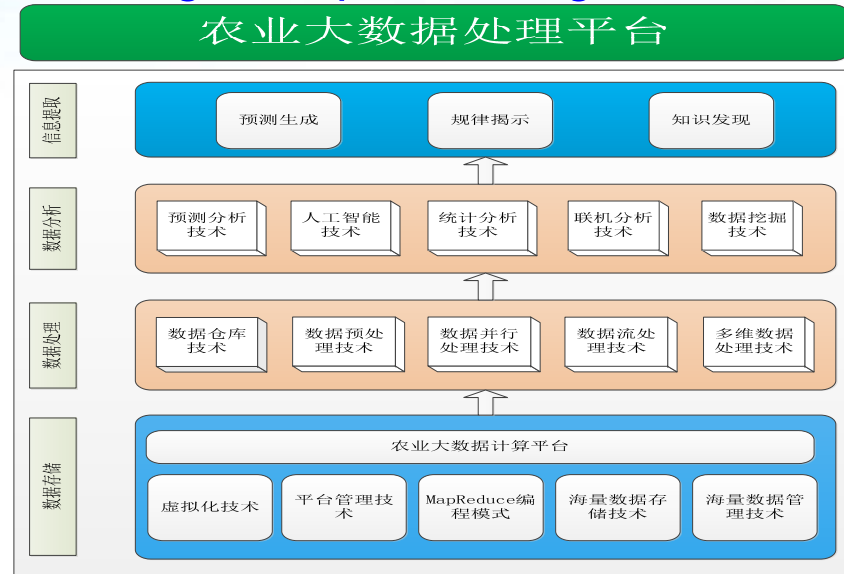
## Real time monitoring



## Intelligent simulation



## Big data processing



## Information Delivery



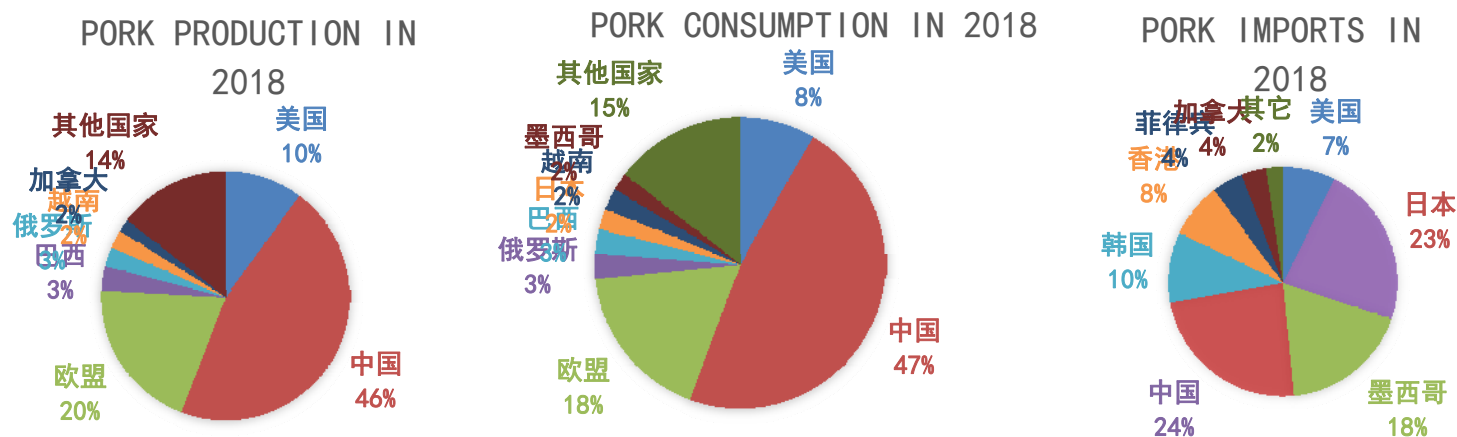


# **III、 Big Data Application**

# 1. Big data application—Current situation

Based on the data description of factors, products and industries, the overall grasp of the industry is more reliable than sampling, and the multi-dimensional is more objective than the plane observation.

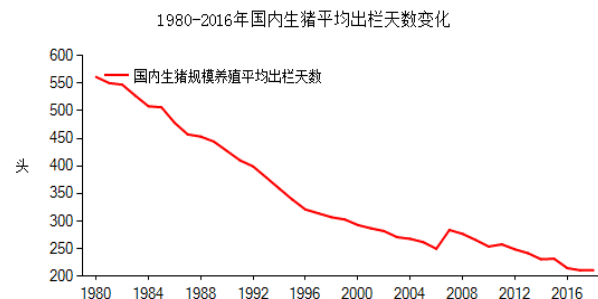
- China is the world's largest producer, consumer and importer of pork.



- In the past 40 years, the productivity of pigs in China has increased dramatically.



The PSY level of pigs (the number of weaned piglets per sow per year) is significantly improved



Shorten the number of live pigs

## 2. Big data application – precise control

Agricultural big data is widely used in precision agricultural production, fine field management, precision poverty alleviation, and industrial management layout.

### Big data applied to field-level production precision control

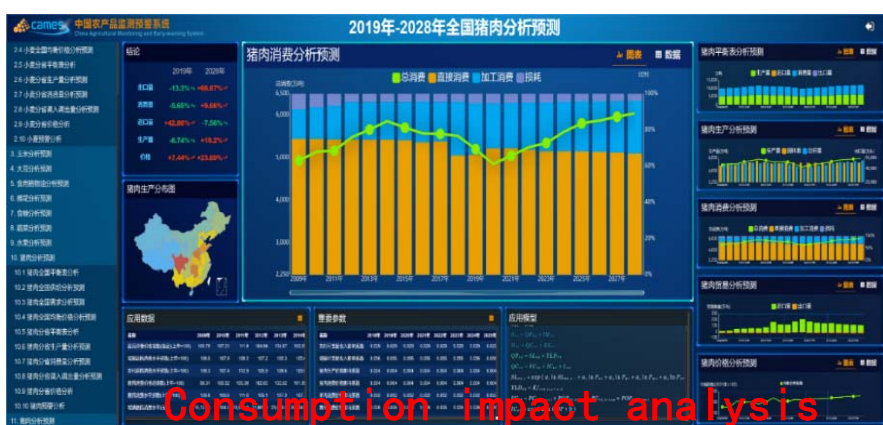
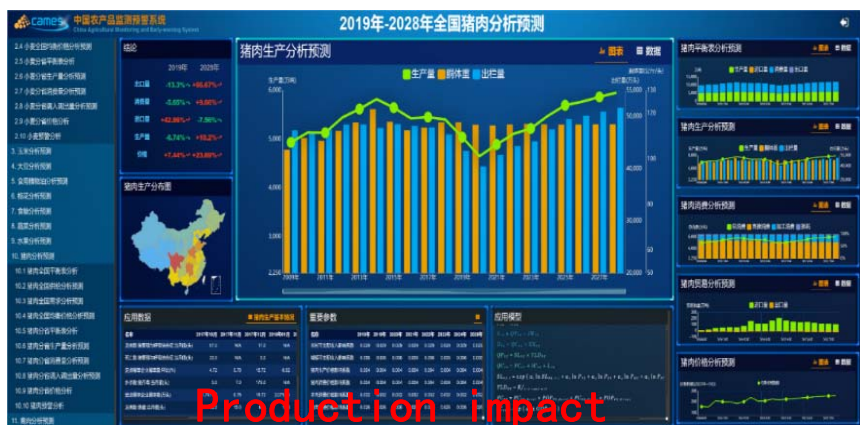
- Crop growth environment monitoring data: Light and humidity, soil, nutrients, pests, etc.;
- Crop growth monitoring data: Video image monitoring, accurate recognition of machine vision;
- "Data + Analysis Model + Intelligent Control": Automatic irrigation, fertilization, light filling, plant protection, and picking to maximize planting benefits.





# 3. Big data applications – forecast

- Based on big data, professional short-term forecasting with professional models and intelligent analysis methods
- Based on big data, supported by the system, the medium and long-term forecasting of products or industries



# Short-term: It poses a huge challenge to the supply of stable prices, and should actively adjust the policy.

**produce:** In 2019, pork production is expected to decline by 15% due to the continued decline in capacity of able sows and pigs.

**consumption:** In 2019, pork consumption decreased by 5.6% from the previous year, and is expected to decline by 12.6% in 2020.

**trading:** In 2019, it is expected to import about 1.7 million tons; in 2020, imports will increase to 2.1 million tons.

**price:** Pig prices will enter a rising cycle in the second half of 2019, and the high point is expected to appear in the first half of 2020.

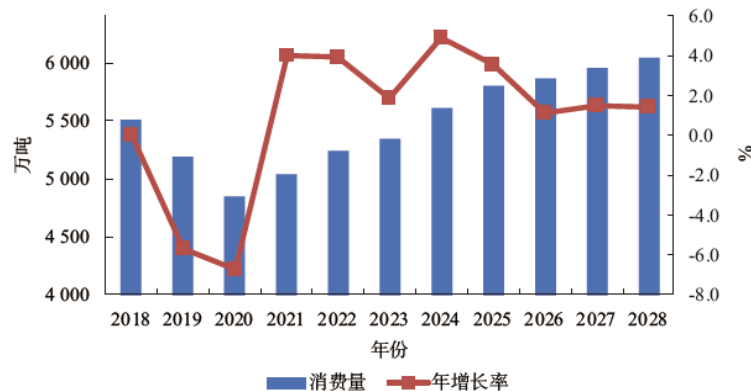


图 8-3 2018—2028 年中国猪肉消费量变化趋势

数据来源：2019—2028 年数据为中国农业科学院农业信息研究所 CAMES 模型系统预测

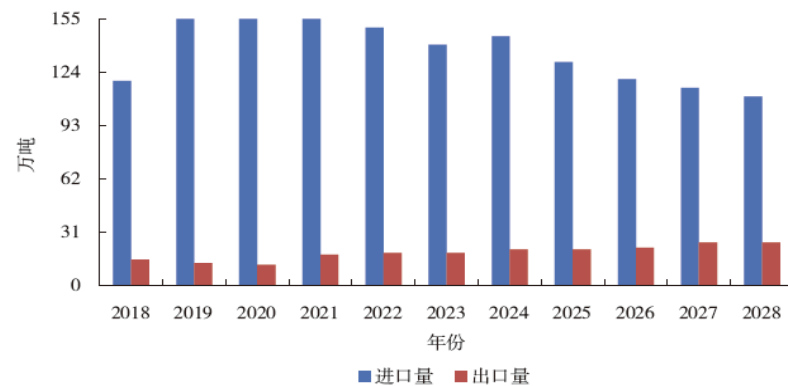


图 8-4 2018—2028 年中国猪肉进口量和出口量

数据来源：2019—2028 年数据为中国农业科学院农业信息研究所 CAMES 模型系统预测

注：2018 年猪肉产量来自中国国家统计局；出口量包括猪肉和活猪，活猪按照 70% 的出肉率折算

# Long-term: major changes will occur in the agricultural industry

## Quantitative analysis, the next 10 years:

- Pork production will gradually recover, with an average annual growth rate of 0.9% in the next 10 years;
- The average annual growth rate of pork consumption and per capita consumption is 0.9% and 0.5% respectively, and the per capita consumption of pork in 2028 is 41.91 kg;
- In the later period, affected by domestic and international price differences and trade openness, pork imports will decline but still maintain a high level.

## 4、Agricultural information publish

The establishment of a standardized release mechanism has provided key technical support for the creation of China's agricultural outlook work. Through a large amount of data analysis, the situation was judged ahead of time, market signals were released, and favorable changes in the market were guided.

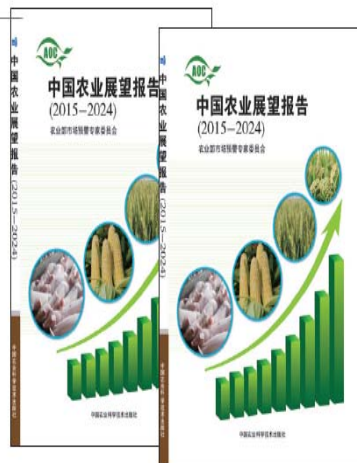
- In addition to the huge agricultural production capacity, the world's agricultural powers often have strong agricultural big data capabilities. China's agricultural data analysis release and data utilization have made important progress.
- Since 2003, the Ministry of Agriculture and Rural Affairs has established the “Agricultural Information Release Calendar” system of the Ministry of Agriculture to release production and market economy information.
- The “China Agriculture Outlook Report” will be released every year for the next 10 years. The monthly report on supply and demand analysis of agricultural products will be released every month, and the daily report of CAMES will be released daily.

# ◆ 2014 China Agriculture Outlook Conference



The 2014 China Agriculture Outlook Conference was hosted by the Agricultural Information Institute of the Chinese Academy of Agricultural Sciences. The conference released the China Agriculture Outlook Report (2014-2023) and held 18 special forums during the same period. Chen Xiaohua, deputy minister of agriculture, and representatives from institutions such as FAO, OECD, and USDA attended the conference. More than 500 people from home and abroad attended the conference.

# ◆ 2015 China Agriculture Outlook Conference



The 2015 China Agriculture Outlook Conference was hosted by the Agricultural Information Institute of the Chinese Academy of Agricultural Sciences. Zhang Hecheng, Director of the Department of Market and Economic Information of the Ministry of Agriculture, released the China Agriculture Outlook Report (2015-2024). More than 500 international experts from the Food and Agriculture Organization (FAO), the Organisation for Economic Co-operation and Development (OECD), the United States, Australia and Pakistan have attended the conference.

# ◆ 2016 China Agriculture Outlook Conference

The 2016 China Agriculture Outlook Conference was hosted by the Market Early Warning Expert Committee of the Ministry of Agriculture and undertaken by the Agricultural Information Institute of the Chinese Academy of Agricultural Sciences. Tang Hao, Director of the Department of Market and Economic Information of the Ministry of Agriculture, released the "China Agriculture Outlook Report (2016-2025)" at the meeting, and the director of the Ministry of Agriculture's Market Early Warning Expert Committee and the Deputy Minister of Agriculture Qu Dongyu gave a speech. Leaders and experts from 16 countries and international organizations including FAO, OECD, IFPRI, USDA, EU, Japan, Brazil, New Zealand, Pakistan, and Cambodia attended the meeting.



# ◆ 2017 China Agriculture Outlook Conference

The 2017 China Agriculture Outlook Conference is sponsored by the Agricultural Information Institute of the Chinese Academy of Agricultural Sciences and supported by the Ministry of Agriculture Market Alert Expert Committee. Xu Shiwei, Secretary General of the Market Early Warning Expert Committee of the Ministry of Agriculture and Executive Chairman of the China Agriculture Outlook Conference, released the China Agriculture Outlook Report (2017–2026). Director of the Market Early Warning Expert Committee of the Ministry of Agriculture, Vice Minister of Agriculture Qu Dongyu, and Deputy Director of the Office of the Central Financial and Economic Leading Group, Han Jun respectively delivered speeches, and more than 800 representatives from home and abroad attended the meeting.





# ◆ 2018 China Agriculture Outlook Conference

The 2018 China Agricultural Outlook Conference was sponsored by the Agricultural Information Research Institute of the Chinese Academy of Agricultural Sciences and supported by the Agricultural and Rural Ministry Market Alert Expert Committee. Han Jun, deputy director of the Ministry of Agriculture and Rural Affairs, attended the conference and delivered a speech. Academician Tang Huajun, president of the Chinese Academy of Agricultural Sciences, gave a welcome speech. The representative of the Food and Agriculture Organization of the United Nations, Vincent Martin, and the Deputy Director-General of the WTO, Alan William Wolff, attended and delivered speeches. More than 900 representatives from home and abroad attended the meeting.



# ◆ 2019 China Agriculture Outlook Conference

The 2019 China Agricultural Outlook Conference was sponsored by the Agricultural Information Research Institute of the Chinese Academy of Agricultural Sciences and supported by the Agricultural and Rural Ministry Market Alert Expert Committee. Tang Hao, Director of the Department of Market and Information Technology of the Ministry of Agriculture and Rural Affairs, released the "China Agriculture Outlook Report (2019-2028)" at the meeting. Han Jun, deputy director of the Central Rural Work Leading Group Office, attended the conference and delivered a keynote speech. The UN Food and Agriculture Organization representative Vincent Martin and the European Commission representative Tassos Haniotis attended the ceremony and delivered speeches. More than 900 representatives from home and abroad attended the conference.



# The formation of China's agricultural outlook report

It was completed by the Information Institute of the Chinese Academy of Agricultural Sciences, the Information Center of the Ministry of Agriculture and Rural Affairs, and the Rural Economic Research Center. The Agricultural and Rural Ministry Market Early Warning Expert Committee was finalized.



**2019**  
**The**  
**Report**  
**Main**  
**force**



Agricultural and Rural Information Center



Rural Economic Research Center



Agricultural and Rural Promotion Center



Institute of Agricultural Information  
Chinese Academy of Agricultural Sciences

# Conclusion

- ✓ The effective development path of agricultural big data is obviously to use big data application as a breakthrough.
- ✓ The application of agricultural big data is the process of deep integration of agriculture and big data.
- ✓ Breakthroughs and advances in big data application, in essence, it is the process of reshaping the ecology of the industry.

Thank you!

