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# Development of Chinese Potatoes as a Staple Food and for Nutritional Health

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# Point Summary

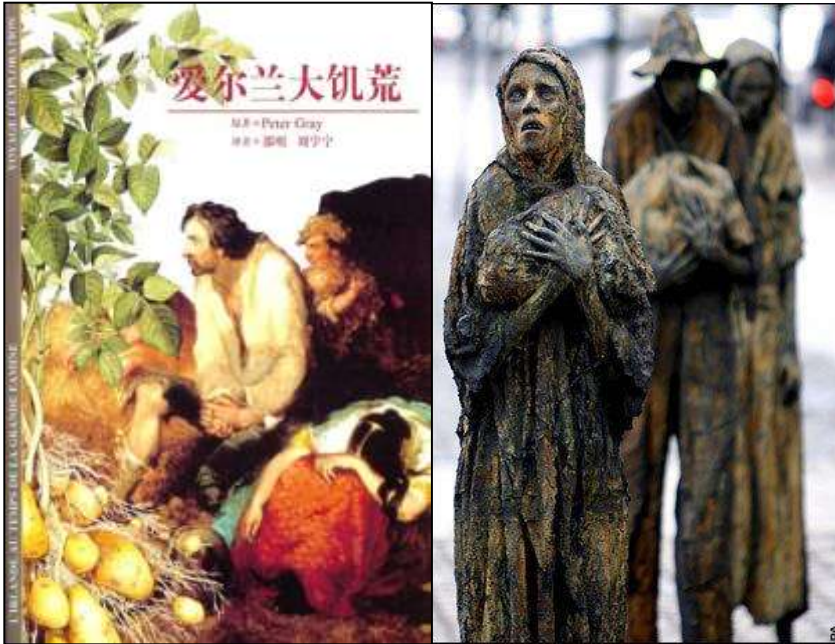
1. **The Important Role Potatoes Play in Global Food Security**
2. **Big Data on Eating Habits and Nutritional Health of Chinese People**
3. **Staple Products that use Chinese Potatoes and Background of Industrial Development**
4. **Breakthrough of Processing Technology and Equipment for Staple Products using Chinese Potatoes**
5. **Extensive Interest shown by Foreign Countries in the Strategy of Chinese Potatoes as a Staple**
6. **Strategy for the Industrial Development of Chinese Potatoes as a Staple**

# **1. The Important Role Potatoes Play in Global Food Security**

# 1. Potatoes have a long history of being a staple food in Europe and America.

- South America: Andes Mountains
- In the 16th century: Spanish Conquistadores ➡ Europe
- Migrating Catholic Priests ➡ Europe
- United Kingdom (Great Britain and Ireland): Potatoes proved to be better than grains as a food source for humans.
- In the 18th century rulers of European countries forced to include potato cultivation (not only as a pig feed) -- King Frederik (Prussia - Germany).
- France: Antoine-Augustin Parmentier (the original ambassador for potatoes) studied the nutritional value of potato (underground bread).
- Spread throughout Europe.
- In the 19th century: Potatoes became a staple for increasingly populated Europe, and spread across the Atlantic to (North) America.
- Industrial Revolution: Potatoes were more effective and cheaper than grains for workers eating daily meals starting at 3.000KCal.

## 2. Famines Caused by Harvest Loss of Potatoes



From 1845 to 1850, because of the great famine caused by harvest loss due to the late blight of potato in Ireland, 1 million people died, and 1.5 million people moved overseas. The population of Ireland decreased sharply by about one quarter.



In 1842, a famine broke in Russia, and the government ordered farmers to grow potatoes for food. Potatoes then became a staple food in Russia.

## 2.The development of Chinese potatoes as a staple will lead to a third dietary revolution in China.

- 5000 years ago, the staple food in the Yangtze River Valley of China was rice, while the staple food in the Yellow River Valley was millet.
- About 5000 years ago, China introduced millet from the Mediterranean, and noodles and steamed buns etc. became the staple food of north China, leading to **the first dietary revolution**.
- About 5000 years ago, China introduced high-yield corn from South America. This new staple food led to **the second dietary revolution**.
- 400 years ago, China introduced potatoes from Europe and America. However, potatoes were always regarded as a vegetable rather than as a Chinese staple food source.



Making Chinese potatoes a staple - **the dietary revolution** is here!



# Three Reasons for Potatoes not Becoming a Chinese Staple

In northern China, wheat-based food cooked from white wheat flour is still the staple food.



In southern China, rice based foods cooked from polished rice is still the staple food.



To date there has been no breakthrough on technology and equipment for processing potatoes into staple food products.



## **2. Big Data on the Eating Habits and Nutritional Health of Chinese People**



# Chinese Traditional Food with World-Renowned Reputation

- ◆ A wide variety, with significant regional and ethnic characteristics.



Rice in  
the South  
Flour in  
the North



Eight  
Cuisines



- ◆ World-renowned dietary culture is an important part of Chinese traditional culture.

While China's modern civilization is advancing, everything except our cooking methods falls behind other countries. Its progress is still out of the reach of other civilized countries.

--Sun Yat-sen, *General Plan for Constructing China*



Beijing Roast Duck in Foreign Countries

# Modern dietary structure contains unbalanced nutrients, with "three-highs" and "three-lows".

- Unbalanced proportion of vegetables and meat;
- Unbalanced proportion of nutrients;
- "Three-highs": high-salt, high-sugar, high-oil;
- “Three-lows” : low-vitamin, low-minerals, low-DF (dietary fiber)

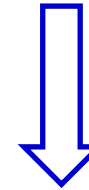
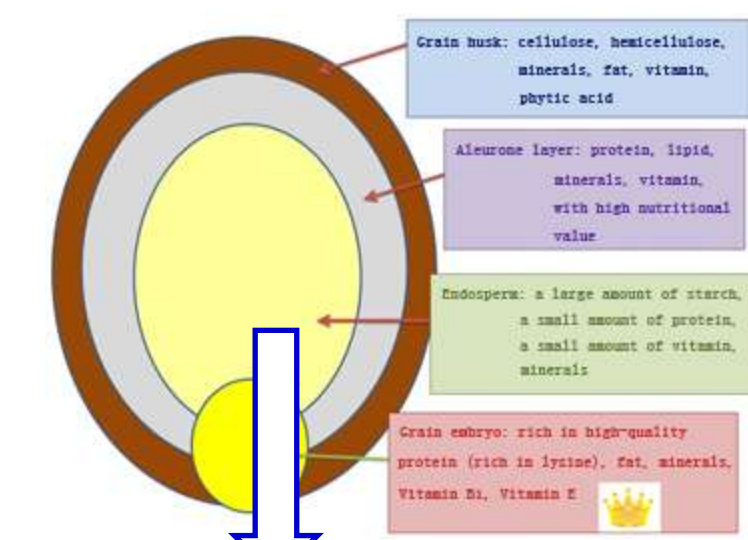


# Too many fried staple foods cooked from polished rice and white flour

- Wheat-based staple foods cooked from white flour
- Rice staple foods cooked from polished rice
- Deep-fried dough sticks, deep-fried dough cake, fried dough twist, crisp noodles ...







VitaminB1 Deficiency -- Beriberi

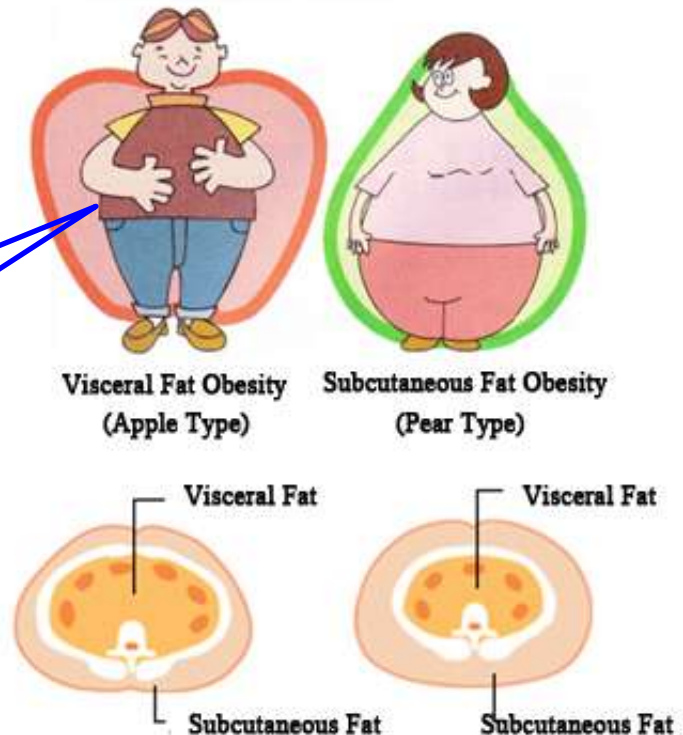
**Why do pigs never have a problem with beriberi?**

# Characteristics of Obesity and People who are Overweight in China

Because of an unbalanced dietary structure, changes in lifestyle, and a decrease in physical activities, the number of people who are overweight or obese is increasing.

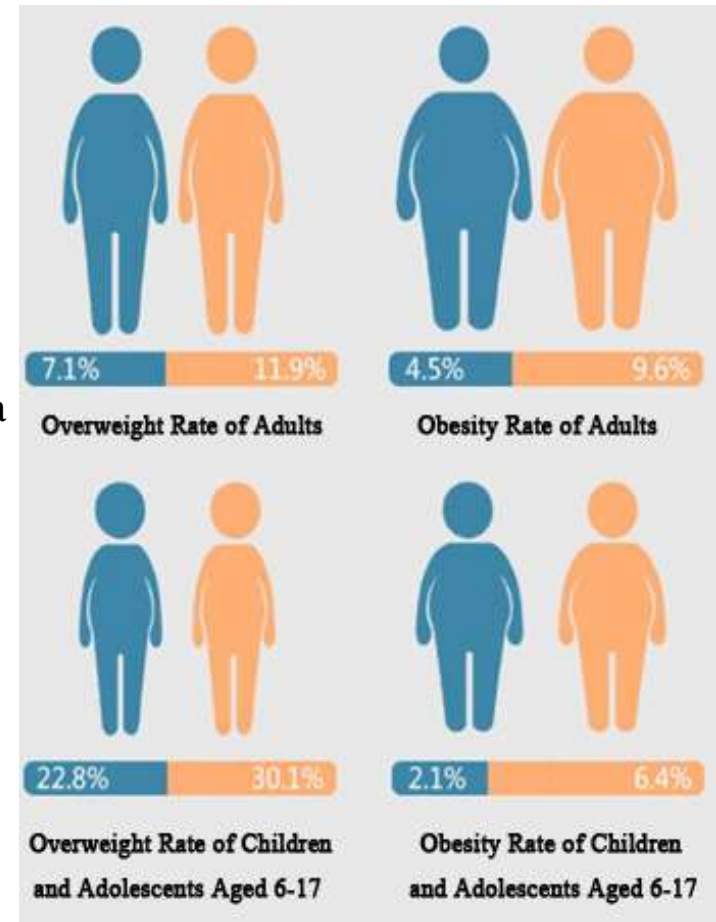
Different body types of visceral fat obesity (obesity of internal organs and abdomen) and subcutaneous fat obesity

Visceral fat obesity can lead to metabolic syndrome



# Nutrition and Chronic Diseases in Chinese People

- Decrease of the intake of grains and potatoes
- Excessive intake of animal-based foods
- Low consumption of beans
- Excessive intake of fat
- The intake of vegetables and fruits has decreased, while a deficiency of some nutrients such as calcium, iron, vitamin A and vitamin D etc still exists



*\*Report on Nutrition and Chronic Diseases in People in China(2015)*

# Big Data on Chinese People's Health

- 160-170 million people living with hypertension.
- There are over 100 million people with hyperlipemia.
- The population of people with diabetes is 92.4 million.
- There are between 70 million-200 million people who are overweight or obese.
- 160 million people have abnormal blood lipid.
- There are about 120 million patients with fatty liver.
- On average one person contracts **diabetes** every 30 seconds.
- On average one person contracts **cancer** every 30 seconds.
- On average one person dies from **cardiovascular and cerebrovascular diseases** every 30 seconds.





## Pangoda of Balanced Diet of People in China (2016)



Cooked  
Food  
Form

Staple  
Food  
Form

## **National Major Strategy - Making Potatoes a Staple**

**Why should potatoes be adopted as a staple food source?**

### **3. Chinese Potato Staple Product range and Background to Industrial Development**

# Dual-purpose potato (vegetable and grain) is the raw material for producing a fully nutritional food.



Fig. 2 Nutritional Value of Potato (Source: U.S. Potato Association)

## Nutrition Value of Dual-Purpose Potato (Vegetable and Grain)



It contains more vitamins and minerals than grains.



It contains more carbohydrate and dietary fiber than vegetables.

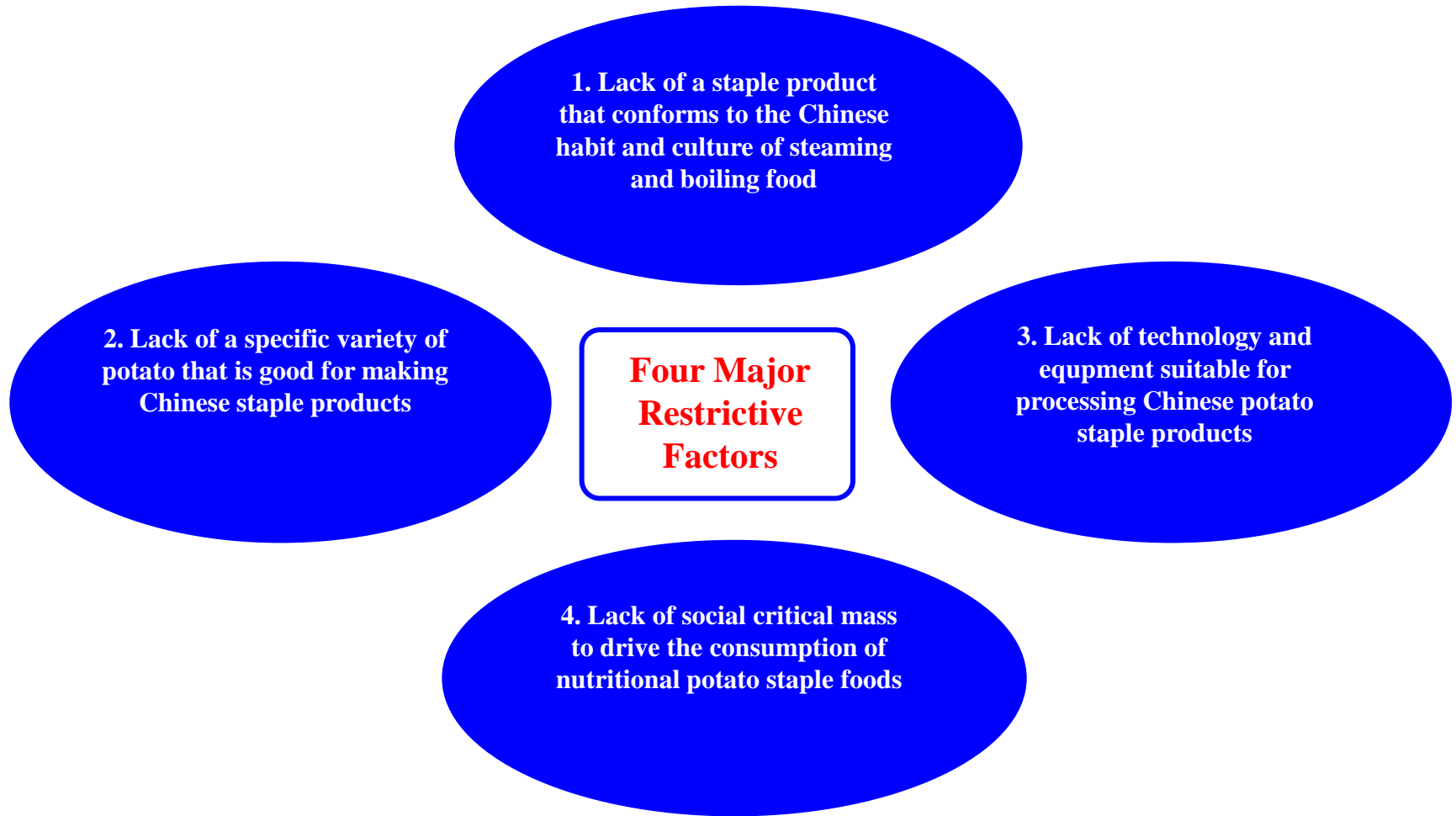
However, potato is traditionally not considered an **adequate crop to sustain a family's livelihood**. People also don't have a clear understanding of the nutritional value of potatoes. As for the development of the potato industry, the **main bottleneck is the limited market for potato products**.

# Potato staple food products and its industrial development is an important choice to upgrade the dietary nutrition structure.

- Presently in China, the staple food structures tend to all focus on polished rice and white flour. This low nutrition and high energy focus has lead to an imbalance in the dietary structure and a significant upturn in the occurrence of chronic diseases.
- Processing potatoes into nutritional staple products (steamed buns, noodles, rice, rice noodles etc.) for regular daily meals is in line with the desire of the Chinese people for an improved nutritional diet and general health.



# Four Major Factors Restricting the Industrial Development of Potatoes in China



# Overall Objective of Development of Chinese Potato Staple Foods

By closely focusing on the national strategy of making potatoes a staple food source, the Institute of Food Science and Technology in the Chinese Academy of Agricultural Sciences is focusing on the overall objective of **“transforming the potato industry from only producing raw materials to producing processed products; from consumption of potatoes as a non-staple food to a staple food; from consumption as a simple food source to consumption for nutrition and health”**. The institute has carried out systematic research on aspects such as technology and equipment for processing potato staple foods, evaluation of nutritional functions, market promotion, and a consumption guide etc., and has achieved systematic research results.

**How can China break through the processing technology bottleneck to transform potatoes into a staple food source?**

## **4. Breakthrough in Processing Technology and Equipment for Chinese Potato Staple Products**

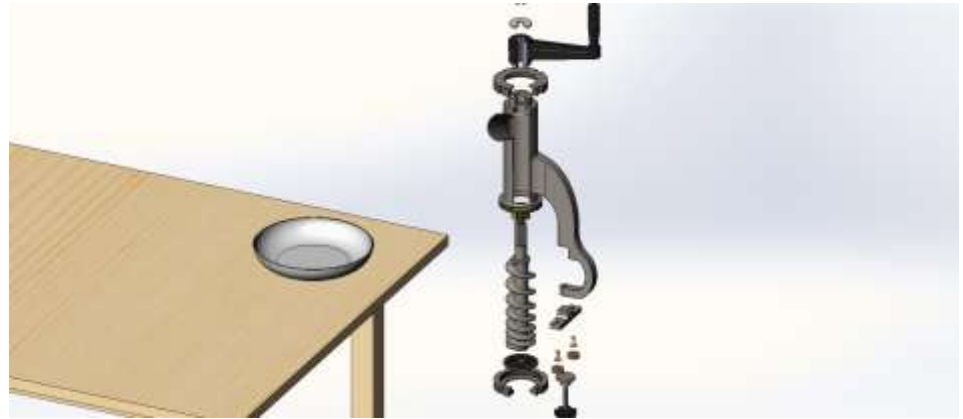


# 1. Research and Development of Processing Equipment for Staple Potato products and Integrated Production Lines

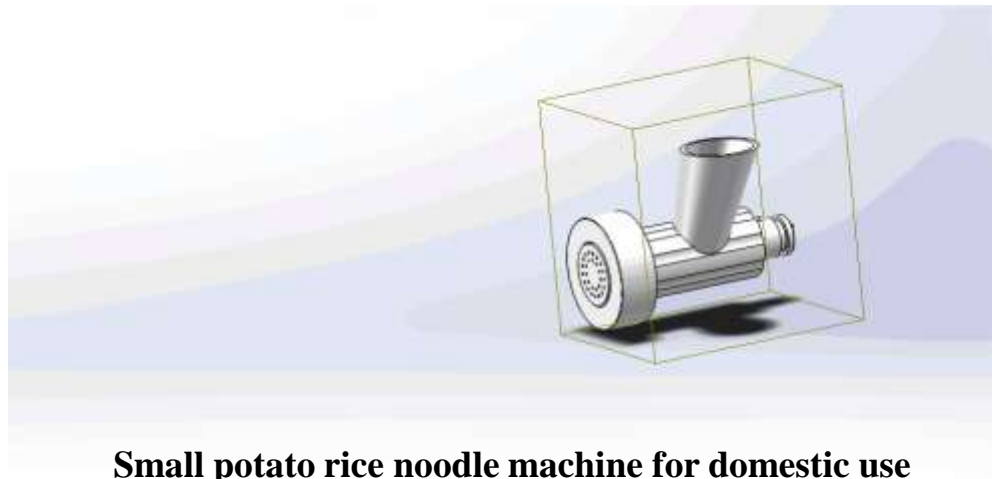
Three levels of equipment research and development:  
for domestic use, for chain catering services and large canteens, and for scale production in factories



**Pre-mixed potato flour for noodles**



**Small noodle machine**



**Small potato rice noodle machine for domestic use**

## Potato noodles for chain catering services and large canteens /Speical Rice Noodle Machine

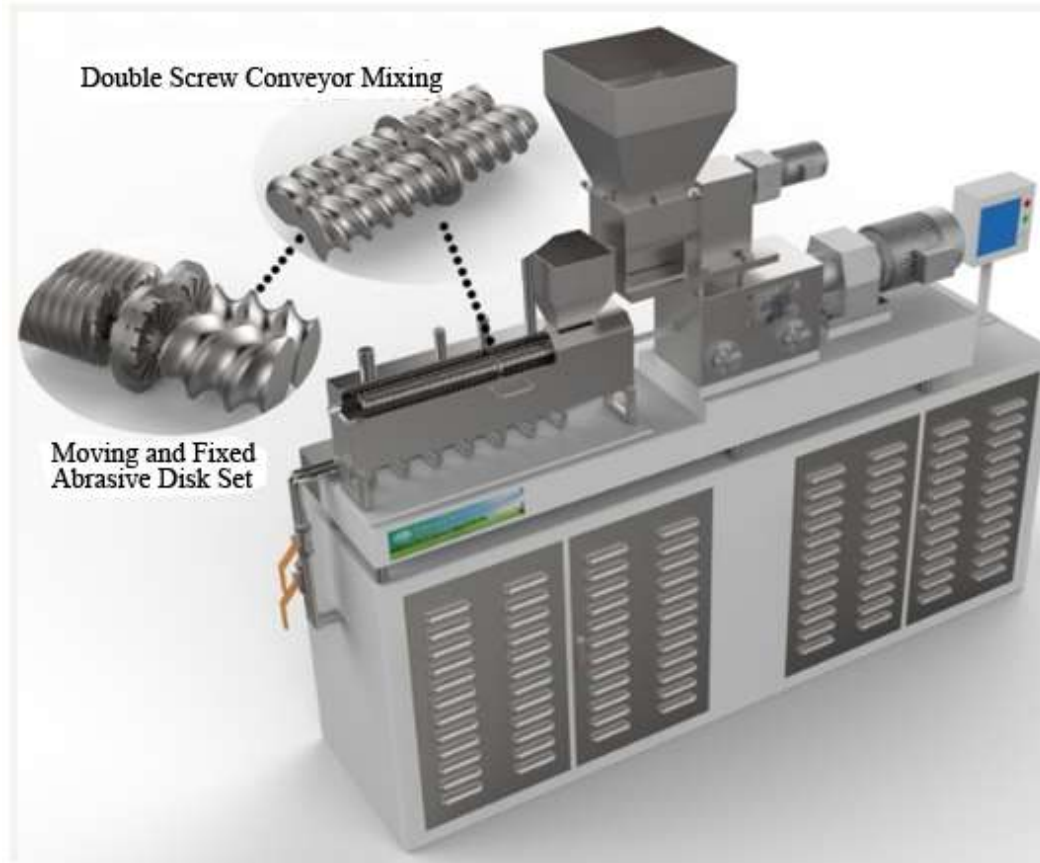


**Integrated Noodle-Making Simulator**



**One-step Rice Noodle Machine**

# Potato Rice Staple Food Press for China Food Catering Services and Large Canteens



Potato Staple Food Press

# Automatic Potato Noodle Production Line with annual yield of 10,000 tons



Single and Double Cycle Ripening Machine



Triple-weaved Rolling



Cut Noodles



Medium-Low Temperature Drier



Cutting and Packing



Potato Noodles(35%)



**Gansu Jupeng Moslem Food Co., Ltd. (Dingxi)**

**Mini potato pancake and donut production line with annual yield of 4,000 ton**



Mini potato pancake automatic production line with an annual yield of 2,000 tons, and a mini potato donut automatic production line with an annual yield of 2,000 tons (The products are exported to the Middle East and Malaysia)

## 2. Over 200 new potato staple products divided into five categories have been created.

### Potato Noodles



### Potato Steam Buns



## Potato Pastry



## Compressed Potato Staple Foods





## Regional Specialty Cuisine now made from Potatoes



2. These products are produced by over 50 enterprises from nine provinces and seven cities across China.

### Beijing City



### Hebei Province



### Hubei Province



### Gansu Province

